Integrated Math 1 Honors
Module 9H
Quadratic Functions
Ready, Set, Go Homework
Solutions

Adapted from

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Ready, Set, Go

Ready

Topic: Adding and multiplying binomials

Simplify the following expressions. For the part b problems, multiply using the given area model.

1a. $(6x-1)+(x-10)$

$\mathbf{7x-11}$

b. $(6x-1)(x-10)$

$\mathbf{6x^2-61x+10}$

	$6x$	-1
x	$6x^2$	$-x$
-10	$-60x$	10

2a. $(8x+3)+(3x-4)$

$\mathbf{11x-1}$

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

$\mathbf{24x^2-23x-12}$

	$8x$	3
$3x$	$24x^2$	$9x$
-4	$-32x$	-12

3a. $(-5x+2)+(7x-13)$

$\mathbf{2x-11}$

b. $(-5x+2)(7x-13)$

$\mathbf{-35x^2+79x-26}$

	$-5x$	2
$7x$	$-35x^2$	$14x$
-13	$65x$	-26

4a. $(12x+3)+(-4x+3)$

$\mathbf{8x+6}$

b. $(12x+3)(-4x+3)$

$\mathbf{-48x^2+24x+9}$

	$12x$	3
$-4x$	$-48x^2$	$-12x$
3	$36x$	9

5. $(x + 5)(x - 5)$
   $x^2 - 25$

	x	5
x	x^2	5x
-5	$-5x$	-25

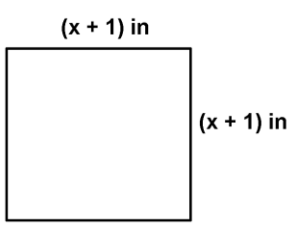
6. Compare the style your answers in #1–4 (part *a*) to your answers in #1–4 (part *b*). Look for a pattern in the answers. How are they different?
   Linear vs. quadratic

7. The answer to #5 is a different "shape" than the other part *b* answers, even though you were still multiplying. Explain how it is different from the other products. Try to explain why it is different. Find 2 examples of multiplying binomials that would have a similar solution as #5.
   Only two terms, answers may vary but could include $(x + 2)(x - 2)$ or $(x + 1)(x - 1)$

8. Try adding the two binomials in #5. $(x + 5) + (x - 5) =$ ___$2x$___ Does this answer look different than those in part *a*? Explain.
   Linear but only one term.

Calculate the perimeter and the area of the figures below. Your answers will contain a variable.

9.

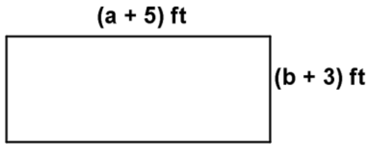


a. Perimeter: ___$2x + 4$ *in*___
b. Area: ___$x^2 + 2x + 1$ in^2___

10.

a. Perimeter: ___$2a + 2b$ *mi*___
b. Area: ___ab mi^2___

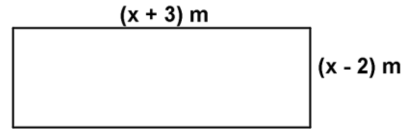
11.



a. Perimeter: $2a + 2b + 16\ ft$

b. Area: $ab + 3a + 5b + 15\ ft^2$

12.



a. Perimeter: $4x + 2\ m$

b. Area: $x^2 + x - 6\ m^2$

13. Compare the perimeter to the area in each of problems 9-12. In what way are the numbers and units in the perimeters and areas different?

The units are squared in the areas and not squared in the perimeters.

14. Explain what happens when an object is dropped from a tall building. How fast does the object fall?

Answers may vary. Students will likely state that the object speeds up as it falls.

Set

Topic: Recursive and explicit rules for linear, exponential, and quadratic patterns

Determine if each table represents a linear, exponential, or quadratic pattern. Then write the recursive and explicit rules for each pattern.

15.

n	$f(n)$
0	4
1	7
2	10
3	13
4	16

Type of Pattern:
Linear

Explicit Rule:
$\boldsymbol{f(n) = 3n + 4}$

Recursive Rule:
$\boldsymbol{f(0) = 4;}$
$\boldsymbol{f(n) = f(n-1) + 3}$

16.

n	$f(n)$
0	$\frac{1}{2}$
1	2
2	8
3	32
4	128

Type of Pattern:
Exponential

Explicit Rule:
$\boldsymbol{f(n) = \frac{1}{2}(4)^n}$

Recursive Rule:
$\boldsymbol{f(0) = \frac{1}{2};}$
$\boldsymbol{f(n) = f(n-1) \cdot 4}$

17.

n	$f(n)$
0	2
1	4
2	8
3	16
4	32

Type of Pattern:
Exponential

Explicit Rule:
$\boldsymbol{f(n) = 2^{n+1}}$

Recursive Rule:
$\boldsymbol{f(0) = 2;}$
$\boldsymbol{f(n) = f(n-1) \cdot 2}$

18.

n	$f(n)$
0	3
1	4
2	7
3	12
4	19

Type of Pattern:
Quadratic

Explicit Rule:
$\boldsymbol{f(n) = n^2 + 3}$

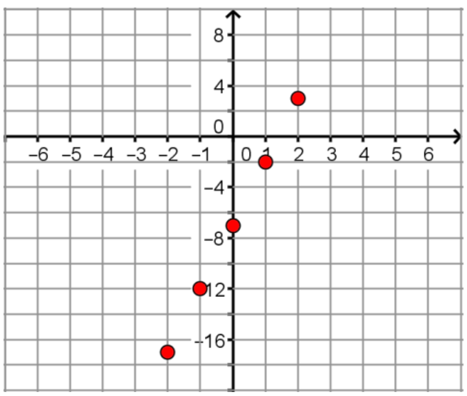
Recursive Rule:
$\boldsymbol{f(0) = 3;}$
$\boldsymbol{f(n) = f(n-1) + 2n - 1}$

Topic: Recognizing linear, exponential, and quadratic equations.

19. In each set of 3 functions, one will be linear and one will be exponential. One of the three will be a new category of function. State the type of function represented (linear, exponential, or new function). List the characteristics in each table and/or graph that helped you to identify the linear and the exponential functions. For the graph, place your axes so that you can show all 5 points. Identify your scale. Find an explicit and recursive equation for each.

a.

