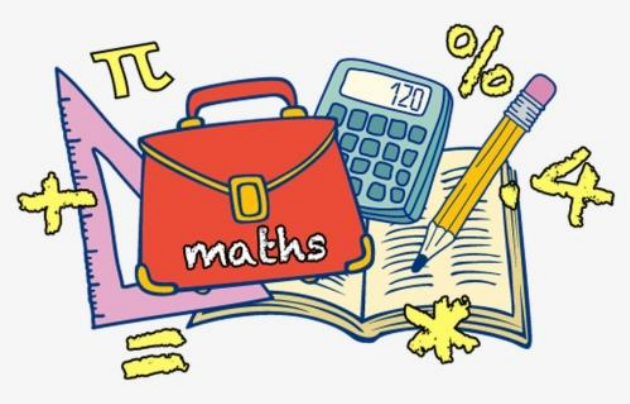


High School Math
Feb 1st – Feb 26th

High School Math Learning Plan		
Date	**Topic/Standard**	**Instructional Activity**
Week of Feb 1st	A1.APR.A.1***Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations. A1.SSE.A.1*Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions. A1.SSE.A.2***Analyze the structure of polynomials to create equivalent expressions or equations.	Student will complete practice worksheet. 7-1 Adding and Subtracting Polynomials 7-2 Multiplying Polynomials 7-3 Multiplying Special Cases
Week of Feb 8th	A1.APR.A.1***Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations. A1.SSE.A.1*Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions. A1.SSE.A.2***Analyze the structure of polynomials to create equivalent expressions or equations.	Student will complete practice worksheet. 7-4 Factoring Polynomials 7-5 Factoring x^2+ bx + c 7-6 Factoring ax^2+ bx + c 7-7 Factoring Special Cases
Week of Feb 15th	A1.REI.A.2***Solve problems involving quadratic equations. b. Derive the quadratic formula. c. Analyze different methods of solving quadratic equations. A1.CED.A.1 Quadratic***Create and graph linear, quadratic and exponential equations in two variables.	Student will complete practice worksheet. 8-1 Key Features of a Quadratic Function 8-2 Quadratic Function in Vertex Form
Week of Feb 22nd	A1.REI.A.2***Solve problems involving quadratic equations. b. Derive the quadratic formula. c. Analyze different methods of solving quadratic equations. A1.CED.A.1 Quadratic***Create and graph linear, quadratic and exponential equations in two variables.	Student will complete practice worksheet. 8-3 Quadratic Functions in Standard Form. 8-4 Modeling with Quadratic Functions 8-5 Linear, Exponential and Quadratic Models

7-1 Additional Practice

Adding and Subtracting Polynomials

What is the name of each polynomial, based on the degree and the number of terms?

1. $-4x^2y$

2. $3x^4 - 2x^3 + 5x^2 + 6x - 12$

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

Write each polynomial in standard form.

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

5. $-7 + 2x - x^5 + 4x^4 + 2x^3$

6. $9 - x^2 + 5x$

Combine like terms and write each expression in standard form.

7. $-5y + 3y^2 + 2y - 2y^2 - 9$

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

9. $x^2 - 5 + 2x + x^2$

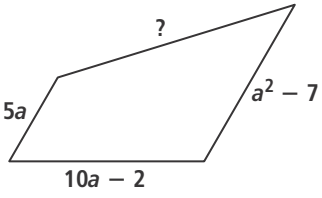
Add or subtract. Write each answer in standard form.

10. $(4x^3 - 5x^2 + 3x - 8) + (2x^3 - 2x^2 + 6x + 12)$

11. $(x^4 - 3x^3 + 5x^2 + x - 4) - (x^3 - 4x^2 - 11x + 10)$

12. Suppose you add or subtract two quadratic trinomials that use the same variable. What are the possible classifications for the sum or difference? Explain.

13. The total length of the fence around a quadrilateral-shaped garden shown is $3a^2 + 15a + 9$. What expression represents the missing fence length?



Name _____

7-2 Additional Practice

Multiplying Polynomials

Find each product.

