Solve for the variable:

1. $-67 = -8n + 5$

$-72 = -8n$

$9 = n$

2. $2(a-4)+15 = 13$

$2a - 8 + 15 = 13$

$2a + 7 = 13$

$2a = 4$

$a = 4$

3. $\frac{9x+6-4x}{2} = 8$

$\frac{5x+6}{2} = 8$

$5x + 6 = 16$

$5x = 10$

$x = 2$

4. $h + 1 = -\frac{h}{2} + 5$

$h = -\frac{h}{2} + 4$

$\frac{3}{2}h = 4$

$3h = 8$

$h = \frac{8}{3}$

5. $-6 - 3(2k+4) = 18$

$-6 - 6k - 12 = 18$

$-18 - 6k = 18$

$-6k = 36$

$k = -6$

6. $8 + 3(p-4) = 2p + 2(p+1)$

$8 + 3p - 12 = 2p + 2p + 2$

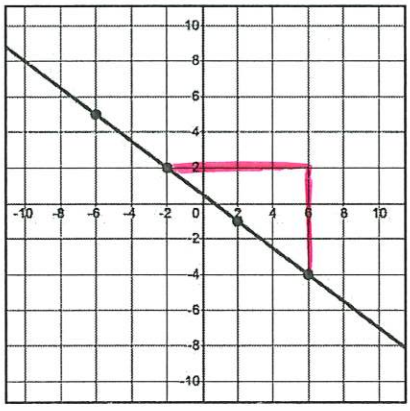
$-4 + 3p = 4p + 2$

$-6 = p$

7. The volume of a cube is 64 cubic inches. What is the length of one edge of the cube?

☐ 4 inches ☐ 8 inches ☐ 21 inches ☐ 32 inches

8. Find the slope of the line:



$m = -\frac{3}{4}$

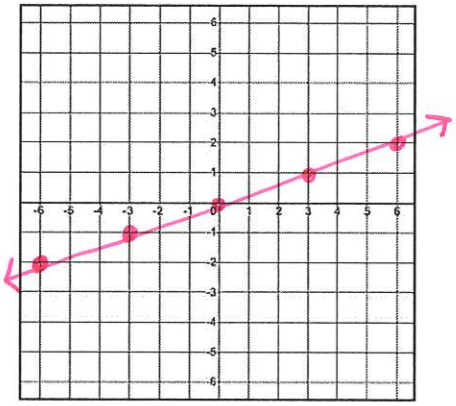
9. Which numbers are perfect squares **but not** perfect cubes?

☐ 1 both ☐ 64 both ☐ 96 neither ☐ 125 cube ☐ 200 neither ☐ 256 ☐ 333 neither ☐ 361

Model each function with a table of values and a graph.

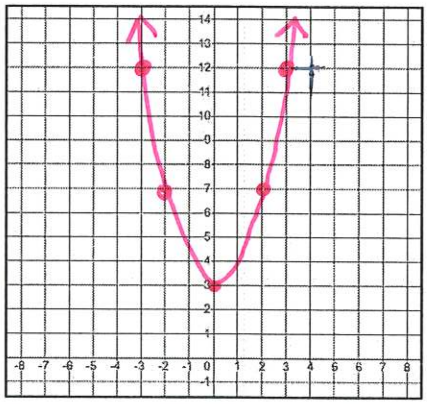
10. $f(x) = \frac{1}{3}x$

x	$f(x)$
-6	-2
-3	-1
0	0
3	1
6	2



11. $f(x) = x^2 + 3$

x	$f(x)$
-3	12
-2	7
0	3
2	7
3	12

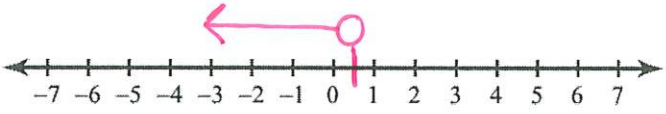


Solve each inequality and sketch its solution on the number line. Leave any fractional solutions as simplified fractions.

