
Completely Free GMAT: Data Sufficiency Practice 1

This document contains original GMAT Data Sufficiency practice problems, answers, and explanations.

Problems are organized roughly from easiest to hardest. Many of the problems in this document are very difficult.

Answer choices are not shown. For every problem, the answer choices are as follows:

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
(C) BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
(D) EACH statement ALONE is sufficient.
(E) Statements (1) and (2) TOGETHER are NOT sufficient.

Answer choices are reprinted from https://www.mba.com/exams/gmat/about-the-gmat-exam/gmat-exam-structure/quantitative

Contents:

Problems

0001

If x and y are positive integers, what is the units digit of xy?

(1) The units digit of y is 5.
(2) The units digit of x is 5.

0002

If $f(x) = x^2 + ax + b$, then is $f(y) = 0$?

(1) $y = 0$
(2) $b = 0$

0003

$ab \neq 0$. Is $a/b = 1$?

(1) $b = 1/a$
(2) $a = b$

0004

A square with side length x is drawn entirely inside of a larger square with side length y. What percent of the larger square's area is contained within the smaller square?

(1) $x/y = 1/3$
(2) $x^2/y^2 = 1/9$

0005

x is what percent greater than y?

(1) y is 5/8 of x
(2) x = y + 6

0006

Is $x + x^3$ positive?

(1) x is positive.
(2) x^2 is positive.

0007

What is the value of $5x/6$?

(1) $6x/5 = 3$
(2) $x = (6)(25)/(5)(12)$

0008

Does a cup of coffee cost more than a cup of tea?

(1) Three cups of coffee cost more than two cups of tea.
(2) Two cups of coffee cost more than three cups of tea.

0009

At what average speed did Bree complete a 120 mile round trip from Riverside to Los Angeles and back?

(1) The round trip took a total of 4 hours.
(2) The trip from Riverside to Los Angeles took 2.2 hours.

0010

What is the ratio of skirts to dresses in Carlena's closet?

(1) Carlena has 15% more skirts than dresses.
(2) Carlena has 3 more skirts than dresses.

0011

What percent of x is y?

(1) x = 4y
(2) y = 15

0012

Is $2x > 2y$?

(1) $x > y$
(2) $-x < y$

0013

Is $x + y > a + b$?

(1) $x + y > 2a$
(2) $a > b$

0014

What is the units digit of x?

(1) The tens digit of x is 3
(2) The tens digit of 10x is 6

0015

If $f(x) = ax^2 + bx + c$, does $f(2) = f(-2)$?

(1) $a = -1$
(2) $b = 0$

0016

What is the value of $x^2 + y^2$?

(1) $x + y = 5$
(2) $x - y = -1$

0017

Of the students at a certain middle school, 175 are taking an art class and 43 are taking a music class. How many students are at the school?

(1) The number of students taking both an art class and a music class is equal to the number of students taking neither.
(2) The number of students not taking a music class is 132 greater than the number of students taking a music class.

0018

What is the value of x?

(1) $(x + 1)^2$ is 15 greater than x^2
(2) $(x - 1)^2$ is 13 less than x^2

0019

In a parking lot containing only black, white, and red cars, what is the probability that a randomly selected car is red?

(1) The number of red cars is $\frac{1}{2}$ of the number of cars that are not red.
(2) $\frac{1}{3}$ of the cars are black.

0020

An upscale clothing store sells only dresses and suits. Yesterday, the store made total sales of $17,000. What percent of this amount came from sales of dresses?

(1) The average price of a dress was 1.5 times the average price of a suit.
(2) The number of dresses sold was 75% of the number of suits sold.

0021

What was the average price of the 30 dresses sold by a certain clothing store last month?

(1) The 10 most expensive dresses cost an average of 480$ each.
(2) It would cost the same total amount to purchase the 10 most expensive dresses as it would to purchase the 20 least expensive dresses.

0022

Marcelo owns a total of 200 shares of various stocks with different prices. On two consecutive days, he recorded the price of each share. If every share changed in price from the first day to the second day, how many of the shares increased in price?

(1) The ratio of the number of shares that increased in price to the number of shares that decreased in price was 2:3.
(2) The ratio of the number of shares that decreased in price to the total number of shares was 3:5.

0023

If $xQ \neq 0$, is $\frac{1}{xQ} > Q^x$?

(1) $Q = 1$
(2) $x = 1$

0024

If $a > b > c$, what is the average of a, b, and c?

(1) The average of a and b is 18
(2) The average of b and c is 13

0025

Is $x^y = y^x$?

(1) $x = y$
(2) $x = 2$

0026

Sequence S is defined for all values of $N \geq 1$. If $N > 1$, then $S_N = \frac{S_{N-1}}{2} - 3$. How many terms of sequence S are positive?

(1) $S_1 = 7$

(2) $S_2 = \frac{1}{2}$

0027

What is the range of a set of three distinct numbers?

(1) The highest of the three numbers is 2.5 times the lowest of the three numbers.
(2) The median of the three numbers is 15,000.

0028

Is the number 33 in the sequence A?

(1) The first term of sequence A is 2.
(2) Each term of sequence A is 2 greater than the previous term.

0029

Is $xy > 0$?

(1) $x - y < x$
(2) $y - x < y$

0030

Substance A is a mixture of two chemicals, X and Y. If X costs $1.40 per gallon and Y costs $14.70 per gallon, what is the cost of four gallons of Substance A?

(1) The ratio of X to Y in Substance A is 1:6.
(2) A gallon of Substance A costs $4.55 more than a gallon of Substance B, which contains a 1:1 mixture of X and Y.

0031

The length of a rug is x feet and its width is 3 feet less than its length. What is the area of the rug, in square feet?

(1) $x^2 - 3x - 10 = 0$
(2) $x^2 - 12x + 35 = 0$

0032

If x and y are positive integers, then does $x^2 - y^2 = 48$?

(1) $6 < x < 9$
(2) $y < 5$

0033

The cost of a gallon of green paint is the sum of the costs of the amounts of blue and yellow paint used to create it. What is the cost per gallon of green paint that consists of 75% yellow paint and 25% blue paint?

(1) A type of green paint that consists of 60% yellow paint and 40% blue paint costs $6.35 per gallon.
(2) Yellow paint costs $5.75 per gallon.

0034

What is the value of $\sqrt{x} + \sqrt{y}$?

(1) $\sqrt{(x + y)} = 5$
(2) $x - y = 7$

0035

Is $x > \frac{1}{2}$?

(1) $x^2 > \frac{1}{4}$
(2) $x^2 > x$

0036

What is the cost of 16 bagels and 6 donuts?

(1) 8 bagels and 3 donuts cost 21.30$.
(2) 10 bagels and 4 donuts cost 27$.

0037

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of xy is 0.
(2) The units digit of x^2 is 5.

0038

In a room full of people and dogs, each person has 2 legs and each dog has 4 legs. What is the ratio of people to dogs in the room?

(1) The ratio of people to legs is 9:40.
(2) The number of dogs is 7 less than the number of people.

0039

Is $x + y > 0$?

(1) $xy > 0$
(2) $xy^2 > 0$

0040

Is $x^2 - x > x - 1$?

(1) $x^2 = x$
(2) $x = 0$

0041

Taxi service A charges a$ per trip plus an additional x dollars per mile. Taxi service B charges b$ per trip plus an additional y dollars per mile. For a trip of 6 miles, does A charge more than B?

(1) $a>6y$
(2) $6x > b$

0042

If a and b are integers, is ab even?

(1) 10a is even
(2) 9b is even

0043

How long will it take Nick, working at a constant rate, to paint a 100 square foot wall?

(1) If his rate of painting were 20 square feet per hour faster than it is now, it would take Nick 1 hour to paint the wall.
(2) If Nick painted 25% faster, it would take him 1 hour to paint the wall.

0044

If x is a positive integer, how many distinct positive integers $0 < i \leq x$ are there for which x is divisible by i?

(1) $x = ab$, where a and b are distinct positive integers.
(2) a and b are prime.

0045

Joe, Kip, and Leon each have a different amount of money, with Joe having the smallest amount and Leon having the biggest amount. How much money does Leon have?

(1) The median amount of money is 242$.
(2) The average (mean) amount of money is 266$.

0046

How many cups of milk did Joyce use in a certain recipe?

(1) Out of the total amount of milk she started with, Joyce drank 1 cup and then used $^1/_3$ of the remainder in the recipe.
(2) After Joyce finished the recipe she had 2 cups of milk remaining.

0047

In 2014, 15% of the 1,800 employees of Company X worked remotely. How many of Company X's employees worked remotely in 2020?

(1) The number of employees working remotely increased by 20% from 2014 to 2020.
(2) The total number of employees at Company X increased by 360 from 2014 to 2020, but the percent of employees who worked remotely stayed the same.

0048

In isosceles triangle ABC, what is the degree measure of angle A?

(1) The degree measure of angle B is 20.
(2) The degree measure of angle C is greater than the degree measure of angle A.

0049

Substance X is made from a mixture of chemicals A, B, and C, in a ratio of 1:3:5. How many gallons of chemical C are needed to produce *g* gallons of substance X?

(1) 4 gallons of chemical A are needed to produce *g* gallons of substance X.
(2) The number of gallons of chemical B needed to produce *g* gallons of substance X is 8 more than the number of gallons of chemical A needed to produce *g* gallons of substance X.

0050

If x and y are integers, is $xy/2$ an integer?

(1) $x = y + 3$
(2) $x = 2y$

0051

Did Kerry complete her 1 mile walk in under 30 minutes?

(1) Her minimum speed while walking was 2.2 miles per hour.
(2) Her maximum speed while walking was 3.4 miles per hour.

0052

If $xy \neq 0$, is $x^y > x^2$?

(1) $y > 2$
(2) $x > 0$

0053

What is the value of x^3?

(1) $x^2 = 4$
(2) $x^5 = 32$

0054

Is $x > y^2$?

(1) $x > |y|$
(2) $y < 0$

0055

Is $x^2 + x < 1$?

(1) $x < 1/2$
(2) $x^2 < 1/4$

0056

Is $x + y > a + b$?

(1) $x - a > y - b$
(2) $x - y > a - b$

0057

If $a > b > c$, is b less than 15?

(1) The average of a and b is 12
(2) The average of b and c is 6

0058

What is the units digit of the integer x?

(1) The units digit of 2x is 4.
(2) The units digit of 3x is 1.

0059

A teacher bought crayons and markers for the classroom. What was the ratio of the number of crayons to markers purchased?

(1) The ratio of the price of one crayon to the price of one marker is 1:2.
(2) The ratio of the amount the teacher spent on crayons to the amount the teacher spent on markers is 5:4.

0060

Will Darren read a certain novel in under 4.5 hours?

(1) The novel has fewer than 165 pages.
(2) Darren reads at a rate of 1.8 minutes per page.

0061

Is x equal to 16?

(1) $0 \leq x - 16 \leq 16 - x$
(2) $16x = (x+16)x - 16x$

0062

What percent of students in a certain class passed the final exam?

(1) The number that passed the final exam is 12 greater than the number that failed the final exam.
(2) The number that failed the final exam is 25% of the number that passed the final exam.

0063

If $a > b > c$, is $abc = 0$?

(1) $ac < b$
(2) $ab = bc$

0064

In a certain sequence, each term is 4 greater than the previous term. How many terms are in the sequence?

(1) The last term of the sequence is 54.
(2) The first term of the sequence is 10.

0065

What percent of x is y?

(1) x is 250% of y
(2) $xy = 10$

0066

When randomly choosing a marble from a bag containing black, blue, and white marbles, what is the probability of choosing a black marble?

(1) The probability of not drawing a blue marble is 1/2.
(2) The probability of not drawing a white marble is 5/6.

0067

Mitchell buys a sweater and a pair of pants, and pays a 4% sales tax on both. If the pre-tax price of the sweater was 50$, what was the total amount that Mitchell paid?

(1) Mitchell paid a total of $4.32 in sales tax.
(2) The sales tax on the pants was $2.32.

0068

Is $x > 0$?

(1) $xy^2 > 0$
(2) $x > y^2$

0069

If a and b are integers, is $a + b$ odd?

(1) $a^2 + b^2$ is odd
(2) $a^3 + b^3$ is odd

0070

Are at least 40% of the books in a certain library fiction?

(1) The number of fiction books is at least 2/3 the number of nonfiction books.
(2) The number of nonfiction books is at most 50% greater than the number of fiction books.

0071

What is the value of x?

(1) $\frac{(x + 4y)}{2} = 2y - x + 3.5$
(2) $(3x)^2 = 49$

0072

If x and y are integers, what is the units digit of x?

(1) The units digit of y is greater than 3.
(2) The units digit of x + y is less than 3.

0073

A driver drove in a straight line from Oriole to Brennon by way of Yellow Springs, without stopping. What was his average speed for the entire trip?

(1) The distance from Oriole to Brennon is 1.7 times the distance from Yellow Springs to Brennon.
(2) The driver traveled from Oriole to Yellow Springs at an average speed of 56 mph, and from Yellow Springs to Brennon at an average speed of 48 mph.

0074

If x is 40% of y, what percent of y + 10 is x + 10?

(1) x = 10
(2) y = 25

0075

During his workout, did Irving complete a lap of a 1/4 mile track in under 2 minutes?

(1) Irving ran around the track for 1 hour at a constant speed of greater than 8 mph.
(2) Irving ran more than 30 laps of the track in 1 hour.

0076

If $4x \neq -7y$, what is the value of $\frac{(2x + 3y)}{(4x + 7y)}$?

(1) $\frac{2x}{7y} = \frac{1}{7}$
(2) $\frac{3y}{4x} = \frac{3}{2}$

0077

Is $xy > 0$?

(1) $x^3 > x$
(2) $x^3y > 0$

0078

The cost of a gallon of orange paint is the sum of the costs of the amounts of red and yellow paint used to make it. What is the cost of a gallon of orange paint consisting of 75% yellow paint and 25% red paint?

(1) 1 gallon of red paint and 5 gallons of yellow paint costs a total of $39.50.
(2) 2 gallons of red paint and 6 gallons of yellow paint costs a total of $52.

0079

Is $x^2 - 4xy + 4y^2 > 9$?

(1) $x > 2y$
(2) $y = 4$

0080

If $f(x) = (x - p)(x - q)$ and $p>q$, is $f(y) > 0$?

(1) $y > p$
(2) $p > 0$

0081

Is $x > 0$?

(1) $xy^2 > 0$
(2) $x^2y < 0$

0082

Is $x > y$?

(1) $x > y^2$
(2) $x > y^3$

0083

Is $x > 0$?

(1) $x < y$
(2) $y < 2x$

0084

Is $x + y > a + b$?

(1) $x = a - b$
(2) $y > 2b$

0085

If $x = 2^a 3^b 5^c$ and a, b, and c are integers, what is the value of $a + b + c$?

(1) $x = 120$
(2) $a \geq b \geq c$

0086

If $x = \frac{8}{x} - 2$, what is the value of x?

(1) $(x + 4)(x - 2) = 0$
(2) $(x - 2)(x - 4) = 0$

0087

Chairs are arranged in R rows with C chairs in each row. There are M chairs left over. What is the total number of chairs?

(1) R is M + 1 greater than C.
(2) The same number of chairs could be arranged in R - 1 rows of C + 1 chairs with no chairs left over.

0088

If $\frac{6}{x} - x = 1$, what is the value of x?

(1) $(2x + 1)^2 = 25$
(2) $x + \frac{14}{x} = 9$

0089

If $f(x) = x + \frac{1}{x}$ and $y \neq 0$, what is the value of $f(y^2)$?

(1) $f(y) = 6$
(2) $y = 3 + 2\sqrt{2}$

0090

A store sells only bracelets and watches. Yesterday, the store sold bracelets and watches with a total price of $5,280. How many of the items sold were bracelets?

(1) The average price of a bracelet was $60 less than the average price of a watch.
(2) The number of bracelets sold was 1.5 times the number of watches sold.

0091

What is the value of $(x - 2)(x + 2)(2x + 1)$?

(1) $(x - 2)(x + 2) = 12$
(2) $(x + 2)(2x + 1) = 54$

0092

Is $x + y > a + b$?

(1) $x > a > y > b$
(2) $x + b > a + y$

0093

A restaurant sold twice as many carbonated drinks as non-carbonated drinks, and 300 more non-alcoholic drinks than alcoholic drinks. What percent of the carbonated drinks sold were non - alcoholic?

(1) The restaurant sold 80 non-carbonated alcoholic drinks.
(2) The restaurant sold 150 non-carbonated non-alcoholic drinks.

0094

If $4x \neq -7y$, what is the value of $\frac{(2a + 3b)}{(4x + 7y)}$?

(1) $\frac{2a}{4x} = \frac{1}{7}$
(2) $\frac{3b}{7y} = \frac{3}{2}$

0095

A marketing survey found that the number of respondents who had heard of Brand A was 100 greater than the number who had not heard of Brand A. Of those who had heard of Brand A, 60% had also heard of Brand B. What percent of those who had heard of Brand B had also heard of Brand A?

(1) The number of respondents who had heard of Brand B was 10 greater than the number who had not heard of Brand B.
(2) The number of respondents who had heard of both brands was 55 greater than the number who had heard of neither product.

0096

If x and y are integers, is $2^x 5^y = 10^{(x + y)}$?

(1) $xy = -4$
(2) $x + y = 0$

0097

A bagel shop charges 2 dollars for one bagel and 20 dollars for a dozen (12) bagels. Yesterday, how many different customers were there who ordered at least a dozen bagels?

(1) The shop sold 46 bagels yesterday for a total of 80 dollars.
(2) One customer ordered exactly 2 dozen bagels.

0098

How many zeroes are at the end of x! (x factorial)?

(1) (x + 2)! has 2 zeroes at the end.
(2) (x + 5)! has 3 zeroes at the end.

0099

Are at least 55% of the seats in a certain room occupied?

(1) The number of occupied seats is at least 10% higher than the number of unoccupied seats.
(2) The ratio of occupied to unoccupied seats is at least 10:9.

0100

Isaac purchased sandwiches for 5$ each and drinks for 3$ each. If he paid with 15$, and there was no tax, did he receive any change?

(1) He purchased more drinks than sandwiches.
(2) He purchased at least one sandwich and at least one drink.

0101

The price of a sofa was marked up by x%, and then the resulting price was marked down by y%. Is the new price lower than the original price?

(1) $x = y$
(2) $y = 50$

0102

At what average speed did a delivery driver complete the 90 mile trip from Bayview to Cerise, factoring in all stops he made on the route?

(1) The driver made a total of 12 stops during the trip, averaging 10 minutes per stop.
(2) Between stops, the driver traveled at an average speed of 45 mph.

0103

Angel and Carline both left the town of Aster at the same time, and traveled via the same route to the town of Bear Creek. Who arrived at Bear Creek first?

(1) Angel and Carline both traveled at constant speeds for the first 30 minutes of the trip, after which Angel had completed 40% of the journey, and Carline had completed 30% of the journey.
(2) 30 minutes into the trip, Carline increased her constant speed by 50% and maintained this speed until she arrived at Bear Creek, while Angel maintained the same constant speed for the entire trip.

0104

If a and b are positive integers, is a + b a prime number?

(1) The greatest common divisor of a and b is 3.
(2) The least common multiple of a and b is 30.

0105

What is the value of $x^2 + 4y^2$?

(1) $x + 2y = 5$
(2) $2x + y = 4$

0106

If a and b are positive integers, then does $a^2 - b^2 = 48$?

(1) $a \geq 15$
(2) $b \geq 10$

0107

Is $a^2 + 4b^2 > 4ab + 9$?

(1) $a > 4b$
(2) $b > 2$

0108

If a, b, and c are integers and $x = 2^a 3^b 5^c$, how many zeroes appear at the end of x when it is written out?

(1) $a = c = 4$
(2) $b = 2$

0109

If x and y are positive integers, what is the units digit of x^y?

(1) $y = 4x + 1$
(2) $x = 6$

0110

What is the value of $\sqrt{x} + \sqrt{y}$?

(1) $x - y = 3$
(2) $\sqrt{x} - \sqrt{y} = 1$

0111

What is the value of $x^4 + x^3 + x^2 + x$?

(1) $x^2 + 1 = 10$
(2) $x^2 + x = 12$

0112

Arlie paints at a rate of x square feet per hour. How long will it take her to paint a 100 square foot fence?

(1) Apolonia, who paints at a rate of 1.25x square feet per hour, would be able to paint the fence 20% faster than Arlie.
(2) Stanton, who paints at a rate of x + 20 square feet per hour, would be able to paint the fence 20% faster than Arlie.

0113

At a donut shop, donuts that were made more than 6 hours ago are marked down by 25%, and the rest are sold at full price. How many of the donuts that Elyse purchased had been marked down?

(1) Elyse purchased a total of 15 donuts for 36$.
(2) Prior to any markdowns, the original price of the donuts Elyse purchased would have been 45$.

0114

If $f(x) = x^2 + ax + b$, what is the value of a/b?

(1) For every value of x, $f(x) = f(-x)$
(2) $f(6) = 0$

0115

The cost of a certain amount of trail mix is the sum of the cost of its ingredients. What is the cost per pound of a trail mix that consists of 25% raisins and 75% peanuts?

(1) A trail mix consisting of 10% raisins, 30% peanuts, and 60% cashews costs 8$ per pound.
(2) Cashews cost 9$ per pound.

0116

If Tess paints at a constant rate, how long will it take her to paint a 150 square foot ceiling?

(1) In order to paint the ceiling 15 minutes faster, Tess would need to increase her rate of painting by 20 square feet per hour.
(2) In order to paint the ceiling 15 minutes faster, Tess would need to increase her rate of painting by 25%.

0117

What is the units digit of x?

(1) The units digit of x^2 is 6.
(2) The units digit of x^3 is the same as the units digit of x.

0118

In a psychology experiment, each participant anonymously donated either 10$ or 100$ to a good cause. What percent of the participants chose to donate 100$?

(1) 28 of the participants donated 10$.
(2) The average amount donated was 40$ per participant.

0119

In a certain sequence of numbers, each term is *K* greater than the preceding term, where *K* is a constant. The sum of 5 sequential terms of the sequence is 150. What is the value of *K*?

(1) The largest of the 5 sequential terms is 70.
(2) The smallest of the 5 sequential terms is −10.

0120

Three distinct positive integers, none of which equals 2, sum to a total of x. What is the smallest of the three integers?

(1) $x < 11$
(2) The largest of the 3 integers is 4

0121

If $-10 < x < y < 10 < z$, is $xy < 0$?

(1) $xyz < 0$
(2) $yz = -10x$

0122

x and y are positive integers and x is 15% greater than y. What is the value of x?

(1) $y < 30$
(2) $x + y < 60$

0123

Evonne owns 200 shares of stock in total, with some shares of Company X and some shares of Company Y. Last Monday, all 200 shares had the same price. Then, the stock price of Company X increased by *x*% and the stock price of Company Y decreased by *y*%. If Evonne's whole portfolio decreased in value by 2%, and she neither bought nor sold any stock, how many shares of Company X did she own?

(1) $x = 6$
(2) $y = 10$

0124

If $y \neq 0$, is $x/y < 4/7$?

(1) Rounded to the nearest 10th, $x/y = 0.6$.
(2) Rounded to the nearest 100th, $x/y = 0.57$.

0125

If a and b are integers, is ab odd?

(1) 2a + 3b is even
(2) a + 3b is odd

0126

Is $xy(1 - xy) > 0$?

(1) $x = 1/2y$
(2) $y = 3$

0127

A bus currently travels from City A to City B at a constant speed. The bus route is changed so that the route is 3 miles longer, but the bus's constant speed is 5 mph faster. Does the new route take more time to complete than the original route?

(1) The original speed of the bus was less than 30 mph.
(2) The original bus route was less than 18 miles long.

0128

In a group of 60 households, each including exactly 0, 1, or 2 children, what is the average number of children per household?

(1) The 16 2-child households account for 4/7 of the children in the group.

(2) 3/7 of the children come from 1-child households.

0129

Maricruz earns an hourly rate of 10 dollars an hour for up to 40 hours per week, and 1.5 times this amount per hour for hours worked past 40. Over the last 4 weeks, what is the average amount that Maricruz earned per week?

(1) Maricruz worked a total of 153 hours over the last 4 weeks.
(2) Maricruz worked a total of 7 hours of overtime over the last 4 weeks.

0130

If x is a positive integer less than 120, what is the greatest common factor of 120 and x?

(1) 120 is not divisible by x
(2) x is not prime

0131

If $xy \neq 0$, what is the value of x^3/y^2?

(1) $x/y = -1/2$
(2) $x^2/y = 3/2$

0132

A set contains exactly 100 distinct positive integers. How many of the numbers in the set are less than 20?

(1) Exactly 75% of the numbers in the set are greater than 25.
(2) Exactly 25% of the numbers in the set are greater than 102.

0133

If Etsuko's mailbox contains only junk mail, bills, and letters, what is the ratio of pieces of junk mail to bills in the mailbox?

(1) Half of the mail in Etsuko's mailbox consists of bills.
(2) The ratio of bills to letters in Etsuko's mailbox is 3:1.

0134

Annetta makes 14$ per hour for the first 40 hours she works in a given week, and p% more than 14$ per hour for any hours she works past 40. How many hours did Annetta work last week?

(1) Annetta made 532$ last week.
(2) p = 10

0135

In sequence A, $a_1 = 1$, and $a_n = a_{n-1} + k$ for some constant positive integer k. Does there exist a value m>1 where $a_m = 10$?

(1) k > 5

(2) k is a multiple of 4

0136

A set of *x* cards is numbered with consecutive integers from 1 to *x*. What is the probability that the number on a randomly selected card is even?

(1) x is even
(2) $x = 18$

0137

Three distinct positive integers sum to 10. Is one of the three integers equal to 5?

(1) One of the three integers is equal to 4.
(2) All three of the integers are less than 6.

0138

If $a < x < b$ and $a-k < y < b-k$, is $x > y$?

(1) $a + k = b$
(2) $b - x < k$

0139

A restaurant's average review score is currently 2.7 out of 5. If none of the old reviews can be changed or deleted, what is the smallest possible number of new reviews that the restaurant would need in order to raise its average score to at least 4.0?

(1) Of the current reviews, 6 have a score of 0.
(2) The restaurant currently has exactly 20 reviews

0140

A manufacturer lists all the models of sunglasses it produces in a catalog. Some of the sunglasses are polarized, while others are not. How much greater is the average price of polarized sunglasses than the average price of non polarized sunglasses?

(1) The ratio of the number of pairs of polarized sunglasses to the number of pairs of non-polarized sunglasses is 4:1.
(2) The average price of the polarized sunglasses in the catalog is 4$ higher than the average price of all of the sunglasses in the whole catalog.

0141

A store sells only gold and silver jewelry. Yesterday, the store sold jewelry with a total price of $4,000. How many dollars worth of gold jewelry did the store sell?

(1) The average price of a piece of silver jewelry was $60 less than the average price of a piece of gold jewelry.
(2) The store sold 50% more pieces of silver jewelry than pieces of gold jewelry.

0142

If x, y, and z are all positive integers, is z located between x and y on a number line?

(1) $xy = z^2$

(2) $x < z < (x + y)/2$

0143

Anisa owns a total of 100 shares of various stocks with different prices. From Monday to Tuesday, all of her shares either increased in price or decreased in price. How many of her 100 shares increased in price?

(1) The total value of all of the shares that increased in price increased by 8% from Monday to Tuesday.
(2) The total value of all 100 shares decreased by 2% from Monday to Tuesday.

0144

What is the value of $(a + b)/(ax + by)$?

(1) $a/b = (1 - y)/(x - 1)$
(2) $1/a + 1/b = y/a + x/b$

0145

If a and b are integers, is a - b odd?

(1) 2a - b is odd
(2) a - 2b is even

0146

A box contains blue and red marbles in equal numbers. Then, x blue marbles are added to the box, and y red marbles are removed from the box. After this happens, the ratio of blue to red marbles is 5:4. How many marbles are now in the box?

(1) $x - y = 1$
(2) $x/y = 3/2$

0147

Does Everett have at least three more pieces of candy than Albertha has?

(1) If Everett gave Albertha two pieces of candy, they would have the same amount of candy.
(2) If Albertha gave Everett six pieces of candy, Albertha would have half as much candy as Everett.

0148

Each term in a sequence is the remainder when the square of the previous term is divided by 10. What is the largest term in the sequence?

(1) The first term of the sequence is even.
(2) The second term of the sequence is 6.

0149

In a rare book store, 100 of the books for sale are first editions and 50 of the books for sale are signed. How many books are for sale in total?

(1) The number of signed first editions is 10 greater than the number of books which are neither signed nor first editions.

(2) The number of unsigned first editions is 50 greater than the number of signed books that are not first editions.

0150

Is p percent of x greater than 65?

(1) p percent of 90 is greater than 50
(2) 70 percent of x is greater than 90

0151

Is $x > y^2$?

(1) $x > (y + 1)^2$
(2) $x > (y - 1)^2$

0152

Did Martha complete her 1 mile walk in under 25 minutes?

(1) Martha's average speed for the first 2/3 of a mile was 2.4 miles per hour.
(2) Martha's average speed for the last 2/3 of a mile was 2.5 miles per hour.

0153

Roderick purchased a television at a discount of x% off of the original price of T dollars, and a stereo at a discount of y% off of the original price of S dollars. What was the ratio of the amount Roderick paid for the television to the amount he paid for the stereo?

(1) $^{T}/_{(S + T)} = 0.4$
(2) $^{x}/_{(x + y)} = 0.8$

0154

ABC and DEF represent two 3-digit numbers with unknown digits, and all six digits are different integers from 1 to 9, inclusive. Is ABC > DEF?

(1) A > B + C
(2) F > E + D

0155

If $xy \neq 0$, is $x^y > y^x$?

(1) $x = y + 1$
(2) $x > y > 0$

0156

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of x^2 is 9.
(2) The units digit of y^2 is 6.

0157

$f(x) = kx^2 + m$, where k and m are constants, and $f(2) - f(1) = 21$. What is the value of f(3)?

(1) $f(4) = 115$
(2) $m = k - 4$

0158

What percent of the students in a certain class know how to swim?

(1) Of the students who know how to swim, 90% also know how to ride a bike.
(2) 80% of the students in the class know how to ride a bike.

0159

A grocery store has a ratio of cashiers to stockers of 4:3. How many cashiers currently work at the store?

(1) If half of the cashiers were reassigned as stockers, the ratio of cashiers to stockers would be 2:5.
(2) If exactly two cashiers were reassigned as stockers, the number of cashiers would equal the number of stockers.

0160

If $x = 2^a3^b$ and a and b are integers, what is the value of a?

(1) $x(5^a) = 300$
(2) $x = 12$

0161

Gavin collects books and magazines written in French and Spanish. Is his number of French books equal to his number of Spanish magazines?

(1) Gavin has twice as many magazines as books.
(2) Gavin has twice as many French items as Spanish items.

0162

Is $x - y > 0$?

(1) $x + y < 0$
(2) $x > 0$

0163

Milo's book collection includes fiction and nonfiction books in Spanish and English. Of the books written in English, there are 20 more fiction books than nonfiction books. Of the nonfiction books, there are 24 more written in English than in Spanish. How many of Milo's books are written in Spanish?

(1) Milo has 180 fiction books.
(2) Milo has 300 books in total.

0164

How many unique prime factors does the integer x have?

(1) x is divisible by 30
(2) x is not divisible by 210

0165

A company sells two types of widgets, Type A and Type B. Last month, the company sold 60 widgets for a total of 16,000 dollars. What percent of the widgets sold last month were Type A?

(1) Type B widgets cost 1.5 times as much as Type A widgets.
(2) Type A widgets cost 200$.

0166

If $x + 1 = {}^{6}/_{x}$, what is the value of x?

(1) $x^2 = 2x$
(2) $x^2 = 4$

0167

On a retailer's website, product listings can have a customer review, a picture, both, or neither. The number of listings that include a picture is twice the number of listings that do not include a picture. The number of listings with a customer review is 300 more than the number of listings without a customer review. In total, how many listings are there on the website?

(1) The number of listings with a customer review is 220 more than the number of listings without a picture.

(2) The number of listings with a picture is 220 more than the number of listings without a review.

0168

What is the value of the integer x?

(1) $2^x < 20 < 3^x$
(2) $2^{(x + 1)} < 20 < 3^{(x + 1)}$

0169

If x = a + 4 and y = b - 3, what is the value of $x^2 - y^2$?

(1) $a^2 - b^2 = 20$
(2) 4a + 3b = 36

0170

Is $x^a > y^b$?

(1) x = 2y
(2) a = 2b

0171

One third of Dr. Gribbins' patients have high blood pressure, and some patients also have high cholesterol with or without high blood pressure. What is the difference between the number of patients who have both high blood pressure and high cholesterol, and the number who have neither?

(1) 70% of the patients who have high blood pressure also have high cholesterol.
(2) The number of patients with high cholesterol is 100 greater than the number of patients who do not have high blood pressure.

0172

What is the value of the integer x?

(1) $x^2 = 2^x$
(2) $x^4 = 4^x$

0173

If $f(x) = k(9 - x^2) + 2mx$, where k and m are constants, what is the value of f(3)?

(1) $f(-3) = -12$
(2) $f(0) = 18$

0174

Is 2^x equal to $(-2)^{(-x)}$?

(1) $x = 0$
(2) $2^x = (-2)^x$

0175

In a survey of 560 people who successfully lost weight, how many reported that they had stopped drinking soda?

(1) Of the respondents who had stopped drinking soda, $3/4$ had also stopped snacking between meals.

(2) $3/7$ of the respondents reported that they had stopped snacking between meals.

0176

If $4x \neq -7y$, what is the value of $(2a + 3b)/(4x + 7y)$?

(1) $a = x$
(2) $6b = 7y$

0177

If $a \neq -b$, is $(x + y)/(a + b) > 0$?

(1) $x < a < b < 0 < y$
(2) x, a, b, 0, and y form a list of evenly spaced integers, in that order.

0178

A tree increases in height by 18% each year. If the tree's height was first recorded in the year 2002, what was its height when it was recorded exactly 3 years later, in 2005?

(1) The tree was 25.7 feet taller in 2005 than it was in 2002.

(2) The tree was 40 feet tall in 2002.

0179

A movie was scored on a scale of 0 to 5 inclusive by a number of reviewers, some of whom were professionals. If the average score was 3.6 out of 5, what was the total number of reviewers (including both professionals and non-professionals)?

(1) The 36 professional reviewers gave the movie an average score of 4.0.
(2) The 60 non-professional reviewers gave the movie an average score of 3.3.

0180

Is $x > 0$?

(1) $x^2 < x$
(2) $x^3 < x$

0181

Is $x^2 > y^2$?

(1) $x + y < 0$
(2) $x - y < 0$

0182

What is the largest integer value of Q for which 3^Q is a factor of X?

(1) 9^7 is a factor of x, and 9^8 is not a factor of x.
(2) x is a perfect square.

0183

In a survey of children aged 4 to 15, one third reported that they enjoy eating vegetables. What percent of those aged 4 to 9 reported that they enjoy eating vegetables?

(1) Of the children who enjoyed eating vegetables, 40% were aged 4 to 9.
(2) Of the children who did not enjoy eating vegetables, 60% were aged 4 to 9.

0184

A shopkeeper purchased a TV for 75$, then sold it at a discount of d% off of an original sales price of s$. How much profit did the store make on the sale?

(1) $sd = 1,500$
(2) $s(100-d) = 11,000$

0185

If z > y and x, y, and z are integers, is $2^x 5^y > 10^z$?

(1) $x + 3y = 4z$
(2) $x > z$

0186

If x and y are positive integers, what is the units digit of x?

(1) The units digit of $x^{(y + 1)}$ is 6.
(2) The units digit of $(x + 1)^y$ is 5.

0187

If x and y are nonzero integers, does $x^y = y^x$?

