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**Online Homework**

**Focused Exercises for Math SAT**

**Skill Set 3: Fractions, Proportions, and Inverse Relations**

Many of the problems in this exercise set came from The College Board, writers of the SAT exam.

1. If  $y$  is inversely proportional to  $x$  and  $y = 15$  when  $x = 5$ , what is the value of  $y$  when  $x = 25$  ?

(A)  $\frac{1}{5}$

(B)  $\frac{1}{3}$

(C) 3

(D) 5

(E) 75

2.  $\frac{3 + \diamond}{2} = 7\frac{1}{2}$

What number, when used in place of  $\diamond$  above, makes the statement true?

(A) 4

(B) 5

(C) 9

(D) 12

(E) 15

3. If  $\frac{x}{y} = \frac{2}{3}$ , what is the value of  $\frac{3x}{2y}$  ?

(A)  $\frac{1}{3}$

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

(C) 1

(D)  $\frac{3}{2}$

(E)  $\frac{9}{4}$

4. If  $x = \frac{1}{2}$ , what is the value of  $\frac{1}{x} + \frac{1}{x-1}$ ?

- (A) -4
- (B) 0
- (C) 1
- (D) 2
- (E) 3

5. If  $a$ ,  $b$ ,  $c$ , and  $f$  are four nonzero numbers, then all of the following proportions are equivalent EXCEPT

(A)  $\frac{a}{f} = \frac{b}{c}$

(B)  $\frac{f}{c} = \frac{b}{a}$

(C)  $\frac{c}{a} = \frac{f}{b}$

(D)  $\frac{a}{c} = \frac{b}{f}$

(E)  $\frac{af}{bc} = \frac{1}{1}$

6. If  $\frac{x}{4} = \frac{2x}{a}$  and  $x \neq 0$ , what is the value of  $a$ ?

- (A) 8
- (B) 4
- (C) 2
- (D)  $\frac{1}{2}$
- (E)  $\frac{1}{4}$

7. If  $2(x - 3) = 8$ , what does  $\frac{x - 3}{x + 3}$  equal?
8. For the function  $f$ ,  $y = f(x)$  is inversely proportional to  $x$ , where  $x > 0$ . If  $f(3) = 6$ , what is the value of  $f(2)$ ?
- (A) 4  
(B) 8  
(C) 9  
(D) 12  
(E) 18
9. If  $y = \frac{5x^3}{z}$ , what happens to the value of  $y$  when both  $x$  and  $z$  are doubled?
- (A)  $y$  is not changed  
(B)  $y$  is halved  
(C)  $y$  is doubled  
(D)  $y$  is tripled  
(E)  $y$  is multiplied by 4
10. If  $n$  is a positive integer and  $\frac{n + 1}{2^n} = \frac{1}{2}$ , then  $n =$
- (A) 1  
(B) 2  
(C) 3  
(D) 4  
(E) 5

11. If  $y$  is directly proportional to  $x^2$  and  $y = \frac{1}{8}$  when  $x = \frac{1}{2}$ , what is the positive value of  $x$  when  $y = \frac{9}{2}$ ?

(A)  $\frac{3}{4}$

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

(C)  $\frac{9}{4}$

(D) 3

(E) 9

12. If  $x$  is  $\frac{1}{5}$  of  $y$ ,  $y$  is  $\frac{3}{10}$  of  $z$ , and  $z > 0$ , then  $x$  is what fraction of  $z$ ?

13. If  $\frac{x}{x-2} = \frac{39}{37}$ , then  $x =$

(A) 37

(B) 39

(C) 41

(D) 74

(E) 78

14. If  $\binom{n}{n-1} \binom{1}{n} \binom{n}{n+1} = \frac{5}{k}$  for positive integers  $n$  and  $k$ , what is the value of  $k$ ?

(A) 1

(B) 5

(C) 24

(D) 25

(E) 26

15. The ratio 1.2 to 1 is equal to which of the following ratios?
- (A) 1 to 2
  - (B) 12 to 1
  - (C) 5 to 6
  - (D) 6 to 5
  - (E) 6 to 50
16. On a blueprint,  $\frac{1}{4}$  inch represents 16 feet. If a driveway is 40 feet long, what is the length, in inches, on the map?
- (A)  $\frac{3}{8}$
  - (B)  $\frac{5}{8}$
  - (C)  $\frac{3}{4}$
  - (D)  $2\frac{1}{2}$
  - (E) 10

17. The length of a drawing of a tool is  $\frac{3}{8}$  of the length of the actual tool. If the length of the drawing of the tool is 6 inches, what is the length, in inches, of the actual tool?
- (A)  $2\frac{1}{4}$
- (B)  $8\frac{1}{4}$
- (C) 16
- (D)  $18\frac{1}{4}$
- (E) 22
18. How many different integer pairs  $(x, y)$  satisfy the equation  $\frac{x}{y} = \frac{1}{2}$  ?
- (A) One
- (B) Two
- (C) Three
- (D) Four
- (E) More than four
19. It takes 4 complete turns of a crank to raise a window 2 inches. At this rate, how many turns does it take to raise the same window  $3\frac{1}{2}$  inches?
- (A) 3.5
- (B) 7
- (C) 12
- (D) 14
- (E) 35