12. $2x - 1 < -3x + 7$

$5x < 8$

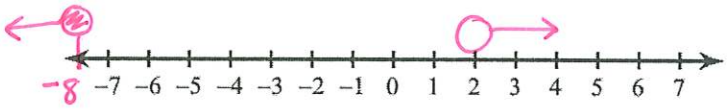
$x < 8/5$



13. $6 < x + 4 \leq -4$

$2 < x \leq -8$

NO SOLUTION



14. Rewrite the square roots by putting it in the simplest radical form.
Example: $\sqrt{12}$ *becomes* $2\sqrt{3}$.

$\sqrt{24}$

$2\sqrt{6}$

$\sqrt{50}$

$5\sqrt{2}$

$\sqrt{8} + \sqrt{98}$

$2\sqrt{2} + 7\sqrt{2}$

$9\sqrt{2}$

Write the equation of a line in slope-intercept form ($y = mx + b$) with the given conditions:

15. A line with a slope of -3 and a y-intercept of 12.

$y = -3x + 12$

16. A line with a slope of -1 that passes through (0, 6).

$y = -x + 6$

Write the equation of the line using $y - y_1 = m(x - x_1)$.

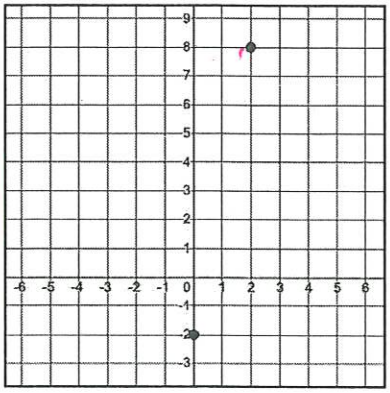
17. A line that passes through the points (1, -3) and (-4, 9).

x_1 y_1 x_2 y_2

$m = \frac{9-(-3)}{-4-1} = -\frac{12}{5}$

$y + 3 = -\frac{12}{5}(x - 1)$

18. A line that passes through the two points shown below.



$m = \frac{10}{2} = 5$

$y - 8 = 5(x - 2)$

19. Do the equations $x + y = -2$ and $3x + 3y = -6$ define the same line? Explain your answer.

$\frac{3x + 3y = -6}{3}$

$x + y = -2$

Yes, the second equation is the first equation but multiplied by 3.

20. Rewrite the equation $35x - 7y = 49$ by solving for y.

$-35x \quad -35x$

$\frac{-7y}{-7} = \frac{-35x}{-7} + \frac{49}{-7}$

$y = 5x - 7$

Solve each proportion/ratio problem. Provide simplified fractions for #21 and #22.

21. $\frac{13}{y} = \frac{3}{8}$

$3y = 104$

$y = \frac{104}{3}$

22. $\frac{w+14}{4y+6} = \frac{3}{4}$

$W + 14 = 3$

$W = -11$

$4y + 6 = 4$

$4y = -2$

$y = -\frac{1}{2}$

23. A bakery produces 1,450 muffins in a 12 hour period. How long will it take to make 2,000 muffins?

$\frac{1450}{12} = \frac{2000}{x}$

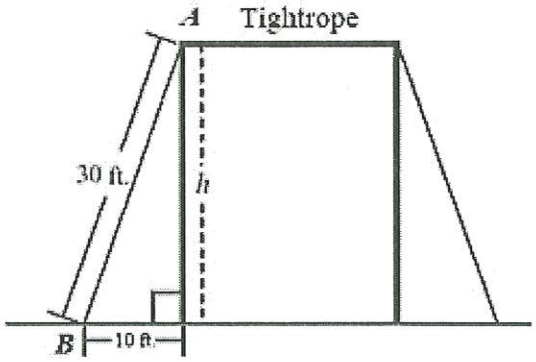
$24000 = 1450x$

$16.55 = x$ hours

24. In order to stabilize a tightrope at a circus, a wire that has a length of 30 feet is attached from the top of the vertical support at point A to point B on the ground. Point B is 10 feet from the base of the vertical support as shown in the figure below.

Based on this information, which of the following is the closest to the value of h, the height of the vertical support?

- ☐ 16 feet
- ☐ 20 feet
- ☐ 28 feet
- ☐ 32 feet



$a^2 + b^2 = c^2$
$10^2 + b^2 = 30^2$
$100 + b^2 = 900$
$b^2 = 800$
$b = \sqrt{800} \approx 28.3$

25. Carpet Masters charges \$9.50 to clean 30 square yards of carpet. How much will it cost to clean rooms that each have an area of 12 square yards?

