

# 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  $90^\circ$  clockwise or counterclockwise about the origin
- Rotate a figure  $180^\circ$  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.)  $(2x^2 - 4x - 3)(3x^2 + 2x - 5)$

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

$$- 12x^3 - 8x^2 + 20x$$

$$- 3x^2 - 6x + 15$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

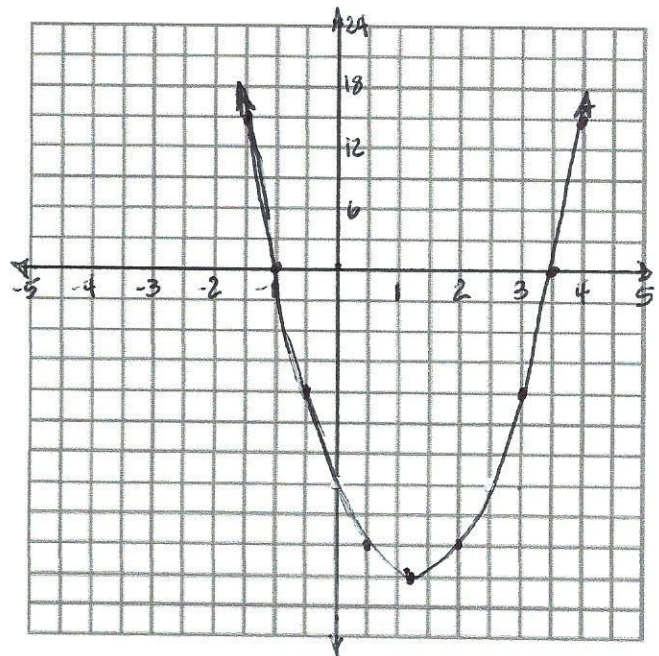
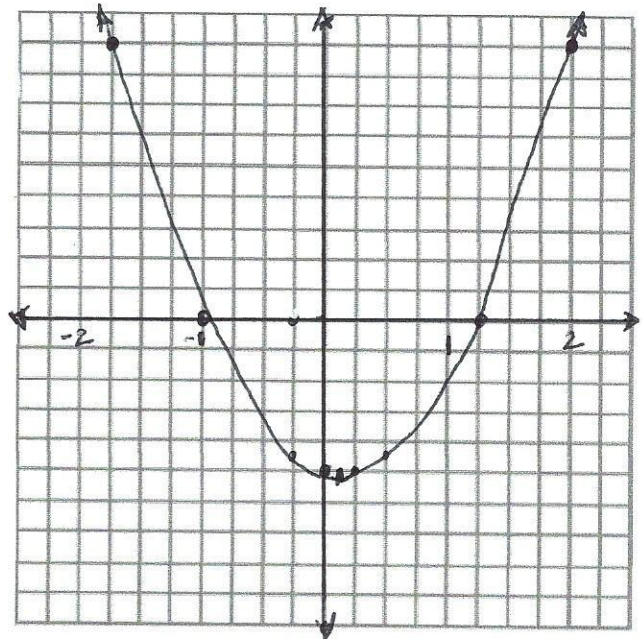
vertex:  $(1.25, -30.375)$

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:

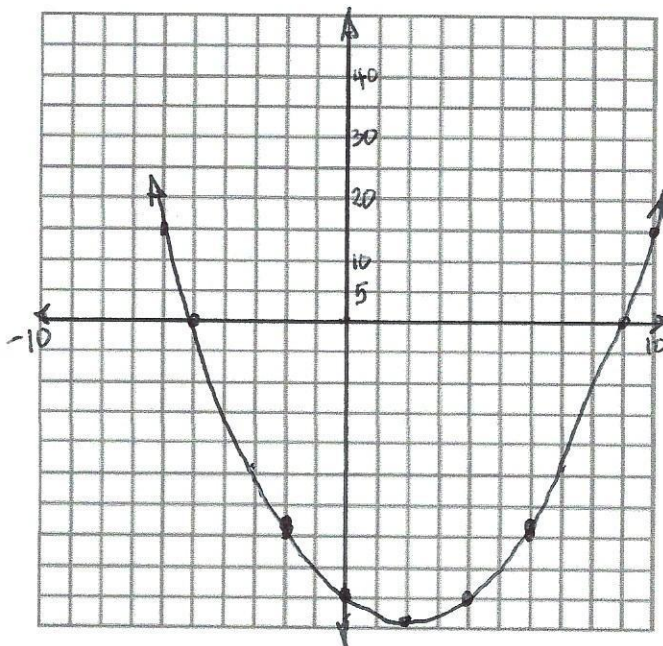
$(2, -49)$

$(10, 15)$

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:  $x = -\frac{9}{4}$

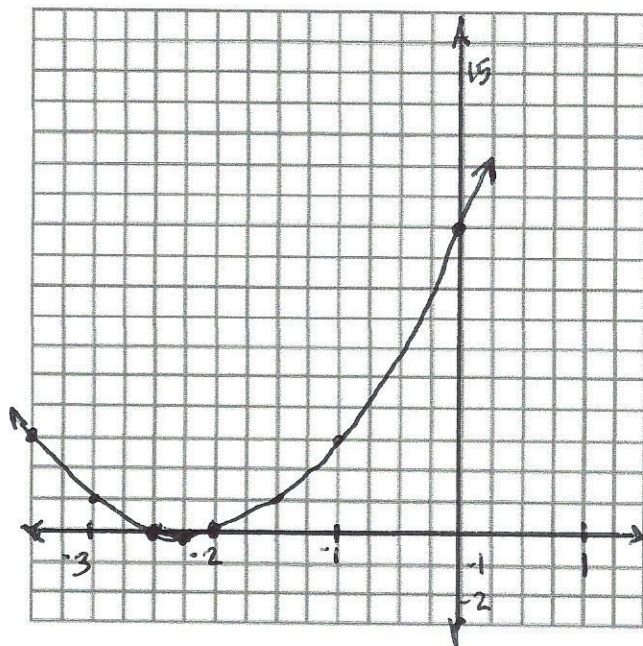
vertex:  $(-2.25, -0.125)$

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:**  $x = -3$

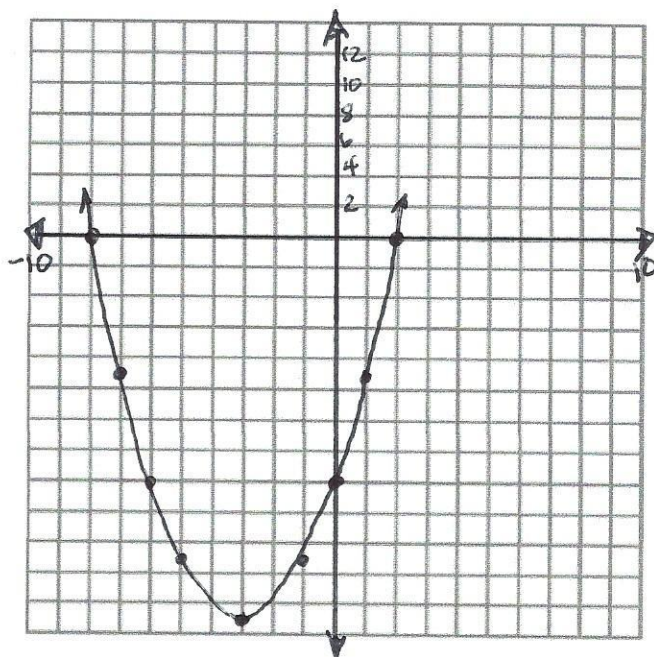
**vertex:**  $(-3, -25)$

**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. It's 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?

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

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

$$-24x + 12 - 20$$

$$\boxed{-24x - 8}$$

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

$$-5x - x + 6$$

$$\boxed{-6x + 6}$$

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

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

$$\boxed{-16x + 14}$$

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

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

$$\boxed{-7x - 11}$$



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?