(1) x does not equal y.
(2) $x + y = 6$

0188

If x and y are positive integers, and the fraction $^1/_{(2^x 5^y)}$ is written as a decimal, how many consecutive zeroes appear immediately following the decimal point?

(1) $x + y = 6$
(2) $x > y$

0189

If p and q are the (distinct) roots of $x^2 + ax + b = 0$, what is the sum of the reciprocals of p and q?

(1) $^a/_b = - 1.2$
(2) $a + b = 1$

0190

If x and y are positive integers, what is the units digit of x?

(1) The units digit of x^5 is 6.
(2) The units digit of x^4 is 6.

0191

How long does it take Jermaine and Alicia, working simultaneously at their individual constant rates, to mow a certain lawn?

(1) It would take three times as long for Alicia to mow the lawn on her own, as it would take the two of them to mow the lawn together.
(2) Working together, Jermaine and Alicia can mow the lawn 1 hour faster than Jermaine could mow the lawn on his own.

0192

An item with an original price of $100 is discounted by x%. The resulting price is later discounted by y%. Which of the two discounts reduced the price by a greater dollar amount?

(1) $y < x$
(2) $x = 15$

0193

If all sodas cost the same amount, what is the largest number of sodas that can be purchased with 16$?

(1) At most 3 sodas can be purchased with 8$.
(2) The price of one soda is between 1.75$ and 2.25$.

0194

What is the value of $\frac{1}{x^4} + x^4$?

(1) $\frac{1}{x^2} + x^2 = \frac{17}{4}$
(2) $x^2 = 4$

0195

a and b are integers with $40 < a < 50$ and $30 < b < 40$. What is the value of a?

(1) The greatest common divisor of a and b is between 15 and 20, inclusive.
(2) $\frac{a}{b} = 1.5$

0196

At a small company each employee has a different, constant hourly pay rate. What is the average of the hourly pay rates of the five employees?

(1) Last week, the five employees worked for a total of 127 hours and earned a total of 1,357 dollars.
(2) Last week, the five employees worked for 12, 15, 30, 30, and 40 hours, respectively.

0197

Is x a negative integer?

(1) x^3 is a negative integer
(2) x^{-3} is a negative integer

0198

Harold and Marisela start running a marathon at the same time and at different constant rates. How far ahead of Marisela is Harold when he reaches the 4 mile mark?

(1) Harold runs at a constant rate of 7.5 miles per hour and Marisela runs at a constant rate of 6 miles per hour.
(2) At the 2 mile mark, Harold is 0.4 miles ahead of Marisela.

0199

At a certain coffee shop, a cup of tea costs 1.25$ and a cup of coffee costs 1.30$. If the shop sold 25 cups of coffee yesterday, how many cups of tea were sold?

(1) The revenue from cups of tea was less than twice the revenue from cups of coffee.
(2) The number of cups of tea sold was more than twice the number of cups of coffee sold.

0200

What is the least common multiple of the integers x and y?

(1) The least common multiple of x and 2y is 40
(2) x is odd

0201

If $x = 2^a 3^b 5^c$, a, b, and c are integers, and a > b > c > 0, what is the value of x?

(1) x is not a multiple of 25.
(2) x is not a multiple of 16.

0202

16 pieces of candy are distributed among 5 children, so that each child has at least one piece of candy. How many of the children have more than 3 pieces of candy?

(1) No two children have the same number of pieces of candy.
(2) The child with the most candy has 6 pieces.

0203

Two students are chosen at random from a class that includes Raeann and Arianne. What is the probability that Raeann will be one of the students who is chosen?

(1) The probability that Raeann and Arianne will both be chosen is $\frac{1}{45}$.
(2) The probability that Raeann will not be chosen is $\frac{4}{5}$.

0204

Every widget-making machine manufactures widgets at the same constant rate per hour. If *x* is the number of machines required to complete a work order of 2,000 widgets within 10 hours, what is the value of *x*?

(1) *x* machines can complete a work order of 2,500 widgets in exactly 12.5 hours.
(2) *x* + 8 machines can complete a work order of 400 widgets in exactly 1 hour.

0205

Two paintings, A and B, were sold at an art gallery. Painting A was originally priced at a$ and was marked up by x% before it was sold. Painting B was originally priced at b$ and was marked down by x% before it was sold. Was the sales price of A greater than the sales price of B?

(1) x > 20
(2) 3a > 2b

0206

Car A leaves the city of Helvetica at 10:30 AM and travels at a constant rate towards the city of Calibri. Car B leaves Calibri at 10:30

AM and travels along the same route, at a different constant rate, towards Helvetica. At what time will the two cars pass each other?

(1) At 11:00 AM, Car A is exactly halfway between Helvetica and Calibri, and at 11:10 AM, Car B is exactly halfway between Helvetica and Calibri.
(2) When the two cars pass each other, the distance that Car A has traveled is exactly 4/3 of the distance that Car B has traveled.

0207

If x and y are integers, what is the value of x - y?

(1) $3^x/4^y = 9$
(2) $3^{(x - y)} = 9$

0208

A pair of escalators both move at the same constant rate, one up and one down. How long would it take Delinda to walk up one of the escalators if it were not moving at all?

(1) It would take Delinda 36 seconds to walk up the escalator that is moving upwards.
(2) It would take Delinda 180 seconds to walk up the escalator that is moving downwards.

0209

What is the value of x^a/y^b?

(1) $x/y = 2$
(2) a = b - 1

0210

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of x is 3.
(2) The units digit of y is 3.

0211

A print shop charges 6$ for each job, plus an additional 5 cents per page. The total cost of any print job consisting of more than 300 pages is discounted by 10%. Did a certain job include more than 300 pages?

(1) The cost of the print job was less than 20$.
(2) The cost of the print job was greater than 19$.

0212

x is a decimal between 0 and 1, exclusive. Does x terminate?

(1) 5x terminates.
(2) 3x terminates.

0213

Can 12 machines, working at equal and constant rates, complete a work order of 1,600 widgets in no more than 4 hours?

(1) Two machines working at the same rate can complete a work order of 120 widgets in under 2 hours.
(2) Five machines working at the same rate can complete a work order of 200 widgets in under 1 hour.

0214

If a, b, and c are distinct integers, is a + b + c even?

(1) abc = 0
(2) a + b = 0

0215

What is the cost of 6 bagels, 14 donuts, and 18 cups of coffee?

(1) 4 donuts and 6 cups of coffee cost 16.80$.
(2) 3 bagels, 3 donuts, and 3 cups of coffee cost 15.90$.

0216

x is an integer. Is x(x + 1) divisible by 3?

(1) x + 2 is not divisible by 3.
(2) x^2 is divisible by 3.

0217

Printing costs 4$ per job plus an additional 10 cents per page. The total cost of any print job over 200 pages is discounted by 10%. What was the number of pages in a certain print job?

(1) The total cost of the print job was $23.40.
(2) The number of pages in the print job was over 200.

0218

A portfolio consists of one share each of 100 different stocks. Hosea recorded the total value of the portfolio on two consecutive days, and observed that none of the 100 prices stayed the same. If the total value of the portfolio decreased by 2% from the first day to the second day, how many of the 100 stocks increased in price?

(1) A portfolio consisting of only those shares that increased in price would have increased in value by 6%.
(2) A portfolio consisting of only those shares that decreased in price would have decreased in value by 10%.

0219

What is the largest integer value of x for which $a/4^x$ is an integer?

(1) 17 is the largest integer value of y for which $a/2^y$ is an integer.
(2) 17 is the largest integer value of y for which $a/6^y$ is an integer.

0220

How many machines, working simultaneously at identical constant rates, would it take to complete a certain work order of 1,500 widgets within 5 hours?

(1) It would take ten hours longer to complete the 1,500 widget order with three machines than it would take to complete it with five machines.
(2) It takes ten machines an hour longer to complete a 2,000 widget order than it takes them to complete a 1,800 widget order.

0221

If $f(x) = (x - p)(x - q)(x - r)$ and $p > q > r$, is $f(y) > 0$?

(1) $y = (p + r)/2$
(2) $r - q < q - p$

0222

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of x^y is the same as the units digit of y^x.
(2) x and y are not equal.

0223

A deck of cards contains cards labeled with a set of consecutive integers, with the smallest number being x. In selecting a random card, what is the probability that its label will be a multiple of 3?
(1) There are 22 cards in the deck.
(2) x is not a multiple of 3.

0224

What is the value of $(x - 3)(x + 3)/x^2$?

(1) $(x - 3)(x + 3) = 27$
(2) $(x + 3)/x^2 = 1/4$

0225

A, B, and C are distinct positive integers. What is the ratio of $|B - A|$ to $|C - B|$?

(1) $|A - C| : |B - C| = 2:5$
(2) $|A - C| : |B - A| = 2:3$

0226

The price of an item in a store is marked up by m%, then that new price is later discounted by d%. Is the new price lower than the original price (prior to the markup)?

(1) $d = 2m$
(2) $d = m + 10$

0227

If $y \neq k$ and $y \neq -k$, is $(x + k)/(y + k) > (x - k)/(y - k)$?

(1) $y > x$

(2) $k > 0$

0228

If x and y are positive integers, is x/y an integer?

(1) y is a perfect square
(2) $x = y^{(3/2)}$

0229

David earns a commission that consists of a certain number of dollars per sale, plus a fixed percent of the dollar amount of the sale. Is his commission on a 250,000 dollar sale at least 20,000 dollars?

(1) His commission on a 300,000 dollar sale is at least 30,000 dollars.
(2) His commission on a 100,000 dollar sale is at least 10,000 dollars.

0230

If $xy \neq 0$, is x^y equal to y^x?

(1) $x^y = y^y$
(2) $x^x = y^x$

0231

The recipe for Bread X requires 4 cups of flour and 1 tbsp of yeast. The recipe for Bread Y requires 3 cups of flour and 2 tbsp of yeast. If a bakery made a number of loaves of Bread X and Bread Y, was the total amount of flour used over 100 cups?

(1) The total number of loaves baked was over 30.
(2) The total amount of yeast used was less than 40 tbsp.

0232

If x and y are integers, what is the value of $3^x - 2^y$?

(1) $x = y$
(2) $3^{(x/2)} - 2^{(y/2)} = 5$

0233

A 30 gallon water tank leaks water at a constant rate of L gallons per hour. If Faustino begins filling the empty tank at exactly 8:00 AM with a hose which outputs H gallons of water per hour, then stops when the tank is full, at what time does the tank become completely empty again?

(1) $60H = L(H - L)$
(2) $L = 150$

0234

If x, y, and z are non-negative integers, is $2^x 5^y > 10^z$?

(1) $x + y > 2z$

(2) $y > z$

0235

In a chess tournament, each participant plays against each other participant exactly once. Every match ends in a win, lose, or draw. A player who wins a match earns 3 points and the player who loses the match earns 0 points. If a match ends in a draw, each player gets 1 point. How many players were in the tournament?

(1) The sum of the total number of points earned by all players was 131.
(2) Fewer than 10 of the matches ended in a draw.

Answer Key

Difficulty is rated on a scale from 1 (easiest) to 5 (hardest).

0001, Logic, Digits, 1, C
0002, Algebra, Functions, 1, C
0003, Algebra, Fractions, 1, B
0004, Geometry, Rectangles, 1, D
0005, Algebra, Percents, 1, A
0006, Logic, PosNeg, 1, A
0007, Algebra, Fractions, 1, D
0008, Story, Inequalities, 1, B
0009, Story, Rates, 1, A
0010, Story, Ratios, 1, A
0011, Story, Percents, 1, A
0012, Logic, Inequalities, 1, A
0013, Logic, Inequalities, 2, C
0014, Logic, Digits, 2, B
0015, Algebra, Functions, 2, B
0016, Algebra, Quadratics, 2, C
0017, Story, Sets, 2, D
0018, Algebra, Quadratics, 2, D
0019, Story, Probability, 2, A
0020, Story, Averages, 2, C
0021, Story, Averages, 2, C
0022, Story, Ratios, 2, D
0023, Logic, Exponents, 2, C
0024, Logic, Statistics, 2, E
0025, Logic, Exponents, 2, A
0026, Algebra, Sequences, 2, D
0027, Story, Statistics, 2, E
0028, Algebra, Sequences, 2, C
0029, Logic, PosNeg, 2, C
0030, Story, Ratios, 2, D
0031, Geometry, Rectangles, 2, A
0032, Logic, Quadratics, 2, E
0033, Story, Percents, 2, C
0034, Logic, Roots, 2, C
0035, Logic, Inequalities, 2, E
0036, Story, Equations, 2, A
0037, Logic, Digits, 2, B
0038, Story, Ratios, 2, A
0039, Logic, PosNeg, 2, C
0040, Logic, Inequalities, 2, B
0041, Story, Inequalities, 2, C
0042, Logic, EvenOdd, 2, B
0043, Story, Rates, 2, D
0044, Logic, Divisibility, 2, C
0045, Story, Statistics, 2, E
0046, Story, Fractions, 2, C
0047, Story, Percents, 2, D

0048, Geometry, Triangles, 2, C
0049, Story, Ratios, 2, D
0050, Logic, Integers, 2, D
0051, Story, Rates, 2, A
0052, Logic, Exponents, 2, E
0053, Algebra, Exponents, 2, B
0054, Logic, PosNeg, 2, E
0055, Logic, Exponents, 2, C
0056, Logic, Inequalities, 2, E
0057, Logic, Statistics, 2, A
0058, Logic, Digits, 2, B
0059, Story, Ratios, 2, C
0060, Story, Rates, 2, E
0061, Algebra, Inequalities, 2, A
0062, Story, Percents, 2, B
0063, Logic, PosNeg, 3, B
0064, Algebra, Sequences, 2, C
0065, Story, Percents, 2, A
0066, Story, Probability, 2, C
0067, Story, Percents, 2, D
0068, Logic, PosNeg, 2, D
0069, Logic, EvenOdd, 2, D
0070, Story, Percents, 2, D
0071, Algebra, Equations, 2, A
0072, Logic, Digits, 2, E
0073, Story, Rates, 2, C
0074, Algebra, Percents, 2, D
0075, Story, Rates, 2, D
0076, Algebra, Fractions, 2, D
0077, Logic, PosNeg, 2, B
0078, Story, Percents, 2, B
0079, Algebra, Quadratics, 2, E
0080, Algebra, Functions, 2, A
0081, Logic, PosNeg, 2, A
0082, Logic, Inequalities, 2, E
0083, Logic, PosNeg, 2, C
0084, Algebra, Inequalities, 2, C
0085, Logic, Divisibility, 2, A
0086, Algebra, Quadratics, 3, B
0087, Story, Remainders, 3, E
0088, Algebra, Quadratics, 3, B
0089, Algebra, Functions, 3, D
0090, Story, Averages, 3, E
0091, Algebra, Quadratics, 3, C
0092, Logic, Inequalities, 3, A
0093, Story, Sets, 3, B
0094, Algebra, Fractions, 3, E
0095, Story, Sets, 3, E
0096, Algebra, Exponents, 3, A
0097, Story, Equations, 3, C
0098, Logic, Digits, 3, B
0099, Story, Percents, 3, E
0100, Story, Equations, 3, B
0101, Story, Percents, 3, A
0102, Story, Rates, 3, C
0103, Story, Rates, 3, E
0104, Logic, Divisibility, 3, A
0105, Algebra, Quadratics, 3, C
0106, Logic, Quadratics, 3, A
0107, Algebra, Quadratics, 3, C
0108, Logic, Digits, 3, A
0109, Logic, Digits, 3, B
0110, Algebra, Roots, 3, C
0111, Algebra, Quadratics, 3, C
0112, Story, Rates, 3, B
0113, Story, Percents, 3, C
0114, Algebra, Functions, 3, A
0115, Story, Percents, 3, C

0116, Story, Rates, 3, B
0117, Logic, Digits, 3, E
0118, Story, Averages, 3, B
0119, Algebra, Sequences, 3, D
0120, Logic, Max-min, 3, D
0121, Logic, Inequalities, 3, D
0122, Logic, Integers, 3, D
0123, Story, Percents, 3, C
0124, Logic, Decimals, 3, E
0125, Logic, EvenOdd, 3, D
0126, Logic, PosNeg, 3, A
0127, Story, Inequalities, 3, E
0128, Story, Statistics, 3, A
0129, Story, Equations, 3, B
0130, Logic, Divisibility, 3, E
0131, Algebra, Exponents, 3, C
0132, Story, Statistics, 3, A
0133, Story, Ratios, 3, C
0134, Story, Percents, 3, A
0135, Algebra, Sequences, 3, B
0136, Logic, Probability, 3, D
0137, Logic, Max-min, 3, D
0138, Algebra, Inequalities, 3, D
0139, Story, Averages, 3, B
0140, Story, Ratios, 3, C
0141, Story, Averages, 3, E
0142, Logic, Number Line, 3, D
0143, Story, Percents, 3, E
0144, Algebra, Fractions, 3, D
0145, Logic, EvenOdd, 3, C
0146, Story, Ratios, 3, C
0147, Story, Inequalities, 3, A
0148, Algebra, Sequences, 3, E
0149, Story, Sets, 3, A
0150, Story, Percents, 3, C
0151, Logic, Inequalities, 3, C
0152, Story, Rates, 3, E
0153, Story, Ratios, 3, E
0154, Logic, Counting, 3, E
0155, Logic, Exponents, 3, E
0156, Logic, Digits, 3, E
0157, Algebra, Functions, 3, D
0158, Story, Percents, 3, E
0159, Story, Ratios, 3, B
0160, Logic, Divisibility, 3, D
0161, Story, Sets, 4, C
0162, Logic, PosNeg, 3, C
0163, Story, Sets, 3, A
0164, Logic, Divisibility, 3, E
0165, Story, Averages, 3, C
0166, Algebra, Quadratics, 3, D
0167, Story, Sets, 3, D
0168, Logic, Exponents, 3, C
0169, Algebra, Quadratics, 3, C
0170, Algebra, Exponents, 3, E
0171, Story, Sets, 3, C
0172, Logic, Exponents, 3, E
0173, Algebra, Functions, 3, A
0174, Logic, Exponents, 3, A
0175, Story, Sets, 3, E
0176, Algebra, Fractions, 3, C
0177, Logic, PosNeg, 3, B
0178, Story, Percents, 3, D
0179, Story, Averages, 3, C
0180, Logic, PosNeg, 3, A
0181, Logic, PosNeg, 4, C
0182, Logic, Divisibility, 4, C
0183, Story, Sets, 4, C

0184, Story, Percents, 4, B
0185, Algebra, Exponents, 4, A
0186, Logic, Digits, 4, B
0187, Logic, Exponents, 4, E
0188, Logic, Decimals, 4, C
0189, Algebra, Quadratics, 4, A
0190, Logic, Digits, 4, A
0191, Story, Rates, 4, C
0192, Story, Percents, 4, A
0193, Story, Equations, 4, C
0194, Algebra, Exponents, 4, D
0195, Logic, Integers, 4, D
0196, Story, Averages, 4, E
0197, Logic, Exponents, 4, C
0198, Story, Rates, 4, D
0199, Story, Inequalities, 4, C
0200, Logic, Divisibility, 4, C
0201, Logic, Divisibility, 4, B
0202, Story, Counting, 4, A
0203, Story, Probability, 4, D
0204, Story, Rates, 4, B
0205, Story, Percents, 4, C
0206, Story, Rates, 4, A
0207, Logic, Exponents, 4, D
0208, Story, Rates, 4, C
0209, Logic, Fractions, 4, E
0210, Logic, Digits, 4, E
0211, Story, Equations, 4, E
0212, Algebra, Decimals, 4, A
0213, Story, Rates, 4, B
0214, Logic, EvenOdd, 4, C
0215, Story, Equations, 4, C
0216, Logic, Divisibility, 4, D
0217, Story, Equations, 4, C
0218, Story, Percents, 4, E
0219, Logic, Integers, 4, D
0220, Story, Rates, 4, D
0221, Algebra, Functions, 4, C
0222, Logic, Digits, 4, E
0223, Logic, Probability, 4, C
0224, Algebra, Quadratics, 4, A
0225, Logic, Ratios, 5, C
0226, Story, Percents, 5, D
0227, Algebra, Inequalities, 5, E
0228, Logic, Integers, 5, B
0229, Story, Equations, 5, A
0230, Logic, Exponents, 5, E
0231, Story, Inequalities, 5, C
0232, Logic, Exponents, 5, C
0233, Story, Rates, 5, A
0234, Algebra, Exponents, 5, C
0235, Story, Counting, 5, C

Problems and Solutions

0001

If x and y are positive integers, what is the units digit of xy?

(1) The units digit of y is 5.
(2) The units digit of x is 5.

---

(1) If the units digit of x is even, the units digit of xy will be 0. If the units digit of x is odd, the units digit of xy will be 5.

NOT SUFFICIENT

(2) If the units digit of y is even, the units digit of xy will be 0. If the units digit of y is odd, the units digit of xy will be 5.

NOT SUFFICIENT

(12) If two numbers both have units digits of 5, their product also has a units digit of 5 (5*5=25).

SUFFICIENT

0002

If $f(x) = x^2 + ax + b$, then is $f(y) = 0$?

(1) $y = 0$
(2) $b = 0$

Is $f(y)=0$?
is $y^2+ay+b=0$?

(1) $y^2+ay+b=0^2+a(0)+b=0+0+b=b$
This equals 0 if b=0, and doesn't equal 0 if b does not equal 0.

NOT SUFFICIENT

(2) $y^2+ay+b=y^2+ay+0=y^2+ay$
This could equal 0 (for example if y=0 or if a=-y) or it could not equal 0

NOT SUFFICIENT

(12)
$f(0) = 0^2+a(0)+b = b$
b=0, so this equals 0

SUFFICIENT

0003

$ab \neq 0$. Is $a/b = 1$?

(1) $b = 1/a$
(2) $a = b$

---

(1) If $b = 1/a$, then $ab = 1$. However, a/b can be different.

For example, if a=1 and b=1, then ab=1 and $a/b = 2$.

But if a=2 and b=0.5, then ab=1 and $a/b = 4$.

NOT SUFFICIENT

(2) If a=b, then $a/b = b/b = 1$.

SUFFICIENT

0004

A square with side length x is drawn entirely inside of a larger square with side length y. What percent of the larger square's area is contained within the smaller square?

(1) $x/y = 1/3$
(2) $x^2/y^2 = 1/9$

The area of the smaller square is x^2 and the area of the larger square is y^2. Because the smaller square is entirely within the larger square, the percent of the area is x^2/y^2*100.

(1) If $x/y=1/3$, then $(x^2/y^2) = 1/9$, and the percent can be found.

SUFFICIENT

(2) If $x^2/y^2=1/9$, then the percent $(100/9)$ can be found.

SUFFICIENT

0005

x is what percent greater than y?

(1) y is 5/8 of x
(2) x = y + 6

You can answer the question if you can find x/y

(1) If $y=5/8$ x, then
$y/x = 5/8$
$x/y = 8/5$

SUFFICIENT

(2) The percent difference depends on the values of x and y.

For example, if y = 1 and x=7, the answer is 600%

If y=2 and x=8, the answer is 300%

NOT SUFFICIENT

0006

Is $x + x^3$ positive?

(1) x is positive.
(2) x^2 is positive.

---

(1) If x is positive, then x^3 is also positive. So, $x + x^3$ is positive.

SUFFICIENT

(2) If x^2 is positive, then x can be either positive or negative. If x is positive, then x^3 is positive, so the sum is positive. If x is negative, then x^3 is negative, so the sum is negative.

NOT SUFFICIENT

0007

What is the value of $\frac{5x}{6}$?

(1) $\frac{6x}{5} = 3$
(2) $x = \frac{(6)(25)}{(5)(12)}$

---

(1) If $\frac{6x}{5} = 3$, then $x = \frac{3*5}{6} = \frac{15}{6} = 2.5$.

$\frac{5x}{6} = \frac{5(2.5)}{6} = \frac{25}{12}$

SUFFICIENT

(2) If $x = \frac{6*25}{5*12}$, then $x=\frac{6*5}{12} = \frac{5}{2}$.

$\frac{5x}{6} = \frac{5(2.5)}{6} = \frac{25}{12}$

SUFFICIENT

0008

Does a cup of coffee cost more than a cup of tea?

(1) Three cups of coffee cost more than two cups of tea.
(2) Two cups of coffee cost more than three cups of tea.

---

(1) $3c > 2t$
$c > \frac{2}{3} t$

A cup of coffee might or might not cost more than a cup of tea, for example, if tea is $3 and coffee is $2.50

NOT SUFFICIENT

(2) $2c > 3t$
$c > 1.5t$
A cup of coffee costs more than 1.5 times a cup of tea, so a cup of coffee must cost more

SUFFICIENT

0009

At what average speed did Bree complete a 120 mile round trip from Riverside to Los Angeles and back?

(1) The round trip took a total of 4 hours.
(2) The trip from Riverside to Los Angeles took 2.2 hours.

---

(1) average speed = total distance/total time = $^{120\text{ miles}}/_{4\text{ hours}}$ = 30 mph

SUFFICIENT

(2) Without knowing the time it took Bree to travel from Los Angeles back to Riverside, the average speed cannot be found.

NOT SUFFICIENT

0010

What is the ratio of skirts to dresses in Carlena's closet?

(1) Carlena has 15% more skirts than dresses.
(2) Carlena has 3 more skirts than dresses.

---

(1) If the number of dresses is D, the number of skirts is 1.15D. So, the ratio is 1.15D:D = 1.15:1 = 115:100 or 23:20.

SUFFICIENT

(2) The ratio can vary. For example, if Carlena has 4 skirts and 1 dress, the ratio is 4:1. If she has 5 skirts and 2 dresses, the ratio is different, 5:2.

NOT SUFFICIENT

0011

What percent of x is y?

(1) x = 4y
(2) y = 15

$^y/_x = ?$

(1)
x = 4y
$1 = {}^{4y}/_x$
$^1/_4 = {}^y/_x = 25\%$

SUFFICIENT

(2) Without any info about x this doesn't let you answer the problem.

NOT SUFFICIENT

0012

Is 2x > 2y?

(1) x > y
(2) -x < y

Divide both sides by 2, is x > y?

(1) The answer is "yes"

SUFFICIENT

(2) x could be bigger than y or smaller than y.

For example, x=2 and y=5. $-2 < 5$ and $x < y$, so the answer is "no"

Or, x=10 and y=5. $-10 < 5$ and $x > y$, so the answer is "yes"

NOT SUFFICIENT

0013

Is $x + y > a + b$?

(1) $x + y > 2a$
(2) $a > b$

---

(1) The answer depends on the value of b. If b is large the answer can be "no" and if b is small the answer can be "yes"

NOT SUFFICIENT

(2) This doesn't tell you the values of x or y.

NOT SUFFICIENT

(12)

If $a > b$, then $a+a > b+a$. So, $2a > a+b$.

Therefore, because $x+y > 2a$, then $x+y > a+b$.

SUFFICIENT

0014

What is the units digit of x?

(1) The tens digit of x is 3
(2) The tens digit of 10x is 6

---

(1) x could have many different values with different units digits, such as 31 or 35.

NOT SUFFICIENT

(2) When a number gets multiplied by 10, its units digit becomes its tens digit. For example, 15 (units digit 5) becomes 150 (tens digit 5). So, x must have a units digit of 6.

SUFFICIENT

0015

If $f(x) = ax^2 + bx + c$, does $f(2) = f(-2)$?

(1) $a = -1$
(2) $b = 0$

$f(x)=ax^2+bx+c$
$f(2)=a(2^2)+b(2)+c = 4a+2b+c$
$f(-2)=a((-2)^2)+b(-2)+c = 4a-2b+c$

Does f(2)=f(-2)?
Is 4a+2b+c = 4a-2b+c?
Is 2b=-2b?
Is 4b=0?
Is b=0?

(1) b could equal either 0 or something else.

To prove it, plug in -1 for a

f(2) = -4+2b+c
f(-2)=-4-2b+c
Is -4+2b+c=-4-2b+c?
Is 2b=-2b?
Is 4b=0?
This depends on whether b=0.

NOT SUFFICIENT
(2) SUFFICIENT

0016

What is the value of $x^2 + y^2$?

(1) x + y = 5
(2) x - y = -1

---

(1)

x+y=5
If x=0 and y=5, then $x^2 + y^2=0+25=25$
If x=1 and y=4, then $x^2 + y^2=1+16=17$

NOT SUFFICIENT

(2)

x-y=-1
If x=0 and y=1, then $x^2 + y^2=0+1=1$
If x=2 and y=3, then $x^2 + y^2=4+9=13$

NOT SUFFICIENT

(12)

x+y=5
x-y=-1

Use elimination to solve

2x=4
x=2
y=3

x^2+y^2=4+9=13

SUFFICIENT

0017

Of the students at a certain middle school, 175 are taking an art class and 43 are taking a music class. How many students are at the school?

(1) The number of students taking both an art class and a music class is equal to the number of students taking neither.
(2) The number of students not taking a music class is 132 greater than the number of students taking a music class.

Make a chart and fill in the given info.

	Art	No art	total
Music			43
No music			
Total	175		

(1) Fill in the additional info.

	Art	No art	total
Music	x		43
No music		x	
Total	175		

The number of students taking just an art class, is equal to the total students taking an art class, minus the number taking both. This is 175-x.

	Art	No art	total
Music	x		43
No music	175-x	x	
Total	175		

The number of students not taking a music class, is equal to the number taking just an art class, plus the number taking neither. This is 175-x + x = 175.

	Art	No art	total
Music	x		43
No music	175-x	x	175
Total	175		

So, the total number of students is 43+175 = 218.

SUFFICIENT

(2) The number of students not taking a music class is 132 greater than the number taking a music class, which is 43. So, there are 132+43 = 175 students not taking a music class.

Therefore, the total number of students is the sum of the number who are taking a music class, and the number who aren't. This is 43+175 = 218.

SUFFICIENT

0018

What is the value of x?

(1) $(x + 1)^2$ is 15 greater than x^2
(2) $(x - 1)^2$ is 13 less than x^2

---

(1) $(x+1)^2-x^2 = x^2+2x+1-x^2=2x+1$

2x+1=15
2x=14
x=7

SUFFICIENT

(2) $x^2-(x-1)^2 = x^2 -(x^2-2x+1) = 2x-1$

2x-1=13
2x=14
x=7

SUFFICIENT

0019

In a parking lot containing only black, white, and red cars, what is the probability that a randomly selected car is red?

(1) The number of red cars is $\frac{1}{2}$ of the number of cars that are not red.
(2) $\frac{1}{3}$ of the cars are black.

---

(1) red = 0.5(total-red)
red=0.5(total)-0.5(red)
1.5(red)=0.5(total)
red/total = 0.5/1.5 = 1/3

The answer is 1/3.

SUFFICIENT

(2) The remaining cars could be all red, all white, or anything in between.

NOT SUFFICIENT

0020

An upscale clothing store sells only dresses and suits. Yesterday, the store made total sales of $17,000. What percent of this amount came from sales of dresses?

(1) The average price of a dress was 1.5 times the average price of a suit.
(2) The number of dresses sold was 75% of the number of suits sold.

---

(1) This doesn't tell you how many dresses or suits were sold

NOT SUFFICIENT

(2) If dresses were very expensive, they could have been most of the $17,000. If dresses were very cheap, they could have been almost none of the $17,000, even though there were more of them sold than there were of suits.

NOT SUFFICIENT

(12)

The average price of a dress was 1.5 times the average price of a suit, but the number of dresses sold was only .75 times the number of suits sold. The total dollar amount the store makes for selling a certain item is theaverage price of that item, times the number of that item sold. So, the dollar amount the store made from selling dresses = 1.5*.75*dollar amount of suits, or 9/8 of the dollar amount of suits.

If the amount of dresses is 9/8 the amount of suits, then dresses+suits=17,000$ can be simplified as follows
9/8 suits + suits=17,000$
17/8 suits=17,000$
suits=8,000$
So, dresses =9,000$ and the percent can be calculated.

SUFFICIENT

0021

What was the average price of the 30 dresses sold by a certain clothing store last month?

(1) The 10 most expensive dresses cost an average of 480$ each.
(2) It would cost the same total amount to purchase the 10 most expensive dresses as it would to purchase the 20 least expensive dresses.

---

(1) The other 20 dresses could have cost any amount, as long as they cost less than the 10 most expensive ones.

NOT SUFFICIENT

(2) The average price of all 30 dresses depends on the numbers. For example, if the 20 least expensive dresses each cost $40, and the 10 most expensive dresses each cost $80, the average will be different from if the numbers are $400 and $800. But, both fit the statement.

NOT SUFFICIENT

(12) The total price of the 10 most expensive dresses is 480$ times 10 = 4,800$. So, the total price of the 20 least expensive is also 4,800$. The total price of all 30 dresses is 9,600$ and the average is 9,600$/30=$320.

SUFFICIENT

0022

Marcelo owns a total of 200 shares of various stocks with different prices. On two consecutive days, he recorded the price of each share. If every share changed in price from the first day to the second day, how many of the shares increased in price?

(1) The ratio of the number of shares that increased in price to the number of shares that decreased in price was 2:3.
(2) The ratio of the number of shares that decreased in price to the total number of shares was 3:5.

---

(1) i = number that increased, d = number that decreased

i+d=100
i/d = 2/3
Solve for i to answer the problem.

SUFFICIENT

(2)

i+d=100
i/(i+d)=3/5
Solve for i to answer the problem.

SUFFICIENT

0023

If $xQ \neq 0$, is $\frac{1}{x^Q} > Q^x$?

(1) Q = 1
(2) x = 1

---

(1) If Q=1, then Q^x equals 1^x which is always equal to 1. Also, x^Q is x^1, which equals x. Plug this into the question.

Is $\frac{1}{x^Q} > Q^x$?
Is $\frac{1}{x} > 1$?

This is true if x is a positive fraction, but it's false if x is another number.

NOT SUFFICIENT

(2) If x=1, then x^Q is equal to 1^Q which equals 1, and Q^x is equal to Q^1, which is Q.

So, the problem asks is $\frac{1}{1} > Q$?
Is Q < 1?

The answer depends on the value of Q.

NOT SUFFICIENT

(12) x=1 and Q=1. Plug this into the question

Is $\frac{1}{(1^1)} > 1^1$?
Is 1 > 1? "no"

SUFFICIENT

0024

If a > b > c, what is the average of a, b, and c?

(1) The average of a and b is 18
(2) The average of b and c is 13

What is $\frac{(a+b+c)}{3}$? You need to find the value of a+b+c to answer this.

(1)

$\frac{(a+b)}{2} = 18$
a+b = 36
c can be any number smaller than b

For example, a = 36, b = 0, c = -1, and the sum is 35
Or a = 19, b = 17, c = 15, and the sum is 51

NOT SUFFICIENT

(2)

$\frac{(b+c)}{2} = 13$
b+c = 26
a can be any number larger than b

For example, b = 26, c = 0, a = 27, and the sum is 53
Or b = 14, c = 12, a = 15, and the sum is 41

NOT SUFFICIENT

(12) a+b = 36 and b+c = 26. But, there are different possible values for a, b, and c.

For example, a = 19, b = 17, c = 26-17 = 9. The sum is 19+17+9 = 45, so the average is 15

Or, a = 20, b = 16, c = 26-16 = 10. The sum is 20+16+10=45, so the average is 15.3

NOT SUFFICIENT

0025

Is $x^y = y^x$?

(1) x = y
(2) x = 2

---

(1) If x = y, then $x^y = y^x$.

SUFFICIENT

(2) If x = 2, then x^y might equal y^x, for example, if y also = 2, the answer is "yes". But if y = 3, then $2^3 = 8$ but $3^2 = 9$, so the answer is "no"

NOT SUFFICIENT

0026

Sequence S is defined for all values of N ≥ 1. If N > 1, then $S_N = \frac{S_{N-1}}{2} - 3$. How many terms of sequence S are positive?

(1) $S_1 = 7$
(2) $S_2 = \frac{1}{2}$

Each term in the sequence is half the previous term, minus 3. The sequence starts at term 1.

