Integrated Math 1 Honors Review Worksheet (Modules 6-11)

Summary of the Concepts & Skills in Module 6H:

- Develop definitions of rigid-motion transformations: translations, rotations, and reflections
- Examine which rigid motion transformation carry one image onto another congruent image
- Write and apply formal definitions of the rigid-motion transformations
- Make and justify properties of quadrilaterals using symmetry transformations
- Describe a sequence of transformations that will carry congruent images onto each other
- Establish the ASA, SAS, and SSS criteria for congruent triangles

Summary of the Concepts & Skills in Module 7H

- Use coordinates to find distances and determine the perimeter of geometric shapes
- Write the equation $f(t) = m(t) + k$ by comparing parallel lines and finding k
- Determine the transformation from one function to another
- Translate linear and exponential functions using multiple representations

Summary of the Concepts & Skills in Module 8H

- Represent and interpret data using a histogram, box plot, and scatterplot
- Analyze a set of data using mean, median, and mode
- Identify center and spread of a data distribution
- Describe and compare data distributions/sets in a context, table, and/or graph
- Interpret and create two-way frequency tables
- Interpret and write conditional statements using relative frequency tables
- Describe the relationship between a scatterplot and its correlation coefficient
- Determine lines of best fit and compare these lines to linear regression equations
- Use residual plots to analyze the strength of a linear model

Summary of the Concepts & Skills in Module 9H:

- Quadratic patterns and sequences
- Determine domain, range, maximum, and minimum values for quadratics
- Using patterns and sequences to find recursive and explicit rules for quadratics
- Finding multiple representations for a context

Summary of the Concepts & Skills in Module 10H:

- Determine the vertex, axis of symmetry, and intercepts for quadratic functions written in factored, vertex, and standard forms
- Represent quadratic functions using multiple representations
- Complete the square in order to identify the vertex of a quadratic function
- Compare factored, vertex, and standards forms of quadratic functions.

Summary of the Concepts & Skills in Module 11H:

- Converting between rational exponents and radicals
- Using rules of exponents and radicals to simplify expressions
- Solving equations containing exponents

Module 6 Review

1. For which of the four quadrilaterals – parallelogram (P), rectangle (Re), rhombus (Rh), square (S) – can each of the following properties be proved?

   a. The diagonals bisect each other. S, Rh

   b. Diagonals are congruent. S, Re

   c. Opposite angles are congruent. P, Re, Rh, S

   d. Consecutive angles are congruent. S, Re

   e. Consecutive angles are supplementary. all

   f. Consecutive sides are congruent. S, Rh

   g. Opposite sides are congruent. all

2. What is the rotational symmetry for a dodecagon? $\frac{360}{12}$, 30°

3. How many lines of symmetry does a dodecagon have? 12

Find the *slope* between each pair of points. Then, using the Pythagorean Theorem, find the *distance* between each pair of points.

4. $(-3,-2)$ $(0,0)$

   a. Slope $\frac{2}{3}$

   b. Distance: $\sqrt{13}$

5. $(7,-1)$ $(11,7)$

   a. Slope $\frac{-8}{-4}$

   b. Distance: $8^2+4^2=c^2$, $c=\sqrt{80}=4\sqrt{5}$

6. Describe the transformation from ΔABC to $\Delta A'B'C'$

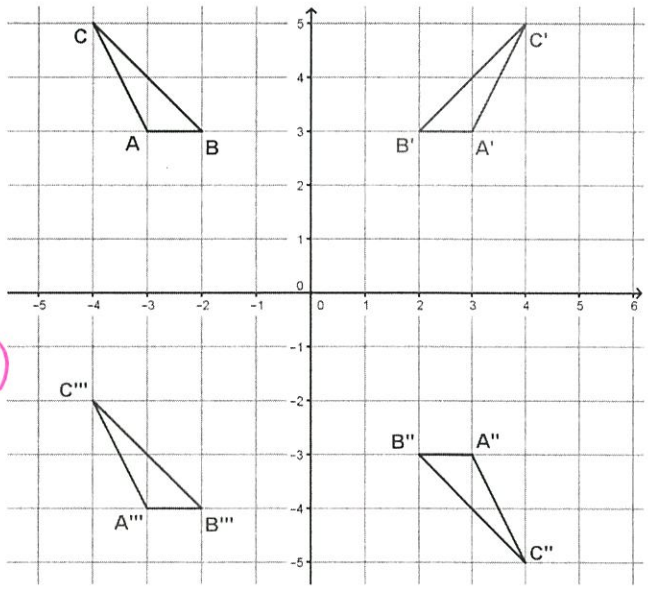
   Reflect over $x=0$

7. Describe the transformation from ΔABC to $\Delta A''B''C''$

   Rotate 180° around (0,0)

