Set 10

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1. When 20 is divided by the positive integer k, the remainder is k – 2. Which of the following is a possible value of k?

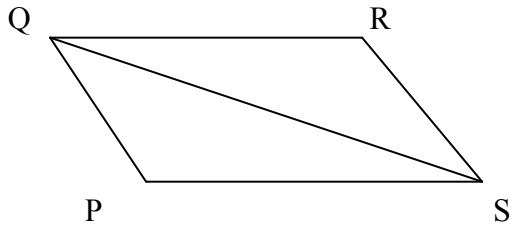
A. 8

B. 9

C. 10

D. 11

E. 12



2. In the figure above, is quadrilateral PQRS a parallelogram?

(1) The area of ΔPQS is equal to the area of ΔQRS.

(2) QR = RS.

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3. If n is an integer and $x^n - x^{-n} = 0$, what is the value of x?

(1) x is an integer.

(2) $n \neq 0$

4. If xy = 165, where x and y are positive integers and x > y, what is the least possible value of x – y?

A. 2

B. 4

C. 8

D. 15

E. 28

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5. According to a survey, 93 percent of teenagers have used a computer to play games, 89 percent have used a computer to write reports, and 5 percent have not used a computer for either of these purposes. What percent of the teenagers in the survey have used a computer both to play games and to write reports?

A. 82%

B. 87%

C. 89%

D. 92%

E. 95%

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6. The value of $-3+\sqrt{9-k}$ is positive for which of the following values of k?

I. –1

II. 0

III. 1

A. None

B. I only

C. II only

D. III only

E. I and II

7. There were 2 apples and 5 bananas in a basket. After additional apples and bananas were placed in the basket, the ratio of the number of apples to the number of bananas was $\frac{1}{2}$. How many apples were added?

(1) The number of apples added was $\frac{2}{3}$ the number of bananas added.

(2) A total of 5 apples and bananas were added.

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8. S is a set of points in the plane. How many distinct triangles can be drawn that have three of the points in S as vertices?

(1) The number of distinct points in S is 5.

(2) No three of the points in S are collinear.

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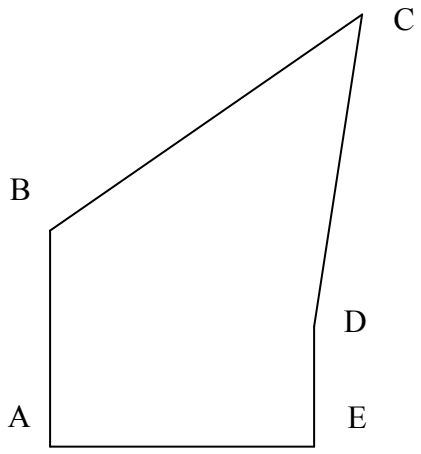
9. A total of 100 customers purchased books at a certain bookstore last week. If these customers purchased a total of 200 books, how many of the customers purchased only 1 book each?

(1) None of the customers purchased more than 3 books.

(2) 20 of the customers purchased only 2 books each.



10. In the figure, AB = AE = 8, BC = CD =13, DE = 2 and DEA = EAB = 90°. What is the area of region ABCDE?

A. 76

B. 84

C. 92

D. 100

E. 108

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11. A certain business produced x rakes each month from November through February and shipped $\frac{x}{2}$ rakes at the beginning of each month from March through October. The business paid no storage costs for the rakes from November through February, but it paid storage costs of $0.1 per rake each month from March through October for the rakes that had not been shipped. In terms of x, what was the total storage cost in dollars that the business paid for the rakes for the 12 months from November through October?

A. 0.4x

B. 1.2x

C. 1.4x

D. 1.6x

E. 3.2x

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12. If the integer k is a multiple of 3, which of the following is also a multiple of 3?

A. k + 2

B. 2k + 8

C. 3k + 5

D. 4k + 4

E. 5k + 12

13. For any positive integer x, the 2-height of x is defined to be the greatest nonnegative integer n such that 2^n is a factor of x. If k and m are positive integers, is the 2-height of k greater than the 2-height of m?

