Set 6

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1. What is 35 percent of the sum of 1.4 and 0.2?

A. 0.42

B. 0.56

C. 0.85

D. 1.55

E. 1.95

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2. If $x \neq y$, is $x + y = xy$?

(1) $(1 - x)(1 - y) = 1$

(2) $x^2 - y^2 = yx^2 - xy^2$

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3. What is the value of the product xy?

(1) $\frac{x}{y} = 0.2$

(2) $x + y = 60$

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4. How many seconds will it take for a car that is traveling at a constant rate of 45 miles per hour to travel a distance of 220 yards? (1 mile = 1,760 yards)

A. 8

B. 9

C. 10

D. 11

E. 12

5. If $x^3y^4 = 5{,}000$, is $y = 5$?

(1) y is a positive integer.

(2) x is an integer.

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6. A string of 10 light bulbs is wired in such a way that if any individual light bulb fails, the entire string fails. If for each individual light bulb the probability of failing during time period T is 0.06, what is the probability that the string of light bulbs will fail during time period T?

A. 0.06

B. $(0.06)^{10}$

C. $1 - (0.06)^{10}$

D. $(0.94)^{10}$

E. $1 - (0.94)^{10}$

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7. If n is a positive integer, what is the remainder when $9^{(6n + 3)}4^{(2n + 2)}$ is divided by 5?

A. 0

B. 1

C. 2

D. 3

E. 4

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8. A department manager distributed a number of pens, pencils and pads among the staff in the department, with each staff member receiving x pens, y pencils and z pads. How many staff members were in the department?

(1) The numbers of pens, pencils and pads that each staff member received were in the ratio 2:3:4, respectively.

(2) The manager distributed a total of 18 pens, 27 pencils and 36 pads.

9. In the xy-plane, if line k passes through the points (3,-4) and (a,b), where b=4a–16 and $a \neq 3$, what is the slope of k?

A. –4

B. –0.5

C. 0

D. 2

E. 4

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10. The sides of a square region, measured to the nearest centimeter, 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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11. Of the three-digit positive integers that have no digits equal to zero, how many have two digits that are equal to each other and the remaining digit different from the other two?

A. 24

B. 36

C. 72

D. 144

E. 216

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12. Is $y^2 = 0$?

(1) $3y = 0$

(2) $y^3 = 0$

13. If the average (arithmetic mean) of the assessed values of x houses is $212,000 and the average of the assessed values of y other houses is $194,000, what is the average of the assessed values of the (x + y) houses?

(1) $x + y = 36$

(2) $x = 2y$

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14. If a certain coin is flipped, the probability that the coin will land heads up is $\frac{1}{2}$. If the coin is flipped 5 times, what is the probability that it will land heads up on the first 3 flips and not on the last 2 flips?

A. $\frac{3}{5}$

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

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

D. $\frac{1}{8}$

E. $\frac{1}{32}$

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15. Company A has a total of n employees, where n is an odd integer, and no two employees have the same annual salary. The annual salaries of the n employees are listed in increasing order, and the 16^{th} salary in the list is the median of the annual salaries. If the sum of the annual salaries of Company A's employees is $942,400, what is the average (arithmetic mean) of the annual salaries of Company A's employees?

A. $29,450

B. $30,400

C. $32,500

D. $47,120

E. $58,900

16. If $\sqrt{x}$ is an integer, what is the value of $\sqrt{x}$?

(1) $11 < x < 17$

(2) $2 < \sqrt{x} < 5$

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17. If $P(r) = \frac{8r}{1-r}$, for what value of r does $P(r) = \frac{P(3)}{2}$?

A. 6

B. 3

C. 0

D. –3

E. –6

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18. An equal number of desks and bookcases are to be placed along a library wall that is 15 meters long. Each desk is 2 meters, and each bookcase is 1.5 meters long. If the maximum possible number of desks and bookcases are to be placed along the wall, then the space along the wall that is left over will be how many meters long?

