

Set 7

1. At a certain company, the average (arithmetic mean) salary of 10 of the employees is \$30,000, the average salary of 30 other employees is \$40,000 and the average salary of the remaining 20 employees is \$60,000. What is the average salary of the 60 employees at the company?

- A. \$40,000
- B. \$43,000
- C. \$45,000
- D. \$60,000
- E. \$65,000

2. The ratio of the number of women to the number of men to the number of children in a room is 5:2:7, respectively. What is the total number of people in the room?

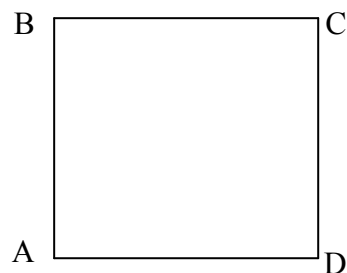
- (1) The total number of women and children in the room is 12.
- (2) There are fewer than 4 men in the room.

3. A coin that is tossed will land heads or tails, and each outcome has equal probability. What is the probability that the coin will land heads at least once on two tosses?

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

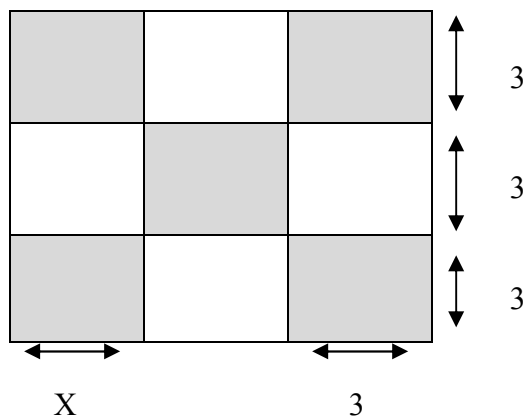
4. On a certain data, Hannah invested \$5,000 at x percent simple annual interest and a different amount at y percent simple annual interest. What amount did Hannah invest at y percent simple annual interest?

- (1) The total amount of interest earned by Hannah's two investments in one year was \$900.
- (2) Hannah invested the \$5,000 at 6 percent simple annual interest.



5. Is quadrilateral ABCD a square?

- (1) $AB = BC = CD = DA$
- (2) $\angle BAD + \angle ADC = 180^\circ$



6. The figure above represents a square garden that is divided into 9 rectangular regions with indicated dimensions in meters. The gray regions are planted with peas, and the unmarked regions are planted with tomatoes. If the sum of the areas of the regions planted with peas is equal to the sum of the areas of the regions planted with tomatoes, what is the value of X ?

- A. 0.5 B. 1 C. 1.5 D. 2 E. 2.5

7. If y is an integer and $y = |x| + x$, is $y = 0$?

(1) $x < 0$

(2) $y < 1$

8. In the sequence 1, 2, 4, 8, 16, 32..., each term after the first is twice the previous term. What is the sum of the 16th, 17th and 18th terms in the sequence?

A. 2^{18}

B. $3(2^{17})$

C. $7(2^{16})$

D. $3(2^{16})$

E. $7(2^{15})$

9. How many years did Dr. Jones live?

(1) If Dr. Jones had become a doctor 10 years earlier than he did, he would have been a doctor for exactly $\frac{2}{3}$ of his life.

(2) If Dr. Jones had become a doctor 10 years later than he did, he would have been a doctor for exactly $\frac{1}{3}$ of his life.

10. What is the hundreds digit of the integer z ?

(1) $10z = 93,120$

(2) z rounded to the nearest hundred is 9,300.

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

(1) $n = a^4 b^3$, where a and b are different positive prime numbers.

(2) The only positive prime numbers that are factors of n are 5 and 7.

12. If the function defined by $f(x) = x^2(1 - x)^2$ for all x , then $f(1 - x) =$

- A. $f(x)$
- B. $[f(x)]^2$
- C. $1 - f(x)$
- D. $(1 - x)f(x)$
- E. $f(1) - f(x)$

13. If x is negative, is $x > -3$?

- (1) $x^2 < 9$
- (2) $x^3 < -9$

14. A three-digit code for certain logs uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 according to the following constraints. The first digit cannot be 0 or 1, the second digit must be 0 or 1, and the second and third digits cannot both be 0 in the same code. How many different codes are possible?

- A. 144
- B. 152
- C. 160
- D. 168
- E. 176

15. If the average (arithmetic mean) of 5 different numbers is 12, what is the median of the 5 numbers?

- (1) The median of the 5 numbers is equal to $\frac{1}{3}$ of the sum of the 4 numbers other than the median.
- (2) The sum of the 4 numbers other than the median is equal to 45.

