Set 11

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1. If Henry were to add 5 gallons of water to a tank that is already $\frac{3}{4}$ full of water, the tank would be $\frac{7}{8}$ full. How many gallons of water would the tank hold if it were full?

A. 25
B. 40
C. 64
D. 80
E. 96

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2. The function f is defined for each positive three-digit integer n by f(n) = $2^x 3^y 5^z$, where x, y and z are the hundreds, tens and units digits of n, respectively. If m and v are three-digit positive integers such that f(m) = 9f(v), then m – v = ?

A. 8
B. 9
C. 18
D. 20
E. 80

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3. At a certain food stand, the price of each apple is $40 and the price of each orange is $60. Mary selects a total of 10 apples and oranges from the food stand, and the average (arithmetic mean) price of the 10 pieces of fruit is $56. How many oranges must Mary put back so that the average price of the pieces of fruit that she keeps is $52?

A. 1 B. 2 C. 3 D. 4 E. 5

4. Professor Vasquez gave a quiz to two classes. Was the range of scores for the first class equal to the range of scores for the second class?

(1) In each class, the number of students taking the quiz was 26, and the lowest score in each class was 70.

(2) In each class, the average (arithmetic mean) score on the quiz was 85.

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5. If x and y are positive integers, what is the value of x?

(1) $3^x 5^y = 1{,}125$

(2) y = 3

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6. If $|d - 9| = 2d$, then what is the value of d?

A. –9

B. –3

C. 1

D. 3

E. 9

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7. There are 11 women and 9 men in a certain club. If the club is to select a committee of 2 women and 2 men, how many different such committees are possible?

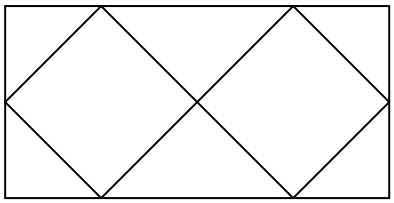
A. 120

B. 720

C. 1,060

D. 1,520

E. 1,980



8. In the figure shown, two identical squares are inscribed in the rectangle. If the perimeter of the rectangle is $18\sqrt{2}$, then what is the perimeter of each square?

A. $8\sqrt{2}$

B. 12

C. $12\sqrt{2}$

D. 16

E. 18

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9. Is the measure of one of the interior angles of quadrilateral ABCD equal to 60 degrees?

(1) Two of the interior angles of ABCD are right angles.

(2) The degree measure of angle ABC is twice the degree measure of angle BCD.

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10. $10,000 is deposited in a certain account that pays r percent annual interest compounded annually, the amount D(t), in dollars, that the deposit will grow to in t years is given by $D(t) = 10{,}000\ \{1 + (\frac{r}{100})\}^t$. To what amount will the deposit grow in 3 years?

(1) D(t) = 11,000

(2) r = 10

11. If a and b are integers, is b even?

(1) 3a + 4b is even.

(2) 3a + 5b is even

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12. Working alone at its constant rate, machine K took 3 hours to produce $\frac{1}{4}$ of the units produced last Friday. Then machine M started working and the two machines, working simultaneously at their respective constant rates, took 6 hours to produce the rest of the units produced last Friday. How many hours would it have taken machine M, working alone at its constant rate, to produce all of the units produced last Friday?

A. 8

B. 12

C. 16

D. 24

E. 30

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13. If x + y is an integer, is y an integer?

(1) x – y is an integer.

(2) x + 2y is an integer.

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14. A certain computer program generates a sequence of numbers $a_1, a_2, a_3 ..., a_n$ such that $a_1 = a_2 = 1$ and $a_k = a_{k-1} + 2a_{k-2}$ for all integers k. $a_7 = ?$

A. 32

B. 43

C. 64

D. 100

E. 128

15. At a certain bookstore, the regular price of each book is 20 percent less than its list price. If during a sale the price of each book at the store was 15 percent less than its regular price, then the price of a book during the sale was what percent less than its list price?

A. 30%

B. 32%

C. 35%

D. 38%

E. 40%

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16. What is the ratio of x to y^2?

(1) The ratio of x^2 to y is $\frac{5}{3}$.