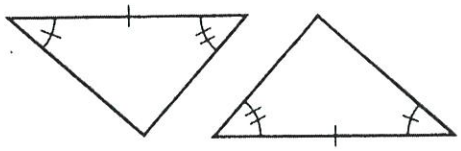
8. Describe the transformation from ΔABC to $\Delta A'''B'''C'''$.

   Translate $(x,y) \rightarrow (x-1, y-7)$

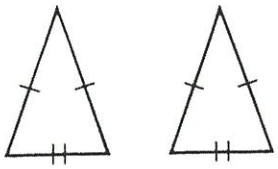


9. For each of the pairs of triangles sketched below, like markings indicate congruent parts. Name the congruence postulate (SAS, ASA, SSS), if any, that will prove the triangles are congruent.

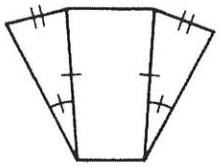
(a) ASA



(b) SSS

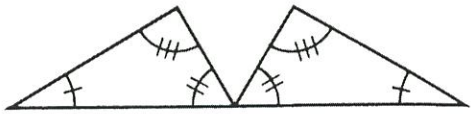


(c)



not congruent

(d)



similar

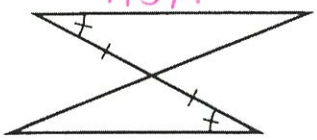
(e)

ASA

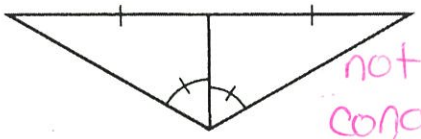
(f)

SAS

(g) ASA

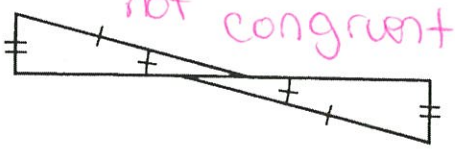


(h)



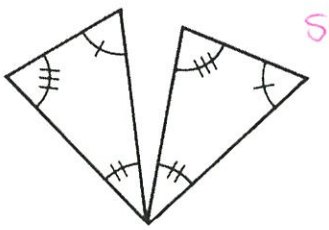
not congruent

(i)

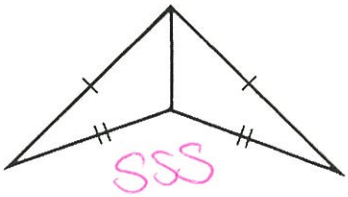


not congruent

(j) similar



(k)



SSS

(l)

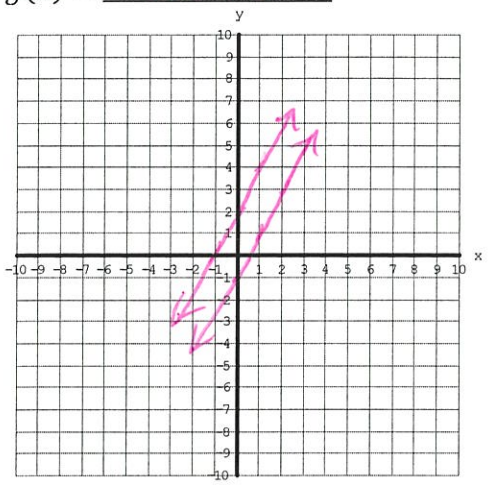
not congruent

Module 7 Review

You are given the equation of $f(x)$ and the transformation $g(x)$.
Graph both $f(x)$ and $g(x)$ *and* write the linear equation in slope-intercept form for $g(x)$.

