

ALGEBRA 8R Final Review - ANSWERS

In addition:

- Translate a figure in a coordinate plane given an algebraic rule (Ex: $(x - 1, y + 2)$)
- Reflect a figure across a line of reflection in a coordinate plane
- Rotate a figure 90° clockwise or counterclockwise about the origin
- Rotate a figure 180° about the origin
- Use the Pythagorean Theorem to find side lengths in right triangles
- Simplify radicals

Expand the expression completely.

1.) $2x(x - 5)$

$$\boxed{2x^2 - 10x}$$

2.) $(x + 3)(x + 10)$

$$x^2 + 10x + 3x + 30$$

$$\boxed{x^2 + 13x + 30}$$

3.) $(x - 7)(x - 5)$

$$x^2 - 5x - 7x + 35$$

$$\boxed{x^2 - 12x + 35}$$

4.) $(2x + 3)(x - 6)$

$$2x^2 - 12x + 3x - 18$$

$$\boxed{2x^2 - 9x - 18}$$

5.) $(x + 4)(2x^2 + 3x - 1)$

$$2x^3 + 3x^2 - x + 8x^2 + 12x - 4$$

$$\boxed{2x^3 + 11x^2 + 11x - 4}$$

6.) $(2x^2 - 4x - 3)(3x^2 + 2x - 5)$

$$\begin{aligned} &6x^4 + 4x^3 - 10x^2 \\ &- 12x^3 - 8x^2 + 20x \\ &- 3x^2 - 6x + 15 \end{aligned}$$

$$\boxed{6x^4 - 8x^3 - 21x^2 + 14x + 15}$$

Factor the expression completely.

7.) $4x^2 - 20x$

$$\boxed{4x(x - 5)}$$

8.) $x^2 + 7x + 10$

$$\boxed{(x + 5)(x + 2)}$$

9.) $x^2 - x - 30$

$$\boxed{(x - 6)(x + 5)}$$

10.) $2x^2 + 13x + 6$

$$\boxed{(2x + 1)(x + 6)}$$

Solve the equation by factoring.

11.) $x^2 + 8x + 16 = 0$

$$(x+4)(x+4) = 0$$

$$\begin{array}{l} \swarrow \\ x+4=0 \\ -4 \quad -4 \\ \hline x = -4 \end{array} \quad \begin{array}{l} \searrow \\ x+4=0 \\ -4 \quad -4 \\ \hline x = -4 \end{array}$$

$$\boxed{x = -4}$$

12.) $x^2 - 3x - 10 = 0$

$$(x-5)(x+2) = 0$$

$$\begin{array}{l} \swarrow \\ x-5=0 \\ +5 \quad +5 \\ \hline x = 5 \end{array} \quad \begin{array}{l} \searrow \\ x+2=0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

$$\boxed{x = -2 \text{ and } 5}$$

13.) $(2x+3)(x-6) = 0$

$$\begin{array}{l} \swarrow \\ 2x+3=0 \\ -3 \quad -3 \\ \hline 2x = -3 \\ \frac{2x}{2} = \frac{-3}{2} \\ x = -\frac{3}{2} \end{array} \quad \begin{array}{l} \searrow \\ x-6=0 \\ +6 \quad +6 \\ \hline x = 6 \end{array}$$

$$\boxed{x = 6 \text{ and } -\frac{3}{2}}$$

14.) $x^2 - 49 = 0$

$$(x-7)(x+7) = 0$$

$$\begin{array}{l} \swarrow \\ x-7=0 \\ +7 \quad +7 \\ \hline x = 7 \end{array} \quad \begin{array}{l} \searrow \\ x+7=0 \\ -7 \quad -7 \\ \hline x = -7 \end{array}$$

$$\boxed{x = 7 \text{ and } -7}$$

15.) $x^2 - 45 = -12x$

$$x^2 + 12x - 45 = 0$$

$$(x+15)(x-3) = 0$$

$$\begin{array}{l} \swarrow \\ x+15=0 \\ -15 \quad -15 \\ \hline x = -15 \end{array} \quad \begin{array}{l} \searrow \\ x-3=0 \\ +3 \quad +3 \\ \hline x = 3 \end{array}$$

$$\boxed{x = -15 \text{ and } 3}$$

16.) $2x^2 + 11x + 5 = 0$

$$(2x+1)(x+5) = 0$$

$$\begin{array}{l} \swarrow \\ 2x+1=0 \\ -1 \quad -1 \\ \hline \frac{2x}{2} = \frac{-1}{2} \\ x = -\frac{1}{2} \end{array} \quad \begin{array}{l} \searrow \\ x+5=0 \\ -5 \quad -5 \\ \hline x = -5 \end{array}$$

$$\boxed{x = -\frac{1}{2} \text{ and } -5}$$

17.) $4x^2 + 7x + 3 = 0$

$$(4x+3)(x+1) = 0$$

$$\begin{array}{l} \swarrow \\ 4x+3=0 \\ -3 \quad -3 \\ \hline \frac{4x}{4} = \frac{-3}{4} \\ x = -\frac{3}{4} \end{array} \quad \begin{array}{l} \searrow \\ x+1=0 \\ -1 \quad -1 \\ \hline x = -1 \end{array}$$

