

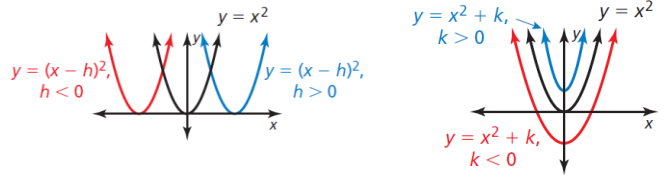
Algebra 2

2-01 Graph Quadratic Functions in Standard Form (2.1, 2.2)

Transformations

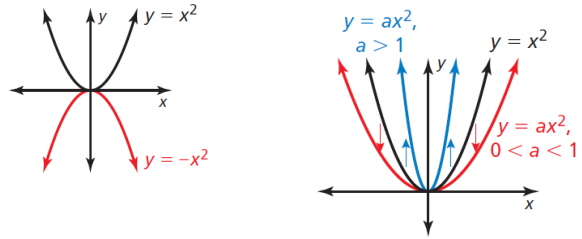
Translation

- _____ or _____ graph
- $y = (x - h)^2 + k$
- h moves _____, k moves _____



Reflection

- _____ graph over line
- $y = -(x^2) = -x^2$ reflects over _____
- $y = (-x)^2 = x^2$ reflects over _____



Stretch/Shrink

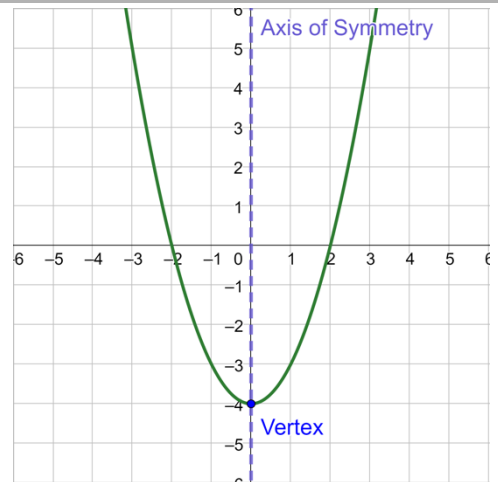
- Stretches or shrinks graph
- $y = ax^2$
- a _____ stretch

Describe the transformation of $f(x) = x^2$ represented by $g(x) = (x - 1)^2 + 2$.

Describe the transformation of $f(x) = x^2$ represented by $g(x) = \left(\frac{1}{4}x\right)^2 - 2$

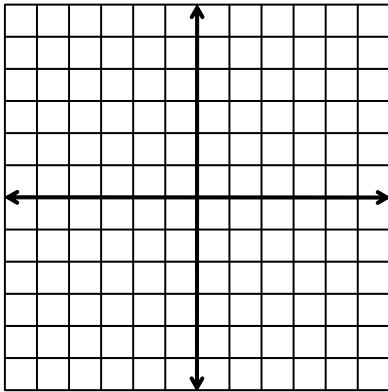
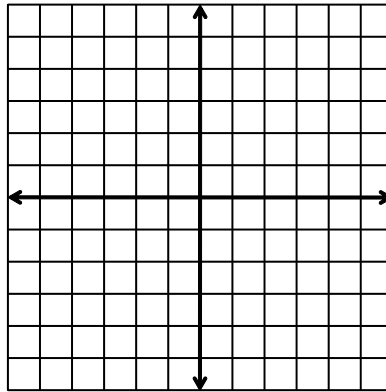
Properties of Quadratic Functions in Standard Form (Vertex Form)

- $f(x) = a(x - h)^2 + k$
- Vertex is _____.
- Wideness of parabola
 - If $|a| > 1$, then it looks _____ than $y = x^2$
 - If $0 < |a| < 1$, then it looks _____ than $y = x^2$
- Opens Up/Down
 - If $a > 0$, the parabola opens _____.
 - If $a < 0$, the parabola opens _____.