(1) The entire sequence can be calculated from the first term:

7
$\frac{7}{2}-3 = 0.5$
$\frac{0.5}{2}-3 = -2.75$
etc.

Once the terms become negative, every term afterwards is negative, because dividing a negative number by 2 and subtracting 3 gives you another negative number. So, the only positive terms are the first two terms and the answer is 2 terms.

SUFFICIENT

(2) If the second term is $\frac{1}{2}$, then the first term is x.
$\frac{x}{2} - 3 = \frac{1}{2}$
$\frac{x}{2} = 3.5$
x = 7
So, the first term is 7 and the second term is $\frac{1}{2}$. After the second term, every term is negative, starting with -2.75. The answer is 2 terms.

SUFFICIENT

0027

What is the range of a set of three distinct numbers?

(1) The highest of the three numbers is 2.5 times the lowest of the three numbers.
(2) The median of the three numbers is 15,000.

---

(1) The answer changes depending on how big the three numbers are. For example, the numbers could be 1, 2, 2.5 (range of 1.5), or they could be 10, 11, 25 (range of 15).

NOT SUFFICIENT

(2) The middle number is 15,000. However, the smallest and largest numbers are not known.

NOT SUFFICIENT

(12)

There are multiple values for the smallest and largest numbers, with 15,000 in the middle. For example, the smallest number can be 10,000 and the largest number can be 25,000, and the range is 15,000.

Or, the smallest number is 8,000 and the largest number is 20,000, and the range is 12,000.

NOT SUFFICIENT

0028

Is the number 33 in the sequence A?

(1) The first term of sequence A is 2.
(2) Each term of sequence A is 2 greater than the previous term.

---

(1) This doesn't give enough info about the rest of the terms of the sequence.

NOT SUFFICIENT

(2) 33 could be in the sequence, for example, if 33 is the first term. Or, if the first term is even, all of the other terms would be even, so 33 would not be in the sequence.

NOT SUFFICIENT

(12) If the first term is even, then all of the other terms will be even, so 33 can't be in the sequence. So, the answer is "no"

SUFFICIENT

0029

Is $xy > 0$?

(1) $x - y < x$
(2) $y - x < y$

---

(1)

$x-y < x$
$x < x+y$
$0 < y$

NOT SUFFICIENT

(2) $y-x < y$
$y < y+x$
$0 < x$

NOT SUFFICIENT

(12) $y > 0$ from statement 1 and $x > 0$ from statement 2

SUFFICIENT

0030

Substance A is a mixture of two chemicals, X and Y. If X costs $1.40 per gallon and Y costs $14.70 per gallon, what is the cost of four gallons of Substance A?

(1) The ratio of X to Y in Substance A is 1:6.
(2) A gallon of Substance A costs $4.55 more than a gallon of Substance B, which contains a 1:1 mixture of X and Y.

---

(1) Combining 1 gallon of X and 6 gallons of Y has a price of $1.40 + 6*$14.70 = $89.60. This is the price of 7 gallons of Substance A. Multiply by 4/7 for the price of 4 gallons of Substance A.

SUFFICIENT

(2) The price of a 1:1 mixture of X and Y is $1.40 + $14.70 = $16.10 for 2 gallons or $8.05 for 1 gallon. Add $4.55 to find the price of one gallon of A = $12.60, then multiply by 4 to answer the problem.

SUFFICIENT

0031

The length of a rug is x feet and its width is 3 feet less than its length. What is the area of the rug, in square feet?

(1) $x^2 - 3x - 10 = 0$
(2) $x^2 - 12x + 35 = 0$

The area of the rug is $x(x-3)$.

(1)

$x^2-3x-10=0$
$(x-5)(x+2)=0$
$x=5$ or -2
Because the rug can't have a negative length, x must equal 5 and the area is $5(5-3)=10$.

For a different solution,

$x^2-3x-10=0$
$x^2-3x=10$
$x(x-3)=10$

The area is 10.

SUFFICIENT

(2)

$x^2-12x+35=0$
$(x-5)(x-7)=0$

x=5 or 7
If x=5, then the area is 5(5-3) = 5(2)=10
If x=7, then the area is 7(7-3) = 7(4) = 28

NOT SUFFICIENT

0032

If x and y are positive integers, then does $x^2 - y^2 = 48$?

(1) $6 < x < 9$
(2) $y < 5$

---

(1) Test numbers.

If x=7, then x^2=49. So, if y=1, then x^2-y^2=49-1=48. Or, if y=2, then x^2-y^2 does not equal 48.

NOT SUFFICIENT

(2) The same two cases from statement 1 work here.

NOT SUFFICIENT

(12) Because the same two cases work for both statements, the statements are still insufficient together.

NOT SUFFICIENT

0033

The cost of a gallon of green paint is the sum of the costs of the amounts of blue and yellow paint used to create it. What is the cost per gallon of green paint that consists of 75% yellow paint and 25% blue paint?

(1) A type of green paint that consists of 60% yellow paint and 40% blue paint costs $6.35 per gallon.
(2) Yellow paint costs $5.75 per gallon.

---

(1) y = cost of a gallon of yellow paint
b = cost of a gallon of blue paint

.6y + .4b = 6.35

6y + 4b = 63.5

y = (63.5-4b)/6

The question asks for the sum of .75y + .25b

.75(63.5-4b)/6 + .25b
(63.5-4b)/8 + .25b
63.5/8 - .25b
Without knowing the value of b, you can't calculate the answer to the problem.

NOT SUFFICIENT

(2) You'd need the cost of blue paint as well in order to answer the problem.

NOT SUFFICIENT

(12)

.6y + .4b = 6.35
.6(5.75)+.4b = 6.35
.4b = 2.9
b = 2.9/.4 = 29/4 = 14.5/2 = 7.25

With the cost of both blue paint and yellow paint the problem can be answered.

SUFFICIENT

0034

What is the value of √x + √y?

(1) √(x + y) = 5
(2) x - y = 7

---

(1) √(x+y) = 5
x+y = 25
√x + √y can have different values depending on the value of x and y.
For example, if x=25 and y=0, then √x+√y=5+0=5
If x=16 and y=9, then √x+√y=4+3=7

NOT SUFFICIENT

(2) x-y=7

If x=7 and y=0, √x+√y=√7+√0=√7
If x=100 and y=93, √x+√y=√100+√93, which is much larger

NOT SUFFICIENT

(12)
√(x+y)=5
x+y=5

Use elimination to find the values of x and y

x+y=25
x-y=7
2x=25+7=32
x=16
y=9

√x+√y=√16+√9=4+3=7

SUFFICIENT

0035

Is x > ½?

(1) $x^2 > \frac{1}{4}$
(2) $x^2 > x$

---

(1) If $x^2 > \frac{1}{4}$, then x > ½ or x < -½.

NOT SUFFICIENT

(2) x^2 is greater than x for positive numbers greater than 1, and for all negative numbers. However, between 0 and 1, this is not true. So, all you know is that x is not between 0 and 1.

NOT SUFFICIENT

(12) x is either greater than $\frac{1}{2}$ or less than $-\frac{1}{2}$.
Also, x is not between 0 and 1.
So, x can be any number less than $-\frac{1}{2}$. Or, x can be greater than 1.

NOT SUFFICIENT

0036

What is the cost of 16 bagels and 6 donuts?

(1) 8 bagels and 3 donuts cost 21.30$.
(2) 10 bagels and 4 donuts cost 27$.

---

(1) $8b + 3d = 21.3$
Double this equation.
$2(8b+3d)=2(21.3)$
$16b+6d=42.6$
The answer is $42.60

SUFFICIENT

(2) $10b+4d=27$
This isn't an even multiple or factor of 16b+6d, unlike statement 1
And if you test cases, you can see that the cost in the question is different depending on the exact numbers for b and d. For example, if $b=0$, then $d=\frac{27}{4}$, and $16b+6d = 16(0) + 6(\frac{27}{4}) = 40.5$. If $d=0$, then $b=2.7$, and $16b+6d=16(2.7)=43.2$.

NOT SUFFICIENT

0037

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of xy is 0.
(2) The units digit of x^2 is 5.

---

(1) Test cases.

$x=2,y=5$ ($xy=10$ which has a units digit of 0)
$x^y = 32$, the answer is 2
$x=5,y=2$ ($xy=10$ which has a units digit of 0)
$x^y=25$, the answer is 5

NOT SUFFICIENT

(2) The only way for a number to have a units digit of 5 after it is squared, is for the number itself to have a units digit of 5. For example, 15^2 and 35^2 have units digits of 5.

So, x has a units digit of 5. If it is raised to any positive integer power, it still has a units digit of 5, so the answer is 5.

SUFFICIENT

0038

In a room full of people and dogs, each person has 2 legs and each dog has 4 legs. What is the ratio of people to dogs in the room?

(1) The ratio of people to legs is 9:40.
(2) The number of dogs is 7 less than the number of people.

---

legs = 2p + 4d
p:d = ?

(1)

people:legs = 9:40

p:2p+4d = 9:40

Write the ratio as fraction

$\frac{p}{(2p+4d)} = \frac{9}{40}$

Simplify the fraction
$\frac{p}{(p+2d)} = \frac{9}{20}$
20p = 9p+18d
11p = 18d
$\frac{p}{d} = \frac{18}{11}$

The ratio of people to dogs is 18 to 11

SUFFICIENT

(2)

d = p - 7

The ratio of people to dogs can vary.

For example, if d = 1 and p = 8, the ratio is 8:1
If d = 2 and p = 9, the ratio is 9:2

These ratios are different

NOT SUFFICIENT

0039

Is x + y > 0?

(1) xy > 0
(2) $xy^2 > 0$

---

(1) x and y are both positive or x and y are both negative. If they're both positive, the answer is "yes." If they're both negative, the answer is "no."

NOT SUFFICIENT

(2) y^2 must be positive (or 0). Because $xy^2 > 0$, then x and y^2 are both positive. So, x is positive. But, y could be positive or negative. So, x+y could be positive or negative.

NOT SUFFICIENT

(12) Statement 2 tells you x is positive. Statement 1 tells you x and y have the same sign, so they're both positive. So, the answer is

"yes."

SUFFICIENT

0040

Is x^2 - x > x - 1?

(1) x^2 = x
(2) x = 0

Is x^2 - x > x-1?
x^2 - 2x + 1 > 0
$(x-1)^2$ > 0

This is always true unless x=1, because $(1-1)^2$ is equal to 0 (not greater than 0).

So the question really asks, is x=0?

(1) x could equal 0, or x could equal 1.

NOT SUFFICIENT

(2) if x equals 0, then the answer is "yes"

SUFFICIENT

0041

Taxi service A charges a$ per trip plus an additional x dollars per mile. Taxi service B charges b$ per trip plus an additional y dollars per mile. For a trip of 6 miles, does A charge more than B?

(1) a>6y
(2) 6x > b

The charge from service A is a + 6x
The charge from service B is b + 6y
Is a+6x > b+6y?

(1) b could be either a very large or very small base charge, which would make service B either more or less expensive.

For example, a=10, x=1, b=100, y=1: B is more expensive

Or, a=10, x=1, b=0, y=1: B is less expensive

NOT SUFFICIENT

(2) a could be either a very large or very small base charge, which would make service A either more or less expensive.

For example, a=10, x=1, b=0, y=100: B is more expensive

Or, a=10, x=1 b=0 y=1: B is less expensive

NOT SUFFICIENT

(12) If a > 6y and 6x > b, then sum the two inequalities. a+6x > b+6y, so service A costs more. "yes"

SUFFICIENT

0042

If a and b are integers, is ab even?

(1) 10a is even
(2) 9b is even

---

(1) 10a will be even no matter what the value of a is. If a is odd, then 10a will be even, and if a is even, then 10a will be even. So, you don't know anything about a, and the statement doesn't say anything about b.

NOT SUFFICIENT

(2) If 9b is even, that only happens when b is even. So, b is even, which means ab is even. "yes"

SUFFICIENT

0043

How long will it take Nick, working at a constant rate, to paint a 100 square foot wall?

(1) If his rate of painting were 20 square feet per hour faster than it is now, it would take Nick 1 hour to paint the wall.
(2) If Nick painted 25% faster, it would take him 1 hour to paint the wall.

Nick's current rate = r square feet per hour

Work = Rate * Time

100 = r * Time
Time = $^{100}/_{r}$ = ?

(1) If it took Nick 1 hour to paint the wall, then he would have to paint at 100 square feet per hour. This is 20 higher than his actual rate, so his rate is 80 square feet per hour. 100/80 = 1.25 hours.

SUFFICIENT

(2) If it took Nick 1 hour to paint the wall, then he would have to paint at 100 square feet per hour. This is 25% higher than his actual rate, so his rate is $^{100}/_{1.25}$ = 80 square feet per hour. $^{100\text{ square feet}}/_{80\text{ square feet per hour}}$ = 1.25 hours.

SUFFICIENT

0044

If x is a positive integer, how many distinct positive integers 0 < i ≤ x are there for which x is divisible by i?

(1) x = ab, where a and b are distinct positive integers.
(2) a and b are prime.

The question asks how many factors x has.

(1) The total number of factors depends on what a and b are.
a = 1, b = 2
x = 1*2 = 2
x has 2 factors (1 and 2)

a = 2, b = 4

x=2*4=8
x has 4 factors (1, 2, 4, 8)

NOT SUFFICIENT

(2) This statement gives you no info about x.

NOT SUFFICIENT

(12) x is the product of exactly two different primes, such as 2 and 3, 5 and 7, or 3 and 7. Test cases.

x = 2*3 = 6
x has 4 factors (1, 2, 3, 6)
x = 5*7 = 35
x has 4 factors (1, 5, 7, 35)
x = 3*7 = 21
x has 4 factors (1, 3, 7, 21)

Because a prime number can't be divided up any more than it already is, no smaller factors can come out of a and b. Therefore, the factors of x will always be 1, a, b, and x itself, so there will always be 4 factors.

SUFFICIENT

0045

Joe, Kip, and Leon each have a different amount of money, with Joe having the smallest amount and Leon having the biggest amount. How much money does Leon have?

(1) The median amount of money is 242$.
(2) The average (mean) amount of money is 266$.

---

(1) Kip has the middle amount of money, so Kip has 242$. Leon's amount of money is unknown, except that it's bigger than 242$.

NOT SUFFICIENT

(2) $^{(J+K+L)}/_{3}$=266
J+K+L=798$
However, Leon's exact amount is unknown

NOT SUFFICIENT

(12) J+K+L = 798 and K=242.

J+242+L=798
J+L=556
There are multiple possibilities, like L=556 and J=0, or L=546 and J=10.

NOT SUFFICIENT

0046

How many cups of milk did Joyce use in a certain recipe?

(1) Out of the total amount of milk she started with, Joyce drank 1 cup and then used $^1/_3$ of the remainder in the recipe.
(2) After Joyce finished the recipe she had 2 cups of milk remaining.

---

m = starting amount of milk

(1) Joyce used $\frac{1}{3}$(m-1) cups. Without knowing m this cannot be solved.

NOT SUFFICIENT

(2) This provides no information about the amount of milk used.

NOT SUFFICIENT

(12)

The starting amount was m cups
Joyce drank 1 cup, leaving m-1 cups
Then she used 1/3 of the remainder, leaving $\frac{2}{3}$(m-1) cups
She has 2 cups remaining, so $\frac{2}{3}(m-1) = 2$
Simplify the equation.

2(m-1)=6
m-1=3
m=4

The starting amount of milk was 4 cups. Joyce used $\frac{1}{3}(m-1)=\frac{1}{3}(3)=1$ cup.

SUFFICIENT

0047

In 2014, 15% of the 1,800 employees of Company X worked remotely. How many of Company X's employees worked remotely in 2020?

(1) The number of employees working remotely increased by 20% from 2014 to 2020.
(2) The total number of employees at Company X increased by 360 from 2014 to 2020, but the percent of employees who worked remotely stayed the same.

In 2014, 0.15*1,800=270 employees worked remotely.

(1) The answer is 1.2*270.

SUFFICIENT

(2) The answer is 0.15*(1,800+360).

SUFFICIENT

0048

In isosceles triangle ABC, what is the degree measure of angle A?

(1) The degree measure of angle B is 20.
(2) The degree measure of angle C is greater than the degree measure of angle A.

Because ABC is isosceles, it has two angles that are equal.

(1) If angle B is 20, then the other two angles are either 20 and 140, or 80 and 80. So, A can be 20, 140, or 80.

NOT SUFFICIENT

(2) This statement gives no information about the angle measures.

NOT SUFFICIENT

(12) The three angles of the triangle are either 20, 20, and 140 or 20, 80, and 80. In the first case, A > C implies that A=140 and C=20. In the second case, B=20, so A and C both equal 80. But, this is against statement 2, so this is impossible. A=140.

SUFFICIENT

0049

Substance X is made from a mixture of chemicals A, B, and C, in a ratio of 1:3:5. How many gallons of chemical C are needed to produce *g* gallons of substance X?

(1) 4 gallons of chemical A are needed to produce *g* gallons of substance X.
(2) The number of gallons of chemical B needed to produce *g* gallons of substance X is 8 more than the number of gallons of chemical A needed to produce *g* gallons of substance X.

---

(1) The chemicals are in a ratio of 1:3:5. So, if 4 gallons of A are needed, the ratio is 4:12:20. The answer is 20.

SUFFICIENT

(2) The number of gallons of B is 8 more than the number of gallons of A. According to the ratio, the number of gallons of B is 3 times the number of gallons of A. So, B = 3A and B = A+8. Solve:

B = 3A = A+8
2A = 8
A = 4

If 4 gallons of A are needed then 20 gallons of C are needed.

SUFFICIENT

0050

If x and y are integers, is $^{xy}/_{2}$ an integer?

(1) x = y + 3
(2) x = 2y

This question asks if xy is even.

(1) x=y+3. So, if x is even, then y is odd and vice versa. One of the two integers must be even. So, their product is even and the answer is "yes"

SUFFICIENT

(2) x=2y. So, $^{xy}/_{2} = {}^{(2y*y)}/_{2} = y^2$. y is an integer, so y^2 is an integer. "yes"

SUFFICIENT

0051

Did Kerry complete her 1 mile walk in under 30 minutes?

(1) Her minimum speed while walking was 2.2 miles per hour.
(2) Her maximum speed while walking was 3.4 miles per hour.

---

(1) If her minimum speed was 2.2 miles per hour, the greatest amount of time she could have taken was $\frac{1}{2.2}$ hours, which is less than 1/2 hour (and therefore, less than 30 minutes). Therefore, she took less than 30 minutes in total and the answer is "yes"

SUFFICIENT

(2) If she walked at 3.4 miles per hour the whole time, she would have completed the walk in under 20 minutes. However, since this is a maximum speed, she could have also completed the walk much more slowly.

NOT SUFFICIENT

0052

If $xy \neq 0$, is $x^y > x^2$?

(1) $y > 2$
(2) $x > 0$

---

(1) If y = 3, then the answer to the problem still depends on what x is. For example,

y = 3, x = -1
$(-1)^3 = -1$ and $(-1)^2 = 1$
-1 < 1 "no"

y = 3, x = 2
$2^3 = 8$ and $2^2 = 4$
8 > 4 "yes"

NOT SUFFICIENT

(2) Which one is greater depends on the value of y. For example,

x = 2, y = 1

$2^1 = 2$, $2^2 = 4$
2 < 4 "no"

x = 2, y = 3
$2^3 = 8$, $2^2 = 4$
8 > 4 "yes"

NOT SUFFICIENT

(12) The answer is different depending on if x is a fraction. For example, if x is not a fraction,

x = 3, y = 3

$3^3 = 27$, $3^2 = 9$
27 > 9 "yes"

$x = \frac{1}{2}$, y = 3

$(\frac{1}{2})^3 = \frac{1}{8}$, $(\frac{1}{2})^2 = \frac{1}{4}$
$\frac{1}{8} < \frac{1}{4}$ "no"

NOT SUFFICIENT

0053

What is the value of x^3?

(1) $x^2 = 4$
(2) $x^5 = 32$

---

(1) If $x^2 = 4$, then x can be either 2 or -2. If x = 2, then $x^3 = 8$, but if x = -2, then $x^3 = -8$.

NOT SUFFICIENT

(2) If $x^5 = 32$, then x must be positive 2. So, $x^3 = 8$.

SUFFICIENT

0054

Is $x > y^2$?

(1) $x > |y|$
(2) $y < 0$

---

(1) $x > |y|$ means that if y is positive then $x > y$, and if y is negative then $x > -y$. But, x can be bigger or smaller than y^2.

For example, x=10, y=1. $10 > |1|$, and $10 > 1^2$. "yes"

Or, x=3, y=2. $3 > |2|$, and $3 < 2^2$. "no"

NOT SUFFICIENT

(2) y is negative, but x is unknown.

NOT SUFFICIENT

(12) y is negative, and $x > |y|$. But, x can be bigger or smaller than y^2. For example, y = -2 and x=3. $3 < (-2)^2$, so the answer is "no"

Or, y=-2 and x=100. $100 > (-2)^2$, so the answer is "yes"

NOT SUFFICIENT

0055

Is $x^2 + x < 1$?

(1) $x < \frac{1}{2}$
(2) $x^2 < \frac{1}{4}$

---

(1) Test cases.
x=0
$0^2 + 0 = 0$
0 < 1 "yes"

x=-10
$(-10)^2 + (-10) = 90$
90 > 1 "no"

NOT SUFFICIENT

(2) If $x^2 < \frac{1}{4}$, then x is between $-\frac{1}{2}$ and $\frac{1}{2}$. So, the biggest that $x^2 + x$ can be is $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$. So, $x^2 + x$ must be less than 1. "yes"

SUFFICIENT

0056

Is x + y > a + b?

(1) x - a > y - b
(2) x - y > a - b

---

(1) Simplify the statement.

x-a > y-b
x-a-y > -b
x-y > a-b

The answer depends on the values of x,y,a, and b.

For example,

x = 5, y=3, a=2, b=1

5-3 > 2-1
5+3 > 2+1 "yes"

Or,

x=3, y=1, a=5, b=4

3-1 > 5-4
3+1 < 5+4 "no"

NOT SUFFICIENT

(2) This statement gives the same info as statement 1. See the cases above which also show this statement insufficient.

NOT SUFFICIENT

(12) Both statements have the same info in different forms. So, using both statements gives you no extra info and you still can't answer the problem.

NOT SUFFICIENT

0057

If a > b > c, is b less than 15?

(1) The average of a and b is 12
(2) The average of b and c is 6

---

(1) If the average of a and b is 12, then $(a+b)/2$ = 12, so a+b = 24

Also, a > b.

So, b has to be less than 12. If b was greater than 12, and a ws greater than b, then a+b would have to be greater than 24. So, this is impossible.

If b is less than 12, b must be less than 15. "yes"

SUFFICIENT

(2) If the average of b and c is 6, then b+c = 12.

This could have multiple values of b, such as

b = 20, c = -8 "no"
b = 10, c = 2 "yes"

NOT SUFFICIENT

0058

What is the units digit of the integer x?

(1) The units digit of 2x is 4.
(2) The units digit of 3x is 1.

---

(1)
x = 2, 2x=4 (answer is 2)
x = 7, 2x=14 (answer is 7)

NOT SUFFICIENT

(2)
The only number that has a units digit of 1 when multiplied by 3 is a number with a units digit of 7 (7*3=21). Double check by testing other odd numbers (even numbers will have an even units digit always). 1*3=3,3*3=9,5*3=15,9*3=27. Therefore, x has a units digit of 7.

SUFFICIENT

0059

A teacher bought crayons and markers for the classroom. What was the ratio of the number of crayons to markers purchased?

(1) The ratio of the price of one crayon to the price of one marker is 1:2.
(2) The ratio of the amount the teacher spent on crayons to the amount the teacher spent on markers is 5:4.

---

c = crayons
m = markers

(1) Provides no info about the number of crayons or markers.

NOT SUFFICIENT

(2) provides no info about the number of crayons or markers, without info about the prices

NOT SUFFICIENT

(12) The price of a crayon is $\frac{1}{2}$ of the price of a marker. But, the teacher spent $\frac{5}{4}$ = 1.25 times as much on crayons as they did on markers. That means the teacher must have purchased more crayons. Specifically, the teacher must have purchased 2.5 times as many crayons as markers, so the ratio must be 2.5:1 or 5:2.

0060

Will Darren read a certain novel in under 4.5 hours?

(1) The novel has fewer than 165 pages.
(2) Darren reads at a rate of 1.8 minutes per page.

---

(1) This doesn't tell you about how fast Darren reads.

NOT SUFFICIENT

(2) This doesn't tell you how long the book is.

NOT SUFFICIENT

(12) If Darren reads 1.8 minutes per page, then 165 pages would take 1.8*165 = 297 minutes.

4.5 hours = 4.5*60 minutes = 270 minutes.

So, if the novel has 164 pages, then it will take more than 4.5 hours and the answer will be "no". If the novel has 100 pages, then it will take less than 4.5 hours and the answer will be "yes".

NOT SUFFICIENT

0061

Is x equal to 16?

(1) $0 \le x - 16 \le 16 - x$
(2) $16x = (x+16)x - 16x$

---

(1) Simplify $0 \le x-16$.

$16 \le x$

Simplify $x-16 \le 16-x$.

$2x \le 32$
$x \le 16$

The only number that is both ≥ 16 and ≤ 16 is 16. $x=16$.

SUFFICIENT

(2)

$16/x = (x+16)/x - 16/x$
$16/x = x/x$
$16/x = 1$
$x = 16$

SUFFICIENT

0062

What percent of students in a certain class passed the final exam?

(1) The number that passed the final exam is 12 greater than the number that failed the final exam.
(2) The number that failed the final exam is 25% of the number that passed the final exam.

---

(1) The answer to the problem depends on how many students are in the class. For example, if there are 14 students, and 1 failed and 13 passed, the percent that passed is 13/14*100 which is about 93%. If there are 100 students, and 56 passed and 44 failed, then the percent that passed is only 56%.

NOT SUFFICIENT

(2) For every 1 student that failed, 4 times as many students passed. So, out of every 5 students, 1 failed and 4 passed. 80% of the students passed.

SUFFICIENT

0063

If a > b > c, is abc = 0?

(1) ac < b
(2) ab = bc

---

(1) abc can be 0. For example, if a=1, b=0, and c=-1, then ac < b and abc=0.

Or, abc can have a value other than 0. For example, if a = 2, b = 1, and c = -1, then ac < b and abc = -2.

NOT SUFFICIENT

(2) There are two ways for ab to equal bc. First, a and c can be equal. However, this is impossible, because the problem says a > b > c. So, the other possibility is that ab=bc because b=0. This must be true. Since b=0, then abc=0 and the answer is "yes"

SUFFICIENT

0064

In a certain sequence, each term is 4 greater than the previous term. How many terms are in the sequence?

(1) The last term of the sequence is 54.
(2) The first term of the sequence is 10.

---

(1) The first term could be anything less than 54. For example, if the first term is 50, then there are only 2 terms in the sequence, 50 and 54.

NOT SUFFICIENT

(2) The last term could be anything greater than 10. For example, if the last term is 14, then there are only 2 terms in the sequence, 10 and 14.

NOT SUFFICIENT

(12) You can write the sequence out exactly and count the terms: 10, 14, 18, ..., 46, 50, 54.

SUFFICIENT

0065

What percent of x is y?

(1) x is 250% of y
(2) xy = 10

$^{y}/_{x}$ = ?

(1) x = 2.5y

$1 = {}^{2.5y}/_{x}$
${}^{y}/_{x} = {}^{1}/_{2.5} = {}^{2}/_{5} = 40\%$

SUFFICIENT

(2) xy = 10
y can be a different percent of x, depending on the values of x and y

For example, if x = 1 and y = 10, then y is 1,000% of x
But if x = 5 and y = 2, then y is 40% of x

NOT SUFFICIENT

0066

When randomly choosing a marble from a bag containing black, blue, and white marbles, what is the probability of choosing a black marble?

(1) The probability of not drawing a blue marble is 1/2.
(2) The probability of not drawing a white marble is 5/6.

To answer the problem you need the fraction of marbles that are black.

(1) $\frac{1}{2}$ of the marbles are blue. So, the other $\frac{1}{2}$ of the marbles are either black or white. However, the fraction that are black could be anywhere from 0 to $\frac{1}{2}$.

NOT SUFFICIENT

(2) 1/6 of the marbles are white. So, 5/6 of the marbles in total are either black or blue. However, the fraction of marbles that are black could be anywhere from 0 to $\frac{5}{6}$.

NOT SUFFICIENT

(12) $\frac{1}{2}$ of the marbles are blue and $\frac{1}{6}$ of them are white. So, the last $\frac{1}{3}$ is black.

SUFFICIENT

0067

Mitchell buys a sweater and a pair of pants, and pays a 4% sales tax on both. If the pre-tax price of the sweater was 50$, what was the total amount that Mitchell paid?

(1) Mitchell paid a total of $4.32 in sales tax.
(2) The sales tax on the pants was $2.32.

---

p = price of pants

(1) The tax is .04(50 + p)

.04(50 + p) = 4.32

p can be calculated, and the total amount paid is p+50

SUFFICIENT

(2)

.04p = 2.32

p can be calculated, and the total amount paid is p+50

SUFFICIENT

0068

Is $x > 0$?

(1) $xy^2 > 0$
(2) $x > y^2$

---

(1) y^2 is always either 0 or positive. And, y^2 can't be 0, because the product xy^2 is not 0. So, y^2 is positive. Because the product xy^2 is positive, then x must be positive as well.

SUFFICIENT

(2) y^2 is always 0 or positive. The very least y^2 can be is 0, so x must be greater than 0.

SUFFICIENT

0069

If a and b are integers, is a + b odd?

(1) $a^2 + b^2$ is odd
(2) $a^3 + b^3$ is odd

---

a^2 and a^3 are always the same as a, even or odd. For example, if a is even, then a^2 and a^3 are also even, and vice versa.

(1) If $a^2 + b^2$ is odd, then a^2 and b^2 are opposites. Either a^2 is odd and b^2 is even, or a^2 is even and b^2 is odd.

So, either a is odd and b is even, or a is even and b is odd.

So, a+b is odd. "yes"

SUFFICIENT

(2) If $a^3 + b^3$ is odd, then a^3 and b^3 are opposites. Either a^3 is odd and b^3 is even, or a^3 is even and b^3 is odd.

So, either a is odd and b is even, or a is even and b is odd.

So, a+b is odd. "yes"

SUFFICIENT

0070

Are at least 40% of the books in a certain library fiction?

(1) The number of fiction books is at least 2/3 the number of nonfiction books.
(2) The number of nonfiction books is at most 50% greater than the number of fiction books.

Because this problem only uses relationships and not exact numbers, you can assume that there are 100 books in the library. Are there at least 40 fiction books?

(1) $f \geq \frac{2}{3} n$

$f + n = 100$

$f \geq \frac{2}{3} (100 - f)$

$f \geq \frac{200}{3} - \frac{2}{3} f$
$\frac{5}{3} f \geq \frac{200}{3}$
$5f \geq 200$
$f \geq 40$

SUFFICIENT

(2) $n \leq 1.5f$
$f + n = 100$
$100 - f \leq 1.5f$
$100 \leq 2.5f$

$f \geq \frac{100}{2.5}$
$f \geq 40$

SUFFICIENT

0071

What is the value of x?

(1) $\frac{(x + 4y)}{2} = 2y - x + 3.5$
(2) $(3x)^2 = 49$

---

(1)

Simplify.

$\frac{(x+4y)}{2} = 2y-x+3.5$
$x+4y = 2(2y-x+3.5)$
$x+4y = 4y - 2x + 7$
$x = -2x + 7$
$3x = 7$
$x = \frac{7}{3}$

SUFFICIENT

(2)

Simplify.
$3x = 7$ or -7
$x = \frac{7}{3}$ or $\frac{-7}{3}$

NOT SUFFICIENT

0072

If x and y are integers, what is the units digit of x?

(1) The units digit of y is greater than 3.
(2) The units digit of x + y is less than 3.

---

(1) This gives you no information about x.

NOT SUFFICIENT

(2) Without information about y, this gives you no information about x.

NOT SUFFICIENT

(12) Test cases. The units digit of x+y is less than 3, which is smaller than the units digit of y alone. So, x must be large enough, that adding it to y causes the units digit of y to "wrap around" as the tens digit increases. For example, adding 9 to 3 to get 12 (which has a smaller units digit).

y = 4
x = 8
4+8 = 12 which has a units digit of 2
The answer is x=8

y = 4
x = 7
4+7 = 11 which has a units digit of 1
The answer is x=7

NOT SUFFICIENT

0073

A driver drove in a straight line from Oriole to Brennon by way of Yellow Springs, without stopping. What was his average speed for the entire trip?

(1) The distance from Oriole to Brennon is 1.7 times the distance from Yellow Springs to Brennon.
(2) The driver traveled from Oriole to Yellow Springs at an average speed of 56 mph, and from Yellow Springs to Brennon at an average speed of 48 mph.

---

(1) If the distance from Yellow Springs to Brennon is d miles, then the distance from Oriole to Brennon is 1.7d miles. Therefore, the distance from Oriole to Yellow Springs is 1.7d-d = 0.7d miles.

However, without knowing the time spent traveling, the average speed can't be found.

NOT SUFFICIENT

(2) If Yellow Springs is very close to Oriole, the overall average speed will be much closer to the speed between Yellow Springs and Brennon (48 mph), because the driver spends much more time traveling at that speed. Similarly, if Yellow Springs is very close to Brennon, the overall average will be closer to 56 mph. Without knowing where the places are relative to each other, the overall average speed can vary.

NOT SUFFICIENT

(12) The driver goes 56 mph for 0.7d miles, then 48 mph for d miles.

The time for the first part of the trip is $^{0.7d}/_{56} = {^{7d}/_{560}} = {^{d}/_{80}}$

The time for the second part of the trip is $^{d}/_{48}$.

So, the total time is $^{d}/_{80} + {^{d}/_{48}} = {^{6d}/_{480}} + {^{10d}/_{480}} = {^{16d}/_{480}} = {^{d}/_{30}}$ hours.

Total distance is 1.7d miles.

Average speed = $^{1.7d\text{ miles}}/_{(d/30\text{ hours})}$ = 1.7d * $^{30}/_{d}$ = 1.7*30 = 51 mph.

SUFFICIENT

0074

If x is 40% of y, what percent of y + 10 is x + 10?

(1) x = 10
(2) y = 25

x = .4y

(1) If x = 10, then 10=.4y, so y can be calculated as $^{10}/_{.4}$ = 25. So, you know x and y and can answer the question.

SUFFICIENT

(2) If y =25, then x = .4y = 10. So, you know x and y and you can answer the quesiton.

SUFFICIENT

0075

During his workout, did Irving complete a lap of a 1/4 mile track in under 2 minutes?

(1) Irving ran around the track for 1 hour at a constant speed of greater than 8 mph.
(2) Irving ran more than 30 laps of the track in 1 hour.

Irving ran 1 lap in under 2 minutes if his average speed for that lap was greater than a certain speed.

To run $^1/_4$ mile in 2 minutes
you would be running 1 mile in 4 times as long, or 2*4 = 8 minutes
That corresponds to a rate of $^1/_8$ mile per minute
$^1/_8$ mile per minute = $^{60}/_{8 \text{ miles per hour}}$
7.5 miles per hour

(1) Irving's speed is always greater than 8 mph, so he must have run a lap at greater than 7.5 miles per hour.

SUFFICIENT

(2) Irving ran more than 30 laps in 1 hour. If every lap was slower than 2 minutes, then he would have taken more than 60 minutes to run more than 30 laps. So, some of the laps must have been faster than 2 minutes.

SUFFICIENT

0076

If 4x ≠ -7y, what is the value of $^{(2x + 3y)}/_{(4x + 7y)}$?

(1) $^{2x}/_{7y} = {}^1/_7$
(2) $^{3y}/_{4x} = {}^3/_2$

(1) Simplify.

$2x = {}^1/_7(7y)$
2x = y

Plug this into the question and try to simplify it to get a value.

