

Question: 1

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Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Absolute Value >

Category 2: Arithmetic > Powers and Roots of Numbers > Powers

Explanation: To find the absolute value of x , you need the value of x --only the sign (positive or negative) doesn't matter. Statement (1) is insufficient: it has no insight as to the value of x , only that x is negative. (The absolute value of x is, by definition, positive, so if x is equal to the negative absolute value of x , x must be negative.)

Statement (2) is sufficient. There are two possible values for x : 2 and -2, but both have an absolute value of 2. The correct answer is (B).

Question: 2

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Explanation: Statement (1) tells you what percent of the women in the group have red hair, but unless 100% of the people in the group are women (which we don't know), that's not sufficient. Statement (2) does the same for men, which has the same problem--also insufficient.

Taken together, the statements are still insufficient: to answer the question with this information, we'd need to know what percent of the group was male or female. Choice (E) is correct.

Question: 3

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Difficulty: 3 (Very Easy)

Category 1: Arithmetic > Discrete Probability >

Explanation: To know the probability that a boy will be selected, you need to know the percentage (or fraction) of students in the class who are boys. Statement (1) gives that information, so it is sufficient. Statement (2) tells you how students are girls, which is not useful unless you know the total number of students (which would allow you to deduce the fraction of students who are girls) or the number of boys (which would let you do the same thing). (2) is insufficient, so the correct answer is (A).

Question: 4

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Difficulty: 5 (Moderate)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Explanation: Since the question is somewhat elliptical, first try to understand what it's asking. Presumably, there are some students in a chemistry course, some students in a biology course, and some students who are not in either one. The question wants to know whether there are more students in both courses than the number in neither course.

Statement (1) is not sufficient. The number of students in chemistry doesn't tell us the number in both or the number in neither.

Statement (2) is not sufficient by the same reasoning as (1).

Taken together, the statements are still not sufficient. There could be anywhere between 0 and 60 students enrolled in both courses. And without knowing the total number of students at the college, we don't know how many are enrolled in neither course. Choice (E) is correct.

Question: 5

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Other >

Category 2: Geometry > Lines >

Explanation: It might be helpful to draw a diagram for this question. Even better, view it as a system of linear equations. Statement (1) tells you that $L - J = 21$, where L and J are the mile markers at exits L and J. It tells you nothing about K, so it's insufficient. Statement (2): $M - K = 26$. Nothing about L, so it's insufficient.

Taken together, the statements are still insufficient. You have two equations with four variables: that's not enough to solve for any of the variables. Since there are no variables in common between the two equations, there's no chance you can combine them in some way to find the value of $K - L$. Choice (E) is correct.

Question: 6

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Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Explanation: If $n + 1$ is odd, n must be even. This is useful information: it's much easier to look for information about n than to have to convert everything back to information about $n + 1$. Statement (1) is sufficient: if $n + 2$ is an even integer, then n is also an even integer. (Evens are separated by 2.) Statement (2) is also sufficient: if $n - 1$ is odd, n is even. Choice (D) is correct.

Question: 7

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Interest Problems > Compound

Explanation: To compare the annual rates of return, we'll need information either comparing the rates of return directly, or information on each individual investment.

Statement (1) is sufficient. If J returns \$115 per \$1,000, we know its annual rate of return. (No need to calculate.) Similarly, given the data provided on K, we know its annual rate as well.

Statement (2) is insufficient. While it gives us K's rate, it says nothing about J. Choice (A) is correct.

Question: 8

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Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Linear Equations-Two Unk >

Explanation: This question gives us a very common GMAT setup. If we call the number of orange crates shipped r and the number of grapefruit crates shipped g , the grower's receipts are given by:

$$x = 15r + 18g$$

Statement (1) gives us another equation:

$$r = 2g + 20$$

It provides a relationship between the number of orange crates and the number of grapefruit crates, but we still have two equations with three variables (r , g , and x). Not sufficient.

Statement (2) is also insufficient. It tells us that x , the total receipts, is \$38,700. That isn't enough to identify r or g , though.

Taken together, the statements are sufficient. We can combine the formula from the question with (2):

$$38,700 = 15r + 18g$$

We also have the formula from (1):

$$r = 2g + 20$$

Two variables, two equations. That's enough to find r . Of course, we don't need to solve; simply recognize that we have the necessary information to solve. Choice (C) is correct.

Question: 9

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Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Other >

Explanation: To answer the question, we'll need to establish the relationship between how many Pat earned and how much he saved.

Statement (1) is sufficient. If Pat's earnings were x , he spent $(1/2)x$ on living expenses, leaving a remainder of $(1/2)x$. If he saved $(1/3)$ of that remainder, he saved $(1/3)((1/2)x) = (1/6)x$. Thus, $(1/6)x = 600$, so $x = 3,600$.

Statement (2) is insufficient. If he paid twice as much in taxes as he saved, he paid \$1200 in taxes, but we don't know how that amount relates to the amount he earned. Choice (A) is correct.

Question: 10

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Rate Problems > Combined Rate

Explanation: The rate at which the amount of water in the tank is increasing is the difference between the rate at which it is being pumped in and the rate at which it is being pumped out.

Statement (1) is insufficient: the amount of water is largely irrelevant to the rate at which it is being pumped in and out. Statement (2) is sufficient: it offers both of the rates we need: the rate at which water is being pumped into the tank, and the rate at which it is being pumped out. No need to convert the rates and combine them; it's enough information, so (B) is correct.

Question: 11

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Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Inequalities > other

Category 2: Algebra > Inequalities > Negatives

Category 3: Arithmetic > Real Numbers >

Explanation: Statement (1) is sufficient: if $9x > 10x$, then x must be negative. (If x is positive or zero, $9x$ is less than or equal to $10x$.) Statement (2) is insufficient: if $x + 3 > 0$, then $x > -3$, which indicates that x could be positive or negative. Choice (A) is correct.

Question: 12

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Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Explanation: The sum of two integers is even if both integers are even or both integers are odd. Statement (1) is insufficient because it doesn't tell us whether i is even or odd, or anything about j . Statement (2) is sufficient: if $i = j$, then they are either both even or both odd. In either case, $i + j$ is even, so the correct choice is (B).

Question: 13

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Difficulty: 3 (Very Easy)

Category 1: Algebra > Linear Equations-One Unk >

Category 2: Word Problems > Other >

Explanation: First, simplify the information given. The first three minutes, at 42 cents per minute, costs a total of \$1.26. The total cost of the call can be given as:

$$1.26 + 0.18(a)$$

where a is the number of additional minutes. Alternatively, since the number of "additional minutes" is 3 minutes less than the length of the call, we can use this:

$$1.26 + 0.18(m - 3) \quad \text{where } m \text{ is the total number of minutes of the call.}$$

Statement (1) is sufficient. We know that the first three minutes cost \$1.26. If that's 36 cents less than the cost of the remainder of the call, the remainder of the call cost:

$$\$1.26 + \$0.36 = \$1.62.$$

We can divide that number by 18 cents to determine the number of additional minutes.

Statement (2) is also sufficient. Using the formula we derived from the question:

$$1.26 + 0.18(m - 3) = 2.88$$

Here, we have only one variable in a linear equation, so we have enough information to solve. At this point you can conclude that (D) is the correct answer. To solve it for good measure:

$$1.26 + 0.18(m - 3) = 2.88$$

$$0.18(m - 3) = 1.62$$

$$m - 3 = 9 \Rightarrow m = 12$$

Question: 14

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Difficulty: 5 (Moderate)

Category 1: Word Problems > Rate Problems > Combined Rate

Category 2: Word Problems > Measurement Problems >

Explanation: Statement (1) is insufficient. It gives us the relationship between how long Car Y spent on the bridge and how long Car X spent. Car X spent one second less on the bridge than did Car Y. However, we don't know how long Car Y spent.

Statement (2) is also insufficient. Car Y traveled across the half - mile bridge at 30 miles per hour, which is equivalent to a rate of 1 mile per two minutes, or a half - mile per minute. So while Car Y spent 1 minute on the bridge, we're not told anything about Car X.

Taken together, the statements are sufficient. (2) gives us Car Y's time on the bridge, while (1) gives us the relationship between the two cars' times. Choice (C) is correct.

Question: 15

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Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Linear Equations-Two Unk >

Explanation: Since we're interested in the value of k , it's useful to rewrite the equation in the question to set it equal to k . Subtract n from both sides, and $k = m - n$.

Statement (1) is insufficient: if $k = m - 10$, we still need to know the value of m to find the value of k . Statement (2) is sufficient: subtract 10 from both sides, then subtract n from both sides, and the result is $m - n = 10$. If $m - n = 10$, then $k = 10$, so the correct choice is (B).

Question: 16

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Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: With statements regarding properties of numbers, it's useful to treat them like algebraic equations. In Statement (1): if $((x)/2)$ is an integer, then $((x)/2) = \text{integer}$, and $x = 2(\text{integer})$. Twice an integer is always an integer, so x must be an integer.

Statement (2) can work the same way: if $2x$ is an integer, then $2x = \text{integer}$, and $x = (\text{integer})/2$. If the integer is even, x is an integer; if it is odd, x is not an integer, so the statement is insufficient. The correct choice is (A).

Question: 17

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Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Explanation: Simplify each of the statements.

Statement (1) is sufficient. The sum of the three expressions is $3P + 15$. Simplify:

$$3P + 15 = \text{even}$$

$$3P = \text{even} - 15$$

$$3P = \text{odd}$$

Since P is an integer, the only way $3P$ can be odd is if P is odd.

Statement (2) is also sufficient. The sum of these three expressions is $3P + 8$. Simplify:

$$3P + 8 = \text{odd}$$

$$3P = \text{odd} - 8$$

$$3P = \text{odd}$$

By the same reasoning as in (1), P must be odd. Choice (D) is correct.

Question: 18

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Difficulty: 4 (Moderately Easy)

Category 1: Geometry > Rectangular Solids and Cylinders > Rectangular Solids

Category 2: Geometry > Quadrilaterals >

Category 3: Word Problems > Geometry Problems >

Explanation: We're given the dimensions of rectangular blocks and we want to determine how many such blocks would fit inside a rectangular box. At the very least, we'll need to know the size of the box before we can answer the question.

Statement (1) is insufficient. Essentially, this tells us about only two of the three dimensions, and we don't know which of the two dimensions it's addressing. Another way of looking at it is that, while we know how many blocks make up the bottom layer, we don't know how many layers there are. Without knowing the size of the box, we can't figure that out.

Statement (2) is sufficient. Given the size of the box, we can determine how many blocks would fit inside it. It would take some time to work through all of the possibilities or come up with a numerical answer, but since this is a DS question, we can rest assured that we would eventually find an answer and select choice (B).

Question: 19

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Difficulty: 5 (Moderate)

Category 1: Algebra > Functions > Sequences

Explanation: To answer a question about a sequence, we not only need to know the rule the sequence follows, but also at least one term in the sequence.

Statement (1) is insufficient. We're given one term (the first) in the sequence, but no way to figure out how to get from the first term to the 192nd term.

Statement (2) is also insufficient. This statement gives us the rule, but without knowing at least one term in the sequence, we can't use that rule to get us the 192nd term.

Taken together, the statements are sufficient. If each term is 3 less than the previous one, we can start with the first term (-40) and generate the second term, then the third, up to the 192nd. Of course we won't do that during the test, but we can quickly recognize that we have the information necessary to do so. Choice (C) is correct.

Question: 20

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Difficulty: 4 (Moderately Easy)

Category 1: Geometry > Triangles > other

Explanation: In any given triangle, the angle opposite the longest side has the greatest degree measure. So, in order to know which angle is the largest, you must know which side is the longest. Since $QR = x + 2$ and $PQ = x$, QR must be greater than PQ , but it isn't clear how PR fits in.

Statement (1) clarifies PR : it's $x + 3$, so PR is greater than both QR and PQ . Thus, the angle opposite PR --angle Q --is the biggest. Statement (2) is not sufficient, as it says nothing about the relationship between x and y . Thus, the correct choice is (A).

Question: 21

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Percents > other

Category 2: Arithmetic > Sets > 2 sets

Category 3: Word Problems > Sets >

Explanation: We're looking for the percentage of drama club members who are female.

Statement (1) is insufficient. 40 percent of the female students are members of the drama club, but those 40 percent could represent all of the drama club members (e.g., there are no men in drama club), or a much smaller percentage (if there are many men in drama club).

Statement (2) is also insufficient. 25 percent of men are members of the drama club, but by the same reasoning as the previous statement, we don't know what percentage of drama club members those 25 percent of men occupy.

Taken together, the statements are still insufficient. If we knew there were exactly 100 men and 100 women at the school (for instance--any equal number will do), we could determine how many men and women (25 and 40) are in drama club and answer the question. However, we don't know that the number of men and women are equal. If there 200 men and 100 women, the number in drama club is 50 and 40, changing the percentages drastically. Choice (E) is correct.

Question: 22

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Difficulty: 3 (Very Easy)

Category 1: Word Problems > Other >

Explanation: There are four variables implied by the question: the cost and number of ounces of the regular - size box, and the cost and number of ounces of the family - size box. We're looking for the ratio of the last two.

Statement (1) is insufficient. It gives us a relationship between the number of ounces in the two boxes, but nothing about cost.

Statement (2) is also insufficient. It gives us the cost of the family - size box, but nothing about the number of ounces.

Taken together, the statements are still insufficient. For the cost per ounce of the family - size box, we would need both the price (which (2) gives us) and the number of ounces. We know only that the family - size box has 10 more ounces than the regular - size box, but not an actual number of ounces. Choice (E) is correct.

Question: 23

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Profit >

Explanation: Since the question includes the caveat "though not proportionally," you can't set up a ratio to find the profit per unit. Statement (1) is not sufficient: we have no idea how much additional profit would come from the next 180,000 units, or if it would exceed \$2 million.

Statement (2) is sufficient: 350,000 units already results in more profit than \$4 million. If the profit increases with each additional unit sold, then the profit on 380,000 units must be more than \$5 million, so, of course, more than \$4 million as well. Choice (B) is correct.

Question: 24

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Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Explanation: Simplify each statement to isolate n.

Statement (1) is sufficient:

$$n^2 - 1 = \text{odd}$$

$$n^2 = \text{odd} + 1$$

$$n^2 = \text{even}$$

Since n is an integer and n^2 is even, n must be even as well.

Statement (2) is also sufficient:

$$3n + 4 = \text{even}$$

$$3n = \text{even} - 4$$

$$3n = \text{even}$$

If the product of two integers is even, at least one of the integers must be even. Since 3 is not even, n must be. Choice (D) is correct.

Question: 25

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Difficulty: 5 (Moderate)

Category 1: Word Problems > Rate Problems > other

Explanation: Call Carmen's current weekly pay p, which is given as follows:

$$p = 30x, \text{ where } x \text{ is her hourly rate.}$$

If her hourly rate were increased by \$1.50, it would be $(x + 1.5)$. Her new number of hours is h in the following equation:

$$p = h(x + 1.5)$$

Note that p remains the same -- the question asks us how many fewer hours she'd need to work to maintain the same weekly pay. The value of figuring out the algebraic representation is that we know how many variables we're working with. We have three variables (p, x, and h), and two equations. If we can get one more equation without adding any new variables, we can answer the question.

Statement (1) is sufficient. If $p = 225$, we have our third equation. To solve, you can plug $p = 225$ into the first equation to find x, then plug p and x into the second equation to find h.

Statement (2) is also sufficient. If 1.50 is 20% of her current hourly wage, $1.5 = 0.2x$. Again, it's a third equation with no new variables. We can plug in the resulting value of x into the first equation and use the results to find h in the second equation. Choice (D) is correct.

Question: 26

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Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Equations >

Category 2: Algebra > Functions > other

Explanation: While the given formula looks complicated, there are only three variables. Even better, c is a constant, so when we solve for it once, we'll never need to solve for it again.

Statement (1) is sufficient. The information we're given, combined with the explanation in the question, tells us that $t = 1$ (the month) and $n = 180$ (the number of units). Start with the given formula and then plug in the values:

$$n = (900/(1 + c2^t))$$

$$180 = (900/(1 + c(2^{-1})))$$

I don't recommend spending the time to solve for c , but recognize that you could solve for c in that equation. Once you have c , a constant, the formula only has two variables. The question is asking how many units (n) are product in month 6--in other words, what is the value of n when $t = 6$? Since we know t and we know c , n is the only variable, meaning we can solve for it.

Statment (2) is also sufficient. The same reasoning applies as in (1). In this case, we just plug different values of n and t into the equation to find the constant c :

$$300 = (900/(1 + c(2^{-2})))$$

Again, no reason to solve, but you can find c . That's enough to find the value of n when $t = 6$. Choice (D) is correct.

Question: 27

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Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Fractions >

Explanation: After 200 gallons were removed, the amount of oil in the tank was $(3/7)c$, where c is capacity. Another way of looking at that is that, before the 200 gallons were removed, the amount in the tank was $(3/7)c + 200$. We're looking for c .

Statement (1) is sufficient. We know that the amount in the tank before the 200 gallons were removed is $(3/7)c + 200$; we're now told that that's the same as half of capacity, or $(1/2)c$. We can set those two equal to each other:

$$(3/7)c + 200 = (1/2)c$$

Dealing with the fractions would take some time, but you don't need to. Recognize that this is a one - variable linear equation, so you can solve for c.

Statement (2) is also sufficient. We can write this algebraically as well. We know that after the 200 gallons were removed, the result was $(3/7)c$. That's also 1600 gallons less than capacity, or $c - 1600$. Since those two expressions represent the same amount of oil, we can set them equal to each other:

$$(3/7)c = c - 1600$$

Again, no need to solve; just recognize that you could. Choice (D) is correct.

Question: 28

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Descriptive Statistics > Average

Category 2: Word Problems > Other >

Explanation: To find the average salary of all the employees in Q, we'll need to know more than just the number and salary of employees in Division R.

Statement (1) is insufficient. There's no information about the number of employees in Q who are not in R, or about the salaries of those people.

Statement (2) is also insufficient. We don't know anything about the salary of those in Division R, or the number of employees who are NOT in Division R.

Taken together, the statements are insufficient. If we had enough information, we'd set up a weighted average problem like this, where r is the number of employees in R and q is the number of employees in Q who are not in R:

$$((30,000r + 35,000q)/(r + q)) =$$

We know that $r = 1,000$, but we don't know q. Without that number, we can't solve. Choice (E) is correct.

Question: 29

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Difficulty: 5 (Moderate)

Category 1: Geometry > Rectangular Solids and Cylinders > Cylinders

Category 2: Geometry > Rectangular Solids and Cylinders > Surface Area

Explanation: To find the surface area of a cylindrical surface, you need the circumference of the cylinder (to get that, you need radius or diameter) and the height of the surface. Statement (1) offers the height, but nothing about the circumference. Statement (2) is completely irrelevant, giving you nothing about the height of the shaded band or the circumference.

Taken together, they are still insufficient. (1) isn't enough, and (2) contributes nothing. The correct choice is (E).

Question: 30

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Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Algebra > Exponents >

Explanation: Statement (1) is insufficient: $n(n + 1) = 6$ is the algebraic way of saying, "the product of two consecutive integers is 6." There are two pairs of consecutive integers whose product is 6: 2 and 3, and -2 and -3. (Always remember the negative if an equation involves a square!)

Statement (2) is sufficient: $16 = 2^4$, so $2^{2n} = 2^4$, or $2n = 4$, or $n = 2$. The correct choice is (B).

Question: 31

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Decimals >

Category 2: Arithmetic > Properties of Integers > Other

Explanation: Statement (1) is insufficient. If $0.43t7$ is rounded up to 0.44, t must be 5 or greater. That limits the options, but it doesn't give us a specific value for t .