$$\boxed{x = -1 \text{ and } -\frac{3}{4}}$$

18.) $8x^2 + 2x - 15 = 0$

$$(4x-5)(2x+3) = 0$$

$$\begin{array}{l} \swarrow \\ 4x-5=0 \\ +5 \quad +5 \\ \hline \frac{4x}{4} = \frac{5}{4} \\ x = \frac{5}{4} \end{array} \quad \begin{array}{l} \searrow \\ 2x+3=0 \\ -3 \quad -3 \\ \hline \frac{2x}{2} = \frac{-3}{2} \\ x = -\frac{3}{2} \end{array}$$

$$\boxed{x = \frac{5}{4} \text{ and } -\frac{3}{2}}$$

For 19 through 23, identify the key features and graph the equation.

19.) $y = 4x^2 - x - 5$

y-intercept: $(0, -5)$

x-intercepts:

$(-1, 0)$

$(1.25, 0)$

line of symmetry: $x = 0.125$

vertex: $(0.125, -5.0625)$

up/down: up

additional point: $(2, 9)$
 $(0.5, -4.5)$

20.) $y = 6x^2 - 15x - 21$

y-intercept: $(0, -21)$

x-intercepts:

$(-1, 0)$

$(3.5, 0)$

line of symmetry: $x = \frac{5}{4}$

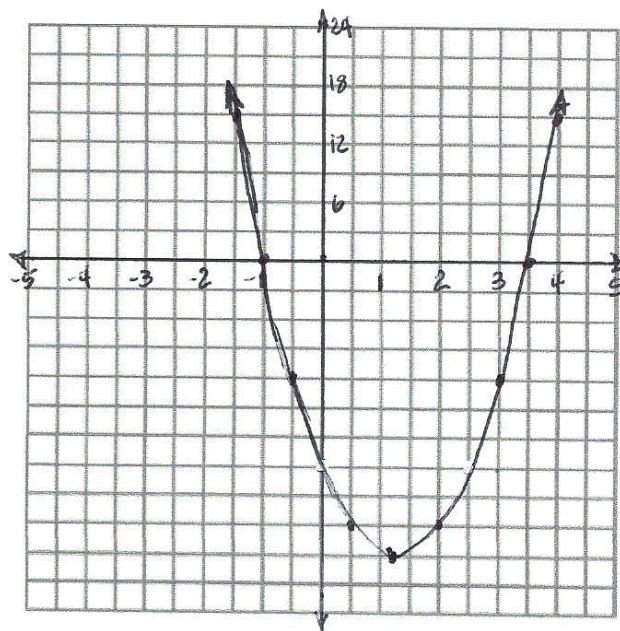
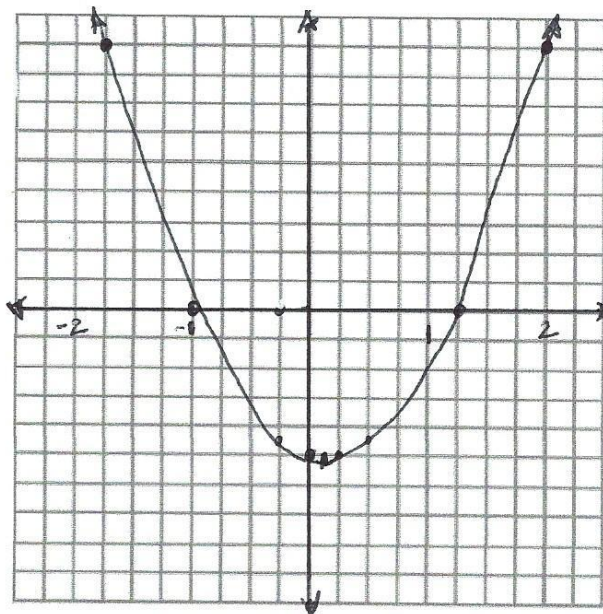
vertex: $(1.25, -30.375)$

up/down: up

additional point:

$(1, -30)$ $(4, 15)$

$(2, -27)$ $(3, -12)$



21.) $y = x^2 - 4x - 45$

y-intercept: $(0, -45)$

x-intercepts:

$(-5, 0)$

$(9, 0)$

line of symmetry: $x = 2$

vertex:

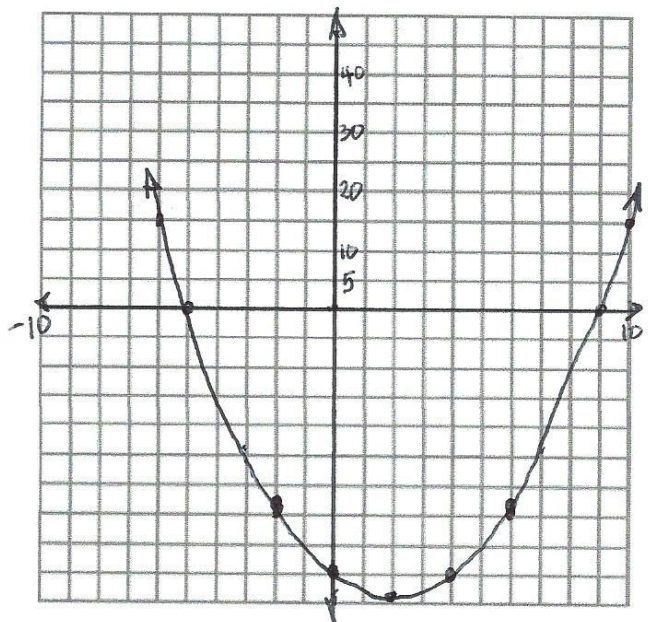
$(2, -49)$

$(10, 15)$

up/down: up

additional point:

$(-2, -35)$



22.) $y = 2x^2 + 9x + 10$

y-intercept: $(0, 10)$

x-intercepts:

$(-2.5, 0)$

$(-2, 0)$

line of symmetry: $x = -\frac{9}{4}$

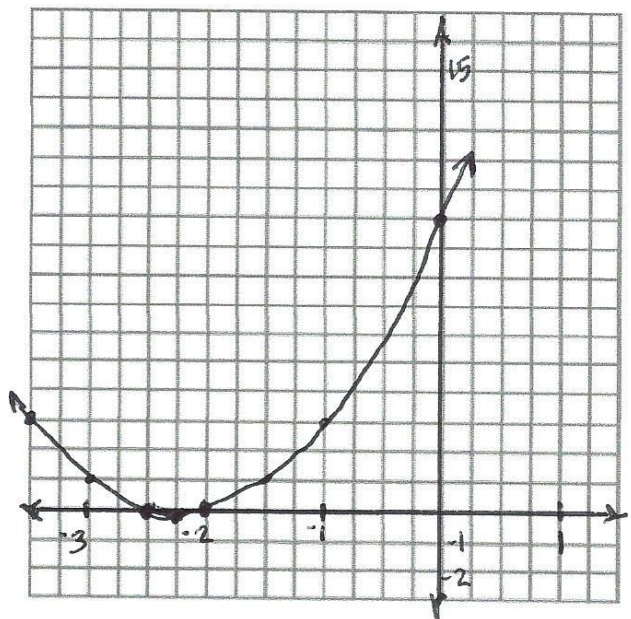
vertex: $(-2.25, -0.125)$

up/down: up

additional point:

$(-1, 3)$

$(-3, 1)$



23.) $y = x^2 + 6x - 16$

y-intercept: $(0, -16)$

x-intercepts:

$(-8, 0)$

$(2, 0)$

line of symmetry: $x = -3$

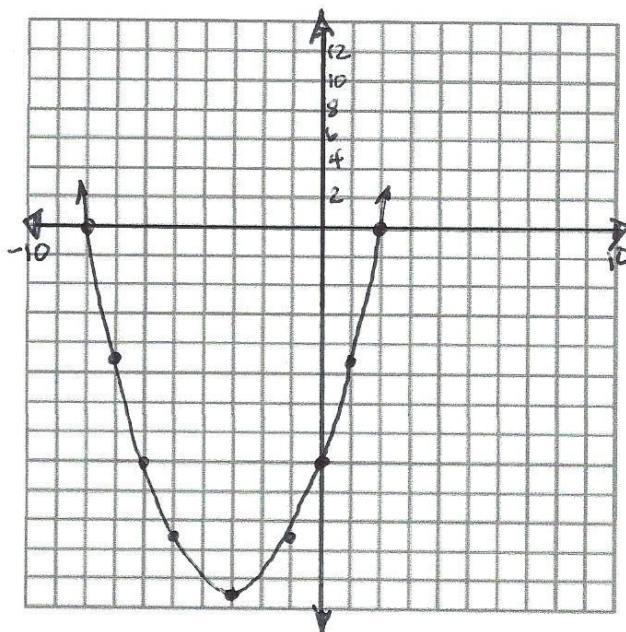
vertex: $(-3, -25)$

up/down : up

additional point:

$(1, -9)$

$(-1, -21)$



For questions 24-27, use the following information.

A stomp rocket is launched into the air from ground level. Its height h as a function of time t can be modeled by the equation $h = -16t^2 + 64t$.

24.) How high will the rocket be at 1.5 seconds?

$$h = -16(1.5)^2 + 64(1.5)$$

$$h = 60$$

60 feet

25.) How long will it take for the rocket to hit the ground?

$$h = -16t(t - 4)$$

$$\begin{array}{l} \swarrow \\ -16t = 0 \\ t = 0 \end{array}$$

$$\begin{array}{l} \searrow \\ t - 4 = 0 \\ +4 \quad +4 \\ \hline t = 4 \end{array}$$

4 seconds

26.) When will the rocket reach its maximum height?

$$LOS = \frac{0 + 4}{2} = 2$$

Maximum height will be reached in 2 seconds.

27.) The advertising on the package says "Can fly over 60 feet high!" Does this rocket exceed the height listed on the package?

$$60 = -16t^2 + 64t$$

$$0 = -16t^2 + 64t - 60$$

$$b^2 - 4ac = 64^2 - 4(-16)(-60)$$

$$= 4096 - 3840$$

$$= 256$$

$$256 > 0$$

Yes it will fly over 60 feet!

Write **two** expressions that are equivalent to the given expression.