$^{(2x+3y)}/_{(4x+7y)} = ?$
$^{(2x+6x)}/_{(4x+14x)}$
$^{8x}/_{18x}$
$^{8}/_{18}$
$^{4}/_{9}$

SUFFICIENT

(2) Simplify.

$^{3y}/_{4x} = ^{3}/_{2}$
$3y = ^{3}/_{2}(4x)$
$3y = 6x$
$y = 2x$

Plug this into the question and try to simplify it to get a value.

$^{(2x+3y)}/_{(4x+7y)} = ?$
$^{(2x+6x)}/_{(4x+14x)}$
$^{8x}/_{18x}$
$^{8}/_{18}$
$^{4}/_{9}$

SUFFICIENT

0077

Is xy > 0?

(1) $x^3 > x$
(2) $x^3y > 0$

---

(1) Simplify the statement.

$x^3 > x$
$x^3 - x > 0$
$x(x^2 - 1) > 0$

So, either x is positive and x^2-1 is positive, or else x is negative and $x^2 - 1$ is negative. That happens either when x is a positive number bigger than 1, or when x is a negative number between -1 and 0 (a negative fraction).

But, you don't know whether y is positive or negative, so you can't answer.

NOT SUFFICIENT

(2) If x^3 is positive, then x is positive. If x^3 is negative, then x is negative. So, x^3y will be the same (positive or negative) as xy. Therefore, xy > 0.

Another way to look at it is dividing both sides by x^2 (this is allowed because x^2 is positive, so you don't have to flip the inequality). So, $^{x^3y}/_{x^2} > ^{0}/_{x^2}$. So, xy > 0.

SUFFICIENT

0078

The cost of a gallon of orange paint is the sum of the costs of the amounts of red and yellow paint used to make it. What is the cost of a gallon of orange paint consisting of 75% yellow paint and 25% red paint?

(1) 1 gallon of red paint and 5 gallons of yellow paint costs a total of $39.50.
(2) 2 gallons of red paint and 6 gallons of yellow paint costs a total of $52.

---

(1) The total amount of paint is 6 gallons and 5/6 is yellow while 1/6 is red. So, r + 5y = 39.50. But, you can't use this to calculate the cost of a 75/25 mixture. You need to solve for .75y + .25r, but if you plug in something from the statement, it doesn't cancel out:

.25r + .75y
.25(39.50-5y) + .75y
.25(39.50) - 1.25y + .75y
.25(39.50) - .5y

Without knowing the value of y, you can't answer the question.

NOT SUFFICIENT

(2) The total amount of paint is 8 gallons and 25% is red while 75% is yellow. So, this statement describes 8 gallons of a 25/75 mixture. Therefore, the cost of 1 gallon of a 25% red/75% yellow mixture is 1/8 of this amount, or 52/8 = $6.50.

SUFFICIENT

0079

Is $x^2 - 4xy + 4y^2 > 9$?

(1) $x > 2y$
(2) $y = 4$

$x^2-4xy+4y^2 > 9$
$(x-2y)^2 > 9$
$x-2y < -3$ or $x-2y > 3$
If $x-2y < -3$ or $x-2y > 3$ the answer is "yes"
if x-2y is between -3 and 3 the answer is "no"

(1)
$x > 2y$
$x-2y > 0$
But, x-2y could be greater than 3 ("yes") or it could be 1, 1.5, 2,etc ("no")

NOT SUFFICIENT

(2) y=4
x-2y=x-8
x-8 can be between -3 and 3, or not between -3 and 3, depending on the value of x

NOT SUFFICIENT

(12)
If y=4, then $x > 2y$, so $x > 8$.
Try some cases.

x=9 and y=4
x-2y=9-8=1
The answer is "no"

x=1,000 and y=4
x-2y=1,000-8=992

The answer is "yes"

NOT SUFFICIENT

0080

If $f(x) = (x - p)(x - q)$ and $p>q$, is $f(y) > 0$?

(1) $y > p$
(2) $p > 0$

Is $(y-p)(y-q) > 0$?

(1) $y > p$
because $p > q$, y is also greater than q
Therefore, y-p and y-q are both positive
So, $(y-p)(y-q)$ is positive

SUFFICIENT

(2) Without knowing the value of y or q, you can't determine whether y-p and y-q are positive or negative.

NOT SUFFICIENT

0081

Is $x > 0$?

(1) $xy^2 > 0$
(2) $x^2y < 0$

---

(1) Since the product of x and y^2 is greater than 0, then neither x nor y can equal 0. So, because y^2 isn't 0, y^2 is positive (because y^2 can never be negative, just positive or 0).

The product of y^2 with x is positive, which means x is positive too. "yes"

SUFFICIENT

(2) The product x^2y will be the same whether x is positive or negative, as long as x isn't 0, because squaring a number other than 0 always makes it positive. So, it's impossible to tell whether x is positive or negative.

NOT SUFFICIENT

0082

Is $x > y$?

(1) $x > y^2$
(2) $x > y^3$

---

(1) In most cases, if $x > y^2$, then $x > y$. But, if y is a positive fraction, then x could be bigger than y^2, but NOT bigger than y. For example, if $y = \frac{1}{2}$, then $y^2 = \frac{1}{4}$. So, if $x = \frac{1}{3}$, then x is actually bigger than y^2 but smaller than y.

NOT SUFFICIENT

(2) In most cases, if $x > y^3$, then $x > y$. But, if y is a positive fraction, then x could be bigger than y^3, but not bigger than y. For example, if $y=\frac{1}{2}$, then $y^3 = \frac{1}{8}$. So, if $x=\frac{1}{3}$, then x is actually bigger than y^3 but smaller than y.

NOT SUFFICIENT

(12)

If x = 10 and y = 1, both statements apply and the answer is "yes." If $x=\frac{1}{3}$ and $y=\frac{1}{2}$, both statements apply and the answer is "no."

NOT SUFFICIENT

0083

Is $x > 0$?

(1) $x < y$
(2) $y < 2x$

---

(1) You don't have enough info about y to figure out if x is positive.

NOT SUFFICIENT

(2) You don't have enough info about y to figure out if x is positive.

NOT SUFFICIENT

(12) x is less than y, and y is less than 2x. So, x is less than 2x. This only happens if x is positive. If x was negative, 2x would be even more negative, for example, -4 being less than -2. So, because this isn't true, x must be positive. The answer is "yes."

SUFFICIENT

0084

Is $x + y > a + b$?

(1) $x = a - b$
(2) $y > 2b$

---

(1) Substitute this into the question.

Is $x+y > a+b$?
Is $a-b+y > a+b$?
Is $-b+y > b$?
Is $y > 2b$?

The answer depends on whether y or 2b is greater, which you can't answer without more info.

NOT SUFFICIENT

(2) This doesn't tell you about the values of x or a.

NOT SUFFICIENT

(12) If you plug $x=a-b$ into the question, it simplifies to "is $y > 2b$?" So, if you also use statement 2, the answer is "yes"

SUFFICIENT

0085

If $x = 2^a 3^b 5^c$ and a, b, and c are integers, what is the value of a + b + c?

(1) x = 120
(2) a ≥ b ≥ c

---

(1) 2, 3, and 5 are all prime, and there is only one way to break a number into primes. If x=120, the only way to break it up is $x=2^3 3^1 5^1$. So, a=3, b=1, and c=1, and a+b+c=3+1+1=5.

SUFFICIENT

(2) a, b, and c could have many different values, like a=b=c=1 or a=b=c=2.

NOT SUFFICIENT

0086

If $x = 8/x - 2$, what is the value of x?

(1) (x + 4)(x - 2) = 0
(2) (x - 2)(x - 4) = 0

$x = 8/x - 2$
$x^2=8-2x$
$x^2+2x-8=0$
(x-2)(x+4)=0
x = 2 or -4

(1) x = -4 or 2. This is the same info given in the problem, so it doesn't tell you which value of x is correct.

NOT SUFFICIENT

(2) x = 2 or 4. The only value that matches the given info in the problem is x=2.

SUFFICIENT

0087

Chairs are arranged in R rows with C chairs in each row. There are M chairs left over. What is the total number of chairs?

(1) R is M + 1 greater than C.
(2) The same number of chairs could be arranged in R - 1 rows of C + 1 chairs with no chairs left over.

---

(1) R is M+1 greater than C.
(2) The same number of chairs could be arranged in R-1 rows of C+1 chairs with no chairs left over.

...

The total number of chairs is RC+M=?

(1)

R = C + M+1

RC+M
(C+M+1)C+M

C^2+CM+C+M

This depends on the value of C and M.

NOT SUFFICIENT

(2)

In this new arrangement, the number of chairs is (R-1)(C+1).

The total number of chairs is the same, so you can set the two values equal.

RC+M = (R-1)(C+1)
RC+M = RC+R-C-1
M=R-C-1

Without knowing R and C you can't find M, or the total number of chairs.

NOT SUFFICIENT
(12)

Statement (1) simplifies to R=C+M+1
Statement (2) Simplifies to M=R-C-1

However, these are both the same equation when simplified:

M=R-C-1
M+1=R-C
C+M+1=R

So, having both statements doesn't give you any more info.

NOT SUFFICIENT

0088

If $6/x - x = 1$, what is the value of x?

(1) $(2x + 1)^2 = 25$
(2) $x + 14/x = 9$

$6/x - x = 1$
$6 - x^2 = x$
$x^2 + x - 6 = 0$
(x-2)(x+3)=0
x = 2 or -3

(1) $(2x+1)^2 = 25$
2x+1 = 5 or -5
If 2x+1 = 5, then x = 2
If 2x+1 = -5, then x=-3
Since x can be either 2 or -3, the value can't be found.

NOT SUFFICIENT

(2)
$x + 14/x = 9$
$x^2+14=9x$
$x^2-9x+14=0$

(x-7)(x-2)=0
x=7 or 2
The only value that matches the given info in the problem is x=2

SUFFICIENT

0089

If $f(x) = x + {}^{1}/_{x}$ and $y \neq 0$, what is the value of $f(y^2)$?

(1) f(y) = 6
(2) y = 3 + 2√2

---

(1) There are two ways to handle this statement.

The first way is longer and involves much more math, but doesn't need you to use a certain math trick.

f(y) = y + 1/y = 6
$y^2 + 1 = 6y$
$y^2 - 6y + 1 = 0$

Use the quadratic formula:

y = (6 +/- √(36-4))/2
y = 3 +/- √(8)

There are two possible values of y. Calculate y^2:

If y = 3+√(8), then y^2 = 9 + 6√(8) + 8 = 17+6√(8)

$f(y^2) = 17 + 6\sqrt{(8)} + {}^{1}/_{(17+6\sqrt{(8)})}$

If y = 3-√(8), then y^2 = 9 - 6√(8) + 8 = 17-6√(8)

In that case, $f(y^2) = 17 - 6\sqrt{(8)} + {}^{1}/_{(17-6\sqrt{(8)})}$

If these two values are equal, then there is one answer to the problem, and the statement (1) is sufficient. If these two values are different, there are two answers, and statement (1) is not sufficient.

Simplify to see if the two values are equal.

$17 + 6\sqrt{(8)} + {}^{1}/_{(17+6\sqrt{(8)})}$

$17 + 6\sqrt{(8)} + {}^{(17-6\sqrt{(8)})}/_{((17+6\sqrt{(8)})(17-6\sqrt{(8)}))}$

$17 + 6\sqrt{(8)} + {}^{(17-\sqrt{(8)})}/_{(289-36*8)}$

$17 + 6\sqrt{(8)} + {}^{(17-\sqrt{(8)})}/_{1}$

17 + 6√(8) + 17 - 6√(8) = 34

$17 - 6\sqrt{(8)} + {}^{1}/_{(17-6\sqrt{(8)})}$

$17 - 6\sqrt{(8)} + {}^{(17+6\sqrt{(8)})}/_{((17+6\sqrt{(8)})(17-6\sqrt{(8)}))}$

$17 - 6\sqrt{(8)} + {}^{(17 + 6\sqrt{(8)})}/_{((289-288))}$

$17 - 6\sqrt{(8)} + 17 + 6\sqrt{(8)} = 34$

The two values are the same, so the answer to the problem is 34.

Or, you can use a math trick to make this much shorter:

$f(y) = y + 1/y$

$(f(y))^2 = y^2 + 1 + 1 + \frac{1}{y^2}$

$(f(y))^2 = y^2 + \frac{1}{y^2} + 2$

So, $f(y^2) = (f(y))^2 - 2$

So, $f(y^2) = 6^2 - 2 = 34$.

SUFFICIENT

(2) If you know y, you could calculate y^2 and then plug it in to the function and find the value exactly.

SUFFICIENT

0090

A store sells only bracelets and watches. Yesterday, the store sold bracelets and watches with a total price of $5,280. How many of the items sold were bracelets?

(1) The average price of a bracelet was $60 less than the average price of a watch.
(2) The number of bracelets sold was 1.5 times the number of watches sold.

---

number of bracelets sold = b
average price of bracelet = x

number of watches sold = w
average price of watch = y

bx + wy = 5,280
b=?

(1) x=y-60
Plug in to the known equation
b(y-60)+wy=5,280
Without knowing w and y you can't solve for b

NOT SUFFICIENT

(2) b=1.5w
w=b/1.5

bx+by/1.5=5,280
b(x+y/1.5)=5,280

Without knowing x and y you can't solve for b

NOT SUFFICIENT

(12) w=b/1.5 and x=y-60

Plug in:
b(y-60)+b/1.5(y)=5,280
b(y-60+y/1.5)=5,280
without knowing y you can't solve for b

NOT SUFFICIENT

0091

What is the value of (x - 2)(x + 2)(2x + 1)?

(1) (x - 2)(x + 2) = 12
(2) (x + 2)(2x + 1) = 54

---

(1)

$(x-2)(x+2)=12$

$(x-2)(x+2)(2x+1)=12(2x+1)=24x+12$

This value depends on what the value of x is.

To be safe, figure out the values of x, and make sure they give you different values for 24x+12.

$(x-2)(x+2)=12$
$x^2-4x=12$
$x^2-4x-12=0$
$(x-6)(x+2)=0$

x=6 or -2

24x+12 = 24(6)+12 or 24(-2)+12 which are different numbers.

NOT SUFFICIENT

(2)

$(x+2)(2x+1)=54$

$(x-2)(x+2)(2x+1)=54(x+2) =54x+108$ which depends on the value of x.

To be safe, figure out the values of x, and make sure they give you different values for 54x+108.

$(x+2)(2x+1)=54$
$2x^2+x+4x+2=54$
$2x^2+5x-52=0$

$(2x+13)(x-4)=0$
x=-6.5 or 4
These give different values for 54x+108, so the problem has different answers.

NOT SUFFICIENT

(12)
$(x+2)(x-2)=12$
$(x+2)(2x+1)=54$

Simplify

$x+2 = \frac{54}{(2x+1)}$

$(\frac{54}{(2x+1)})(x-2)=12$
$\frac{54(x-2)}{(2x+1)}=12$
$54(x-2)=24x+12$
$54x-108=24x+12$
$30x=120$

x=4

With the value of x, you can calculate the answer to the problem.

SUFFICIENT

0092

Is x + y > a + b?

(1) x > a > y > b
(2) x + b > a + y

---

(1) x > a and y > b. Add the two inequalities together to get x+y > a+b. The answer is "yes"

SUFFICIENT

(2) This simplifies to x-y > a-b
Test cases.

x = 5, y=3, a=2, b=1

x-y > a-b
5-3 > 2-1
Is x+y > a+b?
5+3 > 2+1 "yes"

Or,

x=3, y=1, a=5, b=4

x-y > a-b
3-1 > 5-4
Is x+y > a+b?
3+1 < 5+4 "no"

NOT SUFFICIENT

0093

A restaurant sold twice as many carbonated drinks as non-carbonated drinks, and 300 more non-alcoholic drinks than alcoholic drinks. What percent of the carbonated drinks sold were non - alcoholic?

(1) The restaurant sold 80 non-carbonated alcoholic drinks.
(2) The restaurant sold 150 non-carbonated non-alcoholic drinks.

Make a chart and fill in the given info.

	Carbonated	**Non carbonated**	**total**
Alcoholic			y
Non alcoholic			y+300
Total	2x	x	

The total can be written as either 3x or 2y+300. So, 3x=2y+300. Simplify this to 2y=3x-300, so y=1.5x-150. Rewrite the table, replacing y with 1.5x-150, so you only have one variable.

	Carbonated	**Non carbonated**	**total**
Alcoholic			1.5x-150

Non alcoholic			1.5x+150
Total	2x	x	

(1) Fill in the additional info.

	Carbonated	**Non carbonated**	**total**
Alcoholic		80	1.5x-150
Non alcoholic			1.5x+150
Total	2x	x	

Alcoholic carbonated drinks = alcoholic drinks - alcoholic non carbonated drinks
= 1.5x - 150 - 80 = 1.5x - 230

	Carbonated	**Non carbonated**	**total**
Alcoholic	1.5x-230	80	1.5x-150
Non alcoholic			1.5x+150
Total	2x	x	

Non alcoholic carbonated drinks = carbonated drinks - alcoholic carbonated drinks = 2x - (1.5x-230) = 0.5x + 230

	Carbonated	**Non carbonated**	**total**
Alcoholic	1.5x-230	80	1.5x-150
Non alcoholic	0.5x+230		1.5x+150
Total	2x	x	

The question asks for $^{0.5x+230}/_{2x}$, which depends on the value of x, which is unknown.

NOT SUFFICIENT

(2) Fill in the additional info.

	Carbonated	**Non carbonated**	**total**
Alcoholic			1.5x-150
Non alcoholic		150	1.5x+150
Total	2x	x	

Non alcoholic carbonated = non alcoholic - non alcoholic non carbonated
= 1.5x + 150 - 150
= 1.5x

	Carbonated	**Non carbonated**	**total**
Alcoholic			1.5x-150
Non alcoholic	1.5x	150	1.5x+150
Total	2x	x	

The answer is $^{1.5x}/_{2x}={}^{1.5}/_{2}=75\%$

SUFFICIENT

0094

If $4x \neq -7y$, what is the value of $^{(2a + 3b)}/_{(4x + 7y)}$?

(1) $^{2a}/_{4x} = ^{1}/_{7}$
(2) $^{3b}/_{7y} = ^{3}/_{2}$

---

(1)

$2a = ^{4x}/_{7}$

However, the values of y and b are unknown and could have any value

NOT SUFFICIENT

(2) $3b = ^{21y}/_{2}$

However, the values of x and a are unknown and could have any value

(12) Plug in $2a=^{4x}/_{7}$ and $3b=^{21y}/_{2}$

Simplify:

$a = ^{2x}/_{7}$
$b = ^{7y}/_{2}$

$^{(2a+3b)}/_{(4x+7y)}$
$^{(4x/7+21y/2)}/_{(4x+7y)}$

$^{(8x/14+147y/14)}/_{(4x+7y)}$
$^{(8x+147y)}/_{(56x+98y)}$

This can't be simplified further

NOT SUFFICIENT

0095

A marketing survey found that the number of respondents who had heard of Brand A was 100 greater than the number who had not heard of Brand A. Of those who had heard of Brand A, 60% had also heard of Brand B. What percent of those who had heard of Brand B had also heard of Brand A?

(1) The number of respondents who had heard of Brand B was 10 greater than the number who had not heard of Brand B.
(2) The number of respondents who had heard of both brands was 55 greater than the number who had heard of neither product.

Make a chart and fill in the given info.

	Heard of A	**No A**	**total**
Heard of B	.6(x+100)		
No B			
Total	x+100	x	

Simplify and calculate as much additional info as you can

	Heard of A	**No A**	**total**
Heard of B	.6x+60		
No B	.4x+40		
Total	x+100	x	2x+100

(1) Fill in the info in the chart.

	Heard of A	No A	total
Heard of B	.6x+60		y+10
No B	.4x+40		y
Total	x+100	x	2x+100

The total can also be written as 2y+10, so you know that 2y+10 = 2x+100.

This simplifies to 2y = 2x+90, so y = x+45. Rewrite y in the chart so you only have one variable.

	Heard of A	No A	total
Heard of B	.6x+60		x+55
No B	.4x+40		x+45
Total	x+100	x	2x+100

The question asks, what percent of those who heard of Brand B, also heard of Brand A. This is $^{.6x+60}/_{x+55}$ in the chart, but you can't find the exact value without knowing x, which is unknown.

NOT SUFFICIENT

(2) The chart already tells you .6x+60 is the number who heard of both brands. So, the number who heard of neither is 55 less than this, or .6x+5. Fill this in.

	Heard of A	No A	total
Heard of B	.6x+60		
No B	.4x+40	.6x+5	
Total	x+100	x	2x+100

This lets you fill in some additional squares in the chart

	Heard of A	No A	total
Heard of B	.6x+60	.4x-5	x+55
No B	.4x+40	.6x+5	
Total	x+100	x	2x+100

The question asks, what is $^{.6x+60}/_{x+55}$, which can't be calculated without the value of x.

NOT SUFFICIENT

(12) With both statements, the chart looks like this

	Heard of A	No A	total
Heard of B	.6x+60	.4x-5	x+55
No B	.4x+40	.6x+5	x+45
Total	x+100	x	2x+100

However, you still can't answer the question without knowing x, and neither statement gives the value of x.

NOT SUFFICIENT

0096

If x and y are integers, is $2^x 5^y = 10^{(x + y)}$?

(1) xy = -4
(2) x + y = 0

Simplify the question.

$2^x * 5^y = (2^2 * 5)^{(x+y)}$
$2^x * 5^y = 2^{(2x+2y)} * 5^{(x+y)}$

This is true if the exponents for 2 are the same on both sides, and the exponents for 5 are the same on both sides.

x=2x+2y, and y=x+y

If y=x+y, then x=0
If x=2x+2y, then 0=0+2y, so y=0

So, the answer is "yes" if x and y are both 0, and "no" if x and y are not both 0

(1) x and y can't both be 0, because if they were, their product would be 0. So, the answer is "no"

Or, if you didn't simplify the question, you can plug in values for x and y. The only possible values are x=1 y=-4, x=2 y=-2, x=4 y=-1, x=-1 y=4, x=-2 y=2, and x=-4 y=1. For all of these values, the answer is "no"

SUFFICIENT

(2) If x and y are both 0 then the answer is "yes". But if x=1 and y=-1 then the answer is "no".

NOT SUFFICIENT

0097

A bagel shop charges 2 dollars for one bagel and 20 dollars for a dozen (12) bagels. Yesterday, how many different customers were there who ordered at least a dozen bagels?

(1) The shop sold 46 bagels yesterday for a total of 80 dollars.
(2) One customer ordered exactly 2 dozen bagels.

---

(1)
b = number of single bagels
d = number of dozens

The total number of bagels is b, plus 12 times d
46 = b + 12d

The total price is 2 for each bagel, plus 20 for each dozen
80 = 2b + 20d
40 = b + 10d

Use elimination to combine the two equations

46 - 40 = (b+12d) - (b+10d)
6 = 2d
d = 3

So, this statement tells you that the shop sold three dozens, and the rest of the bagels were sold individually.

But, all three dozens could have all been ordered by 1 customer, or by 2 or 3 different customers. So the answer could be 1, 2, or 3.

NOT SUFFICIENT

(2) This doesn't tell you about what the other customers ordered.

NOT SUFFICIENT

(12)

There were three dozens sold in total, and one customer ordered 2 of them. So, someone else must have ordered the third dozen. The answer to the problem is 2 different customers.

SUFFICIENT

0098

How many zeroes are at the end of x! (x factorial)?

(1) (x + 2)! has 2 zeroes at the end.
(2) (x + 5)! has 3 zeroes at the end.

The number of zeroes at the end of a product depends on how many powers of 10 are in that product. For example, 3! has no zeroes at the end, because 3*2*1 does not include any powers of 10. But, 5! has one zero at the end, because 5*4*3*2*1 contains one power of 10 (formed from a 5 and a 2).

The factorials with 2 zeroes at the end are 10! through 14!. The factorials with 3 zeroes at the end are 15! through 19!.

(1) x+2 is between 10 and 14, inclusive. So, x is between 8 and 12, inclusive. x can have one zero at the end (for example, if x=8) or two zeroes (for example, if x=12).

NOT SUFFICIENT

(2) x+5 is between 15 and 19, inclusive. So, x is between 10 and 14, inclusive. So, x! has two zeroes.

SUFFICIENT

0099

Are at least 55% of the seats in a certain room occupied?

(1) The number of occupied seats is at least 10% higher than the number of unoccupied seats.
(2) The ratio of occupied to unoccupied seats is at least 10:9.

---

x = occupied seats
t = total seats

(1)
The number of unoccupied seats is t-x.
The info from the statement is
$x > 1.1(t-x)$
Simplify,
$x > 1.1t - 1.1x$
$2.1x > 1.1t$
$x > {}^{1.1t}/_{2.1}$

So, the occupied seats are at least ${}^{1.1}/_{2.1}$ of the total.

Now you need to figure out if ${}^{11}/_{21}$ is at least 55%. One way to do this is to compare it to an easier value, like ${}^{1}/_{2}$.

${}^{1}/_{2} = {}^{10.5}/_{21} = 50\%$. ${}^{11}/_{21}$ is only ${}^{0.5}/_{21}$ higher than this value, which is much smaller than 5%. So, the number is less than 55%.

So, you can't prove that the number of occupied seats is at least 55% (it might be 53 or 54%).

NOT SUFFICIENT
(2)

$x/(t-x) > 10/9$

This simplifies to $19x > 10t$
$x > \frac{10}{19}t$
x is greater than $\frac{10}{19}$ of the total. Do the same thing as statement 1 and compare this to 50%. $\frac{9.5}{19}$ = 50%, and $\frac{10}{19}$ is only $\frac{0.5}{19}$ (less than 5%) greater. So, the number of occupied seats could be slightly less than 55%, or greater than 55%.

NOT SUFFICIENT

(12) With the info from both statements, the percent of occupied seats could be 53% or 54%, but could also be greater than 55%.

NOT SUFFICIENT

0100

Isaac purchased sandwiches for 5$ each and drinks for 3$ each. If he paid with 15$, and there was no tax, did he receive any change?

(1) He purchased more drinks than sandwiches.
(2) He purchased at least one sandwich and at least one drink.

---

x = number of sandwiches
y = number of drinks
Isaac spent $5x + 3y$
The problem asks if he spent exactly 15$, or less than 15$.

(1) He could have purchased 5 drinks and no sandwiches, and gotten no change. Or, he could have purchased 2 drinks and 1 sandwich, and gotten 4$ change.

NOT SUFFICIENT

(2) He spent at least 8$ on the first sandwich and first drink, leaving 7$ to spend on any other sandwiches or drinks he bought. With 7$, he could have bought,

1 more sandwich (2$ change)
2 more drinks (1$ change)
1 more drink (4$ change)
Nothing else (7$ change)

No matter what, Isaac got change, so the answer is "yes"

SUFFICIENT

0101

The price of a sofa was marked up by x%, and then the resulting price was marked down by y%. Is the new price lower than the original price?

(1) x = y
(2) y = 50

---

(1) If x=y, then the markup is the same percent as the discount. If a price is marked up and then marked down by the same percent, the result will always be lower than the original price. This happens because the discount is being applied to a larger price than the markup was. So, if they're the same percent, the amount of the discount will be greater.

Test numbers to confirm. If something costs 100, then is marked up by 20%, the result is 120. Then, if it is marked down by 20%, the result is .8(120) = 96.

SUFFICIENT

(2) The answer to the problem will depend on the value of x.

NOT SUFFICIENT

0102

At what average speed did a delivery driver complete the 90 mile trip from Bayview to Cerise, factoring in all stops he made on the route?

(1) The driver made a total of 12 stops during the trip, averaging 10 minutes per stop.
(2) Between stops, the driver traveled at an average speed of 45 mph.

---

(1) This doesn't give you any info about how quickly the driver traveled between stops.

NOT SUFFICIENT

(2) Without knowing how the stops affected the driver's average speed, you don't have enough info to find the overall average.

NOT SUFFICIENT

(12) The driver was stopped for a total of 120 minutes, or 2 hours. Because he covered 90 miles at 45 mph, he was also moving for $^{90}/_{45}$ = 2 hours. Therefore, his total distance was 90 miles and total time was 4 hours. This gives an average speed of $^{90}/_{4}$ mph.

SUFFICIENT

0103

Angel and Carline both left the town of Aster at the same time, and traveled via the same route to the town of Bear Creek. Who arrived at Bear Creek first?

(1) Angel and Carline both traveled at constant speeds for the first 30 minutes of the trip, after which Angel had completed 40% of the journey, and Carline had completed 30% of the journey.
(2) 30 minutes into the trip, Carline increased her constant speed by 50% and maintained this speed until she arrived at Bear Creek, while Angel maintained the same constant speed for the entire trip.

---

(1) Angel traveled faster than Carline for the first 30 minutes. But, who arrived first depends on what happened in the second part of the trip.

NOT SUFFICIENT

(2) This statement doesn't give enough information on the original speeds, and Carine could still have been traveling more slowly than Angel.

NOT SUFFICIENT

(12) Since the problem only uses percents and not actual distances, you can safely assume that the distance is 100 miles (or any value you want). Angel completed 40 miles in 30 minutes, and Carline completed 30 miles in 30 minutes. Therefore, Carline's speed was originally 60 mph, and Angel's speed was originally 80 mph.

Then, Carline increased her speed by 50%, to 90 mph. Although she was now going faster than Angel, she might or might not have enough time to catch up to him before arriving at Bear Creek. For example, if Angel arrived at Bear Creek after 31 minutes, he would have arrived before Carline could make up the time she lost on the first part of the trip.

NOT SUFFICIENT

0104

If a and b are positive integers, is a + b a prime number?

(1) The greatest common divisor of a and b is 3.
(2) The least common multiple of a and b is 30.

---

(1) If a and b are both divisible by 3, then their sum will be divisible by 3. Therefore, their sum is not prime.

SUFFICIENT

(2) Test cases.

a=1,b=30
a+b=31 "yes"
a=2,b=15
a+b=17 "yes"
a=15,b=30
15+30=45 "no"

NOT SUFFICIENT

0105

What is the value of $x^2 + 4y^2$?

(1) $x + 2y = 5$
(2) $2x + y = 4$

---

(1)
x=1, y=2
$x^2 + 4y^2 = 1 + 4(4) = 17$
x=3, y=1
$x^2 + 4y^2 = 9 + 4(1) = 13$

NOT SUFFICIENT

(2)
x = 1, y=2
$x^2+4y^2 = 1 + 4(4) = 17$
x=2,y=0
$x^2+4y^2 = 4 + 0 = 4$

NOT SUFFICIENT

(12)

Use elimination to combine the two statements.

x+2y=5
4x+2y=8

3x=3
x=1
y=2

Plug x=1 and y=2 into the problem to find the answer.

SUFFICIENT

0106

If a and b are positive integers, then does $a^2 - b^2 = 48$?

(1) $a \geq 15$
(2) $b \geq 10$

$x^2-y^2=48$
$(x+y)(x-y)=48$

x and y are positive integers, so x+y and x-y are factors of 48. Write the factors

48=1*48
48=2*24
48=3*16
48=4*12
48=6*8

Simplify. x+y is bigger than x-y so x+y is the bigger of the 2 factors.

x+y=48
x-y=1
x=49/2 (not valid, x isn't an integer)

x+y=24
x-y=2
x=13, y=11

x+y=16
x-y=3
x=19/2 (not valid, x isn't an integer)

x+y=12
x-y=4
x=8,y=4

x+y=8
x-y=6
x=7,y=1

So, the three possible answers are
x=13,y=11
x=8,y=4
x=7,y=1

These are the only numbers where $x^2-y^2=48$.

(1) If $x \geq 15$, then none of the three possible answers can be correct, because x is less than 15 for all of them. The answer is "no"

SUFFICIENT

(2) x=13, y=11: "yes"
x=12,y=11: "no"

NOT SUFFICIENT

0107

Is $a^2 + 4b^2 > 4ab + 9$?

(1) $a > 4b$
(2) $b > 2$

$a^2-4ab+4b^2 > 9$
$(a-2b)^2 > 9$
$a-2b < -3$ or $a-2b > 3$

If $a-2b < -3$ or $a-2b > 3$ then the answer is "yes"
If a-2b is between -3 and 3 then the answer is "no"

(1) $a > 4b$
a=1,b=0: a-2b=1-0=1 "no"
a=100,b=0: a-2b=100-0=100 "yes"

NOT SUFFICIENT

(2) $b > 2$
a=6,b=3: a-2b=6-6=0 "no"
a=100,b=3: a-2b=100-6=94 "yes"

NOT SUFFICIENT

(12)
$a > 4b$, so $a-2b > 4b-2b = 2b$
because $b > 2$, $2b > 4$
So, because $a-2b > 2b$ and $2b > 4$, you can see that $a-2b > 4$
Therefore, the answer is "yes" because a-2b is always > 3

SUFFICIENT

0108

If a, b, and c are integers and $x = 2^a 3^b 5^c$, how many zeroes appear at the end of x when it is written out?

(1) a = c = 4
(2) b = 2

The number of zeroes is equal to the number of powers of 10 that x can be divided by. For example, 3,900 can be divided by 10 two times, and has two zeroes at the end.

Because 10 = 2*5, the number of 10's equals the number of pairs of 2 and 5 that can be made. For example, if x includes 2^3 and 5^4 in its prime factorization, a maximum 3 pairs of 2*5 can be made (and a 5 will be left over that can't be used to make a 10). So, x would have 3 zeroes.

(1) If a=c=4, then four pairs of 2*5 can be made, so x can be divided by 10 four times. x has four zeroes.

SUFFICIENT

(2) Without knowing the values of a and c, you can't find the number of pairs of 2 and 5 that can be formed.

NOT SUFFICIENT

0109

If x and y are positive integers, what is the units digit of x^y?

(1) y = 4x + 1
(2) x = 6

(1) Test cases.
x=1, y=5
$1^5 = 1$
x=2,y=9
You don't need to calculate the units digit of 2^9, because it can't be 1 (since 2 is even). So, you know there are two different answers.

NOT SUFFICIENT

(2) The units digit of 6 raised to any positive integer power is always 6.

SUFFICIENT

0110

What is the value of √x + √y?

(1) x - y = 3
(2) √x - √y = 1

---

(1) x-y=3
If x=3 and y=0, then √x+√y=√3+0=√3
If x=4 and y=1, then √x+√y=√4+√1=2+1=3

NOT SUFFICIENT

(2) √x-√y=1
If √x=1 and √y=0, then √x+√y=1
If √x=3 and √y=2, then √x+√y=5

NOT SUFFICIENT

(12)
There are two ways to handle these statements. The easier way looks like this.

(√x-√y)(√x+√y)=x-y
(1)(√x+√y)=3
√x+√y=3

If you don't notice that math trick, you can also simplify like this:

√x=√y+1
$\sqrt{x}^2$=(√y+1)^2
x=y+2√y+1

x-y=3
(y+2√y+1)-y=3
2√y+1=3
2√y=2
√y=1
y=1
x=4
√x+√y=2+1=3

SUFFICIENT

0111

What is the value of $x^4 + x^3 + x^2 + x$?

(1) $x^2 + 1 = 10$
(2) $x^2 + x = 12$

Simplify the question.
$x^4 + x^3 + x^2 + x$
$x(x^3 + x^2 + x + 1)$
$x(x^2(x+1) + 1(x+1))$
$x(x^2+1)(x+1)$

What is the value of $x(x+1)(x^2+1)$?

(1) $x^2 + 1 = 10$
$x^2 = 9$
x could be 3 or -3

If x=3, then $x(x+1)(x^2+1) = 3(3+1)(10)=120$
If x=-3, then $x(x+1)(x^2+1) = -3(-3+1)(10)=60$

NOT SUFFICIENT

(2)
$x^2 + x - 12 = 0$
$(x+4)(x-3)=0$
x=-4 or x=3
If x=3, then $x(x+1)(x^2+1) = 120$
If x=-4, then $x(x+1)(x^2+1) = -4(-3)(17) = 204$

NOT SUFFICIENT

(12) With both statements, x can only equal 3, so you can calculate the answer.