A. 0.5

B. 1

C. 1.5

D. 2

E. 3

---

19. Square ABCD is inscribed in circle O. What is the area of square region ABCD?

(1) The area of circular region O is 64.

(2) The circumference of circle O is 16.

20. Based on this year's costs, an orchard grower budgets P dollars for planting N new trees next year. If the average cost of planting each tree were to increase 25 percent from this year's cost, then the greatest number of trees that the orchard grower could plant next year using P dollars would be:

A. 20% less than N
B. 25% less than N
C. equal to N
D. 20% greater than N
E. 25% greater than N

---

21. A certain polygon has n sides and 54 diagonals. n =?

A. 6
B. 8
C. 10
D. 12
E. 14

---

22. Which of the following is a value of X for which $X^{11} - X^3 > 0$?

A. –2
B. –1
C. –0.5
D. 0.5
E. 1

---

23. In how many different ways is it possible to arrange 8 books on a shelf if 4 are identical?

A. 1,680
B. 10,080
C. 40,296
D. 40,316
E. 210

24. If R, S and T are numbers on the number line, not necessarily in that order, what is the distance between R and T?

(1) The distance between R and S is 50.

(2) The distance between S and T is 41.

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25. A farmer produced 750 bushels of a certain crop at a cost of $20 per bushel. If the farmer sold $\frac{2}{3}$ of the bushels for double their production cost and sold the remaining bushels at 25 percent above their production cost, what was the farmer's gross profit on the sale of the crop?

A. $11,250

B. $13,375

C. $15,000

D. $18,750

E. $26,250

---

26. Is $(x + y)^3$ an even integer?

(1) x and y are integers.

(2) xy = 9

---

27. If M is a positive integer, then M^3 has how many digits?

(1) M has 3 digits.

(2) M^2 has 5 digits.

---

28. If the function F is defined by $F(x) = x^2 + \frac{1}{x^2}$ for all nonzero numbers x, then $F(-\frac{1}{x}) =$

A. $-\frac{1}{F(x)}$ B. $\frac{1}{F(x)}$ C. 1 – F(x) D. –F(x) E. F(x)

29. If X > 1 and Y > 1, is X < Y?

(1) $\frac{X^2}{XY + X} < 1$

(2) $\frac{XY}{Y^2 - Y} < 1$

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30. Yesterday it took a certain plane 3 hours to fly from City A to City B at an average speed of 400 miles per hour. Today the same plane flew from City A to City B along the same route at an average speed of 450 miles per hour. How many more minutes it took yesterday than it took today?

A. 10

B. 15

C. 20

D. 25

E. 30

---

31. The slope of line l is 2. Line k is perpendicular to line l. Which of the following could have been the equation of line k?

A. $y + 2x + 6 = 0$

B. $y – 2x + 6 = 0$

C. $2y + x + 6 = 0$

D. $2y – x + 6 = 0$

E. $y + x + 6 = 0$

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32. Last year in a group of 30 businesses, 21 reported a net profit and 15 had investments in foreign markets. How many of the businesses did not report a net profit and did not invest in foreign markets last year?

(1) Last year 12 of the 30 businesses reported a net profit and had investment in foreign markets.

(2) Last year 24 of the 30 businesses reported a net profit or invested in foreign markets, or both.

33. A pump started filling an empty pool with water and continued at a constant rate until the pool was full. At noon the pool was $\frac{1}{3}$ full, and $1\frac{1}{4}$ hours later it was $\frac{3}{4}$ full. What was the total number of hours that it took the pump to fill the pool?

A. $2 + \frac{1}{3}$

B. $2 + \frac{2}{3}$

C. 3

D. $3 + \frac{1}{2}$

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

---

34. If $|M + 4| = 2$, what is the value of M?

(1) $M < 0$

(2) $M^2 + 8M + 12 = 0$

---

35. Linda purchased 3 books at a book fair. What was the median price of the 3 books?

(1) The average (arithmetic mean) price of the 3 books was \$1.5.

