

Enrich Workbook with Projects

Grade 4

 **Harcourt**
SCHOOL PUBLISHERS

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CALIFORNIA HSP Math

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Enrich Projects

Paper Stacks

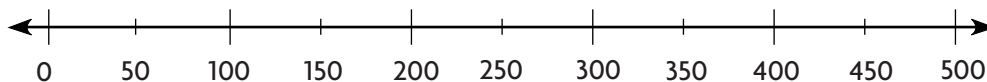
If your teacher asked you to hand out sheets of paper to all your classmates, would you take a large stack of paper and return what you don't hand out, or would you take the time to count the exact number of sheets you need? Work with your group to estimate and then find the exact number of sheets in a stack of paper.

Decide

- ✓ Discuss how you can use a number line to compare numbers.

Do

- ✓ Open a brand-new package of printer paper. One member of your group should take a large portion of paper and make a stack. The stack should have more paper than is needed to give one sheet to each of your classmates, but less paper than the entire package.
- ✓ Each member of your group should take a turn estimating the number of sheets of paper in the stack. On your turn, use a blue marker to record your estimate on the number line below.



- ✓ Now count out 20 more sheets of paper from the package. Use the 20 sheets to help you make a new estimate of the number of sheets of paper in your group's stack. Each person in the group should use a red marker to record a new estimate on the number line.
- ✓ Count the sheets of paper in your group's stack. Use a green marker to record this value on the number line.
- ✓ Compare the values of your group's first estimates and second estimates with the exact number of sheets in your group's stack.

Share

- ✓ Were your group's first estimates or second estimates closer to the actual number of sheets of paper?
- ✓ How can you use what you learned in this project to help you estimate other items, such as stacks of napkins or pages in a book?

Carnival Time

Your group is in charge of buying supplies for the class carnival. There will be five game booths at the carnival, and each will need to be able to give out about 50 prizes. Your class has raised a total of \$150 to spend on carnival supplies and prizes. Work with your group to make a shopping list and estimate the total cost of the items you will need.

Decide

- ✓ Decide what game booths you will have at your carnival and what type of prizes you will give away at each booth. Assign one booth to each member of your group.
- ✓ Discuss how you can use rounding to estimate sums.

Do

- ✓ Using the supply list at the right, make a list of the supplies you will need for your game booth. Be sure to include tickets, the supplies you will need for the game, and the prizes you will be giving away.
- ✓ List the prices for each item on your list.
- ✓ Estimate the total cost of the items on your list.
- ✓ Once you have the estimated costs for all of the booths, use mental math to add the five estimates together. Can you afford to buy all of the supplies?
- ✓ Discuss the following:
 1. What strategies did you use to estimate the cost of items for your booth, and the total cost for all five booths?
 2. Was using an estimate easier than finding the exact answer? Why or why not?

Share

- ✓ Compare your carnival lists with another group's lists. Did they list the same items? How close were your estimates to each other?

Carnival Supplies		
Item	Quantity	Price
Squishy Frogs	48	\$6
Smiley Face Stickers	50	\$9
Cars	30	\$8
Monkey Finger Puppets	12	\$3
Finger Traps	72	\$12
Bendable Monkeys	48	\$18
Whistles	72	\$4
Milk Jugs	1 set	\$9
Bowling Pins and Bowling Ball	1 set	\$6
Dolphin Ring Toss	1	\$8
Bean Bag Toss	1 set	\$10
Rubber Baseballs	12	\$18
Tickets	1 roll	\$3
Floating Ducks	1 set	\$6
Pool	1	\$6
Bracelets	144	\$5
Jumping Frogs	144	\$4

Big Differences

Form a group with two other classmates. Then play the game below by subtracting 3-digit numbers.

Decide

- ✓ Decide who will go first, second, and third when you play the game.
- ✓ Discuss the methods you will use to subtract 3-digit numbers.

Do

- ✓ Write your names in the boxes at the top of the gameboard at the right. Make a scorecard to keep track of each player's points.
- ✓ On your turn, spin the pointer on the spinner three times. Write the digits that the pointer lands on. Use the digits to write two numbers: the greatest possible 3-digit number and the least possible 3-digit number. Find the difference of the two numbers that you wrote. Then write the difference in row A, in the box below your name.
- ✓ After each player has had a turn, draw a circle around the greatest difference in row A. Award 1 point to the player who wrote that number.
- ✓ Play the game for a total of ten rounds. Add the points for each player. The player with the most points wins.

GAMEBOARD

	Name	Name	Name
A.			
B.			
C.			
D.			
E.			
F.			
G.			
H.			
I.			
J.			

Share

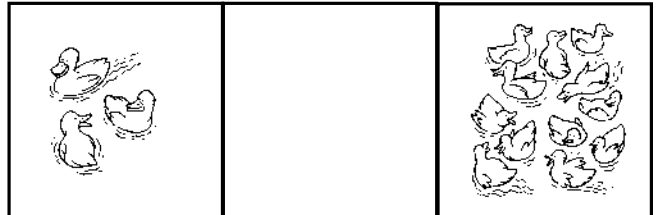
- ✓ Discuss how you could use estimation to make sure the differences you found are reasonable.

What is a Picture Worth?

Work together in a group to draw 3-panel story boards that illustrate 5 addition problems and 5 subtraction problems.

Decide

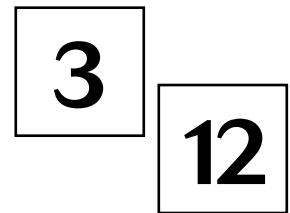
- ✓ Decide whether the story board will illustrate an addition or subtraction problem. Then choose a story to tell in your illustrations.



$$3 + \blacksquare = 12$$

Do

- ✓ Pick 2 cards from a stack of 1–15 Numeral Cards.
- ✓ Write the first number under one panel of your story board and the second number under another panel. Draw a box under the remaining panel.
- ✓ Use a plus or minus sign and an equals sign to form an equation using the numbers and the box.
- ✓ Draw pictures in the 2 panels with numbers beneath them to begin illustrating your story. For example, if you wrote a 3 beneath the first panel, you could draw 3 ducks on a pond inside that panel.
- ✓ Complete your story by drawing a picture in the panel with the box beneath it. Your completed story should illustrate the addition or subtraction problem.
- ✓ Check your work to make sure you have added and subtracted correctly.



Share

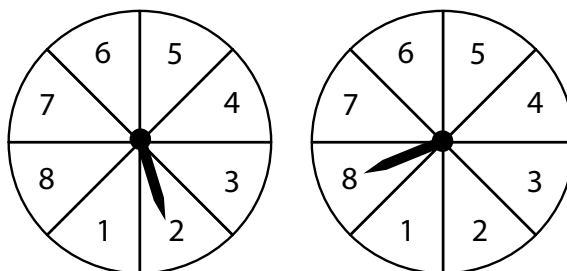
- ✓ How did you illustrate the number represented in the problem by the box?
- ✓ Exchange story boards with another group. Discuss how each story relates to the equation.

Make an Array

You can model multiplication problems using 1-inch grid paper to create arrays. Work with your group to make a design of multiplication arrays.

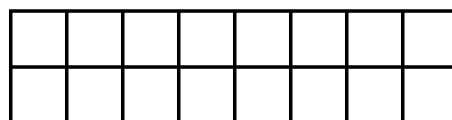
Decide

- ✓ Decide who will go first. Each member of the group will have 5 turns.
- ✓ Talk about how you will cut the 1-inch grid paper to model your multiplication fact. How many squares across will your array be? How many squares down will it be?



Do

- ✓ Use a 1–8 spinner to find the two factors for your multiplication fact. Spin and record the number that the pointer landed on. This will be the first factor in your multiplication fact. Now, spin again. Record the second number. It will be the second factor in your multiplication fact.
- ✓ Model all of 5 of your multiplication facts by drawing arrays on the grid paper. Cut out your arrays.
- ✓ Check your models to make sure they represent the multiplication facts.
- ✓ Now, arrange all of your arrays together. Can you make a rectangle? A square? Arrange them to make your own design.



Share

- ✓ Compare your arrangements with the arrangements of the other groups.
- ✓ Discuss how each array represents a different multiplication fact.

Batter Up

Your group is part of a new baseball team, and you must buy equipment for everyone. Work with your group to determine how much equipment you should buy, and how much the equipment would cost.

Baseball Equipment	Number to Buy	Price Per Item	Total Cost
Bat		\$10	
Helmet		\$7	
Baseball		\$1	
Pant		\$9	
Jersey		\$8	
Batting Glove		\$5	
Total Cost:			

Decide

- ✓ Talk about how you can use the number of players in your group to determine how much equipment you will need to buy. Some items can be used by more than one player, and you may want more than one of other items per player.
- ✓ Determine how you can use multiplication to find the total cost of each kind of equipment.
- ✓ Determine how you will use addition to find the total cost of all of the equipment.

Do

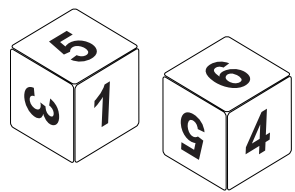
- ✓ Copy and complete the table shown above.
- ✓ Find the total cost for each type of equipment.
- ✓ Find the total cost for all of the equipment.

Share

- ✓ Compare your tables with those of other groups.
- ✓ Discuss the differences that you find.

Math 500

The distance from the library to the park is about 500 steps. Your group will be participating in a math race from the library to the park. You will take turns tossing number cubes to determine the number of steps you will take. Which member of your group will get to the park first?



Decide

- ✓ Determine the order in which each player will toss the number cubes.

Do

- ✓ Draw a table like the one shown on the right. Make a column for each person in your group.
- ✓ The first player tosses the two number cubes at the same time.
- ✓ The player uses the numbers shown on the cubes as factors in a multiplication problem.
- ✓ On a piece of paper, write down the multiplication problem and find the product.
- ✓ In the table, write down the product and add it to that player's score. The score each round represents the total number of steps the player has taken toward the park.
- ✓ Continue taking turns until someone reaches 500.
- ✓ The first player to reach 500 steps wins the race to the park.
- ✓ After the race is over, use your table to discuss these questions:
 1. What product or products occurred most often? Why do you think that happened?
 2. What product or products occurred least often? Why do you think that happened?

Race to the Park					
Tom		Sam		Abby	
Product	Score	Product	Score	Product	Score
8	8	12	12	10	10
36	44	24	36	1	11
10	54	9	45	30	41

Share

- ✓ Share your race tables with other groups. Did they have the same products as your group? What products were different?
- ✓ Compare the your highest and lowest products with those of the other groups.

Multiplication Codes

Your group will work to create a secret code and then use that code to disguise multiplication problems. Will others be able to crack your code?

Decide

- ✓ Discuss how you can use other symbols to represent numbers or letters to make a code.
- ✓ Decide on what symbols your group will use for the digits 0–9.

Do

- ✓ Create a key for your code with your group. Come up with a different symbol to represent each digit from 0 through 9. A sample key is shown at the right. Don't let anyone else see your key!
- ✓ Write a multiplication problem with a 4-digit factor and a 1-digit factor. Solve the problem and show the product. Here is an example:

$$\begin{array}{r} 1,780 \\ \times \quad 4 \\ \hline 7,120 \end{array}$$

- ✓ Now disguise the problem by replacing some of the digits with the symbols in your code. The more digits you replace, the tougher it will be to crack the code.

$$\begin{array}{r} 1, \clubsuit 8 \text{ 🖐} \\ \times \quad 4 \\ \hline 7, \diamond 2 \text{ 🖐} \end{array}$$

- ✓ Each member of your group should write 5 disguised multiplication problems.
- ✓ Trade your problems with your group members and see if you can solve each other's problems without using the code key. If they seem too difficult to solve, try replacing fewer digits with symbols.

Share

- ✓ Trade your disguised problems with another group. Don't share your code key with them. Try and crack their code to solve the problems.

Code Key

0 = 🖐	5 = ✓
1 = ◇	6 = x
2 = ♠	7 = ♣
3 = ⊙	8 = ✱
4 = ■	9 = **

Find Patterns

You can find patterns in the rows of a multiplication table.

Example: Find these three numbers in a row of the multiplication table below.

6	9	12
---	---	----

Find the sum.

$$6 + 9 + 12 = 27$$

Multiply the middle number by 3.

$$3 \times 9 = 27$$

← Same

Work with your group. Use the multiplication table to find patterns.

Decide

- ✓ Discuss the example at the top of the page.

Do

- ✓ Find these three numbers in a row: 36, 42, and 48. Is the sum 3 times the middle number?
- ✓ Find these three numbers in a row: 56, 64, and 72. Is the sum 3 times the middle number?
- ✓ Find these five numbers in a row: 7, 14, 21, 28, and 35. Is the sum 5 times the middle number?
- ✓ Find these numbers in a row: 16, 24, 32, 40, 48, 56, and 64. Without making any calculations, find the number that you would multiply the middle number by to get the sum of the numbers. Is the sum 7 times the middle number?
- ✓ What other patterns can you find? Write or draw some possible patterns on a sheet of paper.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Share

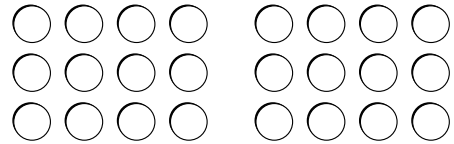
- ✓ Share and discuss your patterns with another group.