Statement (2) is sufficient. Since the digit in the ten - thousandths place is 7, t is rounded up with the number is rounded to the nearest thousandth. So, $t = 5$, because 0.4357 rounds up to 0.436, while 0.4367 rounds up to 0.437. Choice (B) is correct.

Question: 32

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Descriptive Statistics > Average

Explanation: We don't need to worry specifically about the 7 percent sales tax. The more important question is the total cost of the items subject to the tax--that is, the total cost of the items that cost more than \$100 each.

Statement (1) is insufficient. Since the coat cost \$125, that leaves \$240 for the other six items. It's possible that the other six items were all less than \$100 each; for instance, each of the items could be \$40 each. However, one of the items could be \$140 and the other five could be \$20 each.

Statement (2) is also insufficient. If the average of the other six items is \$40, those items total \$240, meaning that the coat cost \$125. That's the same information that (1) gave us, so the result must be the same, as well.

Taken together, the statements are still insufficient. They tell us the same thing, so combining them does not give us any information we didn't have looking at either statement independently. Choice (E) is correct.

Question: 33

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Profit >

Category 2: Arithmetic > Percents > other

Category 3: Algebra > Linear Equations-Two Unk >

Explanation: Note that we're looking for a number, not a percent or relationship.

Statement (1) is insufficient. It gives us a relationship between two numbers (price and profit), but no actual numbers.

Statement (2) is also insufficient. It gives us a number, but that number is the difference between the number we're looking for and some other number (the merchant's cost) that we don't know.

Taken together, the statements are sufficient. If we call cost c and selling price p , the statements give us the following equations:

$$p - c = 0.2p \text{ (the difference between the selling price and the cost was 20\% of the selling price)}$$

$$p = c + 50 \text{ (selling price was \$50 more than cost)}$$

That's two linear equations with two variables. From there, we don't need to solve, just recognize that we could. Choice (C) is correct.

Question: 34

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Difficulty: 5 (Moderate)

Category 1: Geometry > Rectangular Solids and Cylinders > Cylinders

Category 2: Word Problems > Geometry Problems >

Explanation: The height of the cans is the same as the height of the carton, so that dimension is irrelevant. To find the number of circles that fit in a 48 centimeter by 32 centimeter rectangle, you need some measurement pertaining to the circles, such as radius.

Statement (1) offers that: given the radius, you can figure out how many of the cans fit in the given rectangle. Statement (2) is also sufficient: if six of the cans fit along the length (of 48), that

means that each can has a "length" (in the case of a circle, a diameter) of $(48/6) = 8$, or a radius of 4. Thus, the correct choice is (D).

Question: 35

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Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Explanation: Given the system of equations, you can find z with the value of either x (because $x - 4 = z$) or t (because $8 - z = t$). y would also be sufficient, since y would give you x (because $y - x = 8$) and x would give you z . Statement (1) is sufficient: with the value of x , you can solve for z , as shown above. Statement (2) is also sufficient: with the value of t , you can solve for z (also as shown above). The correct choice is (D).

Question: 36

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Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Functions > other

Category 2: Algebra > Exponents >

Explanation: Function questions can look intimidating, but they don't have to be that way. In this case, we're told that a is a constant, so once we solve for it, we'll know what it is in all cases. Since we're looking for $f(1)$, we want to know the value of a^n when $n = 1$. In other words, we need the value of a .

Statement (1) is insufficient. $f(2)$ simply means that $n = 2$. Since $f(n) = a^n$, $f(2) = a^2$. We know that's 100, so $a^2 = 100$. a could be 10 or -10. Since we don't know the precise value of a , we can't answer the question.

Statement (2) is sufficient. We can use much of the same reasoning as in (1):

$$f(3) = a^3 = -1,000$$

$$a = -10$$

There's only one possible value for a , so we can find $f(1)$. Choice (B) is correct.

Question: 37

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Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Percents > other

Explanation: If we use the first letter of "selling price," "cost," and "markup," we can express the first sentence as follows:

$$s = c + m$$

We want to know what percent the markup is of the selling price, or:

$$\left(\frac{m}{s}\right) * 100\%$$

Statement (1) is sufficient. If the markup is 25% of the cost, the cost is 4 times the markup, or $4m$. Thus:

$$s = c + m$$

$$s = 4m + m = 5m$$

If $s = 5m$, then $\left(\frac{m}{s}\right) * 100 = \left(\frac{m}{5m}\right) * 100\% = 20\%$.

Statement (2) is insufficient. It gives us one number, but no way to determine relationships between any two of the three amounts. Choice (A) is correct.

Question: 38

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Explanation: The ratios of populations to numbers of representatives are given as follows:

$$\left(\frac{p_1}{r_1}\right) \text{ and } \left(\frac{p_2}{r_2}\right)$$

We need to determine which is bigger.

Statement (1) is insufficient. The population of district 1 is bigger, but we can't compare ratios without knowing something about the numbers of representatives.

Statement (2) is also insufficient. This time we learn that district 2 has more representatives, but we can't compare ratios without information on populations.

Taken together, the statements are sufficient. District 1 has a larger population (the numerator of the fraction) and a smaller number of representations (the denominator of the fraction). Thus, that fraction/ratio must be larger than that of District 2, with the smaller numerator and larger denominator. Choice (C) is correct.

Question: 39

Page: 276

Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Linear Equations-One Unk >

Category 2: Arithmetic > Ratio and Proportion >

Explanation: Statement (1), combined with the knowledge that the sample is 80 adults, gives us two equations. If we call the number of adults who are college graduates c and the number who are not n :

$$c + n = 80$$

$$n = 3c$$

That's two linear equations and two variables. That's always enough to find the variables, so it's sufficient.

Statement (2) is also sufficient. Again, we know:

$$c + n = 80$$

This time, we have the difference between the two variables as well:

$$n = c + 40$$

Once again, that's two linear equations and two variables. No need to solve, since we know we could solve. Choice (D) is correct.

Question: 40

Page: 276

Difficulty: 5 (Moderate)

Category 1: Word Problems > Data Interpretation >

Explanation: To find the value of x , you'll need to find the distance between R and T. Note that no other distances--for instance the distance between R and S combined with the distance between S and T--would be sufficient to answer the question, since we don't know if that would be the most direct route between R and T.

Statement (1) compares the lengths of the routes between S and T and S and R, which would allow you to solve for y , but does nothing to help you solve for x . Statement (2), however, is sufficient: the distance between T and U is 69, so if 69 is 1.5 times the distance between R and T, you can find that distance. Choice (B) is correct.

Question: 41

Page: 276

Difficulty: 5 (Moderate)**Category 1:** Arithmetic > Properties of Integers > Factors and Multiples**Category 2:** Arithmetic > Real Numbers >

Explanation: Statement (1) is insufficient: x could be 12, 21, or 30. Statement (2) is not only insufficient, it doesn't add anything to (1): if a number's digits add up to 3, it must be divisible by 3. Because (1) is insufficient and (2) doesn't add anything to what (1) tells us, the statements are insufficient when taken together, and the correct choice is (E).

Question: 42

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Difficulty: 6 (Moderately Difficult)**Category 1:** Word Problems > Geometry Problems >**Category 2:** Geometry > Circles > other**Category 3:** Arithmetic > Ratio and Proportion >

Explanation: The real - life scenario of the water pipe makes this question look more complicated than it is. We've got two circles with the same center; the smaller one has a radius of r ; the larger has a radius of t .

Statement (1) is sufficient. We're told that $((t - r)/(r)) = 0.5$ and $t - r = 0.3$. So combining them, we get:

$$((0.3)/(r)) = 0.5$$

That's enough to find r . (No need on DS to worry about handling the decimals.)

Statement (2) is insufficient. The area of the cross section is the difference between the area of the larger circle and the area of the smaller circle, or:

$$\pi t^2 - \pi r^2 = 1.29 \pi$$

That's not enough to find a value for r . Choice (A) is correct.

Question: 43

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Difficulty: 4 (Moderately Easy)**Category 1:** Arithmetic > Decimals >**Category 2:** Arithmetic > Fractions >

Explanation: To find the tenths digit of a number, you don't need the exact number, but you do need a limited range of possible numbers. Statement (1) is insufficient: if the number is less than 0.33, the tenths digit could be 0, 1, 2, or 3. Statement (2) is also insufficient: if the number is greater than 0.25, the tenths digit could be 2 or any digit greater than 2.

Taken together, the statements are still insufficient: if the number is between 0.25 and 0.33, the tenths digit could be 2 or 3, so choice (E) is correct.

Solution and Metadata

Question: 44

Page: 276

Difficulty: 5 (Moderate)

Category 1: Word Problems > Work Problems > 3+ inputs

Category 2: Word Problems > Rate Problems > other

Explanation: First, call X's rate x , Y's rate y , and Z's rate z . Thus:

$$r_x = ((x)/(z))$$

$$r_y = ((y)/(z))$$

Statement (1) is insufficient. It can be simplified to:

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

Since rates must be positive, we can multiply both sides by z :

$$x < y$$

That gives us some information about the rates, but nothing about how z compares to the other two.

Statement (2) is also insufficient. Again, simplifying:

$$((y)/(z)) < 1$$

Multiply both sides by z :

$$y < z$$

z is greater than y , but we don't know whether z is greater than x as well.

Taken together, the statements are sufficient. (2) tells us that z is greater than y , and since (1) tells us that y is greater than x , we know that z must be greater than x as well. Choice (C) is correct.

Question: 45

Page: 276

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Functions > Sequences

Explanation: Whenever we're given a formula with a constant, a high priority is finding the value of the constant. Once we get that, it never changes.

Statement (1) is sufficient.

$$a_n = rn$$

$$\text{so: } a_{50} = 50r$$

Since we know that $a_{50} = 500$:

$$50r = 500$$

$$r = 10$$

So from now on, we know that $a_n = 10n$

We don't need to work through all of the possibilities, but we could find the value of a_n for every possible value of n . For instance, if $n = 1$, $a_n = 10(1) = 10$.

Statement (2) is also sufficient, though it takes more work to establish that:

$$a_{100} = 100r$$

$$a_{105} = 105r$$

$$100r + 105r = 2,050$$

$$205r = 2,050$$

$$r = 10$$

From here, it's the same as in (1). Choice (D) is correct.

Question: 46

Page: 277

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Decimals >

Category 2: Arithmetic > Properties of Integers > Other

Category 3: Arithmetic > Fractions >

Explanation: Statement (1) is insufficient. If r is less than $(1/3)$, in decimal terms it's less than 0.33. It could be 0.05, 0.15 or 0.25.

Statement (2) is sufficient. $(1/10) = 0.1$, so if r is less than $(1/10)$, it must be 0.05. While a number can be negative, a single digit cannot be, so we don't have to worry about negative numbers less than $(1/10)$. Choice (B) is correct.

Question: 47

Page: 277

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Rate Problems > other

Explanation: If two floors are 9 feet apart, then the stairway must have a total height of 9 feet. To find the number of steps that make up a 9 foot tall stairway, you need the height of each step.

Statement (1) provides that: if each step is $(3/4)$ foot high, then the number of steps is $(9/((3/4))) = 9((4/3)) = 12$. Statement (2) is irrelevant: you need the height of the steps, not the width of them. Thus, the correct choice is (A).

Question: 48

Page: 277

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Arithmetic > Percents > other

Explanation: Statement (1) is insufficient. The question starts by asking the relationship between two variables--June transactions made by each of two salespeople. This statement adds a third: May transactions by Y. If we call June transactions by X x_j and May transactions by Y y_m , we can set up an equation:

$$x_j = 1.5y_m$$

Statement (2) is also insufficient. It says nothing about X. It does give us another relationship:

$$y_j = 1.25y_m$$

Taken together, the statements are sufficient. We're looking for $((x_j)/(y_j))$, and each of the statements gives us one of those in terms of Y's May transactions. We can plug in each of those equations:

$$((x_j)/(y_j)) = ((1.5y_m)/(1.25y_m)) = ((1.5)/(1.25)) = (6/5)$$

Choice (C) is correct.

Question: 49

Page: 277

Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Inequalities > other

Explanation: To answer the question, we'll need some point of comparison among the variables a, b, c, and d to tell us more about x and y.

Statement (1) is insufficient. If, for instance, $a = 1$ and $c = 2$, x could still be bigger than y--we don't know anything about the upper limits of those numbers.

Statement (2) is sufficient. If b is less than c we can link to the two sets of inequalities together:

$$a < x < b < c = y = d$$

If y is greater than c, which is greater than b, which is greater than x, y must be greater than x. Choice (B) is correct.

Question: 50

Page: 277

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Sets > 2 sets

Category 2: Word Problems > Sets >

Explanation: Judging from the question, this looks like a question that involves overlapping sets: there will be some directors of Companies K and R that overlap and others who don't.

Statement (1) is not sufficient, but it does provide some information: $17 = (K \text{ directors}) + (R \text{ directors}) - (\text{directors in both K and R})$. Statement (2) is also insufficient, as it gives no indication how much overlap there is.

Taken together, the statements are sufficient. According to (1): $17 = (K \text{ directors}) + (R \text{ directors}) - (\text{directors in both K and R})$. (2) fills in some of those gaps:

$$17 = 12 + 8 - \text{overlap}$$

$$17 = 20 - \text{overlap}$$

overlap = 3. Thus, the correct choice is (C).

Question: 51

Page: 277

Difficulty: 5 (Moderate)

Category 1: Algebra > Inequalities > other

Category 2: Arithmetic > Fractions >

Category 3: Arithmetic > Properties of Integers > Other

Explanation: In order for $((x)/(y))$ to be greater than 1, x must be greater than y . (That's only because the question stipulates that both are positive; if they could be negative, that would open up more possibilities.) So, the question is: "Is x greater than y ?"

Statement (1) is insufficient: x could be greater than y , but as long as the product is greater than 1, y could also be greater than x . Statement (2) is sufficient: add y to both sides of $x - y > 0$ and $x > y$, which directly answers the question. (B) is the correct choice.

Question: 52

Page: 277

Difficulty: 5 (Moderate)

Category 1: Word Problems > Profit >

Category 2: Arithmetic > Ratio and Proportion >

Category 3: Arithmetic > Percents > other

Explanation: If the cost is x and the selling price is y , the profit is $y - x$. We're looking for what percent the profit was of the cost, or:

$$(((y - x)/(x))) * 100\%$$

Statement (1) is insufficient. It tells us that the profit was \$20, but without knowing the exact cost, we can't answer the question.

Statement (2) is sufficient. If the ratio of the selling price to the cost is $(5/4)$, the selling price is 25% higher than the cost. The profit, then, is 25% of x , which we can plug in for $y - x$:

$$(((.25x)/(x))) * 100\%$$

$$= .25 * 100\%$$

$$= 25\%$$

Choice (B) is correct.

Question: 53

Page: 277

Difficulty: 5 (Moderate)

Category 1: Algebra > Simplifying Algebraic Expressions >

Category 2: Arithmetic > Descriptive Statistics > Average

Category 3: Arithmetic > Properties of Integers > Other

Explanation: First, simplify the expression. Since all of the parenthetical expressions are added together, we can drop the parentheses altogether:

$$n - x + n - y + n - z + n - k$$

$$4n - x - y - z - k$$

Statement (1) is sufficient. If the average of x , y , z , and k is n , we can set up an equation:

$$((x + y + z + k)/4) = n$$

$$x + y + z + k = 4n$$

Going back to the original equation, we can rewrite it as follows:

$$4n - (x + y + z + k)$$

Or, substituting what we just discovered:

$$4n - (4n) = 0$$

Statement (2) is insufficient. It tells us the relationship between four of the variables (they are consecutive), but nothing about how those relate to n . Choice (A) is correct.

Question: 54

Page: 277

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: If the number of miles in a trip is x , the price of the trip, in cents, can be expressed as follows:

$$f + m(x - 1)$$

In other words, m times one fewer than the total number of miles, since the first mile cost f cents. (The GMAT likes testing the "additional" concept.) The question is looking for $f + m(10 - 1)$, so to answer the question, it looks like we'll need f and m .

Statement (1) is insufficient. If $f + m(2 - 1) = 0.90$, or $f + m = 0.90$, we don't know how much of the total is the first mile and how much is the second mile.

Statement (2) is also insufficient. Again, if $f + m(4 - 1) = 1.20$, or $f + 3m = 1.20$, we don't know how much of the total cost is the first mile, and how much is the rest.

Taken together, the statements are sufficient. We now have two equations with two variables:

$$f + 3m = 1.20$$

$$f + m = 0.90$$

To simplify, subtract the second from the first:

$$2m = 0.30$$

$$m = 0.15$$

From there, we can solve for f using either of the two equations, and finally find the cost of a 10-mile trip. Since it's DS, we don't need to do that. Choice (C) is correct.

Question: 55

Page: 277

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Percents > other

Explanation: The question gives us a formula:

$$n = g - d$$

We want to know how much n changes (in percentage terms) when g and d increase.

Statement (1) is insufficient: it only tells us of a change in g .

Statement (2) is also insufficient, only mentioning d .

Taken together, the statements are still insufficient. The result of the two changes is $1.04g - 1.15d$. We don't know how that compares, in percentage terms, to $g - d$, because we don't know

how the values of g and d themselves compare. If g and d are the same, we'd know how the 4 percent and 15 percent relate, but the relationship changes if g and d differ. Choice (E) is correct.

Question: 56

Page: 277

Difficulty: 4 (Moderately Easy)

Category 1: Geometry > Triangles > other

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: The angles in a triangle add up to a total of 180 degrees, so in this question, $x + y + z = 180$. Since we're looking for the value of z , we can set that equal to z : $z = 180 - (x + y)$. Statement (1) is sufficient: given the sum of x and y , we can subtract it from 180 and find z . Statement (2) looks similar, but is insufficient. We could use it to solve for x , but not for z .

Question: 57

Page: 277

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Properties of Integers > Other

Explanation: If Max has a total of \$125 in 20's and 5's, he could have anywhere from 0 to 6 20's. He must have at least one 5, and could have as many as 25 5's.

Statement (1) is sufficient. He could have one 5, in which case the \$125 consists of \$5 in 5's and \$120 in 20's. If he has only \$100 in 20's, he must have \$25 in 5's -- that's five 5 - dollar bills. Since the statement tells us he has fewer than five 5's, he must have exactly 1.

Statement (2) is also sufficient. If he has more than 5 20's, he must have 6, for a total of \$120. That leaves \$5 in 5's. Choice (D) is correct.

Question: 58

Page: 277

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Other >

Explanation: If we call the number of students in M s_m and the number of teachers in M t_m and follow the same convention for P , we can set up the two ratios and set them equal to each other:

$$((s_m)/(t_m)) = ((s_p)/(t_p))$$

We're looking for $((s_m)/(s_p))$.

Statement (1) is insufficient. It tells us that $s_m = s_p + 10,000$. Absolute differences don't translate into ratios, though. 10,000 could be half the number of students in M, or 5% of the number in M. (Or any other portion, for that matter.)

Statement (2) is also insufficient. By giving us the student - teacher ratio for M, it also gives us the ratio for P, which is the same. However, it doesn't tell us the relative size of the student body in the two districts.

Taken together, the statements are still insufficient. (2) doesn't give us any insight into the number of students in either district. (1) gives us an absolute difference, but no way to turn that into a ratio. Choice (E) is correct.

Question: 59

Page: 278

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Mixture Problems >

Category 2: Arithmetic > Fractions >

Explanation: Statement (1) is insufficient. We don't know how many students are in section 1 (which would tell us how many students $(2/3)$ represents), and we don't know how many female students are in section 2.

