BELLEVUE SCHOOL DISTRICT
BELLEVUE, WASHINGTON

SUMMER PACKET

FOR STUDENTS GOING INTO:

HIAG 2

(REVIEWS CONCEPTS TAUGHT IN IMT3)

NAME: _____

DO YOUR WORK ON A SEPARATE PIECE OF PAPER, ATTACH TO THIS PACKET, AND SUBMIT IT TO YOUR HIAG 2 TEACHER DURING THE 1ST WEEK OF SCHOOL

Thinking with Math Models

Study the patterns begun in this table.

X	Y_1	Y_2	Y_3	Y_4
1	0	1	2	1
2	0	4.5	4	$\frac{1}{2}$
3	0	8	8	$\frac{1}{3}$
4	0	11.5	16	$\frac{1}{4}$
5	0	15	32	$\frac{1}{5}$
6				
?			1,024	
?			2,048	
N				

a. Copy the table above and then fill in the missing numbers for each column in ways that seem to fit patterns begun in the first several rows.

b. Are any of the patterns linear? Explain your reasoning.

c. Do any of the patterns exhibit inverse variation? Explain your reasoning.

Use the table to answer parts (a) and (b).

x	2	3	7	14	21
y	42	28	12	6	4

a. Are *x* and *y* linearly or inversely related? How do you know?

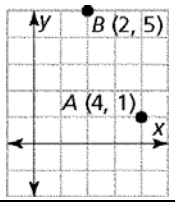
b. Write an equation to describe the relationship between *x* and *y*.

Diane started working at an ice cream shop for $6/hour. She will receive a $2 raise for every year she works at the shop.

a. Write an equation that expresses her salary in terms of years spent working at the ice cream shop.

b. Use this equation to find Diane's salary after five years of working at the ice cream shop.

Find an equation of the line that passes through points A and B**.**



Find an equation of the line that passes through the point (0, 5) and has slope 4.

Find an equation of the line that passes through the point (4, 5) and has slope –2.

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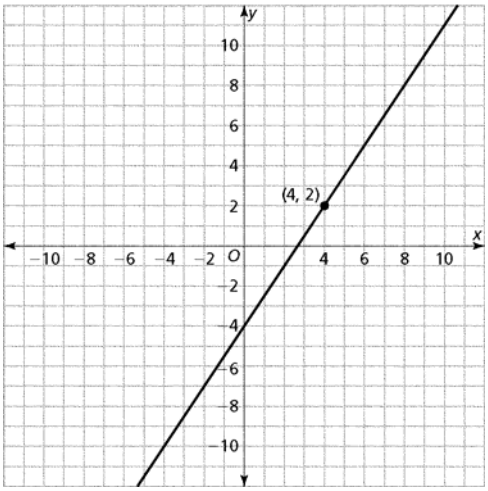
a. What is an equation of the line shown on the graph below?

b. Write equations for two other lines that pass through the point (4, 2).

c. Graph the equations you wrote in part b.



Two charter bus companies offer different pricing plans for a one-day school field trip. Badger Bus Line charges $75 for the driver and $1.25 per mile for the bus. Hawkeye Express charges $100 for the driver and $0.85 per mile for the bus.

a. Write equations showing how the cost of using each company will depend on the length of the field trip x in miles.

Badger Bus Line: c =

Hawkeye Express: c =

Write equations or inequalities matching the following questions. Then do the required calculations or solving to answer the questions.

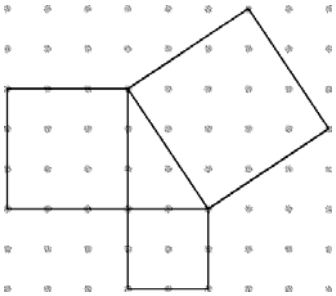
b. For what distance will the cost of using Badger Bus Line be $250?

c. What will a 250 mile trip cost if a Hawkeye Express bus is used?

d. For what trip lengths can the school use Badger Bus if they have **at most** $300 to spend on transportation?