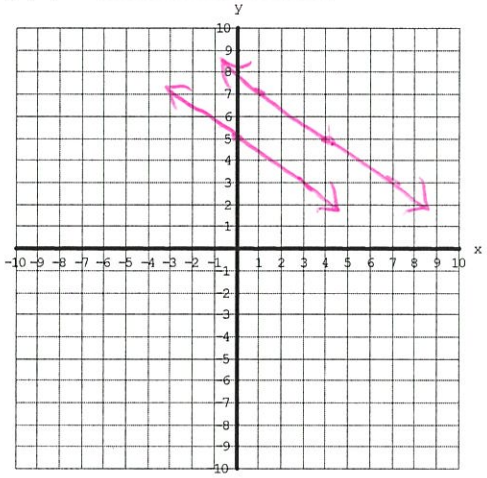
1. $f(x) = 2x - 1$
   $g(x) = f(x) + 3$

$g(x) =$ 2x+2



2. $f(x) = -\frac{2}{3}x + 5$
   $g(x) = f(x - 4)$

$g(x) =$ $-\frac{2}{3}(x-4)+5$



You are given information about $f(x)$ and $g(x)$. Rewrite $g(x)$ in translation form: $g(x) = f(x) + k$

3. $f(x) = 7x + 13$
   $g(x) = 7x - 51$

$g(x) =$ f(x)-64
Translation form

4. $f(x) = 22x - 12$
   $g(x) = 22x + 56$

$g(x) =$ f(x)+68
Translation form

5. $f(x) = -15x + 305$
   $g(x) = -15x - 16$

$g(x) =$ f(x)-321
Translation form

6.

x	$f(x)$	$g(x)$
3	11	26
10	46	61
25	121	136
40	196	211

$g(x) =$ f(x)+15
Translation form

7.

x	$f(x)$	$g(x)$
-4	5	-42
-1	-1	-48
5	-13	-60
20	-43	-90

$g(x) =$ f(x)-47
Translation form

8.

x	$f(x)$	$g(x)$
-10	4	-15.5
-3	7.5	-12
22	20	0.5
41	29.5	10

$g(x) =$ f(x)-19.5
Translation form

9. Two vectors are described in component form in the following way:

$\vec{v}$: $\langle -2, 3 \rangle$ and $\vec{w}$: $\langle 3, 4 \rangle$

a. $\vec{v} + \vec{w} =$ $\langle 1, 7 \rangle$

b. $\vec{v} - \vec{w} =$ $\langle -5, -1 \rangle$

c. $\|\vec{v}\| =$ $\sqrt{2^2+3^2}$ $\sqrt{13}$

10. Find the determinant of each 2 × 2 matrix ad-bc

a. $\begin{bmatrix} 8 & -2 \\ 4 & 1 \end{bmatrix}$ $8 - -8$ 16

b. $\begin{bmatrix} 3 & 2 \\ 6 & 4 \end{bmatrix}$ $12 - 12$ 0

c. $\begin{bmatrix} 4 & 2 \\ 3 & 1 \end{bmatrix}$ $4 - 6$ -2

11. Find the multiplicative and additive inverse of each of the matrices in 10.

Additive inverses: (a) $\begin{bmatrix} -8 & 2 \\ -4 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} -3 & -2 \\ -6 & -4 \end{bmatrix}$ (c) $\begin{bmatrix} -4 & -2 \\ -3 & -1 \end{bmatrix}$

multiplicative inverse:

(a) $\frac{1}{16}\begin{bmatrix} 1 & 2 \\ -4 & 8 \end{bmatrix}$

(b) $\frac{1}{0}\begin{bmatrix} 4 & -2 \\ -6 & 3 \end{bmatrix}$ no inverse

(c) $\frac{1}{-2}\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

12. Solving using an inverse matrix: $\begin{cases} 5x - 3y = 3 \\ 2x + y = 10 \end{cases}$

$$\begin{bmatrix} 2 & -3 \\ 3 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 10 \end{bmatrix}$$

$2 - -9$ 11

$$\frac{1}{11}\begin{bmatrix} 1 & 3 \\ -3 & 2 \end{bmatrix}$$

$$\begin{bmatrix} \frac{1}{11} & \frac{3}{11} \\ \frac{-3}{11} & \frac{2}{11} \end{bmatrix} \cdot \begin{bmatrix} 3 \\ 10 \end{bmatrix} = \begin{bmatrix} \frac{3}{11} + \frac{30}{11} \\ -\frac{9}{11} + \frac{20}{11} \end{bmatrix} = \begin{bmatrix} \frac{33}{11} \\ \frac{11}{11} \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$$

$(3, 1)$

Module 8 Review

1. Complete table for the activities chosen by 74 teenagers on an activity holiday.

	Rock Climbing	Mountain Climbing	**Totals**
Boys	42	5	47
Girls	7	20	27
Totals	49	25	74

2. Create a Relative Frequency Column table for the problem above.

	Rock Climbing	Mountain Climbing	**Totals**
Boys	86%	20%	64%
Girls	14	80%	36%
Totals	100%	100%	100%

3. Given the representations of data to the right, write the meaning of the slope and y-intercept of the regression line in context.