1. $2y^2(y^2 - 6y + 5)$

2. $-x(2x^3 - x^2 + 6x - 8)$

3. $-3x(x^2 - 7x - 6)$

Use a table to find each product.

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

5. $(x - 3)(3x - 6)$

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

Find each product.

7. $(x - 7)(x - 2)$

8. $(2x + 3)(3x - 2)$

9. $(x - 6)(3x - 4y)$

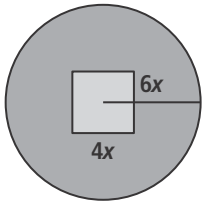
10. $(x - 4)(x^2 + 7x - 8)$

11. $(3x - 4)(2x^2 + 5x + 4)$

12. $(-2x^2 + 5)(x^3 - 8x - 6)$

13. When multiplying two polynomials of degrees m and n, will the product always be a polynomial? If so, explain, and state the degree.

14. A circular flower garden surrounds a sculpture on a square base as shown. What is an expression for the area of the flower garden?



Name _____

7-3 Additional Practice

Multiplying Special Cases

Find each product.

1. $(x + 4)^2$

2. $(2x - 3)^2$

3. $(4y + 7)^2$

4. 32^2

5. 57^2

6. 45^2

Write each product in standard form.

7. $(x + 7)(x - 7)$

8. $(3x + 4)(3x - 4)$

9. $(5y - 1)(5y + 1)$

Use the difference of two squares to find each product.

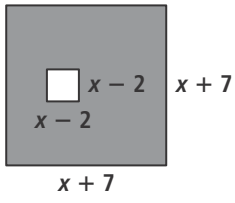
10. $34 \cdot 26$

11. $22 \cdot 28$

12. $17 \cdot 7$

13. Why is the middle term $2ab$ in $(a + b)^2$ and $-2ab$ in $(a - b)^2$ when written in standard form?

14. A hole is punched in a piece of metal to make a part for a machine. What is the area of the metal part, or the shaded region shown?



Name _____

7-4 Additional Practice

Factoring Polynomials

Find the GCF of the terms of each polynomial.

1. $6x^2 + 10$

2. $12x^2 - 16x$

3. $-24y^4 + 30y^3$

4. $4x^2y - 8xy^2$

5. $6x^2y^3 + 9xy^2$

6. $-15x^4y^2 - 25x^3y^3$

Factor out the GCF from each polynomial.

7. $4x^2 - 8x - 6$

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

9. $-3y^2 + 9y - 3$

10. $2x^2y - 4xy + 6xy^2$

11. $12x^4 - 16x^3 + 8x^2 - 28x$

12. $4x^2 + 6xy - 14y^2$

13. Explain why the terms of the polynomial $y^2 + 7$ are said to be relatively prime.

14. Write a trinomial of degree 3 in standard form with a GCF of $6x$. Factor out the GCF from your trinomial.

15. A rectangle has an area of $14y^3 - 35y$.

a. What are expressions for the length and width where one dimension is the GCF?

b. Does a rectangle exist with the given dimensions if $y = 2$? Explain.

Name _____

7-5 Additional Practice

Factoring $x^2 + bx + c$

Write the factored form of each trinomial.

1. $x^2 + 7x + 10$

2. $x^2 + 13x + 30$

3. $x^2 + 12x + 32$

4. $x^2 - 8x + 15$

5. $x^2 - 14x + 45$

6. $x^2 - 17x + 52$

7. $x^2 + 9x - 10$

8. $x^2 + x - 42$

9. $x^2 - 4x - 60$

10. $x^2 + 12xy + 27y^2$

11. $x^2 - 18xy + 56y^2$

12. $x^2 - xy - 42y^2$

13. $x^2 - 22xy + 85y^2$

14. $x^2 + 15xy - 76y^2$

15. $x^2 + 16xy + 55y^2$

16. Suppose you want to factor the expression $x^2 + 2xn + n^2$. Given that $n > 0$, what are the factors? Explain.

17. A parallelogram has an area of $x^2 + 9x - 36$.

a. What are expressions for the length and width of the parallelogram?

b. If x is an integer, what is the least possible value of x for a parallelogram to exist? Explain.

