Student-Centered Activities for the Secondary Math Classroom

(Pre-Algebra, Algebra I, Geometry & Algebra II)

University Of Houston Central Campus

EatMath Workshop #1

October 30, 2010

Amazing Operations

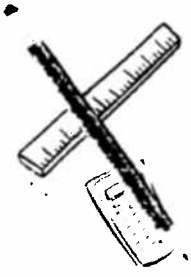
Help Alvaro find the cupcake. The correct path to the cupcake only passes through expressions which are equivalent to 12. You can only move horizontally or vertically to the next box. Start in the indicated box and work through the maze shading boxes with expressions equal to 12 as you go.

Start:

$3(2)^2$	$(2\cdot 3)+6$	$4+2\cdot 8\div 4$	$3(-4)$	$\frac{(12-6+3)^2}{6}$
$2(3+6)$	$(4+2)\cdot 8\div 4$	$\frac{2\cdot 7+10}{5-3}$	$-2+15-6+5$	$6\cdot 8\div 2\cdot 2$
$(12\div 6)\cdot(4+2)\cdot 2$	$2\cdot 7+10\div 5-3$	$2-15+6-5$	$6+8-4\div 2$	$6-18$
$\frac{4\cdot 6-3}{3}$	$12\div 6\cdot 4+2\cdot 2$	3^2-5^2+3	$6-(-6)$	$(3-5)^2+3$
$\frac{1}{4}(16+32)$	$-3(4+6)\div 2$	$-(-3)(-4)$	$3(-5+3)^2$	$(-3)(-4)$
				Finish: 12

Communicating About Mathematics

Describe the rules for the order of operations.



Station #1: What's Happening…

Activity 1: Complete "What's Happening" Handout

Activity 2:

a. Each member in your group should create a real-life independent and dependent relationship.
b. Indentify the independent variable and dependent variable in each problem situation.

Explore: What's Happening

I. Independent/Dependent Relationships

In everyday life, many things depend on others. Match the dependent variable on the left with the independent variable on the right. Write a dependency statement for each event.

Dependent variable	Independent variable
_____ 1. Price of a pizza	A. Amount of sunlight and water
_____ 2. Amount of a car payment	B. Distance and speed
_____ 3. Volume of a cylinder	C. Number of hours worked and rate of pay
_____ 4. Amount of a cell phone bill	D. Number of tickets bought
_____ 5. Growth of a plant	E. Amount of time spent studying
_____ 6. Time it takes for a road trip	F. Number of minutes used
_____ 7. Amount of gasoline in a car's tank	G. Cost of a car
_____ 8. Money earned	H. Size of the pizza
_____ 9. Ticket sales at a movie theater	I. Distance the driver has driven since filling up
_____ 10. Scores on a test	J. Radius and height of the cylinder

1. The price of a pizza depends on _____
2. The amount of a car payment depends on _____
3. The volume of a cylinder depends on _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Activity 2: Independent & Dependent Relationships

Independent Variable:

Dependent Variable:

Activity 2: Independent & Dependent Relationships

Independent Variable:

Dependent Variable:

Station #2: Foot Length vs. Forearm Length

Definition

- **Forearm** – the distance of the inner arm from the bend in the elbow to the bend in the wrist or the base of the hand when the arm is straight.
- **Foot Length** – the distance from the back of the heel to the tip of the longest toe.

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- **Forearm** – the distance of the inner arm from the bend in the elbow to the bend in the wrist or the base of the hand when the arm is straight.
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Explore: Foot Length vs. Forearm Length

Is the length of your foot the same as the length of your forearm? It is believed that there is a strong relationship between the length of a person's forearm and his/her foot length. You will conduct an experiment to see if such a relationship exists.

Using a ruler, measure the forearm length and foot length of each group member.

Record the measures in the table.

Name	Forearm Length (in)	Foot Length (in)

1. Label the axes.

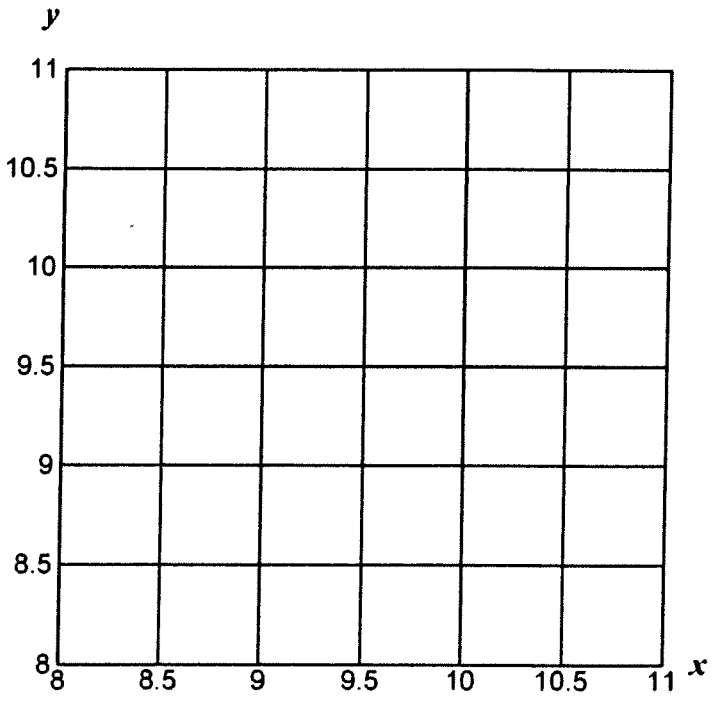
2. Use the data in the table to generate a scatterplot (forearm length, foot length).