(2) The ratio of x to 1 is $\frac{5}{3}$.

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17. Box W and Box V each contain several blue sticks, and all of the red sticks have the same length. The length of each red stick is 18 inches less than the average length of the sticks in Box W and 6 inches greater than the average length of the sticks in Box V. What is the average (arithmetic mean) length, in inches, of the sticks in Box W minus the average length, in inches, of the sticks in Box V?

A. 3

B. 6

C. 12

D. 18

E. 24

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18. If k is a positive integer, is k the square of an integer?

(1) k is divisible by 4.

(2) k is divisible by exactly 4 different prime numbers.

19. If n is positive, which of the following is equal to $\frac{1}{\sqrt{(n+1)}-\sqrt{n}}$?

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20. Bob, Mia and Lou each own a number of shares of stock in a company. How many shares does Lou own?

(1) Bob and Mia together own a total of 800 shares.

(2) Bob and Lou together own a total of 500 shares.

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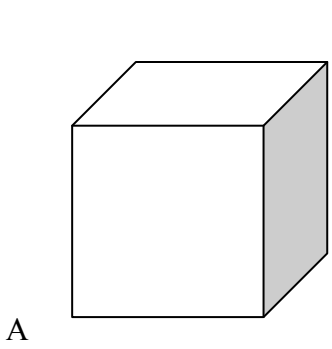
21. In the xy-plane, what is the x-intercept of a certain line?

(1) The line passes through the point (0, 2).

(2) The y-intercept of the line is 2.



22. What is the volume of the cube above?

(1) The surface area of the cube is 600 square inches.

(2) The length of diagonal AB is $10\sqrt{3}$ inches.

23. $\frac{(0.8)^{-5}}{(0.4)^{-4}} = ?$

A. $\frac{3}{32}$

B. $\frac{5}{64}$

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

D. 1

E. 2

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24. By what percent was the price of a certain television set discounted for a sale?

(1) The price of the television set before it was discounted for the sale was 25 percent greater than the discounted price.

(2) The price of the television set was discounted by $60 for the sale.

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25. For a certain race, 3 teams were allowed to enter 2 members each. A team earned (6 – n) points whenever one of its members finished in the n^{th} place. There were no ties, disqualifications or withdrawals. If no team earned more than 6 points, what is the least possible score a team could have earned?

A. 0

B. 1

C. 2

D. 3

E. 4

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26. In the Israeli Football League there are 12 teams. Each team plays once with each of the other teams during one regular season. What is the total number of games that occur during one regular season?

A.72 B. 144 C. 132 D. 121 E. 66

27. For each landscaping job that takes more than 4 hours, a certain contractor charges a total of r dollars for the first 4 hours plus 0.2r dollars for each additional hour or fraction of an hour, where r > 100. Did a particular landscaping job take more than 10 hours?

(1) The contractor charged a total of $288 for the job.

(2) The contractor charged a total of 2.4r dollars for the job.

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28. In the rectangular coordinate system, points (4,0) and (-4,0) both lie on circle C. What is the maximum possible value of the radius of C?

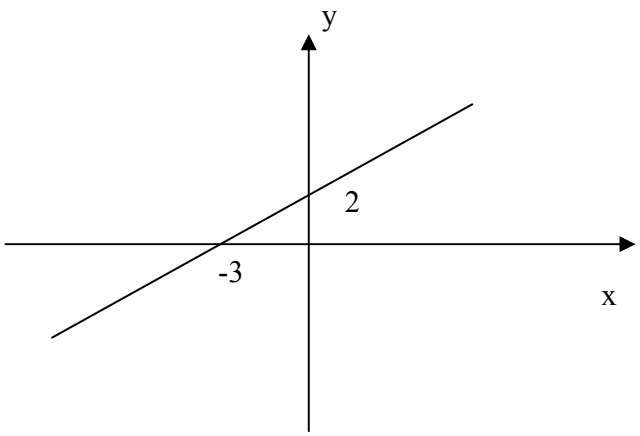
A. 2

B. 4

C. 8

D. 16

E. There is no finite maximum value.



29. The graph of which of the following equations is a straight line that is parallel to line l in the figure above?

A. $3y - 2x = 0$

B. $3y + 2x = 0$

C. $3y + 2x = 6$

D. $2y - 3x = 6$

E. $2y + 3x = -6$

30. A train traveled from station X to station Y at a constant speed of 88 feet per second. Is the distance that the train traveled from station X to station Y greater than 40 miles? (1 mile = 5,280 feet)

(1) It took less than 45 minutes for the train to travel from station X to station Y.