SUFFICIENT

0112

Arlie paints at a rate of x square feet per hour. How long will it take her to paint a 100 square foot fence?

(1) Apolonia, who paints at a rate of 1.25x square feet per hour, would be able to paint the fence 20% faster than Arlie.
(2) Stanton, who paints at a rate of x + 20 square feet per hour, would be able to paint the fence 20% faster than Arlie.

Arlie currently paints at x square feet per hour
Equations for Arlie's current painting:
100 square feet = x * Time
Time = $^{100}/_{x}$ = ?

(1)

Apolonia: rate = 1.25x, time=.8*Time
100 square feet = 1.25x * (.8 Time)
100 square feet = 1.25*.8*x*Time = x*Time

This information is already given in the problem.

NOT SUFFICIENT

(2)

Stanton: rate = x+20, time = .8*Time
100 square feet = (x+20) * .8Time

100 = x*Time

x*Time = (x+20)*.8Time
x = (x+20)*.8
x = .8x + 16
.2x = 16
x = 16/.2 = 80

x is Arlie's rate, 80 square feet per hour, which can be used to calculate the time.

SUFFICIENT

0113

At a donut shop, donuts that were made more than 6 hours ago are marked down by 25%, and the rest are sold at full price. How many of the donuts that Elyse purchased had been marked down?

(1) Elyse purchased a total of 15 donuts for 36$.
(2) Prior to any markdowns, the original price of the donuts Elyse purchased would have been 45$.

---

(1) This doesn't tell you how many donuts were marked down. For example, maybe none of the donuts were marked down, and the original price per donut was simply 36/15 = $2.40 per donut. Or, maybe all of them were marked down from a higher original price.

NOT SUFFICIENT

(2) This doesn't say how much Elyse actually paid, so you don't know how many of the donuts that made up the 45$ order were marked down.

NOT SUFFICIENT

(12) Statement 1 says Elyse purchased 15 donuts. Combining this with statement 2, the original price of a donut was 3$. So, after the 25% discount, a donut would cost $2.25. If Elyse purchased 15 donuts for 36$, then you have two equations to solve.

discounted + not discounted = 15 donuts total
2.25*discounted + 3*not discounted = 36$ total

Solve these two equations, which shows that 12 of the 15 donuts were discounted.

SUFFICIENT

0114

If $f(x) = x^2 + ax + b$, what is the value of $^a/_b$?

(1) For every value of x, f(x) = f(-x)
(2) f(6) = 0

---

(1)

$f(-x) = (-x)^2 + a(-x) + b$
$= x^2 - ax + b$

$x^2 - ax + b = x^2 + ax + b$
$-ax = ax$
$2ax=0$

Because this is true for all values of x, a must equal 0
Therefore, a/b=0

SUFFICIENT

(2)

f(6) = 0
$6^2 + a(6) + b = 0$
36 + 6a + b = 0
6a + b = -36

a/b can have different values, for example: a = -1 and b = -30 (a/b = 1/30) or a = 1 and b = -42 (a/b = -1/42).

NOT SUFFICIENT

0115

The cost of a certain amount of trail mix is the sum of the cost of its ingredients. What is the cost per pound of a trail mix that consists of 25% raisins and 75% peanuts?

(1) A trail mix consisting of 10% raisins, 30% peanuts, and 60% cashews costs 8$ per pound.
(2) Cashews cost 9$ per pound.

---

(1) The answer to the problem depends on the price of cashews, which can be almost any value. If cashews are very expensive, then raisins and peanuts must be very cheap, and vice versa.

NOT SUFFICIENT

(2) This doesn't give you any info about the price of peanuts and raisins.

NOT SUFFICIENT

(12) The trail mix with 10% raisins, 30% peanuts, and 60% cashews includes .1 pounds of raisins, .3 pounds of peanuts, and .6 pounds of cashews per pound of trail mix. The .6 pounds of cashews costs $9 * .6 = $5.40. Therefore, the .1 pounds of raisins and .3 pounds of peanuts costs $8-$5.40 = $2.60.

If .1 pounds of raisins and .3 pounds of peanuts costs $2.60, then 1 pound of raisins and 3 pounds of peanuts costs $26.00. This is the same as 4 pounds of a 25% raisins, 75% peanuts mixture. Therefore, the cost of 1 pound of the mixture is 1/4 of $26.00 or $6.50.

SUFFICIENT

0116

If Tess paints at a constant rate, how long will it take her to paint a 150 square foot ceiling?

(1) In order to paint the ceiling 15 minutes faster, Tess would need to increase her rate of painting by 20 square feet per hour.
(2) In order to paint the ceiling 15 minutes faster, Tess would need to increase her rate of painting by 25%.

Tess current rate = r
Work = Rate * Time
100 = r * Time
Time = 100/r = ?

(1) 15 minutes = 0.25 hours

new situation (Tess works faster): 100 square feet = (Time - 0.25)(rate + 20)
old situation (original rate and time): 100 square feet = Time*rate

Time*rate = (Time-0.25)(rate+20)
Time*rate = Time*rate +20*Time - 0.25*rate -5
Simplify
0 = 20*Time - 0.25*rate - 5
20*Time - 0.25*rate = 5

Already known: rate = 100/Time

You can stop solving here because you have two different equations with two variables, so you can solve for both.

The full solution would look like this,

$20*Time - {}^{0.25*100}/_{Time} = 5$
$20*Time - {}^{25}/_{Time} = 5$
$20*Time^2 - 25 = 5*Time$
$4*Time^2 - Time - 5 = 0$
(4*Time-5)(Time+1) = 0
4*Time-5 = 0
4*Time = 5
Time=1.25 hours

SUFFICIENT

(2)

Create equations similar to statement 1
100 square feet = (Time-0.25)*(1.25rate)
100 square feet = Time*rate

Time*rate=(Time-0.25)*(1.25rate)
Time = (Time-0.25)*1.25
Time = 1.25Time - 1.25*0.25
.25Time = 1.25*.25
Time=1.25 hours

SUFFICIENT

0117

What is the units digit of x?

(1) The units digit of x^2 is 6.
(2) The units digit of x^3 is the same as the units digit of x.

---

(1) x could have a units digit of 4 (4^2 = 16) or 6 (6^2 = 36).

NOT SUFFICIENT

(2) This happens any time the units digits of x^y alternate back and forth between two digits. For example, 9^2 has a units digit of 1, 9^3 has a units digit of 9, 9^4 has a units digit of 1, 9^5 has a units digit of 9, etc. There are two different values for x where this happens: if x has a units digit of 9, or if x has a units digit of 4. This statement can also describe a value of x where the units digit always stays the same, no matter what power it is raised to. So, x could also have a units digit of 1, 5, 6, or 0. The units digit of x can be 1, 4, 5, 6, 9, or 0.

NOT SUFFICIENT

(12) The units digit of x can be either 4 or 6.

NOT SUFFICIENT

0118

In a psychology experiment, each participant anonymously donated either 10$ or 100$ to a good cause. What percent of the participants chose to donate 100$?

(1) 28 of the participants donated 10$.
(2) The average amount donated was 40$ per participant.

---

(1) This doesn't tell you how many participants there were or how many of them donated 100$.

NOT SUFFICIENT

(2)

x= number of people who donated 100$
y= number of people who donated 10$

total amount donated=100x+10y
average donation=(100x+10y)/(x+y)

The average donation is 40, you can plug that in to the equation
40=(100x+10y)/(x+y)
40x+40y=100x+10y
4x+4y=10x+y
3y=6x
y=2x

Twice as many participants donated 10$, as donated 100$. So, 1/3 (33%) of participants donated 100$.

SUFFICIENT

0119

In a certain sequence of numbers, each term is *K* greater than the preceding term, where *K* is a constant. The sum of 5 sequential terms of the sequence is 150. What is the value of *K*?

(1) The largest of the 5 sequential terms is 70.
(2) The smallest of the 5 sequential terms is −10.

Let's say that the first of the five terms is X. So, the five terms are X, X+K, X+2K, X+3K, and X+4K. Their sum is 5X+10K. The problem says that this equals 150.

5X+10K=150
X+2K=30

(1) X+4K=70. You already know X+2K=30. Use elimination to solve for K.

(X+4K)-(X+2K)=70-30
2K=40
K=20

SUFFICIENT

(2) X=-10. Use substitution to solve for K.

-10+2K=30
2K=40
K=20

SUFFICIENT

0120

Three distinct positive integers, none of which equals 2, sum to a total of x. What is the smallest of the three integers?

(1) $x < 11$
(2) The largest of the 3 integers is 4

---

(1)

If x = 1, 2, 3, 4, 5 it is impossible to make a sum of x from 3 different positive integers.

If x = 6, the integers would have to be 1,2,3 but one of those equals 2, so x cannot be 6

x = 7: 1,2,4 (invalid)

x = 8: either 1,2,5 (invalid) or 1,3,4

x = 9: either 1,2,6 (invalid) or 1,3,5 or 2,3,4 (invalid)

x = 10: either 1,2,7 (invalid) or 1,3,6 or 1,4,5 or 2,3,5 (invalid)

The only cases are 1,3,4; 1,3,5; 1,3,6; or 1,4,5. In all of these cases the smallest integer is 1. The answer is 1

SUFFICIENT

(2)

If the largest of the integers is 4, but none of the integers equal 2, the only case is 1, 3, 4. The answer is 1

SUFFICIENT

0121

If $-10 < x < y < 10 < z$, is $xy < 0$?

(1) $xyz < 0$
(2) $yz = -10x$

---

(1) z is greater than 10, so z is positive. So, xy is negative. "yes"

SUFFICIENT

(2) z is positive. y is smaller than z, so y can be either positive or negative.

If y is also positive, then yz is positive. Therefore, -10x is positive and x is negative. Because x is negative and y is positive, 0 is between x and y. "yes"

If y is negative, then yz is negative. So, -10x is also negative, implying that x is positive. But, x is less than y, which is negative. So, this isn't possible.

SUFFICIENT

0122

x and y are positive integers and x is 15% greater than y. What is the value of x?

(1) $y < 30$
(2) $x + y < 60$

$x = 1.15y = {}^{23y}/_{20}$

x is an integer, so y is divisible by 20.

(1) The only number smaller than 30 and divisible by 20 is 20. So, y=20 and x=23.

SUFFICIENT

(2) y=20 and x=23. The next largest case is y=40 and x=46 which is too large.

SUFFICIENT

0123

Evonne owns 200 shares of stock in total, with some shares of Company X and some shares of Company Y. Last Monday, all 200 shares had the same price. Then, the stock price of Company X increased by *x*% and the stock price of Company Y decreased by *y*%. If Evonne's whole portfolio decreased in value by 2%, and she neither bought nor sold any stock, how many shares of Company X did she own?

(1) $x = 6$
(2) $y = 10$

If p is the original price of a share, Evonne's portfolio went from 200p to 200p(0.98) = 196p in value.

The old price of an X stock is p, and the new price of an X stock is (1+x/100)p.

The old price of a Y stock is p, and the new price of a Y stock is (1-y/100)p.

The number of X stocks is n, so the number of Y stocks is 200-n.

You can use this equation:

196p = p*(1+x/100)*n + p*(1-y/100)*(200-n)

196 = (1+x/100)*n + (1-y/100)*(200-n)

To answer the question, solve for n.

(1) If x=6, then the equation is 196 = 1.06n + (1-y/100)(200-n)

196 = 1.06n + 200 - n -2y + ny/100
196 = .06n + 200 - 2y + ny/100
The value of n will change depending on the value of y.

NOT SUFFICIENT

(2) If y=10, then the equation is 196 = (1+x/100)n + 0.9(200-n)

The value of n will change depending on the value of x.

NOT SUFFICIENT

(12) You know both x and y, so the equation is

196 = (1.06)n+0.9(200-n)

Solve for n

196 = 1.06n + 180 - 0.9n
16 = 0.16n
n = 100
The number of Company X stocks is 100.

SUFFICIENT

0124

If $y \neq 0$, is $x/y < 4/7$?

(1) Rounded to the nearest 10th, $x/y = 0.6$.
(2) Rounded to the nearest 100th, $x/y = 0.57$.

$4/7 = 0.571$

(1) If $x/y = 0.6$, then the answer is "no". If $x/y = 0.56$, then the answer is "yes"

NOT SUFFICIENT

(2) If $x/y = 0.573$ (for example, if x=573 and y = 1,000) then the answer is "no". If $x/y = 0.570$ (for example, if x = 57 and y =100) then the answer is "yes"

NOT SUFFICIENT

(12) Both of the cases for statement (2) above also work for statement (1). So, there are two answers to the problem.

NOT SUFFICIENT

0125

If a and b are integers, is ab odd?

(1) 2a + 3b is even
(2) a + 3b is odd

---

(1) You can either use logic, or test cases. If you test cases, you have to figure out first which cases are valid.

If a = odd and b = even, then 2*a + 3*b = 2*odd + 3*even = even+even = even. So, this is a valid case.

a*b = odd*even = even, so the answer to the question is "no"

If a = even and b = odd, then 2*a + 3*b = 2*even + 3*odd = even+odd = odd. So, this case doesn't match the statement. Ignore it.

If a = odd and b = odd, then 2*a + 3*b = 2*odd + 3*odd = even+odd = odd. So, this case doesn't match the statement. Ignore it.

If a = even and b = even, then 2*a + 3*b = 2*even + 3*even = even+even = even. So, this is a valid case.

a*b = even*even, so the answer to the question is "no"

The answer is always "no"

SUFFICIENT

(2) Do the same thing to test cases. Figure out which cases are valid (match the statement) first.

a+3b is odd

If a = odd and b = odd, then a+3b = odd+3*odd = odd+odd = even. So, this case doesn't match the statement. Ignore it.

If a = odd and b = even, then a+3b = odd+3*even = odd+even = odd. So, this is a valid case.

a*b = odd*even = even. "no"

If a = even and b = odd, then a+3b = even+3*odd = even+odd = odd. So, this is a valid case.

a*b = even*odd = even. "no"

If a = even and b = even, then a+3b = even+3*even = even+even = even. So, this case doesn't match the statement. Ignore it.

The answer is always "no"

SUFFICIENT

0126

Is xy(1 - xy) > 0?

(1) $x = \frac{1}{2y}$
(2) y = 3

---

(1) Plug in $x = \frac{1}{2y}$ to the question.

Is $(\frac{1}{2y})(y)(1-(\frac{1}{2y})(y)) > 0$?
Is $\frac{1}{2}(1-\frac{1}{2}) > 0$?
Is $\frac{1}{4} > 0$? "yes"

SUFFICIENT

(2) Plug in y=3.

Is 3x(1-3x) > 0?

Now, plug in different numbers for x.

x=1
Is 3(1-3) > 0? "no"

x= 0.1
is 0.3(1-0.3) >0? "yes"

NOT SUFFICIENT

0127

A bus currently travels from City A to City B at a constant speed. The bus route is changed so that the route is 3 miles longer, but the bus's constant speed is 5 mph faster. Does the new route take more time to complete than the original route?

(1) The original speed of the bus was less than 30 mph.
(2) The original bus route was less than 18 miles long.

Distance = Rate * Time
d = original distance
r = original rate

Originally, the time it took was $\frac{d}{r}$. With the new distance and speed, the time is now $\frac{(d+3)}{(r+5)}$.

This simplifies to is $\frac{d}{r} > \frac{(d+3)}{(r+5)}$?

is d(r+5) > r(d+3)?

is dr + 5d > dr + 3r?
is 5d > 3r?
is d > 0.6r?

(1) Whether d > 0.6 r depends on the length of the route as well as the original rate.

NOT SUFFICIENT

(2) Whether d > 0.6r depends on the original rate as well as the length of the route.

NOT SUFFICIENT

(12) d < 18 and r < 30
It's possible for d > 0.6r

For example, r = 10 and d = 15, then d = 1.5r

But, d could be < 0.6r

r = 20 and d = 10, then d = 0.5r

NOT SUFFICIENT

0128

In a group of 60 households, each including exactly 0, 1, or 2 children, what is the average number of children per household?

(1) The 16 2-child households account for 4/7 of the children in the group.

(2) 3/7 of the children come from 1-child households.

---

(1) There are 16 households with 2 children, so those households account for 16*2 = 32 children.

$32 = \frac{4}{7}$ of the total number of children.

So, $32 = \frac{4}{7}x$
$x = \frac{32*7}{4} = 8*7 = 56$

The number of children is 56 in total, so the average children per household is $\frac{56}{60}$.

SUFFICIENT

(2) There are multiple possibilities. For example, there could be 3 households with 1 child each, and 2 households with 2 children each, for a total of 3+2*2 = 7 children. Then, the average would be $\frac{7}{60}$ children per household.

Or, there could be 6 households with 1 child each, and 4 households with 2 children each, for a total of 6+4*2 = 14 children. Then, the average would be $\frac{14}{60}$ children per household, which is different.

NOT SUFFICIENT

0129

Maricruz earns an hourly rate of 10 dollars an hour for up to 40 hours per week, and 1.5 times this amount per hour for hours worked past 40. Over the last 4 weeks, what is the average amount that Maricruz earned per week?

(1) Maricruz worked a total of 153 hours over the last 4 weeks.
(2) Maricruz worked a total of 7 hours of overtime over the last 4 weeks.

Maricruz earns 10$ an hour for the first 40 hours she works in one week, and 15$ an hour for hours after 40. For example, if she works

45 hours, she earns 40*10 + 5*15 dollars that week.

(1) In one case, she worked all 153 hours in one week. So, that week, she made 40*10 + (153-40)*15 = 400 + 113*15 = 2,095.

Or, she could have worked 40 hours on three different weeks, and 33 hours on the other week. Then, she didn't make overtime for any of the hours, and the total she earned over the four weeks was 153*10 = 1,530.

Both of these would be divided by 4 to give you the average per week, and the results would be different.

NOT SUFFICIENT

(2) If she worked a total of 7 hours of overtime, then the total amount she earned was 146*10 + 7*15. To find the average amount per week, divide this value by 4. This gives you one answer to the problem. Even if she earned different specific amounts in different weeks, because the total over the 4 weeks is known, the average can be calculated exactly.

SUFFICIENT

0130

If x is a positive integer less than 120, what is the greatest common factor of 120 and x?

(1) 120 is not divisible by x
(2) x is not prime

---

(1) Test cases.

x = 7. The GCF of 7 and 120 is 1.

Find a case where 120 isn't divisible by x, but they still have a GCF bigger than 1, meaning that they have a common factor.

One example is x = 80. x is too large to be a factor of 120, but they still have common factors. Their GCF is 40.

NOT SUFFICIENT

(2) 80 is not prime, and if x = 80, then the GCF is 40.

10 is not prime, and if x = 10, then the GCF is 10.

NOT SUFFICIENT

(12) 80 is not prime and 120 is not divisible by 80. If x = 80, then the GCF is 40.

100 is not prime and 120 is not divisible by 100. If x = 100, then the GCF is 20.

NOT SUFFICIENT

0131

If xy ≠ 0, what is the value of x^3/y^2?

(1) $x/y = -1/2$
(2) $x^2/y = 3/2$

---

(1)

$x/y = -1/2$
2x = -y

y = -2x

$^{x^3}/_{(-2x)^2} = {^{x^3}}/_{4x^2} = {^x}/_4$

This depends on the exact value of x

NOT SUFFICIENT

(2)

$^{x^2}/_y = {^3}/_2$
$x^2 = {^{3y}}/_2$
$2x^2 = 3y$
$y = {^2}/_3\ x^2$

$^{x^3}/_{y^2}$
$^{x^3}/_{({^2}/_3\ x^2)^2}$
$^{x^3}/_{({^4}/_9\ x^4)}$
$^1/_{({^4}/_9\ x)}$

This depends on the exact value of x

NOT SUFFICIENT

(12) From statement 1, y = -2x
From statement 2, $y = {^2}/_3\ x^2$

So, ${^2}/_3\ x^2 = -2x$
x is not 0, so you can divide both sides by x

${^2}/_3 x = -2$
$x = -2 * {^3}/_2 = -3$
$y = -2x = 6$

With the values of x and y, you can now calculate $^{x^3}/_{y^2}$

SUFFICIENT

0132

A set contains exactly 100 distinct positive integers. How many of the numbers in the set are less than 20?

(1) Exactly 75% of the numbers in the set are greater than 25.
(2) Exactly 25% of the numbers in the set are greater than 102.

---

(1) If 75% of the numbers are greater than 25, then that represents 75 numbers. So, the other 25 numbers are all 25 or less. The numbers have to be distinct positive integers, and there are only 25 of them that are valid: the numbers 1 through 25. So, the set contains 1, 2, 3, 4, ... , 24, 25, etc.

The answer is 19, because all of the numbers 1 to 19 are in the set.

SUFFICIENT

(2) If 25% of the numbers are greater than 102, then the other 75 numbers are between 1 and 102, inclusive. But, you don't know what these 75 numbers are. They could be the numbers 1 through 75, for example, and the answer would be 19. Or, they could be the numbers 22 through 96, and the answer would be 0 (because they don't include any numbers less than 20). Or, there are many other possibilities.

NOT SUFFICIENT

0133

If Etsuko's mailbox contains only junk mail, bills, and letters, what is the ratio of pieces of junk mail to bills in the mailbox?

(1) Half of the mail in Etsuko's mailbox consists of bills.
(2) The ratio of bills to letters in Etsuko's mailbox is 3:1.

---

j:b = ?

(1) Half of the mail is bills, but the other half could have almost all junk mail (making the ratio large) or almost no junk mail (making the ratio small).

NOT SUFFICIENT

(2) This doesn't give you enough info about the number of pieces of junk mail. There could be much more junk mail than anything else (large ratio), or almost no junk mail (small ratio).

NOT SUFFICIENT

(12) Half of the mail is bills, so the other half is junk mail and letters. So, j+l = b.

According to the second statement, b = 3l. So, you can substitute $b/3$ for l to find an equation that only includes j and b.

$j + b/3 = b$
$j = 2b/3$
$j/b = 2/3$

The ratio of junk mail to bills is 2:3.

SUFFICIENT

0134

Annetta makes 14$ per hour for the first 40 hours she works in a given week, and p% more than 14$ per hour for any hours she works past 40. How many hours did Annetta work last week?

(1) Annetta made 532$ last week.
(2) p = 10

---

(1) If Annetta works for 40 hours, she makes 40*14$ = 560$. She doesn't get the p% higher over-time rate until she has already earned this 560$. This statement says she only earned 532$, so she never earned the higher pay rate, and the value of p% is irrelevant. She worked for $532/14$ = 38 hours.

SUFFICIENT

(2) By itself, this doesn't tell you how much Annetta worked.

NOT SUFFICIENT

0135

In sequence A, $a_1 = 1$, and $a_n = a_{n-1} + k$ for some constant positive integer k. Does there exist a value m>1 where $a_m = 10$?

(1) k > 5
(2) k is a multiple of 4

The problem asks if 10 is anywhere in the sequence. The sequence is made by starting with 1, then adding k. For example, if k = 2, then the sequence will be 1, 3, 5, 7, 9, etc. If k = 3, then the sequence will be 1, 4, 7, 10, etc.

(1) If k=6, then the sequence is 1, 7, 13, 19, etc. and the answer is "no"

If k=9, then the sequence is 1, 10, 19, etc. and the answer is "yes"

NOT SUFFICIENT

(2) If k=4, then the sequence is 1, 5, 9, 13, 17, etc. and the answer is "no"

If k=8, then the sequence is 1, 9, 17, 25, etc. and the answer is "no"

If k is a multiple of 4 that is greater than 8 (such as 12, 16, etc.) then the second term of the sequence is greater than 10, so the answer must be "no"

SUFFICIENT

0136

A set of *x* cards is numbered with consecutive integers from 1 to *x*. What is the probability that the number on a randomly selected card is even?

(1) *x* is even
(2) *x* = 18

---

(1) If x is even, then 1/2 of the cards are even. For example, if x=6, then cards 2,4,and 6 are even and cards 1,3,and 5 are odd. The answer is 1/2

SUFFICIENT

(2) If you know the number of cards the probability can be calculated exactly.

SUFFICIENT

0137

Three distinct positive integers sum to 10. Is one of the three integers equal to 5?

(1) One of the three integers is equal to 4.
(2) All three of the integers are less than 6.

The ways for three distinct positive integers to sum to 10 are:

1 2 7
1 3 6
1 4 5
2 3 5

(1) The only case is 1 4 5, so the answer is "yes"

SUFFICIENT

(2) The only cases are 1 4 5 and 2 3 5, so the answer is "yes"

SUFFICIENT

0138

If $a < x < b$ and $a-k < y < b-k$, is $x > y$?

(1) $a + k = b$
(2) $b - x < k$

---

(1) $a+k=b$. Substitute b with $a+k$ in the inequalities.

$a < x < a+k$
$a-k < y < (a+k)-k$
$a-k < y < a$

$x > a$ and $y < a$, so $x > y$.

SUFFICIENT

(2) Simplify the inequality.

$b-x < k$
$x > b-k$

$x > b-k$ and $y < b-k$, so $x > y$.

SUFFICIENT

0139

A restaurant's average review score is currently 2.7 out of 5. If none of the old reviews can be changed or deleted, what is the smallest possible number of new reviews that the restaurant would need in order to raise its average score to at least 4.0?

(1) Of the current reviews, 6 have a score of 0.
(2) The restaurant currently has exactly 20 reviews

The more reviews the restaurant has, the less each new review will change its score. For example one new review has more impact if there is only 1 review already, versus having 100 reviews already.

x = the number of reviews now

average review = 2.7 = number of total points / x

number of total points = $2.7x$

The problem asks about the minimum possible number of reviews to get the greatest increase, assume that every new review has the highest score of 5.0. If the number of new reviews is y

new average = $(2.7x + 5.0y)/(x+y)$

$(2.7x+5.0y)/(x+y) \geq 4.0$
$2.7x+5.0y \geq 4.0x + 4.0y$
$y \geq 1.3x$

The new reviews must be at least 1.3 times the old reviews.

(1) This does not give the number of old reviews in total.

NOT SUFFICIENT

(2) If there are 20 reviews now, then $x=20$, so the number of new reviews must be at least $1.3(20) = 26$.

SUFFICIENT

0140

A manufacturer lists all the models of sunglasses it produces in a catalog. Some of the sunglasses are polarized, while others are not. How much greater is the average price of polarized sunglasses than the average price of non polarized sunglasses?

(1) The ratio of the number of pairs of polarized sunglasses to the number of pairs of non-polarized sunglasses is 4:1.
(2) The average price of the polarized sunglasses in the catalog is 4$ higher than the average price of all of the sunglasses in the whole catalog.

---

(1) This provides no info about the price.

NOT SUFFICIENT

(2) With the info from this statement, you still need to find the average price of the non-polarized sunglasses to answer the problem. The average price of the non-polarized sunglasses can vary depending on what amount of the sunglasses are polarized.

For example, if 1/2 of the sunglasses are polarized, and the average price of polarized sunglasses is 4$ higher than the overall average, then the average price of the other half must be 4$ LOWER than the overall average. The difference is 8$.

But, if only one pair of sunglasses is polarized, and almost all of them are non-polarized,then the average price of the whole catalog and the average non-polarized price will be very close to each other. In this case, the difference would be close to 4$.

NOT SUFFICIENT

(12) The average price of all of the sunglasses is x, and the average price of all of the polarized sunglasses is x+4.

If s is the number of sunglasses, then sx is the total price of all sunglasses, and (0.8s)(x+4) is the total price of polarized sunglasses.

So, the amount that is left for non-polarized sunglasses is sx - 0.8s(x+4) = 0.2sx - 3.2s.

The number of non-polarized sunglasses is 1/5 of the total, or 0.2s.

So, find the average cost of the non-polarized sunglasses by dividing the total cost by the number of sunglasses. The average cost of non-polarized sunglasses is (0.2sx - 3.2s)/0.2s = x-16.

The non-polarized sunglasses cost 16$ less than the average, and the polarized sunglasses cost 4$ more than the average. So, the difference is 20$.

SUFFICIENT

0141

A store sells only gold and silver jewelry. Yesterday, the store sold jewelry with a total price of $4,000. How many dollars worth of gold jewelry did the store sell?

(1) The average price of a piece of silver jewelry was $60 less than the average price of a piece of gold jewelry.
(2) The store sold 50% more pieces of silver jewelry than pieces of gold jewelry.

---

g = number of pieces of gold jewelry
x = total $ of gold jewelry sold
s = number of pieces of silver jewelry
y = total $ of silver jewelry sold

x + y = 4,000

What is x?

(1) Average price of silver = y/s
average price of gold = x/g

y/s = x/g - 60

Plug in as much as possible:

(4,000-x)/s = x/g - 60
g(4,000-x) = sx - 60sg

There isn't enough info to solve for x

NOT SUFFICIENT

(2)

s = 1.5g

This gives no information about x or y because it doesn't tell you the prices of the jewelry

NOT SUFFICIENT

(12)

From the first statement, you know g(4,000-x) = sx - 60sg

Plug in the second statement

g(4,000-x) = 1.5gx - 60*1.5g*g
Without knowing g, you can't solve for x

Using case testing: the store could have sold 2 pieces of gold jewelry and 3 pieces of silver jewelry. If the silver jewelry each cost $776 and the gold jewelry each cost $836 (60 more than silver), then the total amount was $776*3 + $836*2 = 4,000 and $1,672 came from gold. Or, the store could have sold 20 pieces of gold jewelry and 30 pieces of silver jewelry. If the silver jewelry each cost $56 and the gold jewelry each cost $116, then the total is still 4,000 but $2,320 came from gold.

NOT SUFFICIENT

0142

If x, y, and z are all positive integers, is z located between x and y on a number line?

(1) $xy = z^2$
(2) $x < z < (x + y)/2$

---

(1) If z was bigger than both x and y, z^2 would be bigger than xy. If z was smaller than both x and y, z^2 would be smaller than xy. So, z must be between x and y.

SUFFICIENT

(2) Since the statement says the average of x and y is bigger than x, y must be bigger than x. Also, the average of two numbers is always in between those numbers, so, the average of x and y is less than y. Therefore, because z is bigger than x and smaller than the average of x and y, z must be between x and y.

SUFFICIENT

0143

Anisa owns a total of 100 shares of various stocks with different prices. From Monday to Tuesday, all of her shares either increased in price or decreased in price. How many of her 100 shares increased in price?

(1) The total value of all of the shares that increased in price increased by 8% from Monday to Tuesday.
(2) The total value of all 100 shares decreased by 2% from Monday to Tuesday.

---

(1) The statement tells you the change in price but not the number of shares.

NOT SUFFICIENT

(2) There could have been 100 shares that all decreased by exactly 2%, or 50 shares that increased and 50 shares that decreased by more than 2% (averaging out to 2%), or many other possibilities.

NOT SUFFICIENT

(12) All 100 shares decreased by 2%, but some of them increased by 8%. However, there could have been different numbers that increased. For example, there could have been just one stock that increased by 8%, and the others decreased by a bit more than 2%, averaging out to 2% overall. Or, there could have been two stocks that increased by 8%, and the others decreased by a little more than in the previous scenario, averaging out to 2%.

NOT SUFFICIENT

0144

What is the value of $\frac{(a + b)}{(ax + by)}$?

(1) $\frac{a}{b} = \frac{(1 - y)}{(x - 1)}$
(2) $\frac{1}{a} + \frac{1}{b} = \frac{y}{a} + \frac{x}{b}$

---

(1)
$\frac{a}{b} = \frac{(1 - y)}{(x - 1)}$

a(x-1)=b(1-y)
ax-a=b-by
ax+by=a+b
$\frac{(a+b)}{(ax+by)}=1$

SUFFICIENT

(2)
$\frac{1}{a} + \frac{1}{b} = \frac{y}{a} + \frac{x}{b}$

$\frac{ab}{a} + \frac{ab}{b} = \frac{aby}{a} + \frac{abx}{b}$
b + a = by + ax
$\frac{(a+b)}{(ax+by)}=1$

SUFFICIENT

0145

If a and b are integers, is a - b odd?

(1) 2a - b is odd
(2) a - 2b is even

---

(1) The difference between two numbers is odd if one of those numbers is even, and the other one is odd. The difference between 2a and b is odd. But, 2a always has to be even. So, b must be the odd number.

b is odd. But, you don't know if a is odd or even. You know that 2a is even, but that's true no matter what a is.

So, if b is odd and a is odd, then a-b is even "no"
If b is odd and a is even, then a-b is odd "yes"

NOT SUFFICIENT

(2) The difference between two numbers is odd if one of those numbers is even, and the other one is odd. The difference between a and 2b is odd. But, 2b always has to be even. So, a must be the odd number.

a is odd. But, you don't know if b is odd or even, because you only know about 2b, which would be even no matter what.

So, if a is odd and b is odd, then a-b is even "no"
If a is odd and b is even, then a-b is odd "yes"

NOT SUFFICIENT

(12) Statement 1 tells you that b is odd, and statement 2 tells you that a is odd. So, a-b is even and the answer is "no"

SUFFICIENT

0146

A box contains blue and red marbles in equal numbers. Then, x blue marbles are added to the box, and y red marbles are removed from the box. After this happens, the ratio of blue to red marbles is 5:4. How many marbles are now in the box?

(1) x - y = 1
(2) $x/y = 3/2$

---

m = original number of each color of marbles

New ratio = $(m+x)/(m-y) = 5/4$

Simplify this.

4(m+x) = 5(m-y)
4m + 4x = 5m - 5y
4x + 5y = m

(1) This tells you what x-y is but not m.
For example, if x=10 and y=9, then m=4x+5y=85, so the original number of marbles could be 85*2 =170.

If x=2 and y=1, then m=4x+5y=8+5=13, so the original number of marbles could be 13*2 = 26.

NOT SUFFICIENT

(2) This tells you the relationship between x and y but not m. For example, if x=3 and y=2, then m=4*3+5*2 = 22, so the original number of marbles could be 2*22=44. Or if x=6 and y=4, then m=4*6+5*4=44, so the original number of marbles could be 2*44=88.

NOT SUFFICIENT

(12)

Using both of the statements, you can solve for x and y.

x-y=1
x=y+1

$x/y = 3/2$
2x=3y
2(y+1)=3y
2y+2=3y
y=2
x=3

If x=3 and y=2, then m=4*3+5*2=22, so the answer is 2*22=44.

SUFFICIENT

0147

Does Everett have at least three more pieces of candy than Albertha has?

(1) If Everett gave Albertha two pieces of candy, they would have the same amount of candy.
(2) If Albertha gave Everett six pieces of candy, Albertha would have half as much candy as Everett.

---

(1) E-2 = A+2
E = A+4
Everett has 4 more pieces than Albertha

SUFFICIENT

(2) A-6 = 0.5(E+6)
A-6 = 0.5 E + 3
A = 0.5 E + 9

the difference between A and E depends on the exact values. For example, if E=20, then A=0.5E+ 9 = 19, and the difference is 1. So, the answer is "no". If E=30, then A = 0.5E + 9 = 24, and the difference is 6. So, the answer is "yes"

NOT SUFFICIENT

0148

Each term in a sequence is the remainder when the square of the previous term is divided by 10. What is the largest term in the sequence?

(1) The first term of the sequence is even.
(2) The second term of the sequence is 6.

---

(1) Test cases.

If the first term is 2, then the sequence is like this.

2
$2^2 = 4$
$4^2 = 16$, remainder = 6
$6^2 = 36$, remainder = 6
$6^2 = 36$, remainder = 6

The sequence will keep repeating 6, which is the largest term, so the answer is 6.

But if the first term is 8, then the sequence is like this.

8
$8^2 = 64$, remainder = 4
$4^2 = 16$, remainder = 6
...

In that case, the largest term is 8.