Statement (2) is also insufficient. As with (1), we don't know the size of the given section, nor do we know anything about the other section.

Taken together, the statements are still insufficient. This is essentially a weighted average question. Since $(2/3)$ of the students in one section are female and $(1/2)$ of the students in the other section are female, the number of female students must be between the two fractions. But unless we know how many students are in each section, we don't know where the weighted average falls in between those two fractions. Choice (E) is correct.

Question: 60

Page: 278

Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Arithmetic > Ratio and Proportion >

Explanation: The question gives one linear equation with two variables. To find the value of one of the variables, you'll need another linear equation.

Statement (1) is just that: you can substitute the value of s into the initial equation and solve for n , so (1) is sufficient. (2) is also sufficient: it's not so direct, but it is a linear equation with the same two variables, so, combined with the initial equation, it is enough information to solve for n . Choice (D) is correct.

Question: 61

Page: 278

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Rate Problems > other

Explanation: Statement (1) is insufficient: if you want a number of guests, a percentage of guests will not be sufficient. (Unless you can combine it with a number in the question, but there are none in this example.) Statement (2) is also insufficient: 120 scoops could be 10 single scoops and 55 double scoops, or 100 single scoops and 10 double scoops (or any number of other possibilities).

Taken together, the statements are sufficient. (2) implies an equation: $x + 2y = 120$, where x is the number of people who get one scoop, and y is the number who get two scoops. (1) also gives you an equation: $(0.6)y = x + y$. Together, that's two linear equations with two variables. You can solve for both variables; once you know y , you can answer the question, so (C) is the correct choice.

Question: 62

Page: 278

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: Statement (1) is sufficient. If each of 4 people pay \$45 to share a room, the total cost of the room is $45(4) = 180$. Since the cost for the first person is 120, the cost for the additional three people is 60, or \$20 each.

Statement (2) is also sufficient. Establishing that is trickier than in (1). The daily cost of each of 2 people sharing a room is:

$$((120 + x)/2)$$

That is, the \$120 for the first person, plus x for the second person, divided by two, to give us the price per person.

The corresponding cost for four people is:

$$((120 + 3x)/4)$$

\$120 for the first person, x for each of the other three people, divided by the total number of people.

We know that the price for each of the two people is \$25 more than the price for each of the four people, so:

$$((120 + x)/2) = ((120 + 3x)/4) + 25$$

No need to delve any further into the algebra--that's a one - variable linear equation. We could solve it, but best to accept that we could find the answer and move on. Choice (D) is correct.

Question: 63

Page: 278

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Discount >

Category 2: Arithmetic > Percents > other

Explanation: Call store L's price x and M's price y . Each price is discounted, so each of those prices are reduced by some unknown amount.

Statement (1) is insufficient. M's discount is greater, but without knowing the original prices, we don't know which discount price is less. If both original prices are the same, M's discount price is less. If L's original price is substantially less than M's, L's discount price is less.

Statement (2) is also insufficient. Again, we don't know the original prices. If the original prices are the same, M's discount price is less, but if M's original price is much higher, L's discount price is less.

Taken together, the statements are sufficient. Given each store's discount in terms of both dollars and percentages, we can calculate the original prices. For instance, L's discount is 10 percent of the original price, which is \$5. Thus, L's original price is \$50 and its discount price is \$45. By the same reasoning, M's original price is \$40 and its discount price is \$34. Choice (C) is correct.

Question: 64

Page: 278

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Decimals >

Explanation: Statement (1) is insufficient: if d rounded to the nearest tenth is 0.5, d could be as little as 0.45 or as great as 0.549. In other words, it could be less than or greater than 0.5.

Statement (2) is sufficient: if d rounded to the nearest integer is 1, d could be as little as 0.5 or as great as 1.49. No matter where d lies in that range, it is equal to or greater than 0.5. Choice (B) is correct.

Question: 65

Page: 278

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Real Numbers >

Category 2: Arithmetic > Properties of Integers > Other

Explanation: When you subtract one integer from another, the result is one greater than the number of integers between them. (For instance, the difference between 4 and 2 is 2, but there's only one integer between them.) In this case, we're looking for the number of integers between r and s , which means we need the difference, from which we can subtract 1.

Statement (1) gives us the difference, so it's sufficient. Statement (2) gives us the number of integers between $r + 1$ and $s + 1$, which is the same as the number of integers between r and s . After all, the difference between $r + 1$ and $s + 1$ is the same as the difference between r and s , and the number of integers between them is always 1 less than the difference. Choice (D) is correct.

Question: 66

Page: 278

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Category 2: Arithmetic > Powers and Roots of Numbers > Powers

Explanation: Another way of thinking of the question is: Is t evenly divisible by n ?

Statement (1) is insufficient. The only value of n that makes the equation true is 3:

$$3 = 3^{3-2} = 3^1$$

We don't know what t is, though, so we can't answer the question.

Statement (2) is also insufficient. If $n = 1$, then $t = 3$, so n is a factor of t . However, if $n = 2$, then $t = 9$, in which case n is not a factor of t .

Taken together, the statements are sufficient. We know from (1) that $n = 3$, so $t = 3^3 = 27$. 3 is a factor of 27, so the answer is "yes." Choice (C) is correct.

Question: 67

Page: 278

Difficulty: 5 (Moderate)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Explanation: This is a classic "overlapping sets" question. Since most of the quantities are given in percentage terms, ignore the total of 200 college graduates and treat the total as 100%. We can use the overlapping sets formula:

$$\text{Total} = \text{Group1} + \text{Group2} - \text{Both} + \text{Neither}$$

Or, with the information given in the question:

$$100 = 30 + 40 - b + n$$

We're looking for n.

Statement (1) is sufficient. 40 percent of the students received scholarships. 25 of the students received scholarships but no loans, meaning that 15 percent received scholarships AND loans. That's b in the formula above: $b = 15$:

$$100 = 30 + 40 - 15 + n$$

$$100 = 55 + n$$

$$n = 45$$

Statement (2) is also sufficient. 30 percent of the students received loans; if 50 percent of those also received scholarships, that's 15 percent of the total. Again, then, $b = 15$. That puts us in the same position as in (1), so we can find the value of n. Choice (D) is correct.

Question: 68

Page: 278

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Work Problems > 3+ inputs

Category 2: Word Problems > Work Problems > 2 inputs

Explanation: This question looks fairly complicated, discussing simultaneous and combined rate for three machines. Most GMAT questions only ask you to consider two machines in scenarios like these.

Statement (1) is sufficient. As it turns out, the question is simpler than it looked. Instead of finding the individual rates of all three machines, we can treat M and P as one machine. If we know M and P's combined rate, and we know the combined rate of all three machines, we can find K's individual rate. We don't need to consider M and P as separate, because nowhere up to this point in the question are they treated as such.

Statement (2) is insufficient. As in (1), this gives us the combined rate of two of the three machines. However, it doesn't give us the information we're looking for. Knowing the combined rate of K and P, we can find the rate of M. But since K and P are treated as one unit, we can't separate their individual rates. Choice (A) is correct.

Question: 69

Page: 278

Difficulty: 5 (Moderate)

Category 1: Algebra > Inequalities > Negatives

Category 2: Algebra > Absolute Value >

Explanation: While the number may not be drawn to scale, we can trust that the variables are in the right order, so $q < r < s$

Statement (1) is sufficient. It tells us that q and s have the same absolute value--they are the same distance from zero, only in opposite directions. For instance, if $q = -3$, $s = 3$. Since r is in between q and s, it is closer to zero than either of them. And because t must be greater than s (and thus, further from zero), r is the closest to zero of all four.

Statement (2) is insufficient. The inequality tells us that t is further from zero than q--for instance, if $q = -2$, t must be greater than 2 in order for $-t$ to be less than -2. Consider a couple of different acceptable sets of values:

$$q = -2, r = 3, s = 4, t = 5$$

$$q = -2, r = 1, s = 4, t = 5$$

Both follow the rules in the question and (2), but give contradictory answers. Choice (A) is correct.

Question: 70

Page: 279

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Fractions >

Category 2: Word Problems > Other >

Explanation: The number of Mary's friends who donated \$500 each to her campaign is n . If each of those friends arranged for n more people to donate, the additional number of donors is n^2 . Thus, the total number of donors is $n^2 + n$, and the total dollar amount donated is $500(n^2 + n)$.

Statement (1) is sufficient. If the first n people donated $(1/16)$ of the total, those n people donated $(1/16)$ as much as the total number of $n^2 + n$ people did. We can express that algebraically:

$$n = (1/16)(n^2 + n)$$

Divide both sides by n :

$$1 = (1/16)(n + 1)$$

$$16 = n + 1$$

$$n = 15$$

Statement (2) is also sufficient. We know that the total amount donated is $500(n^2 + n)$, so we can set that equal to \$120,000:

$$500(n^2 + n) = 120,000$$

$$n^2 + n = 240$$

$$n^2 + n - 240 = 0$$

$$(n + 16)(n - 15) = 0$$

$$n = 15 \text{ or } n = -16$$

The number of people must be positive, so $n = 15$.

Note that you don't have to solve that quadratic. The fact that the constant (240) is negative tells you that one answer will be positive and one answer will be negative. Since only the positive answer is relevant to a word problem like this one, at that point you can recognize that you'll only have one answer. Choice (D) is correct.

Question: 71

Page: 279

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: Statement (1) offers an equation: $x + y = 42$, where x is the length of the shorter route and y is the length of the longer route. That's one linear equation with two variables, so it's

not enough to solve for x (the length of the shorter route, which is what the question is asking for).

Statement (2) is also insufficient, but gives us another equation: $2y = 46$, or $y = 23$. On its own, that doesn't tell us anything about the length of the shorter route.

Taken together, the statements are sufficient: if $y = 23$ and $x + y = 42$, $x + 23 = 42$, so $x = 19$. Choice (C) is correct.

Question: 72

Page: 279

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Algebra > Inequalities > other

Explanation: Statement (1) is sufficient: the equation says that x is 2 greater than y . That means that x is greater than y : $x > y$. Statement (2) is not sufficient: multiply both sides by 2, and the result is $x = 2y - 2$. If $y = 1$, then $x = 0$ and x is not greater than y . If $y = 3$, $x = 4$ and x is greater than y . Because there are two possible answers, the statement is not sufficient, and choice (A) is correct.

Question: 73

Page: 279

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Explanation: Treat the statements as equations. If $((m)/2)$ is not an even integer, then:

$((m)/2) \neq 2(\text{integer})$ (An even integer is, by definition, twice some other integer.)

$m \neq 4(\text{integer})$

In other words, (1) says that m is not a multiple of 4. If m is not a multiple of 4, it could be odd, but it could also be an even number such as 2 or 6, so the statement is insufficient.

Statement (2) can be analyzed the same way:

$m - 3 = \text{even}$

$m = \text{even} + 3 = \text{even} + \text{odd} = \text{odd}$

This statement is sufficient, so the correct choice is (B).

Question: 74

Page: 279

Difficulty: 4 (Moderately Easy)

Category 1: Geometry > Triangles > other

Explanation: The area of a triangle is one - half the product of the base and the height, so we'll need those two measurements to find the area of triangle ABC. Statement (1) gives us just that: AC is the base and BD is the height, so the area is one - half the product of those two measurements. Statement (2) is irrelevant, as we need side lengths to find the area of a triangle. Choice (A) is correct.

Question: 75

Page: 279

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Coordinate Geometry > Slope

Explanation: Since we're given slope, it's best to convert the equation $ax + by + c = 0$ into point - slope formula to look more like $y = mx + b$:

$$ax + by + c = 0$$

$$by = -ax - c$$

$$y = ((-ax - c)/(b))$$

$$y = -((a)/(b))x - ((c)/(b))$$

The slope, in that equation, is given by $-((a)/(b))$, so we know that $-((a)/(b)) = (2/3)$.

Statement (1) is sufficient. Given the value of a, we can solve for b:

$$-((a)/(b)) = (2/3)$$

$$-(4/(b)) = (2/3)$$

$$-12 = 2b$$

$$b = -6$$

Statement (2) is insufficient. We can add this information to the equation as follows:

$$y = -((a)/(b))x - ((-6)/(b))$$

$$y = -((a)/(b))x + (6/(b))$$

But we can't solve for b. Choice (A) is correct.

Question: 76

Page: 279

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Category 2: Arithmetic > Properties of Integers > Other

Explanation: In order for the product of three integers to be an even integer, at least one of the integers must be even.

Statement (1) is insufficient. It tells us that t is as much greater than p as p is greater than m . The three integers could be 3, 5, and 7, or 4, 14, and 24, just to name two examples. In the first case, the product is odd; in the second, the product is even.

Statement (2) is also insufficient. If t and m are 16 apart, they must either both be even or both be odd. If both are even, the product of the three integers is even. If both are odd (and p is odd as well), the product is odd.

Taken together, the statements are still insufficient. Since p is halfway between t and m (as given by (1)), t is 8 greater than p , and p is 8 greater than m . All three integers must either be even or odd. If all three are even, the product is even; if all three are odd, the product is odd. Choice (E) is correct.

Question: 77

Page: 279

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Percents > other

Explanation: This is a concept that the GMAT repeatedly tests. The salesman's compensation can be represented as follows, where s is his sales:

$$300 + 0.05(s - 1000)$$

Statement (1) is sufficient. We know that his compensation is equal to 10% of his sales, so we can set that equal to the other way we can express his compensation:

$$0.1s = 300 + 0.05(s - 1000)$$

$$0.1s = 300 + 0.05s - 50$$

$$0.05s = 250$$

$$s = 5000$$

Once we know his sales, we can calculate his compensation.

Statement (2) is also sufficient. Given his sales and the expression derived from the question, we can calculate his compensation:

$$300 + 0.05(s - 1000)$$

$$300 + 0.05(5000 - 1000)$$

$$300 + 0.05(4000)$$

$$300 + 200 = 500$$

Choice (D) is correct.

Question: 78

Page: 279

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Interest Problems > Simple

Explanation: Call the amount that earned x percent interest a . That means the amount that earned y percent interest is $60,000 - a$. Thus, the total amount of interest earned is:

$$a\left(\frac{x}{100}\right) + (60,000 - a)\left(\frac{y}{100}\right)$$

We know that's equal to \$4,080, and we're looking for x .

Statement (1) is insufficient. It gives us a relationship between the two interest rates, but that isn't enough to solve for any of the variables. The equation given by the question has three variables (a , x , and y), and between the question and (1), we only have two equations.

Statement (2) is also insufficient. It tells us that the ratio between a and $60,000 - a$ is $(3/2)$:

$$\left(\frac{a}{60,000 - a}\right) = \left(\frac{3}{2}\right)$$

That's another equation, but as with (1), it's only a second equation, even though we're dealing with a total of three variables. To solve for three variables, we need three distinct equations.

Taken together, the statements are sufficient. The question gives us one equation, (1) gives us another, and (2) gives us the third. As you can probably tell from the complexity of some of the equations and the unfriendliness of the numbers, it isn't a good idea to try to solve; instead, recognize that you have three variables and three equations, and select choice (C).

Question: 79

Page: 279

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Inequalities > other

Category 2: Arithmetic > Percents > other

Category 3: Word Problems > Other >

Explanation: In either state, the price of the computer, including sales tax, is $p + p\left(\frac{t}{100}\right)$ -- that is, the price without sales tax plus the amount of sales tax, which is given by multiplying the price by the sales tax percentage.

Statement (1) is insufficient. Without knowing the prices of the computers in the two states, the tax rates are irrelevant. If the prices are the same, the computer will cost more in the state with the higher sales tax rate. However, if the price is much lower in the state with the higher tax rate, the overall cost is greater in the state with the lower tax rate.

Statement (2) is also insufficient. It compares the amount of sales tax charged on the price of the computer in each state. Again, if the prices were equal in both states, this would tell us in which state the cost is greater, but without knowing the prices, we can't answer the question.

Taken together, the statements are still insufficient. It's easy to see how the overall cost would be greater in state 1 -- if the prices are equal in both states, the state with the higher tax rate will have the higher overall cost. To see how the overall cost would be greater in state 2, consider the following scenario:

$$\begin{aligned} p_1 &= 75 \\ p_2 &= 100 \\ t_1 &= 10\% \\ t_2 &= 5\% \end{aligned}$$

This fulfills the requires of both statements--the tax rate is higher in 1, and the amount of tax charged is \$7.50 in 1, greater than \$5 in 2. However, the overall cost is greater in 2. In 1, the overall cost is \$82.50, while in 2, the overall cost is \$105. Choice (E) is correct.

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Difficulty Level: 400-500

Topics: Inequalities & Absolute Values

Because the variables are positive, we can multiply both sides by r and s without worrying about the inequality sign flipping: $\frac{r}{s} < \frac{s}{r} \rightarrow r^2 < s^2$? For a number to have a greater square, it needs to be farther away from 0. For example $3^2 > 2^2$ because 3 is farther from 0 than 2. Similarly, $(-5)^2 > (-4)^2$ because -5 is farther from 0. So the question is, is s farther from 0 than r ? Since both are positive we can simply ask:

Rephrase $\rightarrow$ "Is $s > r$?"

(1) $\frac{r}{3s} = \frac{1}{4} \rightarrow \frac{r}{s} = \frac{3}{4}$. This statement tells us that r -to- s is a ratio of 3-to-4. Since they are both positive, s must be greater than r . We can definitively answer our rephrase.

Statement (1) is SUFFICIENT

(2) $s = r + 4$. To get s , we must add 4 to r . Therefore, s must be greater than r .

Statement (2) is SUFFICIENT

Notes: Statement 1 is only sufficient because we know that our variables are positive. If they could be negative, it would be possible for r to be bigger than s because r and s could have been -3 and -4.

The correct answer is D

Question: 81

Page: 279

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Descriptive Statistics > other

Explanation: Statement (1) tells us nothing: Between the list of numbers and $k < n$, there's no way to find the value of n .

Statement (2) is also insufficient. Given a list of 5 (or any odd number of) numbers, the median must be one of the numbers in the set. Since the median of this list is 10 and 10 isn't one of the numbers listed, either $k = 10$ or $n = 10$. If we put the numbers in order, it looks like this:

6, (k/n) , (k/n) , 12, 17

Either k or n is the median--whichever is larger.

Taken together, the statements are sufficient. Since (1) tells us that n is larger than k , the order of the numbers is:

6, k , n , 12, 17

The middle number is the median, so $n = 10$. Choice (C) is correct.

Question: 82

Page: 280

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: If x is a multiple of 6 and y is a multiple of 14, xy must be a multiple of $6(14) = 84$. If xy is to be a multiple of 105, it must have factors of 3, 5, and 7. 84 has factors of 3 and 7, but not of 5. To establish whether xy is a multiple of 105, we must either learn that either x or y is a multiple of 5 (in which case the answer is "yes"), or that neither variable is a multiple of 5 (in which case the answer is "no").

Statement (1) is insufficient. Without redoing all the calculations, it's clear that this doesn't tell us whether x is a multiple of 5, and it says nothing about y .

Statement (2) is sufficient. If y is a multiple of 25, it is a multiple of 5. Thus, xy is a multiple of 5, and since we already know it is a multiple of 3 and 7, it is a multiple of $3(5)(7) = 105$. Choice (B) is correct.