Graph a Quadratic Function

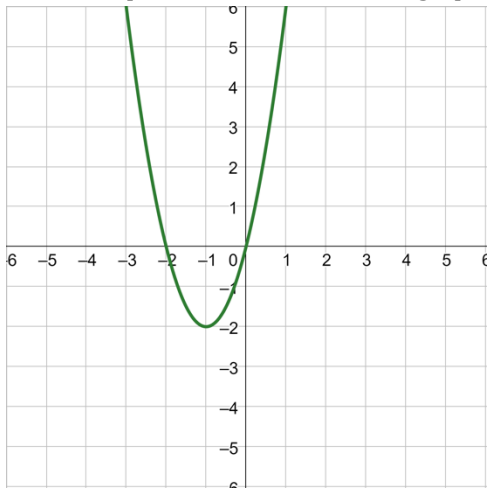
1. Find the _____. In standard form, the vertex is (h, k) .
2. Create a _____ with the vertex in the center.
3. _____ the points from the table of values. At least five points are required.
4. Draw a _____ through the points.

Graph $f(x) = -x^2 + 3$ Graph $f(x) = \frac{1}{2}(x + 1)^2 - 2$ **Find a Quadratic Model**

To find a quadratic model given vertex and another point,

1. Substitute the _____ into standard form, $f(x) = a(x - h)^2 + k$.
2. Substitute the other point for _____.
3. Solve for _____.
4. Write the _____ function.

Write the quadratic function for the graph.



50 #1, 5, 13, 25, 27, 29, 30, and 59 #1, 3, 5, 9, 11, and 76 #1, 3, 5, and Mixed Review = 20

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2-02 Graph Quadratic Functions in General and Intercept Form (2.2)

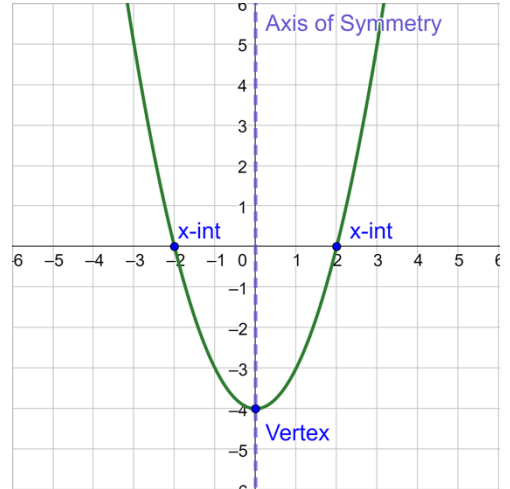
Intercept form

- $y = a(x - p)(x - q)$
where p and q are the _____.
- Axis of symmetry is _____ between the x -intercepts.

$$x = \frac{p + q}{2}$$

- _____

$$\left(\frac{p + q}{2}, f\left(\frac{p + q}{2}\right) \right)$$



General Form

- $y = ax^2 + bx + c$
- The _____ of symmetry is

$$x = -\frac{b}{2a}$$

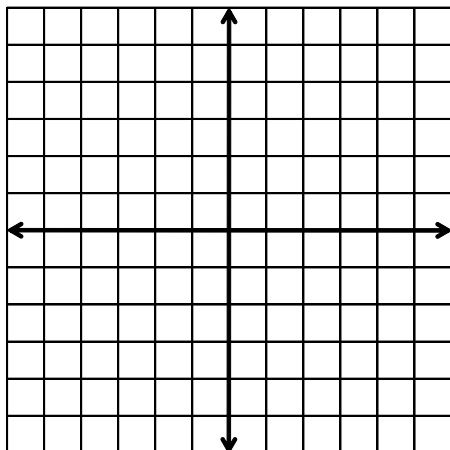
- _____

$$\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right) \right)$$

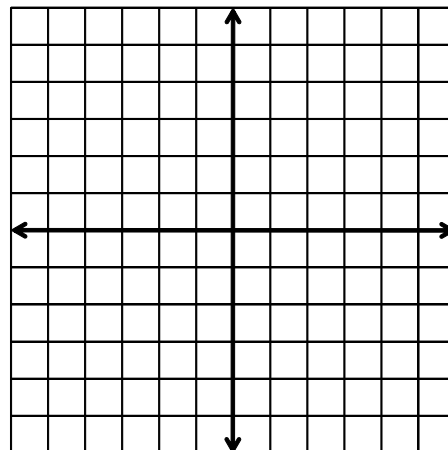
Graph a Quadratic Function

1. Find the _____ of symmetry and _____.
2. Make a _____ using points on either side of the axis of symmetry.
3. _____ the points from the table.
4. _____ the parabola through the points.