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

$$28 \text{ baked goods}$$

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

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

$$158 \text{ baked goods}$$

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.

$$P = 1600 - 1200R$$

$$1540 = 1600 - 1200R$$

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

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

$$0.05 = R$$

5% chance  
of rain.

Solve for the given variable.

43.)  $x$  in terms of  $y$

$$3x + 9y = 27$$

$$\begin{array}{r} -9y \\ -9y \end{array}$$

$$\frac{3x}{3} = \frac{27-9y}{3}$$

$$x = 9 - 3y$$

44.)  $y$  in terms of  $x$

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

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

$$\frac{5y}{5} = \frac{35-16x}{5}$$

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

45.)  $z$  in terms of  $x$  and  $y$

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

$$\begin{array}{r} -2x \end{array} \quad \begin{array}{r} -2x \end{array}$$

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

$$\begin{array}{r} +8y \end{array} \quad \begin{array}{r} +8y \end{array}$$

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

$$\frac{4z}{4} = \frac{20-2x+8y}{4}$$

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

46.)  $w$  in terms of  $P$  and  $l$

$$P = 2l + 2w$$

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

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

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

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



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

$$\begin{array}{r} 5x + 2x + 8 = 64 \\ 7x + 8 = 64 \\ \underline{-8 \quad -8} \\ 7x = 56 \\ \underline{7 \quad 7} \\ x = 8 \end{array}$$

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

$$\begin{array}{l} (x+2)(x-5) = 0 \\ \swarrow \quad \searrow \\ 0 = x+2 \quad \rightarrow x-5=0 \\ \underline{-2 \quad -2} \quad \underline{+5 \quad +5} \\ -2 = x \quad \quad x = 5 \end{array}$$

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

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

$$\begin{array}{l} x(x-12) = 0 \\ \swarrow \quad \searrow \\ x = 0 \quad \rightarrow x-12=0 \\ \quad \quad \underline{+12 \quad +12} \\ \quad \quad x = 12 \end{array}$$

$x = 0 \text{ and } 12$

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

$$\begin{array}{r} 42x - 7 + x = 36 \\ +7 \quad +7 \\ \hline 43x = 43 \\ \underline{43 \quad 43} \\ x = 1 \end{array}$$

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

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

$$\begin{aligned} b^2 - 4ac &= 12^2 - 4(2)(45) \\ &= 144 - 360 \\ &= -216 \end{aligned}$$

No Solution

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

$$\begin{array}{r} 33 + 15w = 6w \\ -15w \quad -15w \\ \hline 33 = -9w \\ \underline{-9 \quad -9} \\ -\frac{11}{3} = w \end{array}$$

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

$$\begin{array}{r} 49c + 7 - 4c = 39c - 26 \\ 45c + 7 = 39c - 26 \\ -39c \quad -39c \\ \hline 6c + 7 = -26 \\ \underline{-7 \quad -7} \\ 6c = -33 \\ \underline{6 \quad 6} \\ c = -\frac{11}{2} \end{array}$$

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

$$\begin{array}{l} 8x^2 + 12x - 10x - 15 = 0 \\ 4x(2x+3) - 5(2x+3) = 0 \\ (4x-5)(2x+3) = 0 \\ \swarrow \quad \searrow \\ 4x-5=0 \quad \rightarrow 2x+3=0 \\ \underline{+5 \quad +5} \quad \underline{-3 \quad -3} \\ 4x = 5 \quad \quad 2x = -\frac{3}{2} \\ \underline{4 \quad 4} \quad \quad \underline{2 \quad 2} \\ x = \frac{5}{4} \quad \quad x = -\frac{3}{2} \end{array}$$