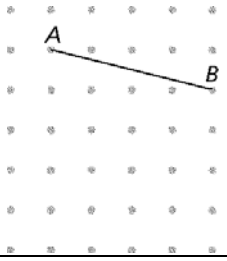
Looking for Pythagoras

a. Find the area of each square below.

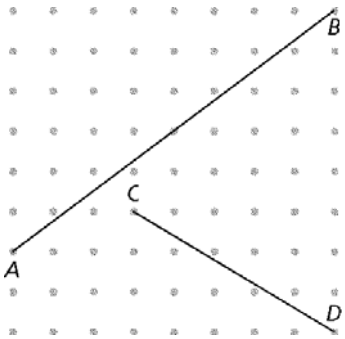


b. Describe any relationship you notice in your answer to part a.

Without using a ruler, find the length of segment *AB*.



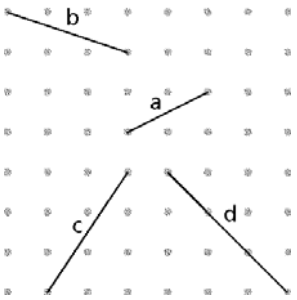
Use the Pythagorean Theorem to find the length of each line segment. Show all work you do to find your solutions.



a. What is the length of segment *AB*?

b. What is the length of segment *CD*?

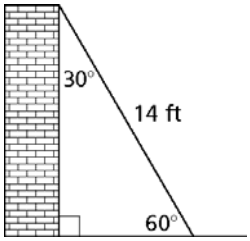
Find the slopes of all the line segments on the grid.



slope of line a: slope of line b:

slope of line c: slope of line d:

A 14-foot piece of wire is strung between a building and the ground, making a 30-60-90 triangle as shown.



a. How far straight out from the base of the building is the wire attached to the ground?

b. How far up the side of the building is the wire attached?

Growing, Growing, Growing

a. Fill in the tables below for the given equations.

$y = 5\left(3^x\right)$

x	y
1	
2	
3	
4	
5	
6	

$y = 3\left(5^x\right)$

x	y
1	
2	

3	
4	
5	
6	

b. In which equation does the *y* value increase at a faster rate? How do you know?

Use tables or graphs to compare these two equations for *x* values from 1 to 10:

$$y = 2\left(3^x\right) \qquad y = 64\left(1.5^x\right)$$

a. In which equation does the *y* value increase at a faster rate? How do you know?

b. For what *x* value are the *y* values equal?

c. The equation $y = 2(3^x)$ might represent the growth pattern for a population of mice. Complete the following sentence by circling your choices. Your sentence should describe the pattern in words.

i. The population started with _____ mice.

2 3 200 300 *x*

ii. The population grew at a rate of _____ .

200% 300% 2% 3% *x*%

The tables below represent three savings plans.

- Cela receives $20 for her birthday on January 1, puts it in her drawer, and adds $4 to it every month.
- Beginning in January, Larry hides $20 under his mattress every month.
- Noah deposits $20 in a savings account at the beginning of January and makes no more deposits. The bank adds interest to his account at a rate of 1.2% per month.

Plan 1

Month (*m*)	Amount (*A*)
0 Jan	$20
1 Feb	$40
2 Mar	$60
3 April	$80

Plan 2

Month (*m*)	Amount (*A*)
0 Jan	$20
1 Feb	$20.24
2 Mar	$20.48
3 April	$20.73

Plan 3

Month (*m*)	Amount (*A*)
0 Jan	$20
1 Feb	$24
2 Mar	$28
3 April	$32

a. Whose plan is plan 1?

b. How long does it take for the original amount of money to double in plan 1?

c. Write an equation to model the growth in plan 1.

d. Whose plan is plan 2?

e. How long does it take for the original amount of money to double in plan 2?

f. Write an equation to model the growth in plan 2.

g. Whose plan is plan 3?

h. How long does it take for the original amount of money to double in plan 3?

i. Write an equation to model the growth in plan 3.

Often when you try to learn new vocabulary words, you find that after a few days you have forgotten some of what you learned. Suppose you cram for a big test and memorize 100 new words and, for each day after the test, you forget 10% of the words you learned.

a. Make a table or a graph or write an equation to represent the vocabulary words you know as each day passes.

b. How many words do you remember after two weeks?

c. After how many days will you remember only half of the words you learned?