3. Does the data appear to have a positive, negative, or no correlation? How do you know?

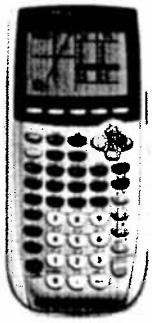
   A trend line is a line drawn through the middle of the data and used to predict a value or trend for a set of data.

   Draw a trend line for the data.

4. How can you use the trend line to predict the foot length given a forearm length of $9\frac{1}{2}$ inches?

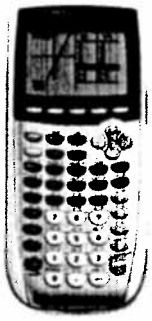


Station #3: Barry's Place



Use your graphing calculator to complete Barry's Place Handout.

Station #3: Barry's Place



Use your graphing calculator to complete Barry's Place Handout.

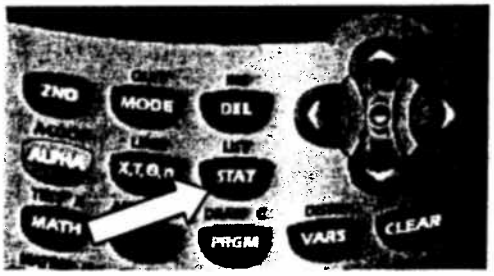
Using the information from the Engage phase, complete the following questions.

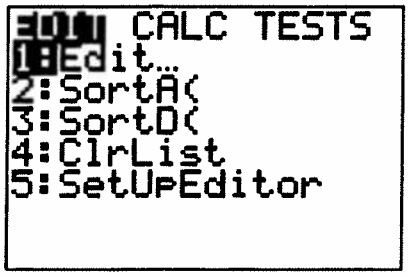
I. Entering data in the calculator

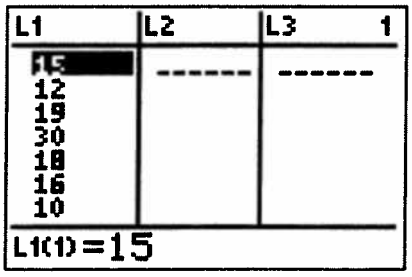
Menu Item	Fat (grams)	Calories (kcals)
Cheeseburger	15	310
Hamburger	12	260
Double Cheese Burger	19	420
Deluxe Burger	30	560
Fantastic Fish Sandwich	18	400
Medium Fries	16	350
Chicken Pieces	10	250
Grilled Chicken Caesar Salad	6	210
Grilled Chicken Sandwich	17	400

Use the steps below to enter data into your graphing calculator using the STAT feature.

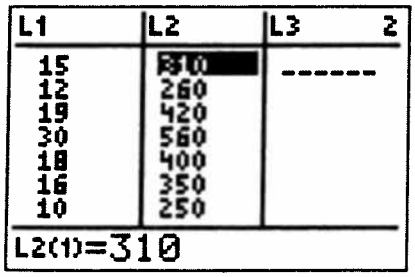
1. Using the STAT feature, enter the data for the Fat (grams) into L_1.

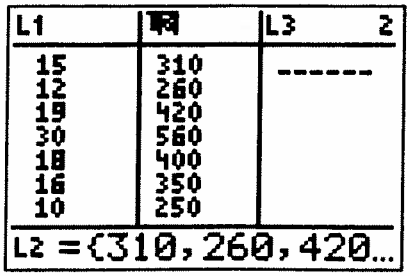


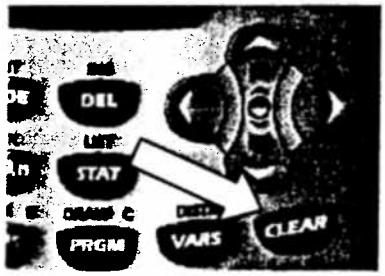




2. Using the STAT feature, enter the data for the Calories (kcals) into L_2.
(Helpful hint: If you need to clear previous data from a list, highlight the list name (L_2) at the top of the column, then press CLEAR, and then press ENTER.)

