Set 12

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1. At the opening of a trading day at a certain stock exchange, the price per share of stock K was $8. If the price per share of stock K was $9 at the closing of the day, what was the percent increase in the price per share of stock K for that day?

A. 1.4%

B. 5.9%

C. 11.1%

D. 12.5%

E. 23.6%

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2. Which of the following is equal to $\frac{(2^{12}-2^{6})}{(2^{6}-2^{3})}$?

A. $2^{6}+2^{3}$

B. $2^{6}-2^{3}$

C. 2^{9}

D. 2^{3}

E. 2

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3. What is the probability that a student randomly selected from a class of 60 students will be a male who has brown hair?

(1) One-half of the students have brown hair.

(2) One-third of the students are males.

4. John, Karen and Luke collected cans of vegetables for a food drive. The number of cans that John collected was $\frac{1}{2}$ the number of cans that Karen collected and $\frac{1}{3}$ the number of cans that Luke collected. The number of cans that Luke collected was what fraction of the total number of cans that John, Karen and Luke collected?

A. $\frac{1}{5}$

B. $\frac{1}{3}$

C. $\frac{2}{5}$

D. $\frac{1}{2}$

E. $\frac{2}{3}$

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5. The sides of a square region, measured to the nearest centimeters, are 6 centimeters long. The least possible value of the actual area of the square region is

A. 36.00 sq cm

B. 35.00 sq cm

C. 33.75 sq cm

D. 30.25 sq cm

E. 25.00 sq cm

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6. For all integers x and y, the operation Δ is defined by $x \Delta y = (x + 2)^2 + (y + 3)^2$. What is the value of integer t?

(1) $t \Delta 2 = 74$

(2) $2 \Delta t = 80$

7. Before a certain tire is used, 40 percent of its total weight consists of tread. If during a lifetime of use, 50 percent, by weight, of the tire's tread is lost and no other parts of the tire is lost, what percent of the tire's total remaining weight consists of the remaining tread?

A. 55%

B. 20%

C. 25%

D. 30%

E. 35%

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8. When positive integer x is divided by 5 the remainder is 3, and when x is divided by 7, the remainder is 4. The same as x, when positive integer y is divided by 5 the remainder is 3, and when y is divided by 7 the remainder is 4. If x > y, which of the following must be a factor of x – y?

A. 12

B. 15

C. 20

D. 28

E. 35

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9. If x and y are nonzero integers, is 18 a factor of xy^2 ?

(1) x is a multiple of 54.

(2) Y is a multiple of 6.

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10. Is $(\frac{t}{3}) > (\frac{w}{5})$?

(1) w > t

(2) 5t > 3w

11. A certain company that sells only cars and trucks reported that revenues from car sales in 1997 were down 11 percent from 1996 and revenues from truck sales in 1997 were up 7 percent from 1996. If total revenues from car sales and truck sales in 1997 were up 1 percent from 1996, what is the ratio of revenues from car sales in 1996 to revenues from truck sales in 1996?

A. 1 : 2

B. 4 : 5

C. 1 : 1

D. 3 : 2

E. 5 : 3

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12. Which of the following is equal to $\left[\frac{1}{(\sqrt{3}-\sqrt{2})}\right]^2$?

A. 1

B. 5

C. $\sqrt{6}$

D. 5 - $\sqrt{6}$

E. $5 + 2\sqrt{6}$

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13. On a certain day, Tim invested $1000 at 10 percent annual interest, compounded annually, and Lana invested $2000 at 5 percent annual interest, compounded annually. The total amount of interest earned by Tim`s investment in the first 2 years was how much greater than the total amount of interest earned by Lana`s investment in the first 2 years?

A. $5

B. $15

C. $50

D. $100

E. $105

14. For a convention, a hotel charges a daily room rate of $120 for 1 person and x dollars for each additional person. What is the charge for each additional person?

(1) The daily cost per person for 4 people sharing the cost of a room equally is $45.

(2) The daily cost per person for 2 people sharing the cost of a room equally is $25 more than the corresponding cost for 4 people.

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15. Is $xy > \frac{x}{y}$?

(1) $xy > 0$

(2) $y < 0$

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16. Is $r > -1$?

(1) $r > -5$

(2) $r < 16$

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17. If the volume of a small container is 14,520 cubic millimeters, what is the volume of the container in cubic centimeters? (1 millimeter = 0.1 centimeter)

A. 0.1452

B. 1.452

C. 14.52

D. 145.2

E. 1,452

18. $2x + y = 12$ and $|y| \leq 12$. For how many ordered pairs (x,y) that are solutions of the system above are x and y both integers?

A. 7

B. 10

C. 12

D. 13

E. 14

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19. In the xy-plane, the sides of a certain rectangle are parallel to the axes. If one of the vertices of the rectangle is (-1,-2), what is the perimeter of the rectangle?

