

Solve each quadratic equation. Use each method at least twice (factoring, quadratic formula, complete the square).

1.  $x^2 - 8x + 12 = 0$

$$(x-6)(x-2) = 0$$

$$\boxed{x=6 \quad x=2}$$

2.  $2x^2 - 24x + 70 = 0$

$$x^2 - 12x + 35 = 0$$

$$(x-7)(x-5) = 0$$

$$\boxed{x=7 \quad x=5}$$

3.  $8x^2 - 15x - 7 = 0$

~~$$\begin{array}{r} -56 \\ -15 \end{array}$$~~

$$15 \pm \sqrt{(-15)^2 - 4(8)(-7)}$$

$$\frac{2(8)}$$

$$\frac{15 \pm \sqrt{449}}{16}$$

$$\boxed{x=2.26 \\ x=-.39}$$

4.  $6x^2 + 13x + 5 = 0$

~~$$\begin{array}{r} 30 \\ 10 \quad 3 \\ 13 \end{array}$$~~

$$6x^2 + 10x + 3x + 5 = 0$$

$$2x(3x+5) + 1(3x+5)$$

$$(3x+5)(2x+1) = 0$$

$$\boxed{x=-5/3 \quad x=-1/2}$$

5.  $x^2 + 12x + 32 = 0$

$$x^2 + 12x + 36 = -32 + 36$$

$$(x+6)^2 = 4$$

$$x+6 = \pm 2$$

$$\boxed{x=-8 \quad x=-4}$$

6.  $-3x^2 - 24x + 70 = 0$

$$24 \pm \sqrt{(-24)^2 - 4(-3)(70)}$$

$$\frac{2(-3)}$$

$$\frac{24 \pm \sqrt{1416}}{-6}$$

$$\boxed{x=-10.27 \\ x=2.27}$$

7.  $x^2 - 6x - 55 = 0$

$$x^2 - 6x + 9 = 55 + 9$$

$$(x-3)^2 = 64$$

$$x-3 = \pm 8$$

$$\boxed{x=11 \quad x=-5}$$

8.  $12x^2 - 25x - 7 = 0$

$$x = \frac{25 \pm \sqrt{(-25)^2 - 4(12)(-7)}}{2(12)}$$

$$x = \frac{25 \pm \sqrt{961}}{24}$$

$$\boxed{x=2\frac{1}{3} \\ x=-\frac{1}{4}}$$

9. Simplify:  $(-3x^2 - 5x + 2) - (4x^2 - 9x + 6)$

$$-7x^2 + 4x - 4$$

10. Simplify:  $(8x^2 - 4x - 5) + (-2x^2 + 7x - 1)$

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

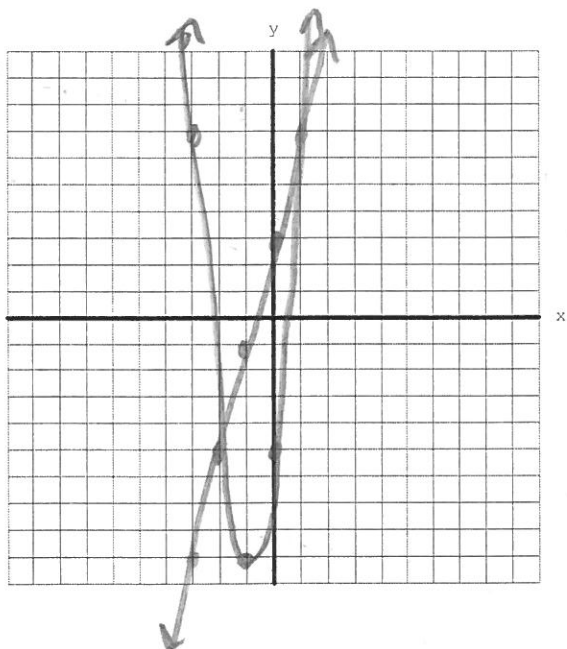
11. Simplify:  $(2x - 7)(3x - 2)$

$$6x^2 - 4x - 21x + 14$$

$$6x^2 - 25x + 14$$

12. Solve the system by graphing.  $y = 4x^2 + 8x - 5$

$$-4x + y = 3 \Rightarrow y = 4x + 3$$



$$x = \frac{-b}{2a} = \frac{-8}{2(4)} = -1$$

$$y = -9 \quad \text{vertex } (-1, -9)$$

$$y\text{-int } (0, -5)$$

$$\text{other point: } (1, 7)$$

$$\boxed{\begin{matrix} (-2, -5) \\ (1, 7) \end{matrix}}$$

13. Solve the system by substitution.  $y = 4x^2 + 8x - 5$

$$-4x + y = 3$$

$$-4x + 4x^2 + 8x - 5 = 3$$

$$4x^2 + 4x - 8 = 0$$

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

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

$$x = 1, x = -2$$

$$y = 7, y = -5$$

$$\boxed{\begin{matrix} (1, 7) \\ (-2, -5) \end{matrix}}$$

14. Determine what kind of equation the word problem represents: circle your answer.

DO NOT ANSWER THE QUESTION IN THE WORD PROBLEM

a. When I bought my motorcycle in 2010, it was worth \$22,000. It decreases in value 4% every year. How much is it worth in 2014?

Linear   Exponential   Quadratic   None