Question: 83

Page: 280

Difficulty: 5 (Moderate)

Category 1: Algebra > Simplifying Algebraic Expressions >

Explanation: When you see an expression with the same variables appearing in multiple places, it's probably something you can factor. This is the case with Statement (1):

$$ab + cd + ac + bd = 6$$

$$a(b + c) + d(b + c) = 6$$

$$(b + c)(a + d) = 6$$

As it is, that's not enough information to find $b + c$; we need $a + d$. Statement (2) offers $a + d$, but without the connection offered by (1), that's irrelevant.

Taken together, the statements are sufficient: if $(b + c)(a + d) = 6$ and $a + d = 4$, then $4(b + c) = 6$, or $b + c = (3/2)$. Choice (C)

Question: 84

Page: 280

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Arithmetic > Descriptive Statistics > Average

Explanation: The average of j and k is $((j + k)/2)$, so all we need is the sum of j and k . Statement (1) is sufficient: to write this statement as an equation looks like this:

$$((j + 2 + k + 4)/2) = 11$$

$$j + 2 + k + 4 = 22$$

$$j + k + 6 = 22$$

$$j + k = 16$$

Given the sum of j and k , you can find the average. Statement (2) is also sufficient:

$$((j + k + 14)/3) = 10$$

$$j + k + 14 = 30$$

$$j + k = 16$$

Again, we're able to find the sum of j and k . Note that the individual values of j and k are not important; we only need the sum to answer the question. Both statements are sufficient, so choice (D) is correct.

Question: 85

Page: 280

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Mixture Problems >

Category 2: Arithmetic > Ratio and Proportion >

Explanation: The question gives us the equation $p + s = 100$. Two variables, one linear equation, so we'll need another linear equation to solve for p , the number of tickets Paula sold.

Statement (1) is sufficient: it offers another linear equation, $s = (2/3)p$. It can be combined with the initial equation to find p . Statement (2) is not sufficient: the total number of tickets sold for Club X is a third variable, so it can't be related back to the initial equation. Thus, choice (A) is correct.

Question: 86

Page: 280

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Discrete Probability >

Category 2: Word Problems > Other >

Explanation: If 31 or more people were involved, then it's guaranteed that at least one number was written down more than once. (There are only 30 numbers to go around.) If between 2 and 30 people participated, then it's possible, but not guaranteed, that a number was written down more than once. So, the question is really asking, "Were there 31 or more people?"

Statement (1) is enough information: if there were more than 40 people, there must have been more than 31. Statement (2) is not enough: if there were fewer than 70 people, it's not clear whether there were more or less than 31. So, choice (A) is correct.

Question: 87

Page: 280

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Rate Problems > Speed

Explanation: Rate equals distance over time:

$$r = ((d)/(t))$$

so $t = ((d)/(r))$. Thus, the question boils down to this:

$$((d_1)/(r_1)) > ((d_2)/(r_2))?$$

Statement (1) is insufficient. It allows us to substitute one of the variables, since $d_1 = d_2 + 30$:

$$((d_2 + 30)/(r_1)) > ((d_2)/(r_2))?$$

While we know that the first distance is greater, we don't know anything about the rates.

Statement (2) is also insufficient. Again, it allows us to substitute one variable, but this time we don't know anything about distance:

$$((d_1)/(r_2 + 30)) > ((d_2)/(r_2))?$$

Taken together, the statements are still insufficient. We can substitute both statements into the original inequality:

$$((d_2 + 30)/(r_2 + 30)) > ((d_2)/(r_2))?$$

An easier way to see the relationship is to cross - multiply. We can do that because distances and rates must be positive:

$$(d_2 + 30)r_2 > (r_2 + 30)d_2 ?$$

$$d_2r_2 + 30r_2 > d_2r_2 + 30d_2 ?$$

$$30r_2 > 30d_2 ?$$

$$r_2 > d_2 ?$$

What matters is the relationship between the second rate and distance. We don't know that, so we can't answer the question. Choice (E) is correct.

Question: 88

Page: 280

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Arithmetic > Percents > other

Explanation: The question gives us a formula:

$$m + r + h = 12,000$$

We're looking for the value of r .

Statement (1) is insufficient. It does give us another equation:

$$r + h = (1/3)m$$

With that, we can substitute $(1/3)m$ for $r + h$ in the original equation. We can then solve for m , but that doesn't help us isolate r .

Statement (2) is sufficient. It gives us an equation as well:

$$r = 0.2(m + h)$$

Or:

$$5r = m + h$$

We can substitute $5r$ for $m + h$ in the original equation:

$$r + 5r = 12,000$$

$$6r = 12,000$$

$$r = 2,000$$

Choice (B) is correct.

Question: 89

Page: 280

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Category 3: Arithmetic > Percents > other

Explanation: We're looking to compare two numbers: x (the number of members of Club X) and y (the number of members of Club Y).

Statement (1) is insufficient. $0.2x$ (20 percent of x) are also members of Club Y--let's call the overlapping group b . Thus:

$$0.2x = b$$

That doesn't tell us anything about how the two variables in the question compare.

Statement (2) is also insufficient. It gives us the same limited information about y :

$$0.3y = b$$

Taken together, the statements are sufficient. We can express both x and y in terms of b --the number of people in both clubs:

$$x = 5b$$

$$y = (10/3)b$$

5 is greater than $(10/3)$, meaning that $5b$ is greater than $(10/3)b$, so x is greater than y . Choice (C) is correct.

Question: 90

Page: 280

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Fractions >

Category 2: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: Before looking at the statements, simplify the given equation by multiplying both sides by 12:

$$((k)/6) + ((m)/4) = ((t)/12)$$

$$2k + 3m = t$$

Statement (1) is sufficient. If k is a multiple of 3, then $2k$ is a multiple of 3. Because m is an integer, $3m$ is a multiple of 3. Since both $2k$ and $3m$ are multiples of 3, their sum, t , is also a multiple of 3. Thus, t and 12 have a common factor greater than 1--that common factor is 3.

Statement (2) is insufficient. Knowing that m is a multiple of 3 tells us that $3m$ is a multiple of 9. There's no evidence that $2k$ and $3m$ have any factors in common, so we don't know that t has any specific factors. For instance, if $k = 1$ and $m = 3$, $t = 11$, so the answer would be "no." However, if $k = 3$ and $m = 3$, $t = 15$, so the answer would be "yes." Choice (A) is correct.

Question: 91

Page: 280

Difficulty: 4 (Moderately Easy)

Category 1: Geometry > Lines >

Explanation: Statement (1) is insufficient: knowing the length of the entire line doesn't help you compare the lengths of two parts of the line. Statement (2) is also insufficient: the length of AB is irrelevant to the comparison of BC and CD.

Taken together, the statements are still insufficient. Remember that illustrations in Data Sufficiency questions are not drawn to scale, so regardless of AB and CD being equal, CD could be greater or smaller than BC. (E) is the correct answer.

Question: 92

Page: 280

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 3+ sets

Category 3: Arithmetic > Percents > other

Explanation: If 60 percent of the employees are over 40 and 30 percent of those have master's degrees, we can find the number of employees who are over 40 and have master's degrees if we know the total number of employees.

Statement (1) is sufficient: we know that 50% of the employees are college graduates, so if 100 of the employees are college graduates, then there are 200 total employees. Given that number, we can find the number of over - 40 employees, and from there, the number of those employees with master's degrees.

Statement (2) is insufficient: we need a number of employees, and this is just a percent. The correct choice is (A).

Question: 93

Page: 280

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Descriptive Statistics > Average

Category 2: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: While at first glance, this question has five variables, the fact that the variables are consecutive even integers simplifies matters. In fact, there is only one variable, and all the others can be expressed in terms of that one. The five are:

$$p, p + 2, p + 4, p + 6, p + 8$$

$q = p + 2$, and so on. The average of the five integers is the middle number (the median), as is the case whenever a set of numbers are equally spaced. Thus, if we can find p , we can find the median, $p + 4$.

Statement (1) is sufficient. $q = p + 2$, and $s = p + 6$, so we know that:

$$p + 2 + p + 6 = 24$$

$$2p + 8 = 24$$

$$2p = 16$$

$$p = 8$$

Statement (2) is also sufficient. Again, we can substitute expressions containing p for q and r :

$$q = p + 2$$

$$s = p + 4$$

$$(((p + 2) + (p + 4))/2) = 11$$

$$2p + 6 = 22$$

$$2p = 16$$

$$p = 8$$

Choice (D) is correct.

Question: 94

Page: 281

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Coordinate Geometry > Slope

Category 2: Geometry > Coordinate Geometry > Other

Explanation: Given the equation of a line in standard form (as it is given to us in this question), the slope is m . That's what we need to answer the question.

Statement (1) is sufficient. Parallel lines have equal slopes. The line in (1) is also given in point-slope form, only the slope is $(1 - m)$ and the y -intercept is $b + 1$. We can ignore the intercept since we only care about the slope. Since the slopes of this line and the one in the question are the same, we can set them equal to each other:

$$m = 1 - m$$

$$2m = 1$$

$$m = (1/2)$$

Statement (2) is insufficient. To say that a line intersects another line tells you only one thing: They are not parallel. So, the only relevant information is that the line we care about passes through the point $(2, 7)$. If we knew another point as well, we could calculate the slope. However, with just one point, we can't. Choice (A) is correct.

Question: 95

Page: 281

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Arithmetic > Real Numbers >

Explanation: Statement (1) is insufficient. If $rs = 1$, rst will be 1 if t equals 1. Since we don't know whether t is 1, we don't know whether $rst = 1$. Statement (2) is also insufficient: if $st = 1$, rst will be 1 if r is 1. Since we don't know whether r is 1, we don't know whether $rst = 1$.

Taken together, the statements are still insufficient. $rs = 1$ and $st = 1$, which means that $r = t$. So, we can put all three variables in terms of r : $s = (1/r)$, and $t = r$. We can then rewrite the question: is $(r)((1/r))(r) = 1$, or "Is $r = 1$?" Neither statement says anything about a specific variable, so we don't know. The correct choice is (E).

Question: 96

Page: 281

Difficulty: 5 (Moderate)

Category 1: Word Problems > Data Interpretation >

Category 2: Geometry > Circles > other

Explanation: Since we're given the total expenses, we need to know what percent of the circle is represented by R. Statement (1) gives us that: a circle has a total of 360 degrees, so if $x = 94$, R represents $(94/360)$ of the circle, from which we can find the dollar amount R represents. Statement (2) isn't enough: we don't know what percent S + T makes up, or what percent S + T + R makes up, so this ratio doesn't help us. The correct choice is (A).

Question: 97

Page: 281

Difficulty: 5 (Moderate)

Category 1: Algebra > Exponents >

Category 2: Algebra > Inequalities > Negatives

Explanation: Statement (1) is sufficient. If $x^2 > 9$, then either $x > 3$ or $x < -3$. Since we know that x is negative, it must be latter: $x < -3$. That answers the question directly.

Statement (2) is insufficient. We can take the cube root of both sides:

$$x < \sqrt[3]{-9}$$

You aren't expected to know the exact cube root of -9, so approximate. The cube root of -8 would be -2, so the cube root of -9 must be very close to -2. To keep it simple, let's say -2.1:

$$x < -2.1$$

The value of x could be either greater or less than -3. Choice (A) is correct.

Question: 98

Page: 281

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Properties of Integers > Remainder

Category 2: Arithmetic > Properties of Integers > Other

Explanation: To know the sum of the remainders, we'll need to know either the exact numbers, or some properties of the numbers as they relate to 7.

Statement (1) is insufficient. The largest possible remainder when divided by 7 is 6, and the smallest is 0, so if the range of the remainders is 6, we know that at least one remainder is 0 and one remainder is 6. However, there are 7 numbers, and we don't know anything about the other 5 remainders.

Statement (2) is sufficient. Consecutive numbers have consecutive remainders; for instance, the set {10,11,12,13,14,15,16} has, when divided by 7, the remainders {3,4,5,6,0,1,2}. Depending on the first number, the first and last remainders won't always be the same, but in a set of seven consecutive integers, exactly one of the integers will have each of the remainders from 0 to 6. Thus, the sum of the remainders must be:

$$0 + 1 + 2 + 3 + 4 + 5 + 6 = 21$$

Choice (B) is correct.

Question: 99

Page: 281

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Linear Equations-Two Unk >

Explanation: Before jumping into the statements, make sure you understand the restrictions. Each of the numbers 1, 2, and 3 will appear in the table exactly 3 times, and not more than once in any row or column.

Statement (1) is sufficient. If $v + z = 6$, v and z must both be 3. That means that no variable in the same row or column with v or z can be 3. That eliminates everything in the middle row, the right - hand row, the middle column, and the bottom column. The only remaining number that could be equal to 3 is r . Since 3 must appear in the table three times, r must be three.

Statement (2) is also sufficient. s and t , and u and x must represent pairs of different numbers. For instance, s and t cannot both be 2. Thus, if the sum of the four numbers is to be 6, the sum of each pair must be 3, and the only way each pair can sum to 3 is if one of each pair is 1 and the other is 2. For instance $s = 1$, $t = 2$, $u = 1$, $x = 3$. Since those are the numbers that share a row and a column with r , r must be 3. Choice (D) is correct.

Question: 100

Page: 281

Difficulty: 5 (Moderate)

Category 1: Algebra > Symbolism >

Category 2: Arithmetic > Properties of Integers > Other

Explanation: This is an unusual symbolism question, so make sure you understand it before jumping in to the statements. Essentially, the symbol means that x must be rounded down to the nearest integer. So not only is $[1.1] = 1$, but $[1.9] = 1$ as well.

Statement (1) is sufficient. Solve for x :

$$5x + 1 = 3 + 2x$$

$$3x = 2$$

$$x = (2/3)$$

$$[x] = 0$$

Statement (2) is also sufficient. If x is greater than 0 but less than 1, the greatest integer less than x must be 0. Choice (D) is correct.

Question: 101

Page: 281

Difficulty: 5 (Moderate)

Category 1: Word Problems > Mixture Problems >

Explanation: It takes a bit of analysis to recognize this, but it's essentially a weighted average question. The 10 kilograms of Material K consists of some A (x kg) and some B (y kg). If it were all A, the cost would be \$30--10 kg at \$3 each. If it were all B, the cost would be \$50. If it were half and half, the cost would be \$40, right in the middle.

Statement (1) is insufficient. If $y > 4$, then $x < 6$, since their sum must be 10. However, we don't know that the amounts are integer values. The mix could consist of 4.1 kg of B, in which case the answer is "yes." If the mix consisted of 6 kg of B, the answer is "no."

Statement (2) is sufficient. As described a moment ago, the price of a half - and - half mix of the two materials would be \$40. If the price is less than \$40, that means that more than half of the mix is of the cheaper variety--that is, Material A, which is \$3 per kg. Since there is more A than B, $x > y$. Choice (B) is correct.

Question: 102

Page: 281

Difficulty: 5 (Moderate)

Category 1: Word Problems > Rate Problems > Speed

Category 2: Word Problems > Rate Problems > Combined Rate

Explanation: The main question in this problem is the speed at which car X is pulling away from car Y--that is, the difference between their speeds. If car X is moving 5 miles per hour faster, it will get five miles ahead per hour. Since car X is now 1 mile ahead and we want to know when it will be 2 miles ahead of car X, we have distance (1 miles), but we need rate (the difference between X's and Y's rates) to find time.

Statement (1) is sufficient: given both rates, we can find the difference (10 miles per hour), so we can solve for time. Statement (2) is also sufficient. Given a distance ((1/2) mile) and a time (3 minutes), you can solve for rate, and then use that rate to find the time the question is asking for. Choice (D) is correct.

Question: 103

Page: 281

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Rate Problems > Speed

Explanation: Given a number of frames, you will need a rate of display to determine the amount of time it takes to run the cartoon. Statement (1) does that: while the rate is in terms of seconds instead of minutes, that can be converted, so the statement is sufficient.

Statement (2) is more involved, but still sufficient. If it takes x minutes to run the cartoon, it takes $((x)/6)$ minutes to rewind it, for a total of $((7x)/6)$ minutes, which is equal to 14. If $((7x)/6) = 14$, you can solve for x , the amount of time it takes to run the cartoon. Both statements are sufficient, so the correct choice is (D).

Question: 104

Page: 282

[Difficulty:](#) 5 (Moderate)

[Category 1:](#) Word Problems > Rate Problems > Speed

Explanation: This question tests whether you can distinguish between "average rate" and rate at a given moment. If you take one hour to drive a 50 mile route, your average speed is 50 miles per hour, but that doesn't mean you were driving 50 miles per hour the entire time--you might have driven 70 miles per hour part of the time, 45 miles per hour part of the time, and 25 miles per hour part of the time. It's much more difficult to answer "what's the rate at a given moment" questions than "average rate" questions.

Statement (1) is insufficient. You can calculate average rate, but there's no information about the specific moment when the train had completed half of its trip.

Statement (2) is also insufficient. Again, this gives you the average rate, but no more.

Taken together, the statements are still insufficient. In fact, the two statements give you the same information. Each one tells you the average rate, so neither helps you find the rate at any given moment. Choice (E) is correct.

Question: 105

Page: 282

[Difficulty:](#) 5 (Moderate)

[Category 1:](#) Arithmetic > Descriptive Statistics > Average

[Category 2:](#) Arithmetic > Descriptive Statistics > other

Explanation: The median of three home prices is the middle one--the price that is smaller than one of the others and larger than one of the others. Since we know the average, we know the total: \$360,000.

Statement (1) is insufficient. If Tom's house is \$110,000, the sum of the other two is \$250,000. It could be that Tom's house is the median price--for instance, if the other two are \$100,000 and \$150,000. However, one of the others could be the median if, for instance, the other two are \$120,000 and \$130,000.

Statement (2) is sufficient. If Jane's house is \$120,000, the sum of the other two is \$240,000. There are two possibilities: either all three houses are \$120,000, or the other two home prices consist of one that is greater than \$120,000 and one that is less than \$120,000. In either case, the median price is \$120,000. Choice (B) is correct.

Question: 106

Page: 282

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: For the product of two integers to be even, at least one of the integers must be even.

Statement (1) is sufficient. If x is 1 greater than y , one of the numbers is odd and one is even. (We don't know which one, but it doesn't matter.) Since one of the numbers is even, the product is even.

Statement (2) is also sufficient. It's easier to understand this if you multiply both sides by y :

$$((x)/(y)) = \text{even}$$

$$x = \text{even}(y)$$

Any integer multiplied by an even is even, so $\text{even} * y = \text{even}$, so x is even. Since x is even, we know that the product of the two integers is even. Choice (D) is correct.

Question: 107

Page: 282

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Discrete Probability >

Category 2: Arithmetic > Fractions >

Explanation: Since there are three colors of chips in the box, the probability that a selected chip is white or blue is 1 minus the probability that it is red.

Statement (1) is insufficient: the probability of white or blue is the sum of the probability of white and the probability of blue, and this only gives us one of those. Statement (2) is sufficient: the probability we're looking for is $(1 - \text{red})$, so given the probability of red, we can find the probability of white or blue. Choice (B) is correct.

Question: 108

Page: 282

Difficulty: 5 (Moderate)

Category 1: Geometry > Lines >

Category 2: Arithmetic > Fractions >

Category 3: Algebra > Linear Equations-Two Unk >

Explanation: To answer this question, you need to know the width of each tick mark. Once that is known, you can count the ticks between 0 and y and determine the value of y.

