

Set 8

1. A student's average (arithmetic mean) test score on 4 tests is 78. What must be the student's score on a 5th test for the student's average score on the 5 tests to be 80?

- A. 80
- B. 82
- C. 84
- D. 86
- E. 88

2. From a group of 3 boys and 3 girls, 4 children are to be randomly selected. What is the probability that equal numbers of boys and girls will be selected?

- A. $\frac{1}{10}$
- B. $\frac{4}{9}$
- C. $\frac{1}{2}$
- D. $\frac{3}{5}$
- E. $\frac{2}{3}$

3. If x and y are positive integers and $1 + x + y + xy = 15$, what is the value of $x + y$?

- A. 3
- B. 5
- C. 6
- D. 8
- E. 9

4. If Ann saves x dollars each week and Beth saves y dollars each week, what is the total amount that they save per week?

- (1) Beth saves \$5 more per week than Ann saves per week.
- (2) It takes Ann 6 weeks to save the same amount that Beth saves in 5 weeks.

5. If x is a positive integer, is the remainder 0 when $3^x + 1$ is divided by 10?

- (1) $x = 4n + 2$, where n is a positive integer.
- (2) $x > 4$

6. If r , s , and w are positive numbers such that $w = 60r + 80s$ and $r + s = 1$, is $w < 70$?

- (1) $r > 0.5$
- (2) $r > s$

7. If a code word is defined to be a sequence of different letters chosen from the 10 letters A, B, C, D, E, F, G, H, I and J, what is the ratio of the number of 5-letter code words to the number of 4-letter code words?

- A. 6 to 1
- B. 3 to 2
- C. 2 to 1
- D. 5 to 1
- E. 6 to 5

8. Which of the following fractions has a decimal equivalent that is a terminating decimal?

A. $\frac{10}{189}$

B. $\frac{15}{196}$

C. $\frac{16}{225}$

D. $\frac{25}{144}$

E. $\frac{39}{128}$

9. Company S produces two kinds of stereos: basic and deluxe. Of the stereos produced by Company S last month, $\frac{2}{3}$ were basic and the rest were deluxe. If it takes $\frac{7}{5}$ as many hours to produce a deluxe stereo as it does to produce a basic stereo, then the number of hours it took to produce the deluxe stereos last month was what fraction of the total number of hours it took to produce all the stereos?

A. $\frac{7}{17}$

B. $\frac{14}{31}$

C. $\frac{7}{15}$

D. $\frac{17}{35}$

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

10. A certain machine produces 1,000 units of product P per hour. Working continuously at this constant rate, this machine will produce how many units of product P in 7 days?

- A. 7,000
- B. 24,000
- C. 40,000
- D. 100,000
- E. 168,000

11. If $5^x - 5^{x-3} = (124)(5^y)$, what is y in terms of x?

- A. x
- B. $x - 6$
- C. $x - 3$
- D. $2x + 3$
- E. $2x + 6$

12. Lines k and m are parallel to each other. Is the slope of line k positive?

- (1) Line k passes through the point (3,2).
- (2) Line m passes through the point (-3,2).

13. Theater M has 25 rows with 30 seats in each row. How many of the seats were occupied during a certain show?

- (1) During the show, there was an average (arithmetic mean) of 10 unoccupied seats per row for the front 20 rows.
- (2) During the show, there was an average (arithmetic mean) of 20 unoccupied seats per row for the back 15 rows.

14. The number of defects in the first five cars to come through a new production line are 9, 7, 10, 4 and 6, respectively. If the sixth car through the production line has either 3, 7 or 12 defects, for which of these values does the mean number of defects per car for the first six cars equal the median?

I. 3

II. 7

III. 12

A. I only

B. II only

C. III only

D. I and III only

E. I, II and III

+	x	y	z
d			m
e		n	
f			

15. The figure above shows two entries, indicated by m and n, in an addition table.

What is the value of $n + m$?

(1) $d + y = -3$

(2) $e + z = 12$

16. On a map Town G is 10 centimeters due east of Town H and 8 centimeters due south of Town J. Which of the following is closest to the straight-line distance, in centimeters, between Town H and Town J on the map?