NOT SUFFICIENT

(2)

If the first term is 16, then the second term is 6 (because $16^2 2^2 = 256$.) After that point, the sequence will keep repeating 6: 16, 6, 6, 6, 6... The largest term is 16.

Or, if the first term is 6, the answer is 6 because all terms equal 6.

NOT SUFFICIENT
...

(12) The case where the first term is 16 and the second term is 6, works for both statements. In this case, the answer is 16 (the first term is the largest). The case where the first term is 6 and the second term is 6 also works for both statements. But, in this case, the answer is 6.

NOT SUFFICIENT

0149

In a rare book store, 100 of the books for sale are first editions and 50 of the books for sale are signed. How many books are for sale in total?

(1) The number of signed first editions is 10 greater than the number of books which are neither signed nor first editions.
(2) The number of unsigned first editions is 50 greater than the number of signed books that are not first editions.

Make a chart and fill in the given info.

	Signed	**Not signed**	**total**
First ed			100
Not first ed			
Total	50		

(1) Fill in the info from the statement

	Signed	**Not signed**	**total**
First ed	x+10		100
Not first ed		x	
Total	50		

Unsigned first ed = all first ed - signed first ed = 100 - (x+10) = 90-x

	Signed	**Not signed**	**total**
First ed	x+10	90-x	100
Not first ed		x	
Total	50		

Unsigned = unsigned first ed + unsigned not first ed = 90-x + x = 90

	Signed	**Not signed**	**total**
First ed	x+10	90-x	100
Not first ed		x	
Total	50	90	140

The total is 140 books.

SUFFICIENT

(2) Fill in the info from the statement

	Signed	**Not signed**	**total**
First ed		y+50	100
Not first ed	y		

Total	50		

Fill in as much additional info as possible

	Signed	**Not signed**	**total**
First ed	50-y	y+50	100
Not first ed	y		
Total	50		

The number of books in total can't be calculated, because you would need to know the number of un-signed books that are not first editions (bottom right).

NOT SUFFICIENT

0150

Is p percent of x greater than 65?

(1) p percent of 90 is greater than 50
(2) 70 percent of x is greater than 90

---

is $\frac{p}{100} * x > 65$?
is $px > 6{,}500$?

(1) $\frac{p}{100} * 90 > 50$
$p > \frac{50*100}{90}$
$p > \frac{5{,}000}{90}$
$p > \frac{500}{9}$

The answer depends on the value of x.

NOT SUFFICIENT

(2) $\frac{70}{100} * x > 90$
$\frac{7}{10} * x > 90$
$x > \frac{90*10}{7}$
$x > \frac{900}{7}$

The answer depends on the value of p.

NOT SUFFICIENT

(12)
$p > \frac{500}{9}$
$x > \frac{900}{7}$

$px > (\frac{500}{9})(\frac{900}{7})$
$px > \frac{50{,}000}{7}$

Compare $\frac{50{,}000}{7}$ to 6,500. You can do this easily by multiplying 6,500 by 7. 6,500*7 = 45,500. So, $\frac{45{,}500}{7} = 6{,}500$, so $\frac{50{,}000}{7}$ is bigger than 6,500.

SUFFICIENT

0151

Is $x > y^2$?

(1) $x > (y + 1)^2$
(2) $x > (y - 1)^2$

---

(1) Simplify.

$x > y^2 + 2y + 1$

If $y^2 + 2y+1$ is bigger than y^2, then this tells you $x > y^2$. But, if y is negative, that logic doesn't work.

For example, if y=-3, then $y^2+2y+1 = (-3)^2 -2(3) + 1 = 9-6+1 = 4$. So, if x=5, then $x > y^2+2y+1$. But, x is NOT bigger than y^2.

NOT SUFFICIENT

(2) Simplify.

$x > y^2 -2y+1$

If y^2-2y+1 is bigger than y^2, then this tells you $x > y^2$. But, if y is a positive number that is bigger than $\frac{1}{2}$, then the logic doesn't work.

For example, if y=1, then $y^2-2y+1 = 1-2+1 = 0$. So, if $x = \frac{1}{2}$, then $x > y^2-2y+1$. But, x is NOT bigger than y^2.

NOT SUFFICIENT

(12) Add the two inequalities together with the inequality sign pointing the same direction.

$x > y^2 + 2y +1$
$x > y^2 - 2y + 1$

$2x > 2y^2 + 2$
$x > y^2 + 1$

If $x > y^2 + 1$, then x must be at least 1 bigger than y^2.

SUFFICIENT

0152

Did Martha complete her 1 mile walk in under 25 minutes?

(1) Martha's average speed for the first 2/3 of a mile was 2.4 miles per hour.
(2) Martha's average speed for the last 2/3 of a mile was 2.5 miles per hour.

---

(1) Be careful, because this could be sufficient if it proves that she walks so slowly that she must have spent more than 25 minutes. Check how long she spent on the first 2/3 of a mile.

She traveled 2/3 miles at 2.4 mph, for a time of $\frac{(2/3)}{(2.4)} = \frac{2}{(3*2.4)} = \frac{2}{7.2} = \frac{20}{72} = \frac{5}{18}$ hours, or $\frac{50}{3}$ minutes. This is less than 25 minutes, so she could have finished the whole walk in this amount of time (or, she could not have.)

NOT SUFFICIENT

(2) She traveled 2/3 miles at 2.5 mph, taking a total of $\frac{(2/3)}{2.5} = \frac{2}{(3*2.5)} = \frac{2}{7.5} = \frac{4}{15}$ hours, or 16 minutes. This is less than 25 minutes, so she could have finished the whole walk in this amount of time (or, she could not have.)

NOT SUFFICIENT

(12) She traveled the first 2/3 miles in 16 2/3 minutes, and the last 2/3 miles in 16 minutes. This can work out in multiple different ways. For example, if the first 1/3 mile took 6 2/3 minutes, the middle 1/3 mile took 10 minutes, and the last 1/3 mile took 6 minutes, the overall time is under 25 minutes. But, if the first 1/3 mile took 10 2/3 minutes, the middle 1/3 mile took 6 minutes, and the last 1/3 mile took 10 minutes, the overall time is over 25 minutes.

NOT SUFFICIENT

0153

Roderick purchased a television at a discount of x% off of the original price of T dollars, and a stereo at a discount of y% off of the original price of S dollars. What was the ratio of the amount Roderick paid for the television to the amount he paid for the stereo?

(1) $T/(S + T) = 0.4$
(2) $x/(x + y) = 0.8$

The original price of the television was T, and Roderick paid $T(1-x/100)$. The original price of the stereo was S, and Roderick paid $S(1-y/100)$. The ratio of the amounts he paid is

$T(1-x/100) : S(1-y/100)$

In simpler form, this is

T(100-x) : S(100-y)

(1)
Test cases.
T = 40, T+S = 100, S = 60
If x=y=50, then Roderick paid 20 for the television and 30 for the stereo, so the ratio is 2:3

If x = 50 and y=10, then Roderick paid 20 for the telvision and 54 for the stereo, so the ratio is 20:54 = 10:27

NOT SUFFICIENT

(2) Test cases:
x = 40, x+y = $x/0.8$ = 50, y = 10
If T=S=100, then Roderick paid 60 for the television and 90 for the stereo, so the ratio is 60:90 = 2:3

If T = 1000 and S=100, then Roderick paid 600 for the television and 90 for the stereo, so the ratio is 600:90 = 20:3

NOT SUFFICIENT

(12) Test cases:

T = 40, S = 60, x = 40, y = 10

He paid .6(40) = 24 for the television and .9(60) = 54 for the stereo, so the ratio is 24:54 = 4:9

T = 40, S=60, x=20, y=5
He paid .8(40) = 32 for the television and .95(60) = 57 for the stereo, so the ratio is 32:57 which can't be simplified

The two ratios are different

NOT SUFFICIENT

0154

ABC and DEF represent two 3-digit numbers with unknown digits, and all six digits are different integers from 1 to 9, inclusive. Is ABC > DEF?

(1) A > B + C
(2) F > E + D

---

(1) ABC has its hundreds digit greater than the sum of its tens and ones digit. So, ABC is a number such as 412 or 723. However, this doesn't give you info about the other number DEF.

NOT SUFFICIENT

(2) DEF has its ones digit greater than the sum of its tens and hundreds digit. So, DEF is a number such as 214 or 359. However, this doesn't give you info about the other number ABC.

NOT SUFFICIENT

(12) It's easy to find a case for ABC > DEF. For example, if ABC = 943 and DEF=127, then ABC > DEF and both statements are true. So, try to find another case for ABC < DEF.

A has to be greater than B+C, and B and C have to be different. So, the smallest B and C can be is 1 and 2, and A has to be bigger than 1+2. So, A is at least 4. The smallest ABC can be is 412. Try to find a value of DEF that is bigger than 412.

One example is DEF = 539. If ABC=412 and DEF=539, then ABC < DEF.

NOT SUFFICIENT

0155

If $xy \neq 0$, is $x^y > y^x$?

(1) $x = y + 1$
(2) $x > y > 0$

---

(1) Test cases.
x=2,y=1

2^1 = 2
1^2 = 1
"yes"

x=-1,y=-2

$(-1)^{(-2)} = 1$
$(-2)^{(-1)} = -\frac{1}{2}$
"yes"

x=-2,y=-3
$(-2)^{(-3)} = \frac{1}{(-2)^3} = -\frac{1}{8}$
$(-3)^{(-2)} = \frac{1}{(-3)^2} = \frac{1}{9}$

"no"

NOT SUFFICIENT

(2) Test cases.
x=2,y=1

$2^1 = 2$
$1^2 = 1$
"yes"

x=10,y=2
$10^2=100$
$2^{10}=1024$

"no"

NOT SUFFICIENT

(12)Test cases.
x=2,y=1

$2^1 = 2$
$1^2 = 1$
"yes"

x=3, y=2

$3^2=9$
$2^3=8$
"yes"

x=4,y=3
$4^3=64$
$3^4=81$
"no"

NOT SUFFICIENT

0156

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of x^2 is 9.
(2) The units digit of y^2 is 6.

---

(1) x must have a units digit of either 3 ($3^2=9$) or 7 ($7^2=49$). Without knowing what y is, x^y can have a lot of different units digits. For example, if y=1, then x^y could have a units digit of 3 or 7.

NOT SUFFICIENT

(2) y must have a units digit of either 4 ($4^2 = 16$) or 6 ($6^2 = 36$). However, without knowing x, you can't find the units digit of x^4 or x^6 (or x^{14}, x^{24}, x^{34}, etc), and it could have many different values.

NOT SUFFICIENT

(12) x has a units digit of 3 or 7, and y has a units digit of 4 or 6. Test cases.

x=3, y=4
$3^4 = 81$ and the answer is 1
x=3,y=6
3^6 has a units digit of 9

NOT SUFFICIENT

0157

$f(x) = kx^2 + m$, where k and m are constants, and $f(2) - f(1) = 21$. What is the value of f(3)?

(1) $f(4) = 115$
(2) $m = k - 4$

$f(2)-f(1)=21$
$k(2^2)+m - (k(1^2)+m) = 21$
$4k+m-k-m=21$
$3k=21$
$k=7$
Plug this in to the question
The value of $f(3)$ is $k(3^2)+m=7(3^2)+m=63+m$
$63+m=?$

(1)

$f(4)=115$
$7(4^2)+m=115$
This lets you calculate m, and then answer the problem by calculating m+63.

SUFFICIENT

(2)
$m=k-4$
$m=3$
Because this also tells you the value of m, it's sufficient.

SUFFICIENT

0158

What percent of the students in a certain class know how to swim?

(1) Of the students who know how to swim, 90% also know how to ride a bike.
(2) 80% of the students in the class know how to ride a bike.

---

(1) The percent who know how to swim could be large or small. For example, if 100% know how to swim, then 90% also know how to ride a bike. If 10% know how to swim, then 9% also know how to ride a bike.

NOT SUFFICIENT

(2) This doesn't give any info about the percent who know how to swim.

NOT SUFFICIENT

(12) The situation can actually still be different. You don't know how many students can ride a bike but not swim, you only know about the ones who can ride a bike who can also swim. So, if the number of those students who can just ride a bike and can't swim is different, then the answer is different.

For example, if 50% of the students know how to swim, then 90% of those (45% in total) also know how to ride a bike. The rest of the 80% who can ride a bike, must be students who don't know how to swim. So, it comes out like this. 5% can just swim, 45% can swim and bike, 35% can just bike, and 15% can do neither. The answer is 50%.

Or, if 80% of the students know how to swim, then 90% of those (64%) also know how to ride a bike. It comes out like this. 16% can just swim, 64% can swim and bike, 16% can just bike, and 14% can do neither. The answer is 80%.

NOT SUFFICIENT

0159

A grocery store has a ratio of cashiers to stockers of 4:3. How many cashiers currently work at the store?

(1) If half of the cashiers were reassigned as stockers, the ratio of cashiers to stockers would be 2:5.
(2) If exactly two cashiers were reassigned as stockers, the number of cashiers would equal the number of stockers.

---

cashiers = c
stockers = s
c:s = 4:3
c/s = 4/3

(1)

In this scenario, the number of cashiers goes from c to $\frac{c}{2}$ and the number of stockers goes from s to s+$\frac{c}{2}$. You know the ratio between these values.

$(\frac{c}{2}) / (s + \frac{c}{2}) = \frac{2}{5}$
$\frac{c}{2} = \frac{2s}{5} + \frac{2c}{10}$
$\frac{c}{2} = \frac{2s}{5} + \frac{c}{5}$
Multiply by 10
5c = 4s + 2c
3c = 4s

This just tells you the ratio of cashiers to stockers (which you already knew from the problem), not the actual numbers.

NOT SUFFICIENT

(2)

The new number of cashiers is c-2 and the new number of stockers is s+2. These numbers are the same.

(c-2) = (s+2)
c = s + 4

So the current number of cashiers is 4 greater than the number of stockers.

Also, the current ratio is 4:3 (from the problem text)

There is only one set of values that fits both of these facts. Cashiers = 16 and stockers = 12

SUFFICIENT

0160

If $x = 2^a3^b$ and a and b are integers, what is the value of a?

(1) $x(5^a) = 300$
(2) x = 12

---

(1) $300 = 2^2 3^1 5^2$, so a=2.

SUFFICIENT

(2) $12=2^2 3^1$, so a=2.

SUFFICIENT

0161

Gavin collects books and magazines written in French and Spanish. Is his number of French books equal to his number of Spanish magazines?

(1) Gavin has twice as many magazines as books.
(2) Gavin has twice as many French items as Spanish items.

---

(1) You don't know how many of the books and magazines are in French vs Spanish.

NOT SUFFICIENT

(2) You don't know how many of the French and Spanish items are books vs magazines.

NOT SUFFICIENT

(12) From statement 1, magazines = 2*books
French magazines + Spanish magazines = 2*(French books + Spanish books)
French magazines + Spanish magazines = 2*French books + 2*Spanish books

From statement 2, French = 2*Spanish
French magazines + French books = 2*(Spanish magazines + Spanish books)
French magazines + French books = 2*Spanish magazines + 2*Spanish books

Subtract the first equation minus the second

Spanish magazines - French books = 2*French books - 2*Spanish magazines

Simplify
3*Spanish magazines = 3*French books
Spanish magazines = French books
The answer is "yes"

SUFFICIENT

0162

Is x - y > 0?

(1) x + y < 0
(2) x > 0

The statement simplifies to "is x > y?"

(1) x could be larger or smaller than y.

NOT SUFFICIENT

(2) Because y is unknown, x could be larger or smaller than y.

NOT SUFFICIENT

(12) x is positive, but x+y is negative. So, y must be negative. Because x is positive and y is negative, x is larger than y and the answer is "yes"

SUFFICIENT

0163

Milo's book collection includes fiction and nonfiction books in Spanish and English. Of the books written in English, there are 20 more fiction books than nonfiction books. Of the nonfiction books, there are 24 more written in English than in Spanish. How many of Milo's books are written in Spanish?

(1) Milo has 180 fiction books.
(2) Milo has 300 books in total.

Make a chart

English Spanish total

Fiction	x+20		
Nonfiction	x	x-24	
Total			

Fill in any additional info in the chart that you can

	English	**Spanish**	**total**
Fiction	x+20		
Nonfiction	x	x-24	2x-24
Total	2x+20		

(1) Fill in 180 for the total fiction books and simplify

	English	**Spanish**	**total**
Fiction	x+20		180
Nonfiction	x	x-24	2x-24
Total	2x+20		

Spanish fiction = 180 - English fiction = 180 - (x+20)

	English	**Spanish**	**total**
Fiction	x+20	160-x	180
Nonfiction	x	x-24	2x-24
Total	2x+20		

Spanish books = Spanish fiction + Spanish nonfiction

Spanish books = x-24 + 160-x = 136

	English	**Spanish**	**total**
Fiction	x+20	160-x	180
Nonfiction	x	x-24	2x-24
Total	2x+20	136	

The answer is 136.

SUFFICIENT

(2) Fill in 300 for the total books and simplify

	English	**Spanish**	**total**
Fiction	x+20		
Nonfiction	x	x-24	2x-24
Total	2x+20		300

Fiction = total - nonfiction = 300-(2x-24) = 324 -2x

	English	**Spanish**	**total**
Fiction	x+20		324-2x
Nonfiction	x	x-24	2x-24
Total	2x+20		300

Spanish fiction = total fiction - English fiction = 304 - 3x

	English	Spanish	total
Fiction	x+20	304-3x	324-2x
Nonfiction	x	x-24	2x-24
Total	2x+20		300

Spanish total = Spanish fiction + Spanish nonfiction = 280 - 2x

	English	Spanish	total
Fiction	x+20	304-3x	324-2x
Nonfiction	x	x-24	2x-24
Total	2x+20	280-2x	300

The total number of Spanish books changes based on the value of x.

NOT SUFFICIENT

0164

How many unique prime factors does the integer x have?

(1) x is divisible by 30
(2) x is not divisible by 210

---

(1) 30 = 2*3*5 so x must include prime factors of 2, 3, and 5. But, x could also include other prime factors. For example, x could be 2*3*5*7 = 210, with four unique prime factors. Or, x could be 2*3*5*7*11 = 2,310, with five unique prime factors.

NOT SUFFICIENT

(2) x could be many different values, such as 6 (two unique prime factors) or 30 (three unique prime factors).

NOT SUFFICIENT

(12) x is divisible by 2, 3, and 5. But, x can't be divisible by 7, because that would make it divisible by 2*3*5*7=210.

However, x can still have different numbers of unique prime factors. For example, x=2*3*5 has three unique prime factors and is divisible by 30 but not 210. Or, x=2*3*5*11 has four unique prime factors and is divisible by 30 but not 210.

NOT SUFFICIENT

0165

A company sells two types of widgets, Type A and Type B. Last month, the company sold 60 widgets for a total of 16,000 dollars. What percent of the widgets sold last month were Type A?

(1) Type B widgets cost 1.5 times as much as Type A widgets.
(2) Type A widgets cost 200$.

---

(1) Without more specific information about the cost of each type of widget, this is not sufficient.

For example, the company could have sold only Type A widgets, costing 16,000/60=267$ each, and the cost of Type B widgets (even though none were sold) would be 1.5 times this, or 400$.

Or, the company could have sold only Type B widgets, again costing 267$ each, and the cost of Type A widgets would be 2/3 of this, or 178$. The answer is different (100%, 0%, or anything in-between), depending on the actual price of the types of widgets.

NOT SUFFICIENT

(2) Without knowing how much the Type B widgets cost, this doesn't tell you anything about how many of each type of widget was sold.

NOT SUFFICIENT

(12) Type A cost 200$ and Type B cost 1.5 times this which equals 300$. Plug this into the given info from the problem.

$a + b = 60$
$200a + 300b = 16,000$
$2a + 3b = 160$

Use elimination to solve for a and b.

$2a+3b=160$
$2a+2b=120$
$b=40$
$a=20$
20 type A and 40 type B were sold

The answer is 20/(20+40) which equals 33%.

SUFFICIENT

0166

If $x + 1 = {}^{6}/_{x}$, what is the value of x?

(1) $x^2 = 2x$
(2) $x^2 = 4$

$x + 1 = {}^{6}/_{x}$
$x^2 + x = 6$
$x^2 + x - 6 = 0$
$(x - 2)(x+3) = 0$
$x = 2$ or -3

(1)

$x^2 = 2x$
$x^2 - 2x = 0$
$x(x-2) = 0$
$x = 0$ or 2
Combined with the problem info, x can only equal to 2.

SUFFICIENT

(2)

$x^2 = 4$
$x = 2$ or -2
Combined with the problem info, x can only equal to 2.

SUFFICIENT

0167

On a retailer's website, product listings can have a customer review, a picture, both, or neither. The number of listings that include a picture is twice the number of listings that do not include a picture. The number of listings with a customer review is 300 more than the number of listings without a customer review. In total, how many listings are there on the website?

(1) The number of listings with a customer review is 220 more than the number of listings without a picture.

(2) The number of listings with a picture is 220 more than the number of listings without a review.

Make a chart

	Picture	**No Picture**	**total**
Review			y+300
No Review			y
Total	2x	x	

Because the total can be written as either 2y+300 or 3x, you know that 2y+300 = 3x. This simplifies to 2y = 3x-300, or y=1.5x-150.

So, you can rewrite the right side of the table using y=1.5x-150 so that there is only one variable.

	Picture	**No Picture**	**total**
Review			1.5x+150
No Review			1.5x-150
Total	2x	x	3x

(1)

The number of listings with a customer review is 220 more than the number of listings without a picture.

Using the info in the chart, this statement says 1.5x+150 = x + 220. This simplifies to .5x = 70, so x=140.

The number of listings is 3x, or 420.

SUFFICIENT

(2) The number of listings with a picture is 220 more than the number of listings without a review. Using the info in the chart, this statement says 2x = 1.5x -150 + 220. This simplifies to .5x = 70, or x=140.

The number of listings is 3x, or 420.

SUFFICIENT

0168

What is the value of the integer x?

(1) $2^x < 20 < 3^x$
(2) $2^{(x + 1)} < 20 < 3^{(x + 1)}$

---

(1) $2^3 = 8$ and $3^3 = 27$, so x could equal 3

Or, $2^4 = 16$ and $3^4=81$, so x could equal 4

NOT SUFFICIENT

(2) x could equal 2 (8 < 20 < 27) or x could equal 3(16 < 20 < 81)

NOT SUFFICIENT

(12) Statement 1 says x is 3 or 4, and statement 2 says x is 2 or 3. The only value that fits both statements is x=3.

SUFFICIENT

0169

If x = a + 4 and y = b - 3, what is the value of $x^2 - y^2$?

(1) $a^2 - b^2 = 20$
(2) 4a + 3b = 36

Simplify x^2-y^2

$(a+4)^2-(b-3)^2$
$a^2+8a+16-(b^2-6b+9)$
$a^2+8a+16-b^2+6b-9$
$a^2+8a+7-b^2+6b = ?$

(1) $a^2-b^2 = 20$

Plug this into the question

$(a^2-b^2)+8a+7+6b$
20+8a+7+6b
27+8a+6b
Without the values of a and b, you can't use this to find the answer to the problem.

To be safe, you can make sure that a and b can have different values.
If $a^2-b^2=20$, then you could have $a^2=20$ and $b^2=0$, so $a=\sqrt{20}$ and b=0. Or, you could have $a^2=36$ and $b^2=16$, so a=6 and b=4. These give different values for 27+8a+6b.

NOT SUFFICIENT

(2) 4a+3b=36

Plug this into the question
$a^2+8a+7-b^2+6b = ?$

2(4a+3b)=8a+6b=72

$a^2-b^2+7+72=?$
This varies depending on the values of a and b, which can change

NOT SUFFICIENT

(12) plug both statements into the question.

$(a^2-b^2)+(8a+6b)+7 = ?$
20 + 2(36)+7=?

SUFFICIENT

0170

Is $x^a > y^b$?

(1) x = 2y
(2) a = 2b

---

(1) If x=2y, then $x^a = (2y)^a = (2^a)(y^a)$.

Is $(2^a)(y^a) > y^b$?

If a is much smaller than b, the answer is "no" and if a is much bigger than b, the answer is "yes".

NOT SUFFICIENT

(2) Without knowing x and y, it isn't possible to find out which side of the inequality is greater.

NOT SUFFICIENT

(12) Plug in both statements to the question.

Is $x^a > y^b$?
Is $(2y)^a > y^b$?
Is $(2y)^{(2b)} > y^b$?
Is $2^{(2b)}\ y^{(2b)} > y^b$?
Is $4^b\ (y^b)^2 > y^b$?

This is not always "yes" or always "no". For example, if b=0, then $4^b(y^b)^2 = 4^0\ (y^0)^2 = 1*1^2 = 1$, and y^b also equals 1. So, the answer is "no."

If b = 1 and y = 1, then $4^b\ (y^b)^2 = 4*1^2 = 4$, and $y^b = 1$. The answer is "yes".

NOT SUFFICIENT

0171

One third of Dr. Gribbins' patients have high blood pressure, and some patients also have high cholesterol with or without high blood pressure. What is the difference between the number of patients who have both high blood pressure and high cholesterol, and the number who have neither?

(1) 70% of the patients who have high blood pressure also have high cholesterol.
(2) The number of patients with high cholesterol is 100 greater than the number of patients who do not have high blood pressure.

Make a chart and fill in the given info.

	High BP	**No high BP**	**total**
High C			
No high C			
Total	$x/3$	$2x/3$	x

(1) Fill in the additional info. 70% of $x/3$ is $7x/30$.

	High BP	**No high BP**	**total**
High C	$7x/30$		
No high C	$3x/30$		
Total	$x/3$	$2x/3$	x

Without the number of patients who have neither high blood pressure nor high cholesterol, you can't find the answer.

NOT SUFFICIENT

(2) Fill in the additional info.

	High BP	**No high BP**	**total**
High C			$2x/3+100$

No high C			
Total	$\frac{x}{3}$	$\frac{2x}{3}$	x

This statement doesn't give info about the number with both conditions or the number with neither.

NOT SUFFICIENT

(12) Combine both statements in one chart.

	High BP	No high BP	total
High C	$\frac{7x}{30}$		$\frac{2x}{3}+100$
No high C	$\frac{3x}{30}$		
Total	$\frac{x}{3}$	$\frac{2x}{3}$	x

The patients who don't have high cholesterol is $x - (\frac{2x}{3}+100) = \frac{x}{3}-100$

	High BP	No high BP	total
High C	$\frac{7x}{30}$		$\frac{2x}{3}+100$
No high C	$\frac{3x}{30}$		$\frac{x}{3}-100$
Total	$\frac{x}{3}$	$\frac{2x}{3}$	x

The patients with neither condition is $\frac{x}{3}-100-\frac{3x}{30} = \frac{7x}{30}-100$

	High BP	No high BP	total
High C	$\frac{7x}{30}$		$\frac{2x}{3}+100$
No high C	$\frac{3x}{30}$	$\frac{7x}{30}-100$	$\frac{x}{3}-100$
Total	$\frac{x}{3}$	$\frac{2x}{3}$	x

Even though you don't know the exact numbers of patients, the number with both conditions is 100 higher than the number with neither.

SUFFICIENT

0172

What is the value of the integer x?

(1) $x^2 = 2^x$
(2) $x^4 = 4^x$

---

(1)
$2^2 = 2^2$
$4^2 = 2^4$
x can be 2 or 4

NOT SUFFICIENT

(2)
$4^4 = 4^4$
$2^4 = 4^2$
x can be 2 or 4

NOT SUFFICIENT

(12) Both statements have x=2 or 4. So, x could be either one.

NOT SUFFICIENT

0173

If $f(x) = k(9 - x^2) + 2mx$, where k and m are constants, what is the value of f(3)?

(1) $f(-3) = -12$
(2) $f(0) = 18$

The problem asks for f(3), which is $k(9-3^2)+2*m*3$

This statement simplifies to $k(0)+6m = 6m$

What is the value of 6m?

(1)

$f(-3) = -12$
$k(9-(-3)^2) + 2*m*(-3) = -12$
$k(0) - 6m = -12$
$-6m = -12$
$m = 2$
Plug this value of m back into the question. The value of f(3) is 6(2) = 12

SUFFICIENT

(1)
$f(0) = 18$
$k(9-0^2) + 2*m*0 = 18$
$9k+0 = 18$
$k=9$

Plug this back into the question
What is the value of f(3)?
What is $9(3-3^2) + 2m(3)$?
You can't answer this without also knowing the value of m

NOT SUFFICIENT

0174

Is 2^x equal to $(-2)^{(-x)}$?

(1) $x = 0$
(2) $2^x = (-2)^x$

---

(1) If x=0, then $2^x = 2^0 = 1$ and $(-2)^{(-x)} = (-2)^0 = 1$. The answer is "yes"

SUFFICIENT

(2) This tells you that x is an even integer. For example, x=2 or x=0.

If x=2, then $2^x = 2^2 = 4$, and $(-2)^{(-x)} = (-2)^{(-2)} = 1/(-2)^2 = 1/4$. The answer is "no"

If x=0, then the answer is "yes"

NOT SUFFICIENT

0175

In a survey of 560 people who successfully lost weight, how many reported that they had stopped drinking soda?

(1) Of the respondents who had stopped drinking soda, $\frac{3}{4}$ had also stopped snacking between meals.

(2) $\frac{3}{7}$ of the respondents reported that they had stopped snacking between meals.

---

(1) This doesn't tell you how many people stopped drinking soda.

NOT SUFFICIENT

(2) $\frac{3}{7}$ of 560, or 240, stopped snacking between meals. But, you don't know how many stopped drinking soda.

NOT SUFFICIENT

(12) 240 respondents stopped snacking between meals. Also, $\frac{3}{4}$ of the people who stopped drinking soda also stopped snacking. But, the number who stopped drinking soda can still vary. For example, 200 people stopped drinking soda, and 150 of them also stopped snacking. Plus, another 90 people stopped snacking who didn't stop drinking soda.

Or, 300 people stopped drinking soda, and 225 of them also stopped snacking. Plus, another 15 people stopped snacking who didn't stop drinking soda.

The number who stopped drinking soda can be 200 or 300 (or many other values).

NOT SUFFICIENT

0176

If $4x \neq -7y$, what is the value of $\frac{(2a + 3b)}{(4x + 7y)}$?

(1) $a = x$
(2) $6b = 7y$

---

(1) This doesn't give you any info about b or y.

NOT SUFFICIENT

(2) This doesn't give you any info about a or x.

NOT SUFFICIENT

(12) Plug in and simplify.

$a = x$

$\frac{(2a+3b)}{(4x+7y)}$
$\frac{(2x+3b)}{(4x+7y)}$

Plug in $6b = 7y$

$\frac{(2x+3b)}{(4x+6b)}$

$\frac{(2x+3b)}{2(2x+3b)}$

The fraction simplifies to $\frac{1}{2}$

SUFFICIENT

0177

If $a \neq -b$, is $\frac{(x + y)}{(a + b)} > 0$?

(1) $x < a < b < 0 < y$
(2) x, a, b, 0, and y form a list of evenly spaced integers, in that order.

---

(1) a and b are both less than 0, so a+b is less than 0. However, x+y could be either positive or negative.

For example, if x = -10, a = -9, b = -8, and y = 3, then x+y is negative.

If x = -10, a = -9, b = -8, and y = 20, then x+y is positive.

If x+y is negative, then the fraction is positive (negative/negative = positive) and the answer is "yes"

If x+y is positive, then the fraction is negative (positive/negative = negative) and the answer is "no"

NOT SUFFICIENT

(2) Test cases.

If the evenly spaced integers are -3, -2, -1, 0, 1, then the fraction is $\frac{(-3+1)}{(-2-1)} = \frac{-2}{-3} = \frac{2}{3}$.

If the numbers are spaced 2 apart instead of 1 apart, the list is -6, -4, -2, 0, 2. The fraction is $\frac{(-6+2)}{(-4-2)} = \frac{-4}{-6} = \frac{2}{3}$

The fraction will always be $\frac{2}{3}$ because the ratio of the difference between the numerator and denominator doesn't change. So, the answer is "yes"

SUFFICIENT

0178

A tree increases in height by 18% each year. If the tree's height was first recorded in the year 2002, what was its height when it was recorded exactly 3 years later, in 2005?

(1) The tree was 25.7 feet taller in 2005 than it was in 2002.

(2) The tree was 40 feet tall in 2002.

The tree's height is shown in this table.

2002 x feet
2003 1.18x
2004 $(1.18^2)x$
2005 $(1.18^3)x$

(1) $(1.18^3)x - x = 25.7$
$x(1.18^3-1)=25.7$
$x=\frac{25.7}{(1.18^3-1)}$

The value of x can be calculated exactly, so the height in 2005 can be calculated exactly.

SUFFICIENT

(2) The height could be found by multiplying 40 by 1.18^3.

SUFFICIENT

0179

A movie was scored on a scale of 0 to 5 inclusive by a number of reviewers, some of whom were professionals. If the average score was 3.6 out of 5, what was the total number of reviewers (including both professionals and non-professionals)?

(1) The 36 professional reviewers gave the movie an average score of 4.0.
(2) The 60 non-professional reviewers gave the movie an average score of 3.3.

---

p=professional
n=nonprofessional

(1)

average score overall
=
(total points given)/(number of reviewers)

total points given = 36*4.0 + n*(average from n)

number of reviewers = 36+n

3.6=(36*4.0+n*(average from n))/(36+n)

3.6*36 + 3.6n = 4.0*36 + n*(average score from nonpro's)

n*(3.6-average from nonpro's)=14.4

This has multiple solutions. For example, n=10 nonpro's with an average score of 2.16 or n=36 nonpro's with an average score of 3.2.

NOT SUFFICIENT

(2)

average score overall
=
(total points given)/(number of reviewers)

total points given = p*(average from pro's) + 60*(3.3)

number of reviewers = p+60

3.6=(p*(average from pro's) + 60*(3.3))/(p+60)

3.6*p+216=p*average from pro's + 198
18 = p*(average from pro's-3.6)

This has multiple solutions. For example, n=20 pro's with an average score of 4.5 or n=40 pro's with an average score of 4.05.

NOT SUFFICIENT

(12) The answer is 36+60=96.

SUFFICIENT

0180

Is x > 0?

(1) $x^2 < x$
(2) $x^3 < x$

---

(1)

x^2 is only smaller than x if x is a positive fraction. x can't be negative, because then x^2 would be positive and bigger than x. So, x is positive and the answer is "yes"

SUFFICIENT

(2)

x^3 is smaller than x if x is a positive fraction, or a larger negative number. For example, $(-2)^3$ is -8, which is smaller than -2. And, $(\frac{1}{2})^3$ is $\frac{1}{8}$, which is also smaller than $\frac{1}{2}$. So, x can be either positive or negative.

NOT SUFFICIENT

0181

Is $x^2 > y^2$?

(1) $x + y < 0$
(2) $x - y < 0$

$x^2 > y^2$ if $|x| > |y|$, meaning x is further from 0 than y.

(1) You don't know which value is x and which value is y. For example, x=-2 and y=1 is one case, and x=1 and y=-2 is another case.

NOT SUFFICIENT

(2) This statement simplifies to $x < y$. But, x^2 can be bigger or smaller than y^2. For example, if x=1 and y=2, then $x < y$ and $1^2 < 2^2$.

Or, if x=-3 and y=2, then $x < y$ and $(-3)^2 > 2^2$.

NOT SUFFICIENT

(12) Statement 2 says $x < y$. Statement 2 simplifies to $x < -y$. Test cases.

If y=2, then $x < 2$ and $x < -2$. So, x must be a negative number that is more negative than y, such as -3 or -4. In these cases, $x^2 > y^2$ and the answer is "yes".

If y=-2, then $x < 2$ and $x < -2$. So, x must be a negative number that is more negative than y, such as -3 or -4. In these cases, $x^2 > y^2$ and the answer is "yes".

Whether y is a positive or negative number, x will be a "more negative" number and so when x is squared, it will be bigger.

SUFFICIENT

0182

What is the largest integer value of Q for which 3^Q is a factor of X?