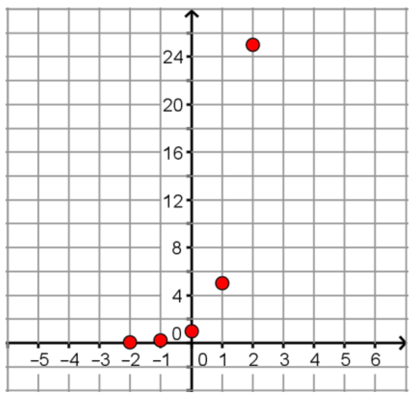
n	$f(n)$
-2	-17
-1	-12
0	-7
1	-2
2	3



Type and characteristics?
Linear; Added 5 to the outputs
Explicit equation:
$\boldsymbol{f(n) = 5n - 7}$
Recursive equation:
$\boldsymbol{f(-2) = -17,}$
$\boldsymbol{f(n) = f(n-1) + 5}$

b.

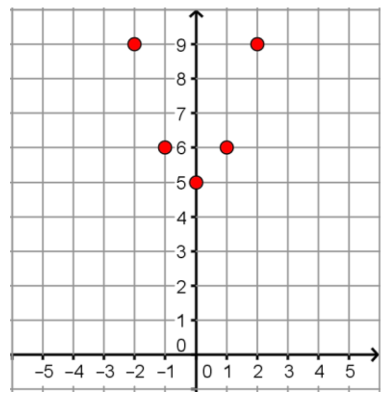
n	$f(n)$
-2	$\frac{1}{25}$
-1	$\frac{1}{5}$
0	1
1	5
2	25



Type and characteristics?
Exponential; Common ratio is 5
Explicit equation:
$\boldsymbol{f(n) = 5^n}$
Recursive equation:
$\boldsymbol{f(-2) = \frac{1}{25},}$
$\boldsymbol{f(n) = f(n-1) \cdot 5}$

c.

n	$f(n)$
-2	9
-1	6
0	5
1	6
2	9



Type and characteristics?
New Function; squared the input and added 5.
Explicit equation:
$\boldsymbol{f(n) = x^2 + 5}$
Recursive equation:
$\boldsymbol{f(-2) = 9,}$
$\boldsymbol{f(n) = f(n-1) + 2n - 1}$

Go

Topic: Greatest Common Factor (GCF)

Find the GCF of the given numbers.

20. $15abc^2$ and $25a^3bc$

$\boldsymbol{15abc^2 = 3 \cdot 5 \cdot a \cdot b \cdot c \cdot c}$
$\boldsymbol{25a^3bc = 5 \cdot 5 \cdot a \cdot a \cdot a \cdot b \cdot c}$

$\boldsymbol{GCF = 5abc}$

21. $12x^5y$ and $32x^6y$

$\boldsymbol{4x^5y}$

22. $17pqr$ and $51pqr^3$

$\boldsymbol{17pqr}$

23. $6x^2, 18x, -12$

$\boldsymbol{6}$

24. $49s^2t^2$ and $36s^2t^2$

$\boldsymbol{s^2t^2}$

25. $11x^2y^2, 33x^2y$, and $3xy^2$

$\boldsymbol{xy}$

Name: **Quadratic Functions | 9.2H**

Ready, Set, Go!

Ready

Topic: Applying the slope formula

Calculate the slope of the line between the given points. Use your answer to indicate which line is the steepest.

1. $A(-3,7)\ \ B(-5,17)$
   $\mathbf{-5}$

2. $H(12,-37)\ \ K(4,-3)$
   $-\frac{17}{4}$

3. $P(-11,-24)\ \ Q(21,40)$
   $\mathbf{2}$

4. $R(55,-75)\ \ W(-15,-40)$
   $-\frac{1}{2}$

Steepest line:______**#1**__________________

5. Galileo did many experiments to investigate the effects of gravity on a falling object. The data below approximates some of his findings. Write a recursive and explicit rule for this data.

Time	Speed of Object
0	0
1	32
2	64
3	96
4	128

Recursive Rule:
$f(0)=0;\ \ f(n)=f(n-1)+32$

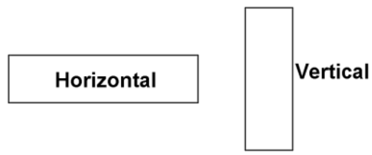
Explicit Rule:
$f(n)=32n$

Set

Topic: Investigating perimeters and areas

Adam and his brother are responsible for feeding their horses. In the spring and summer, the horses graze in an unfenced pasture. The brothers have erected a portable fence to corral the horses in a grazing area. Each day the horses eat all of the grass inside the fence. Then the boys move it to a new area where the grass is long and green. The portable fence consists of 16 separate pieces of fencing each 10 feet long.

The brothers have always arranged the fence in a long rectangle with one length of fence on each end and 7 pieces on each side making the grazing area 700 sq. ft. Adam has learned in his math class that a rectangle can have the same perimeter but different areas. He is beginning to wonder if he can make his daily job easier by rearranging the fence so that the horses have a bigger grazing area. He begins by making a table of values. He lists all of the possible areas of a rectangle with a perimeter of 160 ft., while keeping in mind that he is restricted by the lengths of his fencing units. He realizes that a rectangle that is oriented horizontally in the pasture will cover a different section of grass than one that is oriented vertically. So he is considering the two rectangles as different in his table. Use this information to answer questions 5 – 9 on the next page.

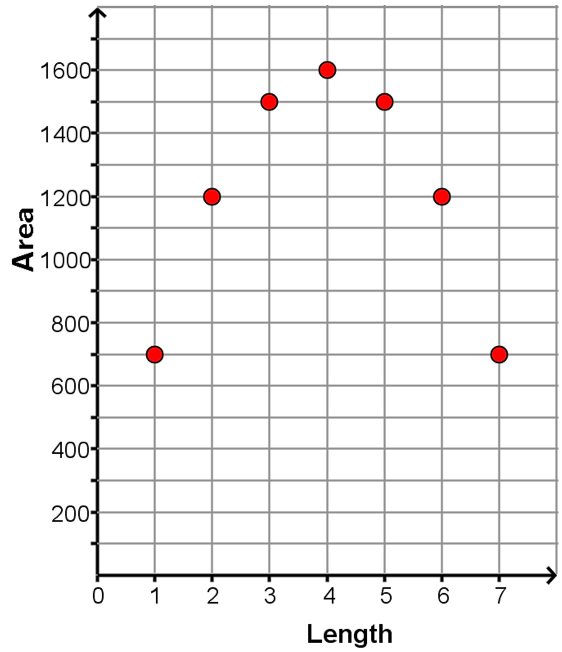


6. Fill in Adam's table with all of the arrangements for the fence.

	Length in "fencing" units	Width in "fencing" units	Length in *ft.*	Width in *ft.*	Perimeter (ft)	Area (ft^2)
	1 unit	7 units	10 ft	70 ft	160 ft	700 ft^2
a.	2 units	**6 units**	**20 ft**	**60 ft**	160 ft	**1200 ft^2**
b.	3 units	**5 units**	**30 ft**	**50 ft**	160 ft	**1500 ft^2**
c.	4 units	**4 units**	**40 ft**	**40 ft**	160 ft	**1600 ft^2**
d.	5 units	**3 units**	**50 ft**	**30 ft**	160 ft	**1500 ft^2**
e.	6 units	**2 units**	**60 ft**	**20 ft**	160 ft	**1200 ft^2**
f.	7 units	**1 unit**	**70 ft**	**10 ft**	160 ft	**700 ft^2**

7. Discuss Adam's findings. Explain how you would rearrange the sections of the porta-fence so that Adam will be able to do less work. Explain what "less work" means for Adam and his brother.
Use a square so horses have more to eat which will require less work to move the fence.