A. 6

B. 13

C. 18

D. 20

E. 24

17. If x is the product of the positive integers from 1 to 8, inclusive, and if i , k , m and p are positive integers such that $x = 2^i 3^k 5^m 7^p$, then $i + k + m + p =$

- A. 4
- B. 7
- C. 8
- D. 11
- E. 12

18. In the xy -plane, the line with equation $ax + by + c = 0$, where $abc \neq 0$, has slope $\frac{2}{3}$. What is the value of b ?

- (1) $a = 4$
- (2) $c = -6$

19. This year Henry will save a certain amount of his income, and he will spend the rest. Next year Henry will have no income, but for each dollar that he saves this year, he will have $1 + r$ dollars available to spend. In term of r , what fraction of his income should Henry save this year so that next year the amount he was available to spend will be equal to half the amount that he spends this year?

- A. $\frac{1}{r+2}$
- B. $\frac{1}{2r+2}$
- C. $\frac{1}{3r+2}$
- D. $\frac{1}{r+3}$
- E. $\frac{1}{2r+3}$

20. Leo can buy a certain computer for p_1 dollars in State A, where the sales tax is t_1 percent, or he can buy the same computer for p_2 dollars in State B, where the sales tax is t_2 percent. Is the total cost of the computer greater in State A than in State B?

(1) $t_1 > t_2$

(2) $p_1 t_1 > p_2 t_2$

21. Is x an odd integer?

(1) $x + 3$ is an even integer.

(2) $\frac{x}{3}$ is an odd integer.

22. The surface of a certain planet reflects 80 percent of the light that strikes it. The clouds around the planet then absorb 40 percent of the reflected light. What percent of the light that strikes the planet is reflected from the surface and passes through the clouds without being absorbed?

A. 32%

B. 40%

C. 48%

D. 60%

E. 88%

23. The selling price of an article is equal to the cost of the article plus the markup. The markup on a certain television set is what percent of the selling price?

(1) The markup on the television set is 25 percent of the cost.

(2) The selling price of the television set is \$250.

24. If $\frac{7x}{3} + a = 8$ and $a > 8$, then, in terms of a , $\frac{3x}{7} =$

A. $\frac{1}{a} + \frac{1}{8}$

B. $\frac{1}{8} - \frac{1}{a}$

C. $\frac{1}{8-a}$

D. $\frac{3(8-a)}{7}$

E. $\frac{9(8-a)}{49}$

25. What is the sum of a certain pair of consecutive odd integers?

(1) At least one of the integers is negative.

(2) At least one of the integers is positive.

26. If an automobile averaged 22.5 miles per gallon of gasoline, approximately how many kilometers per liter of gasoline did the automobile average? (1 mile = 1.6 kilometers and 1 gallon = 3.8 liters, both rounded to the nearest tenth)

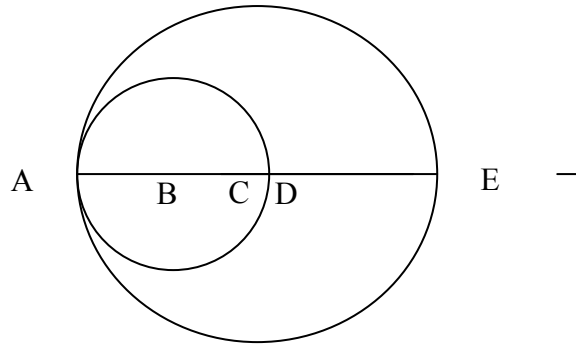
A. 3.7

B. 9.5

C. 31.4

D. 53.4

E. 136.8



27. In the figure, points A, B, C, D and E lie on a line. A is on both circles, B is the center of the smaller circle, C is the center of the larger circle, D is on the smaller circle and E is on the larger circle. What is the area of the region inside the larger circle and outside the smaller circle?

(1) $AB = 4$ and $BC = 2$

(2) $CD = 1$ and $DE = 4$

28. A certain company assigns employees to offices in such a way that some of the offices can be empty and more than one employee can be assigned to an office. In how many ways can the company assign 3 employees to 2 different offices?