16. If n is an integer greater than 6, which of the following must be divisible by 6?

- A. $n(n + 1)(n - 4)$
- B. $n(n + 2)(n - 1)$
- C. $n(n + 3)(n - 5)$
- D. $n(n + 4)(n - 2)$
- E. $n(n + 5)(n - 6)$

17. A doctor prescribed 18 cubic centimeters of a certain drug to a patient whose body weight was 120 pounds. If the typical dosage is 2 cubic centimeters per 15 pounds of body weight, by what percent was the prescribed dosage greater than the typical dosage?

- A. 8
- B. 9
- C. 11
- D. 12.5
- E. 14.8

18. If $9x = 27^y$, which of the following expresses x in terms of y ?

- A. 3^y
- B. 3^{y-1}
- C. 3^{2y-1}
- D. 3^{2y-3}
- E. 3^{3y-2}

19. What is the value of xy ?

(1) $2^{(x+y)} = 4$

(2) $2^{(x+3y)} = 16$

20. Was Lisa's annual salary at least twice as much as Julie's annual salary?

- (1) Lisa's annual salary was \$20,000 more than Julie's annual salary.
- (2) Lisa's annual salary was less than \$40,000.

21. An object thrown directly upward is at a height of h feet after t seconds, where $h = -16(t - 3)^2 + 150$. At what height, in feet, is the object 2 seconds after it reaches its maximum height?

- A. 6
- B. 86
- C. 134
- D. 150
- E. 214

22. At a monthly meeting, $\frac{2}{5}$ of the attendees were males and $\frac{7}{8}$ of the male attendees arrived on time. If $\frac{9}{10}$ of the female attendees arrived on time, what fraction of the attendees at the monthly meeting did not arrive on time?

- A. $\frac{11}{100}$
- B. $\frac{3}{25}$
- C. $\frac{7}{50}$
- D. $\frac{3}{20}$
- E. $\frac{4}{25}$

23. If $x^2 - y = w$, what is the value of x ?

(1) $w + y = 4$

(2) $y = 1$

24. If w , x , y and z are integers such that $1 < w < x < y < z$ and $wxyz = 462$, then $z =$?

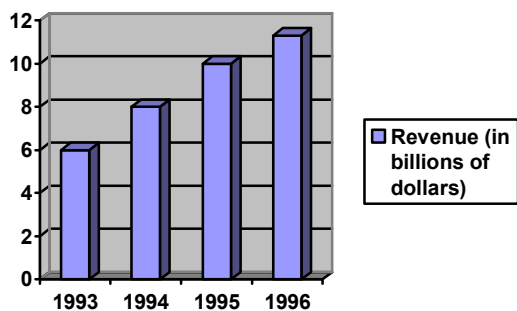
A. 7

B. 11

C. 14

D. 21

E. 42



25. The graph above shows the combined revenue, in billions of dollars, of a chain of food stores for each year over a four-year period (1993 – 6.0, 1994 – 8.0, 1995 – 10.0, 1996 – 11.3). In 1994 a certain store's revenue accounted for 2.0 percent of the combined revenue for that year, and in the 1995 the same store accounted for 2.3 percent of the combined revenue for that year. What was the approximate percent increase in revenue for this store from 1994 to 1995?

A. 0.3%

B. 15.0%

C. 25.0%

D. 30.4%

E. 43.8%

26. When $15n$ is divided by 6 (where n is a positive integer), the remainder is x . What is the value of x ?

(1) When n is divided by 2, the remainder is 0.

(2) When n is divided by 3, the remainder is 0.

27. In a survey, 2,500 executives were each asked whether they read Newsletter A or Newsletter B. According to the survey, 55 percent of the executives read Newsletter A, 62 percent read Newsletter B and 37 percent read both Newsletter A and Newsletter B. How many of the executives surveyed read neither Newsletter A nor Newsletter B?

A. 425

B. 500

C. 600

D. 675

E. 750

28. The product of the units digit, the tens digit, and the hundreds digit of the positive integer m is 96. What is the units' digit of m ?

(1) m is odd.

(2) The hundreds digit of m is 8.

29. The points R, T and U lie on a circle that has radius 4. If the length of arc RTU is $\frac{4\pi}{3}$, what is the length of line segment RU?

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

B. $\frac{8}{3}$

C. 3

D. 4

E. 6

30. 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.