(2) The price of one of the 3 books was \$1.5.

36.In a certain quiz that consists of 10 questions, each question after the first is worth 4 points more than the preceding question. If the 10 questions on the quiz are worth a total of 360 points, how many points is the third question worth?

A. 18

B. 24

C. 26

D. 32

E. 44

37. AB

+BA

AAC

In the correctly worked addition problem shown, where the sum of the two-digit positive integers AB and BA is the three-digit integer AAC, and A, B and C are different digits, what is the units' digit of the integer AAC?

A. 9

B. 6

C. 3

D. 2

E. 0

Answers for set 6

1. The best answer is B.

$(1.4 + 0.2) \times \frac{35}{100} = \frac{8}{5} \times \frac{35}{100} = 0.56$

2. The best answer is D.

(1) Sufficient, $(1 - x)(1 - y) = 1$ ➔ $1 - x - y + xy = 1$ ➔ $xy = x + y$

(2) Sufficient, $x^2 - y^2 = yx^2 - xy^2$ ➔ $(x + y)(x - y) = xy(x - y)$ ➔ $x + y = xy$

3. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, two equations with two variables ➔ $\frac{60 - y}{y} = 0.2$ ➔ $y = 50$ ➔ $x=10$ ➔ $xy = 500$.

4. The best answer is C.

Take x as the number of seconds it will take for the car to travel a distance of 220 yards. The car is traveling at a constant rate of 79,200 $(45 \times 1{,}760)$ yards per 3,600 seconds (60×60) ➔ $\frac{3{,}600}{79{,}200} = \frac{x}{220}$ ➔ $x = 10$

5. The best answer is C.

Find the prime factors of 5000: $5000 = 5^4 2^3$

(1) Insufficient, $y=1$ and $x = \sqrt[3]{5000}$ or $y=5$ and $x=2$.

(2) Insufficient, $x = 1$ and $y = \sqrt[4]{5000}$ or $x=2$ and $y=5$

(1+2) Sufficient, $x = 2$, $y = 5$.

6. The best answer is E.

The probability that the string of light bulbs will fail (at least one light bulb will fail)= 1 –(the probability that none of the light bulbs will fail).

The probability that a certain light bulb will not fail is 0.94 ➔ the probability that all 10 light bulbs will not fail is $(0.94)^{10}$➔ The probability that the string of light bulbs will fail equal $1-(0.94)^{10}$.

7. The best answer is E.

The units' digit of any odd power of 9 is 9 (6n+3= Odd).

The units' digit of any even power of 4 is 6 (2n+2= Even).

Therefore, the units' digit of $9^{(6n+3)}4^{(2n+2)}$ is equal to 4 (9×6 =54)➔ when divided by 5, the remainder of the expression is 4.

8. The best answer is C.

(1) Insufficient.

(2) Insufficient, although we can find the ratio of pens to pencils to pads, that each member received (also given in statement 1), we do not know the **number** of pens, pencils and pads that each member received.

(1+2) Insufficient, there are 1, 3 or 9 staff members in the department.

9. The best answer is E.

The slope of line k is: $\frac{b+4}{a-3}=\frac{(4a-16)+4}{a-3}=4$.

It is also possible to plug in any value for a, and than find the slope (e.g. a=0).

10. The best answer is D.

The least possible value of each side is 5.5 cm ➔ the least possible value of the actual area is 5.5 × 5.5 = 30.25 sq cm.

11. The best answer is E.

The number of three-digit positive integers that have no digits equal to zero and have two digits that are equal to each other and the remaining digit different from the other two = (the number of three-digit positive integers that have no digits equal to zero) – (the number of three-digit positive integers that have no digits equal to zero and have three digits that are equal to each other) – (the number of three-digit positive integers that have no digits equal to zero and have three digits that are different from each other) ➔ $9 \times 9 \times 9 - 9 - 9 \times 8 \times 7 = 216$.