Divide and Conquer

Your group will model division number sentences using counters. You will test different dividends and create a chart that will show whether they are divisible by different 1-digit divisors.

Decide

- ✓ Discuss how you can use counters to model division sentences.
- ✓ Decide the order in which your group members will take turns pouring out counters and testing whether that number of counters is divisible by each of the divisors.



Do

- ✓ Each member needs to have his or her own Division Table, like that at the right.
- ✓ On your turn, put all of the 30 counters into the bag and pour a group of them out onto the desk. Everyone should write the number of counters in the dividend column of their charts.

Division Table									
	Divisor								
Dividend	1	2	3	4	5	6	7	8	9
24	✓	✓	✓	✓		✓		✓	

- ✓ For each divisor in the table, try to divide the counters into that number of equal groups. If it works, all members of the group should place a ✓ in the correct box of their checklists. If it does not work, shade the box gray.
- ✓ The other group members then take turns pouring out different numbers of counters and dividing them. Continue doing this until you have completed 15 rows of the table with different dividends.
- ✓ After the table is complete, discuss these questions:
 1. Look at your table. Do you see any patterns?
 2. Which numbers can be divided by only 1?

Share

- ✓ Share your tables with another group. What dividends did they use that your group did not?

Are We There Yet?

Depending on how fast they can walk or run, fourth graders might be able to travel at anywhere between 3 and 9 miles per hour. What if you could keep up that speed for hours? How far could you go? You can calculate how long it would take you to get somewhere by dividing the distance by your speed. Using a map of your state, your group will calculate how long it would take to walk or run to ten different places.

Decide

- ✓ Look to find where your city or town is located on the map.
- ✓ Choose ten other cities or towns that are on the map and are closer than 100 miles away.
- ✓ Discuss what walking or running speeds you will use.

Do

- ✓ Look at the map and find the distances from your city or town to the locations your group chose.
- ✓ Make a chart like the one below, and list the locations and their distances away.
- ✓ Complete the chart by estimating how long it would take you to walk or run to each location. To find the travel time, divide the distance by the speed.

Travel Time from Des Moines			
Location	Distance (miles)	Speed (miles per hour)	Estimated Travel Time (hours)
Ames	24	3	8
Newton	21	7	3

Share

- ✓ Compare your charts with the charts of other groups.
- ✓ Check the other groups' work. Are their estimates correct?
- ✓ Discuss which locations you would want to walk or run to and which locations are too far away.

Make a Pattern

You will work with your group to create two patterns. First, you will use shapes to create a geometric pattern. Then you will use numbers to make a number pattern.

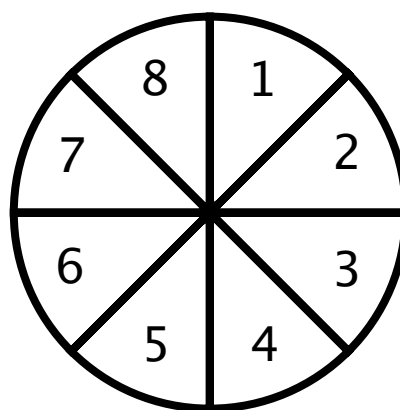
Decide

- ✓ Discuss what makes up a pattern unit.
- ✓ Think of the rule your group will use to form a number pattern.



Do

- ✓ For your shape pattern, place a set of pattern blocks into a bag. Draw out 3 three shapes without looking.
- ✓ Trace each pattern block onto construction paper and then cut out 3 of each shape.
- ✓ Arrange the shapes into a pattern. Glue them onto a piece of white paper.
- ✓ Make sure to repeat your pattern unit three times.
- ✓ For your number pattern, spin a spinner labeled 1–8. This will be the first number in your pattern. Write this number on an index card and place the index card on a desk.
- ✓ Starting with this first number, use a rule to find the first 6 numbers in your number pattern. Write each number on an index card and place it in order on the desk.



Share

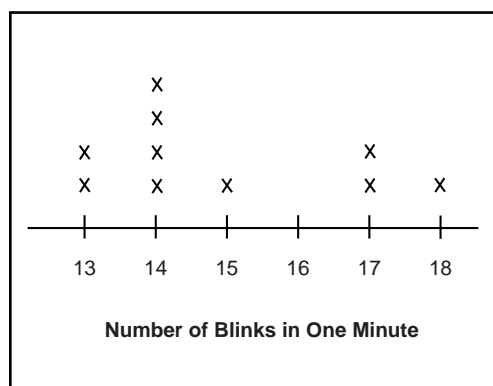
- ✓ Share your patterns with another group, and examine the patterns that group created.
- ✓ Discuss what the pattern unit is in each of their shape patterns. Extend the pattern one pattern unit.
- ✓ Decide what the rule is in each of their number patterns. Fill in 3 more index cards and place them on the desk.

In the Blink of an Eye

It takes only a fraction of a second to blink your eyes. Work with your group to see how many times you blink your eyes in one minute. Then record the data from everyone in your group in a line plot.

Decide

- ✓ Each member in your group will get the chance to be the “Blinker,” the “Timer,” the “Counter,” and the “Recorder” at least once. Decide who will go first for each activity. Then take turns so that each person in your group gets a chance to do all four activities.
- ✓ Discuss how you will measure and record the number of eye blinks per minute.
- ✓ Decide how you will set up your line plot.



Do

- ✓ The first Blinker in your group will pick an object on the wall to focus on, while the Timer uses a stop watch to time one minute.
- ✓ When the Timer announces that the minute has begun, the Counter will watch the Blinker's eyes and count the number of blinks for that minute.
- ✓ The Recorder will record in a table the number of blinks counted.
- ✓ Once everyone has completed the activity, use the information you have recorded to make a line plot. Then discuss these questions:
 1. What was the greatest number of blinks in one minute? What was the least number?
 2. What number of blinks occurred most often? How can you tell this from looking at your line plot?
 3. Are there any numbers on your line plots that do not have an X above them? What does this mean?

Share

- ✓ Share the line plot from your group with another group's plot.
- ✓ Discuss the range of numbers of blinks. What was the most common number of blinks among all of the groups?

What Should We Do?

Your class gets to choose the next Fun Friday school activity. Conduct a survey. Record your data in a tally table. Once you have completed the tally table, make a bar graph that you can present to your teacher.

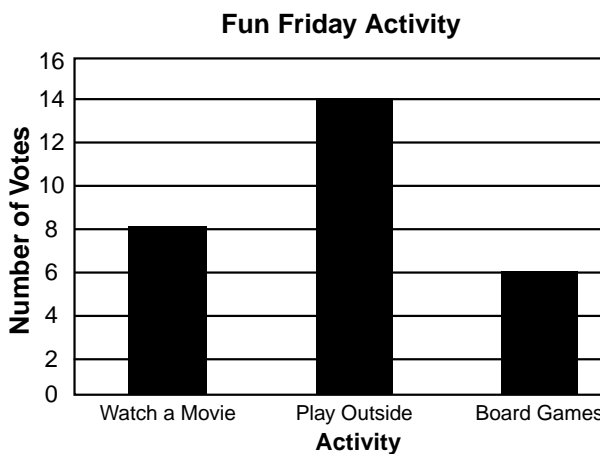
Decide

- ✓ Determine how many classmates you would like to participate in your survey. Do you want to ask just members of your group? Or a larger part or all of your class?
- ✓ Decide what question to ask your classmates to find out how they want to spend Fun Friday.

Activity	Tally
Watch a Movie	
Play Outside	
Board Games	

Do

- ✓ As a group, write your survey question and select the classmates you will survey.
- ✓ Make a tally table that you can use to organize the responses to your question. See the example on the right.
- ✓ Survey your classmates and record their answers in your tally table.
- ✓ When you have completed the tally table, use it to answer these questions:



1. How many different activities did your classmates name?
2. Which activity did the most classmates name?
3. Which activity did the fewest classmates name?

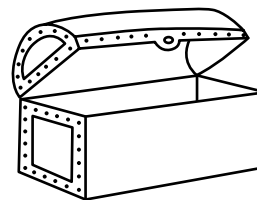
- ✓ Now create a bar graph to show the data in your tally table. Give your graph a title, and make sure to label all the parts of your graph.

Share

- ✓ Share your bar graph with another group. How is your graph different than the other group's graph? How is it similar?
- ✓ Based on your survey, which Fun Friday activity would you ask your teacher to have for the class?

Treasure Hunt

You and your partner will “bury” treasure chests on a coordinate plane, then take turns guessing ordered pairs to try and “dig up” each other’s treasure.



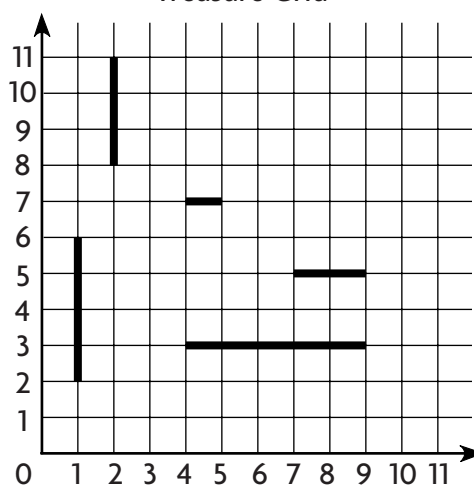
Decide

- ✓ Think of five locations on your treasure grid to hide your treasure chests.
- ✓ Discuss how ordered pairs can be used to describe position on a coordinate plane.

Do

- ✓ Each player will bury five treasure chests on his or her Treasure Grid. The five chests will be represented by line segments of the following lengths: 1 unit, 2 units, 3 units, 4 units, and 5 units.
- ✓ Draw the line segments to represent the five chests on your grid, but don’t let your partner see. You can draw them either vertically or horizontally.
- ✓ Take turns calling out an ordered pair to represent a position on your partner’s grid where you think there is a treasure chest buried.
- ✓ If the ordered pair your partner calls is part of one of treasure chests, say, “Thud!” to represent the sound of a shovel hitting a chest. Both players should mark a *T* on their grids.
- ✓ If the ordered pair is not part of a chest, say, “Miss,” and players mark an *M* on their grids.
- ✓ Once your partner has identified all of the points on a treasure chest you must announce, “Treasure found!”
- ✓ The first player to find all five treasure chests wins the game.

Treasure Grid



Share

- ✓ Share your strategy for finding the treasure chests with your partner and with other pairs.

Plan a Bicycle Trail

Whether you are walking, running, biking, hiking, or riding horseback, it is helpful to use a marked trail. Trails often lead to interesting places, and they are usually away from heavy traffic. Work with your group to plan a bicycle trail in your community.

Decide

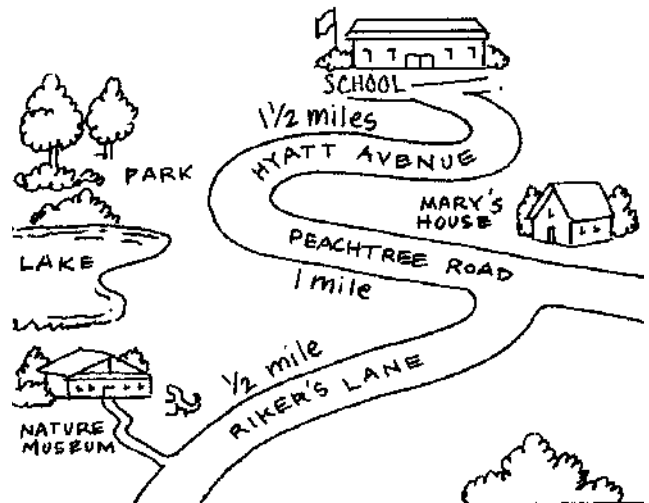
- ✓ Research interesting places where the trail should go.
- ✓ Discuss approximately how long the trail should be and how much time it should take to ride it.
- ✓ Discuss a way to show distances on your map.

Do

- ✓ Draw your bicycle trail on a sheet of paper.
- ✓ Include the total distance and the distance for each part of the trail.
- ✓ Mark points that are $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ of the total distance along your trail.
- ✓ Highlight places of interest.

Share

- ✓ Show your map to the other groups. Describe the characteristics that you had in mind for your bicycle trail, such as separation from heavy traffic.
- ✓ Explain how using fractions helped you make the map.

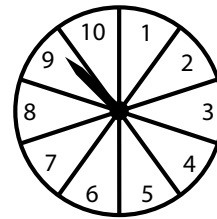


Fraction Subtraction

For this project, you will be modeling fraction subtraction equations. You will use a spinner to create the denominators for two fractions, and then you will model these fractions with counters.

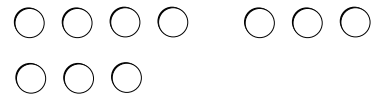
Decide

- ✓ Discuss which part of a fraction is the numerator and which part of the fraction is the denominator.
- ✓ Decide the order in which your group members will form fractions.



Do

- ✓ Use the 10-section spinner to find the denominator for your fractions. Spin and record the number that the pointer stops on. This will be the denominator for both of your fractions.
- ✓ Count out that many counters and divide them into 2 groups. You may divide them however you like.
- ✓ The number of counters in the larger group you made will be the numerator of the first fraction. The number of counters in the smaller group will be the second fraction's denominator. If you divided the counters into equal groups, the numerators will be the same.
- ✓ Write a subtraction problem that uses your two fractions. Solve.
- ✓ Take turns in your group until each person has recorded 15 subtraction problems.



$$\frac{7}{10} - \frac{3}{10} = \frac{4}{10}$$

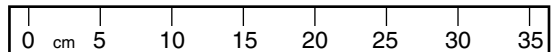
Share

- ✓ Trade subtraction problems with another group of students. Check their work.
- ✓ Discuss how your groups used the counters to find the answer to the subtraction problems. Are there different ways to use them?