28.) $5(x - 3) + 11$

$$5x - 15 + 11$$

$$5x - 4$$

29.) $3x + 15$

$$3(x + 5)$$

$$3(x + 4) + 3$$

30.) $4x - 2 - 3x + x$

$$x - 2 + x$$

$$2x - 2$$

31.) $x + x + x + 8 + 8 + 8$

$$3x + 24$$

$$3(x + 8)$$

Simplify the following expressions.

32.) $12(-2x + 1) - 20$

$$-24x + 12 - 20$$

$$-24x - 8$$

33.) $-5x - (x - 6)$

$$-5x - x + 6$$

$$-6x + 6$$

34.) $-2(5 - 4x) + 8(-3x + 3)$

$$-10 + 8x - 24x + 24$$

$$-16x + 14$$

35.) $10 + 7(-5x + 4x - 5) + 14$

$$10 - 35x + 28x - 35 + 14$$

$$-7x - 11$$

The Student Council is organizing a charity bake sale. They came up with the following expenses and incomes:

- They need to spend \$70 on baking materials – flour, sugar, butter, etc
- They will sell each baked good for \$2.50.

36.) Write an equation for the profit P based on selling n baked goods. Simplify your equation.

$$P = 2.50n - 70$$

37.) How many baked goods do they need to sell to break even?

$$\begin{array}{r} 0 = 2.50n - 70 \\ +70 \qquad +70 \\ \hline 70 = 2.5n \\ 2.5 \quad 2.5 \end{array}$$

$$28 \text{ baked goods}$$

38.) Their goal is to raise \$325. How many baked goods do they need to sell to reach their goal?

$$\begin{array}{r} 325 = 2.5n - 70 \\ +70 \qquad +70 \\ \hline 395 = 2.5n \\ 2.5 \quad 2.5 \end{array}$$

$$158 \text{ baked goods}$$

The profit P of a concession stand outside Fenway park is depended on the number of customers C that go to the stand before, during, and after the game. The number of customers depends on the probability of rain R . The owner of the stand came up with the following equations to help predict their daily profit.

$$P = 8C - 400$$

$$C = 250 - 150R$$

39.) What do the numbers in the profit equation mean **in the context of this situation?**

on average each customer spends \$8

$$P = 8C - 400$$

expenses to run the concession stand each day

on a day with 0% chance rain 250 customers are expected

$$C = 250 - 150R$$

For each 1% increase in probability of rain there are 1.5 fewer customers.

40.) What is the profit of the concession stand if the probability of rain is 40%?

$$C = 250 - 150(0.4)$$

$$C = 250 - 60$$

$$C = 190$$

$$P = 8(190) - 400$$

$$= 1520 - 400$$

$$= 1120$$

$$\text{Profit when probability of rain is 40\% is } \$1120$$

41.) Write an equation for profit P in terms of probability of rain R .

$$P = 8C - 400$$

$$P = 8(250 - 150R) - 400$$

$$P = 2000 - 1200R - 400$$

$$P = 1600 - 1200R$$

$$P = 1600 - 1200R$$

42.) Simplify your profit equation from #41. Use it to help you calculate the probability of rain if the profit of the concession stand is \$1540.

$$P = 1600 - 1200R$$

$$1540 = 1600 - 1200R$$

$$\begin{array}{r} 1540 = 1600 - 1200R \\ -1600 \quad -1600 \\ \hline \end{array}$$

$$\begin{array}{r} -60 = -1200R \\ -1200 \quad -1200 \\ \hline \end{array}$$

$$0.05 = R$$

5% chance
of rain.

Solve for the given variable.

43.) x in terms of y

$$3x + 9y = 27$$

$$\begin{array}{r} 3x + 9y = 27 \\ -9y \quad -9y \\ \hline \end{array}$$

$$\begin{array}{r} 3x = 27 - 9y \\ 3 \quad 3 \\ \hline \end{array}$$

$$x = 9 - 3y$$

44.) y in terms of x

$$5(2x + y) = 35 - 6x$$

$$\begin{array}{r} 10x + 5y = 35 - 6x \\ -10x \quad -10x \\ \hline \end{array}$$

$$\begin{array}{r} 5y = 35 - 16x \\ 5 \quad 5 \\ \hline \end{array}$$

$$y = 7 - \frac{16}{5}x$$

45.) z in terms of x and y

$$2x - 8y + 4z = 20$$

$$\begin{array}{r} 2x - 8y + 4z = 20 \\ -2x \quad -2x \\ \hline -8y + 4z = 20 - 2x \\ +8y \quad +8y \\ \hline \end{array}$$

$$\begin{array}{r} 4z = 20 - 2x + 8y \\ 4 \quad 4 \\ \hline \end{array}$$

$$z = -\frac{1}{2}x + 2y + 5$$

46.) w in terms of P and l

$$P = 2l + 2w$$

$$\begin{array}{r} P = 2l + 2w \\ -2l \quad -2l \\ \hline P - 2l = 2w \\ 2 \quad 2 \\ \hline \end{array}$$

$$\frac{P}{2} - l = w$$

$$w = \frac{P}{2} - l$$

Using the two given equations, write a new equation relating the given variables. Think about what variable you *don't* want and how you can rid of that variable. Simplify your final equation.