b. John kicked a field goal with a velocity of 48 feet per second. How long did it take for the ball to come back to the ground?

Linear   Exponential   Quadratic   None

c. Julie bought 4 tickets to the John Legend concert for \$162.50. Jenny bought 6 tickets for \$236.50. How much did each ticket cost? What was the service fee?

Linear   Exponential   Quadratic   None

15. Jessie climbed a 92 foot cliff, made a wish, and threw her lucky ring into the water below with a velocity of 32 feet per second.

a. How long did it take the ring to hit the water?

$$h(t) = -16t^2 + 32t + 92$$

$$0 = -16t^2 + 32t + 92$$

$$x = \frac{-32 \pm \sqrt{32^2 - 4(-16)(92)}}{2(-16)}$$

$$x = \frac{-32 \pm \sqrt{6912}}{-32}$$

$$x = -1.59$$

$$x = 3.60$$

3.6 sec

b. What was the maximum height the ring reached?

$$t = -b/2a = -32/2(-16) = 1$$

$$h(1) = -16 + 32 + 92 = \boxed{108 \text{ ft.}}$$

16. My parents bought their house in 2007 for \$120,000. If it increases in value 2% every year, how much will it be worth in 2015?

$$y = 120000(1.02)^8$$

$$y = \boxed{\$140,599.13}$$

17. The number of bacteria at the start of the study was 14. It quadrupled every day. How many were there after 7 days?

$$y = 14(4)^7$$

$$= \boxed{229376} \text{ bacteria}$$

18. A taxi driver charges you per mile as well as a set fee for usage of his taxi. Traveling 24 miles will cost you \$32.50. A 52 mile trip in the taxi costs \$67.50.

a. How much does the taxi driver charge you per mile?

$$\begin{matrix} (24, 32.50) \\ (52, 67.50) \end{matrix}$$

$$m = \frac{67.5 - 32.5}{52 - 24} = \frac{35}{28} = \boxed{1.25 \frac{\$}{\text{mile}}}$$

b. How much will it cost to travel 100 miles in the taxi?

$$y = mx + b$$

$$32.50 = 1.25(24) + b \quad b = -2.50$$

$$y = 1.25x + 2.50$$

$$y = 1.25(100) + 2.50$$

c. I got charged \$23.75. How far was my trip in the taxi?

$$23.75 = 1.25x + 2.5$$

$$\boxed{127.50 \text{ dollars}}$$

$$\boxed{x = 17 \text{ miles}}$$

19. Tom has been spending an average of \$6 per day. On day 12, he has \$31 left.

a. How much money did he have to start with?

$$y = mx + b$$

$$31 = -6(12) + b$$

$$b = 103$$

$$\boxed{103 \text{ dollars}}$$

b. How much does he have left on day 17?

$$y = -6x + 103$$

$$y = -6(17) + 103 = \boxed{1 \text{ dollar}}$$

c. On what day did he have \$73 left?

$$73 = -6x + 103$$

$$-30 = -6x$$

$$x = 5$$

$$\boxed{5^{\text{th}} \text{ day}}$$

20. Find the slope using the given information:

a. (12,4) (9,2)

$$m = \boxed{\frac{2}{3}}$$

b. (7,3) (9,-7)