(1) 9^7 is a factor of x, and 9^8 is not a factor of x.
(2) x is a perfect square.

---

(1) 3^{14} is a factor of x, and 3^{16} is not a factor of x. But, 3^{15} might or might not be a factor of x. So, Q could be either 14 or 15.

NOT SUFFICIENT

(2) this doesn't tell you what Q could be. For example, if x=9, then Q=2. But if x=4, then Q=0.

NOT SUFFICIENT

(12) Statement 1 tells you Q must be either 14 or 15. So, the largest power of 3 in x is either 3^{14} or 3^{15}. But, a perfect square has all of its prime factors raised to EVEN powers (for example, $6^2 = 2^2 3^2$). So, Q must be 14 and not 15.

SUFFICIENT

0183

In a survey of children aged 4 to 15, one third reported that they enjoy eating vegetables. What percent of those aged 4 to 9 reported that they enjoy eating vegetables?

(1) Of the children who enjoyed eating vegetables, 40% were aged 4 to 9.
(2) Of the children who did not enjoy eating vegetables, 60% were aged 4 to 9.

Make a chart and fill in the given info.

	4 to 9	**10 to 15**	**total**
Like veg			$\frac{1}{3}x$
Don't like veg			$\frac{2}{3}x$
Total			x

(1) The number of children aged 4 to 9 who like vegetables is 40% of $\frac{1}{3}x$, or $\frac{2}{15}x$.

	4 to 9	**10 to 15**	**total**
Like veg	$\frac{2}{15}x$		$\frac{1}{3}x$
Don't like veg			$\frac{2}{3}x$
Total			x

The rest of the children who like vegetables are aged 10 to 15. This is $\frac{1}{3}x-\frac{2}{15}x$, which equals $\frac{1}{5}x$.

	4 to 9	**10 to 15**	**total**
Like veg	$\frac{2}{15}x$	$\frac{1}{5}x$	$\frac{1}{3}x$
Don't like veg			$\frac{2}{3}x$
Total			x

However, you have no info about the number of children age 4 to 9. So, you can't determine what percent of them are represented by the $\frac{2}{15}x$ who like vegetables.

NOT SUFFICIENT

(2)Use the same approach as with statement 1 to fill in a row of the chart. 60% of $\frac{2}{3}$ is $\frac{2}{5}$.

	4 to 9	**10 to 15**	**total**
Like veg			$\frac{1}{3}x$
Don't like veg	$\frac{2}{5}x$	$\frac{4}{15}x$	$\frac{2}{3}x$
Total			x

However, you can't find the number of children age 4 to 9, so you can't calculate the percent.

NOT SUFFICIENT

(12)

Fill in a chart including the info from both statements.

	4 to 9	**10 to 15**	**total**
Like veg	$\frac{2}{15}x$	$\frac{1}{5}x$	$\frac{1}{3}x$
Don't like veg	$\frac{2}{5}x$	$\frac{4}{15}x$	$\frac{2}{3}x$
Total			x

Add $\frac{2}{15}x$ and $\frac{2}{5}x$ to find the total number of children who like vegetables, which is $\frac{8}{15}x$.

	4 to 9	**10 to 15**	**total**
Like veg	$\frac{2}{15}x$	$\frac{1}{5}x$	$\frac{1}{3}x$
Don't like veg	$\frac{2}{5}x$	$\frac{4}{15}x$	$\frac{2}{3}x$
Total	$\frac{8}{15}x$		x

The percent of children aged 4 to 9 who like vegetables is $(\frac{2}{15}x)/(\frac{8}{15}x)$, which simplifies to 2/8 or 25%.

SUFFICIENT

0184

A shopkeeper purchased a TV for 75$, then sold it at a discount of d% off of an original sales price of s$. How much profit did the store make on the sale?

(1) sd = 1,500
(2) s(100-d) = 11,000

The shopkeeper originally marked the TV at s$, then discounted it by d%. That gives a new price of $s(1-\frac{d}{100})$. The profit is $s(1-\frac{d}{100})-75$.

This simplifies to $\frac{s(100-d)}{100} - 75$.

(1)
$s=\frac{1,500}{d}$
Plug this into the question.

$\frac{(\frac{1,500}{d})(100-d)}{100} - 75$

$\frac{1,500(100-d)}{100d} - 75$
$\frac{15(100-d)}{d} - 75$
$\frac{1,500}{d} - 15 - 75$
$\frac{1,500}{d} - 90$

This is different depending on what was the percent discount. For example, if the discount was 5%, then the profit was $\frac{1,500}{5}-90 = 300-90 = 210$$. If the discount was 10%, then the profit was smaller, $\frac{1,500}{10}-90 = 150-90 = 60$$.

NOT SUFFICIENT

(2)
$s = {}^{11,000}/_{(100-d)}$

Plug this into the question.

${}^{s(100-d)}/_{100}$ - 75

$({}^{11,000}/_{(100-d)})({}^{(100-d)}/_{100})$ - 75

${}^{11,000}/_{100}$ - 75
110-75
35

SUFFICIENT

0185

If z > y and x, y, and z are integers, is $2^x 5^y > 10^z$?

(1) x + 3y = 4z
(2) x > z

$2^x * 5^y > 10^z$
$2^x * 5^y > (2*5)^z$
$2^x * 5^y > 2^z 5^z$
${}^{2^x}/_{2^z} > {}^{5^z}/_{5^y}$
$2^{(x-z)} > 5^{z-y}$?

(1) x + 3y = 4z
x = 4z - 3y

Plug into the question.

$2^{x-z} > 5^{z-y}$?
$2^{4z-3y-z} > 5^{z-y}$?
$2^{3z-3y} > 5^{z-y}$?
$2^{3(z-y)} > 5^{z-y}$?
$8^{z-y} > 5^{z-y}$?

Because z > y, the answer is "yes".

SUFFICIENT

(2) x > z

This just tells you that x-z is positive, so $2^{(x-z)}$ has a positive exponent. z-y is also positive (from the given info in the problem), so this doesn't help you determine whether $2^{(x-z)}$ or 5^{z-y} is bigger.

NOT SUFFICIENT

0186

If x and y are positive integers, what is the units digit of x?

(1) The units digit of $x^{(y + 1)}$ is 6.
(2) The units digit of $(x + 1)^y$ is 5.

(1) There are multiple cases. For example, x = 2 and y+1 = 4. 2^4 has a units digit of 6. Or, x = 6 and y+1 = 10. 6 raised to any power has a units digit of 6. So, the answer to the problem could be 2 or 6 (or other values).

NOT SUFFICIENT

(2) A number raised to a power will only have a units digit of 5, if the original number had a units digit of 5. (For example 5, 25, 125, 625, etc.) So, x+1 had a units digit of 5, meaning x had a units digit of 4.

SUFFICIENT

0187

If x and y are nonzero integers, does $x^y = y^x$?

(1) x does not equal y.
(2) x + y = 6

---

(1) x^y usually will not equal y^x (for example, if x=1 and y=3.) But, x^y and y^x can still be equal. For example, $2^4 = 4^2$.

NOT SUFFICIENT

(2) Test cases.

x=1, y=5
$1^5 = 1$ but $5^1 = 5$ "no"
x=2, y=4
$2^4 = 16$ and $4^2 = 16$ "yes"

NOT SUFFICIENT

(12) The cases x=1,y=5 and x=4,y=2 give a "no" and a "yes" answer, respectively.

NOT SUFFICIENT

0188

If x and y are positive integers, and the fraction $1/(2^x 5^y)$ is written as a decimal, how many consecutive zeroes appear immediately following the decimal point?

(1) x + y = 6
(2) x > y

The number of zeroes after the decimal point depends on how large the fraction is. For example, $1/50$, or 0.02, has one zero after the decimal point. But $1/1000$, or 0.001, has two zeroes after the decimal point.

If a fraction is greater than $1/10$ (0.1), it has no zeroes after the decimal point.

If a fraction is between $1/100$ (0.01) and $1/10$ (0.1), it has one zero, such as 0.025.

If a fraction is between $1/1000$ (0.001) and $1/100$ (0.01), it has two zeroes, such as 0.004. etc.

So, it's important to figure out how large the denominator, $2^x 5^y$, is.

(1) If x+y=6, you could have x=1 and y=5, or x=5 and y=1. In the first case, $2^x 5^y = 2^1 5^5$ = 2*3,125 = 6,250. 6,250 is between 10,000 and 1,000, so $^1/_{6,250}$ has three zeroes.

In the second case, $2^x 5^y = 2^5 5^1$ = 32 * 5 = 160. 160 is between 100 and 1,000, so $^1/_{160}$ has two zeroes.

NOT SUFFICIENT

(2) The values of x and y could be very large (leading to a large denominator and many zeroes), or very small (leading to a small denominator and a decimal with few zeroes).

NOT SUFFICIENT

(12) Only two values of x and y fit both statements.

x= 5, y =1
x=4, y=2

If x=5 and y=1, then the fraction is $^1/_{160}$, which has two zeroes in decimal form.

If x=4 and y=2, then the fraction is $^1/_{(2^4\ 5^2)} = {}^1/_{(16*25)} = {}^1/_{400}$, which has two zeroes in decimal form. So, the answer is always "two".

SUFFICIENT

0189

If p and q are the (distinct) roots of $x^2 + ax + b = 0$, what is the sum of the reciprocals of p and q?

(1) $^a/_b$ = - 1.2
(2) a + b = 1

If p and q are the roots of $x^2+ax+b=0$, then $(x-p)(x-q)=x^2+ax+b$. Simplify and rearrange.

$(x-p)(x-q) = x^2+ax+b$
$x^2-qx-px+pq = x^2+ax+b$
$(-p-q)x+pq = ax + b$
$(-p-q) = a$ and $pq = b$

The sum of the reciprocals of p and q is $^1/_p + {}^1/_q$.

(1) $^a/_b$ = -1.2

Plug in the information learned above:

$^{(-p-q)}/_{pq} = -1.2$
$^{(p+q)}/_{pq} = 1.2$
$^p/_{pq} + {}^q/_{pq} = 1.2$
$^1/_p + {}^1/_q = 1.2$

The sum of the reciprocals is 1.2.

SUFFICIENT

(2) a+b=1

Plug in the information learned above:

$pq-p-q = 1$
$pq = 1+p+q$

$1 = {}^1\!/_{pq} + {}^p\!/_{pq} + {}^q\!/_{pq}$
$1 = {}^1\!/_{pq} + {}^1\!/_q + {}^1\!/_p$
${}^1\!/_p + {}^1\!/_q = 1 - {}^1\!/_{pq}$

Without the value of pq (b), you can't find the value of ${}^1\!/_p + {}^1\!/_q$.

NOT SUFFICIENT

0190

If x and y are positive integers, what is the units digit of x?

(1) The units digit of x^5 is 6.
(2) The units digit of x^4 is 6.

---

(1) The numbers that can have a units digit of 6, when raised to a power, must have a units digit of 2, 4, 6, or 8. However, the only one of these with a units digit of 6 when raised to the 5th power is 6. So, x has a units digit of 6.

SUFFICIENT

(2) This can happen if x has a units digit of 4, 6, or 8. For example, 4^4 has a units digit of 6, 6^6 has a units digit of 6, and 8^6 has a units digit of 6.

NOT SUFFICIENT

0191

How long does it take Jermaine and Alicia, working simultaneously at their individual constant rates, to mow a certain lawn?

(1) It would take three times as long for Alicia to mow the lawn on her own, as it would take the two of them to mow the lawn together.
(2) Working together, Jermaine and Alicia can mow the lawn 1 hour faster than Jermaine could mow the lawn on his own.

Jermaine's rate = x
Alicia's rate = y

(1)
This statement is insufficient because the amount of time it takes will change depending on factors like the size of the lawn. Here is the algebraic reason it isn't sufficient:

h = the amount of time it takes them to mow the lawn together. Then, the time it takes Alicia alone = 3 times this, which is 3h.

So, 1 lawn can be mowed by both together in h hours at a rate of x+y:

1 lawn = (x + y) * h

Or, it can be mowed by Alicia alone in 3h hours at a rate of y:

1 lawn = y * 3h

Combine these two equations and simplify

(x + y)*h = y*3h
x + y = 3y
x = 2y

This tells you Jermaine works at twice the rate of Alicia
But, depending on what Alicia's rate is and the size of the lawn, you don't know how long it would take to mow

NOT SUFFICIENT

(2)

h = the amount of time it takes them to mow the lawn together. Then, the time it takes Jermaine alone = one hour longer, which is h+1.

So, 1 lawn can be mowed by both together in h hours at a rate of x+y:

1 lawn = (x + y) * h

Or, it can be mowed by Jermaine alone in h+1 hours at a rate of x:

1 lawn = x * (h+1)

Combine the two equations and simplify:

(x+y)*h = x*(h+1)

xh + yh = xh + x
yh = x

But if you don't know x, the size of the lawn, etc. you can't solve further.

NOT SUFFICIENT

(12)

From statement (1) you know that x = 2y (Jermaine's rate is 2x Alicia's rate.) From statement (2) you know that yh = x. Combine:

x = 2y
yh = x

yh = 2y
h = 2

So, h = 2 hours to mow the lawn together.

SUFFICIENT

0192

An item with an original price of $100 is discounted by x%. The resulting price is later discounted by y%. Which of the two discounts reduced the price by a greater dollar amount?

(1) y < x
(2) x = 15

---

(1) y < x, so the second reduction is a smaller percent than the first reduction. Also, the second reduction is applied to a smaller original price, since the item has already been discounted once.

Therefore, the second reduction was smaller than the first reduction and you can answer the question.

You can also test this with numbers. Assume the original price was 100.

x = 50, y = 10
50% discount: 100 to 50 = 50$ reduction
10% discount: 50 to 45 = 5$ reduction (smaller)

x = 50, y = 40
50% discount: 100 to 50 = 50$ reduction
40% discount: 50 to 30 = 20$ reduction (smaller)

x = 20, y = 10
20% discount: 100 to 80 = 20$ reduction
10% discount: 80 to 72 = 8$ reduction (smaller)

The second reduction is always smaller.

SUFFICIENT

(2) This doesn't tell you what the percent of the second discount was. It could have been less than 15, giving an answer of "yes" or it could have been as much as 100%.

NOT SUFFICIENT

0193

If all sodas cost the same amount, what is the largest number of sodas that can be purchased with 16$?

(1) At most 3 sodas can be purchased with 8$.
(2) The price of one soda is between 1.75$ and 2.25$.

---

(1) The most that a soda can cost is $8/3$, which is 2.66$. If a soda costs exactly this much, then you can purchase 16/(8/3) sodas with 16$, and this equals 6. The answer could be 6.

The least a soda can cost is slightly more than $8/4$. (It can't be less than this because then you could buy 4 sodas with 8 dollars.) So, for example, a soda could cost 2.01. Then, you could buy 7 sodas for 16 dollars.

The answer can be either 6 or 7.

NOT SUFFICIENT

(2) Check to see whether the two end-points for price, 1.75 and 2.25, give you the same result for the number of sodas you can buy.

$16/1.75 = 16/(7/4)$
$= 16*4/7$
$= 64/7$
= a little over 9, so 9 sodas could be bought
$16/2.25$ is less than 8, so at most 6 or 7 sodas could be bought (you can calculate and see that the exact answer would be 7.1 sodas). The answer here is different from 9

NOT SUFFICIENT

(12) If you can buy at most 3 sodas with 8$, that limits the possible price of a soda. It has to be more than 2$, but less than 2.66$. Also, statement 2 says that the price is between 1.75 and 2.25. Putting these together, to follow both statements, the price has to be more than 2$, but less than 2.25$.

If the price is more than 2$, then you can't buy 8 sodas for 16$ .At most, you can buy 7.

If the price is less than 2.25, then $16/2.25 = 16/(9/4) = 16*4/9 = 64/9$ = a little more than 7. So, you can buy 7 sodas at most.

The answer is 7.

SUFFICIENT

0194

What is the value of $1/x^4 + x^4$?

(1) $1/x^2 + x^2 = 17/4$

(2) $x^2 = 4$

---

(1) Square both sides.

$(\frac{1}{x^2} + x^2)(\frac{1}{x^2} + x^2)$
$\frac{1}{x^4} + \frac{x^2}{x^2} + \frac{x^2}{x^2} + x^4$
$\frac{1}{x^4} + x^4 + 2$

So, $\frac{1}{x^4} + x^4 = (17/4)^2 - 2$

SUFFICIENT

(2) If $x^2=4$ then $x^4 = 16$. The answer is 1/16 + 16.

SUFFICIENT

0195

a and b are integers with 40 < a < 50 and 30 < b < 40. What is the value of a?

(1) The greatest common divisor of a and b is between 15 and 20, inclusive.
(2) $\frac{a}{b} = 1.5$

---

a can have the value 41, 42, 43, etc up to 49. b can have the value 31, 32, 33, etc up to 39.

(1)

If the G.C.D. of a and b is 15, then a and b are both multiples of 15. However, there is no multiple of 15 in the range between 30 and 40. Use a similar reasoning to eliminate all of the numbers except 16.

The only number between 15 and 20 that has a multiple in the range 41-49, and a multiple in the range 31-39, is 16. So, a=3*16=48, and b=2*16=32.

SUFFICIENT

(2)

a/b=1.5=3/2, so a must be divisible by 3. a can only be 42,45, or 48. If a=42, b=42/1.5=42*2/3=28, which is too small. If a=45, b=45/1.5=30, which is also too small. So, a must be 48.

SUFFICIENT

0196

At a small company each employee has a different, constant hourly pay rate. What is the average of the hourly pay rates of the five employees?

(1) Last week, the five employees worked for a total of 127 hours and earned a total of 1,357 dollars.
(2) Last week, the five employees worked for 12, 15, 30, 30, and 40 hours, respectively.

---

(1) There's a simple way to show that this isn't sufficient. If one of the five employees worked for all 127 hours, and earned 1,357$, their pay rate is 10.68$ per hour. The other employees could have any pay rate, because they worked 0 hours so their pay rate doesn't affect anything. So, the average of the pay rates could be almost any number.

NOT SUFFICIENT

(2) This does not give any information about pay.

NOT SUFFICIENT

(12) Test simple cases. One case is that the employee who worked 12 hours earned all $1,357 and had a rate of 113$ per hour. Everybody else had a pay rate of 0$. The average is (113+0+0+0+0)/5 = 22.6

Another case is that the employee who worked 40 hours earned all $1,357 and had a rate of 33.92$. The average will be much lower.

Or, you can test realistic cases (which also show that the average pay rate is different) but the math will take much longer!

NOT SUFFICIENT

0197

Is x a negative integer?

(1) x^3 is a negative integer
(2) x^{-3} is a negative integer

---

(1) If x^3 is negative, then x is also negative. But, x isn't necessarily an integer.

For example, if x^3 is -1, then x = -1, so the answer is "yes". If x^3 is -2, then x is the cube root of -2, which is a negative decimal. So in that case, the answer is "no"

NOT SUFFICIENT

(2) $x^{-3} = \frac{1}{x^3}$. x could be a negative integer if x = -1, because $\frac{1}{(-1)^3}$ is a negative integer as well. But, if x^{-3} is another negative integer, such as -2, then x is a decimal and the answer is "no"

NOT SUFFICIENT

(12) x^3 is a negative integer, and $\frac{1}{x^3}$ is also a negative integer.

So, the number x^3 is a negative integer, and so is its reciprocal.

Usually, the reciprocal of an integer is a fraction (like $\frac{1}{9}$) However, there are two cases where the reciprocal of an integer is also an integer. This happens when the integer is either 1 or -1.

Therefore, x^3 must be -1, which tells you the value of x is -1 also.

SUFFICIENT

0198

Harold and Marisela start running a marathon at the same time and at different constant rates. How far ahead of Marisela is Harold when he reaches the 4 mile mark?

(1) Harold runs at a constant rate of 7.5 miles per hour and Marisela runs at a constant rate of 6 miles per hour.
(2) At the 2 mile mark, Harold is 0.4 miles ahead of Marisela.

---

(1) If Harold runs at a rate of 7.5 miles per hour, he reaches the 4 mile mark at time=$\frac{4 \text{ miles}}{7.5 \text{ miles per hour}}$. This equals $\frac{8}{15}$ hours, or 32 minutes. Because you know Marisela's speed, you can calculate her exact location after 32 minutes. Then, compare this to Harold's location (4 miles) to find the answer.

SUFFICIENT

(2) Harold and Marisela both run at constant rates. If it takes T minutes for Harold to run from 0 miles to 2 miles, it will take another T

minutes for him to run from 2 miles to 4 miles. Similarly, it took Marisela T minutes to run from 0 miles to 1.6 miles (0.4 miles behind Harold). Therefore, in the next T minutes, Marisela will run another 1.6 miles. After 2T minutes, Harold will be at 4 miles and Marisela will be at 3.2 miles. So, the difference is 0.8.

SUFFICIENT

0199

At a certain coffee shop, a cup of tea costs 1.25$ and a cup of coffee costs 1.30$. If the shop sold 25 cups of coffee yesterday, how many cups of tea were sold?

(1) The revenue from cups of tea was less than twice the revenue from cups of coffee.
(2) The number of cups of tea sold was more than twice the number of cups of coffee sold.

---

(1) The revenue from cups of coffee was 1.3*25 = 32.50$. The revenue from tea was less than twice this, which is 65$. But, you can't find the number of cups of tea exactly, because it could be anything less than $^{65}/_{1.25}$.

NOT SUFFICIENT

(2) The cups of tea sold could be any number greater than 50.

NOT SUFFICIENT

(12) More than 50 cups of tea were sold, but the revenue was less than 65$. Check whether there are multiple ways this could happen.

51 cups of tea would have a revenue of 51(1.25$) = 63.75$, so the answer could be 51. But, 52 cups of tea would have a revenue of exactly 65$, which is too high. So, the answer is 51.

SUFFICIENT

0200

What is the least common multiple of the integers x and y?

(1) The least common multiple of x and 2y is 40
(2) x is odd

---

(1) Test cases. If x = 40 and y = 20, then the LCM of x and 2y is 40.

Try to find a case where the LCM is smaller, meaning that x and y share another, smaller multiple.

For example, if x = 20 and y = 20, then the LCM of x and 2y is still 40. But, the LCM of x and y is 20.

NOT SUFFICIENT

(2) This gives no info about y.

NOT SUFFICIENT

(12) x must be an odd factor of 40, which means x = 5 or x = 1.

The LCM of 1 and another number is always just equal to that other number. So, if x=1, then the only situation where the LCM of x and 2y is 40, is if 2y=40. So, one case is x=1 and y=20. In this case, the answer to the question is 20.

If x=5, then 2y could equal either 8 or 40 (because the LCM of 5 and 8 is 40, and the LCM of 5 and 40 is 40). So, y = 4 or y=20. The LCM of 5 and 4 is 20, and the LCM of 5 and 20 is also 20. The answer is always 20.

SUFFICIENT

0201

If $x = 2^a 3^b 5^c$, a, b, and c are integers, and a > b > c > 0, what is the value of x?

(1) x is not a multiple of 25.
(2) x is not a multiple of 16.

---

(1) If x is not a multiple of 25, then c must be 1 (if c is 2 or larger, then 5^2 is a factor of x, so x would be a multiple of 25). But, a and b can be anything bigger than 1, so x can have many different values.

NOT SUFFICIENT

(2) If x is not a multiple of 16, then a must be 3 or smaller. (If a was 4 or larger, then x would be a multiple of 2^4, which equals 16.) The problem says a > b > c > 0 and a, b, and c are integers. The only possible values are a=3, b=2, and c=1. So, x can be calculated ($x=2^3 3^2 5^1 = 8*9*5 = 360$)

SUFFICIENT

0202

16 pieces of candy are distributed among 5 children, so that each child has at least one piece of candy. How many of the children have more than 3 pieces of candy?

(1) No two children have the same number of pieces of candy.
(2) The child with the most candy has 6 pieces.

---

(1) The only possibility for this to happen is if the children have 1, 2, 3, 4, and 6 pieces. So, the answer is 2 (two of the children have more than 3 pieces each.)

SUFFICIENT

(2) If one child has 6 pieces, then the other four children have a total of 10 pieces. This could be distributed in different ways. If the 10 pieces is distributed as 4, 3, 2, 1, then the answer is two. If the 10 pieces is distributed as 3, 3, 3, 1, then the answer is one.

NOT SUFFICIENT

0203

Two students are chosen at random from a class that includes Raeann and Arianne. What is the probability that Raeann will be one of the students who is chosen?

(1) The probability that Raeann and Arianne will both be chosen is $\frac{1}{45}$.
(2) The probability that Raeann will not be chosen is $\frac{4}{5}$.

If you can figure out the number of students, you can figure out the probability which is the answer to the problem. See if you can use the statements to find the number of students.

(1) There is only one way to choose both Raeann and Arianne, so the numerator is 1. The denominator is the total number of pairs of students in the classroom. If the number of students in the classroom is x, then this number is $\frac{x(x-1)}{2}$.So, the probability is $\frac{1}{x(x-1)/2}$, which simplifies to $\frac{2}{(x)(x-1)}$.

So, $\frac{2}{x(x-1)} = \frac{1}{45}$

This simplifies to $90 = x(x-1)$, so x=10

There are 10 students in the classroom. So, you could answer the question.

SUFFICIENT

(2) If the probability that Raeann will not be chosen is $^4/_5$, then the probability that she will be chosen is 1 minus this, which is $^1/_5$.

SUFFICIENT

0204

Every widget-making machine manufactures widgets at the same constant rate per hour. If *x* is the number of machines required to complete a work order of 2,000 widgets within 10 hours, what is the value of *x*?

(1) *x* machines can complete a work order of 2,500 widgets in exactly 12.5 hours.
(2) *x* + 8 machines can complete a work order of 400 widgets in exactly 1 hour.

---

work = number of machines * rate of 1 machine * time
2,000 = x * rate of 1 machine * 10
x * rate of 1 machine = 200
x = $^{200}/_{\text{rate of 1 machine}}$ = ?

(1)
work = number of machines * rate of 1 machine * time
2,500 = x * rate of 1 machine * 12.5
x * rate of 1 machine = 2,500/12.5 = 200

This is already known from the problem text.

NOT SUFFICIENT

(2)
work = number of machines * rate of 1 machine * time
400 = (x+8) * rate of 1 machine * 1
400 = x*rate of 1 machine + 8*rate of 1 machine

x*rate of 1 machine = 200 (from the problem text)

400 = 200 + 8*rate of 1 machine
200 = 8*rate of 1 machine
rate of 1 machine = 25 widgets per hour

Therefore, the answer to the problem is 200/25 = 8 machines

SUFFICIENT

0205

Two paintings, A and B, were sold at an art gallery. Painting A was originally priced at a$ and was marked up by x% before it was sold. Painting B was originally priced at b$ and was marked down by x% before it was sold. Was the sales price of A greater than the sales price of B?

(1) x > 20
(2) 3a > 2b

The sales price of A is $a(1+^x/_{100})$ and the sales price of B is $b(1-^x/_{100})$.

Is $a(1+^x/_{100}) > b(1-^x/_{100})$?

Is a(100+x) > b(100-x)?

(1) If x > 20, which price is greater depends on the values of a and b. For example, if x = 25, then the problem asks, is 125a > 75b? This is true if a > b, but not true if a is much smaller than b.

NOT SUFFICIENT

(2) One possibility is that a is large and b is small. Then, because a is marked up and b is marked down, A definitely costs more than B in the end.

But, this statement only says that a > $^2/3$ b. It doesn't necessarily say that a > b. You need to try a case where a is smaller than b (as close to $^2/_3$ b as possible).

For example, if b=60 and a=41.

is 41(100+x) > 60(100-x)?

is 4,100 + 41x > 6,000 - 60x?
Is 101x > 1,900?
This will be true for large values of x, but not true for small values of x. So, A sometimes costs more and B sometimes costs more.

NOT SUFFICIENT

(12) The smallest possible value of a is a tiny bit bigger than $^2/_3$ b. To make it simple, test a=$^2/_3$ b and see what happens.

a(100+x) > b(100-x)?
$^2/_3$b (100+x) > b(100-x)?
$^2/_3$ (100+x) > (100-x)?
$^{200}/_3$+ $^2/_3$x > 100-x?
$^5/_3$x > $^{100}/_3$?
5x > 100?
x > 20?

So, if x is bigger than 20 and a=$^2/_3$ b, then the sales price of A is bigger.

And if a is bigger than $^2/_3$ b, then the original price of a is even higher, compared to the original price of B. So, the sales price of A should still be bigger.

SUFFICIENT

0206

Car A leaves the city of Helvetica at 10:30 AM and travels at a constant rate towards the city of Calibri. Car B leaves Calibri at 10:30 AM and travels along the same route, at a different constant rate, towards Helvetica. At what time will the two cars pass each other?

(1) At 11:00 AM, Car A is exactly halfway between Helvetica and Calibri, and at 11:10 AM, Car B is exactly halfway between Helvetica and Calibri.
(2) When the two cars pass each other, the distance that Car A has traveled is exactly 4/3 of the distance that Car B has traveled.

---

(1) in 30 minutes, Car A has gone half of the distance, which is d/2 miles. In 40 minutes, Car B has also gone d/2 miles.

Car A's rate is d/2 miles in 30 minutes, which is d miles per hour.
Car B's rate is d/2 miles in 40 minutes (or 2/3 hour), which is $^{3d}/_4$ miles per hour.

The cars are moving towards each other, so sum their rates.

d + $^{3d}/_4$ = $^{7d}/_4$

Together, before they meet, they have to cover d miles

d miles = $\frac{7d}{4}$ mph * time
? = $\frac{d}{(7d/4)}$ = $\frac{4}{7}$ hours

SUFFICIENT

(2) When the cars pass depends on their specific rates and how far apart the cities are. For example, if Car A's rate is 400 mph and Car B's rate is 300 mph, then they might pass in just a few minutes, and Car A will have gone $\frac{4}{3}$ as far as Car B (because it is traveling $\frac{4}{3}$ as fast). Or, if Car A's rate is 4 mph and Car B's rate is 3 mph, they might take a long time to pass, and Car A will still have gone $\frac{4}{3}$ as far as Car B.

NOT SUFFICIENT

0207

If x and y are integers, what is the value of x - y?

(1) $\frac{3^x}{4^y} = 9$
(2) $3^{(x - y)} = 9$

---

(1) Simplify the statement

$\frac{3^x}{4^y} = 9$
$3^x = 9*4^y$
$3^x 4^0 = 3^2\ 4^y$
So, x=2 and y=0
x-y = 2

SUFFICIENT

(2) $3^{(x-y)} = 3^2$
x-y = 2

SUFFICIENT

0208

A pair of escalators both move at the same constant rate, one up and one down. How long would it take Delinda to walk up one of the escalators if it were not moving at all?

(1) It would take Delinda 36 seconds to walk up the escalator that is moving upwards.
(2) It would take Delinda 180 seconds to walk up the escalator that is moving downwards.

Delinda's rate is x steps per second. (You should use 'steps per second' because the statements give the time in seconds.)

The escalator moves at a rate of e steps per second. So, when Delinda moves up the escalator while it goes up, she goes at a rate of x+e steps per second. If she moves up the escalator while it goes down, she goes at a rate of x-e steps per second. And if the escalator isn't moving, she goes at a rate of x.

(1) You don't have to do math to prove that this statement isn't sufficient. If Delinda walks very fast and the escalator moves slowly, it might take a certain amount of time to walk up it. That amount of time could be the same if Delinda walks slowly and the escalator moves fast. So, you don't know her walking speed.

NOT SUFFICIENT

(2) This just tells you the relationship between Delinda's speed and the escalator's speed (because when she walks up the down escalator, her time depends on how much faster she's moving compared to the escalator.) The time would still be the same if Delinda walked faster or slower, as long as the escalator's speed also got faster or slower.

NOT SUFFICIENT

(12)

Going up the escalator:

S steps = (36 seconds) * (x+e steps per second)

Going down the escalator:

S steps = (180 seconds) * (x-e steps per second)

36(x+e) = 180(x-e)

(x+e)=5(x-e)

x + e = 5x - 5e

6e = 4x

e = 2/3 x

Plug back into the first equation to find S/x:

S = 36*(x+e) = 36*(x + 2/3 x) = 36*(5/3 x) = 60x
S/x = 60 seconds

SUFFICIENT

0209

What is the value of x^a/y^b?

(1) $x/y = 2$
(2) a = b - 1

---

(1) Without knowing a and b, you can't calculate x^a/y^b.

NOT SUFFICIENT

(2) Without knowing x and y, you can't calculate x^a/y^b.

NOT SUFFICIENT

(12) Test cases.

x=2, y=1
a=2,b=3

x^a/y^b
$2^2/1^3$
$4/1=4$

x=2,y=1
a=3,b=4

x^a/y^b
$2^3/1^4$

$^8/_1=8$

NOT SUFFICIENT

0210

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of x is 3.
(2) The units digit of y is 3.

---

(1) If the units digit of x is 3, then the units digit of x^y can be 3, 9, 7, or 1.

NOT SUFFICIENT

(2) Be careful about this statement. The units digit of x^y does NOT depend on the "units digit" of y. It actually depends on where y falls in the pattern of units digits, which repeats after four digits. For example, 3^1 has the same units digit as 3^5, 3^9, 3^{13}, 3^{17}, etc, even though 1,5,9,13,17 do not have the same units digits themselves. And, 3^1 has a DIFFERENT units digit from 3^{11} (3 versus 7), even though 1 and 11 have the same units digits.

Now, test cases.

x = 1, y=3
$1^3 = 1$
x=2, y=3
$2^3 = 8$

NOT SUFFICIENT

(12) See the warning above for statement 2. Test cases.

3^3 has a units digit of 7
3^{13} has the same units digit as $3^{(13-4*3)} = 3^1 = 3$.

NOT SUFFICIENT

0211

A print shop charges 6$ for each job, plus an additional 5 cents per page. The total cost of any print job consisting of more than 300 pages is discounted by 10%. Did a certain job include more than 300 pages?

(1) The cost of the print job was less than 20$.
(2) The cost of the print job was greater than 19$.

The print shop charges 6+.05p for a job of 300 pages or fewer. It charges .9(6+.05p) for a job over 300 pages.

(1) Because the cost could have been as low as 0, it's possible that the print job was less than 300 pages. You need to check if it could have been more than 300 pages to see if this statement is insufficient.

A job of 301 pages would cost 6+0.05(301) = $21.05. This would be discounted by 10%, or about 2$, giving a price of under 20$. So, it's possible for the print job to be under 300 pages.

NOT SUFFICIENT

(2) You know from this statement that the cost of the print job was greater than 19$. Because the cost could have been very high, it's possible that the print job was much more than 300 pages. Check if it's also possible for the print job to be under 300 pages.

TThe most a print job of 300 or fewer pages can cost, is 6+.05(300) = 6+15=21$. So, a print job under 300 pages could cost as much as 21$, which is greater than 19$. So, you don't know whether this print job was over or under 300 pages.

NOT SUFFICIENT

(12) A print job of 300 or fewer pages can cost up to 21$, and a print job of over 300 pages can cost as little as .9(21.05)=about $18.90, because of the discount. So, a price between 19$ and 21$ could be either a number of pages slightly below 300, or a number of pages slightly above 300.

NOT SUFFICIENT

0212

x is a decimal between 0 and 1, exclusive. Does x terminate?

(1) 5x terminates.
(2) 3x terminates.

A decimal terminates if when you write it as a fraction, it only has powers of 2 and 5 in its denominator, like $^7/_{(2*5*5)}={}^7/_{50}$.

(1) 5x terminates. So, when you write 5x as a fraction, it only has 2's and 5's in its denominator. For example, 5x = $^9/_{(2*2*5)}$. To find x, divide the fraction by 5. This is the same as multiplying the denominator of the fraction by 5. Since the denominator only included 2's and 5's before, it still only includes 2's and 5's (the number of 5's in the product has just increased by 1). Therefore, x terminates.