Name _____

7-6 Additional Practice

Factoring $ax^2 + bx + c$

Factor each trinomial completely.

1. $2x^2 + 10x + 12$

2. $3x^3 - 3x^2 - 60x$

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

4. $6x^2 + 19x + 10$

5. $4x^2 - 31x + 21$

6. $8x^2 - 14x - 15$

7. $6x^2 + 26x + 8$

8. $12x^3 + 39x^2 - 36x$

9. $-24x^2 + 20x + 100$

10. $3x^2 + 9xy + 6y^2$

11. $2x^2 - 6xy - 8y^2$

12. $4x^2 - 8xy - 140y^2$

13. $2x^2 + 15xy + 25y^2$

14. $6x^2 - 19xy + 15y^2$

15. $4x^2 + 11xy - 20y^2$

16. Why is it helpful to remove the GCF before factoring using grouping or substitution?

17. A right rectangular prism has a volume of $6x^3 - 3x^2 - 45x$.

a. What are expressions for the length, width, and height?

b. What is the least possible integer value of x for the rectangular solid to exist? Explain.

Name _____

7-7 Additional Practice

Factoring Special Cases

Factor each trinomial completely.

1. $x^2 + 12x + 36$

2. $x^2 - 24xy + 144y^2$

3. $4x^2 + 44x + 121$

4. $49x^2 - 14x + 1$

5. $32x^2 + 48xy + 18y^2$

6. $12x^2y^2 - 60xyz + 75z^2$

7. $x^2 - 64$

8. $x^2 - 289y^2$

9. $4x^2 - 49$

10. $27x^2 - 3$

11. $9x^2y^2 - 64z^2$

12. $4x^4 - 36$

13. Under what conditions is a trinomial said to be completely factored?

14. The area of a circle is $4\pi x^2 + 12\pi x + 9\pi$.

a. What is an expression for the radius of the circle?

b. What is the least possible integer value of x for the circle to exist? Explain.

8-1 Additional Practice

Key Features of a Quadratic Function

1. If the vertex of a parabola is (0, 3), what is the axis of symmetry?

2. If the vertex of a parabola is (0, −4), what is the axis of symmetry?

Compare the graphs of each group of functions and list them in order from widest to narrowest.

3. $y = -3x^2$, $y = -5x^2$, $y = -1x^2$

4. $y = 4x^2$, $y = -2x^2$, $y = -6x^2$

Determine whether the graph of each function opens upward or downward.

5. $y = -6x^2$

6. $y = 11x^2$

7. Over what interval is the function shown in the table increasing? Decreasing?

x	$y = 6x^2$	(x, y)
−2	24	(−2, 24)
−1	6	(−1, 6)
0	0	(0, 0)
1	6	(1, 6)
2	24	(2, 24)

8. How do the average rates of change for the functions $f(x) = 2x^2$ and $g(x) = 3x^2$ over the interval $-3 \leq x \leq 4$ compare?

9. Emma is choosing new tile for the floor in his dining room, which is in the shape of a square with side length x feet. The tile costs $3.50 per square foot.

a. Write the function f for the cost of the flooring.

b. Determine the cost of the flooring if she decides on a dining room with side lengths of 10 ft.

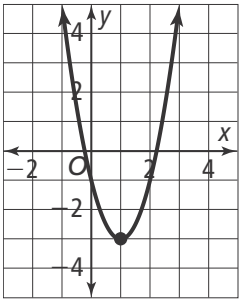
c. Determine the cost of the flooring if she decides on a dining room with side lengths of 15 ft.

8-2 Additional Practice

Quadratic Functions in Vertex Form

Identify the vertex, the axis of symmetry, and the direction of the graph for each of the following parabolas.

1.