8. Make a graph of Adam's investigation. Let length be the independent variable and area be the dependent variable. Label and scale the axes.



9. What is the shape of your graph?

   parabola

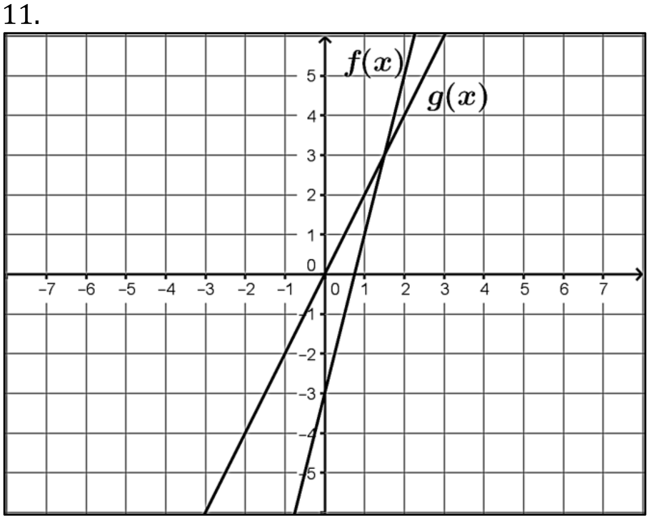
10. Explain what makes this function quadratic.
    The graph is a parabola because the 2nd differences are constant.

Go

Topic: Comparing linear and exponential rates of change.

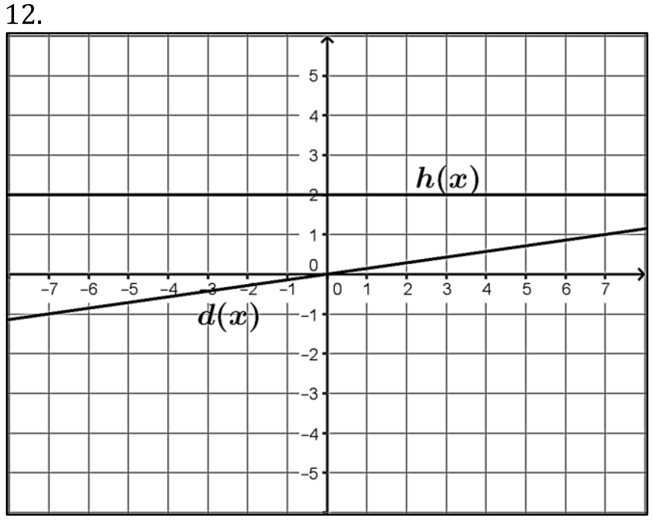
Indicate which function is changing faster.

11.



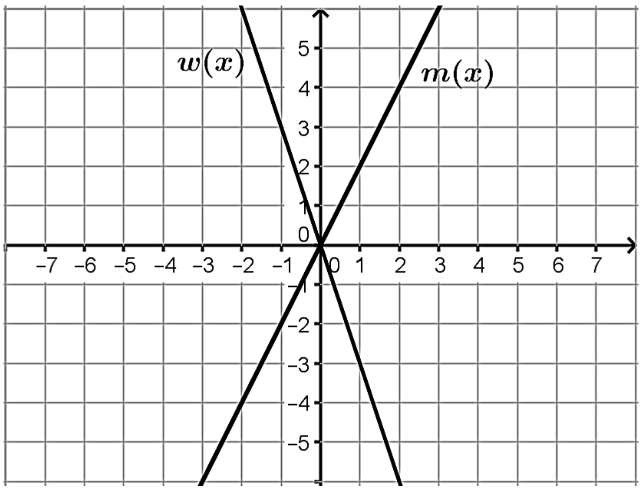
***f*(*x*)**

12.



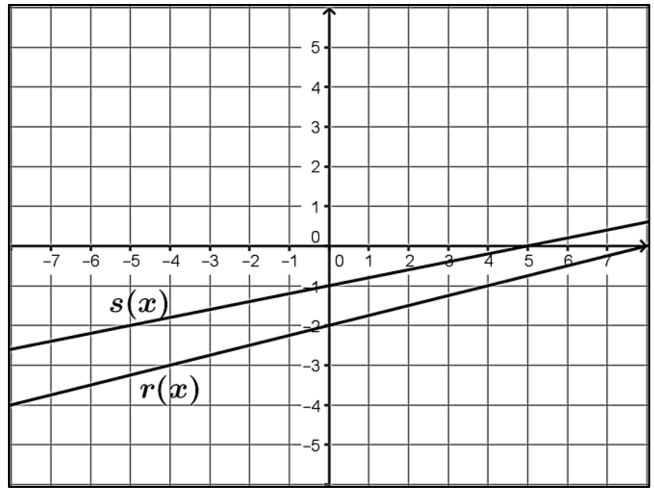
***d*(*x*)**

13.



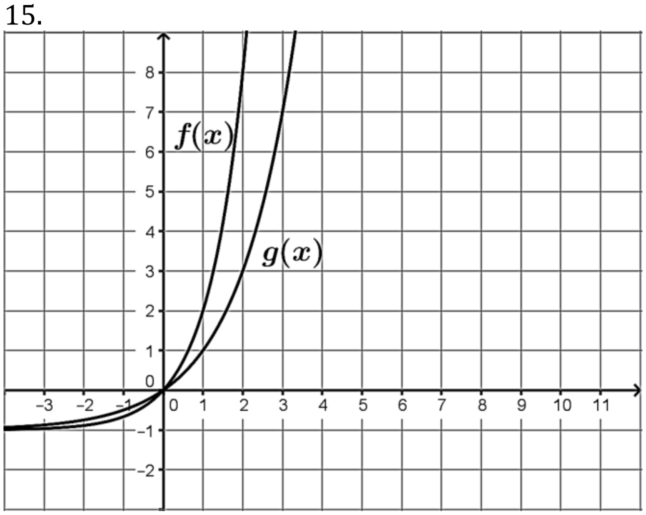
$w(x)$

14.