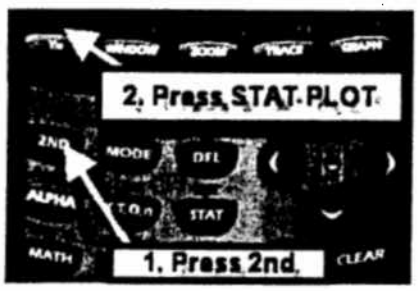


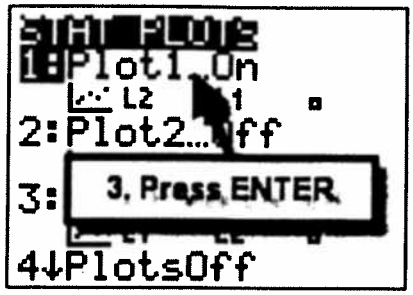


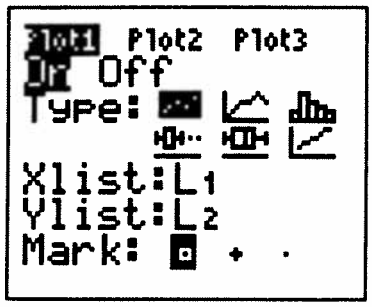


II. Generating a Scatterplot

A. In order to generate a scatterplot, turn on the feature for PLOT 1 and use the following settings.



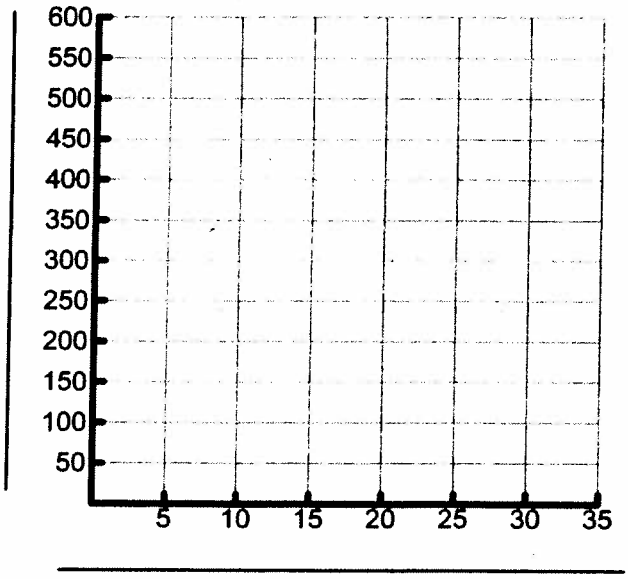




B. What is a reasonable setting for your viewing window?

1. X_{min} = _____
2. X_{max} = _____
3. X_{scl} = _____
4. Y_{min} = _____
5. Y_{max} = _____
6. Y_{scl} = _____

C. Label the axes. Sketch the graph of the scatterplot.



III. Drawing Conclusions

A. Does the data appear to have a positive correlation, negative correlation, or no correlation?

B. Complete the following sentence.

As the number of fat grams increases, the number of calories _____.

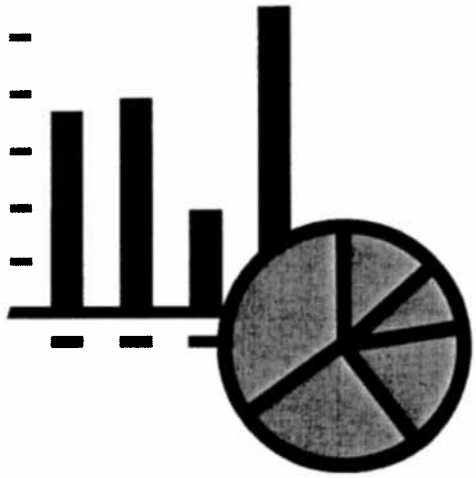
C. Which parent function could be used to model the data?

D. What is the equation of the parent function?

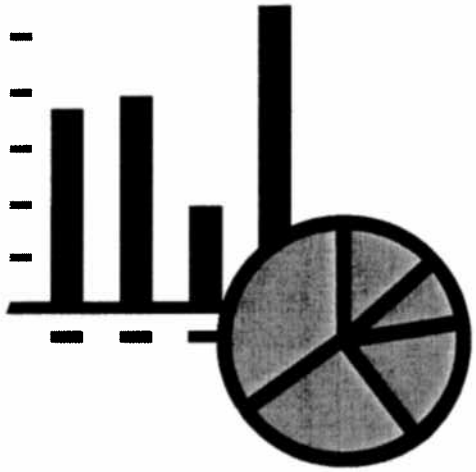
E. A line of best fit can be used to model a set of data. Use your graphing calculator to determine if the equation $y = 15.5x + 100$ models the data you entered.

F. How could someone use this information when ordering food at Barry's Place?

Station #4: Verbal to Symbolic Translations



Station #4: Verbal to Symbolic Translations



Explore 2: Verbal to Symbolic Translations, Part 2

1. Paula has \$75 in the bank. She plans on saving \$10 each week, *w*. Write an equation to represent the total amount of money, *t*, Paula has in the bank.