A. 5

B. 6

C. 7

D. 8

E. 9

29. If the sequence $x_1, x_2, x_3, \dots, x_n$ is such that $x_1 = 3$ and $x_{n+1} = 2x_n - 1$ for $n \geq 1$, then $x_{20} - x_{19} =$

A. 2^{19}

B. 2^{20}

C. 2^{21}

D. $2^{20} - 1$

E. $2^{21} - 1$

30. If y is the smallest positive integer such that 3,150 multiplied by y is the square of an integer, then y must be

- A. 2
- B. 5
- C. 6
- D. 7
- E. 14

31. A certain quantity is measured on two different scales, the R-scale and the S-scale, that are related linearly. Measurements on the R-scale of 6 and 24 correspond to measurements on the S-scale of 30 and 60 respectively. What measurement on the R-scale corresponds to a measurement of 100 on the S scale?

- A. 20
- B. 36
- C. 48
- D. 60
- E. 84

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

- (1) y is a positive integer.
- (2) x is an integer.

	Favorable	Unfavorable	Not sure
Candidate M	40	20	40
Candidate N	30	35	35

33. The table above shows the results of a survey of 100 votes each responded “favorable” or “unfavorable” or “not sure” when asked about their impressions of candidate M and of candidate N. What was the number of voters who responded “favorable” for both candidates?

- (1) The number of votes who did not respond “favorable” for either candidate was 40.
- (2) The number of votes who responded “unfavorable” for both candidates was 10.

34. 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

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

36. How many integers from 0 to 50, inclusive, have a remainder of 1 when divided by 3?

- A. 15
- B. 16
- C. 17
- D. 18
- E. 19

37. How many different factors does the integer n have?

- (1) $n = a^4b^3$, where a and b are different positive prime numbers.
- (2) The only positive prime numbers that are factors of n are 5 and 7.

Answers for set 8

1. The best answer is E.

The sum of the scores on the 5 test minus the sum of the scores on the 4 tests will give the score on the 5th test $\rightarrow (5 \times 80) - (4 \times 78) = 88$.

2. The best answer is D.

The number of different options to select 2 boys and 2 girls is $\frac{3!}{1! \times 2!} \times \frac{3!}{1! \times 2!} = 9$.

The number of options to select any 4 children is $\frac{6!}{4! \times 2!} = 15$. Therefore the

probability that equal numbers of boys and girls will be selected is $\frac{9}{15} = \frac{3}{5}$.

3. The best answer is C.

The easiest way is to plug in the answers. If $x = 4$ and $y = 2$ or $x = 2$ and $y = 4$, then $1+x+y+xy = 15$.

4. The best answer is C.

(1) Insufficient, $y - 5 = x \rightarrow$ one equation with two variables.

(2) Insufficient, $6x = 5y \rightarrow$ one equation with two variables.

(1+2) Sufficient, two equations with two variables.

5. The best answer is A.

(1) Sufficient, $3^{4n+2} + 1 \rightarrow$ the units' digit of 3^{4n+2} is the same as the units' digit of 3^2 (the units' digit repeats itself every 4 powers) $\rightarrow$ the units' digit of 3^{4n+2} is 9. The units' digit of $3^{4n+2} + 1$ is 0.

(2) Insufficient

6. The best answer is D.

(1) Sufficient, $w = 60(r + s) + 20s$ and $(r + s) = 1 \rightarrow w = 60 + 20s$. Therefore if $r > 0.5$ then $s < 0.5$ and $w < 70$.

(2) Sufficient, $w = 60(r + s) + 20s$ and $(r + s) = 1 \rightarrow w = 60 + 20s$. Therefore if $r > s$ then $s < 0.5$ and $w < 70$.

7. The best answer is A.

The number of different 5-letter code words (with importance for the order of the letters in the code) = $\frac{10!}{5! \times 5!} * 5! = \frac{10!}{5!}$. the number of different 4-letter code words =

$$\frac{10!}{4! \times 6!} * 4! = \frac{10!}{6!} \text{ Therefore the ratio is } \frac{\frac{10!}{5!}}{\frac{10!}{6!}} = \frac{6!}{5!} = \frac{6}{1}.$$

8. The best answer is E.

A fraction has a decimal equivalent that is a terminating decimal if the different prime factors of the denominator after cancellation are 2, 5 or both of them. You should check each of the denominators $\rightarrow 128 = 2^7$.