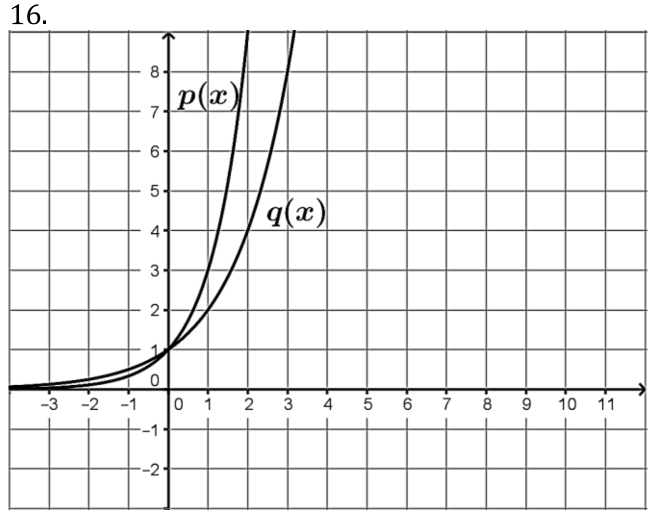
$r(x)$

15.

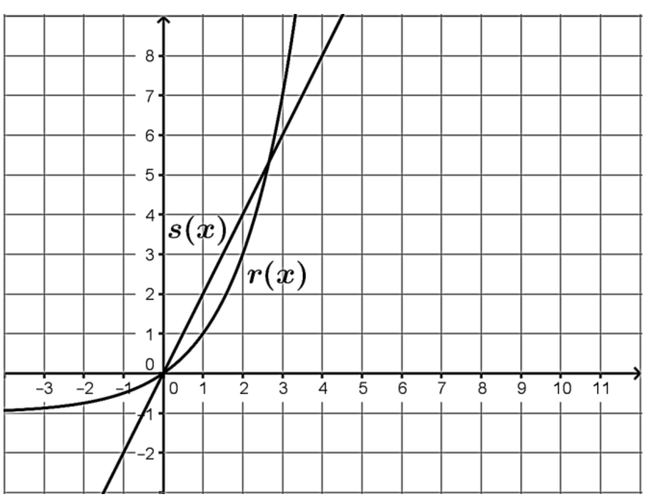


$f(x)$

16.



$p(x)$



17a. Examine the graph at the left from 0 to 1. Which graph do you think is growing faster?

$s(x)$

b. Now look at the graph from 2 to 3. Which graph is growing faster in this interval?

$r(x)$

Topic: Linear, Exponential, & Quadratic Sequences

Determine if each sequence is linear, exponential, or quadratic. Explain how you can determine the type of pattern based upon the table. Then find the recursive and explicit equations for each pattern.

18.

n	$f(n)$
1	3
2	9
3	27
4	81
5	243

Type of Pattern:
Exponential

How did you determine the type of pattern based on the table?
Constant ratio

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) \cdot 3}$

Explicit Equation:
$\boldsymbol{f(n) = 3^n}$

19.

n	$f(n)$
1	6
2	4
3	2
4	0
5	-2

Type of Pattern:
Linear

How did you determine the type of pattern based on the table?
Constant 1st Difference

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) - 2}$

Explicit Equation:
$\boldsymbol{f(n) = -2n + 8}$

20.

n	$f(n)$
1	4
2	7
3	12
4	19
5	28

Type of Pattern:
Quadratic

How did you determine the type of pattern based on the table?
2nd Difference is Constant

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) + 2n - 1}$

Explicit Equation:
$\boldsymbol{f(n) = n^2 + 3}$

21.

n	$f(n)$
1	5
2	8
3	11
4	14
5	17

Type of Pattern:
Linear

How did you determine the type of pattern based on the table?
Constant 1st Difference

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) + 3}$

Explicit Equation:
$\boldsymbol{f(n) = 3n + 2}$

22.

n	$f(n)$
1	2
2	8
3	18
4	32
5	50

Type of Pattern:
Quadratic

How did you determine the type of pattern based on the table?
2nd Difference is Constant

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) + 4n - 2}$

Explicit Equation:
$\boldsymbol{f(n) = 2n^2}$

23.

n	$f(n)$
1	1
2	4
3	16
4	64
5	256

Type of Pattern:
Exponential

How did you determine the type of pattern based on the table?
Constant Ratio

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) \cdot 4}$

Explicit Equation:
$\boldsymbol{f(n) = 4^{x-1}}$

Name: **Quadratic Functions** | **9.3H**

Ready, Set, Go!

Ready

Topic: Evaluating exponential functions

Find the indicated value of the function for each value of x. $x = \{-2, -1, 0, 1, 2, 3\}$

1. $f(x) = 3^x$

$f(-2) = \frac{1}{9}$

$f(-1) = \frac{1}{3}$

$f(0) = 1$

$f(1) = 3$

$f(2) = 9$

$f(3) = 27$

2. $k(x) = \left(\frac{1}{2}\right)^x$

$f(-2) = 4$

$f(-1) = 2$

$f(0) = 1$

$f(1) = \frac{1}{2}$

$f(2) = \frac{1}{4}$

$f(3) = \frac{1}{8}$

3. $m(x) = \left(\frac{1}{3}\right)^x$

$f(-2) = 9$

$f(-1) = 3$

$f(0) = 1$

$f(1) = \frac{1}{3}$

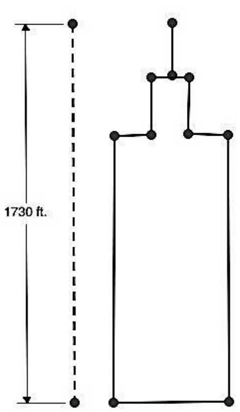
$f(2) = \frac{1}{9}$

$f(3) = \frac{1}{27}$

Set

The Willis Tower in Chicago is 1730 feet tall. If a penny were let go from the top of the tower, the position above the ground $s(t)$ of the penny at any given time, t, would be $s(t) = -16t^2 + 1730$.

4. Fill in the missing positions in the chart below. Then add to get the distance fallen.



Distance from ground

a.__1730__0 sec

b.__1714__1 sec

c. __1666__2 sec

d.__1586__3 sec

e.__1474__4 sec

f.__1330__5 sec

g.__1154__6 sec

h.__946___7 sec

i.__706___8 sec

j.__434___9 sec

k.__130___10 sec

5. How far above the ground is the penny when 7 seconds have passed?
946 feet above ground

6. How far has it fallen when 7 seconds have passed?
784 feet

7. Has the penny hit the ground at 10 seconds? Justify your answer.
No, its height is 130 feet

The average rate of change of an object is given by the formula $r = \frac{d}{t}$, where r is the rate of change, d is the distance traveled, and t is the time it took to travel the given distance. We often use some form of this formula when we are trying to calculate how long a trip may take.