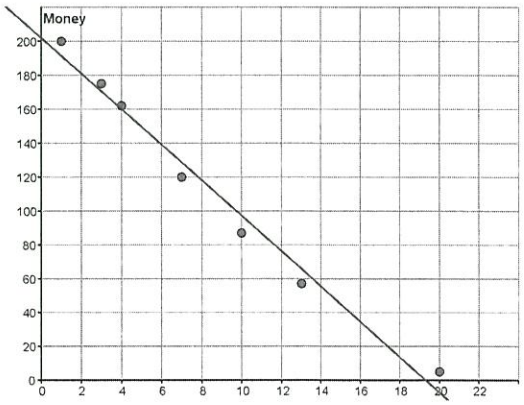
$y = -10.46x + 201.77$.

You may reference the sentence frame below:

The slope is *blank* **because the** *y-variable rises or falls by blank* **for every unit increase of** *x-variable* **.**

The y-intercept is *blank* **because the** *y-variable is blank* **when the** *x-variable* **is 0.**

Weeks since school started	Money in savings
1	200
3	175
4	162
7	120
10	87
13	57
20	5



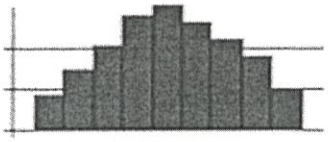
The slope is -10.46 because the money in savings decreases by $10.46 for every week since school started.

The y-intercept is 201.77 because the money in savings was $201.77 when school had not started (x=0).

4.

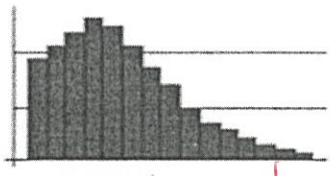
1 – 5. For the following five histograms, list at least 3 characteristics that describe each histogram (consider symmetric, skewed to left, skewed to right, unimodal, bimodal, multi-modal, outliers, gaps,

1



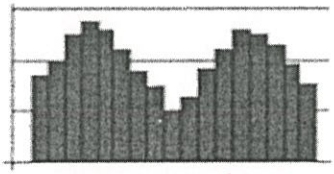
normal
unimodal

2



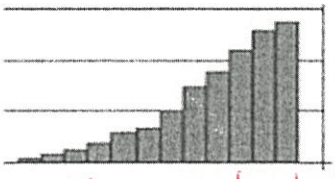
skewed right
unimodal

3



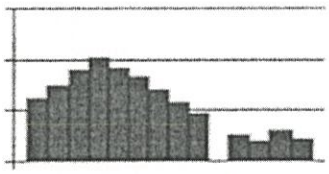
bimodal

4



skewed left
unimodal

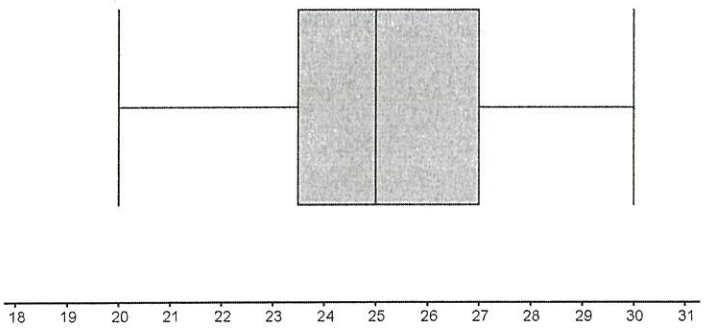
5



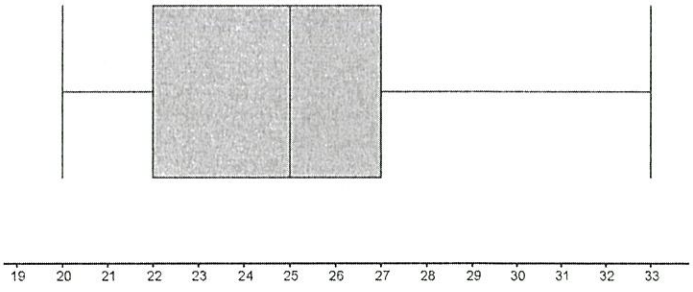
skewed right
unimodal

For each set of data determine the mean, median, mode and range. Then create box-and-whisker plots.