Verbal	Symbolic
Initial amount Paula has	
Savings each week	
Number of weeks	*w*
Total amount saved	*t*
Type of operation(s)	

Initial Amount plus Weekly Savings times number of weeks equals total saved

[ ] + [ ] • [ ] = [ ]

Equation: _____

2. Monique's Minimuffins charges a \$125 setup and delivery fee and \$8 per person to cater an event for a customer. Write an equation to represent the total charge, *t*, for catering a party for a certain number of people, *p*.

Verbal	Symbolic
Setup and delivery fee	
Charge per person	
Number of people	*p*
Total charge	*t*
Type of operation(s)	

Total charge equals cost per person times number of persons plus setup and delivery fee

[ ] = [ ] • [ ] + [ ]

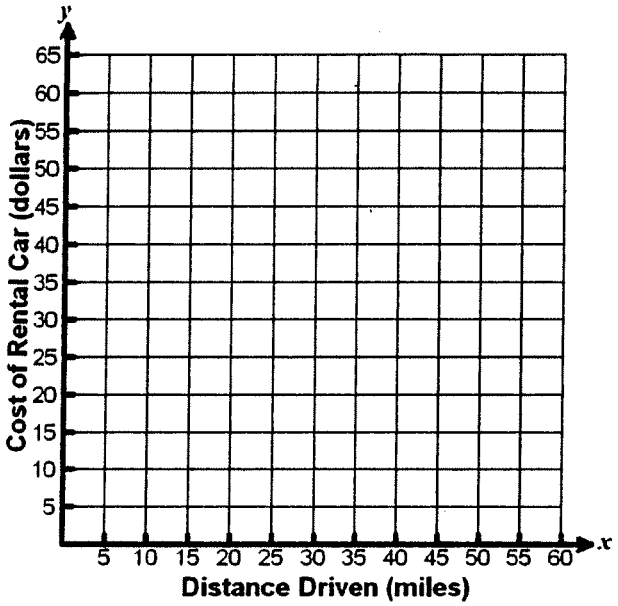
Equation: _____

3. A rental car company charges $35 per day plus $0.25 per mile.

A. Complete the table that represents this situation.

Distance Driven (miles)	Process	Cost of Rental Car (dollars)
10		
20		
30		
40		
50		
60		
x		

B. Create a scatterplot of the data.

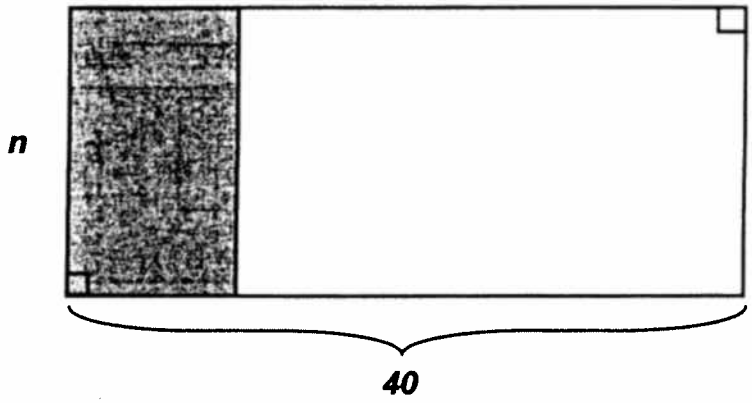


C. Write an equation that represents how much Mikayla has to pay per day for a rental car, *y*, in terms of number of miles driven, *x*.

D. What does the point (0, 35) mean in this problem?

4. In the recent election for Student Council president, 686 students voted for either Zack or Mandi, the two candidates. If Mandy received 156 more votes than Zack, write an equation to represent the total votes, in terms of Zack's votes, x.

5. The area of the shaded portion of the rectangle shown below is 130 square feet.



Write an equation to express the area in square feet of the unshaded portion of the rectangle in terms of n. Use the sentence below to help you write the equation.

$$Area_{\substack{whole\\rectangle}} - Area_{\substack{shaded\\region}} = Area_{\substack{unshaded\\region}}$$

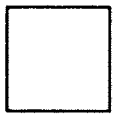
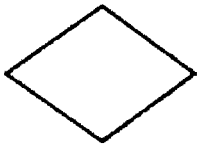
or

$$\square - \square = Area_{\substack{unshaded\\region}}$$

6. A mother is nine times as old as her daughter. In six years, she will be only three times as old as her daughter. If d represents the daughter's age now and m represents the mother's age now, write an equation to represent the mother's age in six years.