8. If our destination is 225 miles away and we can average 75 mph, then we should arrive in 3 hours. $\left[\frac{225\ mile}{75\ mph} = 3\ hours\right]$ In this case you would be rearranging the formula so that $t = \frac{d}{r}$. However, if your mother finds out that the trip only took 2½ hours, she will be upset. Use the rate formula to explain why.
   $r = \frac{225}{2.5}$ **= 90, you were traveling at 90 mph**

9. How is the slope formula $= \frac{y_2 - y_1}{x_2 - x_1}$ like the formula for rate?
   $\frac{\textbf{differences of distance}}{\textbf{differences of time}}$

For the following questions, refer back to the Sear's Tower problem (questions 6 – 9).

10. Find the average rate of change for the penny on the interval [0, 1] seconds.
    16 ft/sec

11. Find the average rate of change for the penny on the interval [6, 7] seconds.
    208 ft/sec

12. Explain why the penny's average speed is different from 0 to 1 second than between the 6th and 7th seconds.
    It speeds up as it falls

13. What is the average speed of the penny from [0, 10] seconds?
    160 ft/sec

14. What is the average speed of the penny from [9, 10] seconds?
    304 ft/sec

15. Find the first differences on the table where you recorded the position of the penny at each second. What do these differences tell you?
    It is not linear

16. Take the difference of the first differences. This is called the 2nd difference. Did your answer surprise you? What do you think this means?
    It is quadratic.

Go

Topic: Evaluating functions

17. Find $f(9)$ given that $f(x) = x^2 + 10$.

91

18. Find $g(-3)$ given that $g(x) = (x-6)^2 + 8$.

89

19. Find $r(-2)$ given that $r(x) = -5(x+4)^2 - 3$.

-23

20. Find $s(-4)$ given that $s(x) = (x-5)(x+9)$.

-45

22. Find $q(-3)$ given that $q(x) = 2(x+6)(x+8)$.
30

Topic: Linear, exponential, or quadratic patterns

Determine if each sequence is linear, exponential, or quadratic. Explain how you can determine the type of pattern based upon the table. Then find the recursive and explicit equations for each pattern.

23.

n	$f(n)$
1	0
2	3
3	8
4	15
5	24

Type of Pattern:
Quadratic

How did you determine the type of pattern based on the table?
Constant 2nd Differences

Recursive Equation:
$\boldsymbol{f(1) = 0, f(n) = f(n-1) + 2n - 1}$

Explicit Equation:
$\boldsymbol{f(n) = n^2 - 1}$

24.

n	$f(n)$
1	6
2	12
3	24
4	48
5	96

Type of Pattern:
Exponential

How did you determine the type of pattern based on the table?
Constant ratio

Recursive Equation:
$\boldsymbol{f(n) = f(n-1) \cdot 2}$

Explicit Equation:
$\boldsymbol{f(n) = 3(2)^n}$

25.

n	$f(n)$
1	3
2	12
3	27
4	48
5	75

Type of Pattern:
Quadratic

How did you determine the type of pattern based on the table?
Constant 2nd Differences

Recursive Equation:
$\boldsymbol{f(1) = 3; f(n) = f(n-1) + 6n - 3}$

Explicit Equation:
$\boldsymbol{f(n) = 3n^2}$

26.

n	$f(n)$
1	-3
2	-7
3	-11
4	-15
5	-19

Type of Pattern:
Linear

How did you determine the type of pattern based on the table?
Constant 1st Differences

Recursive Equation:
$\boldsymbol{f(1) = -3; f(n) = f(n-1) - 4}$

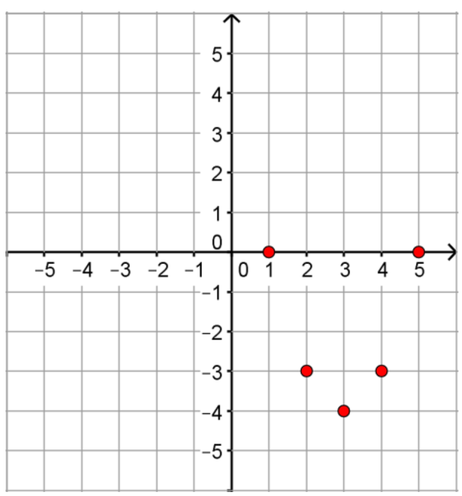
Explicit Equation:
$\boldsymbol{f(n) = -4n + 1}$

Complete the table of values for each given function. Graph the points and identify the type of function given.

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

x	$f(x)$
1	**0**
2	$\boldsymbol{-3}$
3	$\boldsymbol{-4}$
4	$\boldsymbol{-3}$
5	**0**

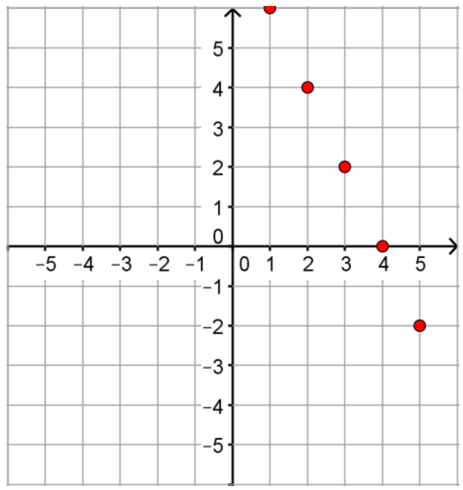
Type of Function:
Quadratic



28. $f(x) = -2x + 8$

x	$f(x)$
1	**6**
2	**4**
3	**2**
4	**0**
5	**-2**

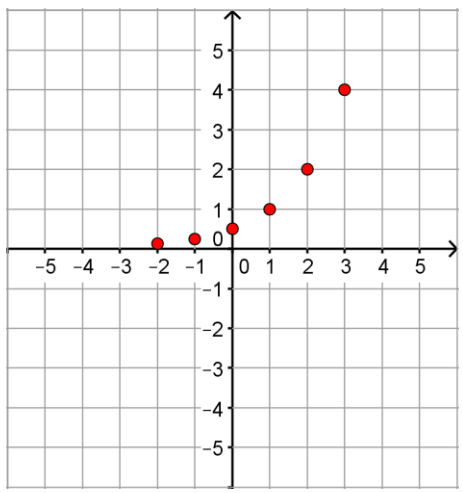
Type of Function:
Linear



29. $f(x) = 2^{x-1}$

x	$f(x)$
-2	**$\frac{1}{8}$**
-1	**$\frac{1}{4}$**
0	**$\frac{1}{2}$**
1	**1**
2	**2**
3	**4**

Type of Function:
Exponential



Name: **Quadratic Functions | 9.4H**

Ready, Set, Go!