(2) It took more than 42 minutes for the train to travel from station X to station Y.

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31. There are 5 cars to be displayed in 5 parking spaces with all the cars facing the same direction. Of the 5 cars, 3 are red, 1 is blue and 1 is yellow. If the cars are identical except for color, how many different display arrangements of the 5 cars are possible?

A. 20

B. 25

C. 40

D. 60

E. 125

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32. If x is an integer, is $3x + 7$ even?

(1) $(x - 5)(x + 1) = 0$

(2) x is a factor of 105.

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33. 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 revenue from car sales in 1996 to revenue from truck sales in 1996?

A. 1:2 B. 4:5 C. 1:1 D 3:2 E. 5:3

34. If $x^2 + y^2 = 1$, is x + y = 1?

(1) xy = 0

(2) y = 0

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35. Of the following, which is the greatest?

A. $(\frac{1}{5})^{-2}$

B. $(\frac{1}{3})^{-2}$

C. 3^{-2}

D. 5^{-2}

B. 2^3

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36. The total amount that a certain bank loaned in 1998 was $47 million. How many dollars did the bank loan in June of 1998 for car loans?

(1) 18 percent of the amount that the bank loaned in June of 1998 was for car loans.

(2) 8 percent of the total amount that the bank loaned in 1998 was loaned in June.

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37. Of the mutual funds on a "select list", $\frac{1}{3}$ have a 5-star rating, and $\frac{2}{5}$ of the remaining funds have 4-star rating. If the remaining 300 funds on the list have 3-star rating, how many funds are on the list?

A. 500
B. 750
C. 1,000
D. 1,200
E. 1,500

Answers for set 11

1. The best answer is B.

If the tank was full then it would hold x gallons of water ➔ $\frac{7x}{8} - \frac{3x}{4} = 5$ ➔ x = 40.

2. The best answer is D.

m (x, y and z) and v (a, b and c) are three-digit numbers. f(m) = 9f(v) ➔

$2^x 3^y 5^z = 9 \times 2^a 3^b 5^c$ ➔ $2^x 3^y 5^z = 2^a 3^{b+2} 5^c$ ➔ m – v = 20.

3. The best answer is E.

Y is the number of oranges ➔ $\frac{40(10-Y)+60Y}{10} = 56$ ➔ Y = 8. After changing the amount of oranges: $\frac{40 \times 2 + 60Y}{2+Y} = 52$ ➔ Y = 3 ➔ Mary must put five oranges back.

4. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, because we do not know the highest score in each class.

5. The best answer is A.

(1) Sufficient, each number is composed of exactly one set of prime numbers, which in this case is: $3*3*5*5*5 = 3^2 5^3 = 1125$

(2) Insufficient.

6. The best answer is D.

We have to check the two options:

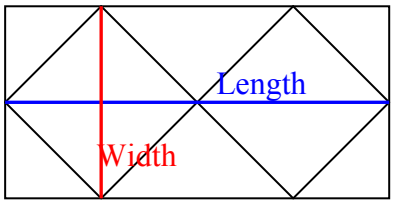
1) The value of the expression $|d-9|$ is positive➔ d>9 ➔ (d – 9) = 2d ➔ d=-9 ➔ the solution is not valid since it is not in the range of d>9

2) The value of the expression $|d-9|$ is negative➔ d<9 ➔ - (d – 9) = 2d ➔ d = 3.

7. The best answer is E.

$\frac{11!}{2!\times 9!} \times \frac{9!}{2!\times 7!} = 55 \times 36 = 1980.$

8. The best answer is B.



The width of the rectangle is equal to the length of the diagonal of the squares. The length of the rectangle is equal to the length of two diagonals of the squares. Therefore the perimeter of the rectangle is equal to six times the square's diagonals, which equals $18\sqrt{2}$ ➔ the length of the squares diagonal is $3\sqrt{2}$ ➔ according to the ratios of an isosceles right triangle (X:X: $X\sqrt{2}$), each side equals $\frac{3\sqrt{2}}{\sqrt{2}} = 3$ ➔ the perimeter of each square is 12.

9. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient. E.g. a quadrilateral with interior angles 90, 90, 120 and 60 or a quadrilateral with interior angles 90, 90, 45 and 135.

10. The best answer is B.

We are looking for D(3), which equal: $10{,}000\left(1+\frac{r}{100}\right)^3$ ➔ We need to know r.

(1) Insufficient, we do not know r.

(2) Sufficient, we can plug in r = 10 and t = 3.

11. The best answer is C.

(1) Insufficient, 4b is even➔ 3a is even ➔ a is even

(2) Insufficient, both a and b are even, or both are odd.

(1+2) Sufficient, from statement (1) we know that a is even. From statement (2) we know that if a is even than b also has to be even➔ b is even.

12. The best answer is D.

Take X as the number of units produced last Friday. It would have taken machine K (working alone) 12 hours to produce X. It would have taken machines K and M (working together) 8 hours to produce X. $\frac{1}{8}-\frac{1}{12}=\frac{1}{24}$ ➔ It would have taken machine M (working alone) 24 hours to produce X.

13. The best answer is B.

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

(2) Sufficient, since we added y and 2y to the same number (x), and in both cases the result was an integer, y must be an integer.

14. The best answer is B.

$a_1=1$, $a_2=1$, $a_3=3$, $a_4=5$, $a_5=11$, $a_6=21$, $a_7=43$.

15. The answer is B.

Take 100 as the list price. Then the regular price is 80 and the selling price is $80-\frac{15}{100}80$. 15% of 80 are 12 (10% of 80 is 8, and 5% is $\frac{8}{2}=4$). Therefore the selling price is 68, which is 32% less then the list price.

16. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, if the ratio of x to 1 is $\frac{5}{3}$ than $x=\frac{5}{3}$. Using the second statement: $\frac{x^2}{y}=\frac{25/9}{y}=\frac{5}{3}\Rightarrow y=\frac{5}{3}$. Now we can find the ratio of x to y^2.

17. The best answer is E.

The length of each red stick is 18 inches less than the average length of the sticks in box W and 6 inches greater than the average length of the sticks in box V. Therefore the difference between the average lengths of the sticks in the boxes must be 24.

18. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, e.g. k = 36 or k= 60.

19. $\frac{1}{\sqrt{n+1}-\sqrt{n}}=\frac{\sqrt{n+1}+\sqrt{n}}{(n+1)-n}=\sqrt{n+1}+\sqrt{n}$.

20. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient. $\begin{cases} B + M = 800 \\ B + L = 500 \end{cases} \Rightarrow M - L = 300$

21. The answer is E.

(1) Insufficient, one point is not enough in order to find the equation

(2) Insufficient, one point is not enough in order to find the equation

(1+2) Insufficient, in both statements the same point is given (0, 2)

22. The best answer is D.

(1) Sufficient, $6a^2 = 600$ ➔ $a^3 = 1000$.

(2) Sufficient, $AB = 10\sqrt{3}$ ➔ $a = 10$ ➔ $a^3 = 1000$.

23. The best answer is B.

$$\frac{(0.8)^{-5}}{(0.4)^{-4}} = \frac{(0.4)^4}{(0.8)^5} = \frac{(0.4)^4}{2^5(0.4)^5} = \frac{1}{2^5 * 0.4} = \frac{1}{2^5 * 2/5} = \frac{5}{2^6}$$

24. The best answer is A.

(1) Sufficient, if the discounted price was x then the original price was 1.25x.

Therefore the price was discounted by 20 percent.

(2) Insufficient

25. The best answer is D.

We should find how many points are left for the third team, when the first two teams earn the maximum possible points: The best option is (1, 5) and (2, 4) for the first two teams (6 points each), and (3, 6) are the locations of the third team➔ the least possible score equals (6-6)+(6-3)=3.