Graph $y = -2(x + 2)(x - 3)$



Graph $y = x^2 - 2x - 3$

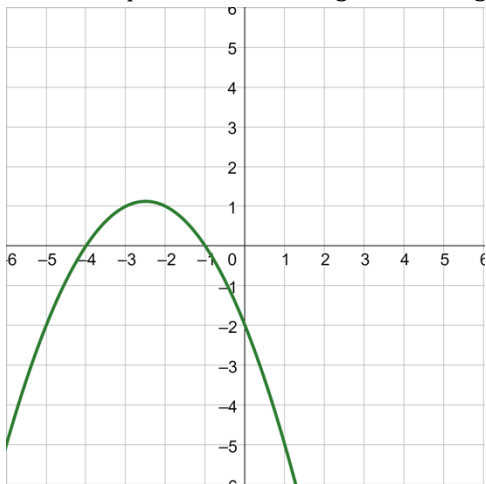


Write a Quadratic Function in Intercept Form

1. Find the _____. These are p and q .
2. Find _____ other point that the graph passes through. This is _____.
3. Substitute the _____ for p and q in intercept form $y = a(x - p)(x - q)$.
4. Substitute the point for _____.
5. Solve for _____.
6. Write the _____ by substituting p , q , and a into intercept form.

Write the quadratic function whose x -intercepts are -3 and 7 and passes through $(0, 21)$.

Write the quadratic function given in the graph.



59 #17, 19, 21, 23, 29, 45, 47, 49, 50, 65, and 76 #7, 9, 11, 15, 17, and Mixed Review = 20

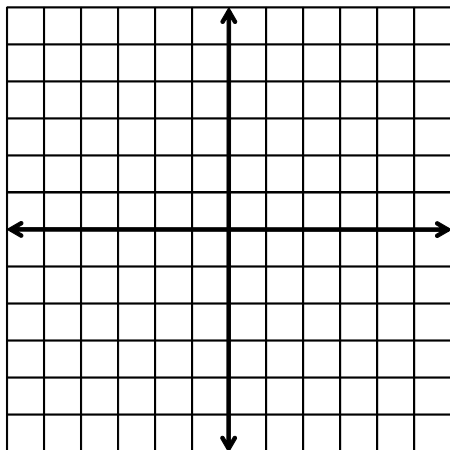
Algebra 2

2-03 Graph Quadratic Inequalities (3.6)

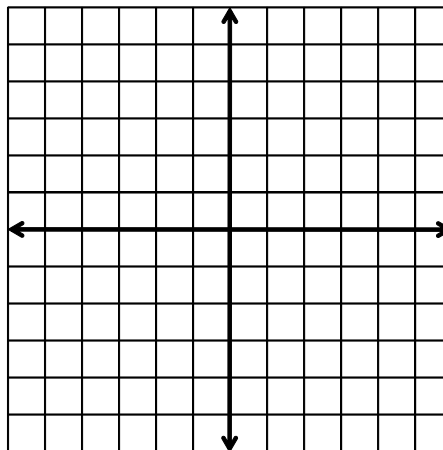
Graph a Quadratic Inequality in Two Dimensions

1. Graph the inequality as if it was a _____.
2. Decide whether the line is _____ or _____.
 - $\leq, =, \geq \rightarrow$ _____ line.
 - $<, > \rightarrow$ _____ line.
3. Decide where to shade.
 - a. Method 1:
 - i. Pick a _____ point _____ on the line and _____ it into the original inequality.
 - ii. If the point is a _____, shade _____ side of the parabola.
 - iii. If it is NOT a solution, shade the _____ side.
 - b. Method 2:
 - i. Solve the inequality for _____.
 - ii. If the inequality is $y >$, shade _____ the parabola.
 - iii. If the inequality is $y <$, shade _____.