Ready

Topic: Recognizing functions

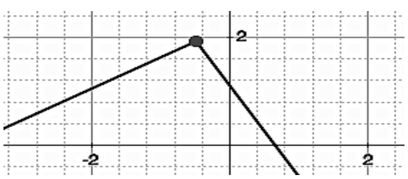
Identify which of the following representations are functions. If it is NOT a function state how you would fix it so it was.

1. $D = \{(4,-1)\ (3,-6)\ (2,-1)\ (1,2)\ (0,4)\ (2,5)\}$

   No, input of 2 has two outputs

2. The number of calories you have burned since midnight at any time during the day.

   Yes

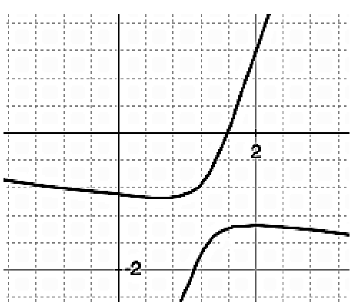
3. 

   Yes

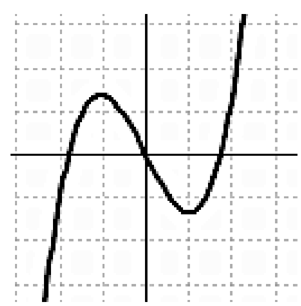
4.

x	-12	-8	-6	-4
$f(x)$	25	25	25	25

   Yes

5. 

   No, rotate 90°

6. 

   Yes

Set

Topic: Comparing rates of change in linear, quadratic, and exponential functions

The graphs below show time vs. distance graphs of cars traveling in the same direction along the freeway.

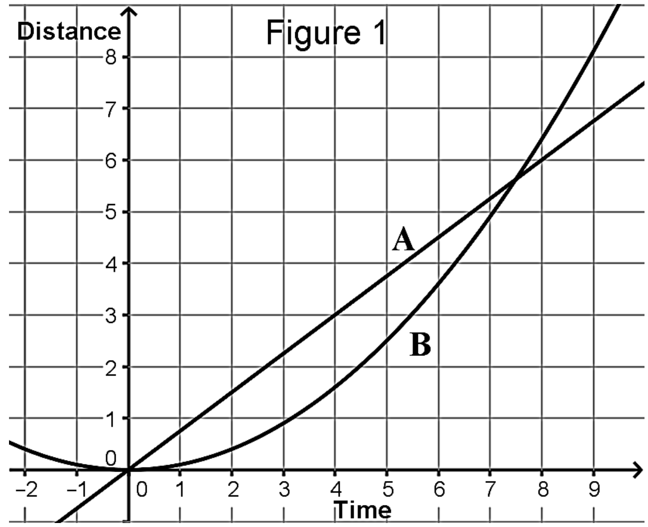
Figure 1:

7. Which car has the cruise control on? How do you know?
   A, constant rate of change

8. Which car is accelerating? How do you know?
   B, rate of change is getting steeper

9. Identify the interval where car A seems to be going faster than car B.
   Time before 4 seconds

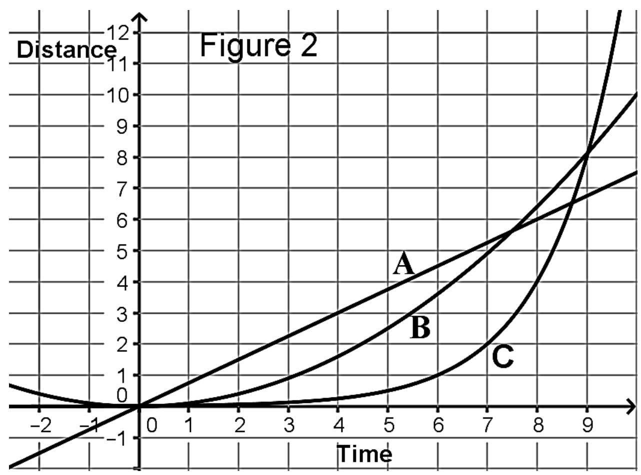
10. Identify the interval where car B seems to be going faster than car A.
    After 4 seconds



11. What in the graph indicates the speed of the cars?
    The slope

Figure 2:

12. A third car C is now shown in the graph. All 3 cars have the same destination. If the destination is a distance of 12 units from the origin, which car do you predict will arrive first? Justify your answer.
    Car C looks to reach distance of 12 units between 9 & 10 seconds, the other cars are below 10 units at the same time.



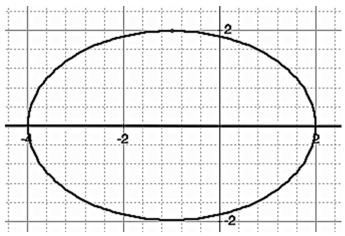
Go

Topic: Identifying domain and range from a graph.

State the domain and range of each graph. Use interval notation where appropriate.

