

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Perform the indicated operation and simplify the result.

$$1) \frac{3x^2 + 21}{x - 7} + \frac{-2x}{x - 7} - \frac{2x^2 + 8x}{x - 7}$$

1) \_\_\_\_\_

Answer:  $x - 3$

$$2) \frac{5x}{9x + 1} - \frac{3}{9x + 1}$$

2) \_\_\_\_\_

Answer:  $\frac{5x - 3}{9x + 1}$

Find the least common denominator.

$$3) \frac{3p + 1}{p^2 - 36} \text{ and } \frac{p - 1}{p^4 - 6p^3}$$

3) \_\_\_\_\_

Answer:  $p^3(p + 6)(p - 6)$

Add or subtract, as indicated, and simplify the result.

$$4) \frac{7}{32x} + \frac{5}{4x^2}$$

4) \_\_\_\_\_

Answer:  $\frac{7x + 40}{32x^2}$

$$5) \frac{y-2}{y-1} - \frac{y-2}{y+3}$$

$$\text{Answer: } \frac{4(y-2)}{(y-1)(y+3)}$$

5) \_\_\_\_\_

$$6) \frac{m+5}{m^2+9m+18} + \frac{4m-1}{m^2+5m-6}$$

$$\text{Answer: } \frac{5m^2+15m-8}{(m+6)(m+3)(m-1)}$$

6) \_\_\_\_\_

$$7) \frac{x}{x^2-16} - \frac{8}{x^2+5x+4}$$

$$\text{Answer: } \frac{x^2-7x+32}{(x-4)(x+4)(x+1)}$$

7) \_\_\_\_\_

Simplify the complex rational expression

$$8) \frac{\frac{3}{a} + 3}{\frac{3}{a} - 3}$$

$$\text{Answer: } \frac{1+a}{1-a}$$

8) \_\_\_\_\_

9)

$$\frac{\frac{64t^2 - 25s^2}{st}}{\frac{8}{s} - \frac{5}{t}}$$

Answer:  $5s + 8t$

9) \_\_\_\_\_

10)

$$\frac{1 - \frac{7}{x}}{x - \frac{49}{x}}$$

Answer:  $\frac{1}{x+7}$

10) \_\_\_\_\_

11)  $\frac{m^{-1} + z^{-1}}{m^{-1} - z^{-1}}$

Answer:  $\frac{z+m}{z-m}$

11) \_\_\_\_\_

Solve the equation.

12)  $\frac{4}{p+3} = \frac{2}{p-3}$

Answer:  $\{9\}$

12) \_\_\_\_\_

$$13) 1 + \frac{1}{y} = \frac{30}{y^2}$$

Answer:  $\{-6, 5\}$

13) \_\_\_\_\_

$$14) \frac{3}{x+4} - \frac{7}{x-4} = \frac{8}{x^2-16}$$

Answer:  $\{-12\}$

14) \_\_\_\_\_

$$15) \frac{1}{b} + \frac{1}{b-6} = \frac{b-5}{b-6}$$

Answer:  $\{1\}$

15) \_\_\_\_\_

Solve the problem.

$$16) \text{ For the function } f(x) = \frac{x-2}{x+4}, \text{ solve } f(x) = \frac{3}{4}.$$

Answer:  $x = 20$

16) \_\_\_\_\_

$$17) \text{ Let } f(x) = \frac{x-1}{x+7} \text{ and } g(x) = \frac{x-3}{x-4}. \text{ For what value(s) of } x \text{ does } f(x) = g(x)?$$

Answer:  $x = \frac{25}{9}$

17) \_\_\_\_\_

Solve the rational inequality.

$$18) \frac{x - 3}{x + 4} > 0$$

$$\text{Answer: } (-\infty, -4) \cup (3, \infty)$$

18) \_\_\_\_\_

$$19) x + \frac{24}{x} < 10$$

$$\text{Answer: } (-\infty, 0) \cup (4, 6)$$

19) \_\_\_\_\_

$$20) \frac{(x + 12)(x - 7)}{x - 1} \geq 0$$

$$\text{Answer: } [-12, 1) \cup [7, \infty)$$

20) \_\_\_\_\_

$$21) \frac{4x}{6 - x} < x$$

$$\text{Answer: } (0, 2) \cup (6, \infty)$$

21) \_\_\_\_\_

Solve the formula for the indicated variable.