Graph $y \leq \frac{1}{2}(x + 2)(x - 4)$



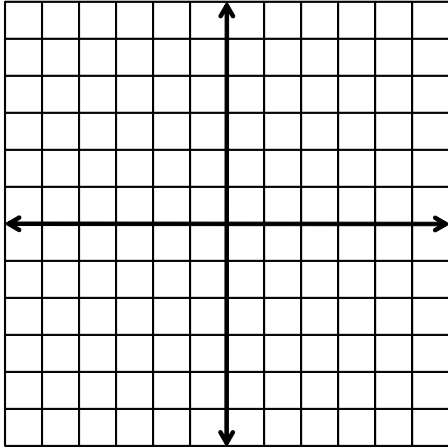
Graph $y > 2(x - 2)^2 - 5$



Graph a System of Quadratic Inequalities

1. Graph each inequality on the _____ coordinate plane.
2. The solution is all the points where all the shaded areas _____.
3. If there is no overlap of the shaded areas, then there is _____.

Solve
$$\begin{cases} y \geq x^2 - 4 \\ y \leq -x^2 + 2x + 3 \end{cases}$$



140 #1, 5, 7, 11, 15, 17, 19, 21, 25, 50, Mixed Review = 15

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2-04 Graph Polynomial Functions (4.1, 4.8)

Polynomial in One Variable

- Function that has _____ variable and there are powers of that variable and all the powers are _____.

$4x^3 + 2x^2 + 2x + 5$

$100x^{1234} - 25x^{345} + 2x + 1$

$\frac{2}{x}$

$3xy^2$

Degree

- _____ power of the variable





What is the degree? $4x^3 + 2x^2 + 2x + 5$

Types of Polynomial Functions

Degree	Type	Example	Graph
0	_____	$y = 2$	
1	_____	$y = 2x + 1$	
2	_____	$y = 2x^2 + x - 1$	
3	_____	$y = 2x^3 + x^2 + x - 1$	
4	_____	$y = 2x^4 + 2x^2 - 1$	

End Behavior

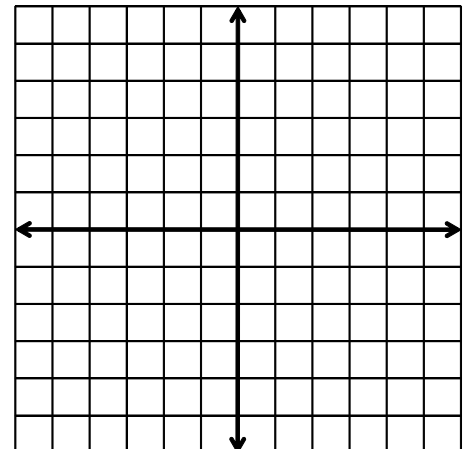
- Polynomial functions always go towards _____ or _____ at either _____ of the graph

	Leading Coefficient +	Leading Coefficient -
Even Degree		
Odd Degree		

Graphing polynomial functions

- Make a _____
- _____ the points
- Make sure the graph matches the appropriate _____

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



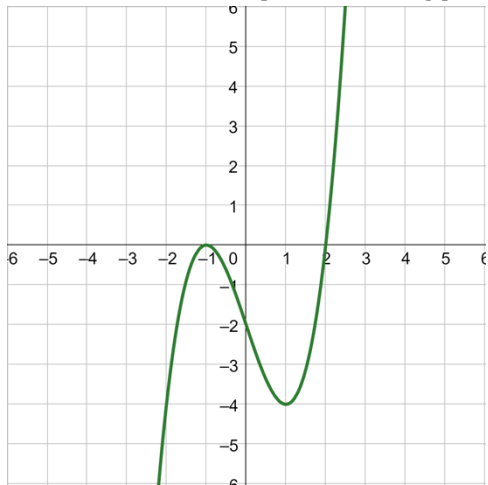
x-intercepts

- Points where the graph crosses the _____

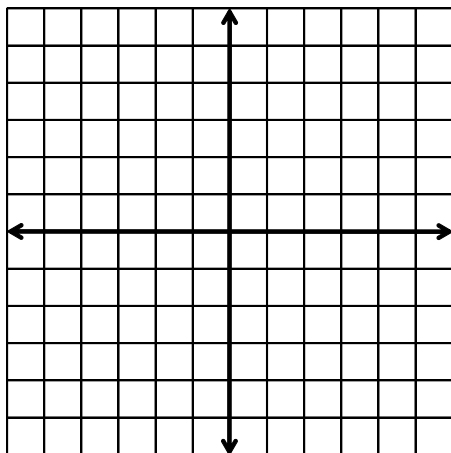
Turning Points

- Local _____ and _____ (turn from going up to down or down to up)
- The graph of every polynomial function of degree n can have at most _____ turning points.
- _____ lets you find the turning points easily.