(1) k > m

(2) $\frac{k}{m}$ is an even integer.

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14. If $4x < x < x^3 < x^2$, which of the following is a possible value of x?

A. –2

B. –1.5

C. –1

D. –0.5

E. 0

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15. What was the range of the selling prices of the 30 wallets sold by a certain store yesterday?

(1) $\frac{1}{3}$ of the wallets had a selling price of $24 each.

(2) The lowest selling price of the wallets was $\frac{1}{3}$ the highest selling price of the wallets.

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16. On a certain nonstop trip, Marta averaged x miles per hour for 2 hours and y miles per hour for the remaining 3 hours. What was her average speed, in miles per hour, for the entire trip?

(1) 2x + 3y = 280

(2) y = x + 10

17. In a box of 12 pens, a total of 3 are defective. If a customer buys 2 pens selected at random from the box, what is the probability that neither pen will be defective?

A. $\frac{1}{6}$

B. $\frac{2}{9}$

C. $\frac{6}{11}$

D. $\frac{9}{16}$

E. $\frac{3}{4}$

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18. A scientist recorded the number of eggs in each of 10 birds` nests. What was the standard deviation of the numbers of eggs in the 10 nests?

(1) The average (arithmetic mean) number of eggs for the 10 nests was 4.

(2) Each of the 10 nests contained the same number of eggs.

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19. If p, r, s and t are nonzero integers, is $\frac{p}{r} = \frac{s}{t}$?

(1) s = 3p and t = 3r.

(2) 3p = 2r and 3s = 2t.

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20. If $a_1 = 1$ and $a_{n+1} = 1 + \frac{1}{a_n}$ for all $n \geq 1$, what is the value of a_5?

A. $\frac{3}{8}$ B. $\frac{5}{8}$ C. $\frac{8}{5}$ D. $\frac{5}{3}$ E. $\frac{8}{3}$

21. A toy store`s gross profit on a computer game was 10 percent of the cost of the game. If the store increased the selling price of the game from $44 to $46 and the cost of the game remained the same, then the store`s gross profit on the game after the price increase was what percent of the cost of the game?

A. 10.5%

B. 11%

C. 12.5%

D. 13%

E. 15%

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22. Four extra-large sandwiches of exactly the same size were ordered from m students, where m > 4. Three of the sandwiches were evenly divided among the students. Since 4 students did not want any of the fourth sandwich, it was evenly divided among the remaining students. If Carol ate one piece from each of the four sandwiches, the amount of sandwich that she ate would be what fraction of a whole extra-large sandwich?

A. $\frac{m+4}{m(m-4)}$

B. $\frac{2m-4}{m(m-4)}$

C. $\frac{4m-4}{m(m-4)}$

D. $\frac{4m-8}{m(m-4)}$

E. $\frac{4m-12}{m(m-4)}$

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23. When the wind speed is 9 miles per hour, the wind-chill factor w is given by w= -17.366 + 1.19t, where t is the temperature in degrees Fahrenheit. If at noon yesterday the wind speed was 9 miles per hour, was the wind-chill factor greater than 0?

(1) The temperature at noon yesterday was greater than 10 degrees Fahrenheit.

(2) The temperature at noon yesterday was less than 20 degrees Fahrenheit.

24. Which of the following is closest in value to $9^9 - 9^2$?

A. 9^9

B. 9^8

C. 9^7

D. 9^6

F. 9^5

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25. An office supply store received a shipment of boxes of pencils. How many pencils were in the shipment altogether? (1 gross = 12 dozen)

(1) The number of boxes of pencils in the shipment was 6 gross.

(2) There were 3 dozen pencils in each box of pencils in the shipment.

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26. Of the following values of n, the value of $(-\frac{1}{5})^{-n}$ will be greatest for n =

A. 3

B. 2

C. 0

D. –2

E. –3

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27. For all numbers x, the function f is defined by f(x) = 3x + 1 and the function g is defined by $g(x) = \frac{x-1}{3}$. If c is a positive number, what is the value of g(c)?