26. The best answer is E.

Each of the teams plays with the other 11 teams. Every game is between two teams at once and it will not have to happen again. ➔ $\frac{12 \times 11}{2} = 66.$

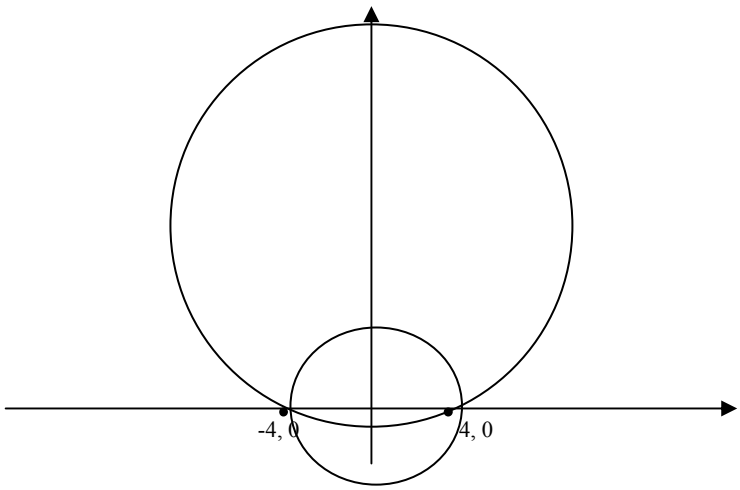
27. The best answer is B.

(1) Insufficient, since we do not know r.

(2) Sufficient, if the contractor charged a total of 2.4r dollars then the job took 10 hours or less (the last 0.2r dollars could have been charged for an hour or a fraction of an hour).

28. The best answer is E.

The minimum possible value of the radius of C is 4 [(if (0,0) is the center of the circle]. The maximum possible value is ∞. E.g.:



29. The answer is A.

Two parallel lines must have the same slope. Line l is passing though points (0,2) and (-3,0) ➔ The slope of line l is: $\frac{2-0}{0-(-3)} = \frac{2}{3}$. In order to find the slope of the equations listed above, it is recommended to convert them into the following template: Y= AX+ B, where A is equal to the slope.

30. The best answer is B.

1 mile = 5,280 feet ➔ 40 miles = 211,200 feet.

(1) Insufficient, the distance is smaller than $45 \times 60 \times 88 = 237{,}600$.

(2) Sufficient, the distance is greater than $42 \times 60 \times 88\times = 221{,}760$.

31. The best answer is A.

There are five cars to be arranged in a row, of which three are identical ➔ $\frac{5!}{3!} = 20$.

32. The best answer is D.

We need to know whether x is even or odd.

(1) Sufficient, x can be 5 or (-1).

(2) Sufficient, the prime factors of 105 are 3, 5 and 7 ➔ all the factors of 105 are odd➔ x is odd (x can be 1, 3, 5, 7, 15, 21, 35 or 105).

33. 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.

34. The best answer is E.

(1) Insufficient, according to the statement x = 0 or y = 0 ➔ If x = 0 then y = 1 or (-1). If y = 0 then x = 1 or (-1). Therefore x + y = 1 or (-1).

(2) Insufficient, the same reason as with statement (1).

(1+2) Insufficient, the same reason as with statement (1).

35. The best answer is A.

$(\frac{1}{5})^{-2} = 25,\quad (\frac{1}{3})^{-2} = 9,\quad 3^{-2} = \frac{1}{9},\quad 5^{-2} = \frac{1}{25},\quad 2^{3} = 8$

36. The best answer is C.

(1) Insufficient. We don't know the total amount of loans in June

(2) Insufficient. We don't know the portion of car loans out of the total amount of loans in June

(1+2) Sufficient. Using both statements we know that the total car loans in June is: $\frac{8}{100} * \frac{18}{100} * 47m$

37. The best answer is B

Let x be the total number of funds ➔ $\frac{1}{3}x$ is the number of 5-star ratings ➔ The number of 4-star ratings is $\frac{2}{5}\left(x - \frac{1}{3}x\right) = \frac{4}{15}x$ ➔ and the number of 3-star ratings is $x - \frac{1}{3}x - \frac{4}{15}x = 300$ ➔ $\frac{6}{15}x = 300$ ➔ x = 750