$$22) P = \frac{A}{1 + rt} \quad \text{for } r$$

$$\text{Answer: } r = \frac{A - P}{Pt}$$

22) \_\_\_\_\_

23)  $\frac{PV}{T} = \frac{pv}{t}$  for P

23) \_\_\_\_\_

Answer:  $P = \frac{pvT}{tV}$

24)  $P = \frac{Fd}{t}$  for t

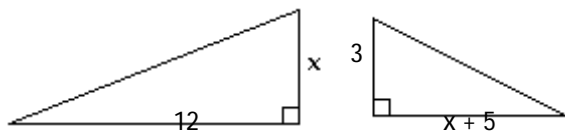
24) \_\_\_\_\_

Answer:  $t = \frac{Fd}{P}$

Solve the proportion problem.

25)

25) \_\_\_\_\_



Suppose that the two triangles shown in the figure are similar. Find x.

Answer:  $x = 4$

26) The ratio of the weight of an object on Earth to an object on Planet X is 4 to 9. If a person weighs 250 pounds on Earth, find his weight on Planet X. (Round your answer to the nearest whole number, if necessary.)

26) \_\_\_\_\_

Answer: 563 pounds

- 27) A recent advertisement claimed that 2 out of every 7 doctors recommend a certain herbal supplement to increase energy levels. If a local hospital employs 230 doctors, how many doctors would you expect to recommend the supplement? (Round your answer to the nearest whole number, if necessary.) 27) \_\_\_\_\_
- Answer: 66 doctors

Solve the work problem.

- 28) A painter can finish painting a house in 7 hours. Her assistant takes 9 hours to finish the same job. How long would it take them to complete the job if they were working together? (Round your answer to the nearest tenth, if necessary.) 28) \_\_\_\_\_
- Answer: 3.9 hours

- 29) Mark and Rachel work for Smith Landscaping Company. Mark can finish a planting job in 4 hours, while it takes Rachel 3 hours to finish the same job. If Mark and Rachel work together on the job and Smith Landscaping charges \$40 per hour for a two-person crew, then how much will Smith Landscaping charge for the job? (Round your answer to the nearest cent, if necessary.) 29) \_\_\_\_\_
- Answer: \$68.57

- 30) One pump can drain a pool in 10 minutes. When a second pump is also used, the pool only takes 2 minutes to drain. How long would it take the second pump to drain the pool if it were the only pump in use? (Round your answer to the nearest tenth, if necessary.) 30) \_\_\_\_\_
- Answer: 2.5 minutes

Find the constant of proportionality  $k$ , and write the linear function relating the two variables.

31) Suppose that  $y$  varies directly with  $x$ . When  $x = 9$ , then  $y = 72$ .

Answer:  $k = 8$ ;  $y = 8x$

31) \_\_\_\_\_

32) Suppose that  $y$  varies directly with  $x$ . When  $x = \frac{1}{5}$ , then  $y = 2$ .

Answer:  $k = 10$ ;  $y = 10x$

32) \_\_\_\_\_

Find the quantity indicated.

33) Suppose that  $y$  is directly proportional to  $x$ . When  $x = 24$ , then  $y = 6$ . Find  $y$  when  $x = 28$ .

Answer: 7

33) \_\_\_\_\_

Find the constant of proportionality  $k$ , and write the linear function relating the two variables.

34) Suppose that  $y$  varies inversely with  $x$ . When  $x = 5$ , then  $y = 12$ .

Answer:  $k = 60$ ;  $y = \frac{60}{x}$

34) \_\_\_\_\_

Find the quantity indicated.

35) Suppose that  $y$  varies inversely with  $x$ . When  $x = 8$ , then  $y = 10$ . Find  $y$  when  $x = 40$ .

Answer: 2

35) \_\_\_\_\_



Solve.

- 36) The amount of time it takes a swimmer to swim a race is inversely proportional to the average speed of the swimmer. A swimmer finishes a race in 75 seconds with an average speed of 4 feet per second. Find the average speed of the swimmer if it takes him 100 seconds to finish the race.

Answer: 3 feet per second

36) \_\_\_\_\_