(1) f(c) = 13

(2) f(1) = c

28. A certain company expects quarterly earnings of \$0.8 per share of stock, half of which will be distributed as dividends to shareholders while the rest will be used for research and development. If earnings are greater than expected, shareholders will receive an additional \$0.04 per share for each additional \$0.1 of per share earnings. If quarterly earnings are \$1.1 per share, what will be the dividend paid to a person who owns 200 shares of the company's stock?

A. \$92
B. \$96
C. \$104
D. \$120
E. \$240

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29. For which real numbers x is the expression $\frac{2}{(x-2)(x+1)}$ <u>not</u> defined?

A. x = 0 only
B. x = 2 only
C. x = -1 only
D. x = -1 or 2
E. x = -1, 0 or 2

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30. What is the value of $(2x-5)^3$?

(1) $(2x)^3 = 216$
(2) $(2x+3)^2 = 81$

31. Phobus, one of the satellites of Mars, revolves about Mars at a distance of approximately 5,800 miles from the center of Mars and approximately 3,700 miles from the surface of Mars. If it is assumed that Mars is spherical and the orbit of Phobus is circular, what is the approximate circumference, in miles, of mars at its equator?

A. $2{,}100\pi$

B. $4{,}200\pi$

C. $7{,}400\pi$

D. $9{,}500\pi$

E. $190{,}000\pi$

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32. In the decimal representation of x, where $0 < x < 1$, is the tenths digit of x nonzero?

(1) 16x is an integer.

(2) 8x is an integer.

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33. A small business invests $9,900 in equipment to produce a product. Each unit of the product costs $0.65 to produce and it sold for $1.2. How many units of the product must be sold before the revenue received equals the total expense of production, including the initial investment in equipment?

A. 12,000

B. 14,500

C. 15,230

D. 18,000

E. 20,000

34. A merchant discounted the sale price of a coat and the sale price of a sweater. Which of the two articles of clothing was discounted by the greater dollar amount?

(1) The percent discount on the coat was 2 percentage points greater than the percent discount on the sweater.

(2) Before the discount, the sale pric of the coat was $10 less than the sale price of the sweater.

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35. If g(x) = x + 4 for all x and f(x) = $\frac{2x^2 - 5}{x}$ for all nonzero x, then f(x) = g(x) for which of the following values of x?

A. –5

B. –3

C. 1

D. 3

E. 5

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36. Is x > 5?

(1) $x^2 > 25$

(2) 2x + 7 > 0

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37. Pumping alone at their respective constant rates, one inlet pipe fills an empty tank to $\frac{1}{2}$ of capacity in 3 hours and a second inlet pipe fills the same empty tank to $\frac{2}{3}$ of capacity in 6 hours. How many hours will it take both pipes, pumping simultaneously at their respective constant rates, to fill the empty tank to capacity?

A. 3.25

B. 3.6

C. 4.2

D. 4.4

E. 5.5

Answers for Set 10

1. The best answer is D.

The easiest way is to plug in the answers: when 20 is divided by 11 the remainder is 11-2=9.

2. The best answer is E.

We need to prove that each of the two opposite sides in the quadrilateral are equal, or parallel.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient

3. The best answer is E.

$x^n - x^{-n} = 0$ ➔ $x^n\left(1 - x^{-2n}\right) = 0$ ➔Two options: $x^n = 0$ OR $\left(1 - x^{-2n}\right) = 0 \Rightarrow x^{-2n} = 1$

(1) Insufficient, if n = 0 than the equation is true for any x.

(2) Insufficient, e.g. x = 1 or x = 0

(1+2) Insufficient, e.g. x = 1 or x = 0.

4. The best answer is B.

The prime factors of 165 are 3,5 and 11. Therefore the possible x and y are: (165, 1) (55,3), (33,5) and **(15,11)**.

5. The best answer is B.

Take 100 as the number of teenagers that answered the survey. B is the number of teenagers that have used a computer both to play games and to write reports ➔ 100-5 = 93 + 89 – B ➔ B = 87.