Wing Spans

The record for the bird species with the longest wingspan goes to the great white pelican. Its wings can measure 3.60 meters from tip to tip! In this project, you will find your “wingspan” and model it with a decimal model.

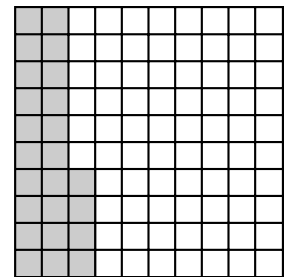
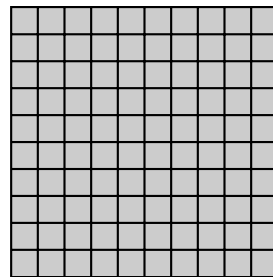
Decide



- ✓ Discuss how you can use a meter stick to measure the distance between your outstretched arms, from finger tip to finger tip.
- ✓ Decide who will be measured first, and who will mark the distance to measure.

Do

- ✓ The first member of your group to be measured should stand with his or her back against the wall or blackboard, with arms stretched out to create their biggest wingspan possible.
- ✓ Another member of the group will mark the farthest point of each hand's fingertips on the wall or blackboard with a piece of masking tape. If using a blackboard, you can use a piece of chalk to mark the distance.
- ✓ Use a meter stick or measuring tape to measure the length of your wingspan between the markers.
- ✓ Record the length in meters. Remember that each centimeter is 0.01 meters.
- ✓ Repeat until all members of your group have measured their wingspans.
- ✓ Shade a hundredths decimal model to show each length.



Share

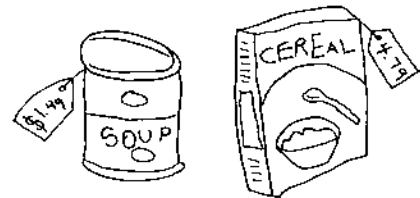
- ✓ Trade decimal models with another group. Arrange the models for both groups in order from least to greatest lengths.

To Market, to Market

You and your partner will set up a market together, and then each of you will go shopping.

Decide

- ✓ Work with your partner to select ten food items that you will sell at your market.
- ✓ Discuss how to add and subtract money amounts.
- ✓ Decide who will be the shopper first, and who will be the cashier.



Do

- ✓ Draw or cut out and paste pictures of ten food items on a piece of poster board. Label each item with a price less than \$5.00.
- ✓ The shopper selects 2 items to buy from the market and tells the cashier.
- ✓ The cashier writes down the items and their prices on a market receipt like the one shown at the right, and finds the total cost of the items.
- ✓ The cashier then calculates the amount of change due the shopper if he or she had paid for the items with a \$10.00 bill.
- ✓ Once the receipt is complete, switch roles. Repeat this until you and your partner each have had a chance to shop 5 times.
- ✓ After you have completed all of the receipts with your partner, discuss these questions:
 1. Which pair of items cost the most? Which pair cost the least?
 2. Pick any receipt. How much more did the more-expensive item cost than the cheaper item?

Market Receipt

soup	\$1.49
cereal	\$4.79
TOTAL:	
CHANGE:	

Share

- ✓ Share your market posters with other pairs. Find how much it would cost to buy 2 items from their market.

Gone Fishing

You will play a game of geometry *Go Fish* with your group as you take turns fishing for shapes, sets of lines, and angles.

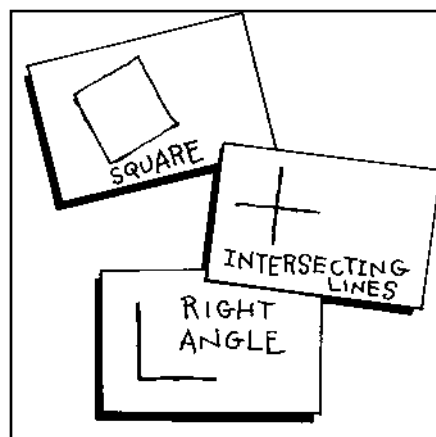
Decide

- ✓ Discuss the different ways that you can identify and classify plane figures, including sets of lines and angles.
- ✓ Decide the order in which group members will go fishing.

Do

- ✓ Use pattern block patterns to cut six shapes out of construction paper.
- ✓ Paste these shapes onto separate index cards for each player. Then label each shape with its name.
- ✓ Each player then should draw these figures on six index cards and label them with their names:

intersecting lines, perpendicular lines, parallel lines, a right angle, an angle less than a right angle, and an angle greater than a right angle.



- ✓ Have one player shuffle the cards and deal six cards to each player. Place the remaining cards face down in the center of the desk.
- ✓ As in the game *Go Fish*, players try to get as many matching pairs of cards possible. Players begin by taking out all pairs of figures in their hands and placing those pairs face-down in front of them.
- ✓ The first player begins by asking any other player whether he or she has a card with a certain figure. If so, the first player takes that card and can put down a matched pair. If not, the other player says "Go fish," and the first player must take a card from the pile.
- ✓ The player with the most matching pairs when the pile of cards is gone wins.

Share

- ✓ Discuss everyday objects that are examples of plane figures, lines, and angles.

Name That Shape

Your group will be creating a poster that will show examples of different types of polygons. You will get to make and classify polygons with different numbers of sides.

Decide

- ✓ Discuss how you can identify a polygon by the number of its sides, and how to identify a triangle, a quadrilateral, a pentagon, a hexagon, and an octagon.
- ✓ Decide the order in which group members will draw polygons.

Do

- ✓ Label a poster board as shown here.

Polygons				
Triangles	Quadrilaterals	Pentagons	Hexagons	Octagons

- ✓ Label the sections of a blank 5-section spinner with 3, 4, 5, 6, and 8.
- ✓ On your turn, spin the pointer on the spinner to find the number of sides your figure will have.
- ✓ Draw a polygon on construction paper that has the number of sides shown on the spinner. You can choose any length for your sides. The sides all can have the same lengths, or they can have different lengths.
- ✓ Cut your polygon out of the construction paper and glue it under the correct category on your piece of poster board.
- ✓ Take turns using the spinner and cutting out shapes until your group has placed at least five shapes in each category.
- ✓ When your poster is complete, discuss these questions:
 1. Can you sort the triangles into different types of triangles?
 2. What kinds of quadrilaterals do you have?

Share

- ✓ Discuss everyday objects that are examples of each polygon.
- ✓ Compare the polygons in each category. What is the same about each polygon? What is different?

Can You Figure it Out?

Form a group with five other students. Each member of your group will write a riddle that describes a solid figure. Then you will trade riddles and make the solid figure out of construction paper.

Decide

- ✓ Discuss how you can identify solid figures. What is a face?
- ✓ Discuss how a net can be used to create a solid figure out of a piece of paper.

Do

- ✓ Label six index cards with the following: cube, rectangular prism, triangular prism, square pyramid, cone, and cylinder. Shuffle the index cards and pass one to each member of your group.
- ✓ Each member will write a riddle about the solid figure on the back of his or her index card. Use what you know about the number and types of faces on that solid figure.
- ✓ Trade your riddles with other group members and solve the riddles.
- ✓ Draw a net of each figure on a piece of construction paper. Cut out the net. Then fold and tape the net to form the solid figure.
- ✓ Copy and complete the table at the right.
- ✓ Discuss these questions:
 1. Which clues were the most helpful in solving each riddle?
 2. Which solid figures are most similar? Which are most different?

Solid Figures		
	Number Of Faces	Plane Shapes That Make Up The Faces
Cube		
Rectangular Prism		
Triangular Prism		
Square Pyramid		
Cone		
Cylinder		

Share

- ✓ Discuss everyday objects that are solid figures.

Name _____

Yarn Designs

Can rectangles with the same perimeter have different areas?

You will make different rectangles with yarn to find out.

Decide

- ✓ Discuss how you can use the squares on grid paper to find the area of each of the rectangles you will create.
- ✓ Determine the order in which each member of your group will create rectangles.

Do

- ✓ Label the sections of a 5-section spinner with 4, 8, 12, 16, 20, and 24. Use the spinner to find the perimeter of your rectangle in inches.
- ✓ Cut a piece of yarn equal to the length of the perimeter you spin. Use a ruler or the 1-inch grid paper as a guide.
- ✓ Make a rectangle out of your string by gluing it onto a piece of 1-inch grid paper. Make sure the length of each side is a whole number.
- ✓ Can you make another rectangle with the same perimeter but a different area? If so, cut another piece of yarn of the same length and glue another rectangle on the grid paper. You may need to use more than one piece of paper.
- ✓ When you have made all the rectangles you can with that perimeter, copy and complete the table shown above.
- ✓ Take turns with the members of your group until each member has been able to work with two different perimeters.
- ✓ Collect your group's rectangles and discuss these questions:
 1. Which rectangles have the same perimeter? Which, if any, have the same area?
 2. For which perimeter length were you able to make the most different rectangles?

Lengths of Sides	Perimeter	Area

Share

- ✓ Compare your rectangles with another group's rectangles. Did they make all the rectangles your group made?

What Are The Odds?

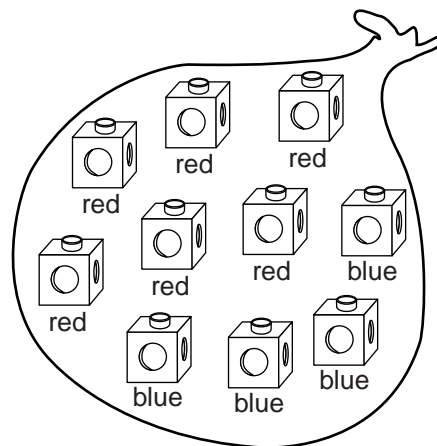
For this project, you will draw a number of different-color cubes from a bag and then try to predict how many of each color are in the bag based on your results.

Decide

- ✓ Discuss how you can predict how many cubes of different colors are in the bag based on how many you draw out.
- ✓ Determine the order in which each member of your group will place cubes into the bag.

Do

- ✓ Begin with 10 red cubes and 10 blue cubes.
- ✓ Have one member of your group choose a total of 10 cubes of either color and place them into the bag while no one else from the group is looking.
- ✓ The person who placed the cubes in the bag will hold the bag so that no one can see which cubes are in it. The other members of your group will take turns drawing out one cube at a time.
- ✓ Record the cube's color in a tally table and return the cube to the bag. Repeat 20 times.
- ✓ Based on your tally table, answer the following questions:
 1. How many cubes of each color do you think are in the bag?
 2. If you were to draw 20 more cubes, how many times would you expect to pick each color?
- ✓ Take the cubes out of the bag. How close were your predictions?
- ✓ Repeat until each member of your group has had a chance to place the cubes into the bag.



Cube Pull Results	
Color	Number of Pulls
red	
blue	

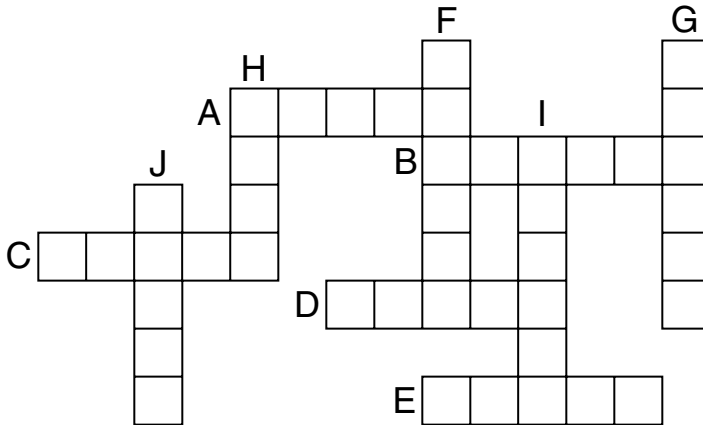
Share

- ✓ Discuss with the other groups how you used your tally tables to predict how many cubes of each color were in the bag.

Enrich Worksheets

Place Value Number Cross

Use the clues below to write the standard form of each number in the grid.



Across	Down
A eighty-three thousand, two hundred four	F one hundred forty-six thousand, five hundred twenty-nine
B six hundred ninety-seven thousand, forty-three	G nine hundred thirty-three thousand, seventeen
C fifty-eight thousand, four hundred twelve	H eight thousand, seven hundred ninety-two
D sixty-three thousand, nine hundred eighty	I seven hundred twenty-nine thousand, thirty-five
E thirty thousand, five hundred twenty-one	J twenty-four thousand, six hundred seventy-nine

Think About It!

1. **Stretch Your Thinking** Write a different clue for D Across that would fit in the puzzle.

2. **WRITE Math** Explain how your answer for B Across helped you find your answers for F Down, I Down, and G Down in the puzzle.

Million Match

Denny wants to know how many pennies equal certain money amounts. Draw a line to match the dollar amount to the number of pennies.