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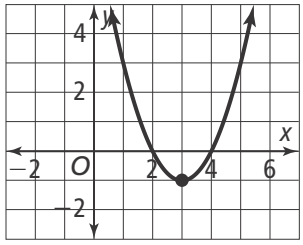
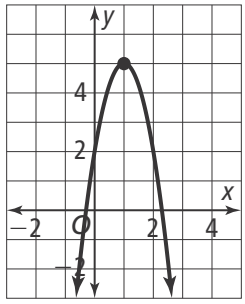


3.



Write the function for the graphs in Exercises 1–3 in vertex form.

4. Graph in Exercise 1

5. Graph in Exercise 2

6. Graph in Exercise 3

How does the value of *a*, *h*, or *k* affect the vertex for the graph of each function compared to the parent function $f(x) = x^2$?

7. $g(x) = (x - 8)^2$

8. $h(x) = (x + 4)^2 + 12$

9. $j(x) = -\frac{1}{2}x^2 + 8$

Identify the vertex of the graph of each function.

10. $y = 4x^2 - 2$

11. $y = -2(x + 4)^2 - 6$

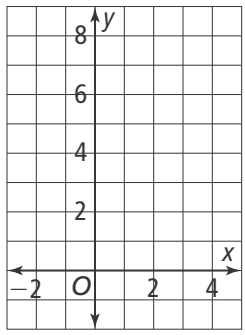
12. $y = x^2 + 5$

13. $y = (x - 12)^2$

14. $y = -9(x + 3)^2 - 3$

15. $y = -3x^2 - 7$

16. Graph the function $f(x) = 4(x - 2)^2 + 4$. Find the vertex and axis of symmetry.



17. Allie is playing basketball. She takes a shot 24 ft away from the basket. When the ball is 4 ft away from her, it is at a height of 10 ft above the floor. The ball reachs its highest height of 18 ft above the floor, when it is 12 feet away from her?

a. Find the value of *a*?

b. If the hoop is 10 ft high, how close would Allie have to be to make the basket?

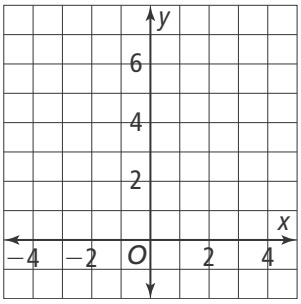
Name _____

8-3 Additional Practice

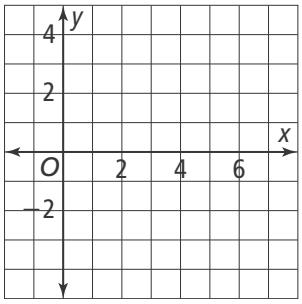
Quadratic Functions in Standard Form

Graph each function. What are the *y*-intercept, axis of symmetry, and vertex of each function? Does the vertex represent a maximum or minimum value?

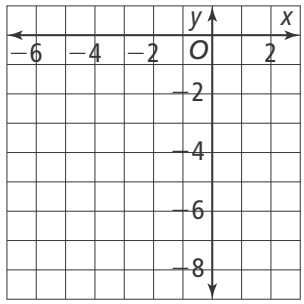
1. $f(x) = x^2 + 1$



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



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



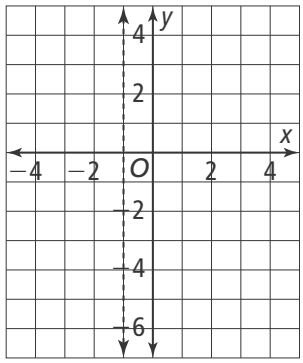
Find the axis of symmetry using the midpoint between the *x* values of the *x*-intercepts.

4. $f(x) = -9x^2 + 1$

5. $f(x) = -2x^2 + 8x - 9$

6. $f(x) = 4x^2 + 24x + 131$

7. The parabola shown has the form $y = ax^2 + bx + c$.



a. What is the axis of symmetry?

b. Use the formula $x = \frac{-b}{2a}$ to find b.

c. What is the equation of the parabola?