20. If  $\frac{3}{7}$  of  $n$  is 42, what is  $\frac{5}{7}$  of  $n$ ?
- (A) 70  
(B) 45  
(C) 30  
(D) 18  
(E) 10
21. If the ratio of  $q$  to  $r$  is 4 to 5, which of the following could be true?
- (A)  $q=0, r=\frac{4}{5}$   
(B)  $q=2, r=\frac{5}{2}$   
(C)  $q=5, r=6$   
(D)  $q=15, r=12$   
(E)  $q=16, r=25$
22. If  $s=\frac{1}{x}$  and  $q=\frac{1}{y}$  and if  $x=2$  and  $y=3$ , what is the value of  $\frac{1}{s} + \frac{1}{q}$ ?
23. If  $\frac{x}{y} = -1$ , then  $x + y =$
- (A) 0  
(B) 1  
(C)  $x$   
(D)  $y$   
(E)  $2x$
24. The ratio of 1.5 to 32 is the same as the ratio of 0.15 to  $x$ . What is the value of  $x$ ?
25. The expression  $\frac{3x-1}{4} + \frac{x+6}{4}$  is how much more than  $x$ ?



26. If  $\frac{p}{r} = \frac{5}{2}$  and  $\frac{r}{s} = \frac{2}{3}$ , then  $\frac{p}{s} =$

(A)  $\frac{4}{15}$

(B)  $\frac{2}{5}$

(C)  $\frac{3}{5}$

(D)  $\frac{5}{3}$

(E)  $\frac{15}{4}$

27. If  $\frac{3}{x} + \frac{5}{4} = 1$ , what is the value of  $x$ ?

(A)  $-20$

(B)  $-12$

(C)  $-8$

(D)  $4$

(E)  $8$

28. If  $kn \neq k$  and  $n = \frac{1}{k}$ , which of the following expressions is equivalent to

$\frac{1-k}{1-n}$  ?

(A)  $-n$

(B)  $-k$

(C)  $1$

(D)  $k$

(E)  $n$

29. If  $\frac{v}{s} = 2$  and  $\frac{r}{s} = \frac{t}{v}$ , then, for  $t \neq 0$ ,  $\frac{r}{t} =$

(A)  $\frac{1}{2}$

(B) 2

(C)  $\frac{t}{v}$

(D)  $\frac{v}{2s}$

(E)  $\frac{2v}{s}$

30. The ratio of  $j$  to  $k$  to  $l$  to  $m$  to  $p$  is 5 to 4 to 3 to 2 to 1. If  $j = 60$ , what is the value of  $m$ ?

(A) 8

(B) 12

(C) 24

(D) 55

(E) 57

31. If  $\frac{1}{4}$  of  $\frac{4}{3}$  is subtracted from 2, what is the resulting value?

32. A business is owned by 3 men and 1 woman, each of whom has an equal share. If one of the men sells  $\frac{1}{2}$  of his share to the woman, and another of the men keeps  $\frac{2}{3}$  of his share and sells the rest to the woman, what fraction of the business will the woman own?
- (A)  $\frac{5}{24}$
- (B)  $\frac{11}{24}$
- (C)  $\frac{1}{2}$
- (D)  $\frac{13}{24}$
- (E)  $\frac{11}{6}$
33. A company sells boxes of balloons in which the balloons are red, green, or blue. Luann purchased a box of balloons in which  $\frac{1}{3}$  of them were red. If there were half as many green balloons in the box as red ones and 18 balloons were blue, how many balloons were in the box?
34. In a bag of marbles,  $\frac{1}{2}$  of the marbles are red,  $\frac{1}{4}$  of them are green, and  $\frac{1}{5}$  of them are blue. If the remaining 2 marbles are white, what is the number of green marbles in the bag?
- (A) 4
- (B) 5
- (C) 8
- (D) 10
- (E) 40

35. If it takes 10 people 12 hours to do a certain job, how many hours would it take 6 people, working at the same rate, to do  $\frac{1}{4}$  of the same job?
- (A) 6  
(B) 5  
(C)  $4\frac{1}{2}$   
(D) 4  
(E)  $3\frac{3}{4}$
36. During a game, the blue team scored one-sixth of its points in the first quarter, one fourth in the second quarter, one-third in the third quarter, and the remaining points in the fourth quarter. If its total score was 36, how many points did the blue team score in the fourth quarter?
- (A) 6  
(B) 8  
(C) 9  
(D) 12  
(E) 25
37. The eggs in a certain basket are either white or brown. If the ratio of the number of white eggs to the number of brown eggs is  $\frac{2}{3}$ , each of the following could be the number of eggs in the basket EXCEPT
- (A) 10  
(B) 12  
(C) 15  
(D) 30  
(E) 60
38. The numerator of a certain fraction is 5 less than the denominator. If the fraction is equal to  $\frac{3}{4}$ , what is the denominator of this fraction?
- (A) 8  
(B) 12  
(C) 16  
(D) 20  
(E) 24

39. A measuring cup contains  $\frac{1}{5}$  of a cup of orange juice. It is then filled to the 1 cup mark with a mixture that contains equal amounts of orange, grapefruit, and pineapple juices. What fraction of the final mixture is orange juice?
40. A ball is dropped from 192 inches above level ground and after the third bounce it rises to a height of 24 inches. If the height to which the ball rises after each bounce is always the same fraction of the height reached on its previous bounce, what is this fraction?
- (A)  $\frac{1}{8}$
- (B)  $\frac{1}{4}$
- (C)  $\frac{1}{3}$
- (D)  $\frac{1}{2}$
- (E)  $\frac{2}{3}$