- | | |
|-------------------------------------|-------------------|
| 1. How many pennies equal \$1? | 1,000 pennies |
| 2. How many pennies equal \$100? | 100 pennies |
| 3. How many pennies equal \$10,000? | 100,000 pennies |
| 4. How many pennies equal \$10? | 10,000 pennies |
| 5. How many pennies equal \$1,000? | 1,000,000 pennies |

Juanita reads 10 pages in an hour. She wants to know how long it will take her to read more pages. Draw a line to match the number of pages to the number of hours it will take to read them.

- | | |
|---|---------------|
| 6. How many hours will it take to read 100 pages? | 100 hours |
| 7. How many hours will it take to read 10,000 pages? | 10 hours |
| 8. How many hours will it take to read 1,000,000 pages? | 1,000 hours |
| 9. How many hours will it take to read 1,000 pages? | 100,000 hours |
| 10. How many hours will it take to read 100,000 pages? | 10,000 hours |

Think About It!

11.  Explain how you got your answer for Exercise 10.

12. **Stretch Your Thinking** Suppose a person drives 100 miles each day. How many days will it take for the person to drive one million miles?

Population Comparison

The table shows the populations of several states in the United States.

State	Population (in 2005)
Ohio	Eleven million, four hundred sixty-four thousand, forty-two
Pennsylvania	Twelve million, four hundred twenty-nine thousand, six hundred sixteen
New York	Nineteen million, two hundred fifty-four thousand, six hundred thirty
Illinois	Twelve million, seven hundred sixty-three thousand, three hundred seventy-one
New Jersey	Eight million, seven hundred seventeen thousand, nine hundred twenty-five

Use the table to answer the following questions.

- Greta writes a report on a state whose population has a seven in the one thousands place. What state does Greta write a report about?

- Jason moved from a state whose population has a one in the one millions place. From which state did Jason move?


- Gina lives in a state whose population has a two in the ten thousands place. In which state does Gina live?

- Juan has a pen pal that lives in a state whose population has a nine in the one millions place. Where does Juan's pen pal live?

- Lucia goes on vacation to a state whose population has a one in the ten millions place and a seven in the tens place. Where does Lucia go on vacation?

Think About It!

- Which state from the table above has the greatest population? HINT: look at the millions period.

-  Explain how you determined which state Lucia visited in Exercise 5.

Write and Compare

Use the numbers in each box to write two different numbers. Each number must have at least 4 digits. Write your numbers on the lines below the box. Then, place your numbers correctly to make the relationship true.

1.

4 8 3 2 9 1

<

2.

5 6 0 9 7 1

>

3.

2 3 8 5 6 4

<

4.

9 6 5 2 8 6

>

5.

6 1 2 5 4 7

<

6.

0 5 3 2 9 1

>

7.

2 7 2 3 1 5

<

8.

1 5 3 9 7 6

>

Think About It!

9. **Stretch Your Thinking** If the 6s in Exercise 4 were changed to 1s, would your answer change? Explain.

10. **WRITE Math** How did you know how to complete the relationship in Exercise 8?

Missing Numbers

Water splashed on Josh's homework! Help him fill in the missing numbers to make each number sentence true.

1. _____,452,805 > 8,____52,805 > 8,6____2,805
2. 264,____04 < 2____4,384 < 26____,684
3. 6____,209,885 > 6____,209,885 > 60,____09,885
4. 4,486,____01 < 4,486,____01 < 4,48____,901
5. 576,____23,092 > 576,23____,092 > 576,23____,092
6. 2____8,134 < 2____0,143 < ____80,413
7. 75,____83,630 > 7____,072,904 > 74,0____2,904
8. 3____6,954 < 36____,954 < 364,95____
9. 62____,903,234 > 62____,903,234 > 628,____03,234
10. 45,629,1____9 < 45,629,1____0 < 45,629,1____1

Think About It!

11. **Stretch Your Thinking** Suppose for Exercise 8 you could only use the digits 4, 5, 6 to complete the number sentence. How would you use the digits?

$$3__6,954 < 36__,954 < 364,95__$$

12. **WRITE Math** Explain how you chose the digits to use to complete Exercise 5.

Match the Collection

Four friends each have a different collection. Each collection has a different number of items. Use the clues below to find which collection each friend has and the number of items in their collection. Complete the table by writing *yes* or *no* in each row and column.


- A Rory's collection does not have 156, 165, or 262 items in it.
- B Max's collection begins with an S.
- C Lucia's collection does not have 382 or 165 items in it.
- D Max's collection has between 200 and 300 items in it.
- E The friend who collects coins has 165 coins.
- F The friend who collects stickers has collected fewer items than the friend who collects rocks.
- G The friend who collects stamps has 262 stamps.

	Rocks	Stickers	Coins	Stamps	382	262	156	165
Rory								
Max								
Sun								
Lucia								

Use the table to complete these statements.

- Rory collects _____. He has _____ items in his collection.
- Max collects _____. He has _____ items in his collection.
- Sun collects _____. She has _____ items in her collection.
- Lucia collects _____. She has _____ items in her collection.

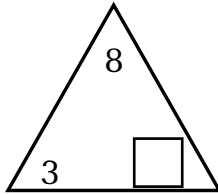
Think About It!

-  Sun's name is not used in the clues. How did you find which collection Sun has and the number of items in her collection?

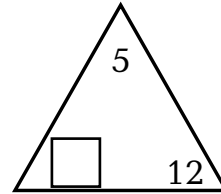
The Triangle Family

Write a number that could complete each triangle fact family.
Write the number sentences for the completed fact family in the spaces below the triangle.

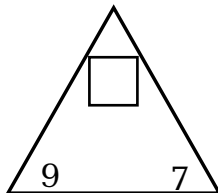
1.



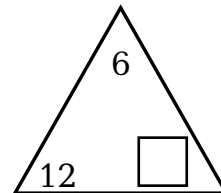
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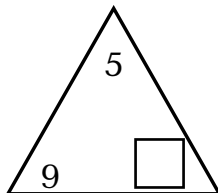
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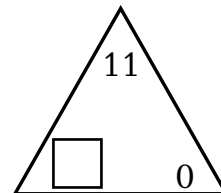
4.



5.



6.



Think About It!

7. **Stretch Your Thinking** What other number could you use for Exercise 1? Explain your thinking and show the fact family. _____

Rounding Populations

The geography club holds a contest to guess the populations of several states. Some students rounded to the nearest million. Other students rounded to the nearest hundred thousand. These are the winning guesses.

Sarah guessed 5,500,000.

Julio guessed 6,000,000.

Tim guessed 4,500,000.

Andre guessed 5,600,000.

Aidan guessed 5,000,000.

Jin guessed 4,000,000.

Write the name of the winner for each state.

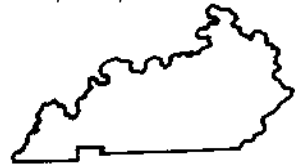
1. Arizona
5,843,834



2. Maryland
5,558,058



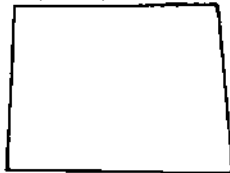
3. Kentucky
4,145,922



4. Louisiana
4,515,770



5. Colorado
4,601,403



6. Wisconsin
5,509,026



Think About It!

7. **Stretch Your Thinking** Use the pictures above to find which states' populations will round to 6,000,000.

8. **WRITE Math** Explain how you matched the state populations with the estimates.

Can You See the Pattern?

$$36 - 14 = 22$$

$$360 - 140 = 220$$

$$3,600 - 1,400 = 2,200$$

$$36,000 - 14,000 = 22,000$$

Find the missing numbers to complete the pattern.

1. _____ + 15 = 34

$$190 + \underline{\hspace{2cm}} = 340$$

$$1,900 + \underline{\hspace{2cm}} = 3,400$$

$$19,000 + 15,000 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} + 150,000 = 340,000$$

$$1,900,000 + 1,500,000 = \underline{\hspace{2cm}}$$

3. 62 + 16 = _____

$$\underline{\hspace{2cm}} + 160 = 780$$

$$6,200 + \underline{\hspace{2cm}} = 7,800$$

$$62,000 + 16,000 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} + 160,000 = 780,000$$

$$6,200,000 + 1,600,000 = \underline{\hspace{2cm}}$$

5. 39 + _____ = 76

$$390 + 370 = \underline{\hspace{2cm}}$$

$$3,900 + \underline{\hspace{2cm}} = 7,600$$

$$\underline{\hspace{2cm}} + 37,000 = 76,000$$

$$\underline{\hspace{2cm}} + 370,000 = 760,000$$

$$3,900,000 + 3,700,000 = \underline{\hspace{2cm}}$$

2. 88 - _____ = 49

$$880 - 390 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} - 3,900 = 4,900$$

$$88,000 - \underline{\hspace{2cm}} = 49,000$$

$$\underline{\hspace{2cm}} - 390,000 = 490,000$$

$$8,800,000 - 3,900,000 = \underline{\hspace{2cm}}$$

4. 54 - _____ = 26

$$\underline{\hspace{2cm}} - 280 = 260$$

$$5,400 - 2,800 = \underline{\hspace{2cm}}$$

$$54,000 - 28,000 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} - 280,000 = 260,000$$

$$5,400,000 - 2,800,000 = \underline{\hspace{2cm}}$$

6. 45 - _____ = 7

$$450 - \underline{\hspace{2cm}} = 70$$


$$\underline{\hspace{2cm}} - 3,800 = 700$$

$$45,000 - \underline{\hspace{2cm}} = 7,000$$

$$\underline{\hspace{2cm}} - 380,000 = 70,000$$

$$4,500,000 - 3,800,000 = \underline{\hspace{2cm}}$$

Think About It!

7.  Explain how patterns helped you fill in the missing numbers for all of the exercises.

8. **Stretch Your Thinking** Suppose the pattern for Exercise 6 continues. How would you complete the number sentence below?


$$450,000,000 - 380,000,000 =$$

Estimating Crowds

It's Kid's Month at the city baseball stadium. Daniel wants to know how many people attend the baseball games during Kid's Month. He records the information for all 5 Kid's Month games. He knows how many adults and children attend each game. Help Daniel estimate the total number of people that attend each baseball game to the nearest thousand.

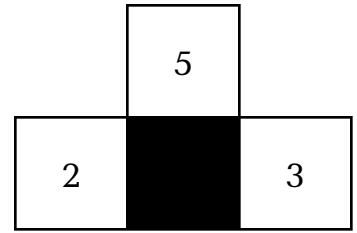
<p style="text-align: center;">Game 1</p> <p>Adults: 29,456 Children: 18,233</p>	Estimated Total Attended
<p style="text-align: center;">Game 2</p> <p>Adults: 26,574 Children: 13,999</p>	Estimated Total Attended
<p style="text-align: center;">Game 3</p> <p>Adults: 31,897 Children: 14,043</p>	Estimated Total Attended
<p style="text-align: center;">Game 4</p> <p>Adults: 27,778 Children: 19,908</p>	Estimated Total Attended
<p style="text-align: center;">Game 5</p> <p>Adults: 23,202 Children: 11,697</p>	Estimated Total Attended

Think About It!

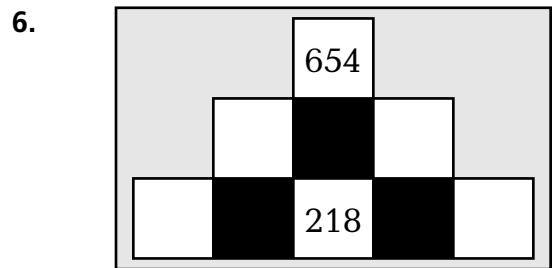
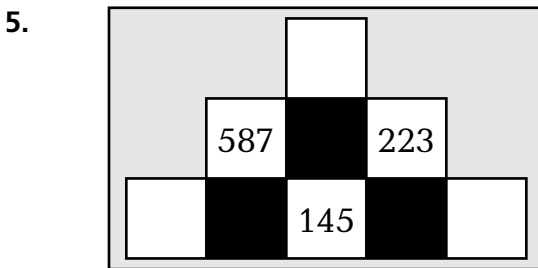
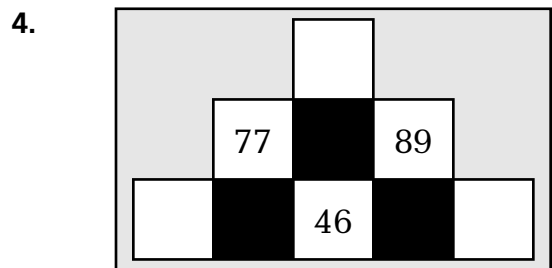
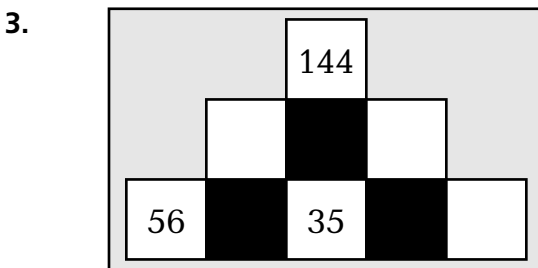
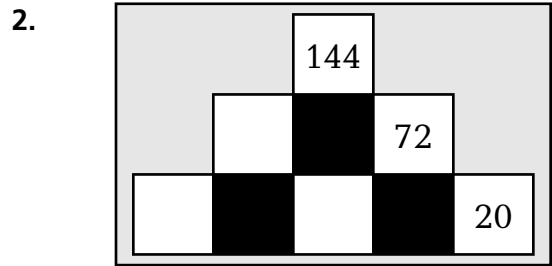
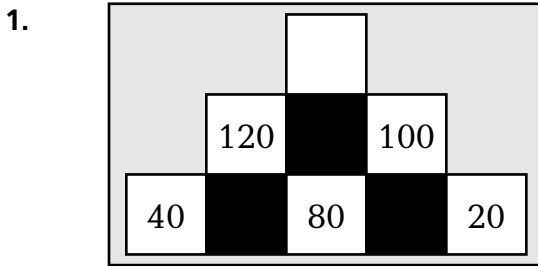
-  Daniel wants to find out how many more people attended the most crowded game than attended the least crowded game. Explain how Daniel can determine which estimated totals to use. What is Daniel's answer?