Statement (1) is sufficient: if there are 3 spaces between 0 and x and $x = (1/2)$, you can find the width of each space. Statement (2) is also sufficient: the distance between x and y is four spaces, so if that distance is $(2/3)$, you can find the width of each space. The correct choice is (D)

Question: 109

Page: 282

Difficulty: 7 (Very Difficult)

Category 1: Geometry > Triangles > Multiple figures

Category 2: Geometry > Triangles > other

Explanation: An important first step is to draw a diagram to represent the description. Regardless of the shape of the triangle you draw, XYZ will represent one corner of ABC, and RSC will be an even smaller corner of the triangle inside XYZ. The important thing to recognize is that these three triangles are "similar." All three have the same angle (the angle at point C) between two sides that have the same ratio to each other. Since XC is half of AC and YC is half of BC, the ratio of XC to YC is the same as the ratio of AC to BC. The same reasoning goes for RC to SC.

Statement (1) is sufficient. ABX is exactly half the area of ABC -- it has two of the same sides as ABC, and the shorter side (AX) is half the length of the length of the corresponding side in ABC. Thus, if the area of ABX is half the area of ABC, so the area of ABC is 64. Thus, $(1/2)bh = 64$, or $bh = 128$. In RSC, each of the sides is one - quarter the length of the corresponding side in ABC. (This is where the "similar" triangles come in -- all of the measurements, not just RS and SC, are one - quarter of the corresponding measurement in ABC.) So we're looking for:

$$((1/4)b)((1/4)h)$$

or

$$(1/16)bh$$

We know bh , so we can find this value.

Statement (2) is insufficient. It provides one useful piece of information towards finding the area of ABC, but to find the area of a triangle, we need both base and height ("altitude"), not just one. Choice (A) is correct.

Question: 110

Page: 282

Difficulty: 5 (Moderate)**Category 1:** Arithmetic > Properties of Integers > Factors and Multiples**Category 2:** Arithmetic > Properties of Integers > Other**Category 3:** Arithmetic > Properties of Integers > Evens and Odds**Explanation:** We can express the question as follows:

uth = 96, where u, t, and h represent the units, tens, and hundreds digit of the number m. We're looking specifically for the units digit, u. Keep in mind that the three variables must be digits, so they must be between 0 and 9, inclusive. It is worthwhile to figure the prime factorization of 96 to get a sense of the possibilities:

$$96 = 2 * 2 * 2 * 2 * 2 * 3$$

For instance, the three digits could be 4 (2 * 2), 8 (2 * 2 * 2), and 3. Or 2, 8, and 6. There may be other possibilities; the important thing isn't to figure out all of the possible permutations before looking at the statements. Rather, understand that the three numbers must include the complete prime factorization of 96.

Statement (1) is sufficient. If m is odd, the units digit in m must be odd. (And remember, the units digit is what we're looking for.) Given the prime factorization of 96, we can rule out 5, 7, and 9. 1 and 3 are the only possibilities. We've already seen that the digits could be 4, 8, and 3. Could they include 1 instead? That would require that the other two digits include the complete prime factorization. It turns out that it's impossible. If one of the numbers is 8, the other is 12; if one of the numbers is 6, the other is 16. There's no way to multiply two single - digit numbers by each other to reach 96. Thus, the units digit of m is 3.

Statement (2) is insufficient. If the hundreds digit is 8, that means the other two digits must include the prime factorization of 96 except for 2 * 2 * 2. That's 2 * 2 * 3. That could be 4 and 3 or 2 and 6. Further, we don't know which of those numbers would be the tens or units digit. Choice (A) is correct.

Question: 111

Page: 282

Difficulty: 6 (Moderately Difficult)**Category 1:** Arithmetic > Ratio and Proportion >**Category 2:** Word Problems > Other >

Explanation: Statement (1) is insufficient. We're looking for a number of employees. A ratio isn't going to help us here. There could be 20, 30, and 40 of the office supplies, or 20,000, 30,000, and 40,000. This statement gives us no clue as to the number of supplies or employees.

Statement (2) is also insufficient. While it tells us the number of each type of supply, we don't know how many of each that each employee receives, so we don't know how many employees there are.

Taken together, the statements are still insufficient. If each employee received 2, 3, and 4 of each type of supply, that means there are 9 employees. If each employee received 6, 9, and 12 of each type instead, there are 3 employees. Choice (E) is correct.

Question: 112

Page: 282

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Work Problems > 2 inputs

Explanation: While we're given two different times, we can't yet determine rates. The two machines each filled part of the lot, but we don't know how much of the lot each machine filled.

Statement (1) is insufficient. This doesn't help us find rates--we don't know how "30 bottles" relates to the size of the entire lot. X's total of $30 * 60$ bottles per hour could represent 20% of the lot, 10% of the lot, or an infinite number of other possibilities.

Statement (2) is sufficient. This tells us how much each machine accomplished in the time they spent filling the lot. If X produced twice as many bottles as Y, that means X filled $(2/3)$ of the order and Y filled the remaining $(1/3)$. Thus, if X filled $(2/3)$ of the order in 4 hours, it would've taken X 6 hours to fill the entire order. Choice (B) is correct.

Question: 113

Page: 282

Difficulty: 5 (Moderate)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Explanation: If $(3/4)$ of $(2/3)$ of the passengers are managers, then $(1/4)$ of $(2/3)$ of the passengers are not managers, then we can find the number of non - manager passengers if we know the total number of passengers.

Statement (1) gives us just that: if there are 690 passengers, then $(2/3)(690)$ of them are company employees, and $(1/4)$ of those are not managers. Statement (2) does the same: if there are 230 non - employees, 230 is $(1/3)$ the number of total passengers, so we can derive the number of total passengers. Both statements are sufficient, so the correct choice is (D).

Question: 114

Page: 283

Difficulty: 5 (Moderate)

Category 1: Geometry > Circles > other

Category 2: Arithmetic > Ratio and Proportion >

Category 3: Word Problems > Geometry Problems >

Explanation: Put in more mathematical terms, the circumference of K is $(1/2)$ the circumference of G. To find the area of G, you'll need the radius of G, which you can get from the circumference of G. Since G and K are related, any bit of information--radius, diameter, circumference, area--about either garden will be sufficient.

Statement (1) offers the area of G, from which you can get the radius of G, then the circumference of G, then the circumference of K, so it is sufficient. Statement (2) is also sufficient, as it gives the circumference of G, from which you can get the circumference of K. The correct choice is (D).

Question: 115

Page: 283

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Symbolism >

Category 2: Algebra > Functions > other

Explanation: As usual, when the GMAT introduces a complicated - sounding rule or function, it represents something quite simple. The two functions result in either the larger of the two numbers in parentheses (max) or the smaller (min). We're looking for $\min(10, w)$. If w is greater than 10, the result is 10. If w is less than 10, the result is w , and we'll need to know the value of w to answer the question.

Statement (1) is sufficient. In plain English, w is equal to the greater of 20 and z . If z is less than 20, the greater of 20 and z is 20. If z is greater, z must be larger than 20. In other words, w is either 20 or something greater than 20. Thus, $\min(10, w) = 10$, because w must be greater than 10.

Statement (2) is also sufficient. Following the same reasoning as in (1), if $w = \max(10, w)$, w must be greater than 10. If w is greater than 10, $\min(10, w) = 10$. Choice (D) is correct.

Question: 116

Page: 283

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Descriptive Statistics > Average

Explanation: When given an average, it's always possible to look at it as a total. Instead of the question asking whether the average was greater than 90 over a six - day period, we can ask whether the total number of people registered was over $90 * 6 = 540$ in that time. Since we know that one day had the least number of registered people, and that was 80, we can also phrase the question as: Was the number of people registered on the other five days greater than 460?

There's no guarantee that re - phrasings like these will make the question simpler, but they do let you gain a firmer grasp of the content before trying to apply the statements.

Statement (1) is sufficient. For the four days mentioned, the total number of people registered must be greater than 400. Thus, between these four days and the day on which the smallest number of people registered, the total was 480. Since we want to know whether the overall total was above 540, we really need to know whether the number of the sixth day was greater than 60. Since 80 was the smallest single - day total, we know that the total on the sixth day was greater than 80, so the minimum number of possible registrations was 560, so the answer is "yes."

Statement (2) is insufficient. Given that one day had 80 people registered, if the three days with the smallest number registered average to 85, those three days could be 80, 87, and 88, or perhaps 80, 85, and 90. Taking the first case, we can construct scenarios in which we'd get a "yes" or "no" answer:

80, 87, 88, plus 89, 89, and 89. (Average is below 90.)

80, 87, 88, plus 100, 100, and 100. (Average is above 90.)

Choice (A) is correct.

Question: 117

Page: 283

Difficulty: 5 (Moderate)

Category 1: Geometry > Circles > Multiple figures

Category 2: Geometry > Circles > other

Explanation: To find the area of the region inside the larger circle and outside the smaller circle, we'll need to find the areas of each of the two circles. To do that, we'll need some measurement of each circle. Finding the radius of each is a typical way of solving this sort of problem.

Statement (1) is sufficient. AB is the radius of the smaller circle, so we can find the area of the smaller circle. AC is the radius of the larger circle and is equal to the sum of AB and BC. Given AC, we can find the area of the larger circle as well.

Statement (2) is also sufficient. The sum of CD and DE is CE, the radius of the larger circle. Given that, we can find the area of the larger circle. Knowing the radius of the larger circle ($CD + DE = 1 + 4 = 5$), we know that AC is 5 as well. The diameter of the smaller circle is AD, which is the sum of AC and CD. AC is 5 and CD is 1, so the diameter is 6. That means the radius of 3, so we can find the area of the smaller circle. Choice (D) is correct.

Question: 118

Page: 283

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Rate Problems > other

Explanation: To answer this question, you need a lot of information: the regular hourly rate, the number of hours worked beyond 40 hours, and the number of hours worked on Sunday. Statement (1) provides the regular hourly rate, but nothing else, so it is insufficient. Statement (2) gives total number of hours, but the information about the number of hours per day is irrelevant. Since there's nothing about dollars per hour, (2) is insufficient.

Taken together, there's still not enough information. Those 54 hours could come from 54 from Monday through Saturday, or could be a few hours on Sunday and the remainder from Monday to Saturday. Those two scenarios would result in different payment amounts for the week, so choice (E) is correct.

Question: 119

Page: 283

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Sets >

Explanation: To answer this question, you'll need the number of tickets sold at full price and at the discount, plus the full price of the tickets as the price of the discounted tickets.

Statement (1) allows you to find the first two: if the number of tickets sold at full price is $(1/4)$ of 400, or 100, leaving 300 sold at a discount. However, it is insufficient because there's no information about the cost per ticket. Statement (2) is also insufficient, as it has no information about the number of tickets at either price.

Taken together, the statements are still insufficient. While we know the number of each type of ticket, and the full price of the ticket, we can't answer the question without knowing the price of the discounted tickets. The correct choice is (E).

Question: 120

Page: 283

Difficulty: 7 (Very Difficult)

Category 1: Arithmetic > Percents > Percent Change

Explanation: This question can involve quite a bit of algebra. Jump right in. If we call the 1997 rent r , we know that the 1998 rent is x percent more:

$$1998: r + ((x)/100)r$$

In other words: it's the 1997 rent plus x percent (x divided by 100) of the 1997 rent.

The algebra gets messier when we subtract y percent from the 1998 rent to get the 1999 rent:

$$[r + ((x)/100)r] - ((y)/100)[r + ((x)/100)r]$$
$$(r + ((x)/100)r)(1 - ((y)/100))$$

We want to know whether that expression (the 1999 rent) is greater than the 1997 rent, r :

$$(r + ((x)/100)r)(1 - ((y)/100)) > r ?$$

Before jumping into the statements, recognize that we can divide r from both sides:

$$(1 + ((x)/100))(1 - ((y)/100)) > 1 ?$$

$$(1 + ((x)/100))(1 - ((y)/100)) > 1 ?$$

Given all those 1's, let see if we can get any further:

$$1 + ((x)/100) - ((y)/100) - ((xy)/(10,000)) > 1 ?$$

$$((x)/100) - ((y)/100) - ((xy)/(10,000)) > 0 ?$$

$$x - y - ((xy)/100) > 0 ?$$

$$x - y > ((xy)/100) ?$$

That's a lot of work, and it takes a lot of time, but glance at the statements and you can recognize just how much work it can save you.

Statement (1) is insufficient. Given that $x > y$, the left side of the inequality will always be positive, but it could be very small. For instance, if $x = 20$ and $y = 19$, the left side is 1, and the right side is $((20(19))/100)$, or about 4. By contrast, if there's a large difference between x and y , the left side will be larger.

Statement (2) is sufficient. This is where our work pays off. It answers the question directly (if we've simplified the question, anyway). $((xy)/100)$ is less than $x - y$, so the answer to the question is "yes." Choice (B) is correct.

Question: 121

Page: 283

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Inequalities > other

Category 2: Geometry > Coordinate Geometry > Other

Explanation: An inequality represents a region on the coordinate plane. While the equation $2x + 3y = 6$ is a line, the inequality is a region bounded by that line. If the point (r,s) is in the region, that means that given the values of r (the x - coordinate) and s (the y - coordinate), it is true that $2r + 3s \leq 6$. We're trying to determine whether that's the case.

Statement (1) is insufficient. If $3r + 2s = 6$, we don't know whether $2r + 3s \leq 6$. If $r = 2$ and $s = 0$, the answer is "yes." If $r = 0$ and $s = 3$, the answer is "no."

Statement (2) is also insufficient. If $r = 1$ and $s = 1$, the answer is "yes." If $r = 2$ and $s = 1$, the answer is "no."

Taken together, the statements are still insufficient. The first example I mentioned, when $r = 2$ and $s = 0$, follows the rules given in both statements, so we know that the answer could be "yes." To establish that the statements are insufficient, we need to find a counterexample. If $s = 2$ and $r = (2/3)$, then it is true that $3r + 2s = 6$, but $2r + 3s = (4/3) + 6$, which is greater than 6, so the answer is "no." Choice (E) is correct.

Question: 122

Page: 283

Difficulty: 5 (Moderate)

Category 1: Geometry > Rectangular Solids and Cylinders > Rectangular Solids

Explanation: To find the volume of a rectangular solid, we need the three dimensions--usually described as length, width, and height.

Statement (1) is insufficient. It doesn't matter which face has which name (e.g. "length"), so we can say:

$$lw = 15$$

$$wh = 24$$

That's three variables but only two equations--not enough information.

Statement (2) is also insufficient. Knowing the area of two of the faces (in this case, two corresponding faces) isn't enough.

Taken together, we have enough information. There are three distinct faces, each of which occurs twice (for instance, the top and bottom have the same dimensions). We're given the measurements of each:

$$lw = 15$$

$$wh = 24$$

$$lh = 40$$

We have three variables and now three equations. It takes some work to find the values, but they can be guessed at based on the factors of the numbers. Since 40 and 15 are both multiples of 5, we can guess that $l = 5$, meaning that $w = 3$ and $h = 8$, which is confirmed by $wh = 24$. With the three dimensions, we can calculate the volume of the solid. Choice (C) is correct.

Question: 123

Page: 283

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Arithmetic > Properties of Integers > Other

Explanation: Algebraically, we can represent the total cost of the stamps as:

$$c = 0.15x + 0.29y$$

Statement (1) is sufficient. It doesn't initially appear to be sufficient, since all we can establish is the new equation:

$$4.40 = 0.15x + 0.29y$$

However, be careful any time the variables represent integers. There are infinite number of solutions to an equation like that one, but most of them have non - integer values. In this case, there's only one solution that includes integers for both variables. One warning sign is the unusual number "29" making an appearance.

For instance, no number of 29 cent stamps would cost 50 cents, or 100 cents. The only possible totals are multiples of 29:

29 cents, 58 cents, 87, etc.

Since any multiple of 15 ends in either a 5 or a 0 and 4.40 ends in a zero, the total price of the 29 cent stamps must end in a five or a zero as well. Thus, the number of 29 cent stamps must be a multiple of five:

$$0.29 * 5 = 1.45$$

$$0.29 * 10 = 2.90$$

$$0.29 * 15 = 4.35$$

We can quickly dismiss the last as impossible, because no number of 15 cent stamps could be added to 4.35 and result in 4.40.

Thus, we can check the other two. If the 29 cent stamps total \$1.45, that leaves \$2.95 for the 15 cent stamps. Two 15 cent stamps is 30 cents, which means that 20 would be \$3.00. We can't get to \$2.95 -- the only nearby options are \$2.85, \$3.00, and \$3.15.

That leaves only the middle choice: Ten 29 cent stamps. The 15 cent stamps must cost a total of \$1.50, which is the price of 10 such stamps. We can conclude that Joanna bought ten of each price of stamp.

Statement (2) is insufficient. This tells us that the total price must be a multiple of 44 cents (the total price of one of each stamp), but we don't know how many she bought. Choice (A) is correct.

Question: 124

Page: 284

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 3+ sets

Explanation: Since only 30 of the 100 people answered "Favorable" regarding N, the maximum number of people who answered "Favorable" regarding both is 30, and that is only the case if all of those were answered "Favorable" regarding N did the same regarding M. The minimum size of the overlap is 0, if none of the same people viewed the candidates favorably.

Statement (1) is sufficient. If the number of people who did not answer Favorable regarding either candidate was 40, that means 60 of the 100 people answered Favorable regarding at least one of the candidates. There were 70 total Favorable answers, but some of those must have come from the same people. We can express this as an equation:

$$\text{FavorableM} + \text{FavorableN} - \text{FavorableBoth} = 60$$

$$40 + 30 - \text{FB} = 60$$

$$\text{FB} = 10$$

That's the number we're looking for--the number who responded Favorable regarding both candidates.

Statement (2) is not sufficient. The reason why (1) was sufficient is that is limited the answers to two choices: Favorable or "not favorable." The chart splits the "not favorable" into two

categories. Since we care about the "Favorable" answers, we need to be able to isolate that one. Knowing a detail about the "Unfavorable" answers leaves us with two answers' worth of variables--those for "Favorable" answers and those for "Not Sure" answers. Choice (A) is correct.

Question: 125

Page: 284

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Symbolism >

Category 2: Arithmetic > Real Numbers >

Explanation: The equation in the question is true if the symbol stands for multiplication or division. The equation is the definition of the distributive property, which applies to multiplication and division, but not addition and subtraction.

Statement (1) is sufficient. If $k \circ 1$ is not equal to $1 \circ k$, then the symbol must stand for subtraction: $1 - k \neq k - 1$. Statement (2) is sufficient: if the symbol stands for subtraction, then the initial equation is false. Choice (D) is correct.

Question: 126

Page: 284

Difficulty: 5 (Moderate)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Explanation: Statement (1) is not sufficient: if 20 of the 60 cars had a stereo but no power windows, then 40 of the cars either had both, neither, or power windows but no stereo. Statement (2) is also not sufficient: if 30 of the 60 cars had both, that leaves 30 cars that either had stereo but no power windows, power windows but no stereo, or neither.

Taken together, it's still not enough information. Given what we know about 50 of the 60 cars, that leaves 10 cars that either have power windows but no stereo, or neither. Without knowing how many cars have power windows but not stereo, it's insufficient, choice (E).

Question: 127

Page: 284

Difficulty: 5 (Moderate)

Category 1: Word Problems > Sets >

Category 2: Arithmetic > Sets > 2 sets

Explanation: The total number of students at Jefferson School is given by $300 = S + F + B$, where S is the number of students who study Spanish only, F is the number who study French only, and B is the number who study both. To find B , you'll need both F and S . Since any student among these 300 studies either one language or the other, if 100 do not study French, then 100 study Spanish only, so $S = 100$. Now only one more variable is required to solve for B .

Statement (1) provides that variable: if 60 do not study Spanish, those 60 must study French only, meaning that $F = 60$. With the values of S and F , you can solve for B . Statement (2) is also sufficient: if a total of 240 students study Spanish and 100 students study Spanish only, that leaves 140 students who study Spanish and study French. The correct choice is (D).