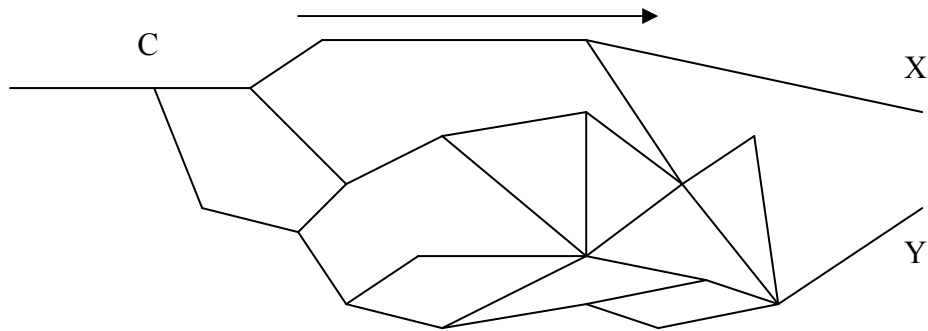
31. One kilogram of a certain coffee blend consists of x kilogram of type I coffee and y kilogram of type II coffee. The cost of the blend is C dollars per kilogram, where $C = 6.5x + 8.5y$. Is $x < 0.8$?

- (1) $y > 0.15$
- (2) $C \geq 7.3$

32. If $k = -1$, which of the following is true?

- I. $k^k = k$
- II. $|k| = -k$
- III. $k^0 = -k$

- A. I only
- B. I and II only
- C. I and III only
- D. II and III only
- E. I, II and III



33. The figure above represents a system of roads along which traffic flows in the direction indicated by the arrow. If the traffic were to split evenly at each fork of the road system, what percent of the traffic entering fork C would exit at Y?

- A. 87.5%
- B. 75%
- C. 62.5%
- D. 50%
- E. 12.5%

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

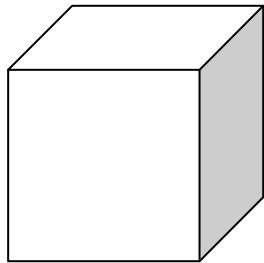
- (1) When x is divided by 6, the remainder is 3.
- (2) When y is divided by 6, the remainder is 1.

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

- (1) $\frac{1}{(x+y)} = -1$
- (2) $xy = 6(x+y)$

36. If $b(a + 1) = b$, then $ab =$

- A. -1
- B. 0
- C. 1
- D. a
- E. b



37. 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

Answers for set 7

1. The best answer is C.

$$\frac{10 \times 30,000 + 30 \times 40,000 + 20 \times 60,000}{60} = 10 \times 500 + 20,000 + 20 \times 1,000 = 45,000$$

2. The best answer is D.

The ratio is 5:2:7, thus we can say that the number of women, the number of men and the number of children is $5n$, $2n$ and $7n$, respectively.

(1) Sufficient, $5n+7n=12 \rightarrow n=1 \rightarrow$ there are 5 women, 2 men and 7 children.

(2) Sufficient, $2n < 4 \rightarrow$ the only possible value of n is 1 (n is a natural number) $\rightarrow$ there are 5 women, 2 men and 7 children.

3. The best answer is E.

The probability that the coin will land heads at least once on two tosses = $1 -$ the

probability that the coin will land tails twice on two tosses $\rightarrow 1 - \frac{1}{2} \times \frac{1}{2} = \frac{3}{4}$.

4. The best answer is E.

(1) Insufficient

(2) Insufficient

(1+2) Insufficient, take z as the amount that Hannah invested at y percent $\rightarrow$

$$5,000 \times 0.06 + \frac{y}{100} z = 900. \text{ We have one equation with two unknowns.}$$

5. The best answer is E.

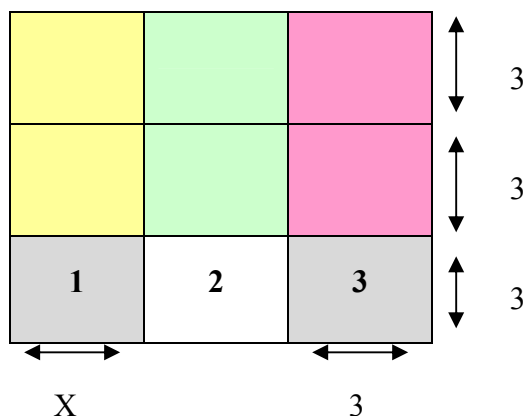
(1) Insufficient

(2) Insufficient

(1+2) Insufficient, ABCD can be either a square or a rhombus.

6. The best answer is C.

The garden is a square → the dimensions of the square are 9 meters on 9 meters.



The two yellow regions are equal in size (same dimensions), the two green regions are equal in size and the two pink regions are equal in size → the area of regions 1 and 3 is equal to the area of region 2 → $3X + 9 = 3(6 - X)$ → $X = 1.5$.