6. The best answer is B.

The easiest way is to plug in the answers. When k=(-1): $-3+\sqrt{9-(-1)}=-3+\sqrt{10}$

7. The best answer is D.

(1) Sufficient, X is the number of bananas added ➔ $\frac{2+\frac{2}{3}x}{5+x}=\frac{1}{2}$ ➔ x= 3

(2) Sufficient, X is the number of bananas added ➔ $\frac{2+5-x}{5+x}=\frac{1}{2}$ ➔ x=3

8. The best answer is C.

(1) Insufficient, we do not know how many of the points in S are collinear.

(2) Insufficient, we do not know how many distinct points in S.

(1+2) Sufficient. The number of optional triangles equal $\frac{5!}{3!2!}=10$

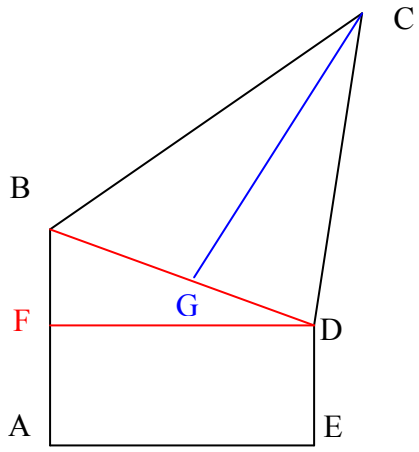
9. The best answer is C.

(1) Insufficient, e.g. 40 purchased 1 book, 20 purchased 2 books and 40 purchased 3 books or 30 purchased 1 book, 40 purchased 2 books and 30 purchased 3 books.

(2) Insufficient, e.g. 40 purchased 1 book, 20 purchased 2 books and 40 purchased 3 books or 80 purchased 1 book, 10 purchased 2 books and 10 purchased 10 books.

(1+2) Sufficient. 200= One+(20*2)+(100-20-One)*3 ➔ One=40

10. The best answer is D.



Draw line BD to calculate separately the area of ABDE (a trapezoid: $\frac{DE + AB}{2} * AE$) and BCD. Notice that after finding BD (using Pythagorean Theorem in BFD) you can find the height of triangle BCD using the fact that it is Isosceles and therefore the height is also the median (using Pythagorean Theorem in the small triangle BCG).

11. The best answer is C.

In March 3.5x rakes had not been shipped, so the storage cost was $\$0.1 \times 3.5x$ = \$0.35x. In April 3x rakes had not been shipped, so the storage cost was $\$0.1 \times 3x$ = \$0.3x etc`. Then we should add the storage cost for all the months.

12. The best answer is E.

5k is a multiple of 3, and12 is a multiple of 3, and thus 5k + 12 is a multiple of 3.

13. The best answer is B.

(1) Insufficient, e.g. the 2-height of 10 is 1 and also the 2-height of 6 is 1.

(2) Sufficient, the 2-hieght of k is greater since we multiplied m with an even number

14. The best answer is D.

When 4x<x ➔ x<0, and when x < x^3 ➔ -1<x<0 or x>1. Together -1<x<0. It is also possible to plug in the answers.

15. The best answer is E.

We need to know the actual prices of the chipset and the most expensive wallets.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, since we do not know the lowest and the highest selling price.

16. The best answer is A.

In order to find her average speed we need to find how much is $\frac{2x+3y}{5}$.

(1) Sufficient

(2) Insufficient.

17. The best answer is C.

The probability that neither pen will be defective is $\frac{9}{12}\times\frac{8}{11}=\frac{6}{11}$.

18. The best answer is B.

(1) Insufficient

(2) Sufficient, in this case the standard deviation is 0.

19. The best answer is D.

(1) Sufficient, since $\mathrm{p}\times 3r = r\times 3p$.

(2) Sufficient, since $\frac{2r}{3}\times t = r\frac{2t}{3}$

20. The best answer is C.

$a_1 = 1, a_2 = 2, a_3 = 1.5, a_4 = \frac{5}{3}, a_5 = \frac{8}{5}$.

21. The best answer is E.

The cost price was \$40 $\left(Cost * \frac{110}{100} = 44 \right)$ ➔ the gross profit increased to \$6 ➔ the gross profit increased to 15% of the cost.