Question: 128

Page: 284

Difficulty: 7 (Very Difficult)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Category 2: Word Problems > Other >

Explanation: If n students are to be assigned to m classrooms such that each classroom has the same number of students, we're talking about factors and multiples. n must be a multiple of m . Given the inequality $3 < m < 13 < n$, perhaps there are 4 classrooms and 20 students, for 5 students each. Note in that case that 20 is a multiple of 4.

Statement (1) is insufficient. It tells us that $3n$ is a multiple of m . More technically:

$$(3n)/m = \text{integer}$$

We care about $(n)/m$ --if that's an integer, n is a multiple of m . To isolate what we're interested in, divide both sides by 3:

$$(n)/m = (\text{integer})/3$$

That isn't necessarily an integer. In more practical terms, imagine that $m = 6$ and $n = 20$. $3n$ (60) is a multiple of 6, but n (20) is not. That gives us a "no" answer. It's also possible that $m = 6$ and $n = 30$.

Statement (2) is sufficient. We can use the same technique to analyze the statement, which tells us:

$$(13n)/m = \text{integer}$$

It's no accident that 13 appears in the question and again in this statement. To simplify:

$$(n)/m = (\text{integer})/13$$

There's no guarantee that the expression $(\text{integer})/13$ is an integer. It could, for instance, be $1(1/13)$ or $17(6/13)$. However, in both of those cases, the value of m would have to be 13 or a multiple of 13. For instance, if $n = 14$ and $m = 13$, we get $1(1/13)$. There's no way to divide by a denominator that is less than 13 and get a result like $1(1/13)$. The question tells us that m is less than 13, so the only possible results of $(\text{integer})/13$ that are acceptable are integers. For instance, if $m = 3$ and $n = 30$, in which case both 30 and 390 ($13n$) are divisible by m . Choice (B) is correct.

Question: 129

Page: 284

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Descriptive Statistics > other

Category 2: Arithmetic > Percents > other

Explanation: Statement (1) is insufficient. If 25 percent of the projects have 4 or more people, then 75 percent of the projects have 3 or fewer people. The median is somewhere in that 75 percent (it's between the 49th and 51st percent, to be exact), but we don't know whether that's 1, 2, or 3 people.

Statement (2) is also insufficient. By the same reasoning, if 35 percent have 2 or fewer employees, 65 percent have 3 or more. The median is somewhere between 3 and a very large number, but we don't know where.

Taken together, the statements are sufficient. The statements leave us with a middle 40 percent of projects that have both 3 or fewer people and 3 or more people assigned to them. Put it all together, and all of those middle 40 percent of projects have exactly 3 people assigned to them. Since we're talking about the middle 40 percent, the median must be 3. Choice (C) is correct.

Question: 130

Page: 284

Difficulty: 5 (Moderate)

Category 1: Word Problems > Measurement Problems >

Explanation: Word Problems \TEXTsymbol{ > } Measurement Problems \TEXTsymbol{ > }

Explanation: Statement (1) gives you a range of possible appointment times. The earliest it could be is Monday at 12:00 AM + 60 hours; the latest is Monday at 11:59 PM + 60 hours. Since 60 hours is two full days plus 12 hours, the first one is Wednesday at 12:00PM, while the second is Thursday at 11:59 AM, so the statement is insufficient.

Statement (2) also provides a range, but says nothing about the day. Taken together, there's a more specific range. The latest the appointment could be on Thursday, according to (1), is 11:59 AM. So, if the appointment is no earlier than 1PM, the appointment must be on Wednesday, so the combined statements are sufficient, choice (C).

Question: 131

Page: 284

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Category 2: Word Problems > Mixture Problems >

Explanation: The information in the question tells us that $h = t + 4$, where h is the number of heads that resulted from a certain number of coin flips, and t is the number of tails that resulted. To find the value of h , we'd need another linear equation to go along with the first one.

Statement (1) is sufficient: it says that $h + t = 24$. Combined with $h = t + 4$, that's two linear equations and two variables, so we can solve for h . Statement (2) is more convoluted, but also sufficient. Setting up an equation for total points looks like this: $3h + t = 52$, another linear equation with two variables that we can pair with the initial equation. The correct choice is (D).

Question: 132

Page: 284

Difficulty: 5 (Moderate)

Category 1: Geometry > Intersecting Lines and Angles >

Category 2: Geometry > Quadrilaterals >

Explanation: Note that all four of the named angles are adjacent to interior angles of a quadrilateral. The angle to the right of x is $180 - x$, the angle to the left of y is $180 - y$, and so on. The interior angles of a quadrilateral always sum to 360, so we can set up an equation:

$$(180 - x) + (180 - y) + (180 - w) + (180 - z) = 360$$

$$720 - x - y - w - z = 360$$

$$360 = x + y + w + z$$

Since we're looking for $x + y$, we need the values of w and z .

Statements (1) and (2) are both insufficient on their own. They give us one of the two angles we need, but not both. Don't fall in the trap of assuming that any of the lines are parallel--not only do they not appear parallel, but also, in general, Data Sufficiency diagrams are unreliable.

Taken together, the statements are sufficient. If $w = 95$ and $z = 125$, we can solve for $x + y$:

$$360 = x + y + w + z$$

$$360 = x + y + 95 + 125$$

$$x + y = 140$$

Choice (C) is correct.

Question: 133

Page: 284

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Descriptive Statistics > Average

Explanation: Statement (1) is insufficient. It's possible that all of the 15 numbers are 4, in which case they are all equal. However, if two of the numbers change from 4 to 3 and 5, the sum is still 60, but the numbers are not equal.

Statement (2) is sufficient. If the sum of any three numbers in the list is always the same, there cannot be any difference between any of the numbers. Take, for instance, the list {3, 4, 4, 5}. It's possible to select three numbers that sum to 12 (3, 4, and 5), but it's also possible to select three numbers that do not (3, 4, 4, or 4, 4, 5). As soon as you introduce one number other than 4 into the list, all of those three - number sums are no longer the same. Choice (B) is correct.

Question: 134

Page: 284

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Descriptive Statistics > Standard Deviation

Category 2: Arithmetic > Descriptive Statistics > Average

Explanation: To find standard deviation, we need to know one of two things: every number in a set, or each number's distance from the mean.

Statement (1) is insufficient. Knowing the mean of a set isn't enough--the idea of standard deviation is to measure how closely packed or widely dispersed the numbers are around the mean. We have no information about that here.

Statement (2) is sufficient. We don't know the exact numbers, but since all of the numbers are the same, we know each number's distance from the mean: 0. The standard deviation of the set, then, is zero. Choice (B) is correct.

Question: 135

Page: 285

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Quadrilaterals >

Category 2: Geometry > Triangles > Pythag

Explanation: To find the area of this quadrilateral, we would need to break it up into three parts: first, the triangle on the left (SRW), a rectangle bounded by S, T, W, and a point along RU directly below T, and the triangle left over on the right side. We know the dimensions of the first two of those parts, but need to know one more dimension of the triangle on the right to find its area.

Statement (1) is sufficient: if the length of RU is 80, then that leaves $80 - 45 - 15 = 20$ for the base of the triangle on the right. Given a base of 20 and a height of 60, we can find the area of that triangle. Statement (2) is also sufficient: we know the height of the triangle on the right, so if we also know the hypotenuse, we can solve for the base, and then find the area. Choice (D) is correct.

Question: 136

Page: 285

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Descriptive Statistics > Average

Explanation: If the average of 6 numbers is 75, that means that the six numbers sum to $6(75) = 450$. Statement (1) is sufficient: if none of the numbers are less than 75, none of the numbers can be greater than 75, either. If any of the numbers were greater than 75, there would need to be a number less than 75 to "balance out" the average. Since there aren't any, all the numbers must be 75.

Statement (2) is the same thing, in reverse: if none of the numbers is greater than 75, none can be less than 75, either, so all six numbers must be 75. Both statements are sufficient, so choice (D) is correct.

Question: 137

Page: 285

Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Linear Equations-Two Unk >

Explanation: If the price of a donut is d and the price of a bagel is b , we're looking for $5d + 3b$.

Statement (1) is sufficient. It gives us an equation:

$$10d + 6b = 12.90$$

That's one equation with two variables, but notice that the ratio of 10 to 6 is the same as that of 5 to 3. Divide both sides of the equation by 2 to make it look even more similar:

$$5d + 3b = 6.45$$

There's your answer.

Statement (2) is insufficient. Another equation:

$$d = b - 0.15$$

This time, we can't manipulate the equation to find the value of $5d + 3b$. We could substitute $b - 0.15$ for d , but that would leave us with an expression with a variable remaining:

$$5(b - 0.15) + 3b$$

Choice (A) is correct.

Question: 138

Page: 285

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Algebra > Equations >

Explanation: To know the total amount of revenue, you need to know how many of the tickets were full price, how many were half price, and the cost of each type of ticket. Statement (1) is insufficient, as it only gives you the discount rate of the discount tickets. Statement (2) is also insufficient, as it only gives you the price of full-price tickets.

Taken together, there still isn't enough information. While you can find the price of each type of ticket, you don't know how many of each type of ticket were sold. The correct choice is (E).

Question: 139

Page: 285

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Fractions >

Category 2: Arithmetic > Decimals >

Category 3: Arithmetic > Properties of Integers > Remainder

Explanation: Whether or not a decimal is terminating depends largely on the denominator: if the denominator is 2, for instance, the result will be an integer or a decimal of .5. (Other denominators of this type are 4, 5, 8, and 10.) However, any denominator that is a multiple of 3 will either be an integer or a non - terminating decimal, such as $0.33\overline{3}$.

Statement (1) is insufficient, as it provides no information about the denominator. Statement (2) is sufficient: if the denominator is 4, the decimal is either .0, .25, .5, or .75. In any of those cases, it is terminating. Choice (B) is correct.

Question: 140

Page: 285

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Triangles > Special Tris

Category 2: Geometry > Triangles > Multiple figures

Explanation: To know the value of $x + y$, you need to know the value of each of the two variables. Statement (1) is insufficient, as it only pertains to the value of x . Statement (2) is also insufficient, as it provides no values for either variable.

Taken together, the statements are still insufficient. While we know the value of x , y remains unknown. Without the value of angle DAC or angle ACD, knowing that triangle ADC is isosceles isn't helpful. The correct choice is (E).

Question: 141

Page: 285

Difficulty: 5 (Moderate)

Category 1: Word Problems > Mixture Problems >

Category 2: Arithmetic > Descriptive Statistics > Average

Category 3: Word Problems > Sets >

Explanation: The question sounds a bit like it involves overlapping sets, but since it specifies that there are no overlapping members of X and Y, we can set up a simple equation for the number of people on each committee:

$$x + y = z$$

Statement (1) is insufficient. Given the average ages of the people on X and Y, we don't know anything about how many people are on either.

Statement (2) is also insufficient. Again, the average age doesn't tell us anything about the number of people, especially since this statement doesn't differentiate between X and Y.

Taken together, the statements are sufficient. All of these average ages give us a weighted average problem. Consider the sum of the ages of the people on each of the committees:

$$X: 25.7x$$

$$Y: 29.3y$$

$$Z: 26.6z \text{ (or, } 26.6(x + y)\text{)}$$

The sum of the ages of the members of X and Y is equal to the sum of the members of Z, so:

$$25.7x + 29.3y = 26.6(x + y)$$

From here, we can't figure out the value of x or y, but we can find a ratio:

$$25.7x + 29.3y = 26.6x + 26.6y$$

$$2.7y = 0.9x$$

$$((x)/(y)) = ((2.7)/(0.9)) = (3/1)$$

Thus, X has more members than Y. Choice (C) is correct.

Question: 142

Page: 285

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Percents > other

Explanation: Statement (1) is insufficient. We're told what percent of her sales Jean earns as a commission, but to answer the question, we would also need to know her total sales.

Statement (2) is also insufficient. Since we're talking about 6 - month periods, an average of \$10,000 per month higher means that, in the second half of 1988, she sold \$60,000 more than in the first half. Still, this doesn't tell us anything specific about her commission.

Taken together, the statements are still insufficient. Combined, we know that Jean made 5% on \$60,000 less than what she sold in the second half of the year. However, we don't know what that amount is. We need to multiply 5% by some number for sales, and we don't have that number. Choice (E) is correct.

Question: 143

Page: 285

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Percents > Percent Change

Category 3: Arithmetic > Ratio and Proportion >

Explanation: To find out the current relationship between stocks Y and X, you need some other relationship between them, or the amount of stocks Y and X. Statement (1) gives you the relationship: if they were equal, you can determine the present relationship after each price was altered by a percentage.

Statement (2) is also sufficient. The increase in the price per share of X was 10% of x, or $(0.1)x$. The decrease in Y was $(0.1)y$. The statement gives an equation: $(0.1)x = (10/11)(0.1)y$. That equation can be manipulated to produce the ratio $((y)/(x))$, from which you can answer the question. The mechanics of solving for the percent aren't important: it's recognizing that any relationship between the changes in Y and X is enough to establish their present ratio. Choice (D) is correct.

Question: 144

Page: 286

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Quadrilaterals >

Category 2: Geometry > Triangles > Multiple figures

Category 3: Geometry > Triangles > Pythag

Explanation: To find the length of a side of A, it's most likely (given the way that GMAT questions with multiple figures generally work) that you'll have to find the lengths of the other sides of triangle D. It helps to know that the area of D is 4: the product of the base and the height, then, is 8.

Statement (1) is sufficient: if the area of B is 9, the length of a side of B is 3, which means the height of triangle D is 3. From there, you can find the length of the base, then the length of the hypotenuse (using the pythagorean theorem), which is a side of A.

Statement (2) is sufficient for the same reasons: from the area of C, you can deduce the length of a side of C, which is the base of triangle D. From there, using the product of the base and height of D, you can find the height of D, then the hypotenuse of D. Choice (D) is correct.

Question: 145

Page: 286

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: The question gives you one equation: $s = 2b$. To solve for s , you'll need one more linear equation with one or both of those variables. Statement (1) provides that: $(s - 4) = 3(b - 4)$. The equations are distinct, so you can solve for s . Statement (2) is also sufficient: you can combine $(s + 8) = 1.5(b + 8)$ with the initial equation to solve for s . Choice (D) is correct.

Question: 146

Page: 286

Difficulty: 5 (Moderate)

Category 1: Algebra > Inequalities > other

Category 2: Word Problems > Rate Problems > other

Explanation: 120 words per paragraph for 25 paragraphs is a total of $120(25) = 3,000$ words. The non - preface part of the report is 2,600 words long, so the question is asking whether the number of words in the preface is less than 400.

Statement (1) is insufficient: if the preface has more than 200 words, it could be less than 400, but could also be greater. Statement (2) is sufficient: if the preface has less than 300 words, it must have less than 400. The correct choice is (B).

Question: 147

Page: 286

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Descriptive Statistics > other

Explanation: If we were to rank all of the books on the two shelves in order of their number of pages, the book with the median number of pages would be the one in the middle of that ranking. While we know that some of the books have no more than 400 pages and others have no fewer than 475, we don't know how many books are on each shelf, so we don't know whether the median falls in one of the groups or the other.

Statements (1) and (2) are insufficient on their own. Knowing how many books are on one of the two shelves is not enough. For instance, if we know that 25 books have no greater than 400 pages, we still don't know whether the median is greater than 400 (if, for instance, there are 30 books on the other shelf) or the median is less than 400 (if there are 20 books on the lower shelf).

Taken together, the statements are sufficient. There are 25 books with 400 or fewer pages and 24 with 475 or greater. If we rank all of those, the book in the middle of the list will be the one with the greatest number of pages among the 25 with 400 or fewer. The question tells us that one of those books has exactly 400 pages. None of those books have more, so the book with the greatest

number of pages on the upper shelf--and thus, the book with the median number of pages--has exactly 400 pages. Choice (C) is correct.

Question: 148

Page: 286

Difficulty: 5 (Moderate)

Category 1: Geometry > Quadrilaterals >

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: The figure in this problem doesn't have any useful geometric characteristics (for instance, a right angle), so all we can do is try to find x .

Statement (1) is insufficient. Any of the four sides could be 120 meters. That could mean that $x = 120$, $x + 60 = 120$, or $3x = 120$. All three options would give us different answers.

Statement (2) is sufficient. Since there are only two sides that are equal, the phrase "each of the two shortest sides" must refer to x . Since $3x$ is three times as long as x , it can't be the side that is twice as long. By process of elimination, $x + 60$ must be twice as long as x :

$$x + 60 = 2x$$

$$60 = x$$

We have the value of x , and we can find the total distance around the path. Choice (B) is correct.

Question: 149

Page: 286

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Coordinate Geometry > Other

Category 2: Geometry > Triangles > Multiple figures

Explanation: The height of triangle OPQ is a line parallel to the y -axis between P and the x -axis. Because $OP < PQ$, the distance between that line and O is not as long as the distance between that line and Q. As a corollary, the triangle to the right of that line has a greater area than the triangle to the left of the line.

Statement (1) is sufficient: if the y -coordinate of P is 8, the height of the triangle is 8. If the x -coordinate of P is 6, the base of the triangle must be greater than 12, as the triangle to the right of the height is larger than the one to its left. Since the area is greater than $(1/2)(12)(8)$, it must be greater than 48.

Statement (2) is insufficient: while it provides the base of the triangle, it does not offer anything about the height, which is necessary to determine the area. Choice (A) is correct.

Question: 150

Page: 286

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Fractions >

Category 2: Algebra > Equations >

Category 3: Arithmetic > Ratio and Proportion >

Explanation: So that it will be easier to spot a sufficient statement, first simplify the equation:

$$S = (((2/(n)))/((1/(x)) + (2/(3x)))) = (((2/(n)))/((3/(3x)) + (2/(3x)))) = (((2/(n)))/(((3 + 2)/(3x)))) = (((2/(n)))/((5/(3x)))) = ((2/(n)))/((3x/5)) = ((6x)/(5n))$$

In other words, to find the value of S, you need the ratio $((x)/(n))$. Statement (1) is sufficient: divide both sides by 2, and $((x)/(n)) = 2$. Statement (2) is insufficient: it doesn't provide a ratio or a value of x, so it would be impossible to find S. The correct choice is (A).

Question: 151

Page: 286

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Exponents >

Category 2: Arithmetic > Powers and Roots of Numbers > Powers

Explanation: Since we know that n is a positive integer, k must be something like 51, 510, 5,100, and so on. That sharply limits the number of possibilities.

Statement (1) is sufficient. Consider the possible values of k in the given range. If we continue the list I started a moment ago, we have:

5,100

51,000

510,000

The first is less than 6,000 and the last is greater than 500,000. Thus, the only acceptable option is 51,000.

Statement (2) is also sufficient. Given the value of k^2 , we can find a positive and negative value of k. There's no need to do the math. Since 5.1 raised to any power will be positive, we can dismiss the negative value. Whatever the square root of $2.601 * 10^9$, that's our answer. Choice (D) is correct.

Question: 152

Page: 287

Difficulty: 5 (Moderate)

Category 1: Algebra > Linear Equations-Two Unk >

Explanation: The first step in a question like this is to set up an equation to represent the information given in the question. If Carmen had 12 more tapes, she'd have $c + 12$. If that's twice as many as Rafael has, then:

$$c + 12 = 2r$$

Statement (1) is insufficient. Given an inequality, start by testing a value close to the edge of the acceptable range. Since Rafael must have more than 5, try $r = 6$. In that case:

$$c + 12 = 2(6)$$

$$c = 0$$

Carmen has fewer. Now try something much larger, like $r = 60$:

$$c + 12 = 2(60)$$

$$c = 108$$

In this case, Carmen has more. Contradictory answers mean that the statement is insufficient.