5. {23, 24, 25, 20, 25, 29, 24, 25, 30}



6. {20, 24, 10, 35, 25, 29, 24, 25, 33}



7. a. How much of the data is represented by the box?

50%

b. How much is represented by each whisker?

25%

Match the scatterplot with its correlation coefficient.

Correlation Coefficients:

0.05

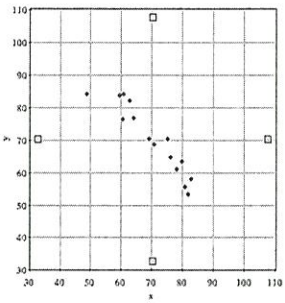
0.97

-0.94

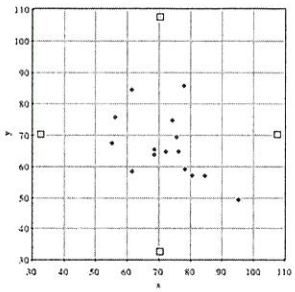
-0.49

0.68

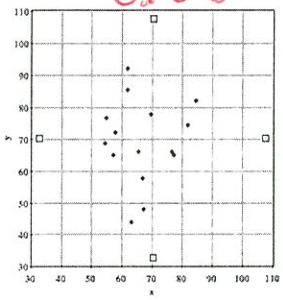
8. -0.94



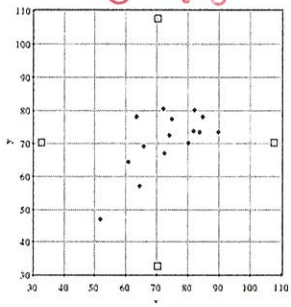
9. -0.49



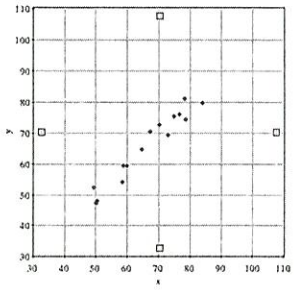
10. 0.05



11. 0.68

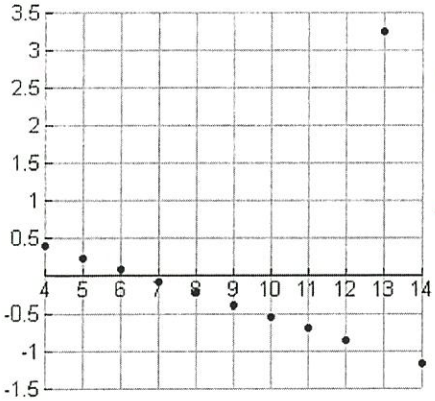


12. 0.97



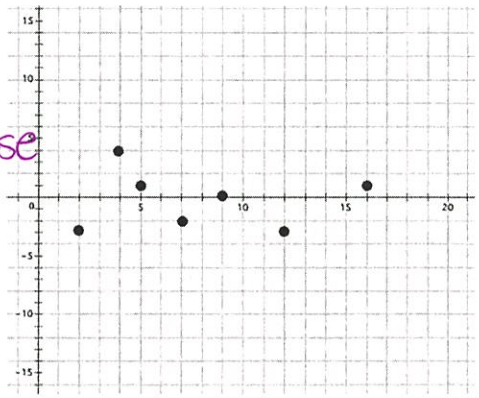
The following graphs are residual plots. Use the residual plot to determine if a line of regression is an appropriate model and explain why.

13.



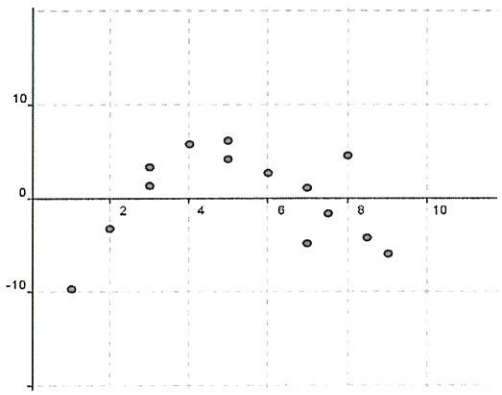
not a good model because the slope is incorrect.

14.



Yes this is a good model. The points are randomly scattered above and below the line.