47.) x in terms of z

$$x = 3y + 4z$$

$$y = 5z + 9$$

$$x = 3(5z + 9) + 4z$$

$$x = 15z + 27 + 4z$$

$$\boxed{x = 19z + 27}$$

48.) A in terms of B

$$A = BC$$

$$B = 5 + C$$

$$\begin{array}{r} -5 \quad -5 \\ \hline \end{array}$$

$$B - 5 = C$$

$$A = BC$$

$$A = B(B - 5)$$

$$\boxed{A = B^2 - 5B}$$

49.) A in terms of l and P

$$A = lw$$

$$P = 2l + 2w$$

$$\begin{array}{r} -2l \quad -2l \\ \hline \end{array}$$

$$\frac{P - 2l}{2} = \frac{2w}{2}$$

$$\frac{P}{2} - l = w$$

$$A = l\left(\frac{P}{2} - l\right)$$

$$\boxed{A = -l^2 + \frac{Pl}{2}}$$

50.) I in terms of n

$$I = np$$

$$10n = 75 - 5p$$

$$\begin{array}{r} -75 \quad -75 \\ \hline \end{array}$$

$$\frac{10n - 75}{-5} = \frac{-5p}{-5}$$

$$-2n + 15 = p$$

$$I = np$$

$$I = n(-2n + 15)$$

$$\boxed{I = -2n^2 + 15n}$$

For 51-54, use the following information.

The Metropolis Middle School volleyball team is operating the concession stand at school basketball games to help raise money for new uniforms. The profit in dollars P from operating the stand is given by the equation $P = 15n - 5(2n + 20)$, where n is the total number of items sold.

51.) How much money will the volleyball team raise if they sell 65 items?

$$\begin{aligned} P &= 15(65) - 5(2(65) + 20) \\ &= 975 - 620 - 100 \\ &= 225 \end{aligned}$$

$\$225$ profit

52.) How many items does the team need to sell in order to **break even**?

$$\begin{aligned} 0 &= 15n - 5(2n + 20) \\ 0 &= 15n - 10n - 100 \\ 0 &= 5n - 100 \\ +100 \quad +100 \\ \hline 100 &= \frac{5n}{5} \end{aligned}$$

20 items need to be sold to break even.

53.) If the team needs to raise \$1,000 for new uniforms, how many items will they have to sell?

$$\begin{aligned} 1000 &= 15n - 5(2n + 20) \\ 1000 &= 15n - 10n - 100 \\ 1000 &= 5n - 100 \\ +100 \quad +100 \\ \hline 1100 &= \frac{5n}{5} \end{aligned}$$

220 items need to be sold.

54.) Write an equivalent equation for the profit P .

$$\begin{aligned} P &= 15n - 5(2n + 20) \\ &= 15n - 10n - 100 \\ &= 5n - 100 \end{aligned}$$

$P = 5n - 100$

Solve for the given variable using the most efficient method.