(1) One of the vertices of the rectangle is (2,-2).

(2) One of the vertices of the rectangle is (2,3).

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20. Tom, Jane and Sue each purchased a new house. The average (arithmetic mean) price of the three houses was $120,000. What was the median price of the three houses?

(1) The price of Tom's house was $110,000.

(2) The price of Jane's house was $120,000.

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21. A certain circle in the xy-plane has its center at the origin. If P is a point on the circle, what is the sum of the squares of the coordinates of P?

(1) The radius of the circle is 4.

(2) The sum of the coordinates of P is 0.

22. What is the median number of employees assigned per project for the projects at Company Z?

(1) 25 percent of the projects at Company Z have 4 or more employees assigned to each project.

(2) 35 percent of the projects at Company Z have 2 or fewer employees assigned to each project.

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23. One kilogram of a certain coffee blend consists of x kilogram of type I coffee and y kilogram of type II coffee. The cost of the blend is C dollars per kilogram, where $C = 6.5x + 8.5y$. Is $x < 0.8$?

(1) $y > 0.15$

(2) $C \geq 7.3$

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24. Of the goose eggs laid at a certain pond, $\frac{2}{3}$ hatched, and $\frac{3}{4}$ of the geese that hatched from those eggs survived the first month. Of the geese that survived the first month, $\frac{3}{5}$ did not survive the first year. If 120 geese survived the first year and if no more than one goose hatched from each egg, how many goose eggs were laid at the pond?

A. 280

B. 400

C. 540

D. 600

E. 840

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25. If n is a positive integer, what is the remainder when $3^{8n+3} + 2$ is divided by 5?

A. 0 B. 1 C. 2 D. 3 E. 4

26. What is the greatest common factor of the positive integers J and K?

(1) K = J+1

(2) K*J is divisible by 5.

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27. The interior of a rectangular carton is designed by a certain manufacturer to have a volume of x cubic feet and a ratio of length to width to height of 3:2:2. In terms of x, which of the following equals the height of the carton, in feet?

A. $\sqrt[3]{x}$

B. $\sqrt[3]{\frac{2x}{3}}$

C. $\sqrt[3]{\frac{3x}{2}}$

D. $\frac{2}{3}\sqrt[3]{x}$

E. $\frac{3}{2}\sqrt[3]{x}$

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28. A certain company sold 800 units of its product for $8 each and 1,000 units of its product for $5 each. If the company's cost of producing each unit of its product was $6, what was the company's profit or loss on the 1,800 units of its product?

A. $1,600 loss

B. $600 loss

C. No profit or loss

D. $600 profit

E. $1,600 profit

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29. What is the remainder when the positive integer n is divided by the positive integer k, where k > 1?

(1) $n = (k + 1)^3$

(2) k = 5

30. In a stack of cards, 9 cards are blue and the rest are red. If 2 cards are to be chosen at random from the stack without replacement, the probability that the cards chosen will both be blue is $\frac{6}{11}$. What is the number of cards in the stack?

A. 10

B. 11

C. 12

D. 15

E. 18

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31. In triangle PQR, the measure of angle P is 30° more than twice the measure of angle Q. What is the measure of angle R?

(1) PQ=QR

(2) The measure of angle P is 78°

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32. What is the remainder when the sum of the positive integers x and y is divided by 6?

(3) When x is divided by 6, the remainder is 3.

(4) When y is divided by 6, the remainder is 1.

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33. If $xy \neq 0$, what is the value of $\frac{1}{x}+\frac{1}{y}$?

(1) $\frac{1}{(x+y)}=-1$

(2) xy = 6(x + y)

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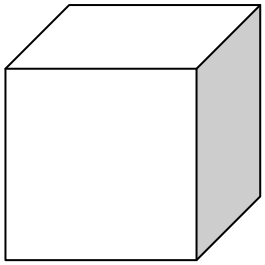
34. If b(a + 1) = b, then what is the value of ab ?

A. –1 B. 0 C. 1 D. a E. b



35. In the rectangular solid above, the three sides shown have areas 12, 15 and 20 respectively. What is the volume of the solid?

A. 60

B. 120

C. 450

D. 1,800

E. 3,600

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36. If x, y and k are positive numbers such that $(\frac{x}{x+y})(10)+(\frac{y}{x+y})(20)=k$ and if x < y, which of the following could be the value of k?

A. 10

B. 12

C. 15

D. 18

E. 30

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37. If k is an integer and $(0.0025)(0.025)(0.00025)\times 10^{k}$ is an integer, what is the least possible value of k?

A. –12

B. –6

C. 0

D. 6

E. 12

Answers for Set 12

1. The best answer is D.

The original price is \$8 and the increase amount is \$1 (\$9 - \$8). Therefore the percent increase is : $\frac{1\times 100}{8} = 12.5$.

