

Test 4 covers all cumulative material, including new sections 6.1 - 6.4, 6.6, 6.7, and 7.1 - 7.4. Bring a non-graphing calculator and something to write with and erase with.

Be prepared to show your work on all test problems in order to receive full or partial credit.

1. Simplify.

a. $\frac{x^2 + x}{x^2 - 1}$

b. $\frac{10 - 2y}{y - 5}$

c. $\frac{2a^2 - 5a - 3}{2a^2 - 12a + 18}$

2. For what value(s) of x is the rational expression undefined?

a. $\frac{4x + 2}{3x - 21}$

b. $\frac{x - 5}{2x^2 - 11x - 6}$

3. Solve the system of equations by graphing. **You must use this method.**

a. $\begin{cases} 3x + y = 6 \\ x + 2y = 2 \end{cases}$

b. $\begin{cases} 2x - y = 6 \\ y = 2 \end{cases}$

c. $\begin{cases} y = -2x + 3 \\ 2x = -y - 1 \end{cases}$

4. Solve the system of equations by the substitution method. **You must use this method.**

a. $\begin{cases} y + 3x = 1 \\ 2x - 2y = 6 \end{cases}$

b. $\begin{cases} 2x - y = 1 \\ -4x + 2y = 3 \end{cases}$

5. Solve the system of equations by the elimination method. **You must use this method.**

a. $\begin{cases} 3x = y + 4 \\ -6x + 2y = -8 \end{cases}$

b. $\begin{cases} 3x + 2y = 1 \\ 5x + 2y = -5 \end{cases}$

6. Simplify, and express without negative exponents.

a. $2x^0$

c. $(3a^{-2}b^4)^{-3}$

b. $(2x)^0$

d. $\frac{2x^{-5}y^{-4}}{x^{-2}y}$

7. Multiply and simplify.

a. $\frac{x^2}{x^2 - 4} \cdot \frac{x^2 + 4x + 4}{x^2 - x}$

b. $\frac{3a^2b}{a + 1} \cdot \frac{a^2 + a}{27b^5}$

8. Divide and simplify.

a. $\frac{x^2}{x+1} \div \frac{x^2+x}{2}$

b. $\frac{5x^2-10x}{x^3+7x^2+10x} \div \frac{10x^2-40}{x+5}$

9. Add or subtract, as indicated, and simplify your answer.

a. $\frac{x}{x^2-1} + \frac{1}{x^2-1}$

c. $\frac{5}{6x} + \frac{3}{2x^2}$

b. $\frac{5x^2}{2-x} - \frac{9x+2}{2-x}$

d. $\frac{x}{x+3} - \frac{1}{x-3}$

10. Solve.

a. $\frac{5}{x} = \frac{3}{x+2}$

c. $x + \frac{4}{x} = 5$

b. $\frac{6}{5} = \frac{4}{x}$

d. $\frac{5}{x-4} = \frac{2}{x+3}$

11. Mrs. Munoz wants to create 30 oz of ascorbic acid (vitamin C) solution of strength 9%. She has on hand some ascorbic acid solution of strengths 8% and 12%. How much of each should she use?
12. April goes to the grocery store to create some pilaf, which is a mixture of from lentils and rice. Lentils cost \$1.85 per pound and rice costs \$0.75 per pound. How many pounds of each should she mix to end up with 6 pounds of pilaf that is worth \$1.19 per pound?
13. There were 200 tickets sold for a volleyball game. Tickets for students were \$2 each and for adults were \$3 each. The total amount collected was \$530. How many of each type of ticket were sold?
14. The sum of two numbers is 56, and the difference between them is 22. Find the two numbers.
15. A survey result indicated that 3 out of every 5 people eat breakfast. If 27 of the people surveyed indicated that they eat breakfast, how many people were surveyed?
16. If a six foot tall man casts a shadow of length 8 feet at dusk, then what length shadow does a 9 foot tall sign cast, also at dusk?
17. For the line given by the equation $x - 3y = 6$
- a. Find the x- and y-intercepts
- b. Find the slope of the line
18. Find an equation of the line with slope $-\frac{3}{4}$, passing through the point $(-4, -2)$.

19. Due to inflation, prices have increased 15% since 1995. A backpack costs \$46 now. What would the cost of this backpack have been in 1995?

20. Factor completely. If the polynomial cannot be factored, state that it is prime.

a. $9b^2 - 64$

c. $3x^3 + 2x^2 - 27x - 18$

b. $4x^3 + 10x^2 - 6x$

d. $9y^2 + 16$

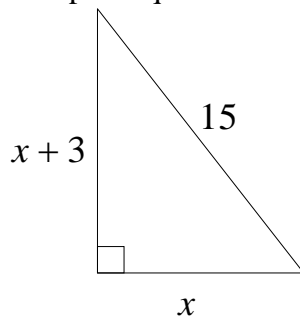
21. Solve.

a. $3(2x^2 - 5) = x$

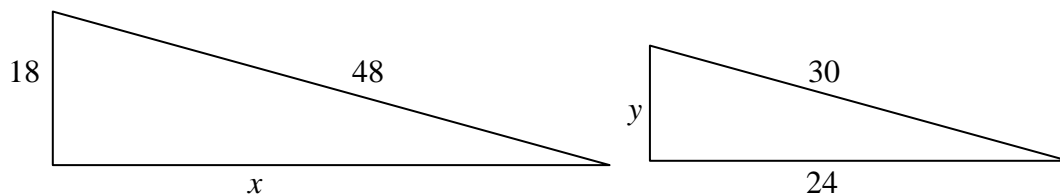
b. $x(3x + 13) = 10$

22. Solve for z : $2x - 3z = y$

23. Set up an equation and solve it to find the value of x in the right triangle below.



24. The triangles below are similar. Find the length of the sides marked x and y .



25. If a car can travel 715 miles on 26 gallons of gasoline, how much gasoline will it need to travel 1650 miles?

26. Two angles are called complementary if their sum is 90 degrees. The difference between two complementary angles is 54 degrees. Find the measure of each angle.