Frogs, Fleas and Painted Cubes

Each expression below represents the area of a rectangle made by changing the dimensions of a square with sides of length *x*. Match the expression with the correct instructions.

Area	**Instructions for changing a square into a rectangle.**
a. $(x-3)(x+3)$	**v.** Increase one dimension by 3, and increase the other by 5.
b. $x(x+5)$	**w.** Increase one dimension by 3, and decrease the other by 3.
c. $(x+3)(x+5)$	**x.** Decrease one dimension by 5, and increase the other by 3.
d. $(x-3)(x+5)$	**y.** Increase one dimension by 5, and do not change the other.
e. $(x+3)(x-5)$	**z.** Increase one dimension by 5, and decrease the other by 3.

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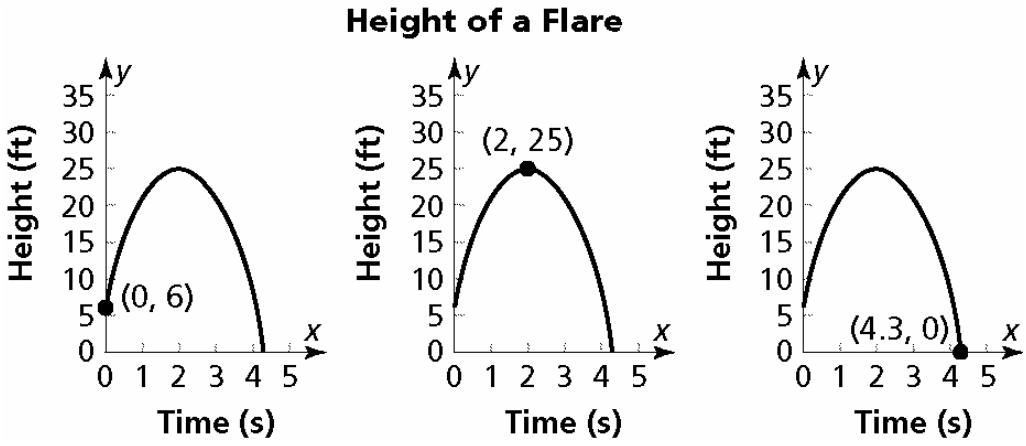
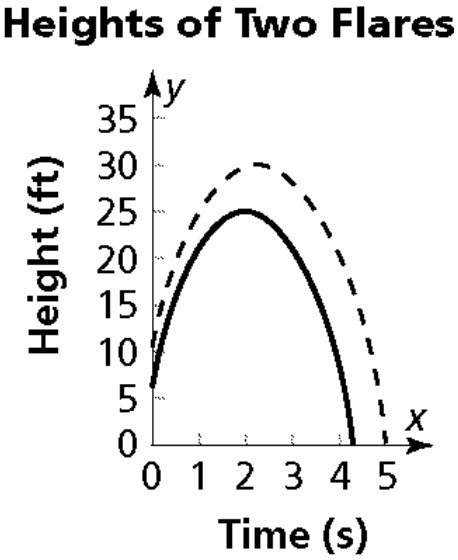
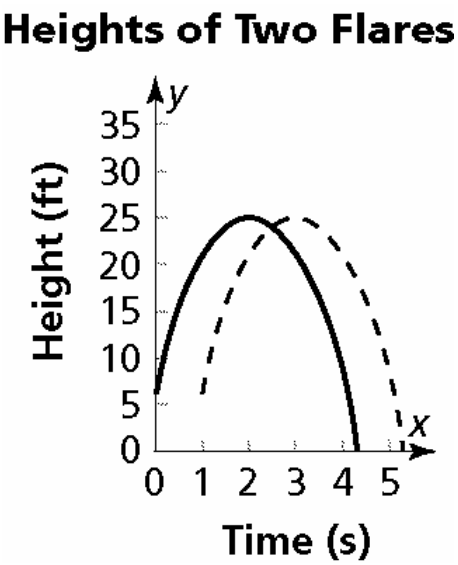
a. An emergency flare is fired from a boat. The graphs below represent how the flare's height changes over time. A point is marked on each graph. Explain what each point reveals about the position of the flare.



b. In the graph below, the solid line represents the flare from part a. The dashed line represents a second flare. Explain the differences you see between the second flare's graph (the dashed line) and the original flare's graph (the solid line).



c. In the graph below, the solid line represents the flare from part a. The dashed line represents a third flare. Explain the differences you see between the third flare's graph (the dashed line) and the original flare's graph (the solid line).