55.) $5x + 2(x + 4) = 64$

$$5x + 2x + 8 = 64$$

$$7x + 8 = 64$$

$$\underline{-8 \quad -8}$$

$$7x = 56$$

$$\underline{7 \quad 7}$$

$$\boxed{x = 8}$$

56.) $x^2 - 3x - 10 = 0$

$$(x + 2)(x - 5) = 0$$

$$\downarrow$$

$$0 = x + 2$$

$$\underline{-2 \quad -2}$$

$$-2 = x$$

$$\rightarrow x - 5 = 0$$

$$\underline{+5 \quad +5}$$

$$x = 5$$

$$\boxed{x = -2 \text{ and } 5}$$

57.) $x^2 - 12x = 0$

$$x(x - 12) = 0$$

$$\downarrow$$

$$x = 0$$

$$\rightarrow x - 12 = 0$$

$$\underline{+12 \quad +12}$$

$$x = 12$$

$$\boxed{x = 0 \text{ and } 12}$$

58.) $7(6x - 1) + x = 36$

$$42x - 7 + x = 36$$

$$\underline{+7 \quad +7}$$

$$43x = 43$$

$$\underline{43 \quad 43}$$

$$\boxed{x = 1}$$

59.) $2x^2 + 45 = -12x$

$$2x^2 + 12x + 45 = 0$$

$$b^2 - 4ac = 12^2 - 4(2)(45)$$

$$= 144 - 360$$

$$= -216$$

$$\boxed{\text{No Solution}}$$

60.) $33 + 15w = 3w - w + 4w$

$$33 + 15w = 6w$$

$$\underline{-15w \quad -15w}$$

$$33 = -9w$$

$$\underline{-9 \quad -9}$$

$$\boxed{-\frac{11}{3} = w}$$

61.) $7(7c + 1) - 4c = 13(3c - 2)$

$$49c + 7 - 4c = 39c - 26$$

$$45c + 7 = 39c - 26$$

$$\underline{-39c \quad -39c}$$

$$6c + 7 = -26$$

$$\underline{-7 \quad -7}$$

$$6c = -33$$

$$\underline{6 \quad 6}$$

$$\boxed{c = -\frac{11}{2}}$$

62.) $8x^2 + 2x - 15 = 0$

$$8x^2 + 12x - 10x - 15 = 0$$

$$4x(2x + 3) - 5(2x + 3) = 0$$

$$(4x - 5)(2x + 3) = 0$$

$$\downarrow$$

$$4x - 5 = 0$$

$$\underline{+5 \quad +5}$$

$$\frac{4x}{4} = \frac{5}{4}$$

$$\rightarrow 2x + 3 = 0$$

$$\underline{-3 \quad -3}$$

$$\frac{2x}{2} = \frac{-3}{2}$$

$$\boxed{x = -\frac{3}{2} \text{ and } \frac{5}{4}}$$

$$63.) x^2 + 8x + 16 = 0$$

$$(x+4)^2 = 0$$

$$\begin{array}{r} \swarrow \\ x+4=0 \\ -4 \quad -4 \\ \hline x=-4 \end{array}$$

$$\boxed{x = -4}$$

$$64.) 6(n-5) - 11n = -5n + 4$$

$$\begin{array}{r} 6n - 30 - 11n = -5n + 4 \\ -5n - 30 = -5n + 4 \\ +5n \quad +5n \\ \hline -30 = 4 \end{array}$$

$$\boxed{\text{No Solution}}$$

$$65.) 9y - 4(y+5) = 40$$

$$\begin{array}{r} 9y - 4y - 20 = 40 \\ 5y - 20 = 40 \\ +20 \quad +20 \\ \hline 5y = 60 \\ \frac{5y}{5} = \frac{60}{5} \end{array}$$

$$\boxed{y = 12}$$

$$66.) x^2 - 49 = 0$$

$$(x-7)(x+7) = 0$$

$$\begin{array}{r} \swarrow \quad \searrow \\ x-7=0 \quad x+7=0 \\ +7 \quad +7 \quad -7 \quad -7 \\ \hline x=7 \quad x=-7 \end{array}$$

$$\boxed{x = 7 \text{ and } -7}$$

$$67.) \frac{2}{7}(4m-18) = 12$$

$$\begin{array}{r} 2(4m-18) = 12(7) \\ 8m - 36 = 84 \\ +36 \quad +36 \\ \hline 8m = 120 \\ \frac{8m}{8} = \frac{120}{8} \end{array}$$

$$\boxed{m = 15}$$

$$68.) 3x^2 + 11x - 10 = 0$$

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-11 \pm \sqrt{121 + 120}}{6} \\ &= \frac{-11 \pm \sqrt{241}}{6} \end{aligned}$$

$$\boxed{x = 0.75 \text{ and } -4.42}$$

$$69.) 4x^2 + 7x + 3 = 0$$

$$4x^2 + 4x + 3x + 3 = 0$$

$$4x(x+1) + 3(x+1) = 0$$

$$(4x+3)(x+1) = 0$$

$$\begin{array}{r} \swarrow \quad \searrow \\ 4x+3=0 \quad x+1=0 \\ -3 \quad -3 \quad -1 \quad -1 \\ \hline 4x=-3 \quad x=-1 \\ \frac{4x}{4} = \frac{-3}{4} \end{array}$$

$$\boxed{x = -\frac{3}{4} \text{ and } -1}$$

$$70.) 3q - 16q = 7 + \frac{1}{2}(-32q - 12)$$

$$-13q = 7 - 16q - 6$$

$$\begin{array}{r} -13q = 1 - 16q \\ +16q \quad +16q \\ \hline +3q = 1 \end{array}$$

$$\frac{+3q}{3} = \frac{1}{3}$$

$$\boxed{q = \frac{1}{3}}$$

For questions 71-74, use the following information.

A rocket is launched into the air from ground level with an initial velocity of 120 feet per second.

71.) Write an equation that models how the height h of the rocket changes over time t .

$$h = -16t^2 + 120t$$

72.) How long will it take for the rocket to hit the ground?

$$0 = -16t(t - 7.5)$$

$$\begin{array}{l} \swarrow \\ 0 = -16t \\ 0 = t \end{array}$$

$$\begin{array}{r} \searrow 0 = t - 7.5 \\ +7.5 \quad +7.5 \\ \hline 7.5 = t \end{array}$$

$$\boxed{7.5 \text{ seconds}}$$

73.) The advertising on the package says "Can fly over 250 feet high!" Does this rocket exceed the height listed on the package?

$$250 = -16t^2 + 120t$$

$$0 = -16t^2 + 120t - 250$$

$\boxed{\text{No! It cannot fly over 250 feet high.}}$

$$\begin{aligned} b^2 - 4ac &= 120^2 - 4(-16)(-250) \\ &= 14,400 - 16,000 \\ &= -1600 \end{aligned}$$

74.) When is the rocket 160 feet off the ground?

$$\begin{array}{r} 160 = -16t^2 + 120t \\ -160 \quad \quad -160 \\ \hline 0 = -16t^2 + 120t - 160 \\ \frac{0}{8} \quad \quad \frac{120}{8} \quad \quad \frac{-160}{8} \\ \hline 0 = -2t^2 + 15t - 20 \end{array}$$

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ x &= \frac{-15 \pm \sqrt{15^2 - 4(-2)(-20)}}{-4} \\ x &= \frac{-15 \pm \sqrt{25 - 160}}{-4} \\ x &= \frac{-15 \pm \sqrt{-135}}{-4} \end{aligned}$$

$\boxed{\text{At 1.73 and 5.77 seconds}}$

$$x = 1.73 \text{ and } 5.77$$

State whether each equation below represents a linear, exponential, or quadratic relationship and **explain how you know**.