Mother's age now	Daughter's age now	Mother's age in 6 years	Daughter's age in 6 years
m	d		

Quadrilateral Partners

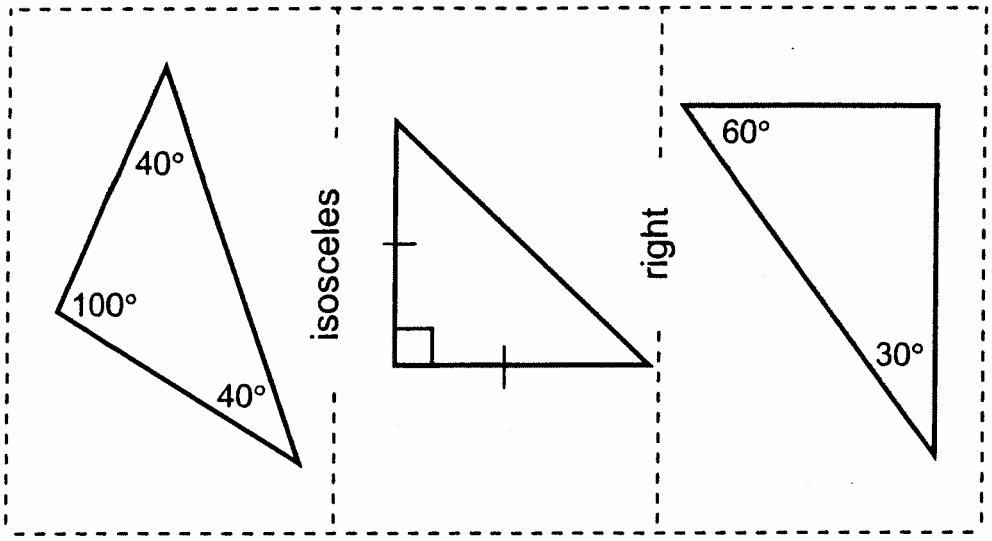
	
	

Triangle Loop

Cut apart the **Triangle Loop Cards**. Arrange the cards to form a loop so that any two cards that touch share a common characteristic. Tape the cards together and write the common characterstic on the cards. Refer to the Word Bank as needed.

Word Bank					
acute	right	obtuse	equilateral	isosceles	scalene

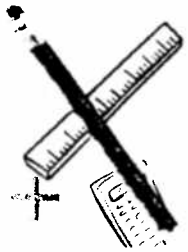
Example:



These two triangles are both isosceles triangles.

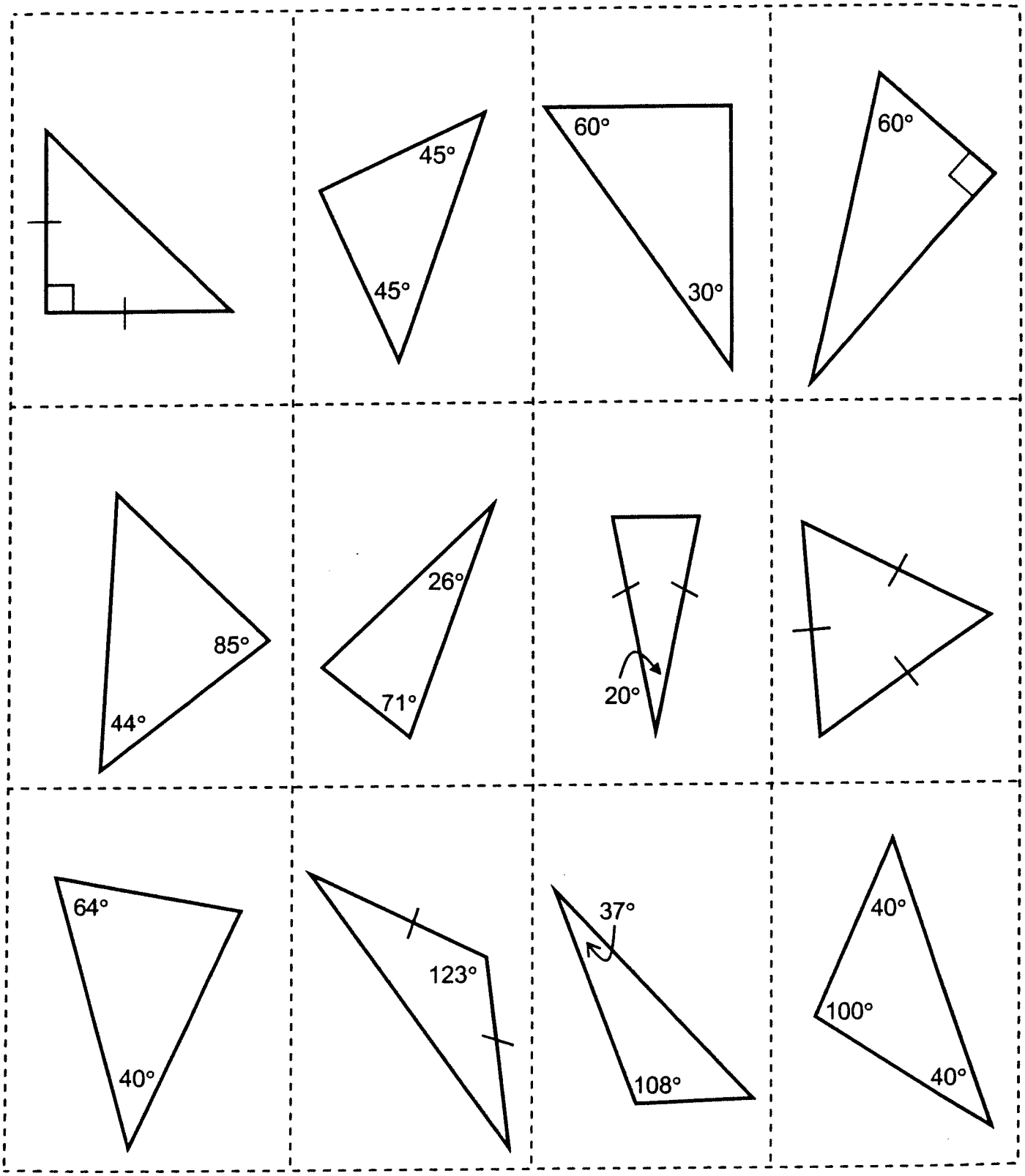
These two triangles are both right triangles.