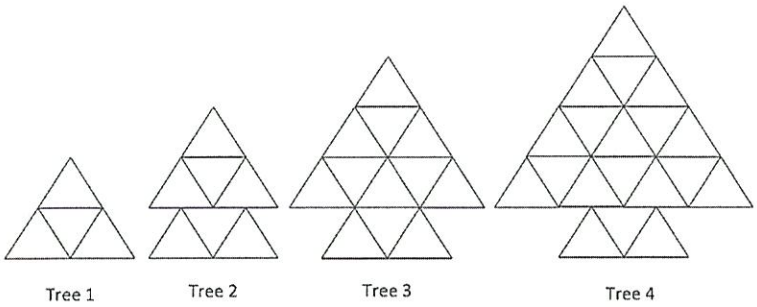
15.



No the points form a parabolic pattern. A different regression model would be more appropriate.

Module 9 Review

1. What is an explicit function for the pattern?



$f(x) = x^2 + 3$

2. Find $r(-1)$ given that $r(x) = -5x^2 - 3x + 9$.

$r(-1) = -5(-1)^2 - 3(-1) + 9$

$-5 + 3 + 9$

$r(-1) = 7$

3. Find $s\left(\frac{1}{2}\right)$ given that $s(x) = x^2 + \frac{5}{4}x - \frac{1}{2}$.

$s\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 + \frac{5}{4}\left(\frac{1}{2}\right) - \frac{1}{2}$

$\frac{1}{4} + \frac{5}{8} - \frac{1}{2}$

$\frac{2}{8} + \frac{5}{8} - \frac{4}{8} =$

$s\left(\frac{1}{2}\right) = \frac{3}{8}$

4. Find $q(2)$ given that $q(x) = 7^x + 11x$.

$q(2) = 7^2 + 11(2)$

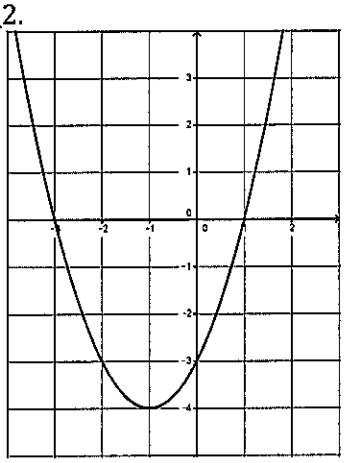
$= 49 + 22$

$q(2) = 71$

Match the function on the left with the equivalent function on the right.

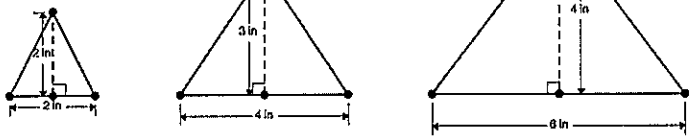
D 1. $f(x) = -2x + 5$

F 2.



G 3. I put $7000 in a savings account that pays 3% interest compounded annually. I plan to leave it in the bank for 20 years. The amount I will have then.

C 4. The area of the triangles below.



A 5. $f(0) = 5;\ f(n) = 2 \cdot f(n-1)$

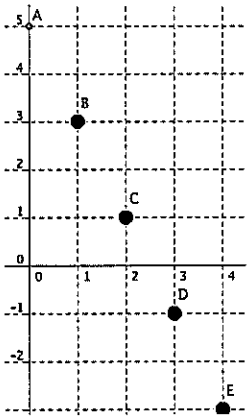
B 6. $f(0) = 5;\ f(n) = f(n-1) - 2$

E 7.

x	-7.75	-¼	½	11.6
$f(x)$	7.75	¼	-½	-11.6

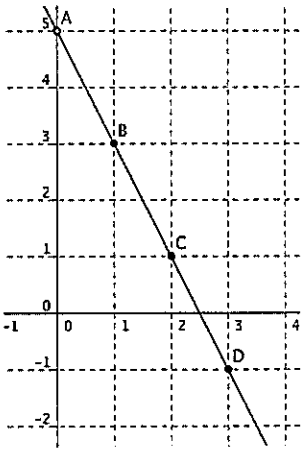
a. $f(x) = 5(2)^x$

b.



c. $f(1) = 2;\ f(n+1) = f(n) + 2n$

d.



e. $y + x = 0$

f. $y = (x-1)(x+3)$

g. $A = 7000(1.03)^{20}$

Module 10 Review:

Given the quadratic function, identify the vertex, intercepts, and vertical stretch of the parabola and the other forms of the function. (standard form, factored form, vertex form)