75.) $y = 3x^2 - 12$

QUADRATIC

- Highest order exponent on x is 2.
- Follows format $y = ax^2 + bx + c$

76.) $y = 2(3.5)^x$

EXPONENTIAL

- Follows format $y = ag^x$

77.) $y = (x - 4)(2x + 8)$

QUADRATIC

- Product of 2 linear expressions
- when expanded follows $y = ax^2 + bx + c$

78.) $y = -x + 14$

LINEAR

- Follows format $y = mx + b$

79.) $y = 6(x - 2) + 7(x + 1)$

LINEAR

- when simplified follows format: $y = mx + b$

80.) $y = .25^x$

EXPONENTIAL

- Follows format $y = ag^x$

81.) $y = \frac{1}{2}x^2 - 15x + 11$

QUADRATIC

- Follows format $y = ax^2 + bx + c$

82.) $y = 3(2x + 12)(-3x + 2)$

QUADRATIC

- Product of 2 linear expressions.
- when expanded, will follow $y = ax^2 + bx + c$

Simplify the radical expressions.

$$\begin{aligned} 83.) \sqrt{300} \\ = \sqrt{100 \cdot 3} \\ = 10\sqrt{3} \end{aligned}$$

$$\begin{aligned} 84.) \sqrt{63} \\ = \sqrt{9 \cdot 7} \\ = 3\sqrt{7} \end{aligned}$$

$$\begin{aligned} 85.) \sqrt{384} \\ = \sqrt{16 \cdot 4 \cdot 6} \\ = \sqrt{16} \cdot \sqrt{4} \cdot \sqrt{6} \\ = 4 \cdot 2 \cdot \sqrt{6} \\ = 8\sqrt{6} \end{aligned}$$

$$\begin{aligned} 86.) \sqrt{8400} \\ = \sqrt{400 \cdot 21} \\ = 20\sqrt{21} \end{aligned}$$

$$\begin{aligned} 87.) \sqrt{45} \cdot 3\sqrt{10} \\ = 3\sqrt{9 \cdot 5 \cdot 5 \cdot 2} \\ = 3\sqrt{9} \cdot \sqrt{25} \cdot \sqrt{2} \\ = 3 \cdot 3 \cdot 5 \cdot \sqrt{2} \\ = 45\sqrt{2} \end{aligned}$$

$$\begin{aligned} 88.) 2\sqrt{150} \cdot 4\sqrt{8} \\ = 8\sqrt{25 \cdot 3 \cdot 2 \cdot 2 \cdot 4} \\ = 8\sqrt{25} \cdot \sqrt{4} \cdot \sqrt{4} \cdot \sqrt{3} \\ = 8 \cdot 5 \cdot 2 \cdot 2 \cdot \sqrt{3} \\ = 160\sqrt{3} \end{aligned}$$

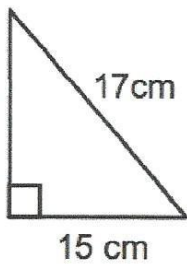
$$\begin{aligned} 89.) \frac{\sqrt{75}}{\sqrt{3}} \\ = \sqrt{\frac{75}{3}} \\ = \sqrt{25} \\ = 5 \end{aligned}$$

$$\begin{aligned} 90.) \frac{\sqrt{10}}{\sqrt{35}} \\ = \sqrt{\frac{2}{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} \\ = \frac{\sqrt{14}}{7} \end{aligned}$$

$$\begin{aligned} 91.) \frac{\sqrt{15}}{\sqrt{45}} \\ = \sqrt{\frac{1}{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\ = \frac{\sqrt{3}}{3} \end{aligned}$$

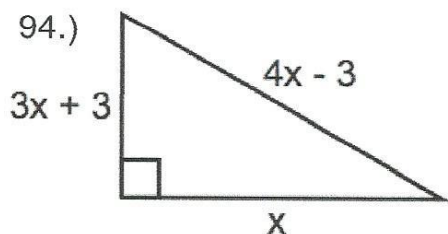
Find the missing side length. Leave your answer in simplest radical form.

92.)



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 a^2 + 15^2 &= 17^2 \\
 a^2 + 225 &= 289 \\
 -225 \quad -225 \\
 \hline
 a^2 &= 64 \\
 \sqrt{a^2} &= \sqrt{64} \\
 a &= 8 \text{ cm}
 \end{aligned}$$

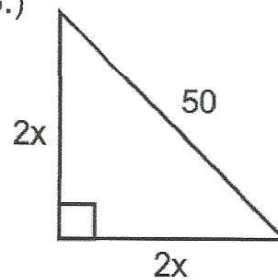
94.)