27. Sales tax in Austin is 8.25%. The price including tax of a new television is \$422.16. What is the pre-tax price? *Round your answer to the nearest cent.*

28. To determine the number of foxes in an area, 25 foxes are caught, tagged, and released. Later 36 foxes are caught, and 4 of these have tags. Estimate the area's fox population.

29. A sample of 150 light bulbs contained 7 defective bulbs. How many defective bulbs would you expect in a batch of 2700 light bulbs?

Answers

1.

a. $\frac{x}{x-1}$

b. -2

c. $\frac{2a+1}{2(a-3)}$

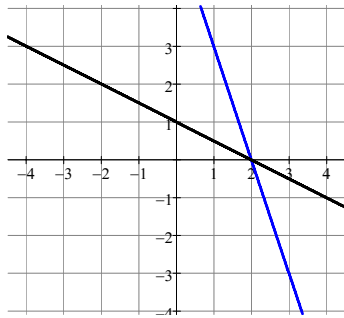
2.

a. $x = 7$

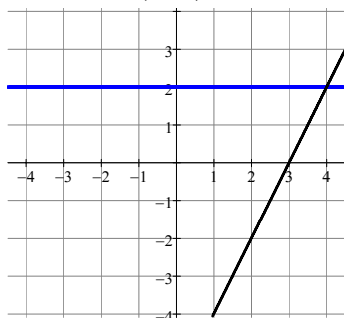
b. $x = 6$ or $x = -\frac{1}{2}$

3.

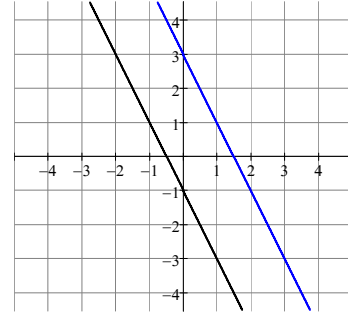
a. Solution: $(2, 0)$



b. Solution: $(4, 2)$



c. Inconsistent (no solution)



4. a. $(1, -2)$

b. Inconsistent (no solution – parallel lines)

5. a. Dependent (infinite number of solutions – every point on the line is a solution)

b. $(-3, 5)$

6.

a. 2

b. 1

c. $\frac{a^6}{27b^{12}}$

d. $\frac{2}{x^3y^5}$

7.

a. $\frac{x(x+2)}{(x-2)(x-1)}$

b. $\frac{a^3}{9b^4}$

8.

a. $\frac{2x}{(x+1)^2}$

b. $\frac{1}{2(x+2)^2}$

- 9.
- $\frac{1}{x-1}$
 - $-1(5x+1)$ or $-5x-1$
 - $\frac{5x+9}{6x^2}$
 - $\frac{x^2-4x-3}{(x+3)(x-3)}$
- 10.
- $x = -5$
 - $x = \frac{10}{3}$ or $3\frac{1}{3}$
 - $x = 1$ or $x = 4$
 - $x = -\frac{23}{3}$ or $-7\frac{2}{3}$
11. Equations:
 $x + y = 30$
 $0.08x + 0.12y = 0.09(30)$
 Answer:
 22.5 oz of 8% solution
 7.5 oz of 12% solution
12. Equations:
 $\ell + r = 6$
 $1.85\ell + 0.75r = 1.19(6)$
 2.4 pounds of lentils
 3.6 pounds of rice
13. Equations:
 $s + a = 200$
 $2s + 3a = 530$
 70 student tickets and 130 adult tickets
14. Let x & y be the two numbers.
 Equations: $\begin{cases} x + y = 56 \\ x - y = 22 \end{cases}$
 The two numbers are 17 & 39.
15. 45 people were surveyed.
16. 12 feet
- 17.
- x-int = $(6, 0)$
y-int = $(0, -2)$
 - slope = $\frac{1}{3}$
18. $y = -\frac{3}{4}x - 5$
19. \$40.00 CAUTION: \$39.10 may seem close, but it is incorrect!
- 20.
- $(3b+8)(3b-8)$
 - $2x(x+3)(2x-1)$
 - $(x+3)(x-3)(3x+2)$
 - prime (SUM of squares)
- 21.
- $x = \frac{5}{3}$ or $x = -\frac{3}{2}$
 - $x = \frac{2}{3}$ or $x = -5$
22. $z = \frac{2x-y}{3}$
23. Equation: $x^2 + (x+3)^2 = 15^2$
 Solution: $x = 9$ [$x = -12$ not possible]
24. $x = 38.4$ and $y = 11.25$
25. 60 gallons
26. Let x & y be the measures of the two angles in degrees.
 Equations: $\begin{cases} x + y = 90 \\ x - y = 54 \end{cases}$
 The angles measure 72° and 18° .
27. \$389.99 CAUTION: \$387.33 may seem close, but it is incorrect!
28. 225 foxes
29. 126 light bulbs