Communicating About Mathematics
Describe a strategy you used to determine the placement of the **Triangle Loop Cards**.



Triangle Loop Cards

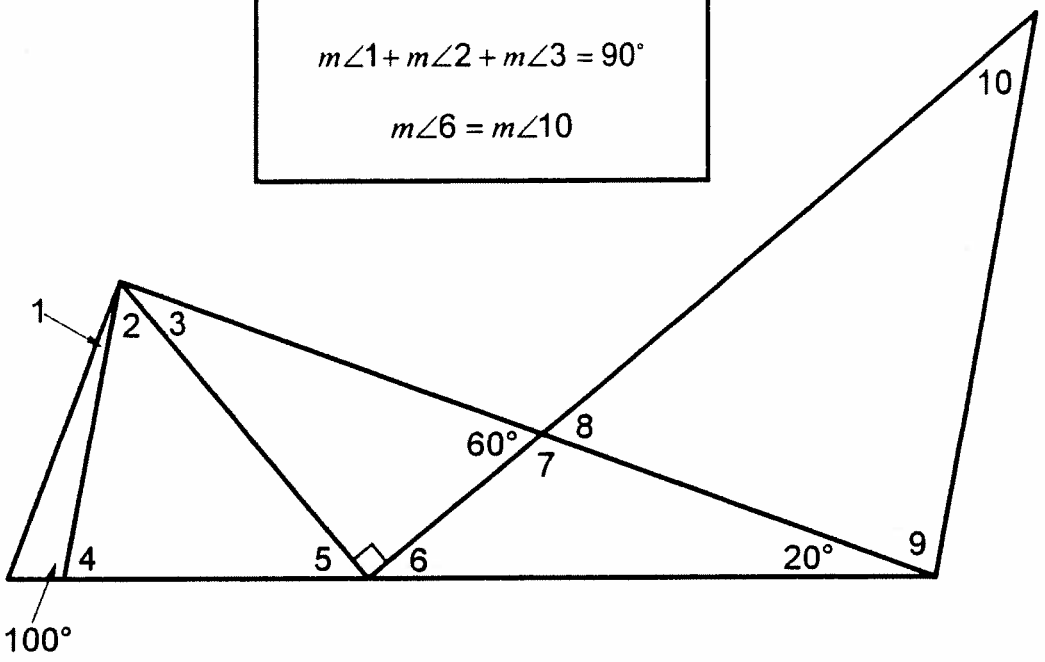
Cut along the dotted lines.



Triangle's Angles

Use the clues below to find the measure of the missing angles. Record your results below.

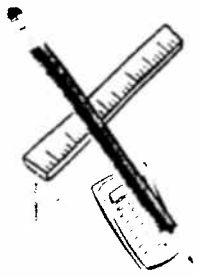
Clues
$m\angle 1 + m\angle 2 + m\angle 3 = 90°$ $m\angle 6 = m\angle 10$



$m\angle 1 =$	$m\angle 6 =$
$m\angle 2 =$	$m\angle 7 =$
$m\angle 3 =$	$m\angle 8 =$
$m\angle 4 =$	$m\angle 9 =$
$m\angle 5 =$	$m\angle 10 =$

Communicating About Mathematics

Describe the strategy you used to determine the angle measures.



The Outside Angle

Use your protractor to measure the indicated angles on the **Triangles** page. Complete the table below for each triangle.

1.

Triangle	$m\angle 1$	$m\angle 2$	$m\angle x$
A			
B			
C			
D			

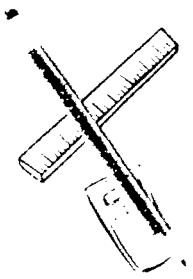
2. Calculate the sum of $m\angle 1$ and $m\angle 2$ for each triangle.