SUFFICIENT

(2) 3x terminates. So, you can write 3x as a fraction with only 2's and 5's in its denominator. Whether x terminates or not, depends on whether the 3 cancels out when both sides are divided by 3. For example, if 3x = $^1/_{(2*5)}$, then x = $^1/_{(2*3*5)}$, which does NOT terminate, since it has a 3 in its denominator. But if 3x = $^9/_{(2*5)}$, then x=$^9/_{(2*3*5)}$ = $^3/_{(2*5)}$, which DOES terminate.

NOT SUFFICIENT

0213

Can 12 machines, working at equal and constant rates, complete a work order of 1,600 widgets in no more than 4 hours?

(1) Two machines working at the same rate can complete a work order of 120 widgets in under 2 hours.
(2) Five machines working at the same rate can complete a work order of 200 widgets in under 1 hour.

If 12 machines can complete a work order of 1,600 widgets in no more than 4 hours, then 12 machines can complete 1/4 as much, or 400 widgets, in no more than an hour. Therefore, 12 machines work at a rate of at least 400 widgets per hour. Each individual machine works at at least 1/12 this rate, or 400/12 = 33.3 widgets per hour.

Does a machine make (at least) 33.3 widgets per hour?

(1) Two machines can complete half as many, or 60 widgets, in 1 hour. So, each machine completes at least 30 widgets per hour. However, the rate could be under 100/3 (like 31 or 32 widgets per hour) or over 100/3.

NOT SUFFICIENT

(2) If five machines can complete 200 widgets per hour, then each machine completes at least 40 widgets per hour. This is over 100/3 widgets per hour, so the machines must be fast enough to complete the 1,600-widget order.

SUFFICIENT

0214

If a, b, and c are distinct integers, is a + b + c even?

(1) abc = 0
(2) a + b = 0

---

(1) a, b, or c must be 0. But, the other two numbers can be odd or even.

For example,
a = 0, b = 1, c = 2. In that case, a+b+c is odd "no"
a = 0, b = 1, c = 3. In that case, a+b+c is even "yes"

NOT SUFFICIENT

(2) a + b + c = 0 + c = c. This is even if c is even, and odd if c is odd.

NOT SUFFICIENT

(12) One of the three numbers is 0. Specifically, you can conclude that c equals 0. c must be 0 because if a or b were 0, then the sum of a+b (which must be two different numbers) couldn't be 0.

So, c = 0, and a+b = 0. Therefore, a + b + c = 0 + 0 = 0, which is even. "yes"

SUFFICIENT

0215

What is the cost of 6 bagels, 14 donuts, and 18 cups of coffee?

(1) 4 donuts and 6 cups of coffee cost 16.80$.
(2) 3 bagels, 3 donuts, and 3 cups of coffee cost 15.90$.

---

(1) This doesn't provide the cost of bagels.

NOT SUFFICIENT

(2) This simplifies to b+d+c = $^{15.9}/_{3}$ = 5.3. But, this doesn't tell you the cost of 6b+14d+18c.

For example, a bagel could be 5.30$ and everything else could cost 0$, or a donut could be 5.30$ and everything else could cost 0$. These cases would give different answers to the problem.

NOT SUFFICIENT

(12)
Compare the question, and the two pieces of info you haven.

4d + 6c = 16.8
b + d + c = 5.3

6b + 14d + 18c = ?

You need to figure out if you can calculate the price of 6b+14d+18c, just using the two facts you know. Start with the second equation, since it's the only one that includes bagels. You want the price of 6 bagels, so multiply by 6.

b+d+c = 5.3
6b + 6d + 6c = 31.8

Rewrite the question.

6b + 14d + 18c = ?

(6b + 6d + 6c) + 8d + 12c = ?
Substitute in the price you know
31.8 + 8d + 12c = ?

The rest of the question looks similar to the first equation. If 4d + 6c = 16.8, then 8d + 12 is twice this, or 33.6.

31.8 + 33.6 = ?
31.8 + 33.6 = 65.4
The answer is 65.40$

SUFFICIENT

0216

x is an integer. Is x(x + 1) divisible by 3?

(1) x + 2 is not divisible by 3.
(2) x^2 is divisible by 3.

---

(1) Numbers that aren't divisible by 3 include 1, 2, 4, 5, 7, 8, etc. Test some of these cases.

x+2 = 1
x = -1

In this case, x(x+1) = -1(0) = 0, which is divisible by 3. "yes"

x+2=2
x=0

In this case, x(x+1) = 0(1) = 0, which is divisible by 3. "yes"

x+2 = 4
x=2

In this case, x(x+1) = 2(3) = 6, which is divisible by 3. "yes"

All possible cases will have x(x+1) be divisible by 3 and will give you a "yes" answer. That's because every third number has to be divisible by 3 (for example, 3 is divisible by 3, 4 and 5 aren't, 6 is, 7 and 8 aren't, etc.)

So, one out of every three numbers has to be divisible by 3. So, either x, x+1, or x+2 is divisible by 3.

If x+2 isn't divisible by 3, then you know that x or x+1 is, so x(x+1) is divisible. The answer is always "yes".

SUFFICIENT

(2) If x^2 is divisible by 3, then x must be divisible by 3.

If x is divisible by 3, then x(x+1) is divisible by 3. So, the answer is "yes".

SUFFICIENT

0217

Printing costs 4$ per job plus an additional 10 cents per page. The total cost of any print job over 200 pages is discounted by 10%. What was the number of pages in a certain print job?

(1) The total cost of the print job was $23.40.
(2) The number of pages in the print job was over 200.

The cost of a print job of 200 pages or less is 4 + 0.1p.

The cost of a print job of more than 200 pages is .9(4+0.1p).

(1) You don't know if the print job was more than 200 pages or less than 200 pages, so you have to check both possibilities to see if they work. If the print job was less than 200 pages, then 4+.1p = 23.4.

4+.1p = 23.4
.1p = 19.4
p = 194

So, it's possible that the print job was 194 pages and was charged at the normal rate.

If the print job was more than 200 pages, then .9(4+.1p)=23.4

.9(4+.1p)=23.4
3.6+.09p=23.4
.09p=19.8
p=220

So, it's possible that the print job was 220 pages and was charged at the discounted rate.

The print job can be either 194 or 220 pages.

NOT SUFFICIENT

(2) This doesn't give you enough info about the exact number of pages.

NOT SUFFICIENT

(12) The first statement tells you that the print job was either 220 or 194. With the second statement, you know it was 220.

SUFFICIENT

0218

A portfolio consists of one share each of 100 different stocks. Hosea recorded the total value of the portfolio on two consecutive days, and observed that none of the 100 prices stayed the same. If the total value of the portfolio decreased by 2% from the first day to the second day, how many of the 100 stocks increased in price?

(1) A portfolio consisting of only those shares that increased in price would have increased in value by 6%.
(2) A portfolio consisting of only those shares that decreased in price would have decreased in value by 10%.

---

(1) One case is a portfolio where all 100 shares started at $100. Then, one of them increased by 6% to $106, and the other 99 decreased by about 2.1% each, causing a total decrease in the portfolio's value from $10,000 to $9,800.

Or, all 100 shares started at $100. Then, ten of them increased by 6% to $106, and the other 90 decreased by about 2.9% each, causing a total decrease in the portfolio's value from $10,000 to $9,800.

NOT SUFFICIENT

(2) One case is a portfolio where all 100 shares started at $100. Then, 50 of them decreased by 10% to $90, and the other 50 increased to 106, reducing the total value from $10,000 to $9,800.

Or, all 100 shares started at $100. Then, 90 of them decreased by 10% to $90, and the other 10 increased by 70% to $170, reducing the total value from $10,000 to $9,800.

NOT SUFFICIENT

(12) The answer depends on the starting value of the stocks. For example, if all stocks cost $100, then 50 would have to increase and 50 would have to decrease for them to average out to a 2% decrease, given the two statements. The answer would be 50.

Or, 20 stocks started at $400, and the other 80 stocks started at $100. Then, the 20 stocks that started at $400 could each increase by 6%, and the 80 stocks that started at $100 could each decrease by 10%. In this scenario, the value of the portfolio starts at $400*20 + $100*80 = 16,000. Then, it decreases to $424*20 + $90*80, which is $15,680. This is a 2% decrease also, and the answer would be 20.

NOT SUFFICIENT

0219

What is the largest integer value of x for which $a/4^x$ is an integer?

(1) 17 is the largest integer value of y for which $a/2^y$ is an integer.
(2) 17 is the largest integer value of y for which $a/6^y$ is an integer.

$a/4^x$ is an integer but because x is the largest value, $a/4^{(x+1)}$ is not an integer.

4 can be rewritten as 2^2. So, $a/2^{2x}$ is an integer but $a/2^{2(x+1)} = a/2^{2x+2}$ is not an integer. The biggest power of 2 can divide into a is either 2^{2x} or 2^{2x+1}.

(1) 17 is odd, so 17 cannot equal 2x. So, 17=2x+1. x=8.

SUFFICIENT

(2) 6^y can be rewritten as 2^y3^y. It isn't relevant whether a is divisible by 3 or how many times it's divisible, because 4^x doesn't have any factors of 3, so ignore the 3^y and only look at if a is divisible by 2 and how many times. a is divisible by 2 at most 17 times, so it is divisible by 4 eight times as shown above.

SUFFICIENT

0220

How many machines, working simultaneously at identical constant rates, would it take to complete a certain work order of 1,500 widgets within 5 hours?

(1) It would take ten hours longer to complete the 1,500 widget order with three machines than it would take to complete it with five machines.
(2) It takes ten machines an hour longer to complete a 2,000 widget order than it takes them to complete a 1,800 widget order.

Work = number of machines * rate of 1 machine * time

1,500 widgets = number of machines * rate of 1 machine * 5 hours
number of machines * rate of 1 machine = 300 widgets
number of machines = 300 widgets/rate of 1 machine = ?

(1)

Work = number of machines * rate of 1 machine * time

Five machines completing the order:
1,500 widgets = 5 * rate of 1 machine * time
rate of 1 machine * time = 300

Three machines completing the order:
1,500 widgets = 3 * rate of 1 machine * (time + 10)
rate of 1 machine * (time + 10) = 500

Solve the first equation for time:

time = $^{300}/_{\text{rate of 1 machine}}$

Plug in:

rate of 1 machine * ($^{300}/_{\text{rate of 1 machine}}$ + 10) = 500
300 + 10*rate of 1 machine = 500
10*rate of 1 machine = 200

rate of 1 machine = 20

So, the answer to the problem is $^{300}/_{20}$= 15 machines.

SUFFICIENT

(2)

Work = number of machines * rate of 1 machine * time

1,800 = 10 * rate of 1 machine * time
2,000 = 10 * rate of 1 machine * (time + 1)

180 = rate of 1 machine * time
200 = rate of 1 machine * (time + 1)

time = $^{180}/_{\text{rate of 1 machine}}$

200 = rate of 1 machine * ($^{180}/_{\text{rate of 1 machine}}$ + 1)
200 = 180 + rate of 1 machine

rate of 1 machine = 20

So, the answer to the problem is $^{300}/_{20}$ = 15 machines.

SUFFICIENT

0221

If f(x) = (x - p)(x - q)(x - r) and p > q > r, is f(y) > 0?

(1) y = $^{(p + r)}/_{2}$
(2) r - q < q - p

Put p, q, and r on a number line.

-------R------Q------P-------- >

if y > p, q, and r, then y-p, y-q, and y-r are positive. So, f(y) > 0.

-------R------Q------P++++++++ >

If y < p, but y > q and r, then y-p is negative but y-q and y-r are positive. So, f(y) < 0.

-------R------Q------P++++++++ >

Similarly, if y is between r and q, then f(y) is positive. If y is less than r, then f(y) is negative.

-------R++++++Q------P++++++++ >

(1) y is the average of p and r, so y is halfway between p and r. However, y could either be bigger or smaller than q, depending on where q is relative to r and p. Therefore, f(y) could be either positive or negative.

NOT SUFFICIENT

(2) Without information about y, you can't tell whether f(y) > 0.

NOT SUFFICIENT

(12)

-------R++++++Q------P++++++++ >

Because y=(r+p)/2, y is between r and p, so y is in one of these two ranges:

-------R+++(Y)+++Q---(Y)---P+++++++ >

Statement (2) says that r-q < q-p. Simplify this.

r+p < 2q
q > (r+p)/2

Because y=(r+p)/2, q > y. So, y is between r and q, and f(y) is positive.

SUFFICIENT

0222

If x and y are positive integers, what is the units digit of x^y?

(1) The units digit of x^y is the same as the units digit of y^x.
(2) x and y are not equal.

---

(1) The easiest way to prove that this statement is not sufficient, is to note that if x=y, x^y will equal y^x, and therefore the units digits of x^y and y^x will be the same. For example, if x=y=2, then x^y and y^x have the same units digit, and the answer to the question is the units digit of 2^2, or 4. If x=y=3, then the answer to the question is the units digit of 3^3, or 7.

NOT SUFFICIENT

(2) Without knowing the values of x and y it is not possible to find more information about their units digits.

NOT SUFFICIENT

(12) Try to find cases where x and y are not equal, but their units digits are the same.

For example, any number with a units digit of 6, will still have a units digit of 6 when it is raised to a positive integer power (6, 36, 216, etc.) So if x = 6 and y = 16, then x^y and y^x have the same units digit, 6. The answer to the problem is 6.

Or, any number with a units digit of 1, will behave the same way. For example, if x=1 and y=11, 1^{11} and 11^1 have the same units digit, of 1. The answer to the problem is 1.

NOT SUFFICIENT

0223

A deck of cards contains cards labeled with a set of consecutive integers, with the smallest number being x. In selecting a random card, what is the probability that its label will be a multiple of 3?
(1) There are 22 cards in the deck.
(2) x is not a multiple of 3.

The probability is the number of multiples of three, divided by the total number of cards.

(1)

total number of cards = 22
multiples of 3 depends on where the cards start being numbered.
For example, if the cards are 1, 2, 3, ... , 20, 21, 22, then there are exactly 7 multiples of 3 (3, 6, 9, 12, 15, 18, 21) and the probability is $^{7}/_{22}$

But if the cards are 3, 4, 5, ..., 22, 23, 24, then there are 8 multiples of 3 (3, 6, 9, 12, 15, 18, 21, 24) and the probability is $^{8}/_{22}$

NOT SUFFICIENT

(2) Test cases.

If x=1 and there are 2 cards (1 and 2), then the probability is 0.

If x=1 and there are 3 cards (1,2,3), then the probability is $^{1}/_{3}$.

NOT SUFFICIENT

(12) The 22 cards are x, x+1, x+2, ... up to x+21.

If x is a multiple of 3, then the multiples of 3 are:
x, x+3, x+6, x+9, x+12, x+15, x+18, x+21 (8 multiples)

But if x is not a multiple of 3, then x+21 is also not a multiple of 3. So, there are only 7 multiples of 3.

You know that x is not a multiple of 3, so the answer is $^{7}/_{22}$

SUFFICIENT

0224

What is the value of $^{(x - 3)(x + 3)}/_{x^2}$?

(1) (x - 3)(x + 3) = 27
(2) $^{(x + 3)}/_{x^2} = {}^{1}/_{4}$

Simplify the question.
What is the value of $^{(x^2-9)}/_{x^2}$?
What is the value of $1 - {}^{9}/_{x^2}$?

(1) This simplifies to $x^2-9 = 27$, so $x^2=36$. Plug this in to the question to find one answer.

SUFFICIENT

(2) This simplifies to $4(x+3) = x^2$.

$4x + 12 = x^2$
$x^2 - 4x - 12 = 0$
$(x+2)(x-6) = 0$
x = -2 or 6
The value of $1 - {}^{9}/_{x^2}$ is different for these two cases.

NOT SUFFICIENT

0225

A, B, and C are distinct positive integers. What is the ratio of |B - A| to |C - B|?

(1) |A - C| : |B - C| = 2:5
(2) |A - C| : |B - A| = 2:3

Draw A, B, and C on a number line.

------A--------B---------C---------

|B-A| is the distance between A and B on the number line
|C-B| is the distance between B and C on the number line

(1) There are multiple ways this can happen depending on the order of A, B, and C.

----A=1-----C=3---------------B=8--

If A = 1, C = 3, and B = 8, then |A-C| is 2 and |B-C| is 5. In this case, |B-A| is 7 and the ratio the problem asks for is 7:5.

---C=1-------A=3---------B=6--

If C = 1, A = 3, and B = 6, then |A-C| is 2 and |B-C| is 5. In this case, |B-A| is 3 and the ratio the problem asks for is 3:5.

NOT SUFFICIENT

(2)
|A-C|:|B-A| = 2:3

Test cases again.

----C=1------A=3-----------B=6---

If C = 1, A = 3, and B = 6, then |A-C| is 2 and |B-A| is 3. The ratio the problem asks for is 3:5.

----B=1-----C=2-----A=4--------

If B = 1, C = 2, and A = 4, then |A-C| is 2 and |B-A| is 3. The ratio the problem asks for is 3:1.

NOT SUFFICIENT

(12)

(1) |A-C|:|B-C| = 2:5
(2) |A-C|:|B-A| = 2:3

Assume that |A-C| is 2x. Draw A and C on a number line with the distance 2x between them.

-----A------(2x)-------C----------

From the first statement, you know that |B-C| = 5x. So, the distance between B and C is 5x. That only lets you put B in two different places. Here is one possibility.

--A--(2x)-C-----(5x)-----B----

But, in this case, |A-C|:|B-A| is actually 2x:7x = 2:7, not 2:3. So, this case doesn't fit the second statement. It can't be the right situation.

The only other possibility is this.

---B--(3x)---------A----(2x)------C--

This case fits both statements. In this case, you can also find the ratio the problem asks for. |B-A| to |C-B| is 3x to 5x = 3:5.

SUFFICIENT

0226

The price of an item in a store is marked up by m%, then that new price is later discounted by d%. Is the new price lower than the original price (prior to the markup)?

(1) d = 2m
(2) d = m + 10

The original price is p.

Marking it up by m percent makes it p(1+m/100).

Then marking it down by d percent makes it p(1+m/100)(1-d/100).

The question asks if $p(1+{}^{m}\!/_{100})(1-{}^{d}\!/_{100}) < p$. The p cancels out so the question asks, is $(1+{}^{m}\!/_{100})(1-{}^{d}\!/_{100}) < 1$?

(you can now ignore the original price p because it cancels out.)

Simplify by multiplying both sides by 100^2

(100 + m)(100 - d) < 10,000?

(1) You can either plug this in and do algebra, or you can test cases because the math with numbers is simple.

Here's the algebra solution.

(100+m)(100-2m) < 10,000?
$10{,}000 - 200m + 100m - 2m^2 < 10{,}000$?
$-100m - 2m^2 < 0$?

$2m^2 + 100m > 0$?

Because m is a markup, m is positive. So, $2m^2 + 100m$ is positive, so the answer is "yes."

Or, test numbers. If m = 10, then d = 20.

(100 + m)(100-d) = (110)(80) which is less than 10,000

If m = 1, then d = 2

(101)(98) = 9,898 which is less than 10,000

If m = 50, then d = 100 (the largest it can be, because you can't discount by more than 100%)

(150)(0) = 0 which is less than 10,000

The answer is always "yes" whether m and d are large or small.

SUFFICIENT

(2)

Like statement 1, here is the math solution.

(100 + m)(100 - d) < 10,000?
d = m+10

(100 + m)(100-m-10) < 10,000?
(100+m)(90-m) < 10,000?
$9{,}000-100m+90m-m^2 < 10{,}000$?
$-10m - m^2 < 1{,}000$?
$m^2 + 10m + 1{,}000 > 0$?

Because m is positive, this is always true and the answer is "yes"

Or, plug in numbers.

m = 1, d = 1+10 = 11

(100+1)(100-11) = 101*89 which is < 10,000

m=10,d=20

(110)(80) is less than 10,000

m = 90,d=100
(190)(0) = 0 which is less than 10,000

The answer is always "yes"

SUFFICIENT

0227

If $y \neq k$ and $y \neq -k$, is $\frac{(x + k)}{(y + k)} > \frac{(x - k)}{(y - k)}$?

(1) y > x
(2) k > 0

You can't simplify the fractions in the inequality, because you don't know if the denominator is positive or negative. Test cases instead of simplify.

(1)

x = 0, y = 2

Is $\frac{(x + k)}{(y + k)} > \frac{(x - k)}{(y - k)}$?
Is $\frac{(0 + k)}{(2 + k)} > \frac{(0 - k)}{(2 - k)}$?

Is $\frac{k}{(2+k)} > \frac{-k}{(2-k)}$?

This depends on the value of k.

If k = 0, then the answer is "no", because both sides equal 0

If k = 1, then the inequality is $\frac{1}{3} > \frac{-1}{1}$? And the answer is "yes"

NOT SUFFICIENT

(2)

x = 0, y = 2, k = 1

$\frac{1}{3} > \frac{-1}{1}$ "yes"

x = 2, y = 0, k = 1

$\frac{3}{1} > \frac{1}{-1}$ "yes"

x = 2, y = 2, k = 1

$\frac{3}{3} = \frac{1}{1}$ "no"

NOT SUFFICIENT

(12)
Is $^{(x + k)}/_{(y + k)} > ^{(x - k)}/_{(y - k)}$?

y > x and k > 0

y = 2, x = 1, k = 3

Is $^{(1+3)}/_{(2+3)} > ^{(1-3)}/_{(2-3)}$?
Is $^4/_5 > ^{-2}/_{-1}$?
Is $^4/_5 > 2$? "no"

y = 3, x = 2, k = 1

Is $^{(2+1)}/_{(3+1)} > ^{(2-1)}/_{(3-1)}$?
Is $^3/_4 > ^1/_2$? "yes"

NOT SUFFICIENT

0228

If x and y are positive integers, is $^x/_y$ an integer?

(1) y is a perfect square
(2) $x = y^{(3/2)}$

---

(1) You can't answer the problem without knowing about x.

NOT SUFFICIENT

(2) $x = y^{(3/2)}$. Plug this in to $^x/_y$.

$^x/_y$
$y^{(3/2)}/_y$
$y^{(3/2 - 1)}$
$y^{(1/2)}$
$\sqrt{y}$

Now you can show that y is a perfect square. If y was NOT a perfect square, then $x=y^{(3/2)}$, which equals $y\sqrt{y}$, would not be an integer. But, you know x is an integer, so y must be a perfect square. So, $\sqrt{y}$ is an integer and the answer is "yes"

SUFFICIENT

0229

David earns a commission that consists of a certain number of dollars per sale, plus a fixed percent of the dollar amount of the sale. Is his commission on a 250,000 dollar sale at least 20,000 dollars?

(1) His commission on a 300,000 dollar sale is at least 30,000 dollars.
(2) His commission on a 100,000 dollar sale is at least 10,000 dollars.

---

x = fixed commission per sale
y = percent of sales amount

For a sale of 250,000, David earns $x + ^y/_{100}(250,000)$. The problem asks if this is at least 20,000. This simplifies to, is $x+2,500y \geq$

20,000?

(1)
The problem asks if David's commission was greater than 20,000. So, try to make the commission as small as possible and see if it is still greater than 20,000.

To make the commission as small as possible, assume that his commission on a 300,000 sale was exactly 30,000. So, $x + \frac{y}{100}(300{,}000) = 30{,}000$. This simplifies to $x + 3{,}000y = 30{,}000$.

Therefore, $y = \frac{30{,}000-x}{3{,}000}$. Plug this into the question.

Is $x + 2{,}500(\frac{30{,}000-x}{3{,}000}) \geq 20{,}000$?
Is $x + 2{,}500(10 - \frac{x}{3{,}000}) \geq 20{,}000$?
Is $x + 25{,}000 - \frac{25}{30}x \geq 20{,}000$?
Is $\frac{5}{30}x \geq -5{,}000$?

Because x is positive (David's commission must be positive), then this is always true and the answer is "yes"

SUFFICIENT

Note that if you substitute differently, the math becomes more complicated, but you can still find the same answer. Try substituting for x instead:

$x + 3{,}000y = 30{,}000$
$x = 30{,}000-3{,}000y$

Plug this in to the question

Is $30{,}000 - 3{,}000y + 2{,}500y \geq 20{,}000$?
Is $30{,}000 - 500y \geq 20{,}000$?
Is $10{,}000 \geq 500y$?
Is $y \leq 20$?

This means, if $y \leq 20$, the answer is "yes". But, remember what y represents. y is the percent of sale that David earns as a commission So, if y is GREATER than 20, then David earns more than 20% of 250,000, which is much greater than 20,000. So, the answer is still "yes".

SUFFICIENT

(2) This statement could mean that x = 10,000 (he earns 10,000 per sale plus 0% of the sale). So, his commission on a 250,000 sale would also be 10,000, and the answer would be "no"

Or, it could mean that x = 0, and y = 10%. So, his commission on a 250,000 sale would be 10% of 250,000, which is 25,000. The answer would be "yes"

NOT SUFFICIENT

0230

If $xy \neq 0$, is x^y equal to y^x?

(1) $x^y = y^y$
(2) $x^x = y^x$

---

(1) There are three ways that two numbers raised to the same power can come out the same.

First, the two numbers can be equal.

Second, one number can be positive and the other can be negative (for example, 3 and -3). If they are both raised to the same even power (like 2), the answer will be the same.

Third, they can be raised to the 0 power, because every number raised to the 0 power is 1. That is impossible here, however, because xy does not equal 0, so neither x nor y is equal 0.

So, either x=y, or x=-y.

If x=y, plug that into the question.

$x^y = y^x$?
$x^x = x^x$? "yes"

Try x=-y. For example, x = -2, y = 2. In that case, $x^y = y^y$. What is the answer to the problem?

$x^y = (-2)^2 = 4$
$y^x = 2^{(-2)} = 1/2^2 = 1/4$

"no"

NOT SUFFICIENT

(2) As statement (1), either x=y, x=-y, or x or y is 0 (impossible). If x=y, the answer is "yes" but if x=-y, then the answer can be "no."

NOT SUFFICIENT

(12) The case x=2, y=-2 works for both statements, because $2^{(-2)} = (-2)^{(-2)}$ and $2^2 = (-2)^2$. But, it gives an answer of "no" because $2^{(-2)}$ does not equal $(-2)^2$.

Any case where x=y, such as x and y = 3, works for both statements and gives an answer of "yes."

NOT SUFFICIENT

0231

The recipe for Bread X requires 4 cups of flour and 1 tbsp of yeast. The recipe for Bread Y requires 3 cups of flour and 2 tbsp of yeast. If a bakery made a number of loaves of Bread X and Bread Y, was the total amount of flour used over 100 cups?

(1) The total number of loaves baked was over 30.
(2) The total amount of yeast used was less than 40 tbsp.

---

x = loaves of bread X
y = loaves of bread Y

flour = 4x + 3y
yeast = x + 2y

Is 4x+3y > 100?

(1) If the bakery made a lot of loaves (like 1,000) then the answer will be "yes"

Check whether the answer can be "no". That is only the answer if the bakery can make more than 30 loaves but use less than 100 cups of flour.

Bread Y uses less flour. If the bakery makes 31 loaves of Bread Y, it uses 31*3 = 93 cups of flour, so the answer is "no"

NOT SUFFICIENT

(2) One possibility is that the bakery made a small number of loaves, like 2. So, the answer would be "no" because 100 cups of flour wasn't used.

Is it possible to get a "yes" answer? Try to maximize the amount of flour used. For example, they could have baked just 39 loaves of Bread X which would take 39 tbsp of yeast. That would take 39*4 = more than 100 cups of flour, so the answer would be "yes"

NOT SUFFICIENT

(12) Statement 1 tells you x+y > 30 and statement 2 tells you x+2y < 40.

Combine these to see if 4x+3y > 100.

x+2y < 40, so -x-2y > -40

x + y > 30, so 5x+5y > 150

Add these together: -x + 5x -2y + 5y > -40 + 150
4x + 3y > 110

This shows the answer is "yes"

Or, you can test cases.

Test x=0
If x+y > 30, then y > 30
If x+2y < 40, then 2y < 40, so y < 20
So, it's not possible to have x=0

Test x=10
If x+y > 30, then y > 20
If x+2y < 40, then 2y < 30, so y < 15
So, it's not possible to have x=10

Test x=20
If x+y > 30, then y > 10
If x+2y < 40, then 2y < 20, so y < 10
So, it's not possible to have x=20

Test x=25... In this case, the answer will always be "yes", because 25 loaves of X takes 100 cups of flour, and you need at least 6 more loaves of Y (more flour) to fit statement 1.

If you try smaller cases, you will find that the smallest x can be is 23. But the 23 loaves of bread X accounts for 92 cups of flour, and it's not possible to bring the total loaves up to 30+ without going over 100 cups of flour.

SUFFICIENT

0232

If x and y are integers, what is the value of $3^x - 2^y$?

(1) x = y
(2) $3^{(x/2)} - 2^{(y/2)} = 5$

---

(1)

If x=y, then $3^x - 2^y = 3^x - 2^x$. This depends on the value of x. For example, if x=1, then $3^x - 2^x = 3 - 2 = 1$.
If x=2, then $3^x - 2^x = 3^2 - 2^2 = 9 - 4 = 5$.

NOT SUFFICIENT

(2)

$3^{(x/2)} - 2^{(y/2)} = 5$

Don't just square both sides of the equation! If you square the left side, you get $3^x - 2*2^{(y/2)}*3^{(x/2)} - 2^y$, which isn't simpler.

Test numbers:

y=0
$3^{(x/2)} - 2^0 = 5$

$3^{(x/2)}=6$

y=2
$3^{(x/2)}-2^1=5$
$3^{(x/2)}=7$

Don't calculate the value of x. It's insufficient because the values of x are different, even though you don't know what the values are.

NOT SUFFICIENT

(12)

$3^{(x/2)}-2^{(y/2)}=5$
x=y
$3^{(x/2)}-2^{(x/2)}=5$

Test numbers
x=0

$3^0-2^0=1-1=0$ (not 5)

x=2
$3^1-2^1=3-2=1$ (not 5)

x=4
$3^2-2^2=9-4=5$

So, x=4 is a valid case.
There aren't any other valid cases, because as x keeps getting bigger, $3^{(x/2)}-2^{(x/2)}$ will keep getting bigger, and it's already equal to 5.

And if you test negative numbers, because $3^{(x/2)}$ and $2^{(x/2)}$ will both be small fractions, their difference will be a fraction, not 5.

So, x=4.

SUFFICIENT

0233

A 30 gallon water tank leaks water at a constant rate of L gallons per hour. If Faustino begins filling the empty tank at exactly 8:00 AM with a hose which outputs H gallons of water per hour, then stops when the tank is full, at what time does the tank become completely empty again?

(1) 60H = L(H - L)
(2) L = 150

Until the tank is full, it gains H gallons per hour, and loses L gallons per hour. In total, it increases at H-L gallons per hour. So, the time it will take to fill the 30 gallon tank is $^{(30\text{ gallons})}/_{(\text{H-L gallons per hour})} = {}^{30}/_{(H-L)}$ hours.

Then, the tank empties out at L gallons per hour. To empty out 30 gallons, it will take $^{30\text{ gallons}} / _{\text{L gallons per hour}} = {}^{30}/_{L}$ hours.

The total time taken is $^{30}/_{(H-L)} + {}^{30}/_{L}$. This simplifies to

$^{30H}/_{L(H-L)} = ?$

(1) substitute in 60H instead of L(H-L) into the question.

$^{30H}/_{60H} = ?$
$^{1}/_{2}$
It will take 1/2 hour to finish the whole process, so the answer is 8:30 AM.

SUFFICIENT

(2) If L = 150, then the question asks for the value of $^{30H}/_{(150*(H-150))}$

$^{H}/_{50*(H-150)}$

This depends on the value of H, which is not known.

NOT SUFFICIENT

0234

If x, y, and z are non-negative integers, is $2^x 5^y > 10^z$?

(1) x + y > 2z
(2) y > z

$2^x * 5^y > 10^z$
$2^x * 5^y > (2*5)^z$
$2^x * 5^y > 2^z * 5^z$
$^{2^x}/_{2^z} > ^{5^z}/_{5^y}$
$2^{(x-z)} > 5^{(z-y)}$?

(1) Test cases.

z = 1, x = 1, y = 3

$2^{(1-1)} = 2^0 = 1$
$5^{(1-3)} = 5^{(-2)} = ^1/_{25}$
"yes"

z = 2, y = 0, x = 5

$2^{(x-z)} = 2^3 = 8$
$5^{(z-y)} = 5^2 = 25$
"no"

NOT SUFFICIENT

(2) Test cases.

y = 4, z = 3, x = 0

$2^{(0-3)} = 2^{(-3)} = ^1/_8$
$5^{(3-4)} = 5^{(-1)} = ^1/_5$
"no"

y = 2, z = 1, x = 0

$2^{0-1} = 2^{-1} = ^1/_2$
$5^{(1-2)} = 5^{(-1)} = ^1/_5$
"yes"

NOT SUFFICIENT

(12)
Simplify the first statement.

x + y > 2z
x - z + y > z

x - z > z - y

So, $2^{(x-z)}$ has a larger exponent than $5^{(z-y)}$. However, this doesn't necessarily imply $2^{(x-z)} > 5^{(z-y)}$, because 2 is smaller than 5.

From the second statement, y > z. So, z-y is negative. $5^{(z-y)}$ has a negative exponent, so its value is less than 1.

x-z, the exponent of 2, can be either positive or negative. If x-z is positive, then $2^{(x-z)}$ is greater than 1, which means the answer to the problem is "yes"

Or, both x-z and z-y are negative. So, you're really comparing $\frac{1}{2^{(z-x)}}$ and $\frac{1}{5^{(y-z)}}$. Which fraction is bigger? z-x < y-z, so 2 is being raised to a smaller power than 5. Therefore, the denominator of $\frac{1}{2^{(z-x)}}$ is less than the denominator of $\frac{1}{5^{(y-z)}}$. So, $\frac{1}{2^{(z-x)}}$ is a bigger fraction than $\frac{1}{5^{(y-z)}}$. The answer is "yes"

SUFFICIENT

0235

In a chess tournament, each participant plays against each other participant exactly once. Every match ends in a win, lose, or draw. A player who wins a match earns 3 points and the player who loses the match earns 0 points. If a match ends in a draw, each player gets 1 point. How many players were in the tournament?

(1) The sum of the total number of points earned by all players was 131.
(2) Fewer than 10 of the matches ended in a draw.

---

x = number of players

total matches = number of pairs of players = $\frac{x(x-1)}{2}$

(1) The total number of points for a match that was won by a player is 3 (3 for the winner and 0 for the loser). The total number of points for a match that was a draw, is 2 (1 for each player). So, the total number of points is 2*draws + 3*(total matches - draws).

If there were 131 points in total, then the number of matches must have been at most $\frac{131}{2}$ = 65.5 (or 65, since you can't have part of a match). That would only happen if every match was a draw. The number of matches must have been at LEAST $\frac{131}{3}$ = 43.7 (or 44). That would only happen if every match was won and lost. So, the number of matches is between 44 and 65.

So, $44 < \frac{x(x-1)}{2} < 65$
88 < x(x-1) < 130
This is only true if x is 10 or 11. But, x can have either of thoe values.

NOT SUFFICIENT

(2) This doesn't tell you how many players there were.

NOT SUFFICIENT

(12) Statement 1 tells you that there were either 10 or 11 players. If there were 10 players, then there were 45 matches. For there to be 131 points, most of those matches were worth 3 points (specifically, 41 matches were 3 points each, and the other 4 matches were draws worth 2 points each). So, this is a possibility.

If there were 11 players, then there were 55 matches. Find out if this is possible with under 10 draws. If there were 10 draws, then there were 45 regular matches, so the total points would be 10*2 + 45*3 = 20+135 = 155. This is much higher than the actual total of 131 points. So to reduce the number of points to 131, there must have been over 10 draws. But, that would go against statement 2. So, this case doesn't work.

The only possibility is that there were 10 players.

SUFFICIENT