8. The position of a ball after it is thrown is modeled by the function $f(x) = -2(x - 1)^2 + 7$ in vertex form, where x is the height, in feet, above the ground and y is the horizontal distance, in feet, of the ball when it lands.

a. Write the function in standard form.

b. What is the height of the ball when it is thrown?

c. What is the horizontal distance from the point the ball was thrown from to the highest point that the ball reached?

Write each function in standard form.

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

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

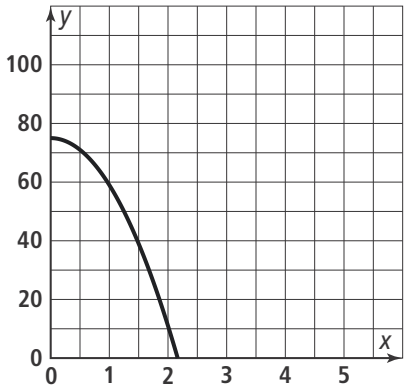
8-4 Additional Practice

Modeling with Quadratic Functions

1. An acrobat is on a platform that is 25 feet in the air. She jumps down at an initial vertical velocity of 4 ft/s. Write a quadratic function to represent the height h of the acrobat t seconds after the jump. If a safety net is placed 5 feet above the ground, how long will it take for her to land safely on the net?

2. A disc is thrown into the air with an upward velocity of 20 ft/s. Its height h in feet after t seconds is given by the function $h = -16t^2 + 20t + 6$. What is the maximum height the disc reaches? How long does it take for the disc to reach the maximum height? How long does it take for the disc to descend to 3 feet above the ground?

3. During a physics experiment, a class drops a golf ball off a bridge toward pavement below. The bridge is 75 ft high. The function $h = -16t^2 + 75$ gives the golf ball's height h in feet above the pavement after t seconds. Use the graph of the function at the right. After how many seconds does the golf ball hit the pavement?



4. The length of a rectangular park is twice its width. The park is surrounded by a 3-foot-wide path. Write a quadratic function to represent the total area of the park and the path.

5. For the vertical motion model $h(t) = -16t^2 + 54t + 3$, identify the maximum height reached by an object and the amount of time the object is in the air before it hits the ground. Round to the nearest tenth.

6. Compare the models $f(x) = -0.5x^2 + 0.5x + 10$ and $g(x) = -0.5x^2 + 0.45x + 10.25$ by evaluating the residuals. Analyze how the points are distributed about the line $y = 0$. Which function better represents the actual data?

$f(x)$					
x	1	2	3	4	5
residual	10	9	8	4	0

$g(x)$					
x	1	2	3	4	5
residual	10.2	9.15	7.1	4.05	0

7. An object is thrown off a platform that is 15 ft high with an initial velocity of 8.5 ft/s. What function models the height h of the object after t seconds?

Name _____

8-5 Additional Practice

Comparing Linear, Exponential, and Quadratic Models

Use a table to determine whether the function below is linear, quadratic, or exponential. Then, use regression to find the function that models the data.

1.

		Differences		
x	*y*	1st	2nd	Ratio
0	7			
1	28			
2	49			
3	70			
4	90			

2.

		Differences		
x	*y*	1st	2nd	Ratio
0	5			
1	5			
2	11			
3	23			
4	41			

3.

		Differences		
x	*y*	1st	2nd	Ratio
0	1			
1	0.25			
2	0.0625			
3	0.0156			
4	0.0039			

4. The data in the table represent the population of a town for the past five years. When the population reaches 100,000 the town can be reclassified as a city. Does this situation suggest a linear, exponential, or quadratic function model? Will the town be reclassified as a city in the next 8 years?

x	*y*
1	85,000
2	88,000
3	87,000
4	92,000
5	93,000

5. Consider linear, quadratic, and exponential functions.

a. What type of function would best model the area of a figure?

b. What type of function would best model the perimeter of a figure?

6. Compare the rates of change for $f(x) = 2x + 4$, $g(x) = 2x^2 + 4$, and $h(x) = 2^x$ over the interval $x = 3$ to $x = 5$. Which function has the greatest rate of change?