Mental Math Pyramids

Find the missing numbers in each mental math pyramid. For each small pyramid within the larger pyramid add the 2 numbers in the bottom row to find the missing number. Each set of three numbers is a fact family: the sum will always be the top number. So, you can use addition, subtraction, or fact families to figure out the missing numbers. The first one has been started for you.



$2 + 3 = 5$ $3 + 2 = 5$
 $5 - 3 = 2$ $5 - 2 = 3$



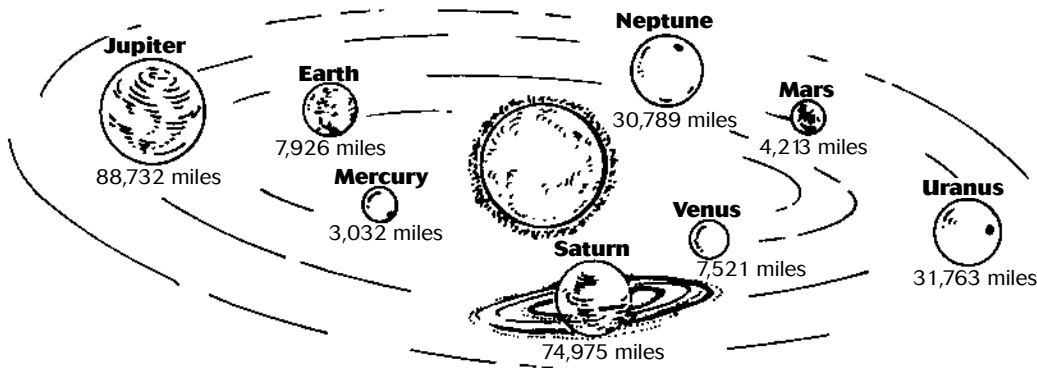
Think About It!

7. **WRITE Math** How was Exercise 6 different from the other Exercises? Explain how you used mental math to solve Exercise 6.

8. **Stretch Your Thinking** How would your answers for Exercise 3 be different if 144 was changed to 134?

In Outer Space

The diagram shows the planets in our solar system and the diameter of each planet.



Circle estimate or exact answer, depending on which would help you solve the problem. Then solve each problem.

1. What is the difference between Jupiter's diameter and Saturn's diameter?

estimate / exact answer _____
2. Which two planets have a combined diameter of about 60,000 miles?

estimate / exact answer _____ and _____
3. About how many miles larger is Venus' diameter than Mercury's diameter?

estimate / exact answer _____
4. What is the difference between the diameter of the largest planet and the diameter of the smallest planet?

estimate / exact answer _____

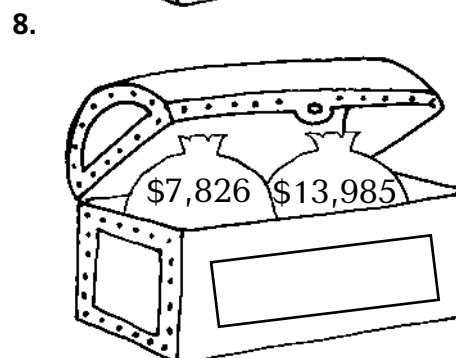
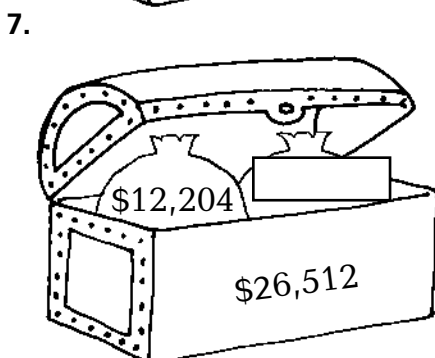
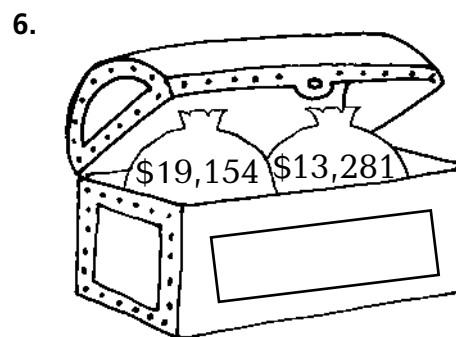
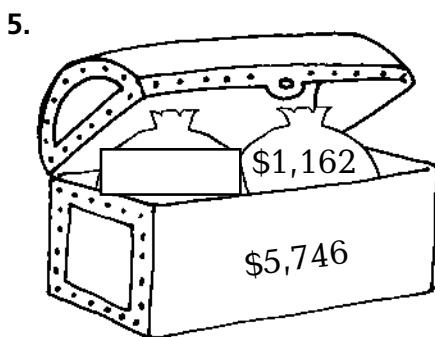
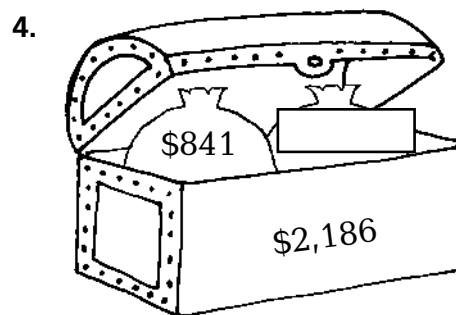
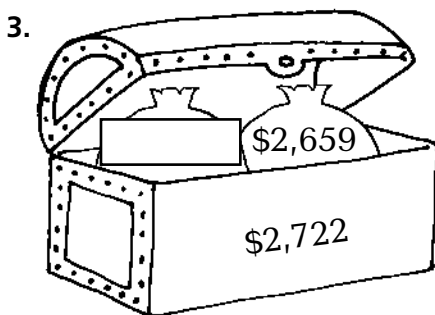
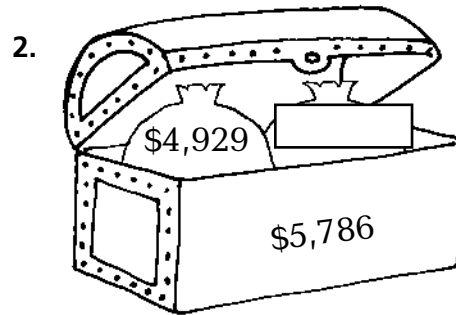
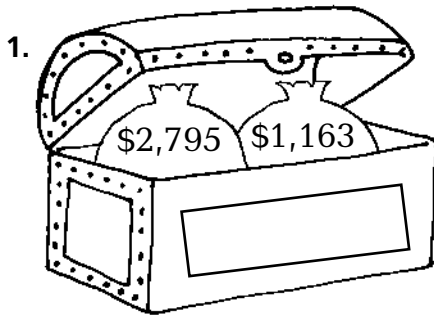
Think About It!

5. Write a new problem using the data in the diagram that needs an estimate for an answer.

6. **Stretch Your Thinking** Rewrite Exercise 4 so that you need to find an estimate.

Treasure Hunt

Sally and Joe went on a treasure hunt. They found eight treasure chests that each contained two bags of gold. Sally and Joe labeled each bag of gold with its value. Then they added the two bags together to find the total value of each chest and placed that label on the outside of the chest. Unfortunately, on the way back home, some of the labels got lost. Help Sally and Joe write the missing values on the bags or the treasure chests.



Empty Boxes

Each problem below is missing one or more digits.

Find each missing digit and write it in the box.

$$\begin{array}{r} \square 09 \\ - 255 \\ \hline 554 \end{array}$$

$$\begin{array}{r} 800 \\ - \square 74 \\ \hline 26 \end{array}$$

$$\begin{array}{r} 5\square 9 \\ - 32\square \\ \hline 246 \end{array}$$

$$\begin{array}{r} \square 09 \\ - 562 \\ \hline 347 \end{array}$$

$$\begin{array}{r} 6\square 9 \\ - 381 \\ \hline 2\square 8 \end{array}$$

$$\begin{array}{r} \square 00 \\ - 3\square\square \\ \hline 335 \end{array}$$

$$\begin{array}{r} 9,\square 02 \\ - 3,685 \\ \hline 5,817 \end{array}$$

$$\begin{array}{r} 5,005 \\ - 1,\square 48 \\ \hline 3,557 \end{array}$$

$$\begin{array}{r} 2,1\square\square \\ - 1,882 \\ \hline 258 \end{array}$$

$$\begin{array}{r} 8,70\square \\ - 1,2\square 1 \\ \hline 7,412 \end{array}$$

$$\begin{array}{r} 6,2\square 1 \\ - 3,559 \\ \hline 2,\square 42 \end{array}$$

$$\begin{array}{r} \square,000 \\ - 3,5\square\square \\ \hline 4,472 \end{array}$$

$$\begin{array}{r} 2,0\square\square \\ - \square 15 \\ \hline 1,648 \end{array}$$

$$\begin{array}{r} 5,\square 9\square \\ - 1,225 \\ \hline 4,5\square 5 \end{array}$$

$$\begin{array}{r} 3,009 \\ - 2,\square\square\square \\ \hline 491 \end{array}$$

$$\begin{array}{r} 4,\square 07 \\ - 1,\square\square 4 \\ \hline 3,163 \end{array}$$


$$\begin{array}{r} \square,31\square \\ - \square,632 \\ \hline 2,678 \end{array}$$

$$\begin{array}{r} 9,\square\square\square \\ - 7,238 \\ \hline \square,762 \end{array}$$

$$\begin{array}{r} 6,\square\square 1 \\ - 5,\square\square 2 \\ \hline 999 \end{array}$$

$$\begin{array}{r} 3,\square 00 \\ - 1,\square\square 0 \\ \hline \square,620 \end{array}$$

Think About It!

21.  **WRITE Math** Explain how you found the missing digits in Exercise 11.

22. **Stretch Your Thinking** How would the missing digits change if the difference in Exercise 12 changed from 4,472 to 4,482?

Math Squares

Choose addition or subtraction to find the missing numbers in the squares. The first two numbers in each row add up to last number in the row. The first two numbers in each column add up to the last number in the column.

1.

	15,190	27,641
12,064		
	34,198	58,713

2.

	3,966	
10,872		13,605
	6,699	23,445

3.

110,407	134,657	245,064
324,679		623,990

4.

124,623		307,945
50,980		
175,603		416,213


5.

	33,700	
52,817		89,705
	70,588	177,566

6.

	412,184	
		171,133
451,031	472,751	923,782

Think About It!

7.  Describe how you could use paper and pencil, and mental math, to complete Exercise 3.

8. Complete the addition/subtraction square shown below.

		234,593

Question and Answer

For each exercise, write a problem situation that contains a question, each solution must be the answer printed in that exercise. In your problem situation, include extra information that is not needed to solve the problem.

1. Answer: 213 miles

2. Answer: 83 people

3. Answer: 498 trading cards

4. Answer: 7,190 points

5. Answer: \$521

6. Answer: 1,923 flowers

Think About It!

7. **Stretch Your Thinking** Revise your problem for Exercise 1 so that there is not enough information to solve the problem.

8. **Stretch Your Thinking** Revise your problem for Exercise 5 so that there is not enough information to solve the problem.

Equal Squares

Use the addition properties to complete the squares by adding across, down, and diagonally. For each square, the sum of the addends in every row, column, and diagonal must be the same.

1.

3	10	2
4	5	
8		

2.

160		140
80		
60		40

3.

	3	
15		
12	33	9

4.

	40	
	20	
25	0	

5.

24	108	48
72		

6.

700		
	600	
900		500

Think About It!

7. **Stretch Your Thinking** Make your own equal squares below.

Expressions, Expressions

Use the digits given to write an expression with addition and subtraction to make the value shown. Use parentheses where necessary. The first exercise is done for you.

Digits	Value	Expression
1. 1, 2, 3, 4	15	$14 + (3 - 2)$
2. 1, 2, 3	2	
3. 4, 5, 6	60	
4. 4, 5, 6, 7	46	
5. 1, 2, 3, 4, 5	47	
6. 5, 6, 7, 8	18	
7. 5, 6, 7, 8, 9	120	
8. 5, 6, 7, 8, 9	17	

Think About It!

9. **Stretch Your Thinking** Choose any four consecutive digits such as 1, 2, 3, 4. Use addition and subtraction to write an expression with a value of 14.

10. **WRITE Math** For Exercise 8, explain how you chose the expression.

Expression Tables

Complete the table for the value given.
Use the addition properties to help you.

1.

a	$4 + (a - 1)$
5	
12	
1	

2.

b	$b + 4 + 15$
0	
44	
16	

3.

s	$8 - 2 + s$
25	
100	
34	

4.

t	$5 + 12 - t$
2	
6	
10	

5.

x	$62 - (x + 8)$
44	
8	
12	

6.

y	$80 + 9 + y$
11	
50	
37	

Think About It!