2. The best answer is A.

$\frac{2^{12}-2^6}{2^6-2^3} = \frac{(2^6-2^3)(2^6+2^3)}{2^6-2^3} = 2^6+2^3$.

3. The best answer is E.

We need to know the number of male student with brown hair.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient

4. The best answer is D.

John collected X cans. Therefore Karen collected 2X cans and Luke collected 3X cans. The total number of cans was 6X ➔ $\frac{3X}{6X} = \frac{1}{2}$.

5. The best answer is D.

The least possible value of each side is 5.5 cm. Therefore the least possible value of the actual area is 30.25 sq cm (5.5 × 5.5).

6. The best answer is C.

(1) Insufficient, we get a quadratic equation; $(t+2)^2=49$ ➔ t=5 or t=-9

(2) Insufficient, the same reason as with statement 1; $(t+3)^2=64$ ➔ t=5 or t=-11

(1+2) Sufficient, t=5.

7. The best answer is C.

The total weight of the tire is unknown. Take 100 as an example. 40% of 100 are 40. 50% out of the 40 are lost ➔ 20. Therefore the remaining weight of the tire's tread is 20 and the remaining weight of the tire is 80 (100-20) ➔ 20 are 25% of 80.

8. The best answer is E.

I) (x-y) must be divisible by both 5 and 7➔ therefore, (x-y) is a multiple of 35 (5*7).

II) x and y can be one of the numbers in the set: 18, 53, 88, 123…. (d=35). Therefore, if x>y, x-y is a multiple of 35.

9. The best answer is D.

(1) Sufficient, if x is a multiple of 54, then xy^2 is a multiple of 54, and 18 is a factor of xy^2.

(2) Sufficient, if y is a multiple of 6, then xy^2 is a multiple of 36, and 18 is a factor of xy^2.

10. The best answer is B.

(1) Insufficient, e.g. w=15 and t=9 or w=10 and t=9.

(2) Sufficient, since we can divide the inequality in the statement by 15 and get the original equation.

11. The best answer is A.

If X was the revenues from cars sales in 1996 and Y was the revenues from trucks sales in 1996, then 0.89X was the revenues from cars sales in 1997 and 1.07Y was the revenues from trucks sales in 1997. The total revenues (cars and trucks) in 1996 was X+Y and the total revenues in 1997 was 1.01(X+Y). Therefore 1.01(X+Y) = 0.89Y+1.07X ➔ 0.12Y = 0.06X ➔ 2Y = X.

12. The best answer is E.

$\left[\frac{1}{\sqrt{3}-\sqrt{2}}\right]^2 = \frac{1^2}{3-2\sqrt{2}\sqrt{3}+2} = \frac{1}{5-2\sqrt{6}}$ ➔ we can multiply the numerator and the denominator by $(5+2\sqrt{6})$ ➔ $\frac{5+2\sqrt{6}}{(5+2\sqrt{6})(5-2\sqrt{6})} = \frac{5+2\sqrt{6}}{25-24} = 5+2\sqrt{6}$

13. The best answer is A.

Tim's total amount after 2 years was: 1000×1.1×1.1 = 1210. The total amount of interest earned by Tim was 210. Lana's total amount after 2 years was: 2000×1.05×1.05 = 2205. The total amount of interest earned by Lana was 205.

14. The best answer is D.

(1) Sufficient, $\frac{120+3x}{4} = 45$ ➔ we can find x.

(2) Sufficient, $\frac{120+x}{2} - 25 = \frac{120+3x}{4}$ ➔ we can find x.

15. The best answer is E.

(1) Insufficient, the fact that x and y have the same sign doesn't help us: e.g. x=1 y=2, or x=1 y=0.5.

(2) Insufficient, e.g. x=-1 y=-2, or x=-1 y= -0.5.

(1+2) Insufficient, using both statements we only know that both x and y are negative. E.g. x=-1 y=-2, or x=-1 y= -0.5.

16. The best answer is E.

(1) Insufficient, r=-3, r=3

(2) Insufficient, r=-3, r=3

(1+2) Insufficient, r= -3, r =3.

17. The best answer is C.

1 millimeter = 0.1 centimeter ➔ 1000 cubic millimeters = 1 cubic centimeter ➔ 14,520 cubic millimeters = 14.52 cubic centimeters.

18. The best answer is D.

Y must be an even integer between -12 and 12 inclusive➔ there are 13 pairs: (0,12), (1,10), (2,8), (3,6), (4,4), (5,2), (6,0), (7,-2), (8,-4), (9,-6), (10,-8), (11,-10), (12,-12).

19. The best answer is B.

(1) Insufficient, since we know only the length of one side of the rectangle.