A square has sides of length x centimeters. A new rectangle is created by increasing one dimension by 5 centimeters and decreasing the other dimension by 4 centimeters.

a. Write an expression for the area of the original square and an expression for the area of the new rectangle.

b. For what x values is the area of the new rectangle greater than the area of the square? For what x values is the area of the new rectangle less than the area of the square? For what x values are the areas equal? Explain how you found your answers

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A square has sides of length x centimeters. A new rectangle is created by increasing one dimension by 2 centimeters and doubling the other dimension and then adding 2 centimeters.

a. Make a sketch to show how the original square is transformed into the new rectangle.

b. Write two expressions, one in factored form and one in expanded form, for the area of the new rectangle.

c. Write an equation for the area, A, of the rectangle.

Write the following equations in factored form:

$A = x^2 + 8x + 16$

$A = x^2 + 10x + 16$

$A = x^2 - 6x$

$A = x^2 - 9$

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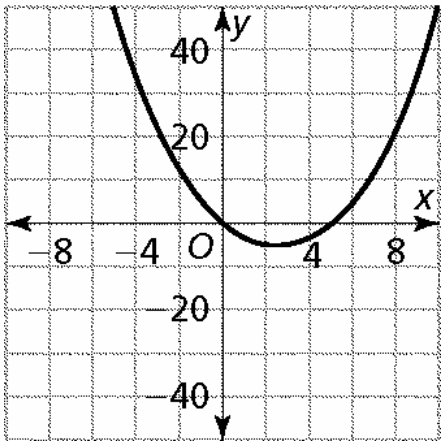
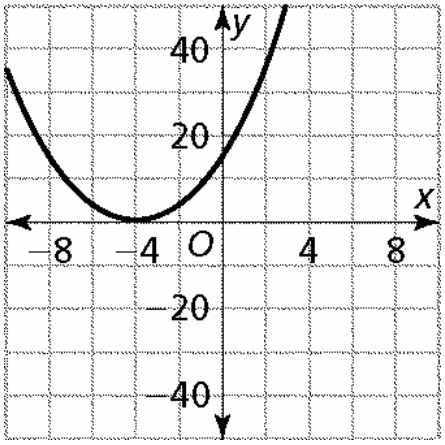
a. Match each equation (A, B, C) below with the correct graph (i, ii, iii).

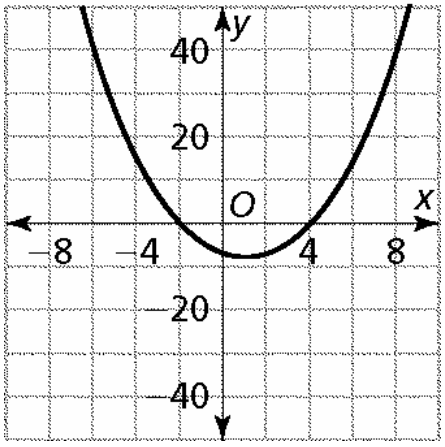
A. $y = x^2 - 2x - 8$ i.



B. $y = x^2 - 5x$ ii.



C. $y = x^2 + 8x + 16$ iii.

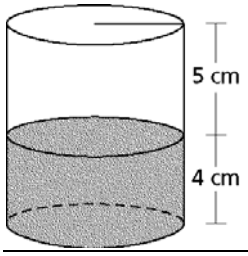


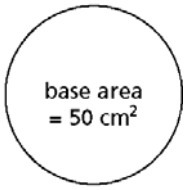
b. Write each equation in factored form. Describe how you found the factored form.