7. **Stretch Your Thinking** Use the variable to make your own expression table.

n	

8. **WRITE Math** Write a problem that you can use the expression in Exercise 7 to solve.

Match the Equation

Match the equation with the letter of the correct problem situation. Write the letter on the line. Then solve the equation.

1. _____ $9 + m = 13$

Solution: _____

2. _____ $n - 17 = 50$

Solution: _____

3. _____ $14 + p = 25$

Solution: _____

4. _____ $25 - q = 18$

Solution: _____

5. _____ $r + (24 + 18) = 102$

Solution: _____

6. _____ $(22 - 6) - s = 11$

Solution: _____

a. Heath had \$22. He spent \$6 on lunch and then bought some comic books. He has \$11 left.

b. The vet has 25 pets to see today. Fourteen pets are dogs and the rest are cats.

c. Wyona had 9 CDs in her collection. She got some more CDs for her birthday. Now she has a total of 13 CDs.

d. Kelly added 24 pennies to the class penny jar. Michael added 18 pennies. Now there are 102 pennies in the penny jar.

e. Javier has 50 points. He has 17 fewer points than Daniella.

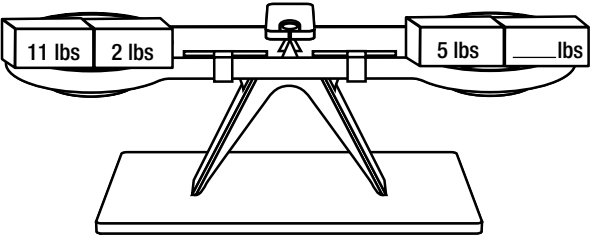
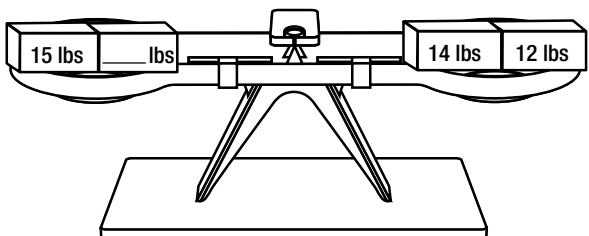
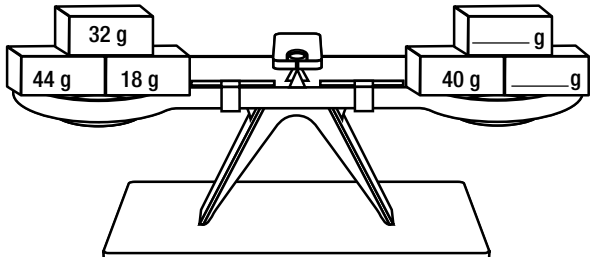
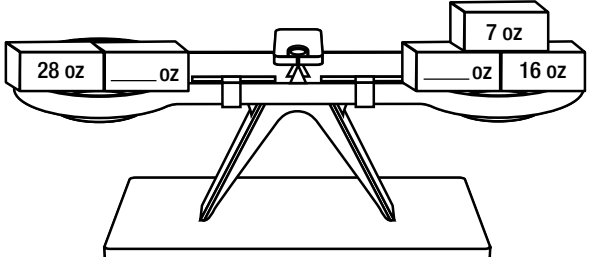
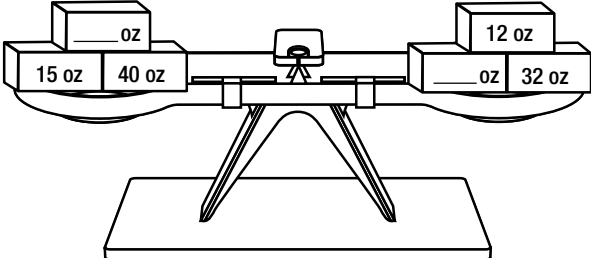
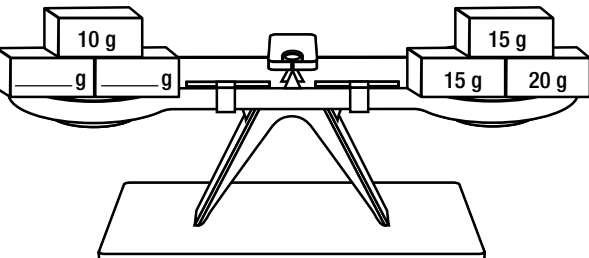
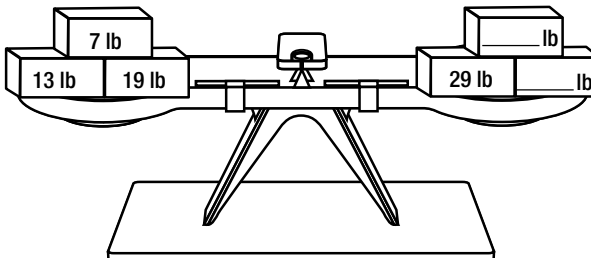
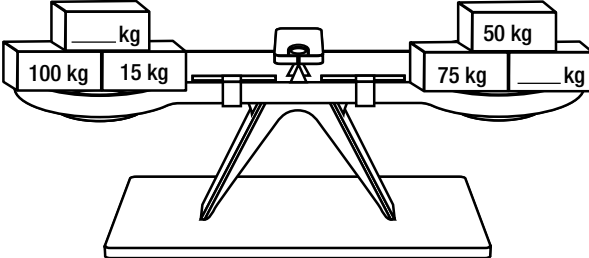
f. Sasha had 25 books. She sold some at the school sale. Now she has 18 books.

Think About It!

7. **Stretch Your Thinking** Write an equation that tells something about yourself. For example, your equation could show how your age has changed from kindergarten to fourth grade. Explain what your equation means.

Balance the Scale

For a scale to balance, the weight on both sides must be equal. Choose the weight or weights that balance the scale.

<p>1.</p> 	<p>2.</p> 
<p>3.</p> 	<p>4.</p> 
<p>5.</p> 	<p>6.</p> 
<p>7.</p> 	<p>8.</p> 

Think About It!

9. **WRITE Math** Explain how you determined which weights made the scale balance.

Detective Backward

Detective Backward solves problems by looking at them differently. Use clues and the work backward strategy to help the detective solve each case.

1. The Case of the Uncounted Books

Lucy has 4 boxes of books. She taped the boxes shut to mail them, but then lost the list of how many books are in each box. Luckily, she has the following clues.

- There are twice as many books in Box 1 as in Box 2.
- Box 4 has 6 books, which is 4 books less than Box 2 has.
- Box 3 has 3 less books than Box 1.

How many books are in each box?

Solution: _____

2. The Case of the Missing Treasure Chest

Henry works in the museum. A treasure chest was lost at 8 P.M. and they think Henry misplaced it. Henry says he was not at the museum at 8 P.M. Use the clues to prove that Henry was not at the museum at 8 P.M.

- Henry returned home from working at the museum at 8:45 P.M.
- Henry stopped off at his friend's house for 20 minutes on his way home.
- It takes Henry 10 minutes to walk from the museum to his friend's house. Then 10 minutes to walk home.
- On his way home, Henry stopped at a grocery store to buy a snack. The store's cameras show he was there for 15 minutes.

What time did Henry leave the museum? Was Henry at the museum when the treasure chest was misplaced?

Solution: _____

3. The Case of the Uncounted Money

The Bike Club collected money for fees on Wednesday, Thursday, and Friday this week. Before Wednesday, the club already had some money. The club forgot to count the dues money it collected. Read the clues to discover how much money the club collected.

- On Friday, the club had \$100 in all.
- The club collected \$20 in dues on Wednesday, which was \$5 more than it had to begin with.
- On Thursday, the club collected \$5 more than they collected on Wednesday.

How much did the Bike Club collect each of the three days? What was the total amount of money collected this week?

Solution: _____

Alphabet Code

The alphabet code below uses a pattern. Use what you know about the order of the alphabet to fill in the missing code letters.

Alphabet Code

Alphabet letter	A	B	C	D	E	F	G	H	I	J	K	L	M
Code letter	F			I				M					


Alphabet letter	N	O	P	Q	R	S	T	U	V	W	X	y	Z
Code letter	S								A				

- Find the pattern and crack the code. Use it to replace the code letters with the actual alphabet letters.

Secret Message: NK DTZ HFS WJFI yMNx, yMJS DTZ FWJ F HTIJ GWJFPJW!

- Use the code to write your own message.

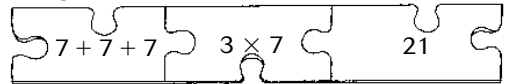
Think About It!

-  What is the rule of the code?

- Stretch Your Thinking** How could you change the code to make it more difficult to crack?

Operations Puzzle

The 3 puzzle pieces in each problem below should all represent the same number. The left piece is repeated addition or subtraction, the center piece is multiplication or division, and the right piece is the total. Use related operations to complete the missing numbers and sentences.



1.

2.

3.

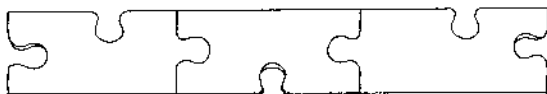
4.

5.

6.

Think About It!

7. Complete the three puzzle pieces below to show related subtraction and division problems and the solution.



8. **WRITE Math** Explain how you knew if you needed to write in a division or multiplication problem in the center puzzle piece on Exercise 1.

Friend or Family?

Each rectangle contains 5 numbers. Three of the numbers form a multiplication and division fact family. The other two numbers are not part of the fact family. Cross out the two numbers that are not part of the fact family. Then write the fact family for the set of numbers you chose.

1.	<table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">6</td> <td style="width: 33%;">5</td> <td style="width: 33%;">1</td> </tr> <tr> <td>5</td> <td></td> <td>11</td> </tr> </table>	6	5	1	5		11	<hr/> <hr/>	<hr/> <hr/>
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5		11							
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35	28	6							
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42		20							
6.	<table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">3</td> <td style="width: 33%;">27</td> <td style="width: 33%;">5</td> </tr> <tr> <td>8</td> <td></td> <td>9</td> </tr> </table>	3	27	5	8		9	<hr/> <hr/>	<hr/> <hr/>
3	27	5							
8		9							

Think About It!

7. Which exercise did you only write two number sentences for? Explain why.


8. **Stretch Your Thinking** What if the 27 in Exercise 6 was changed to 24. How would your answer change?

Match the Pairs

Draw a line to match each clue to the correct pair of numbers on the right.

- | | |
|--|----------|
| 1. The quotient of this number pair is an odd number that is equal to its divisor. | 2 and 6 |
| 2. The product of this number pair is equal to the product of 2×2 . | 5 and 10 |
| 3. The quotient of this number pair is equal to the divisor of the number pair. | 3 and 9 |
| 4. The product of this number pair is equal to $9 + 9$. | 2 and 9 |
| 5. The quotient of this number pair is an even number that is less than 4. | 5 and 6 |
| 6. The quotient of this number pair is an odd number greater than 1 and less than 5. | 1 and 4 |
| 7. The product of this number pair is equal to 1 ten, 2 ones. | 3 and 8 |
| 8. The product of this number pair is equal to the sum of $12 + 12$. | 4 and 16 |
| 9. The quotient of this number pair is one greater than the sum of $3 + 3$. | 3 and 4 |
| 10. The product of this number pair is equal to 2 tens, 10 ones. | 3 and 24 |
| 11. The quotient of this number pair is equal to $2 + 2 + 2 + 2$. | 3 and 21 |
| 12. The product of this number pair is equal to $8 - 8$. | 0 and 5 |

Think About It!

13.  Explain how you found the answer for Exercise 6.

14. Stretch Your Thinking What if the last number pair was changed from 0 and 5 to 0 and 9? Would that change the match you made? Explain.

Follow the Path

Follow the square paths.

Write your answer in the last square of each path.

1.

45	$\div 9$	$\times 1$	$\div 5$	
----	----------	------------	----------	--

2.

9	$\times 4$	$\div 6$	$\times 8$	
---	------------	----------	------------	--

3.

24	$\div 3$	$\div 2$	$\times 6$	
----	----------	----------	------------	--

4.

5	$\times 8$	$\div 10$	$\times 7$	
---	------------	-----------	------------	--

5.

81	$\div 9$	$\times 6$	$\times 0$	
----	----------	------------	------------	--

6.

6	$\times 4$	$\div 2$	$\div 6$	
---	------------	----------	----------	--

Think About It!

7. Complete the path below, like the ones above, to find the solution shown.

8				4
---	--	--	--	---

Number Riddles

Write the number to solve each riddle.

You may use a multiplication table.

- | | |
|--|---|
| <p>1. I am a 2 digit number. You can divide me by 3, 6 or 9. The digit in my tens place is less than 3. The digit in my ones place is greater than 7. What number am I?</p> <p>_____</p> | <p>2. I am a single digit number. You can multiply me by myself and the product will be odd and less than 10. If you add me to myself, the sum will be even, and greater than 2. What number am I?</p> <p>_____</p> |
| <p>3. I am a 2 digit number greater than 15. I am a multiple of 2, 3 and 4. What number am I?</p> <p>_____</p> | <p>4. I am a single digit number greater than 5. You can divide me by 2 or 4. What number am I?</p> <p>_____</p> |
| <p>5. I am a 2 digit number greater than 40. You can divide me by 7, and also by 8, but not any other set of single digit numbers. What number am I?</p> <p>_____</p> | <p>6. I am a single digit number greater than 4. You can divide me by 3, but not by 6. What number am I?</p> <p>_____</p> |
| <p>7. I am a 2 digit number. When you divide me by 6 you will find that my quotient is the same as my divisor. What number am I?</p> <p>_____</p> | <p>8. I am a 2 digit number. You can divide me by every single digit except for 5 and 7. Add my digits together and the sum is 9. What number am I?</p> <p>_____</p> |

Think About It!