7. The best answer is D.

(1) Sufficient, if $x < 0$ then $|x| + x = 0$.

(2) Sufficient, y is an integer and $y < 1$ → $y = 0$ ($|x| + x$ can not be negative)

8. The best answer is E.

We can write the terms in the sequence as powers of 2: $2^0, 2^1, 2^2, \dots$ → the sum of the 16th, 17th and 18th terms in the sequence is equal to: $2^{15} + 2^{16} + 2^{17} = 2^{15}(1 + 2 + 4) = 7(2^{15})$.

9. The best answer is C.

Take x as the number of years that Dr. Jones lived, and y as the number of years that Dr. Jones had been a doctor.

(1) Insufficient, $\frac{2x}{3} = y + 10$ (one equation with two unknowns).

(2) Insufficient, $\frac{x}{3} = y - 10$ (one equation with two unknowns).

(1+2) Sufficient, we can subtract one equation from the other to find that $y = 30$ and $x = 60$ (two equations with two unknowns).

10. The best answer is A.

- (1) Sufficient, $10z = 93,120 \rightarrow z = 9,312 \rightarrow$ the hundreds digit of z is 3.
- (2) Insufficient, the hundreds digit of z can be either 2 or 3.

11. The best answer is A.

- (1) Sufficient, notice that a and b are different prime factors. Therefore, we can find how many different factors n has ($1, a, b, a^2b, ab^2, a^2b^2 \dots$).
- (2) Insufficient, e.g. $7 \cdot 5 = 35$ has 4 different factors ($1, 5, 7, 35$) and $5 \cdot 5 \cdot 7 = 175$ has 6 different factors ($1, 5, 7, 25, 35, 175$).

12. The best answer is A

$$f(1-x) = (1-x)^2(1-(1-x))^2 = (1-x)^2x^2 = f(x)$$

13. The best answer is A.

- (1) Sufficient, $x^2 < 9 \rightarrow -3 < x < 3 \rightarrow x > -3$.
- (2) Insufficient, $x^3 < -9 \rightarrow x < \sqrt[3]{-9} \rightarrow$ The third root of -9 is bigger than $-3 \rightarrow x$ can be greater or lower than -3 .

14. The best answer is B.

The first digit can be 2, 3, 4, 5, 6, 7, 8 or 9 (8 options). The second digit can be 0 or 1 (2 options) and the third digit can be 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9 (10 options). Notice that the second and third digits cannot both be 0 in the same code. Therefore 8 options are impossible (100, 200, etc.). The number of possible codes is $8 \times 2 \times 10 - 8 = 152$.

15. The best answer is D.

- (1) Sufficient, take x as the median and y as the sum of the other 4 numbers $\rightarrow x + y = 60$ and $x = \frac{y}{3} \rightarrow x = 15$ (two equations with 2 unknowns).
- (2) Sufficient, the average of the 5 numbers is 12 $\rightarrow$ the sum of the 5 numbers is 60 $\rightarrow$ the median is 15 ($60 - 45$).

16. The best answer is A.

The product of three consecutive integers is divisible by 6 because one integer has to be divisible by 3, and at least one integer is divisible by 2 $\rightarrow n(n+1)(n-1)$ is divisible by 6. If the integer $(n-1)$ is the one that is divisible by 3, then $(n-4)$ is also divisible by 3 (and any other integer that is equal to $(n-1)+3k$) $\rightarrow n(n+1)(n-4)$ is divisible by 6.

17. The best answer is D.

Take x as the typical dosage for a patient whose body weight is 120 pounds $\rightarrow$

$$\frac{2}{15} = \frac{x}{120} \rightarrow x = 16.$$

Take y as the percent that the prescribed dosage was greater than the typical dosage

$$\rightarrow \frac{18-16}{16} \times 100 = y \rightarrow y = 12.5.$$

18. The best answer is E.

$$9x = 27^y \rightarrow 9x = 3^{3y} \rightarrow x = \frac{3^{3y}}{3^2} = 3^{3y-2}$$

19. The best answer is C.

(1) Insufficient, $(x+y) = 2$

(2) Insufficient, $(x+3y) = 4$

(1+2) Sufficient, 2 equations with 2 unknowns.

20. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, if Lisa's annual salary was \$40,000, then Lisa's annual salary was twice as much as Julie's annual salary (using statement 1). Lisa's annual salary was less than \$40,000 $\rightarrow$ Lisa's annual salary was at least twice as much as Julie's annual salary.