Say it with Symbols

Which of the following expressions represent the total volume of the cylinder? There is more than one correct expression. You should be able to identify the correct choices without using your calculator. Explain why each expression you choose is correct.

$50(9 - 5)$ $50(5 + 4)$ $50 \times 5 + 50 \times 4$ $50 \times 5 \times 4$





Solve the following equation, and check your answer.

$-3x + 3.5 = 3x - 3.1$

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a. Circle all values in the table that represent solutions to $100 + 2x = 12x - 10$.

x	$y = 100 + 2x$	$y = 12x - 10$
8	116	86
9	118	98
10	120	110
11	122	122
12	124	134
13	126	146
14	128	158

b. Solve the equation $100 + 2x = 12x - 10$ symbolically, and check your answer.

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a. Circle all values in the table that represent solutions to $x^2 - 5x = 0$.

b. Draw a double circle around all values in the table that represent solutions to $x^2 - 5x = 14$.

c. Find the solution to $x^2 - 5x = 0$ by working with the equation.

x	$y = x^2 - 5x$
–2	14
–1	6
0	0
1	–4
2	–6
3	–6
4	–4

5	0
6	6
7	14
8	24

d. Explain how a graph can be used to solve the equations $x^2 - 5x = 0$ and $x^2 - 5x = 14$.

Evaluate the following expressions for the given values of x and y. Be prepared to explain the reasons for your answers.

a. $5(x + 12y)$ when $x = -7$ and $y = 0.5$

b. $15 - 8x^2$ when $x = -3$

c. $\frac{5x^2 - 4x}{7 - 3x}$ when $x = -2$

Write each of the following expressions in two different but equivalent forms. Be prepared to explain why the new forms are equivalent to those that are given.

a. $7x(3 - 9x)$

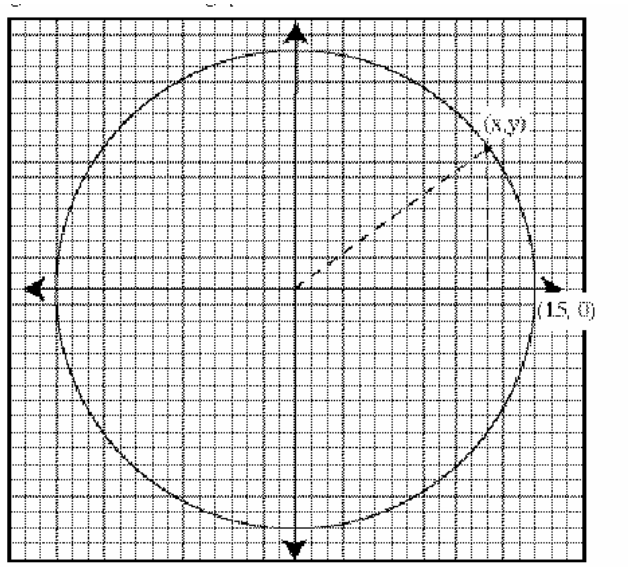
b. $15x + 8x^2$

c. $(5x^2 - 9x + 7) + 4x(3 + 5x)$

d. $(450 - 8a + 7b) - 3(5a - 2b)$

e. $(2x + 3)(5x - 7)$

The circle on the graph below has a radius of 15 and is centered at the origin. Use the drawing to answer the following questions.



a. Use information from the sketch to estimate these coordinate pairs for points on the circle.

i. (8,) **ii.** (3,) **iii.** (–12,) **iv.** (0,)

v. (, –7) **vi.** (, –3) **vii.** (, 0) **viii.** (, 11)

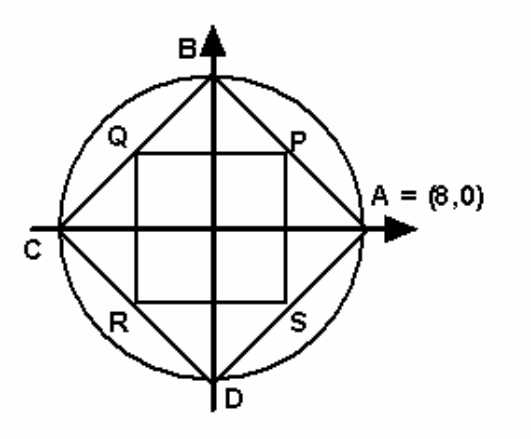
b. Use the Pythagorean Theorem to complete these coordinate pairs for points on the circle.

i. (9,) **ii.** (–14,) **iii.** (, 7) **iv.** (, –9)

c. Write an equation that relates coordinates *x* and *y* for points on the circle.

