RATIO AND VARIATION:

Multiple-Choice

1. A recipe for 4 servings requires salt and pepper to be added in the ratio of 2 : 3. If the recipe is adjusted from 4 to 8 servings, what is the ratio of the salt and pepper that must now be added?

   (A) 4 : 3
   (B) 2 : 6
   (C) 2 : 3
   (D) 3 : 2

2. On a certain map, $\frac{3}{8}$ of an inch represents 120 miles. How many miles does $1\frac{3}{4}$ inches represent?

   (A) 300
   (B) 360
   (C) 480
   (D) 560

3. The population of a bacteria culture doubles in number every 12 minutes. The ratio of the number of bacteria at the end of 1 hour to the number of bacteria at the beginning of that hour is

   (A) 64 : 1
   (B) 60 : 1
   (C) 32 : 1
   (D) 16 : 1

4. At the end of the season, the ratio of the number of games a team has won to the number of games it lost is 4 : 3. If the team won 12 games and each game played ended in either a win or a loss, how many games did the team play during the season?

   (A) 9
   (B) 15
   (C) 18
   (D) 21

5. If s and t are integers, $8 < t < 40$, and $\frac{s}{t} = \frac{4}{7}$, how many possible values are there for t?

   (A) Two
   (B) Three
   (C) Four
   (D) Five

6. A school club includes only sophomores, juniors, and seniors, in the ratio of 1 : 3 : 2. If the club has 42 members, how many seniors are in the club?

   (A) 6
   (B) 7
   (C) 12
   (D) 14

7. If $\frac{c-3d}{4}=\frac{d}{2}$, what is the ratio of c to d?

   (A) 5 : 1
   (B) 3 : 2
   (C) 4 : 3
   (D) 3 : 4

8. If 4 pairs of socks costs $10.00, how many pairs of socks can be purchased for $22.50?

   (A) 5
   (B) 7
   (C) 8
   (D) 9

9. Two boys can paint a fence in 5 hours. How many hours would it take 3 boys to paint the same fence?

   (A) $\frac{3}{2}$
   (B) 3
   (C) $3\frac{1}{3}$
   (D) $4\frac{2}{3}$

10. A car moving at a constant rate travels 96 miles in 2 hours. If the car maintains this rate, how many miles will the car travel in 5 hours?

    (A) 480
    (B) 240
    (C) 210
    (D) 192

11. The number of kilograms of corn needed to feed 5,000 chickens is 30 less than twice the number of kilograms needed to feed 2,800 chickens. How many kilograms of corn are needed to feed 2,800 chickens?

    (A) 70
    (B) 110
    (C) 140
    (D) 190

12. The number of calories burned while jogging varies directly with the number of minutes spent jogging. If George burns 180 calories by jogging for 25 minutes, how many calories does he burn by jogging for 40 minutes?

    (A) 200
    (B) 276
    (C) 288
    (D) 300

13. If y varies directly as x and $y = 12$ when $x = c$, what is y in terms of c when $x = 8$?

(A) $\frac{2c}{3}$

(B) $\frac{3}{2c}$

(C) $20c$

(D) $\frac{96}{c}$

$$\frac{x}{z} = \frac{1}{3}$$

14. If in the equation above x and z are integers, which are possible values of $\frac{x^2}{z}$?

I. $\frac{1}{9}$

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

III. 3

(A) II only
(B) III only
(C) I and III only
(D) II and III only

15. If $a - 3b = 9b - 7a$, then the ratio of a to b is

(A) 3 : 2
(B) 2 : 3
(C) 3 : 4
(D) 4 : 3

16. The ratio of A to B is $a : 8$, and the ratio of B to C is $12 : c$. If the ratio of A to C is $2 : 1$, what is the ratio of a to c?