Triangle	$m\angle 1 + m\angle 2$
A	
B	
C	
D	

3. What is the relationship between the sum $m\angle 1 + m\angle 2$ and $m\angle x$ for each triangle?

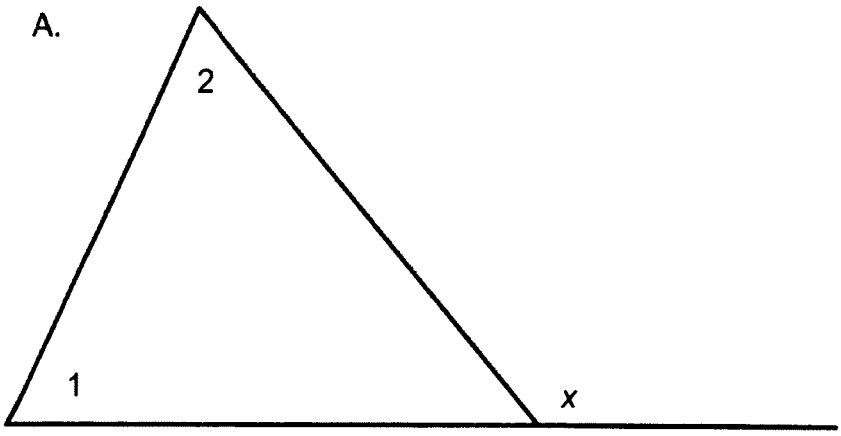
Communicating About Mathematics

How would you describe the measure of angle x on the four triangles?

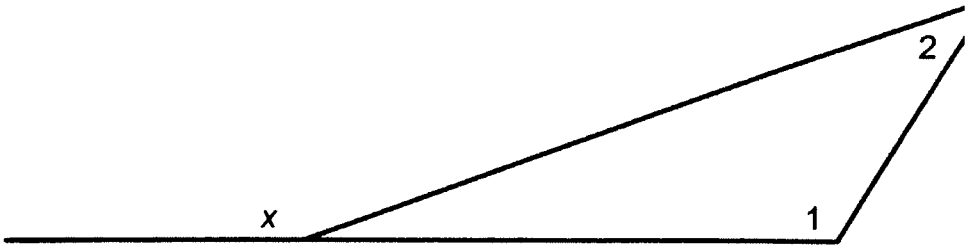


Triangles

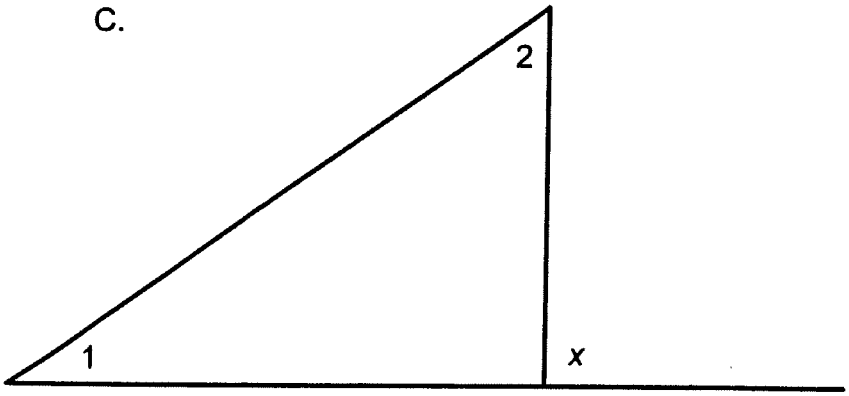
A.



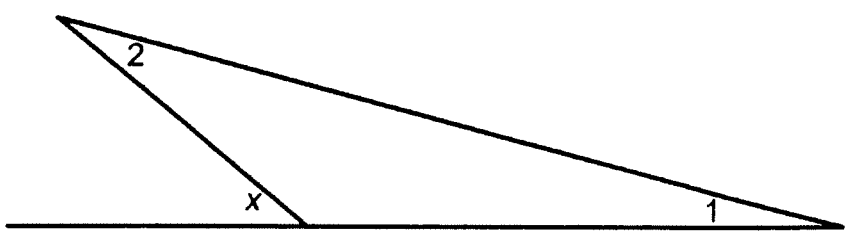
B.



C.

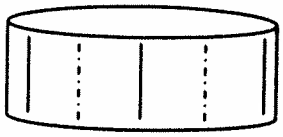


D.



Systems of Equations Loop

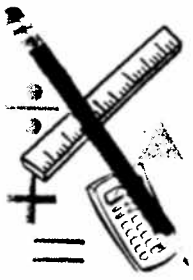
1. Cut apart the **Systems of Equations Cards**.
2. Determine which systems of equations match the solution.
3. Tape the bottom of the card that contains the systems of equations to the top of the card that contains the solution.
4. Continue this process for the remaining systems of equations.
5. When complete, the taped cards should form a loop.



My Workspace:

Communicating About Mathematics

Explain the strategy you used to determine your card matches.



Systems of Equations Cards

Cut along the dotted lines. Do not cut along the solid lines.