Statement (2) is sufficient. We already know that if $c = 0$, then $r = 6$, meaning that Rafael has more. To try a number close to the edge of the range given in (2), use $c = 11$:

$$11 + 12 = 2r$$

$$r = 11.5$$

That's not acceptable--common sense tells us we need an integer number of tapes. Instead, try $c = 10$:

$$10 + 12 = 2r$$

$$r = 11$$

We've gotten as close to the edge of the acceptable range as possible, and Rafael still has more than Carmen. Carmen can't have any more than 10 or fewer than 0, so we've tested both extremes. Since we keep getting the same answer, the statement is sufficient. Choice (B) is correct.

Question: 153

Page: 287

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Absolute Value >

Category 2: Algebra > Exponents >

Explanation: Statement (1) is sufficient: if x is negative, the absolute value of x is positive. Therefore, $x|x|$ is the product of a positive and a negative: a negative. A positive number raised to any power remains positive, so 2^x must be positive. A negative number is always less than a positive number, so the answer is "yes."

Statement (2) is also sufficient, and easier: knowing the value of x , you could find the value of each side of the equation, and compare them. It doesn't matter what the answer will be: since there's only one possible value for x , there's only one possible outcome. Choice (D) is correct.

Question: 154

Page: 287

Difficulty: 7 (Very Difficult)

Category 1: Algebra > Exponents >

Category 2: Arithmetic > Powers and Roots of Numbers > Powers

Category 3: Arithmetic > Ratio and Proportion >

Explanation: To write the question in equation form:

$$b - a \geq 2(3^n - 2^n) ?$$

Statement (1) is sufficient, but it requires some crafty algebra to show why:

$$3^{n+1} - 2^{n+1} = 3^n(3^1) - 2^n(2^1) = 2(1.5(3^n) - 2^n)$$

$$\text{So, is } 2(1.5(3^n) - 2^n) \geq 2(3^n - 2^n) ?$$

Divide both sides by 2:

$$1.5(3^n) - 2^n \geq 3^n - 2^n ?$$

Add 2^n :

$$1.5(3^n) \geq 3^n ?$$

Then divide by 3^n :

$$1.5 \geq 1 ?$$

Since 1.5 is greater than 1, we can conclusively answer the question.

Statement (2) is not enough information: it tells us nothing about b or a . Choice (A) is correct.

Question: 155

Page: 287

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Ratio and Proportion >

Category 2: Word Problems > Other >

Explanation: The question is a wordy one, but it basically gives you a ratio of the 1970 mixer price to the 1989 mixer price, and asks what the 1970 mixer price is. Statement (1) gives you a difference. Say the 1970 price is x and the 1989 price is y : $y - x = 102.40$. The question specifies that $((y)/(x)) = 3.56$, so you have two linear equations and two variables: you can solve for x , the 1970 mixer price.

Statement (2) is more direct: given the 1989 price and the ratio between the 1970 and 1989 prices, you can solve for the 1970 mixer price. Choice (D) is correct.

Question: 156

Page: 287

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Exponents >

Category 2: Arithmetic > Powers and Roots of Numbers > Powers

Category 3: Algebra > Inequalities > other

Explanation: Statement (1) is insufficient: $5^{k+1} = 5^k 5^1$, so we can simplify the inequality:

$$5^k 5^1 > 3,000$$

$$5^k > ((3,000)/5)$$

$$5^k > 600$$

If 5^k is greater than 600, it is unknown whether it is less than 1,000.

Statement (2) is sufficient: even without manipulating the equation, you can recognize that it is an equation with one variable, so you can solve for that variable. Regardless of what that variable is, you can find the value of 5^k and determine whether it is less than 1,000. Choice (B) is correct.

For those interested, here's how to solve the equation in (2) for 5^k :

$$5^{k-1} = 5^k - 500$$

$$500 = 5^k - 5^{k-1}$$

$$500 = 5^k - 5^k 5^{-1}$$

$$500 = 5^k(1 - 5^{-1})$$

$$500 = 5^k(1 - (1/5))$$

$$500 = 5^k((4/5))$$

$$5^k = 500((5/4)) = (2500/4) = 625$$

Question: 157

Page: 287

Difficulty: 5 (Moderate)

Category 1: Geometry > Triangles > Special Tris

Category 2: Algebra > Linear Equations-Two Unk >

Explanation: If the hypotenuse of a right triangle is 10, we know that:

$$a^2 + b^2 = 10^2$$

To find the perimeter, we'll need the specific values of a and b.

Statement (1) is sufficient. The legs of a right triangle (a and b) are the base and height, so we express the area as:

$$(1/2)ab = 25$$

$$ab = 50$$

It would take some involved algebra to find the precise values of a and b, but since we have two equations and two variables, we should be able to solve.

(Alert readers will note that, since the first equation involves exponents, these are not "linear" equations. If you do solve, you will find multiple possible answers. However, one of the two possible answers is negative, and in a geometry question, there can't be negative lengths. This is a typical "catch" in geometry Data Sufficiency questions.)

Statement (2) is also sufficient. It tells us that $a = b$. We can simplify the original equation and solve:

$$a^2 + a^2 = 100$$

$$2a^2 = 100$$

$$a^2 = 50$$

$$a = 5\sqrt{2}$$

Choice (D) is correct.

Question: 158

Page: 287

Difficulty: 5 (Moderate)

Category 1: Word Problems > Rate Problems > other

Category 2: Arithmetic > Ratio and Proportion >

Explanation: Statement (1) is sufficient: if each member contributes \$4 and the total contribution is \$60, the number of members is $(60/4) = 15$.

Statement (2) is trickier, but also sufficient. Say that the number of members is m and the contribution per member is c . Thus, the contribution per person is given by $(60/(m)) = c$. However, if 5 members fail to contribute, the number of contributing members is $m - 5$, and the contribution is $c + 2$. Thus, $(60/(m - 5)) = c + 2$. That's two linear equations with two variables. They would take some time to solve, but luckily you don't have to. Choice (D) is correct.

Question: 159

Page: 287

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Real Numbers >

Category 2: Algebra > Inequalities > other

Explanation: Statement (1) is sufficient: if $((x)/(y)) < 0$, then x and y do not have the same sign. Thus, if x is negative, y must be positive. Statement (2) is insufficient. If $y - x > 0$, then $y > x$. If x is negative and y is greater, y could be a greater negative number, or it could be positive. Choice (A) is correct.

Question: 160

Page: 287

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Circles > Multiple figures

Category 2: Geometry > Circles > Sector/Arc

Category 3: Geometry > Triangles > Multiple figures

Explanation: To find the circumference of the circle, you need the radius, or something that can give you the radius. Statement (1) is sufficient: the triangle has angles in a ratio of 45:45:90, which means that the sides have a ratio of $x:x:x\sqrt{2}$. So, if the perimeter of the triangle is $20 + 10\sqrt{2}$, $x + x + x\sqrt{2} = 20 + 10\sqrt{2}$. You can solve for x , which is also a radius of the circle, so you can solve for the circumference of the circle.

Statement (2) is also sufficient: arc XYZ is $(1/4)$ the circumference of the entire circle, since it is defined by an angle of 90, which is one-quarter of 360, the angle measure of the entire circle. If 5π is a quarter of the circumference, the circumference must be $4(5\pi) = 20\pi$. Choice (D) is correct.

Question: 161

Page: 287

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Other >

Explanation: This question is very wordy, but it's important not to get bogged down in the details. The concept is simple. At the end of May, the balance was \$2,600. For some number of months after the start of the year (those months might or might not include May), he made a \$120 deposit every month. After the months in which he made deposits, he made a monthly withdrawal of \$50.

Statement (1) is insufficient. We know that the balance at the end of May was \$2,600. If Carl made a deposit in May, the balance at the end of April must have been \$120 less--\$2,480. That's possible. If Carl made a withdrawal in May, the balance at the end of April must have been \$2,650. This statement contradicts that. Thus, he must have made a deposit in May, meaning that he made a deposit in each month up to May. Thus, his month - end balances up to that point were:

April: \$2,480

March: \$2,360

February: \$2,240

January: \$2,120

(You don't need to figure all of this out--the important thing is that this question tells you the month - end balances for the first four months.) We don't know how much longer Carl keeps making deposits, though, so we don't know what the range turns out to be for the entire year.

Statement (2) is also insufficient. By the same reasoning as in (1), we can figure out the two possible balances for the end of June, based on the May - end balance of \$2,600. If he made a deposit in June, the June - end balance would be \$2,720. That's impossible, according to this statement. Thus, he must have made a withdrawal, meaning that the June - end balance was \$2,550. We know that he made a withdrawal for every month after that, so we can figure out the month - end balances from May through December. However, this statement doesn't give us enough information to determine when he started making withdrawals.

Taken together, the statements are sufficient. (1) told us that Carl made deposits from January until May, then (2) indicates that he made withdrawals from June to December. As we saw in (1), we could determine his opening balance, and if we subtract \$50 for each month starting in June, we can determine the rest. That gives us the information we need to find the range of the monthly closing balances. Choice (C) is correct.

Question: 162

Page: 287

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Powers and Roots of Numbers > Roots

Category 2: Algebra > Inequalities > other

Explanation: It's important to note that both n and k are positive. Because both are positive, meaning that all of the terms on both sides of the inequality are positive, we can simplify the inequality by squaring both sides:

$$\sqrt{n+k} > 2\sqrt{n} ?$$

$$(\sqrt{n+k})^2 > (2\sqrt{n})^2 ?$$

$$n+k > 4n ?$$

$$k > 3n ?$$

More simply, the question is asking whether k is greater than $3n$.

Statement (1) answers that question directly, so it is sufficient.

Statement (2) is insufficient. Simplify it, and it says that $k > 2n$. If k is greater than $2n$, it might be greater than $3n$, but it might not be--it might be equal to $2.5n$. Choice (A) is correct.

Question: 163

Page: 287

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Ratio and Proportion >

Explanation: If p is proportional to e and e is proportional to i , then p is also proportional to i . To find the value of p if $i = 70$, you need the ratio of p to i , or the ratios of p and e and e to i .

Statement (1) is insufficient: while it provides the relationship between e and i , it doesn't provide the ratio of p to e . Statement (2) is sufficient, providing the ratio of p to i . With that ratio and the value of i , you can find the value of p . Choice (B) is correct.

Question: 164

Page: 288

Difficulty: 7 (Very Difficult)

Category 1: Geometry > Coordinate Geometry > Distance

Category 2: Word Problems > Geometry Problems >

Category 3: Arithmetic > Powers and Roots of Numbers > Powers

Explanation: Statement (1) is insufficient: it includes nothing about u or v . Statement (2) is also insufficient. It may be easier to work with these equations (at least for now) in the form $u + r = 1$ and $v + s = 1$. If u and s are 1 and r and v are 0, yes, the points are equidistant from the origin. There are plenty of counterexamples, though: for instance if u and v are 0 and r and s are 1.

Taken together, the statements are sufficient. Note that the equation in (1) can be rewritten in two ways:

$$r = 1 - s$$

$$s = 1 - r$$

The first indicates that, since $v = 1 - s$, $r = v$. The second indicates that, since $u = 1 - r$, $s = u$. Therefore, the two sets of coordinates are equal, though the x and y coordinates are reversed. If the distance of each individual coordinate is equal to a coordinate in the other point, the distance of the points from the origin is the same. Choice (C) is correct.

Question: 165

Page: 288

Difficulty: 7 (Very Difficult)

Category 1: Algebra > Exponents >

Category 2: Arithmetic > Powers and Roots of Numbers > Roots

Explanation: To determine whether Statement (1) has any relevance to the question, square both sides so that b is not under a radical sign:

$$b + 2 = (3^x + 3^{-x})^2$$

$$b + 2 = (3^x)^2 + 2(3^x 3^{-x}) + (3^{-x})^2$$

$$b + 2 = 3^{2x} + 2(((3^x)/(3^x))) + 3^{2(-x)}$$

$$b + 2 = (3^2)^x + 2(1) + (3^2)^{-x}$$

$$b + 2 = 9^x + 2 + 9^{-x}$$

$$b = 9^x + 9^{-x}$$

In other words, the answer is "yes:" the equation in (1) is equivalent to the one in the question.

Statement (2) is not sufficient: it has no information about b . Choice (A) is correct.

Question: 166

Page: 288

Difficulty: 6 (Moderately Difficult)

Category 1: Algebra > Exponents >

Category 2: Arithmetic > Fractions >

Category 3: Algebra > Inequalities > other

Explanation: $0.01 = (1/100) = ((1/10))^2$, so the question is really asking:

Is $((1/10))^n < ((1/10))^2$?

Or, is $n < 2$?

Statement (1) is sufficient: if n is greater than 2, n is not less than 2. Statement (2) is also sufficient, and can be simplified as follows:

$$((1/10))^{n-1} < 0.1$$

$$((1/10))^{n-1} < ((1/10))^1$$

$$n - 1 < 1$$

$$n < 2$$

If n is less than 2, we can answer the question: n is less than 2. Choice (D) is correct.

Question: 167

Page: 288

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Other

Explanation: Statement (1) is sufficient. Look at what happens to the digits when we multiply a number by 10:

$$x = 3,456$$

$$10x = 34,560$$

Each digit moves one space to the left. The units digit becomes the tens digit, and so on. In reverse, the hundreds digit of $10x$ is 5, which is the same as the tens digit of x . Thus, if the hundreds digit of $10n$ is 6, 6 moves one step to the right when we divide by 10, so we know the tens digit of n .

Statement (2) is not sufficient. If the tens digit of $n + 1$ is 7, $n + 1$ could be any number between 70 and 79, inclusive. (Or 170 and 179, or 270 and 279, but all of those possibilities don't have any effect on the reasoning that follows.) If $n + 1 = 70$, then $n = 69$, and the tens digit is 6. But if $n + 1$ is 71 or greater, n is 70 or greater, meaning that the tens digit is 7. Choice (A) is correct.

Question: 168

Page: 288

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Fractions >

Category 2: Algebra > Simplifying Algebraic Expressions >

Explanation: Notice that there's a $t - x$ on both the top and bottom of the fraction. Take advantage of things like that. Just as you can simplify $((x + y)/3)$ to $((x)/3) + ((y)/3)$, we can do the following:

$$((2t + t - x)/(t - x))$$

$$= ((2t)/(t - x)) + ((t - x)/(t - x))$$

$$= ((2t)/(t - x)) + 1$$

Without looking at the statements, we don't know that this version will be any more useful than the original, but it gives us more options and a simpler fraction to work with.

Statement (1) is sufficient. The simplification paid off. If $((2t)/(t - x)) = 3$, the value of the original fraction (which is equivalent to $((2t)/(t - x)) + 1$) is $3 + 1 = 4$.

Statement (2) is not sufficient. In either the original version of the fraction or our simplified version, it gives us the denominator. But in each case, we would still need the value of $2t$:

$$((2t)/(t - x)) + 1 = ((2t)/3) + 1$$

We don't get a number, so it's not enough information. Choice (A) is correct.

Question: 169

Page: 288

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Real Numbers >

Category 2: Arithmetic > Powers and Roots of Numbers > Powers

Category 3: Arithmetic > Powers and Roots of Numbers > Roots

Explanation: Statement (1) is insufficient: if n^2 is a perfect square, then n is an integer; if not, n is not an integer. Statement (2) is sufficient: if $rt[n] = \text{func}\{\text{integer}\}$, then $n = (\text{func}\{\text{integer}\})^2$, and any integer times itself results in an integer. Choice (B) is correct.

Question: 170

Page: 288

Difficulty: 7 (Very Difficult)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Category 2: Arithmetic > Properties of Integers > Evens and Odds

Category 3: Arithmetic > Powers and Roots of Numbers > Powers

Explanation: First, simplify the expression: $n^3 - n = n(n^2 - 1) = n(n + 1)(n - 1)$. In other words, $n^3 - n$ is the product of three consecutive integers, so the question could read: "Is the product of three consecutive integers divisible by 4?" The product of three consecutive integers could be divisible by 4 if one of the three numbers is a multiple of four. However, if the sequence is odd - even - odd and the even number is not a multiple of 4, the product would not be a multiple of 4.

Statement (1) is sufficient. If $n = 2k + 1$ and k is an integer, that means that n is odd. If n is odd, then $n + 1$ and $n - 1$ are both even, in which case one of the two even numbers must be a multiple of 4, so the product of the three consecutive integers must also be a multiple of 4.

Statement (2) is not sufficient. $(n^2 + n) = n(n + 1)$, so it indicates that the product of the second two of the three consecutive integers is divisible by 6. If $n = 2$, then $n(n + 1) = 2(3) = 6$ and $n(n + 1)(n - 1) = 2(3)(1) = 6$, which is not a multiple of 4. However, if $n = 12$, then $n(n + 1) = 12(13)$ (a multiple of 6) and $n(n + 1)(n - 1) = 12(13)(11)$, which, by virtue of being a multiple of 12, is a multiple of 4. Choice (A) is correct.

Question: 171

Page: 288

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Properties of Integers > Remainder

Category 2: Arithmetic > Real Numbers >

Explanation: Statement (1) is sufficient: if x divided by 100 has a remainder of 30, x must be some multiple of 100 plus 30, such as 130, 230, 530, or 4,430--in all cases, the tens digit is 3. Statement (2) is insufficient: if x divided by 110 has a remainder of 30, x must be some multiple of 110 plus 30, such as 140, 250, or 360, which opens up the possibility for several different tens digits.

Question: 172

Page: 288

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Properties of Integers > Evens and Odds

Explanation: Statement (1) is insufficient: it has no information about y. Statement (2) is insufficient: it has no information about x.

Taken together, it's necessary to put everything in terms of z. Since $x = z^2$ and $y = (z - 1)^2$:

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

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

$$x - y = -2z + 1$$

Since z is an integer, -2z is an even integer (any integer times 2 is even), and -2z + 1 is odd (any even plus 1 is an odd). Therefore, yes, x - y is odd; choice (C) is correct.

Question: 173

Page: 288

Difficulty: 7 (Very Difficult)

Category 1: Geometry > Circles > Multiple figures

Category 2: Geometry > Triangles > Pythag

Category 3: Geometry > Triangles > Multiple figures

Explanation: It's important for the purposes of this problem to know that, in a semicircle, an angle created by the intersection of the circumference of the circle and two lines that also go through the edges of the diameter is a right angle. In other words, angle PQR is a right angle. So, there are 3 right triangles in the diagram. If we call PQ x and QR y, the equations are as follows:

$$2^2 + a^2 = x^2$$

$$2^2 + b^2 = y^2$$

$$x^2 + y^2 = (a + b)^2$$

In short: three equations and four variables. To solve, we need a fourth equation.

Statement (1) offers that: if $a = 4$, we can plug 4 into each of the equations, reducing them to three equations with three variables. It would take some time to solve, but it's enough to know that we can.

Statement (2) works the same way: since $b = 1$, we can plug 1 into each of the equations and solve. Choice (D) is correct.

Question: 174

Page: 288

Difficulty: 5 (Moderate)

Category 1: Word Problems > Other >

Category 2: Arithmetic > Ratio and Proportion >

Explanation: Statement (1) is insufficient: the amount of water currently in the bucket doesn't tell us the capacity of the bucket. Statement (2) is sufficient: an increase of $(1/3)$ when the bucket is half full is given by: $(1/3)((1/2)x) = (1/6)x$, where x is the capacity of the bucket. If $(1/6)x = 3$, we can solve for x , the capacity of the bucket. Choice (B) is correct.