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

v: $(-2, -64)$

x-inter(s): $(2,0)$ $(-6,0)$

y-inter $(0, -48)$

stretch: 4

$y = 4(x+2)^2 - 64$

$y = 4x^2 + 16x - 48$

2. $y = (x+6)^2 - 1$

v: $(-6, -1)$

x-inter(s): $(-5,0), (-7,0)$

y-inter: $(0, 35)$

stretch: 1

$y = x^2 + 12x + 35$

$y = (x+5)(x+7)$

3. $y = 4(x+2)^2 - 64$

v: $(-2, -64)$

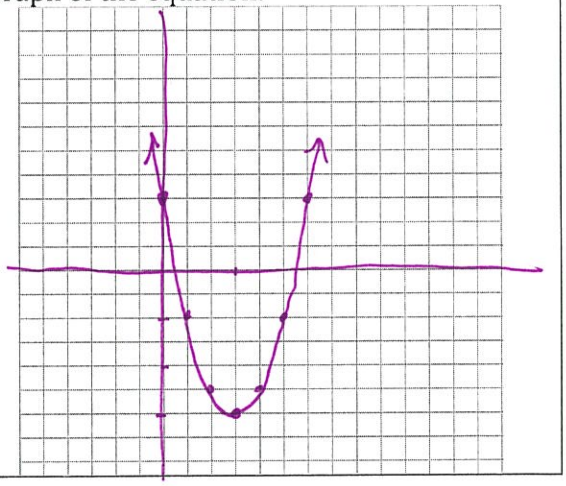
x-inter(s): $(2,0)$ $(-6,0)$

y-inter: $(0, -48)$

stretch: 4

$y = 4(x-2)(x+6)$

$y = 4x^2 + 16x - 48$

4. You get this:	Fill in this:
$y = x^2 - 6x + 3$ $x^2 - 6x + 9 - 6$ $(x-3)^2 - 6$	Vertex form of the equation: $y = (x-3)^2 - 6$
	Graph of the equation: 

Module 11 Review:

1. For each of the following problems, simplify the expression

A. $\sqrt{27} = 3\sqrt{3}$

B. $\sqrt[3]{32} = 2\sqrt[3]{4}$

C. $\sqrt{20x^7}$ $2x^3\sqrt{5x}$

D. $\sqrt[3]{\frac{16xy^5}{x^7y^2}}$ → $\sqrt[3]{\frac{16y^3}{x^6}} \rightarrow 2\frac{y}{x^2}\sqrt[3]{2}$

E. $f^{\frac{1}{3}} \cdot \sqrt[5]{f^2}$ → $f^{1/3} \cdot f^{2/5} \rightarrow f^{5/15} \cdot f^{6/15} = f^{11/15}$

2. Fill in the missing values of the table based on the growth that is described.

The growth in the table is triple at each whole year.

Years	0	$\frac{1}{2}$	1	$\frac{3}{2}$	2	$\frac{5}{2}$	3	$\frac{7}{2}$	4
Bacteria	2	$2\sqrt{3}$	6	$6\sqrt{3}$	18	$18\sqrt{3}$			

3

1. Simplify $\left(-\frac{3x^5}{xy^6}\right)^2$ → $\frac{9x^{10}}{x^2y^{12}} \rightarrow \frac{9x^8}{y^{12}}$

2. Evaluate f(4)=___, when $f(x) = x^{\frac{7}{4}}$

$f(4) = 4^{7/4} \rightarrow \sqrt[4]{4^7} \rightarrow \sqrt[4]{(2^2)^7} \rightarrow \sqrt[4]{2^{14}} \rightarrow 2\sqrt[4]{2^2}$

$f(4) = 8\sqrt[4]{4} = 8 \cdot 4^{1/4}$

3. What is a rational number?

can be written as a fraction.

4. What is an irrational number?

π, e, $\sqrt{2}$ cannot be simplified in order to be written as a fraction

5. Determine if the following are rational or irrational?

R I

a. $\sqrt{27} \rightarrow 3\sqrt{3} \rightarrow$ I
b. $\sqrt[3]{32} \rightarrow 2\sqrt[3]{4} \rightarrow$ I
c. $\sqrt[4]{16^3} \rightarrow \sqrt[4]{4^6} \rightarrow \sqrt[4]{2^{12}} \rightarrow 2^3$ R
d. $7^{\frac{1}{3}}$ I