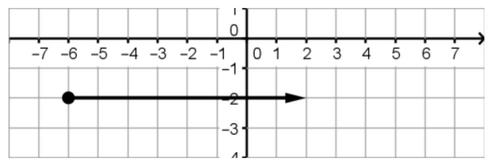
13a. Domain: $[-4, 2]$

b. Range: $[-2, 2]$



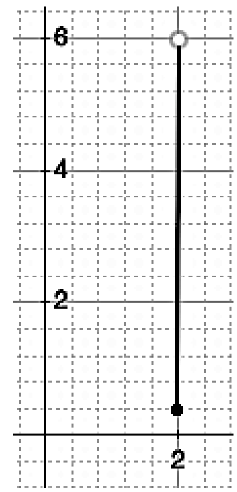
14a. Domain: $[-6, \infty)$

b. Range: -2



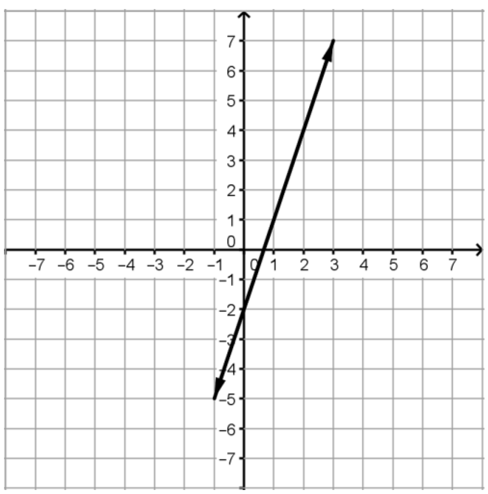
15a. Domain: 2

b. Range: $\left[\frac{2}{5}, 6\right)$



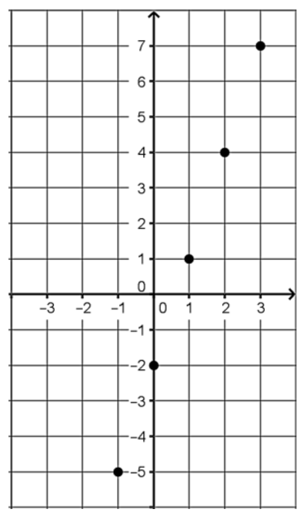
16a. Domain: $(-\infty, \infty)$

b. Range: $(-\infty, \infty)$



17a. Domain: $\{-1, 0, 1, 2, 3\}$

b. Range: $\{-5, -2, 1, 4, 7\}$



18. Are the domains of #16 and #17 the same? Explain.

The domains are not the same because #16 is a continuous function and #17 is a non-continuous function

Topic: Evaluating quadratic functions

Complete each table of values for the given functions.

19. $f(x) = 2x^2 - 8$

x	$f(x)$
-2	**0**
-1	**-6**
0	**-8**
1	**-6**
2	**0**

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

x	$f(x)$
-2	**-6**
-1	**-3**
0	**-2**
1	**-3**
2	**-6**

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

x	$f(x)$
-5	**12**
-4	**6**
-3	**4**
-2	**6**
-1	**12**

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

x	$f(x)$
-1	**−21**
0	**−12**
1	**−9**
2	**−12**
3	**−21**

Ready, Set, Go!

Ready

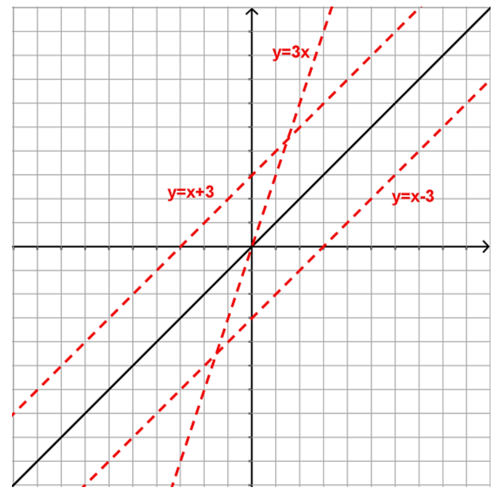
Topic: Transforming lines

1. Graph the following linear equations on the grid. The equation $y = x$ has been graphed for you. For each new equation:
   - explain what the number 3 does to the graph of $y = x$. Pay attention to the y-intercept, the x-intercept, and the slope.
   - Identify what changes in the graph and what stays the same.

   a. $y = x + 3$
   moves up 3

   b. $y = x - 3$
   moves down 3

   c. $y = 3x$
   steeper

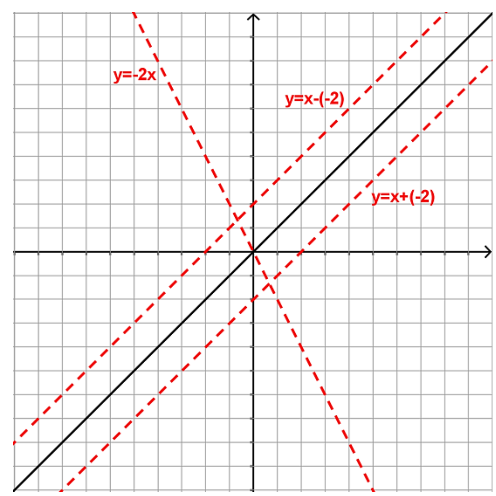


2. The graph of $y = x$ is given. For each equation predict what you think the number -2 will do to the graph. Then graph the equation.

   a. $y = x + (-2)$
   Prediction: **down 2**

   b. $y = x - (-2)$
   Prediction: **up 2**

   c. $y = -2x$
   Prediction: **steeper**



Set

Topic: Distinguishing between linear, exponential, and quadratic functions

For each relation given in #3-6:

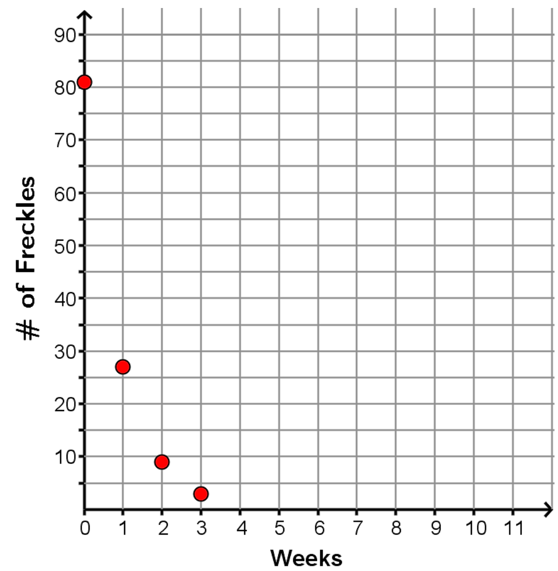
a. Identify whether or not the relation is a function. (If it's not a function, skip b–d.)
b. Determine if the function is Linear, Exponential, or Quadratic.
c. Express the relation in the indicated form.

3. I had 81 freckles on my nose before I began using vanishing cream. After the first week, I had 27. The next week 9, then 3…

   a. Function? **Yes**

   b. Linear, Exponential, or Quadratic? **Exponential**

   c. Make a graph. Label your axes and the scale. Show all 4 points.



4.

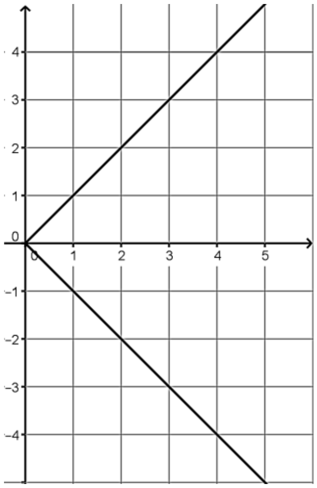
x	y
0	81
1	$80\frac{2}{3}$
2	$80\frac{1}{3}$
3	80
4	$79\frac{2}{3}$

a. Function? **Yes**

b. Linear, Exponential, or Quadratic? **Linear**

c. Write the explicit equation. $y = -\frac{1}{3}x + 81$

5.