Question: D25

Page: 24

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Powers and Roots of Numbers > Powers

Category 2: Arithmetic > Properties of Integers > Other

Explanation: Note from the question that units digit cannot be 0, 1, or 2. Since it's a digit, it must be no greater than 9. Thus, the units digit of n must be between 3 and 9, inclusive.

Statement (1) is insufficient. Consider each of the possibilities from 3 to 9. If the units digit of n is 3, the units digit of n^2 is 9, so it can't be 3. If the units digit of n is 4, the units digit of n^2 is 6. Continue through the options: if 5, then 5; if 6, then 6; if 7, then 9; if 8, then 4; if 9, then 1. Thus, the units digit of n could be either 5 or 6.

Statement (2) is also insufficient. Again, consider each of the choices. When calculating the cube, don't bother with the actual cube, just focus on the units digit. For instance, if the units digit of n is 9, it doesn't matter that $n^3 = 729$, just that the units digit of n^3 is 9. The product of 9 and 9 is 81, so the units digit is 1. The product of 1 and 9 is 9, so the units digit of the cube must be 9.

Working through each of the options: if 3, then 7; if 4, then 4; if 5, then 5; if 6, then 6; if 7, then 3; if 8, then 2; if 9, then 9. Thus, the units digit of 9 could be 4, 5, 6, or 9.

Taken together, the statements are still insufficient. Even knowing both statements, the units digit of n could be 5 or 6. Choice (E) is correct.

Question: D26

Page: 24

Difficulty: 4 (Moderately Easy)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: Statement (1) is insufficient. If 2, 3, and 5 must all be a factor of p , we can eliminate some possible values (7, for example), and establish that some numbers, such as 30, could be the value of p . But since all we know are some of the factors, we don't know the precise number. Every multiple of 30 is a possible value.

Statement (2) is also insufficient. By the same reasoning as in (1), those factors establish that p must be 70 or a multiple of 70.

Taken together, the statements are still insufficient. The smallest possible value of p is 210 (the product of 2, 3, 5, and 7), but p could also be any multiple of 210. Choice (E) is correct.

Question: D27

Page: 24

Difficulty: 4 (Moderately Easy)

Category 1: Word Problems > Other >

Explanation: Statement (1) is insufficient. We know the total charge, but that could be 1 minute for \$6.50 per minute, 65 minutes for 10 cents per minute, or a variety of other options.

Statement (2) is also insufficient. We don't know the total charge, so the first - minute and additional - minute charges could be anything.

Taken together, the statements are still insufficient. One way to think about this algebraically is that she is charged the same amount (d dollars) for each of m minutes and she is also charged a \$0.50 surcharge for the first minute:

$$md + \$0.50 = \$6.50$$

$$md = \$6.00$$

Since we don't know how many minutes, or how many dollars per minute, we can't get very far with that equation. Choice (E) is correct.

Question: D28

Page: 24

Difficulty: 5 (Moderate)

Category 1: Geometry > Triangles > other

Explanation: An isosceles triangle has at least two equal sides. To find the perimeter, we need to know the length of all three sides.

Statement (1) is insufficient. We need to know the lengths of the other two sides.

Statement (2) is also insufficient, for the same reason as (1).

Taken together, the statements are still insufficient. If two of the sides measure 16 and 20 and the triangle is isosceles, the third side must be either 16 or 20. We don't know which, though, and the two possibilities give us two different perimeters. Choice (E) is correct.

Question: D29

Page: 24

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Percents > other

Category 2: Arithmetic > Sets > 2 sets

Category 3: Word Problems > Sets >

Explanation: Statement (1) is insufficient. We don't know what fraction of retailers owned their own store, and we don't know what percentage of retailers who do not own their own store purchased computers for business purposes. Both would be necessary to answer the question in conjunction with the information given.

Statement (2) is insufficient. It doesn't tell us anything about purchasing computers for business purposes.

Taken together, the statements are insufficient. Combined, they tell us what percentage of retailers own their own store and purchased computers for business purposes. However, we don't know how many retailers who do not own their own store and purchases computers for business purposes. Choice (E) is correct.

Question: D30

Page: 24

Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Other >

Explanation: This is a trickier question than it first looks like. Consider the minimum and maximum values of the gift certifications. If all of them are \$10, the value is \$200. If all are \$100, the value is \$2,000. Changing one gift certification from a \$10 to a \$100 affects the total by \$90. For instance, if instead of 20 \$10 gift certificates, they were made up of 19 \$10s and 1 \$100, the total would be \$90 greater than \$200 -- \$290. On the flip side, if instead of 20 \$100 gift certificates, they were made up of 19 \$100s and 1 \$10, the total would be \$90 less than \$2,000 -- \$1,910. The relevant point is that there are a finite number of possible values, and they are separated by \$90 between \$200 and \$2,000.

Statement (1) is sufficient. Continue to count down from \$2,000 by \$90s to see what the possibilities are in this range. 19 \$100s is \$1,910; 18 \$100s is \$1,820; 17 \$100s is \$1,730, and 16 \$100s is \$1,640. The only possibility in the range between \$1,650 and \$1,800 is \$1,730--17 \$100 gift certificates and 3 \$10 gift certificates.

Statement (2) is insufficient. The number of \$10 gift certificates could be as many as 4 and as few as zero. Choice (A) is correct.

Question: D31

Page: 24

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Descriptive Statistics > Standard Deviation

Explanation: Statement (1) is sufficient. You will rarely see the term "variance" on the GMAT; when you do, recognize that it is the square of the standard deviation. It's that simple--if the variance for the set is 4, the standard deviation is $\sqrt{4} = 2$.

Statement (2) is also sufficient. It is a long - winded definition of standard deviation. SD measures the average difference between the mean and each term in the set. If every term in the set is 2 away from the mean, the average distance is 2, meaning that the SD is 2. Choice (D) is correct.

Question: D32

Page: 24

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Descriptive Statistics > other

Category 2: Algebra > Inequalities > other

Explanation: First, put the integers in order: 3, 4, 5, 6; x and y could each go anywhere in that list, depending on what we learn about them. Right now, the range could be as little as 3; in order for the range to be greater than 9, there are three possibilities: one of the variables is greater than 12, one of the variables is less than -3, or the two variables are more than 9 apart.

Statement (1) is insufficient. It is possible that $x = 1$ and $y = 4$, in which case the range is less than 9. However, it is also possible that $x = 1$ and $y = 15$, in which case the range is greater than 9.

Statement (2) is also insufficient. x and y could be 4 and 5, in which case the range is less than 9. It is also possible that x and y could be 14 and 15, in which case the range must be greater than 9.

Taken together, the statements are sufficient. The smallest x could be is 4. Since $y > 3x$, y must be greater than 12. If y is greater than 12, we've already established that the range must be greater than 9. Choice (C) is correct.

Question: D33

Page: 24

Difficulty: 6 (Moderately Difficult)

Category 1: Arithmetic > Powers and Roots of Numbers > Powers

Category 2: Algebra > Exponents >

Explanation: The question can be simplified quite a bit:

$$((5^{x+2})/25) < 1 ?$$

$$5^{x+2} < 25 ?$$

$$5^{x+2} < 5^2 ?$$

$$x + 2 < 2 ?$$

$$x < 0 ?$$

Statement (1) is sufficient. If x is 0, $5^x = 1$. If x is greater than 0, 5^x is greater than 1. Thus, if $5^x < 1$, x is less than zero, so the answer is "yes."

Statement (2) is also sufficient. As we established by simplifying the question, the question is asking whether x is less than zero. This tells us. Choice (D) is correct.

Question: D34

Page: 24

Difficulty: 5 (Moderate)

Category 1: Arithmetic > Percents > other

Category 2: Arithmetic > Sets > 2 sets

Category 3: Word Problems > Sets >

Explanation: The best way to think about this question is that there are four possible sets of requirements: computer and writing skills; computer skills only; writing skills only; neither computer nor writing skills. The percentages of companies that require each of those sets of skills will sum to 100. We know that 20 percent require both, so we can set up the following equation:

$$100 = 20 + c\text{Only} + w\text{Only} + \text{neither}$$

To find neither, we'll need both of the other variables.

Statement (1) is insufficient. The companies that require computer skills fall into one of two categories: computer and writing skills, or computer skills only. If half of those companies require writing skills, those companies are the "both" companies. If 20 percent are both, that means that 20 percent are "computer only." Thus:

$$100 = 20 + 20 + w_{\text{Only}} + \text{neither}$$

Still not enough.

Statement (2) is also insufficient. This statement gives us "writing only" companies. Again, it's one of the two variables we need, but not both:

$$100 = 20 + c_{\text{Only}} + 45 + \text{neither}$$

Taken together, the statements are sufficient:

$$100 = 20 + 20 + 45 + \text{neither}$$

$$\text{neither} = 15$$

Choice (C) is correct.

Question: D35

Page: 24

Difficulty: 4 (Moderately Easy)

Category 1: Algebra > Equations >

Category 2: Algebra > Simplifying Algebraic Expressions >

Explanation: When DS questions ask for the value of expressions instead of single variables, be careful. You won't necessarily need to find the value of each variable.

Statement (1) is sufficient. Add $3q$ to both sides:

$$3w + 3q = 3$$

$$w + q = 1$$

Statement (2) is also sufficient. Divide both sides by 5:

$$w + q = 1$$

Choice (D) is correct.

Question: D36

Page: 25

Difficulty: 5 (Moderate)

Category 1: Geometry > Circles > other

Explanation: Before considering the statements, consider the possible locations of X and Y. In a circle with a radius of 2, the furthest apart two points can be and still be within the circle is a little under 4, the diameter.

Statement (1) is insufficient. If XY is 3 and X is inside the circle, it's possible that Y is also inside the circle--as noted, the two could be close to 4 apart and still both be inside the circle. However, that's no guarantee. If, say, X is near the top of the circle and Y is 3 above that, Y is not within the circle.

Statement (2) is sufficient. If the radius is 2, every point that is less than 2 away from the center of the circle (O) is inside the circle. If OY is 1.5, Y is less than 2 away from the center, so Y is inside the circle. Choice (B) is correct.

Question: D37

Page: 25

Difficulty: 5 (Moderate)

Category 1: Algebra > Inequalities > other

Category 2: Algebra > Equations >

Explanation: Statement (1) is sufficient. One way to read the statement would be: " x is two greater than y ." If x is any positive amount greater than y , x is greater than y .

Statement (2) is insufficient. First, simplify:

$$x = 2y - 2$$

If $y = 1$, then $x = 0$, so y is larger. However, if $y = 5$, $x = 8$, so x is larger. Choice (A) is correct.

Question: D38

Page: 25

Difficulty: 5 (Moderate)

Category 1: Algebra > Inequalities > other

Category 2: Word Problems > Rate Problems > Speed

Explanation: If Paula's speed were exactly 70 km per hour, she could travel as many as 210 miles in 3 hours. Since we know her speed was greater than 70kph, it would take her less than 3 hours to travel 210 or fewer km. It's possible she could drive further than 210 miles in less than 3 hours, but since we don't know her exactly speed, we don't know the exact distance she could travel in that time.

Statement (1) is insufficient. If the distance is greater than 200 km, it could be completed in under 3 hours--if the distance is less than 210 km. If it's greater than 210 km, we don't know whether she could drive that far in under 3 hours.

Statement (2) is sufficient. We know she can drive as much as 210 km in under 3 hours, so it follows that she could drive less than 205 km in under 3 hours. Choice (B) is correct.

Question: D39

Page: 25

Difficulty: 6 (Moderately Difficult)

Category 1: Geometry > Coordinate Geometry > Slope

Category 2: Geometry > Coordinate Geometry > Other

Explanation: Knowing that a line passes through the point $(-5, r)$ isn't very helpful--almost every point has a point somewhere with an x - coordinate of -5 . Before attacking the statements, think about lines with a negative slopes, and what would be required for such a line to have a positive x - intercept. A line with a negative slope moves down and to the right (or up and to the left, depending on how you think about it). If such a line passes through the x - axis when x is positive, one way to think about it is that it starts in the upper left quadrant, moves into the upper right quadrant after passing through the y - axis, then passes into the lower right quadrant after passing through the x - axis.

Statement (1) is insufficient. Knowing the slope tells us the "tilt" or angle of the line, but nothing about the intercepts of the line.

Statement (2) is also insufficient. In the scenario described above, r must be positive. (When the line is to the left of the origin, the y value must be positive.) However, it's possible that r is positive and the x - intercept is negative. If the point is, say, $(-5, -1)$ and the line moves sharply downward, the x - intercept will be negative.

Taken together, the statements are insufficient. I've already described the situation in which the answer would be "no"--if $r = 1$ and the slope is -5 (that is, it moves sharply downward), the x - intercept will be negative. However, if r is sufficiently great (say, $r = 1000$ --there's no limit on how great r can be), even a line moving sharply downward will have positive x - and y - intercepts. Choice (E) is correct.

Question: D40

Page: 25

Difficulty: 5 (Moderate)

Category 1: Word Problems > Interest Problems > Compound

Category 2: Word Problems > Interest Problems > Simple

Explanation: Since the numbers are simple, recognize that \$500 on an investment \$5,000 is 10%, so $p = 10$. To determine what must be invested at k percent to earn the same return, we need to know the value of k .

Statement (1) is sufficient. We know the value of p , so we can use it to find the value of k .

Statement (2) is also sufficient, as we're given k directly. Choice (D) is correct.

Question: D41

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Fractions >

Category 2: Algebra > Inequalities > other

Explanation: If $((x + y)/(z)) > 0$, the numerator and denominator must have the same sign. We're trying to determine whether x is positive, which will depend on what we can find out about the other variables.

Statement (1) is insufficient. If $x < y$, it could be that both are negative, that both are positive, or that x is negative and y is positive. We don't know anything more without any knowledge of z .

Statement (2) is also insufficient. If z is negative and the overall expression is positive, $x + y$ must also be negative. That isn't enough to find x , since either one (or both) of the two variables could be negative, but we don't know which one.

Taken together, the statements are sufficient. If z is negative, we know at least one of the variables x and y must be negative as well. Since (1) tells us that x is the smaller of those two, if only one of them is negative, x must be the one that is negative. Choice (C) is correct.

Question: D42

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Properties of Integers > Factors and Multiples

Explanation: Statement (1) is insufficient. It tells us that k is a multiple of 15. It must have at least two prime factors, 3 and 5. It could have any other prime factors, up to an infinite number of them, but we only know for sure that it has two.

Statement (2) is also insufficient. By the same reasoning, we know that 2 and 5 are both prime factors of k . Again, it could have many other prime factors, but we only know of two of them.

Taken together, the statements are sufficient. We know that 2, 3, and 5 are prime factors of k , so k must have at least three different prime factors. Choice (C) is correct.

Question: D43

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Descriptive Statistics > Average

Category 2: Arithmetic > Descriptive Statistics > other

Explanation: To compare the mean and the median in a set, we need to know how the numbers are distributed. For instance, in a set like $\{1, 1, 1, 1, 10\}$, the median is lower than the mean, because while the mean is somewhere between 1 and 10, the median is 1. Ultimately, it depends on how many numbers in the set are above and below the mean.

Statement (1) is insufficient. This gives us enough information to calculate the mean (though we don't need to calculate it), but nothing about the median.

Statement (2) is sufficient. The median is less than 50 percent of the terms and greater than 50 percent of the terms, so if 60 percent of the terms are less than the average, the median must be less than the average. Choice (B) is correct.

Question: D44

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Powers and Roots of Numbers > Roots

Category 2: Algebra > Exponents >

Category 3: Arithmetic > Properties of Integers > Other

Explanation: Statement (1) is sufficient. If $rt[m]$ is an integer, the expression $(rt[m])^n$ can be phrased as, "an integer raised to a positive integer power." Any integer raised to a positive integer power must be an integer.

Statement (2) is insufficient. We know that m is an integer, but not that $rt[m]$ is an integer. If $rt[n]$ is an integer, n is the square of an integer. With this information, the expression $(rt[m])^n$ can be phrased as, "the square root of an integer raised to a square of an integer power." While $(rt[3])^4$ would be an integer, $(rt[5])^1$ would not. Choice (A) is correct.

Question: D45

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Difficulty: 6 (Moderately Difficult)

Category 1: Word Problems > Other >

Explanation: If there are 66 people in the auditorium and no more than 6 of them have their birthdays in any given month, there must be birthdays in at least 11 of the 12 months. There will be birthdays in exactly 11 months if there are exactly 6 people with birthdays in each of those months. ($6 * 11 = 66$). If there are any months where there are fewer than 6 birthdays, there must be birthdays in all 12 months.

Statement (1) is sufficient. If there are more birthdays in February than in March, there can be no more than 5 birthdays in March. Thus, there must be birthdays in all 12 months (necessarily including January).

Statement (2) is also sufficient. Again, we learn that there are no more than 5 birthdays in one of the months, meaning that there must be birthdays in all 12 months. Choice (D) is correct.

Question: D46

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Percents > other

Category 2: Arithmetic > Descriptive Statistics > Average

Explanation: The information given includes the average of the 10 employees' salaries last year, from which we could determine the total salary paid to the 10 employees. To find the average salary this year, we need to know how much each of the employees' salaries changed.

Statement (1) is insufficient. We don't know what happened with the other 2 salaries, and we don't know how much of the total those 8 salaries made up.

Statement (2) is also insufficient. We don't know about the other 8 salaries, and we don't know what fraction of the total those 2 salaries represented.

Taken together, the statements are still insufficient. While we know that 8 salaries increased by 15% and 2 salaries stayed the same, we don't know how much money is represented by the 8 salaries and the 2 salaries. The total salary is about \$430,000; if the 2 salaries that stayed the same totaled \$30,000, the resulting salary this year is much greater than if the two salaries that stayed the same totaled \$130,000. Choice (E) is correct.

Question: D47

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Difficulty: 5 (Moderate)

Category 1: Arithmetic > Sets > 2 sets

Category 2: Word Problems > Sets >

Explanation: This is an overlapping sets question. We're given the total, and we're given the amounts represented by the two sets, but we don't know how many books are in both sets, or how many are in neither set. We can use the following formula:

$$80 = 24 + 23 - \text{both} + \text{neither}$$

Statement (1) is sufficient. There are 24 fiction books. If 6 more of those were not written in Spanish than written in Spanish, 15 were not written in Spanish and 9 were written in Spanish. That answers the question.

Statement (2) is also sufficient. Of the 23 Spanish books, if 5 more are nonfiction than fiction, 14 are nonfiction and 9 are fiction. Choice (D) is correct.

Question: D48

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Difficulty: 5 (Moderate)

Category 1: Geometry > Quadrilaterals >

Category 2: Geometry > Triangles > Pythag

Explanation: We're looking for the perimeter of a rectangle. To find that, we'll need both the length and width.

Statement (1) is insufficient. The diagonal is the same as the hypotenuse of a right triangle formed with the length and width as legs. Using the pythagorean theorem:

$$l^2 + w^2 = 10^2$$

Two variables and one equation isn't enough.

Statement (2) is also insufficient. This tells us that $lw = 48$. Again, it's two variables and one equation. The side lengths could be 12 and 4, 6 and 8, or any number of other possibilities.

Taken together, the statements are sufficient. Given two equations with two variables, we can solve. To do so algebraically would be unnecessary and too arduous for the time constraints of a DS question. However, if you recall common triangle ratios, if the hypotenuse is 10, the sides could be 6 and 8. Since that gives you an area of 48, 6 and 8 are the length and width, resulting in a perimeter of 28. Choice (C) is correct.