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 (3x+3)^2 + x^2 &= (4x-3)^2 \\
 9x^2 + 18x + 9 + x^2 &= 16x^2 - 24x + 9 \\
 10x^2 + 18x + 9 &= 16x^2 - 24x + 9 \\
 0 &= 6x^2 - 42x \\
 0 &= 6x(x-7) \\
 6x &= 0 & \rightarrow x-7=0 \\
 x &= 0 & \quad +7 \quad +7 \\
 & & \quad \hline
 & & x=7
 \end{aligned}$$

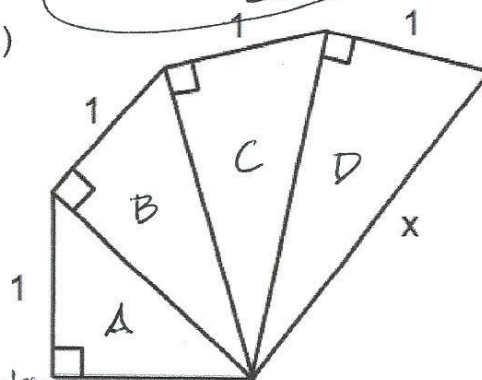
$x=7$

93.)



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 (2x)^2 + (2x)^2 &= 50^2 \\
 4x^2 + 4x^2 &= 2500 \\
 8x^2 &= 2500 \\
 \frac{8x^2}{8} &= \frac{2500}{8} \\
 \sqrt{x^2} &= \sqrt{\frac{1250}{4}} \\
 x &= \frac{25\sqrt{2}}{2}
 \end{aligned}$$

95.)



Hypotenuse
Calculations: 1

Triangle A

$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 1^2 + 1^2 &= c^2 \\
 2 &= c^2 \\
 \sqrt{2} &= c
 \end{aligned}$$

Triangle B

$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 1^2 + (\sqrt{2})^2 &= c^2 \\
 3 &= c^2 \\
 \sqrt{3} &= c
 \end{aligned}$$

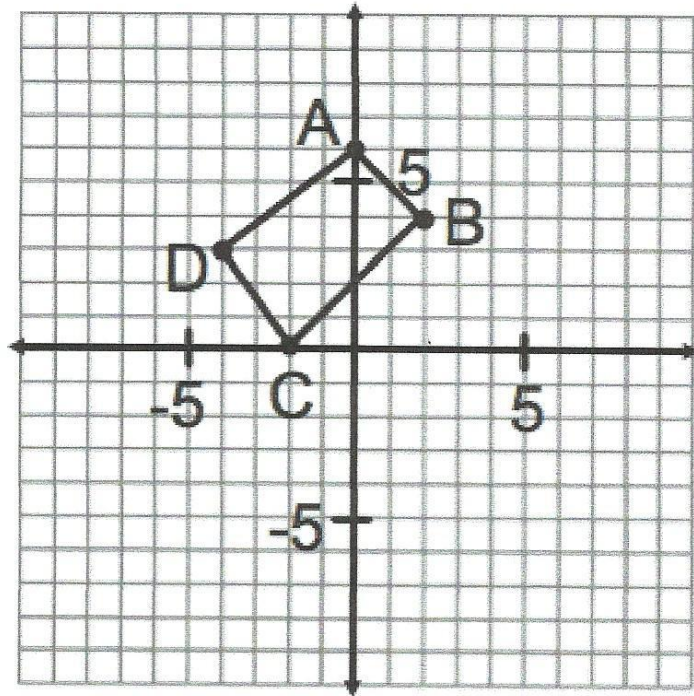
Triangle C

$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 1^2 + (\sqrt{3})^2 &= c^2 \\
 4 &= c^2 \\
 2 &= c
 \end{aligned}$$

Triangle D

$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 1^2 + 2^2 &= c^2 \\
 5 &= c^2 \\
 \sqrt{5} &= c \\
 x &= \sqrt{5}
 \end{aligned}$$

Use the following diagram to perform the given transformations. Identify the coordinates of the new point, segment, or shape.



- 96.) A after a translation of
 $(x - 7, y + 2)$

$$A'(-7, 8)$$

- 97.) B after a reflection across
the y-axis

$$B'(-2, 4)$$

- 98.) Segment CD after a reflection
across the line $y = -3$

$$C'(-2, -6) \quad D'(-4, -9)$$

- 99.) D after a rotation 90 degrees
about the origin

$$D'(3, 4)$$

- 100.) Segment AB after a rotation of
180 degrees about the origin

$$A'(0, -6) \quad B'(-2, -4)$$

- 101.) Quadrilateral ABCD after a reflection across the y-axis

$$A'(0, 6) \quad B'(-2, 4) \quad C'(2, 0) \quad D'(4, 3)$$

- 102.) Quadrilateral ABCD after a 180 degree rotation about the point (0, 2)

$$A'(0, -2) \quad B'(-2, 0) \quad C'(2, 4) \quad D'(4, 1)$$

- 103.) Quadrilateral ABCD after a rotation of 90 degrees counterclockwise about
the origin

$$A'(-6, 0) \quad B'(-4, 2) \quad C'(0, -2) \quad D'(-3, -4)$$

- 104.) Quadrilateral ABCD after a rotation of 180 degrees about the origin
followed by a reflection in the line $x = 3$

$$A''(6, -6) \quad B''(8, -4) \quad C''(4, 0) \quad D''(2, -3)$$