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

21. Find the y-intercept using the given information:

a.  $m = \frac{1}{2} (-4, 5)$

$$5 = \frac{1}{2}(-4) + b$$

$$\boxed{7 = b}$$

b.  $m = -3 (-2, -10)$

$$-10 = -3(-2) + b$$

$$\boxed{b = -16}$$

22. Which type of equation does the following table represent?

-2	-1	0	1	2
7	4	3	4	7

a. (Circle one): Linear Exponential Quadratic

b. Write an equation to represent the table above:

$$y = 1x^2 + bx + 3$$

$$4 = 1 + b + 3$$

$$b = 0$$

$$\boxed{y = x^2 + 3}$$

23. Which type of equation does the following table represent?

-2	-1	0	1	2	3
22	17	12	7	2	-3

a. (Circle one): Linear Exponential Quadratic

b. Write an equation to represent the table above:

$$\boxed{y = -5x + 12}$$

24. Which type of equation does the following table represent?


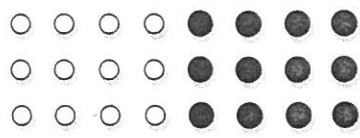
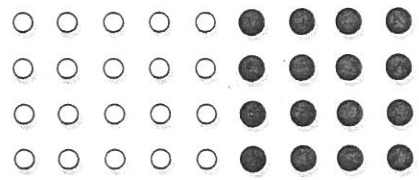
-2	-1	0	1	2
16	-8	4	-2	1

a. (Circle one): Linear Exponential Quadratic

b. Write an equation to represent the table above:

$$\boxed{y = 4(-\frac{1}{2})^x}$$

25. Answer the questions for the pattern in the table below.

Stage 2	Stage 3	Stage 4
 $2 \times 3$ $2 \times 4$	 $3 \times 4$ $3 \times 4$	 $4 \times 5$ $4 \times 4$

a. Write an expression for the white dots:

$$x(x+1) = x^2 + x$$

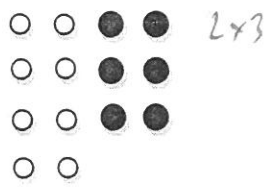
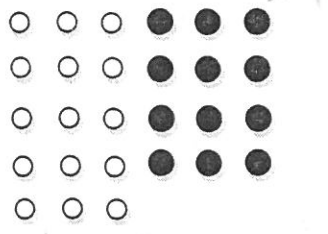
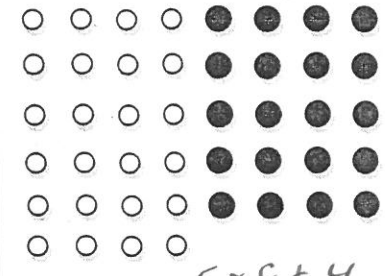
b. Write an expression for the black dots:

$$x(4) = 4x$$

c. Write an expression for the total dots:

$$x(x+5) = x^2 + 5x$$

26. Answer the questions for the pattern in the table below.

Stage 2	Stage 3	Stage 4
 $2 \times 3$ $2 \times 4$ $3 \times 4 + 2$	 $3 \times 4$ $4 \times 6 + 3$	 $4 \times 5$ $4 \times 8$ $5 \times 8 + 4$

a. Write an expression for the white dots:

$$x(x+2)$$

b. Write an expression for the black dots:

$$x(x+1)$$

c. Write an expression for the total dots:

$$(x+1)(2x) + x$$

$$2x^2 + 2x + x$$

$$2x^2 + 3x$$

For #27-32,

a. Circle if each sequence is arithmetic, geometric, quadratic, or none of these.

b. Write a formula for the sequence if it is arithmetic or geometric.

c. Find the next three terms in each sequence.

27. 3, 7, 11, 15, 19...

$\begin{matrix} \vee & \vee \\ +4 & +4 \end{matrix}$

Circle One:  A  G  Q  None

Formula (if A or G):  $a_n = 4n - 1$

Next 3 terms: 23, 27, 31

28. 7, 14, 28, 56, 112...

$\begin{matrix} \vee & \vee & \vee \\ \times 2 & \times 2 & \times 2 \end{matrix}$

Circle One:  A  G  Q  None

Formula (if A or G):  $y = 3.5(2)^n$

Next 3 terms: 224, 448, 896

29. 64, 16, 4, 1...