9. The best answer is A.

Take the number of deluxe stereos as y and the number of hours it takes to produce a basic stereo as x . Therefore it took $2yx$ hours to produce the basic stereos and $\frac{7xy}{5}$ to produce the deluxe stereos. The ratio of the number of hours it took to produce the deluxe stereos to the total number of hours it took to produce all the stereos =

$$\frac{\frac{7xy}{5}}{\frac{17xy}{5}} = \frac{7}{17}.$$

10. The best answer is E.

If the machine produces 1,000 units per hour, then it will produce $24 \times 7 \times 1,000$ units in 7 days.

11. The best answer is C.

$$5^x \left(1 - \frac{1}{125}\right) = (124)(5^y) \Rightarrow 5^{x-y} = \frac{124 \times 125}{124} \Rightarrow 5^{x-y} = 5^3 \Rightarrow x - y = 3.$$

12. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, since the slope of lines k and m can be either positive or negative.

13. The best answer is E.

(1) Insufficient, we do not know the number of unoccupied seats in the last 5 rows.

(2) Insufficient, we do not know the number of unoccupied seats in the first 10 rows.

(1+2) Insufficient, since the front 20 rows and the back 15 rows are congruent. We do not have details about the middle 10 rows that belong to both groups. E.g. each of the first 10 rows is fully occupied and each of the last 15 rows has 20 unoccupied seats. OR each of the first 20 rows has 10 unoccupied seats, and each of the last 5 rows has 30 unoccupied seats.

14. The best answer is D.

Calculate the average and median in each case (it is easier to find the basic average, of the first 5, and then to calculate the change in each case):

I- The mean number is equal to 6.5 and the median is equal to 6.5

II- The mean number is equal to $7\frac{1}{6}$ and the median is equal to 7.

III- The mean number is equal to 8 and the median is equal to 8.

15. The best answer is C.

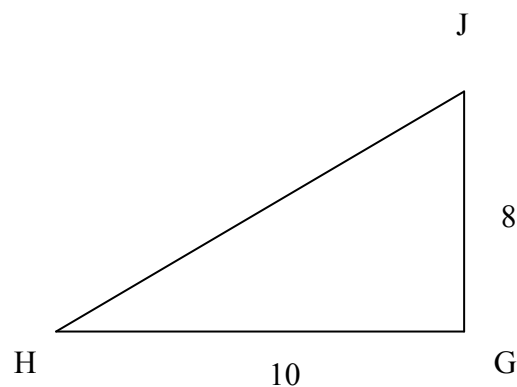
$$z + d = m \text{ and } e + y = n \rightarrow m + n = z + d + e + y.$$

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, since we know that $z + d + e + y = 9$.

16. The best answer is B.



$$HJ = \sqrt{164} \text{ (Pythagorean Theorem).}$$

17. The best answer is D.

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 = 1 \times 2 \times 3 \times 2^2 \times 5 \times 2 \times 3 \times 7 \times 2^3 = 2^7 \times 3^2 \times 5 \times 7$$

18. The best answer is A.

$$y = -\frac{a}{b}x - \frac{a}{c} \rightarrow -\frac{a}{b} = \frac{2}{3} \rightarrow \text{we need to know the value of } a \text{ in order to find the value of } b.$$

(1) Sufficient

(2) Insufficient

19. The best answer is E.

Take 100 as the total income and x as the amount that he will spend this year.

Therefore we are looking for the value of $\frac{100-x}{100}$. $(1+r)(100-x) = \frac{x}{2} \rightarrow 2(1+r)$

$$(100-x) = 100 - (100-x) \rightarrow \frac{100-x}{100} = \frac{1}{2(1+r)+1} = \frac{1}{3+2r}.$$

20. The best answer is E.

(1) Insufficient

(2) Insufficient, using this statement we know that the amount of tax paid is higher in state B than in state A.

(1+2) Insufficient, since we do not know whether p_1 is greater or smaller than p_2

(because $t_1 > t_2$ and also $p_1 t_1 > p_2 t_2$).

21. The best answer is D.

(1) Sufficient, since x has to be odd (even $- 3 =$ odd).

(2) Sufficient, since x has to be odd (odd $\times 3 =$ odd).

22. The best answer is C.

Take 100 as the light that strikes the planet. Therefore 80 is the light that the surface of the planet reflects (80% from 100) and 48 is the light that the clouds do not absorb (60% from 80).

23. The best answer is A.

(1) Sufficient, notice that we should find only the ratio between the markup and the selling price. Take x as the cost $\rightarrow$ the markup is $0.25x$ and the selling price is $1.25x$.