21. The best answer is B.

The maximum height is when $(t-3) = 0 \rightarrow$ The maximum height is after 3 seconds $\rightarrow$
Therefore we need to plug in $t = 3+2 = 5 \rightarrow h = 86$.

22. The best answer is A.

Take 100 as the number of the attendees at the monthly meeting. Therefore 40 of the attendees were males and 5 of them did not arrive on time. 6 of the females did not arrive on time. Therefore 11 of the 100 attendees did not arrive on time.

23. The best answer is E.

(1) Insufficient, $x^2 = 4 \rightarrow x = 2$ or -2 .

(2) Insufficient

(1+2) Insufficient, $x^2 = 4 \rightarrow x = 2$ or -2 .

24. The best answer is B.

Find the prime factors of 462: $462 = 2 \times 3 \times 7 \times 11$ and we know that $2 < 3 < 7 < 11 \rightarrow z=11$

25. The best answer is E.

2 percent of 8 billions are 0.16 billions. 2.3 percent of 10 billions are 0.23 billions $\rightarrow$

$$\frac{0.23 - 0.16}{0.16} * 100 = X \rightarrow \frac{0.07}{0.16} * 100 = \frac{0.08 - 0.01}{0.16} * 100 = \frac{1}{2} - \frac{1}{16} * 100 = X \rightarrow X=43.75$$

26 The best answer is A.

$15n=12n+3n \rightarrow 12n$ is divided by 6, and when a multiple of three ($3n$) is divided by 6 the remainder can be either 3 (when n is odd) or 0 (when n is even).

(1) Sufficient, according to the explanation above. It is also possible to plug in several numbers: $15n$ can be 30, 60, 90, 120... ($x = 0$).

(2) Insufficient, $15n$ can be 45, 90, 135... ($x = 3$ or 0).

27. The best answer is B.

Take x as the percent of the executives that read neither Newsletter A nor Newsletter B $\rightarrow 100 - x = 55 + 62 - 37 \rightarrow x = 20 \rightarrow 20$ percent of 2500 are 500.

28. The best answer is A.

Find the prime factors of 96: $96 = 2^5 \times 3$

(1) Sufficient, if m is odd it's units digit has to be 3.

(2) Insufficient, e.g. 834 or 843.

29. The best answer is D.

The length of an arc = $\frac{\text{central angle}}{360^\circ} \times 2\pi r \rightarrow$ take x as the central angle and O as

the center of the circle $\rightarrow 8\pi \times \frac{x}{360^\circ} = \frac{4\pi}{3} \rightarrow x = 60^\circ \rightarrow$ triangle ORU is an

equilateral triangle $\rightarrow RU = 4$.

30. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, since we know that 40 percents ($100 - 25 - 35 = 40$) of the projects have 3 employees. Therefore 3 is the median number.

31. The best answer is B.

(1) Insufficient, since $x + y = 1$, e.g. $x = 0.7$ and $y = 0.3$ or $x = 0.83$ and $y = 0.17$.

(2) Sufficient, $c = 6.5x + 8.5y \rightarrow c = 6.5(x + y) + 2y \rightarrow c = 6.5 + 2y \rightarrow$ therefore if $c \geq 7.3$ then $6.5 + 2y \geq 7.3 \rightarrow y \geq 0.4 \rightarrow x \leq 0.6$

32. The best answer is E.

I. $(-1)^{(-1)} = -1$

II. $1 = -(-1)$

III. $1 = -(-1)$

33. The best answer is A.

The probability to choose one road at each of the forks of the road system is 0.5.

Therefore the probability to exit at X is: $0.5^3 = 0.125 \rightarrow$ the probability to exit at Y is $1 - 0.125 = 0.875$.

34. The best answer is C.

(1) Insufficient

(2) Insufficient

(1+2) Sufficient, we can write x as $6n+3$ (n is a non-negative integer) and y as $6m+1$ (m is a non-negative integer) $\rightarrow (x + y) = (3 + 6n + 1 + 6m) = 4 + 6(n + m) \rightarrow$ the remainder is 4.

35. The best answer is B.

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

(1) Insufficient

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

36. The best answer is B.

Divide the equation by b to find that: $a + 1 = 1 \rightarrow a=0 \rightarrow ab = 0$.

37. The best answer is A.

The dimensions of the rectangular solid are 5, 3 and 4:

$$\left[\begin{cases} X \times Y = 12 \\ X \times Z = 15 \Rightarrow X = 3 \rightarrow Y = 4 \rightarrow Z = 5 \\ Y \times Z = 20 \end{cases} \right]. \text{ Therefore the volume of the solid is}$$

$$5 \times 4 \times 3 = 60.$$