(A) 2 : 3
(B) 3 : 2
(C) 4 : 3
(D) 3 : 4

17. If $8^r = 4^t$, what is the ratio of r to t?

(A) 2 : 3
(B) 3 : 2
(C) 4 : 3
(D) 3 : 4

18. If $\frac{a+b}{b} = 4$ and $\frac{a+c}{c} = 3$, what is the ratio of c to b?

(A) 2 : 3
(B) 3 : 2
(C) 2 : 1
(D) 3 : 1

19. In a certain college, the ratio of mathematics majors to English majors is 3 : 8. If in the following school year the number of mathematics majors increases 20% and the number of English majors decreases 15%, what is the new ratio of mathematics majors to English majors?

(A) 4 : 9
(B) 1 : 2
(C) 9 : 17
(D) 17 : 32

20. At a college basketball game, the ratio of the number of freshmen who attended to the number of juniors who attended is 3 : 4. The ratio of the number of juniors who attended to the number of seniors who attended is 7 : 6. What is the ratio of the number of freshmen to the number of seniors who attended the basketball game?

(A) 7 : 8
(B) 3 : 4
(C) 2 : 3
(D) 1 : 2

21. It took 12 men 5 hours to build an airstrip. Working at the same rate, how many additional men could have been hired in order for the job to have taken 1 hour less?

(A) Two
(B) Three
(C) Four
(D) Six

22. If x represents a number picked at random from the set $\{-3, -2, -1, 0, 1, 2\}$, what is the probability that x will satisfy the inequality $4 - 3x < 6$?

(A) $\frac{1}{6}$
(B) $\frac{1}{3}$
(C) $\frac{1}{2}$
(D) $\frac{2}{3}$

23. What are the coordinates of the point P in the xy-plane that divides the segment whose endpoints are $A(-2, 9)$ and $B(7, 3)$ into two segments such that the ratio of AP to PB is 1 to 2?

(A) $P(1, 5)$
(B) $P(4, 1)$
(C) $P(1, 7)$
(D) $P(2, 6)$

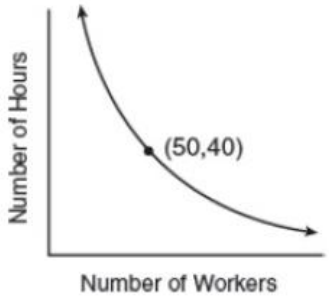
Grid-In

1. A string is cut into 2 pieces that have lengths in the ratio of 2 : 9. If the difference between the lengths of the 2 pieces of string is 42 inches, what is the length in inches of the shorter piece?

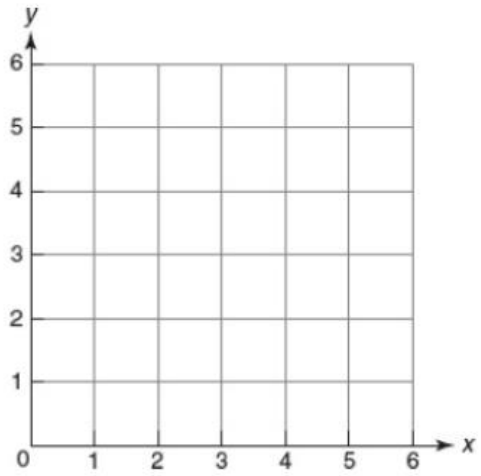
2. For integer values of a and b, $b^a = 8$. The ratio of a to b is equivalent to the ratio of c to d, where c

and d are integers. What is the value of c when $d = 10$?

3. Jars A, B, and C each contain 8 marbles. What is the minimum number of marbles that must be transferred among the jars so that the ratio of the number of marbles in jar A to the number in jar B to the number in jar C is 1 : 2 : 3?



4. A political campaign organizer has determined that the number of hours needed to get out a mailing for her candidate is inversely related to the number of campaign workers she has. If she uses the information in the accompanying graph, how many hours would it take to do the mailing if 125 workers are used?



5. A square dartboard is placed in the first quadrant from $x = 0$ to 6 and $y = 0$ to 6, as shown in the accompanying figure. A triangular region on the dartboard is enclosed by the graphs of the equations $y = 2$, $x = 6$, and $y = x$ (not shown). Find the probability that a dart that randomly hits the dartboard will land in the triangular region formed by the three lines.