Use what you know about coordinates and equations for lines to solve this crop circle design problem.

a. Find coordinates for points A, B, C, and D and points P, Q, R, and S on this plan for a square–in–a–square crop circle design. Justify your choices.



b. Write equations for each line (segment) in the diagram.

Find the equation of a line that is:

a. parallel to the line with the given equation.

b. perpendicular to the line with the given equation

$y = 4x - 3$

$y = -2x + 10$

$y = x - \frac{1}{3}$

$y = \frac{1}{2}x + 11$

Sam is planning a ski trip and wants to figure out which mountain offers the best deal. Sam needs to rent skis and buy a lift ticket. He researched his options, and he found the following two packages which include ski rental and lift ticket:

Zippity Ski Slopes Rental Package	***Cruising Ski Slopes Rental Package***
$5 + $ 5 per hour for rental	$20 + $ 2 per hour for rental

Sam wants to find the best deal for his ski trip. Use the information above to answer the following questions.

a. Write equations to represent each of the ski packages.

b. Graph each equation. Then use the graph to answer these questions.

i. Under what circumstances are the costs for the ski packages the same, and what will that cost be?

ii. Under what circumstances is *Zippity* cheaper than *Cruising Ski Slopes*?

iii. What is the cost of a ski package for *Cruising Ski Slopes* if you rent the skis for 10 hours?

Solve the following inequalities. Then, create number line graphs for each solution.

$14 < 8x - 2$

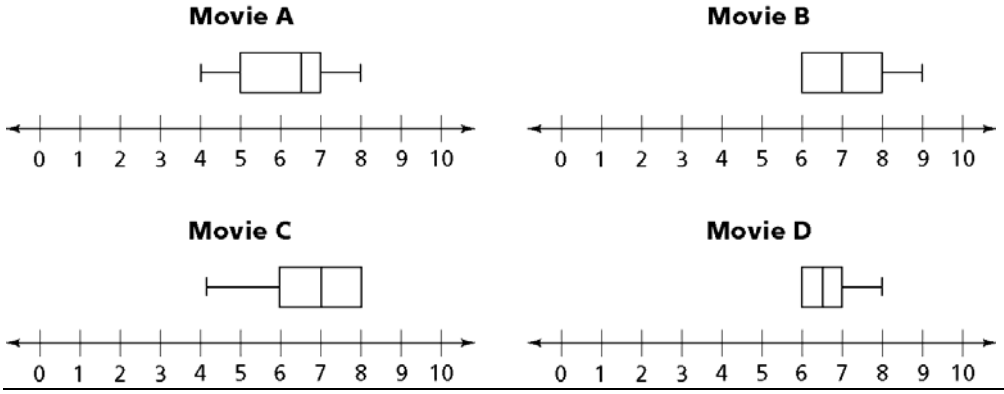
$3x + 20 \leq 32$

$-3x + 11 > 32$

$-20x - 11 \geq 14 + 15x$

Samples and Populations

These box plots represent the distribution of the ratings given to four movies by 20 newspapers and magazines. Compare the box plots. Which movie do you believe is the most highly recommended? Explain your reasoning.



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a. A class of tenth-grade students counted the change in coins that they had in their pockets, backpacks, or purses. Below are their results. Make a box plot of these data.

$1.35 $0.42 $0.85 $0.35 $0.75 $0.90 $1.02 $3.64 $0.20 $0.35 $0.45

$0.75 $0.12 $0.10 $0.80 $1.75 $1.12 $0.41 $0.28 $0.25 $0.25 $0.40

b. Describe what your box plot tells you about the typical amount of change carried by a student in this class.