Another way to solve this question; There are three options: 1. xxy 2. xyx 3. yxx = (9*1*8) + (9*8*1) + (8*9*1) = 72*3 = 216.

12. The best answer is D.

(1) Sufficient, $3y = 0$ ➔ $y = 0$ ➔ $y^2 = 0$.

(2) Sufficient, $y^3 = 0$ ➔ $y = 0$ ➔ $y^2 = 0$.

13. The best answer is B.

We know the average of x and y. Therefore, in order to find the average of (x + y), we need to know the ratio between x to y.

(1) Insufficient

(2) Sufficient. The average is $\left[\frac{2(\$212{,}000)+\$194{,}000}{3}\right]$

14. The best answer is E.

The probability that the coin will land heads up is $\frac{1}{2}$, and also the probability that the coin will not land heads up is $\frac{1}{2}$. Therefore the probability that it will land heads up on the first 3 flips and not on the last 2 flips is $\frac{1}{2} * \frac{1}{2} * \frac{1}{2} * \frac{1}{2} * \frac{1}{2} = \left(\frac{1}{2}\right)^5$

15. The best answer is B.

The median of n terms is the $\frac{n+1}{2}$ term ➔ $\frac{n+1}{2}$=16th salary ➔ n=31 ➔

The average is: $\frac{942{,}400}{31} = 30{,}400.$

16. The best answer is C.

(1) Insufficient, x = 16 ➔ $\sqrt{x} = 4$ or $\sqrt{x} = -4$.

(2) Insufficient, e.g. $\sqrt{x} = 3$ or $\sqrt{x} = 4$.

(1+2) Sufficient, $\sqrt{x} = 4$.

17. The best answer is D.

For which value of r does $\frac{8r}{1-r} = \frac{P(3)}{2} = -6$?

Plug in the answers, and find that $\frac{8(-3)}{1-(-3)} = -6$

18. The best answer is B.

An equal number of desks and bookcases must be placed. The length of one desk and one bookcase is 2+1.5=3.5. The maximum possible number of pairs that can be placed is along the wall is $4\left(3.5P \le 15\right)$. The space along the wall that is left over will be 1 meter (15- 4*3.5=1)

19. The best answer is D.

The diagonal of the square is equal to the diameter of the circle ➔ we need to find the radius of the circle.

(1) Sufficient, $\pi R^2 = 64$

(2) Sufficient, $2\pi R = 16$

20. The best answer is A.

The cost of planting each tree was $\frac{P}{N}$ ➔ now the cost of planting each tree is $\frac{1.25P}{N}$ ➔ the greatest number of trees that the orchard grower could plant next year using P dollars would be: $\frac{P}{1.25PN} = 0.8N$.

21. The best answer is D.

Each vertex sends a diagonal to every other vertex except himself and the two vertices next to him on both sides ➔ $\frac{n(n-3)}{2} = 54$ ➔ n = 12.

22. The best answer is C.

This inequality: $X^{11} > X^3$, true, when $X > 1$ or when $-1 < X < 0$.

23. The best answer is A.

$$\frac{8!}{4!} = \frac{1\times 2\times 3\times 4\times 5\times 6\times 7\times 8}{1\times 2\times 3\times 4} = 1{,}680$$

24. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, e.g. the order of the numbers can be R, S and T (the distance between R and T is 91) or the order of the numbers can be R, T and S (the distance between R and T is 9).