$\frac{\$9.50}{30} = \frac{x}{12}$
$30x = 114$
$x = 3.8$

\$3.80 for 12 square yards

26. What is the ratio of $18b^6$ to $45b^4$ in simplest form?

$\frac{18b^6}{45b^4} = \frac{2b^2}{5}$

27. Find the GCF of: $10x^4y^2$ and $8x^2y$

$2x^2y$

28. Factor the polynomial completely:
$32a^2b - 40ab$

$8ab(4a - 5)$

29. Factor completely: $x^2 - 11x + 18$

$(x - 9)(x - 2)$

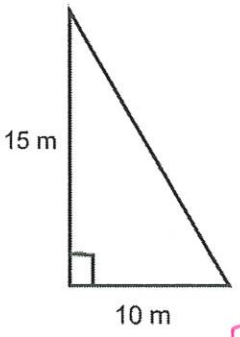
Solve each:

30. Multiply: $(x + 4)(x + 3)$

$x^2 + 3x + 4x + 12$

$x^2 + 7x + 12$

31. Find the length of the third side of the triangle. What is this side in a right triangle called?



hypotenuse

$10^2 + 15^2 = c^2$

$100 + 225 = c^2$

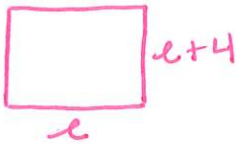
$325 = c^2$

$5\sqrt{13} = c$

32. A rectangle's width is 4 feet longer than its length. The rectangle's perimeter is 400. Determine the width.

l = length

$w = l + 4$



$2(l + l + 4) = 400$

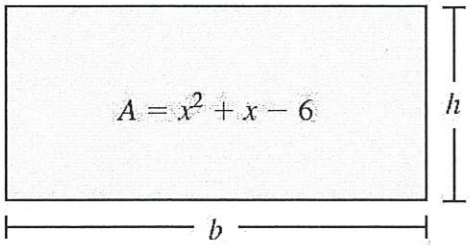
$4l + 8 = 400$

$4l = 392$

$l = 98$

width = 102 feet

33. Use factoring to find the dimensional expression for a rectangle whose area is represented by the expression:



$(x+3)(x-2)$

$h = (x+3)$

$b = (x-2)$

34. Find the value for k:

$(3x + 2)(2x - 5) = ax^2 + kx + n$

$6x^2 - 15x + 4x - 10$

$6x^2 - 11x - 10$

$k = -11$

35. What is the greatest common factor for the expression below?

$10x^4 + 4x^3 - 2x^2$

$2x^2$

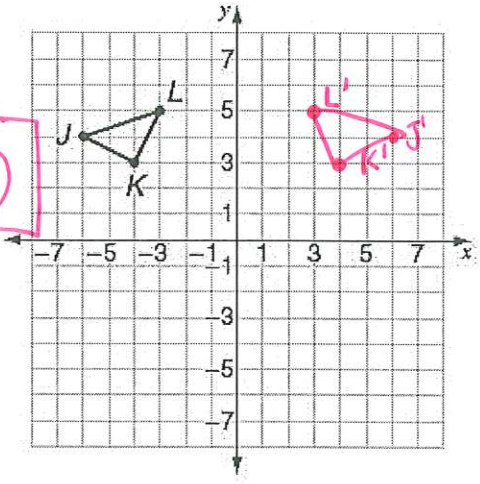
36. Which statement is true about the graphs of these equations?

$y = 2x + 7$
$5y = 10x - 15$ → $y = 2x - 3$

☐ The lines coincide
☐ The lines are parallel
☐ The lines are perpendicular
☐ The lines intersect, but are not perpendicular

37. After a reflection over the y-axis, the image of Triangle JKL is Triangle J'K'L'. What are the coordinates of the point K'?

K': (4, 3)



38. Which of these represent a linear function? Circle **all** that apply.

☐ (3, 6), (0, 2), (3, 5)
NO (x=3 is repeated)

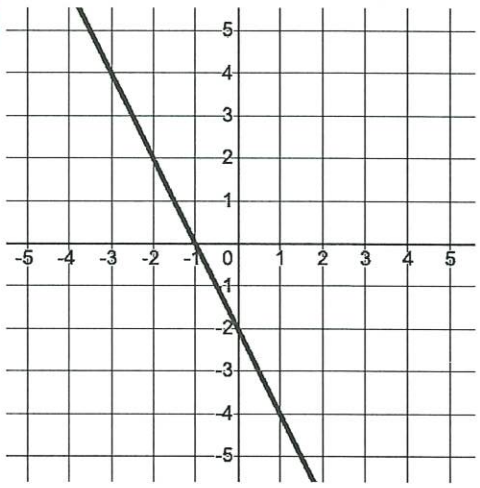
☐ For each square whose sides have length *s*, the perimeter is 4s.