(2) Sufficient, we have opposite vertices, and therefore we can find the length of both sides: 2-(-1) and 3-(-2)

20. The best answer is B.

(1) Insufficient, there are two options: 1) two houses are more expensive than 110K and therefore the median could be higher than 110,000 2) one house is cheaper than 110K and the other one is more expensive, and therefore the median could also be 110K

(2) Sufficient, there are two options: 1) all three houses cost 120K 2) one house is cheaper and the other is more expensive. In both cases the median would be 120K.

21. The best answer is A.

(1) Sufficient, The distance between P and the origin is the radius of the circle, which equals: $r=d^2=(x_p-0)^2+(y_p-0)^2$ ➔ $r=d^2=x_p^2+y_p^2$.

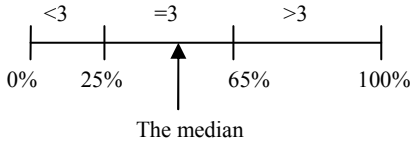
(2) Insufficient, e.g. $3^2+(-3)^2 \neq 2^2+(-2)^2$.

22. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient,



23. The best answer is B.

$x + y = 1$ ➔

(1) Insufficient, e.g. $x = 0.7$ or $x = 0.83$.

(2) Sufficient, $c = 6.5x + 8.5y$ ➔ $c = 6.5(x + y) + 2y$ ➔ $c = 6.5 + 2y$.

Therefore if $c \geq 7.3$ then $x \leq 0.4$.

24. The best answer is D.

$120 = \frac{2}{5}$ of the geese that survived the first month ➔ $300 = \frac{3}{4}$ of the geese that hatched ➔ $400 = \frac{2}{3}$ of the goose eggs ➔ 600 goose eggs were laid at the pond.

25. The best answer is E.

The unit digit of 3^{8n+3} and any other power of 3 which is divisible by 4 with remainder 3 is 7 ➔ The unit digit of the whole expression is 9, and the remainder is 4.

26. The best answer is A.

(1) Sufficient, if j and k are consecutive integers their GCD must be 1.

(2) Insufficient, e.g. the GCD of 5 and 5 is 5, and the GCD of 3 and 5 is 1.

27. The best answer id B.

Let 2y be the height of the carton. Then the volume of the carton is $3y \times 2y \times 2y = x$ ➔ $y = \sqrt[3]{\frac{x}{12}}$ ➔ $2y = \sqrt[3]{\frac{2x}{3}}$.

28. The best answer is D.

The company's income: $800 \times 8 + 1000 \times 5 = 11{,}400$. The company`s cost: $1800 \times 6 = 10{,}800$. The company's profit: $11{,}400 - 10{,}800 = 600$.

29. The best answer is A.

(1) Sufficient, $n = (k + 1)^3$ ➔ $n = k^3 + 3k^2 + 3k + 1$ ➔ the first three terms are divisible by k, therefore the remainder when n is divided by k has to be 1.

(2) Insufficient, since n is not known.

30. The best answer is C.

Take X as the number of red cards. The probability that the cards chosen will both be blue is $\frac{9}{9+x} \times \frac{8}{8+x} = \frac{6}{11}$ ➔ $x = 3$ ➔ There are 12 cards in the stack.

31. The best answer is D.

Angle $P = 2Q + 30$. Statement

(1) Sufficient, if PQ=QR then P=R ➔ $(2Q + 30) + (2Q + 30) + (Q) = 180$ ➔ $Q = 24$ ➔ $R=(24+30)*2=78$

(2) Sufficient, $P=78$ ➔ $Q= (78-30)/2 =24$ ➔ $180=78+24+R$ (sum of interior angles in a triangle is 180).

32. The best answer is C.

We need to know what is the remainder when x is divided by 6 and when y is divided by 6.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, the remainder is 3+1=4

33. The best answer id B.

$\frac{1}{x}+\frac{1}{y}=\frac{x+y}{xy}$

(1) Insufficient

(2) Sufficient, $\frac{x+y}{xy}=\frac{1}{6}$.

34. The best answer is B.

b (a + 1) = b ➔ ab + b = b ➔ ab = 0.

35. The best answer is A.

Let H be the height, L be the length and W be the width of the box. HL=12, HW=15 and LW=20➔ the dimensions of the box are 5, 3 and 4➔ the volume of the solid is 3*4*5=60.

36. The best answer is D.

Try to solve this question as an average problem. There are x students who got 10 on the exam, and there are y people who got 20 on the exam. K is the average $\left(\frac{10x+20y}{x+y}=k\right)$ and therefore must be between 10 and 20. We know that y>x ➔ the average must be closer to 20. The only answer between 15 and 20 is 18.

37. The best answer is E.

(0.025) × (0.0025) × (0.00025) = 25*25*25 with a "debt" of 12 movements of the decimal point. 25^3 is an integer with a non-zero unit digit (doesn't have 2 as a factor) ➔ In order for the number to be an integer it should be multiplied by 10^{12}.