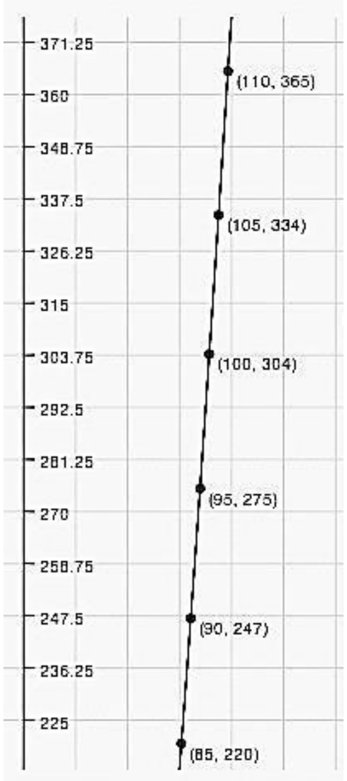
a. Function? **No**

b. Linear, Exponential, or Quadratic?
Neither

c. Create a table.

x	y
0	**0**
1	± 1
2	± 2
3	± 3

6. Speed in mph of a baseball vs. distance in ft.



a. Function? **Yes**

b. Linear, Exponential, or Quadratic? **Quadratic**

c. Predict the distance the baseball flies if it leaves the bat at a speed of 115 mph.
397 feet

Go

Determine if each table represents a linear, exponential, or quadratic pattern. Then write the recursive and explicit rule.

7.

n	$f(n)$
1	-3
2	0
3	5
4	12
5	21

Type of Pattern:
Quadratic

Recursive Rule:
$\boldsymbol{f(1) = -3}$
$\boldsymbol{f(n) = f(n-1) + 2n - 1}$

Explicit Rule:
$\boldsymbol{f(n) = n^2 - 4}$

8.

n	$f(n)$
1	6
2	12
3	24
4	48
5	96

Type of Pattern:
Exponential

Recursive Rule:
$\boldsymbol{f(1) = 6}$
$\boldsymbol{f(n) = f(n-1) \cdot 2}$

Explicit Rule:
$\boldsymbol{f(n) = 3 \cdot 2^n}$

9.

n	$f(n)$
1	5
2	3
3	1
4	-1
5	-3

Type of Pattern:
Linear

Recursive Rule:
$\boldsymbol{f(1) = 5}$
$\boldsymbol{f(n) = f(n-1) - 2}$

Explicit Rule:
$\boldsymbol{f(n) = -2n + 7}$

10.

n	$f(n)$
1	9
2	27
3	81
4	243
5	729

Type of Pattern:
Exponential

Recursive Rule:
$\boldsymbol{f(1) = 9}$
$\boldsymbol{f(n) = f(n-1) \cdot 3}$

Explicit Rule:
$\boldsymbol{f(n) = 3^{n+1}}$

11.

n	$f(n)$
1	4
2	16
3	36
4	64
5	100

Type of Pattern:
Quadratic

Recursive Rule:
$\boldsymbol{f(1) = 4}$
$\boldsymbol{f(n) = f(n-1) + 8n - 4}$

Explicit Rule:
$\boldsymbol{f(n) = 4n^2}$

12.

n	$f(n)$
1	3
2	7
3	11
4	15
5	19

Type of Pattern:
Linear

Recursive Rule:
$\boldsymbol{f(1) = 3}$
$\boldsymbol{f(n) = f(n-1) + 4}$

Explicit Rule:
$\boldsymbol{f(n) = 4n - 1}$

Simplify each expression.

13. $(3x - 8) + (5x - 12)$
$\mathbf{8x - 20}$

14. $(7x + 2)(3x - 4)$
$\mathbf{21x^2 - 22x - 8}$

15. $(4x + 6) + (x - 9)$
$\mathbf{5x - 3}$

16. $(x - 4)(x - 9)$
$\mathbf{x^2 - 13x + 36}$

17. $2(x + 8)(x - 3)$
$\mathbf{2x^2 + 10x - 48}$

18. $3(2x - 1)(4x + 7)$
$\mathbf{24x^2 + 30x - 21}$

Use the tile pattern below to answer questions 19-21.

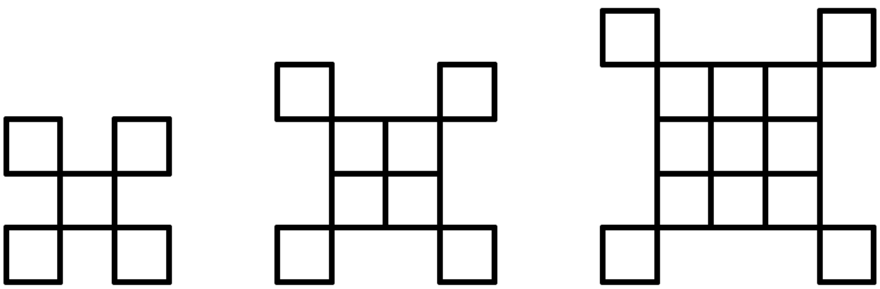
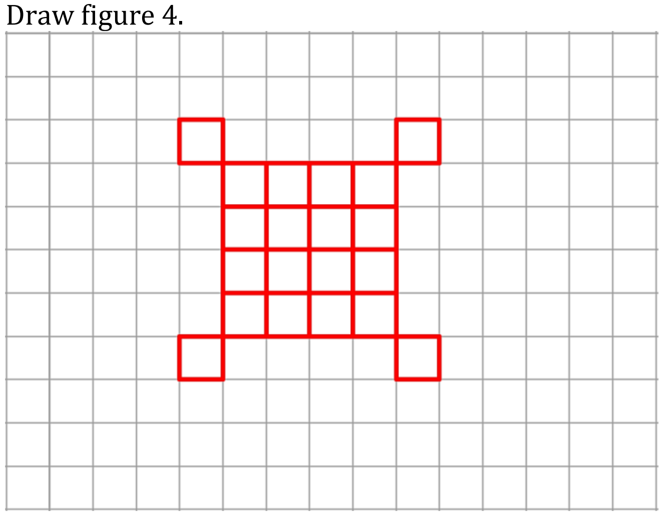


Figure 1 Figure 2 Figure 3

19. Describe how you see the pattern growing. On the figure, shade in the blocks where you see this growth.
Answers may vary. Sample: The square in the middle grows by an odd number each time. This square has sides that are the same length as the figure number.

20. Draw figure 4.



21. Complete the table below that represents the number of tiles/boxes per figure. Then find the recursive and explicit rules.

n	$f(n)$
1	**5**
2	**8**
3	**13**
4	**21**
5	**30**

Recursive Rule:
$\mathbf{f(1) = 5; f(n) = f(n-1) + 2n}$

Explicit Rule:
$\mathbf{f(n) = n^2 + 4}$