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



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

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

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

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

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

$$6n - 30 - 11n = -5n + 4$$

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

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

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

$$9y - 4y - 20 = 40$$

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

$$\frac{5y}{5} = \frac{60}{5}$$

$$\boxed{y = 12}$$

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

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

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

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

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

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

$$2(4m-18) = 12(7)$$

$$\begin{array}{r} 8m - 36 = 84 \\ +36 \quad +36 \\ \hline 8m = 120 \end{array}$$

$$\frac{8m}{8} = \frac{120}{8}$$

$$\boxed{m = 15}$$

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-11 \pm \sqrt{121 + 120}}{6}$$

$$= \frac{-11 \pm \sqrt{241}}{6}$$

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

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

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

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

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

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

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

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

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

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

$$-13q = 1 - 16q$$

$$\begin{array}{r} +16q \quad +16q \\ \hline \end{array}$$

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

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

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?

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

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

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

7.5 seconds

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

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

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

No! It cannot fly over 250 feet high.

$$\begin{aligned} b^2 - 4ac &= 120^2 - 4(-16)(-250) \\ &= 14400 - 16,000 \\ &= -1600 \end{aligned}$$

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

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

At 1.73 and 5.77 seconds

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ x &= \frac{-15 \pm \sqrt{15^2 - 4(-2)(-20)}}{2(-2)} \\ x &= \frac{-15 \pm \sqrt{25 - 16}}{-4} \\ x &= \frac{-15 \pm 3}{-4} \end{aligned}$$

$x = 1.73$  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.

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

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

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

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

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

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

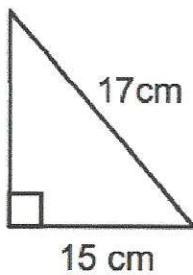
$$\begin{aligned} 89.) \frac{\sqrt{75}}{\sqrt{3}} \\ &= \sqrt{\frac{75}{3}} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$$

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

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

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

92.)



$$a^2 + b^2 = c^2$$

$$a^2 + 15^2 = 17^2$$

$$a^2 + 225 = 289$$

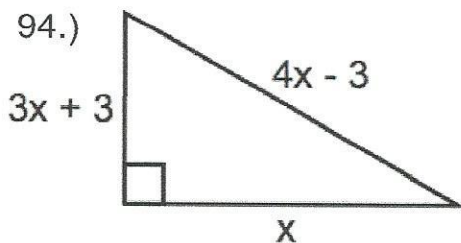
$$\begin{array}{r} -225 \\ -225 \end{array}$$

$$a^2 = 64$$

$$\sqrt{a^2} = \sqrt{64}$$

$$a = 8 \text{ cm}$$

94.)



$$a^2 + b^2 = c^2$$

$$(3x+3)^2 + x^2 = (4x-3)^2$$

$$9x^2 + 18x + 9 + x^2 = 16x^2 - 24x + 9$$

$$10x^2 + 18x + 9 = 16x^2 - 24x + 9$$

$$0 = 6x^2 - 42x$$

$$0 = 6x(x-7)$$

$$6x = 0$$

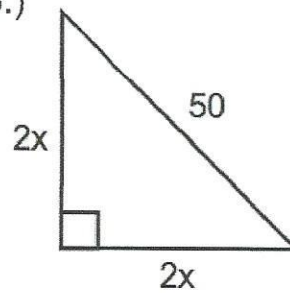
$$x = 0$$

$$x - 7 = 0$$

$$\begin{array}{r} +7 \\ +7 \\ \hline x = 7 \end{array}$$

$$x = 7$$

93.)