What are the x-intercepts and turning points?



Graph $f(x) = x^3 - 2x^2 - x + 2$ and estimate the x-intercepts and turning points.



158 #1, 3, 7, 19, 21, 23, 25, 29, 31; 210 #1, 3, 7, 23, 25, 27, Mixed Review = 20

Algebra 2

2-05 Write Quadratic and Polynomial Models (4.9)

Find a Polynomial Model Given x-intercepts

1. Write a polynomial model in the form $y = a(x - k_1)(x - k_2)(x - k_3) \dots$ where there is one factor per _____.
2. Substitute the x-intercepts for the _____.
3. Substitute the other point for _____.
4. Solve for _____.
5. Write the _____ function.

Write a polynomial model with x-intercepts are -2, 1, 3 and (0, 2)

Find the Degree of a Polynomial Using Finite Differences

1. Have a table of values with _____ spaces _____.
2. Find the _____ of successive _____.
3. Find the _____ of successive _____ from the previous step.
4. Repeat until all the differences in a step are the _____ number (not zero).
5. The number of _____ of differences is the _____ of the function.

Find the degree of the polynomial passing through (0, 1), (1, 6), (2, 25), (3, 70), (4, 153), (5, 286)

Finding a model given several points

1. Use _____ difference to find the _____.
2. Use either of the following methods.
 - a. **Method 1:** Solve a System of Equations by Hand (This lesson uses Method 2)
 - i. Write a general polynomial function of the given degree such as $y = ax^3 + bx^2 + cx + d$.
 - ii. Substitute a point for x and y to get an equation where the variables are the coefficients.
 - iii. Substitute another point in the general polynomial for x and y to get a second equation where the variables are the coefficients.
 - iv. Continue substituting points until there the same number of equations as coefficients.
 - v. Solve the system of equations using something like elimination to find the values of the coefficients.
 - vi. Write the equation by substituting the coefficients into the general polynomial.
 - b. **Method 2:** Use a _____ on a _____

Finding Linear Regression on a TI-84

1. Push STAT and select Edit...
2. Enter the x -values in List 1 (L1) and the y -values in List 2 (L2).
3. To see the graph of the points
 - a. Push Y= and clear any equations.
 - b. While still in Y=, go up and highlight Plot1 and press ENTER.
 - c. Press ZOOM and select ZoomStat.
4. Push STAT and move over to the CALC menu.
5. Select the type of regression.
6. Make sure the Xlist: is L1, the Ylist: is L2, the FreqList: is blank, and the Store RegEQ: is Y1.
 - a. Get Y1 by pressing VARS and select Y-VARS menu.
 - b. Select Function....
 - c. Select Y1.
7. Press Calculate
8. The calculator will display the equation. To see the graph of the points and line, press GRAPH.

Finding Linear Regression on a NumWorks graphing calculator

1. On the home screen select Regression.
2. In the Data tab, enter the points.
3. Move to the Graph tab.
4. The default is a linear regression and is displayed at the bottom of the screen. To change the regression type
 - a. Press OK.
 - b. Select Regression.
 - c. Select the desired regression type.

Find a polynomial function passing through $(1, -2)$, $(2, 2)$, $(3, 12)$, $(4, 28)$, $(5, 50)$, $(6, 78)$

Best-Fitting Polynomial Models

1. Real-life usually _____ fit a model _____, so finite differences _____ work.
2. Use a _____ find regressions of _____ degrees.
3. Choose the one that seems to fit the data the best as shown on the _____.

Algebra 2

2-Review

Take this test as you would take a test in class. When you are finished, check your work against the answers.

2-01

Describe the transformations of the graph.

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

2. $f(x) = -2x^2$

Graph.

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

Write a quadratic function with the given vertex.

4. Vertex: $(2, -3)$; Passes through $(0, 9)$

2-02

Identify the vertex.

5. $y = 2(x - 1)(x + 3)$

6. $y = x^2 + 4x - 5$

Graph.

7. $y = \frac{1}{2}x^2 + x - 2$

Write a quadratic function with the given x-intercepts.

8. x-intercepts: $(3, 0)$ and $(7, 0)$; Passes through $(4, 3)$

2-03

(a) Is the line of the graph solid or dashed? (b) Is the graph shaded above or below the parabola?