$\begin{matrix} \vee & \vee & \vee \\ \div 4 & \div 4 & \div 4 \end{matrix}$

Circle One:  A  G  Q  None

Formula (if A or G):  $y = 256(1/4)^n$

Next 3 terms: 1/4, 1/16, 1/64

30. 13, 15, 18, 22, 27... 33 40 48

$\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ +2 & +3 & +4 & +5 & +6 & +7 & +8 \\ \vee & \vee & \vee \\ +1 & +1 & +1 \end{matrix}$

Circle One:  A  G  Q  None

Formula (if A or G):

Next 3 terms: 33, 40, 48

31. 5, -3, -11, -19, -27...

$\begin{matrix} \vee & \vee & \vee & \vee \\ -8 & -8 & -8 & -8 \end{matrix}$

Circle One:  A  G  Q  None

Formula (if A or G):  $y = -8x + 13$

Next 3 terms: -35, -43, -51

32. 75, 70, 60, 45, 25... 0 -30 -65

$\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ +5 & 0 & -5 & -10 & -15 & -20 & -25 & -30 & -35 \\ \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ -5 & -5 & -5 & -5 & -5 & -5 & -5 & -5 \end{matrix}$

Circle One:  A  G  Q  None

Formula (if A or G):

Next 3 terms: 0, -30, -65

$y = -2.5x^2 + 2.5x + 75$

$y = -2.5x^2 + bx + 75$   
 $75 = -2.5(1)^2 + b(1) + 75$   
 $0 = -2.5 + b$   
 $b = 2.5$

33. Find the vertex, x-intercepts and y-intercept of the following equation, then graph.

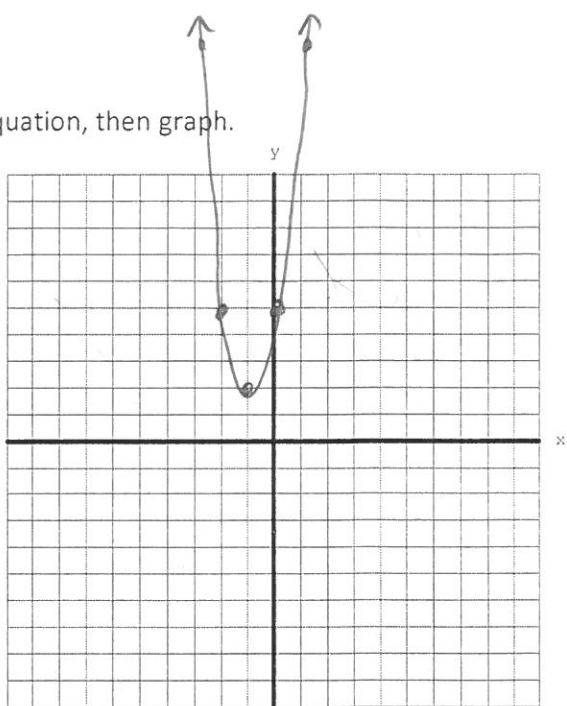
$$y = 3x^2 + 6x + 5$$

x-intercepts (exact): \_\_\_\_\_ and \_\_\_\_\_

x-intercepts (approx.): \_\_\_\_\_ and \_\_\_\_\_

y-intercept: (0, 5)

vertex: (-1, 2)       $x = -\frac{b}{2a} = -\frac{6}{2(3)} = -1$   
 $y = 2$



34. Solve the system of equations using any method:

$$3x - 2y = -4$$

$$2x + y = -5$$

$$3x - 2y = -4$$

$$4x + 2y = -10$$

$$\hline 7x = -14$$

$$x = -2$$

$$2(-2) + y = -5$$

$$y = -1$$

$$\boxed{(-2, -1)}$$

35. Write the slope intercept equation given the 2 points: (1, 7)(4, -5)

$$\frac{7 + 5}{1 - 4} = \frac{12}{-3} = -4$$

$$7 = -4(1) + b$$

$$11 = b$$

$$\boxed{y = -4x + 11}$$

36. On Charlotte's first test, she got 54 points. Since joining Ms. Boehl's 8<sup>th</sup> hour resource, her scores have been increasing by 6%. What was Charlotte's score on her 9<sup>th</sup> test?

$$y = 54(1.06)^8 = \boxed{86 \text{ points}}$$