25. The best answer is A.

The farmer sold $\frac{2}{3}$ of the bushels for \$40 (a profit of \$20 per unit), and the remaining bushels for $\frac{125}{100} * \$20 = \$25$ (a profit of \$5 per unit)➔ the gross profit is:

$$\left(\frac{2}{3} * 750\right) * 20 + \left(\frac{1}{3} * 750\right) * 5 = 11{,}250$$

26. The best answer is C.

(1) Insufficient

(2) Insufficient, e.g. x=3 y=3, OR $x = \sqrt{9}$ $y = \sqrt{9}$

(1+2) Sufficient, xy is an odd integer ➔ x and y have to be odd integers ➔ (x + y) is even ➔ $(x + y)^3$ is an even integer.

27. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, e.g. M = 100 (M^2 = 10,000 and M^3 = 1,000,000) or M = 300 (M^2 = 90,000 and M^3 = 27,000,000).

28. The best answer is E.

$$F(-\frac{1}{x}) = \frac{1}{x^2} + \frac{1}{\left(\frac{1}{x^2}\right)} = \frac{1}{x^2} + x^2 = F(x)$$

29. The best answer is B.

(1) Insufficient, $\frac{X^2}{XY + X} < 1$ ➔ $\frac{X}{Y + 1} < 1$ ➔ X < Y + 1 (e.g. X = 5 and Y = 7 or X=5 and Y = 4.5).

(2) Sufficient, $\frac{XY}{Y^2 - Y} < 1$ ➔ $\frac{X}{Y - 1} < 1$ ➔ X < Y – 1

30. The best answer is C.

The distance between City A to City B is 1,200 miles (400×3).

Today it took the plane $\frac{1200}{450} = 2\frac{2}{3}$ hours to fly from A to B ➔ yesterday it took 20 minutes more than it took today.

31. The best answer is C.

In order for two linear equations to be perpendicular to each other, the product of their slops should equal -1➔ 2*m=-1 ➔ m= -0.5. The slope of the equation in answer C equals -0.5.

32. The best answer is D.

Take x as the number of businesses that did not report a net profit and did not invest in foreign markets last year, and y as the number of businesses that reported a net profit and had investment in foreign markets ➔ 30 – x = 21 + 15 - y

(1) Sufficient, y = 12 ➔ x=6.

(2) Sufficient, 21 + 15 – y = 24 ➔ x=6

33. The best answer is C.

In 75 minutes (1.25 hours) the pump filled $\frac{3}{4} - \frac{1}{3} = \frac{5}{12}$ of the pool. Take x as the number of minutes that it took the pump to fill the pool ➔ $\frac{\frac{5}{12}}{75} = \frac{1}{x}$ ➔ x = 180 ➔ it took the pump 3 hours to fill the pool.

34. The best answer is E.

$|M+4| = 2$ ➔ (M+4=2) OR (M+4=-2) ➔ M=(-6) or (-2).

(1) Insufficient

(2) Insufficient, plug in M=-2 and M=-6, and see that both solutions are possible.

(1+2) Insufficient

35. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, there were 3 books, and the price of one of the books was equal to the average ➔ two possibilities: (1) all three books cost 1.5 (2) one book is cheaper and one is more expensive than 1.5 ➔ the median was equal to $1.5.

36. The best answer is C.

Take x as the number of points that the first quiz is worth ➔ x + x + 4 + x + 8 +…x + 36 = 360 ➔ $10x + 45 \times 4 = 360$ ➔ x = 18 ➔ the third quiz is worth 26.

It can also be solved as arithmetic set. Divide 360 by 10 to find the average. The average of an arithmetic set with even number of terms is the average between the two middle terms, in this case 5 and 6 ➔ the fifth term equal 34 and the sixth term equal 38 ➔ 34-(2*4)=26

37. The best answer is E.

When a three-digit number is a sum of two two-digit numbers, its units' digit has to be 1 (the greatest possible solution will be 99+99=198) ➔ A has to be 1. Now we have

$$\begin{array}{r} 1B \\ +\ B1 \\ \hline 11C \end{array}$$

. If B would have been any other integer but 9, the sum of the two two-digit would have been smaller than 100 ➔ B has to be 9 ➔ 19+91=110 ➔ C has to be 0.