9. **Stretch Your Thinking** What if the riddle for Exercise 8 was missing the line "Add my digits together and the sum is 9." Could another number be the answer?
- _____
- _____
- _____

10.  Explain how you solved the riddle in Exercise 2.
- _____
- _____
- _____

Pattern Shading

Follow the directions for the multiplication table shown below.

1. Shade any number that is a multiple of 4.
2. Draw a triangle around any number that is a multiple of 8.
3. Draw a circle around any number that is a multiple of 12.

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

4. Describe two patterns you see in the table.

Think About It!

5. **Stretch Your Thinking** How are the numbers that you marked on the multiplication table different from the unmarked numbers on the table?
6. **WRITE Math** Why are the all of the numbers with circles drawn around them also shaded?

Write A Story Problem

Kendra lost her homework assignment! Luckily, she still has the piece of paper showing her number sentence and the final answers. She also knows that all of the story problems are about a trip to the zoo. Write a story problem for each answer about a trip to the zoo.

1. $72 \div 8 = 9$

The class took 9 vans to the zoo.

2. $72 \div 6 = 12$

There were 12 people in each group.

3. $7 \times 8 = 56$

There were 56 birds at the zoo.

4. $10 \times 5 = 50$

There were 50 seats on the safari ride.

5. $42 \div 6 = 7$


There were 7 monkeys in each area.

6. $8 \times \$3 = \24

Souvenir books cost \$24 altogether.

Think About It!

7. **Stretch Your Thinking** How could you write a story problem for Exercise 6 to find the cost of each souvenir book?

8.  What words did you use in your story problems that indicated the use of multiplication?

What's Missing?

For each division or multiplication sentence, find the number that will replace the symbol to make the sentence true. Then match the missing number to the letter in the table at the right. Next, fill in the blanks below with the correct letter to find the answer to the riddle. The first one has been done for you.

2	P
3	T
4	M
5	S
7	U
8	L
9	R
11	E
12	I

- 1. $9 \times \blacksquare = 36$ $\blacksquare = \underline{4} = \underline{M}$
- 2. $\times \times 12 = 84$ $\times = \underline{\quad} = \underline{\quad}$
- 3. $99 \div \blacklozenge = 11$ $\blacklozenge = \underline{\quad} = \underline{\quad}$
- 4. $120 \div \blacktriangle = 10$ $\blacktriangle = \underline{\quad} = \underline{\quad}$
- 5. $2 \times \bullet = 16$ $\bullet = \underline{\quad} = \underline{\quad}$
- 6. $\blacklozenge \times 5 = 15$ $\blacklozenge = \underline{\quad} = \underline{\quad}$
- 7. $24 \div \bigcirc = 12$ $\bigcirc = \underline{\quad} = \underline{\quad}$
- 8. $5 \div \text{C} = 1$ $\text{C} = \underline{\quad} = \underline{\quad}$
- 9. $121 \div \blackuparrow = 12$ $\blackuparrow = \underline{\quad} = \underline{\quad}$

What tools do you need in math class?

M _____ - _____
 \blacksquare \times \bullet \blacklozenge \blacktriangle \bigcirc \bullet \blacktriangle \blackuparrow \blacklozenge C

Think About It!

10. **Stretch Your Thinking** For Exercise 9, write a different number sentence so the symbol still has the same value.

11. **WRITE Math** Explain how you found the missing factors for Exercise 2.

Symbols

Suppose the \boxtimes symbol means find the product of the two numbers and then multiply by three.

Examples: $2 \boxtimes 5 = (2 \times 5) \times 3 = 30$

$1 \boxtimes 4 = (1 \times 4) \times 3 = 12$

1. $3 \boxtimes 4 = \underline{\hspace{2cm}}$	2. $1 \boxtimes 8 = \underline{\hspace{2cm}}$	3. $2 \boxtimes 5 = \underline{\hspace{2cm}}$
4. $4 \boxtimes 2 = \underline{\hspace{2cm}}$	5. $3 \boxtimes 3 = \underline{\hspace{2cm}}$	6. $2 \boxtimes 6 = \underline{\hspace{2cm}}$

Suppose the \odot symbol means find the sum of the two numbers and then multiply times 4.

Examples: $3 \odot 6 = (3 + 6) \times 4 = 36$

$5 \odot 7 = (5 + 7) \times 4 = 36$

7. $8 \odot 2 = \underline{\hspace{2cm}}$	8. $4 \odot 3 = \underline{\hspace{2cm}}$	9. $2 \odot 7 = \underline{\hspace{2cm}}$
10. $3 \odot 5 = \underline{\hspace{2cm}}$	11. $2 \odot 5 = \underline{\hspace{2cm}}$	12. $3 \odot 9 = \underline{\hspace{2cm}}$

Suppose the $\star\star$ symbol means multiply each number by 2 and then add the products.

Examples: $4 \star\star 5 = (4 \times 2) + (5 \times 2) = 18$

$3 \star\star 8 = (3 \times 2) + (8 \times 2) = 22$

13. $1 \star\star 4 = \underline{\hspace{2cm}}$	14. $3 \star\star 5 = \underline{\hspace{2cm}}$	15. $6 \star\star 8 = \underline{\hspace{2cm}}$
16. $7 \star\star 7 = \underline{\hspace{2cm}}$	17. $4 \star\star 6 = \underline{\hspace{2cm}}$	18. $2 \star\star 9 = \underline{\hspace{2cm}}$

Think About It!

19. **Stretch Your Thinking** Choose your own symbol and create a meaning for it. Give two examples.


20. **WRITE Math** Which Exercises are an example of the associative property of multiplication? The distributive property? Explain.

Missing Operations

Write +, −, ×, or ÷ in each \bigcirc to make the expression equal to the given value.

Expression	Value
1. $30 \bigcirc 5 \times 2$	12
2. $3 \bigcirc 4 \div 6$	2
3. $2 + 25 \bigcirc 5$	7
4. $5 + 2 \times 7 \bigcirc 3$	16
5. $8 \bigcirc 8 \bigcirc 4 \div 2$	8
6. $35 \bigcirc 7 \bigcirc 6 \times 4$	29
7. $5 \bigcirc 3 \times 6 \bigcirc 2$	21
8. $3 + 9 \bigcirc 0 \times 3$	3
9. $3 \bigcirc 7 \bigcirc 4 \bigcirc 1$	18
10. $8 \bigcirc 2 \bigcirc 2 \bigcirc 4$	12
11. $72 \bigcirc 6 \bigcirc 4 \bigcirc 1$	16
12. $12 \bigcirc 4 \bigcirc 12 \bigcirc 3$	12

Think About It!

13.  Explain how you decided which operation signs to use for Exercise 12.

14. **Stretch Your Thinking** Write an expression that uses the numbers 1, 2, 3, 4, and 5 and one of each operation sign. Your expression must have a value between 10 and 20.

Creative Expressions

Use the given value to complete the expression in the right column. You must use all or some of the digits in the left column in your expression. Use parentheses when necessary. You may also combine the digits to make 2-digit numbers if needed. The first exercise is completed for you.

Digits	Value	Expression
1. 1, 2, 3, 4	8	$(3 + 1) \times (4 - 2)$
2. 1, 2, 3, 4	20	$4 \times$ _____
3. 4, 5, 6, 7	3	$45 -$ _____
4. 4, 5, 6, 7	63	$(4 + 5) \times$ _____
5. 0, 1, 2, 3, 4	9	$40 \div$ _____
6. 1, 2, 3, 4, 5	9	_____ (2×3)
7. 5, 6, 7, 8, 9	23	(5×6) _____
8. 0, 2, 4, 6, 8	0	_____

Think About It!

9. **Stretch Your Thinking** Find the expression with the greatest value that uses the digits 1, 2, 3, and 4.

10. **WRITE Math** For Exercise 7, explain how you wrote an expression with the given value.

Paint Disaster

Help! Jack spilled paint on his homework problems and now he can't read some of the numbers. Complete the table so Jack can turn his homework in on time.

1.

$6 \times a$	
If $a = 4$	
If $a = \underline{\quad}$	48
If $a = 10$	

2.

$b \div 8$	
If $b = 24$	
If $b = 72$	
If $b = \underline{\quad}$	8

3.

$(10 \times s) + 2$	
If $s = 6$	
If $s = \underline{\quad}$	2
If $s = 9$	

4.

$24 \div t$	
If $t = \underline{\quad}$	8
If $t = 12$	
If $t = 4$	

Find the expression used to complete the table.

5.

$\underline{\hspace{2cm}}$	
If $m = 2$	6
If $m = 12$	36
If $m = 9$	27

6.

$\underline{\hspace{2cm}}$	
If $p = 35$	5
If $p = 70$	10
If $p = 7$	1

Think About It!

7. **Stretch Your Thinking** Make your own expression table.

$\underline{\hspace{2cm}}$	
If $n = \underline{\quad}$	
If $n = \underline{\quad}$	
If $n = \underline{\quad}$	

8. **WRITE Math** Write a word problem that you can solve using the expression in Exercise 6.

The Equation Machine

A scientist has created a machine that solves equations. Help the scientist test the machine. For each equation, use the previous solution as one of the variables. If you get stuck and a variable doesn't work, check your work for the previous problem(s).

Example:

$$\begin{aligned} \text{First equation: } 2 \times x &= 14 \\ x &= 7 \end{aligned}$$

$$\begin{aligned} \text{Second equation: } y \div x &= 3 \\ y \div 7 &= 3 \\ y &= 21 \end{aligned}$$

Equation	Solution
1. $2 \times a \times 3 = 24$	$a = \square$
2. $b \div a = 5$	$b = \square$
3. $c \times 2 = b$	$c = \square$
4. $1 \times c \times 3 = d$	$d = \square$
5. $d \div e = 6$	$e = \square$
6. $e \times f = 35$	$f = \square$
7. $63 \div f = g$	$g = \square$

Think About It!

8. **Stretch Your Thinking** What other equation could you write for Exercise 7 to get the same answer for the variable g ?

Missing Numbers

Merielle's dog ate holes in her homework! Help her fill in the missing numbers to make each equation true.

1. $(1 + \underline{\quad}) \times 9 = 4 \times \underline{\quad}$

2. $(\underline{\quad} - 3) \times 5 = 50 \div 10 \times \underline{\quad}$

3. $\underline{\quad} \times 4 \times 6 = 2 \times \underline{\quad} \times 6$

4. $55 \div \underline{\quad} \times 3 = 6 \times 5 + \underline{\quad}$

5. $5 \times \underline{\quad} = \underline{\quad} \times 4 \times 5$

6. $18 \div \underline{\quad} \times 3 = 3 + (\underline{\quad} \times 6)$

7. $(9 - \underline{\quad}) \times 7 = 3 \times \underline{\quad} \times 7$

8. $36 \div 3 \div \underline{\quad} = 36 \div \underline{\quad}$

9. $1 + (\underline{\quad} \times 9) = 2 + (8 \times \underline{\quad})$

10. $44 \div 11 \div \underline{\quad} = 2 \times 7 \div \underline{\quad}$

Think About It!

11. **Stretch Your Thinking** Choose an equation from exercises 1–10. Multiply each side by 3. Write the new values.

12. **WRITE Math** Explain why the new equation you wrote for Exercise 11 is still true.

Jump, Frog, Jump

Help the lost frog find his way to the correct lily pad. For each equation, one number is missing. Find the missing number that will make the equation true.

1. $5 \times 3 + \bigcirc = 37$

6. $10 \times 9 - \bigcirc = 85$

2. $9 \times \bigcirc - 5 = 49$

7. $56 \div \bigcirc + 8 = 16$

3. $108 \div 12 + \bigcirc = 33$

8. $\bigcirc \div 3 + 3 = 6$

4. $\bigcirc \div 3 + 10 = 14$

9. $\bigcirc \times 5 - 2 = 38$

5. $11 \times 11 - \bigcirc = 117$

10. $6 \times \bigcirc + 5 = 23$

Use the missing numbers from Exercises 1-10 to connect the points below. Be sure to go in order to find the correct path.



22

8

20

2

23

6

24

19

9

21

1

12

7

9

14

4

5

11

8

13

6

10

8

3

Think About it!

11. **Stretch Your Thinking** Change the equations for Exercises 8-10 so the missing numbers take the frog to a different lily pad.

Construct an Equal Square

For an equal square, the numbers in each row, column, and diagonal add to the same sum. Apply the rule to the values in the base square to create a new square with a new sum.

Base Square sum = 15

8	1	6
3	5	7
4	9	2

Example Rule: Multiply by 2
sum = 30

16	2	12
6	10	14
8	18	4

For 1-2, use the base square above to make a new equal square. Write the rule you used and the new sum.

1. Rule: _____

2. Rule: _____

Sum: _____

Sum: _____

3. Now find the rule that changes the base square on the left to the square on the right.

96	12	72
36	60	84
48	108	24

24	3	18
9	15	21
12	27	6

Rule: _____

Googol Patterns in Multiplication

A googol is the number 1 followed by 100 zeros. The term was coined by the nephew of American mathematician Edward Kasner in 1938. Kasner asked his young nephew to assign a name to the largest number he could imagine. His reply was the “googol.” You can use multiplication patterns to work with googols.