22. The best answer is E.

$\frac{3}{m} + \frac{1}{m-4} = \frac{4m-12}{m(m-4)}$

23. The best answer is E.

(1) Insufficient. We have to check the lower limit, which is 10 degrees. If for t=10 the Wind-factor would have been greater than 0, we could have determined that the wind factor is greater than 0, and the statement would have been sufficient

$(-17.366 + 1.19(10) < 0)$

(2) Insufficient. We have to check the upper limit, which is 20 degrees. If for t=20 the Wind-factor would have been smaller than 0, we could have determined that the wind factor is smaller than 0, and the statement would have been sufficient

$(-17.366 + 1.19(20) > 0)$

(1+2) Insufficient, e.g. t = 11 ➔ w = -4.276 or t = 18 ➔ w = 4.054.

24. The best answer is A.

$9^9 - 9^2 = 9^9 - 81$ ➔ Therefore the answer has to be 9^9 or 9^8. Lets look at the difference between 9^9 and 9^8: $9^9 - 9^8 = 8 \times 9^8$ ➔ thus the subtraction of 81 is insignificant, and wont make us closer to 9^8.

25. The best answer is C.

(1) Insufficient, since we do not know how many pencils were in each box.

(2) Insufficient, since we do not know how many boxes were in the shipment.

(1+2) Sufficient

26. The best answer is B.

The easiest way is to plug in the answers. $\left(-\frac{1}{5}\right)^{-2} = \left(-\frac{5}{1}\right)^{2} = (-5)^2 = 25$

27. The best answer is D.

(1) Sufficient, since we can find the value of c by the equation: 13 = 3c + 1.

(2) Sufficient, since we can find the value of c by the equation: c = 3*1 + 1.

28. The best answer is C.

The shareholders will receive \$0.52 (\$0.8 + \$0.04 + \$0.04 + \$0.04) per share. A person who owns 200 shares will be paid \$104 (\$200 × \$0.52).

29. The best answer is D.

The expression will not be defined if the denominator is 0.

30. The best answer is A.

(1) Sufficient, since we can find the value of 2x.

(2) Insufficient, since the expression is squared, it can get either a positive value or a negative value (x=3 or x=-6).

31. The best answer is B.

r = 5800-3700 = 2100 ➔ the circumference is $2 \times 2100 \times \pi$.

32. The best answer is B.

(1) Insufficient, since the tenths digit can be either zero (if $x = \frac{1}{16} = 0.0625$) or nonzero (if x=$\frac{2}{16}, \frac{3}{16}, \frac{4}{16}, \frac{5}{16} \ldots$)

(2) Sufficient, because even when x has the smallest possible value, the tenths digit is nonzero ($\frac{1}{8} = 0.125$).

33. The best answer is D.

9900 + 0.65X = 1.2X ➔ 9900 = 0.55X = $\frac{11}{20}$ X ➔ X = 18,000.

34. The best answer is E.

We need to know the sale prices and the amount of the discounts.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient

If the sell price of the coat was higher than the sell price of the sweater and the percent discount on the sweater was greater than the percent discount on the coat, then the answer would have been C. Also if the sell price of the sweater was higher than the sell price of the coat and the percent discount on the coat was greater than the percent discount on the sweater, then the answer would have been C

35. The best answer is E.

The easiest way is to plug in the answers. Another option is through the equation:

x + 4 = $\frac{2x^2 - 5}{x}$ ➔ 0 = x^2-4x-5 ➔ x=5 or x=-1.

36. The best answer is C.

(1) Insufficient, since x > 5 or x < -5.

(2) Insufficient, 2x + 7 > 0 ➔ x> -3.5

(1+2) Sufficient, Using both statements the answer is x > 5.

37. The best answer is B.

The first pipe can fill the tank in 6 hours, and second pipe can fill the tank in 9 hours.

$\frac{1}{6}+\frac{1}{9}=\frac{5}{18}\Rightarrow\frac{5}{18}=\frac{1}{X}\Rightarrow X=3.6$.