$$a^2 + b^2 = c^2$$

$$(2x)^2 + (2x)^2 = 50^2$$

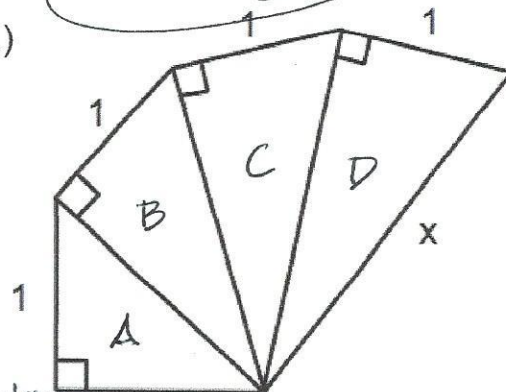
$$4x^2 + 4x^2 = 2500$$

$$\frac{8x^2}{8} = \frac{2500}{8}$$

$$\sqrt{x^2} = \sqrt{\frac{1250}{4}}$$

$$x = \frac{25\sqrt{2}}{2}$$

95.)



Hypotenuse  
Calculus: 1

Triangle A

$$a^2 + b^2 = c^2$$

$$1^2 + 1^2 = c^2$$

$$2 = c^2$$

$$\sqrt{2} = c$$

Triangle B

$$a^2 + b^2 = c^2$$

$$1^2 + (\sqrt{2})^2 = c^2$$

$$3 = c^2$$

$$\sqrt{3} = c$$

Triangle C

$$a^2 + b^2 = c^2$$

$$1^2 + (\sqrt{3})^2 = c^2$$

$$4 = c^2$$

$$2 = c$$

Triangle D

$$a^2 + b^2 = c^2$$

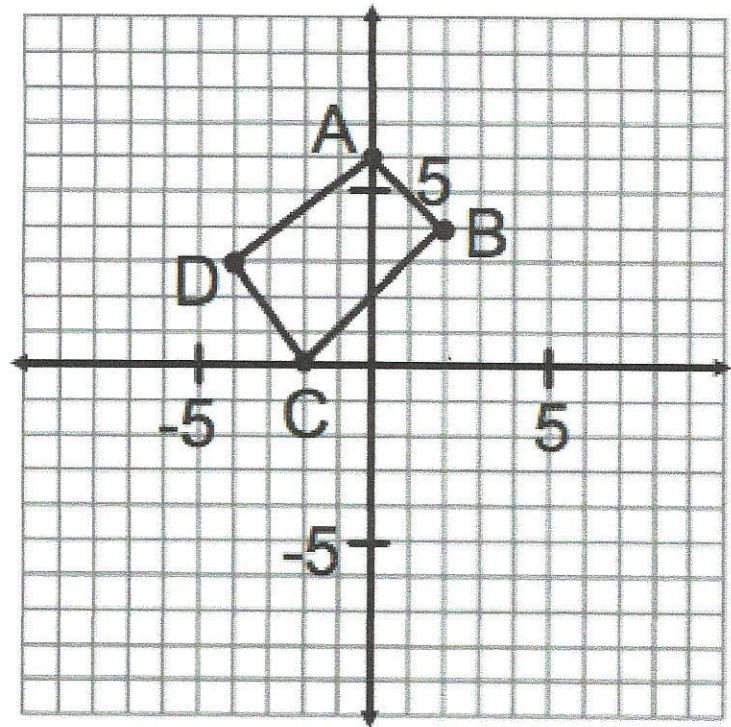
$$1^2 + 2^2 = c^2$$

$$5 = c^2$$

$$\sqrt{5} = c$$

$$x = \sqrt{5}$$

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  
 $(x - 7, y + 2)$

$$A'(-7, 6)$$

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

$$B'(-2, 3)$$

- 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

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

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

$$A'(0, 4) \quad B'(-2, 3) \quad C'(1, 0) \quad D'(3, 2)$$

- 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

$$A'(-4, 0) \quad B'(-3, 2) \quad C'(0, 2) \quad D'(-1, -4)$$

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

$$A''(6, -4) \quad B''(8, -3) \quad C''(4, 0) \quad D''(2, -1)$$