(2) Insufficient

24. The best answer is E.

$$\frac{7x}{3} = 8 - a \rightarrow \frac{49x}{21} = 8 - a \rightarrow \frac{x}{21} = \frac{8 - a}{49} \rightarrow \frac{9x}{21} = \frac{9(8 - a)}{49} \rightarrow \frac{3x}{7} = \frac{9(8 - a)}{49}$$

25. The best answer is C.

(1) Insufficient, e.g. (-1) and (-3) or (-1) and 1.

(2) Insufficient, e.g. 1 and 3 or 3 and 5.

(1+2) Sufficient, since there is only one suitable pair (-1) and 1.

26. The best answer is B.

$22.5 \times 1.6 = 36 \rightarrow$ therefore the automobile averaged 36 kilometer per gallon.

$\frac{36}{1 \times 3.8} = 9.473 \rightarrow$ therefore the auto mobile averaged approximately 9.5 kilometer per liter.

27. The best answer is D.

We need to find the area of the smaller and the larger circles $\rightarrow$ we need to find the small radius and the big radius (AB and AC).

(1) Sufficient, $AB + BC = AC \rightarrow AC = 6$ and $AB = 4$.

(2) Sufficient, $AC = CD + DE = 5$ and $AB = \frac{AC + CD}{2} = 3$.

28. The best answer is D.

Each of the three employees has two optional offices to work in: $2 \times 2 \times 2 = 8$.

29. The best answer is A.

$x_1 = 3, x_2 = 5, x_3 = 9, x_4 = 17, x_5 = 33 \dots$ we can see a pattern of the differences

between any two consecutive terms: $x_2 - x_1 = 2, x_3 - x_2 = 2^2, x_4 - x_3 = 2^3,$

$x_5 - x_4 = 2^4 \dots \rightarrow x_{20} - x_{19} = 2^{19}.$

30. The best answer is E.

$3,150 = 2 \times 3 \times 3 \times 5 \times 5 \times 7 \rightarrow$ in order to get a square of an integer we need pairs of prime number. Therefore $y = 2 \times 7 = 14$

$$\left[3,150 * 14 = 2^2 * 3^2 * 5^2 * 7^2 = (2 * 3 * 5 * 7)^2 = 210^2 \right]$$

31. The best answer is C.

We have two different points (6,30) and (24,60). You should find the equation of the

line between those two points $\rightarrow$ the slope of the line is: $\frac{60 - 30}{24 - 6} = \frac{5}{3} \rightarrow$ therefore the

equation of the line is: $y = \frac{5}{3}x + 20$. Now you should plug in $y = 100$.

32. The best answer is C.

(1) Insufficient, x doesn't have to be an integer $\rightarrow$ e.g. $y=2$ and $x=6.78$ or $y=5$ and $x=2$

(2) Insufficient, y doesn't have to be an integer

(1+2) Sufficient, $5000 = 5^4 * 2^3 \rightarrow y = 5$ and $x = 2$.

33. The best answer is A.

(1) Sufficient, the number of voters who responded "favorable" for candidates M or N or for both is 60. Take x as the number of voters who responded "favorable" for both candidates $\rightarrow 60 = 40 + 30 - x$.

(2) Insufficient

34. The best answer is E.

The units digit of 3^{8n+3} is the same as the units digit of 3^3 (repeats itself every 4 powers) $\rightarrow$ The units digit of 3^{8n+3} is 7 $\rightarrow$ The units digit of $3^{8n+3} + 2$ is 9 $\rightarrow$ the remainder is 4.

35. The best answer is B.

Take $2y$ as the height of the carton. Then the volume of the carton is $3y \times 2y \times 2y =$

$$x \rightarrow y = \sqrt[3]{\frac{x}{12}} \rightarrow 2y = \sqrt[3]{\frac{2x}{3}}.$$

36. The best answer is C.

$$a_1 = 1, a_n = 49, d = 3, n = ? \rightarrow \frac{49-1}{3} + 1 = 17.$$

37. The best answer is A.

(1) Sufficient, since we can find how many different factors does the integer n have

(1, a , b , ab , ab^2 , ab^3 , a^2 , a^2b , etc.).

(2) Insufficient, e.g. 35 or 175.