☐

x	2	2	2	2
y	4	2	0	-2

NO (x=2 is repeated)

☐



39. Carrie wants to find out how the area of a circle will change as the radius increases in length, so she makes a table.

x
y

Radius (feet)	2.5	3.5	4.5	5.5	6.5
Area (square feet)	19.63	38.47	63.59	94.99	132.67

What is the average rate of change as the radius changes from 2.5 to 5.5 feet? Write your answer as a decimal.

slope

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{94.99 - 19.63}{5.5 - 2.5} = \frac{75.36}{3} =$$ 25.12 square feet per foot.

40. Evaluate using the Order of Operations:

$8 + 2(5 - 2) + 3 - 4 - 2 \cdot 3^2$

$8+2(3)+3-4-2\cdot 9$

$8+6+3-4-18 = \boxed{-5}$

41. Evaluate $-x(y-8)^2$ for $x = -2$ and $y = -5$.

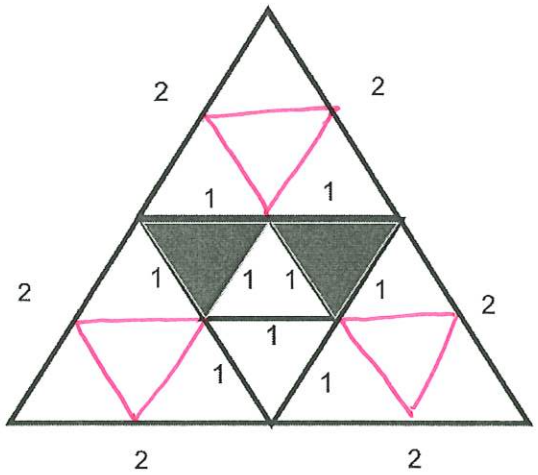
$-(-2)(-5-8)^2$

$2(13)^2$

$2(169) = \boxed{338}$

42. What fractional amount of the entire triangle is shaded?

$\frac{2}{16} = \boxed{\frac{1}{8}}$



43. Let a and b be integers with a > b > 0 where $\frac{a^3-b^3}{(a-b)^3} = \frac{63}{27}$. What is the value of $\frac{b}{a}$?

$(a-b)^3 = 27$

$a-b=3$

$a=b+3$

$(b+3)^3 - b^3 = 63$

$(b^2+6b+9)(b+3) - b^3 = 63$

$b^3+3b^2+6b^2+18b+9b+27-b^3=63$

$9b^2+27b+27=63$

$9b^2+27b-36=0$

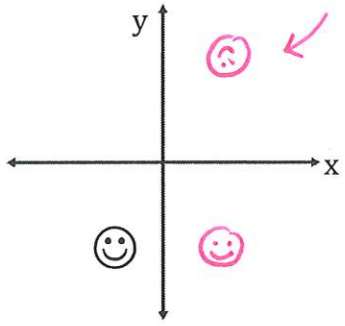
$b^2+3b-4=0$

$(b+4)(b-1)=0$

$b=-4 \quad b=1$

$\boxed{\frac{b}{a} = \frac{1}{4}}$

44. Draw the resulting image after the object is reflected over the y-axis, and then that result is reflected over the x axis.



45. Each expression on the right can be paired with a description on the left. Write the letter of the expression in the blank before its description. Some expressions may be used twice, other may not be used at all.

Description		Expression
1. I	Perimeter of a Triangle	A. $\frac{1}{2}bh$
2. A	Area of a Triangle	B. $2r$
3. E	Perimeter of a Square	C. $2l + 2w$
4. G	Area of a Square	D. $\frac{1}{2}\pi r^2$
5. C	Perimeter of a Rectangle	E. $4s$
6. L	Area of a Rectangle	F. $1/2\ h(b_1 + b_2)$
7. J	Area of a Parallelogram	G. s^2
8. F	Area of a Trapezoid	H. πd
9. B	Diameter of a Circle	I. $a + b + c$
10. H	Circumference of a Circle	J. bh
11. K	Area of a Circle	K. πr^2
12. D	Area of a Semicircle	L. lw