$x+y=6$ $x-y=2$	$y=2x$ $3x-y=5$	$x+y=3$ $3x-6y=9$
(–3, –5)	(6, –3)	(3, 1)

$y=x-2$ $y=\frac{3}{2}x-\frac{1}{2}$	$8x+2y=-4$ $2x-y=-4$	$y=3x-2$ $y=-x+8$
(–1, 2)	(5, 10)	(4, 2)

$3x-y=-10$ $2y=-9x+5$	$6x+8y=12$ $6y=-4x+6$	$y=x-2$ $y=\frac{2}{3}x-1$
(2.5, 5.5)	(3, 0)	(–1, 7)

Can You Guess My Numbers?

Solve the following problem in two ways.

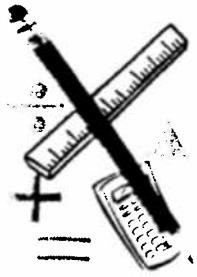
I am thinking of two numbers. The sum of the numbers is 27. The larger of the two numbers is six less than twice the smaller number. What are the two numbers?

Strategy 1

Strategy 2

Communicating About Mathematics

Which strategy do you prefer? Explain your thinking.



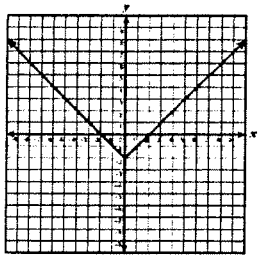
TAKS Released Problems

1. **(A.1A, 09-11, 11)** During a sale at a shoe store, all shoes were 25% off the original price. Which statement best describes the functional relationship between the sale price of a pair of shoes and the original price?

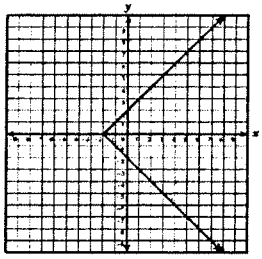
A The sale price is dependent on the original price.
B The original price is dependent on the sale price.
C The sale price and the original price are independent of each other.
D The sale price is dependent on the number of pairs of shoes purchased.

2. **(A.1B, 05-19, 11)** Which of the following graphs does not represent y as a function of x?

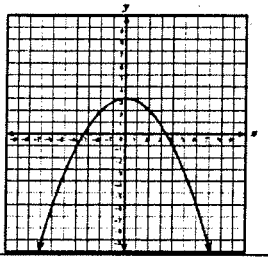
A



C



B



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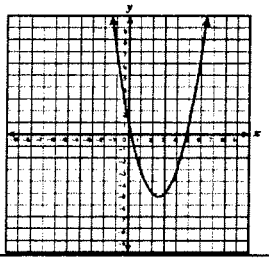


3. **(A.1C, 06-30, 9)** Snoop Dogg is purchasing a table and chairs for $1350, including tax and interest. He will pay for the furniture with monthly payments of $75. If Snoop Dogg has made m payments, which equation best describes r, the amount of the remaining balance?

A $r = (1350 - 75)m$
B $r = 75m + 1350$
C $r = 1350 - 75m$
D $r = 75m - 1350$

4. **(A.1D, 04-24, 9)** Harry Potter received a gift card for $20 worth of video rentals from a video store. If the cost of renting a video is $2.50, which table best describes *b*, the balance remaining on the gift card after he rents *n* videos?

A

n	*b*
0	$20.00
1	$17.50
2	$15.00
4	$10.00
6	$5.00

C

n	*b*
1	$17.50
2	$15.00
3	$13.50
4	$11.00
5	$8.50

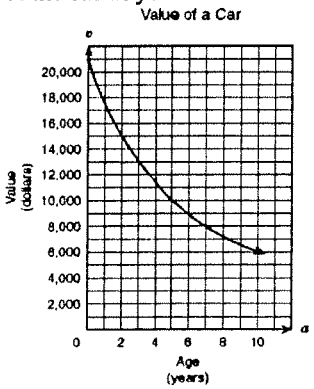
B

n	*b*
0	$20.00
2	$17.50
4	$15.00
6	$12.50
8	$10.00

D

n	*b*
0	$20.00
1	$15.00
4	$10.00
6	$2.50
8	$0.00

5. **(A.1E, 09-7, 9)** The graph below shows the relationship between the value of a car in dollars and the age of the car in years.



According to the graph, which of the following statements appears to be true?

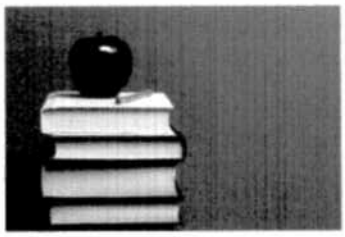
A. The value of the car decreased by $1,000 per year.
B. The value of the car decreased by $2,000 per year.
C. The value of the car decreased more from Year 9 to Year 10 than in any other year.
D. The value of the car decreased more from Year 0 to Year 1 than in any other year.

6. **(A.4B, 09-10, 9)** Which expression is equivalent to

$$-7(x-2)+5(3-x)-4x?$$

A $-16x+1$
B $-16x+29$
C $-2x+1$
D $-12x+13$

Resources Used



"Accelerated Curriculum for Mathematics Grade 10 TAKS". Region IV Education Service Center (2008).

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