9. $y \geq -2(x - 4)(x + 1)$

10. $y < x^2 - 5$

Graph.

11. $y > x^2 + 2x + 1$

12.
$$\begin{cases} y > \frac{1}{2}(x - 1)^2 - 4 \\ y < -x^2 + 4 \end{cases}$$

2-04

Describe the end behavior of the graph.

13. $y = -7x^4 + 2x^2 - 15$

14. $y = 2 + 3x + 5x^3$

(a) Graph the function, (b) estimate the turning points, and (c) estimate the x-intercepts.

15. $y = \frac{1}{2}x^3 - \frac{1}{2}x^2 - x + 2$

16. $y = 0.1x^4 - 1.8x^2 + 4$

2-05

Write a polynomial function with the given x-intercepts.

17. x-intercepts: $(2, 0)$, $(1, 0)$, $(-4, 0)$; passes through: $(0, 5)$

18. x-intercepts: $(-1, 0)$, $(0, 0)$, $(4, 0)$; passes through: $(1, 2)$

Use finite differences to find the degree of the function passing through the given points.

19.

x 0 1 2 3 4 5 6 7

y 1 -1 -1 1 5 11 19 29

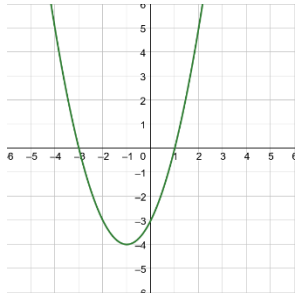
20.

x 0 1 2 3 4 5 6 7

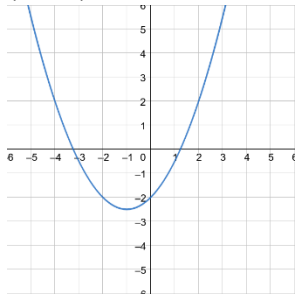
y 0 -2 -10 -30 -68 -130 -222 -350

Answers

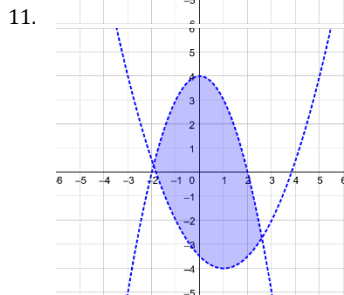
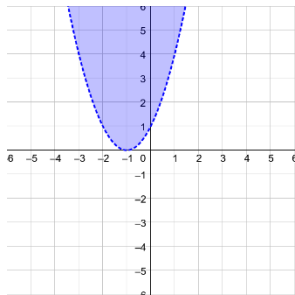
1. Translated 3 right and 5 up
2. Reflected over x -axis and vertical stretch by factor of 2



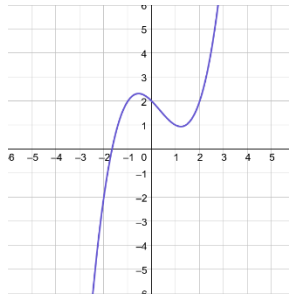
- 3.
4. $y = 3(x - 2)^2 - 3$
5. $(-1, -8)$
6. $(-2, -9)$



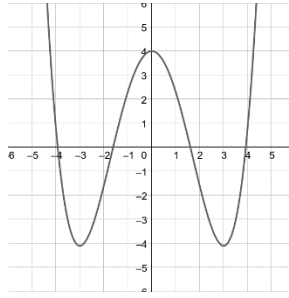
- 7.
8. $y = -(x - 3)(x - 7)$
9. Solid, shaded above
10. Dashed, shaded below



- 11.
- 12.
13. Falls to the left, falls to the right
14. Falls to the left, rises to the right



15. ;
 Max: $(-0.5, 2.3)$, Min: $(1.2, 0.9)$; x -int: $(-1.6, 0)$



16. ;
 Max: $(0, 4)$, Min: $(-3, -4.1)$, $(3, -4.1)$; x -int: $(-3.9, 0)$, $(-1.6, 0)$, $(1.6, 0)$, $(3.9, 0)$

17. $y = \frac{5}{8}(x - 2)(x - 1)(x + 4)$
 18. $y = -\frac{1}{3}(x + 1)(x)(x - 4)$
 19. 2
 20. 3