Describe the following numbers.

1. 8 times a googol
8 followed by _____ zeros
2. 80 times a googol
8 followed by _____ zeros
3. 800 times a googol
_____ followed by _____ zeros
4. 8,000 times a googol
_____ followed by _____ zeros
5. 80,000 times a googol
_____ followed by _____ zeros

Think About It!

6. A googol is a very large number. Which items might scientists describe in terms of googols?

7. **Stretch Your Thinking** What pattern do you see in describing the numbers in Exercises 1–5? Use the pattern to describe 8,000,000 times a googol. Explain your answer.

Find the Missing Factors

Choose two factors from the box for each estimated product.

3	5	624
9	126	957

1. 1,800 _____ × _____ 2. 500 _____ × _____

3. 5,000 _____ × _____ 4. 900 _____ × _____

8	7	435
6	899	273

5. 1,800 _____ × _____ 6. 6,300 _____ × _____

7. 3,200 _____ × _____ 8. 2,100 _____ × _____

5	6,149	3,044
2	3	8,756

9. 30,000 _____ × _____ 10. 6,000 _____ × _____

11. 9,000 _____ × _____ 12. 45,000 _____ × _____

Think About It!

13. **Stretch Your Thinking** Two factors create an estimated product of 10,000. One of these factors is a single digit. What two factors could they be? Explain your thinking.

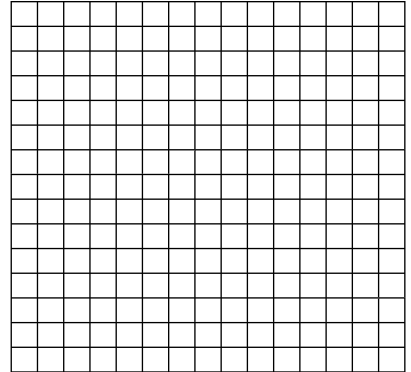
Follow Their Paths

Use the grids to solve. Be careful where you choose your starting point.

1. Amy and Roger start at the same place. Amy walks 8 units east, 5 units south, and 3 units west. Roger walks 8 units east and 3 units south.

Is Roger east or west of Amy? How many units?

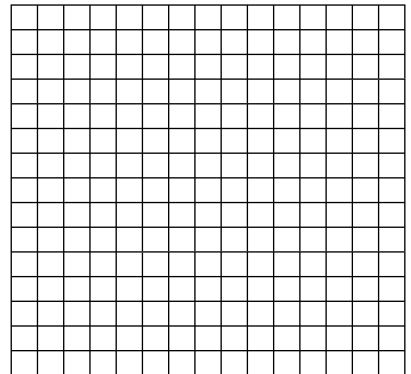
Is Roger north or south of Amy? How many units?



2. Shelly and Wade walk together south 6 units. Then Shelly walks 4 more units south and Wade walks 5 units east. Shelly walks 8 units west.

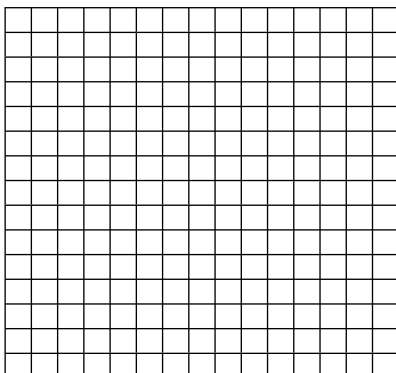
Is Shelly east or west of Wade? How many units?

Is Shelly north or south of Wade? How many units?



Think About It!

3. **WRITE Math** Look at Exercise 1. Suppose Roger walks 5 units south and 5 units east instead. Use the grid below to draw your new diagram.



4. **WRITE Math** Explain how you chose the starting point in Exercise 2.

Picture the Factors

You can use pictures to model products when you don't have base-ten models to use.

Key:



= 1,000



= 100

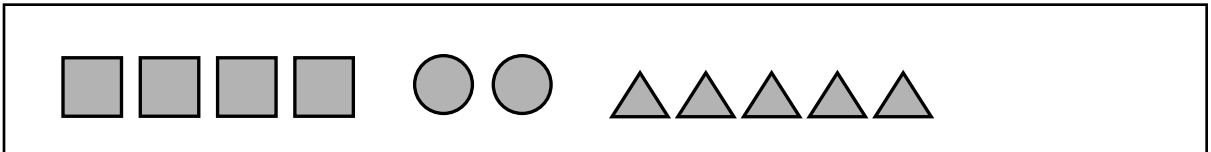


= 10

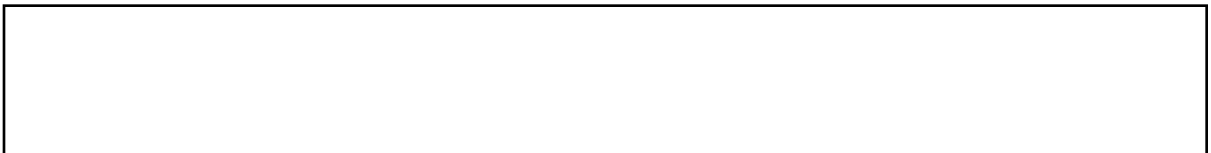


= 1

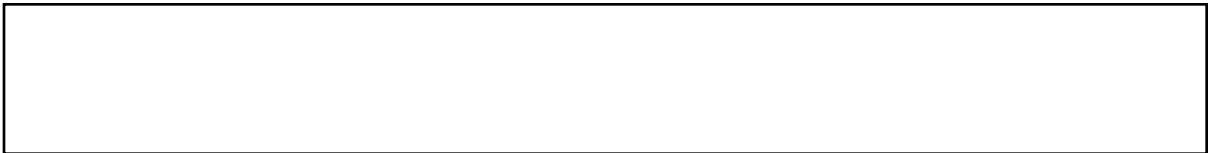
1. The picture below shows 1×425 . How can you change the picture in order to show 3×425 ? Try it. Then find the product of 3×425 .



2. Now draw a picture to show 6×175 . Find the product.




3. Draw a picture to show 2×684 . Find the product.



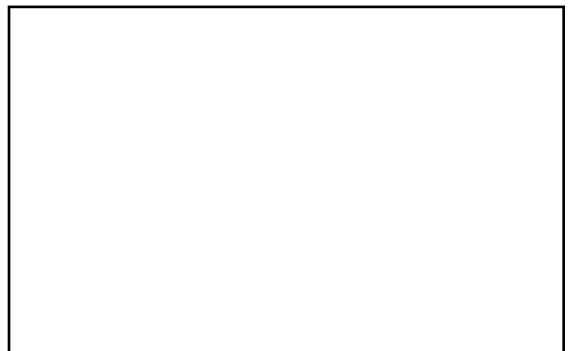
4. Draw a picture to show 5×339 . Find the product.



Think About It!

5.  Compare the pictures you drew to base-ten blocks. How are they similar?

6. **Stretch Your Thinking** How can you use a picture to show $3 \times 1,005$? Try it. What is the product?



Shaping Factors

Choose one number from a circle and another number from a triangle. Then use these two numbers to write a number sentence that is true for each problem.

1. Find the least product.

2. Find the greatest product.

3. Find the product closest to 1,050.

4. Find a product with an 8 in the ones place.

5. Find the greatest product ending in 25.

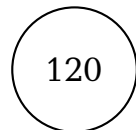
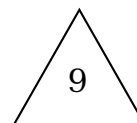
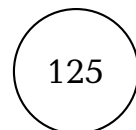
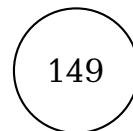
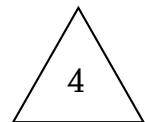
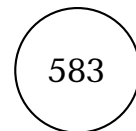
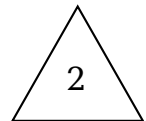
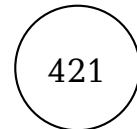
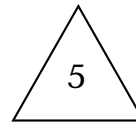
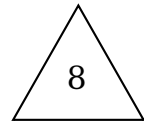
6. Find a product between 1,500 and 1,700.

7. Find a product that contains only the digits 2 and 9.

8. Find a product with three zeros.

9. Find the product closest to 500.

10. Find the product closest to 2,000.




Math Cross

Complete the multiplication puzzle.

		1,246	×	4	=					
		×								
		3	×	2,157	=					
		=					×			
2	×		=				2			
×							=			
\$3,610			6	×	2,157	=				
=			×			×				
			\$1,248			4	×	\$21.43	=	
		=			=					

Think About it!

-  **WRITE Math** How could you use estimation to check if your answers are reasonable? Explain.

Estimating the Cost of Energy

How much energy does your family use? Estimate how many hours your family uses these appliances within an 8-hour period. Find the total cost of electricity for that 8-hour period. Then estimate the cost for a 24-hour period, and 1 week.

Appliance	Cost per hour	Estimated number of hours used per 8-hour period	Cost (\$) for 8-hour period	Cost (\$) for 24-hour period	Total cost (\$) for 1 week, (7 days)
Hair dryer	\$0.16				
60-inch color television	\$0.02				
Stereo	\$0.02				
Light bulb	\$0.01				
Water heater	\$0.04				
Personal computer	\$0.04				
Refrigerator	\$0.01				
Oven	\$0.25				
Microwave oven	\$0.15				
Toaster oven	\$0.16				
Air conditioner (central)	\$0.40				

Think About It!

1. How did you figure out about how much the total cost of all the appliances for the entire week would be?

2. Suppose your family wants to cut its energy use. Which appliances would it make the most sense to use less? Explain.

Multiplication Mix-Up

Oops! Sam accidentally wrote an extra digit in the answers to these problems. Find the real product for each problem and then cross out the extra digit in Sam's answer. The first problem is done for you.

1. $1 \times 11 = \underline{11}$

Sam's incorrect answer: ~~1~~1 1

2. $2 \times 11 = \underline{\hspace{2cm}}$

Sam's incorrect answer: 2 4 2

3. $3 \times 11 = \underline{\hspace{2cm}}$

Sam's incorrect answer: 3 3 2

4. $4 \times 11 = \underline{\hspace{2cm}}$

Sam's incorrect answer: 5 4 4

5. $5 \times 11 = \underline{\hspace{2cm}}$

Sam's incorrect answer: 5 2 5

6. $6 \times 11 = \underline{\hspace{2cm}}$

Sam's incorrect answer: 6 6 1

Look at the pattern of the correct products for Exercises 1-6. Predict the product of Exercises 7-10. Draw the corresponding shape from each problem around the correct product on the right. Only four of the numbers on the right will have shapes drawn around them.

7. $7 \times 11 = \square$

37

110

8. $8 \times 11 = \triangle$

99

52

9. $9 \times 11 = \bigcirc$

46

88

10. $10 \times 11 = \star$

77

123

Think About It!

11. How can you use the pattern in products with a factor of 11 to predict the pattern in products with a factor of 22?

Product Puzzles

For each puzzle line, write the product in the empty square.
Then use the product to continue multiplying down the line.
The first one has been done for you.

1.

4	× 10	40	× 2	80	× 6	=	480
---	------	----	-----	----	-----	---	-----

2.

3	× 20		× 17	
---	------	--	------	--

3.

10	× 3		× 92	
----	-----	--	------	--

4.

9	× 5		× 80	
---	-----	--	------	--

5.

12	× 4		× 40	
----	-----	--	------	--

6.

11	× 5		× 90	
----	-----	--	------	--

7.

8	× 9		× 70	
---	-----	--	------	--

8.

7	× 6		× 60	
---	-----	--	------	--

9.

6	× 4		× 90	
---	-----	--	------	--

Think About It!

10. **Stretch Your Thinking** Make your own product puzzle where the final product is over 5,000.

--	--	--	--	--

Decode the Message

Use estimation to find the number sentence that has the greatest product. Then move the letter of the correct answer to its place in the letter puzzle below. For example, the letter of the greatest product from Exercise 1 will move to blank 1.


The first one has been done for you.

- | | | | | | |
|-------|-----------------|---|-----------------|---|-----------------|
| 1. A | 42×50 | E | 33×64 | T | 48×56 |
| 2. A | 121×15 | B | 112×14 | C | 102×12 |
| 3. J | 91×24 | O | 89×33 | P | 82×31 |
| 4. K | 78×46 | R | 74×48 | E | 79×55 |
| 5. A | 45×32 | I | 48×39 | R | 43×34 |
| 6. I | 256×26 | E | 209×31 | Y | 228×27 |
| 7. T | 505×48 | W | 515×13 | B | 517×44 |
| 8. T | 349×62 | R | 321×69 | S | 378×65 |
| 9. N | 88×72 | P | 67×70 | M | 91×64 |
| 10. D | 430×53 | H | 425×42 | M | 428×61 |

What is a great way to evaluate the reasonableness of an answer?

_____ T _____ !
 4. 8. 7. 5. 10. 2. 1. 6. 3. 9.

Think About It!

11.  For Exercise 10, how did you use estimation to decide which was the greatest product?

12. **Stretch Your Thinking** How could you estimate the product of $3,253 \times 56$? Try it.

Homework Match-Up

John's dog ripped up his homework assignment. Each word problem is now split into three different sections. Help John put together the three pieces of his homework. Then solve.

1. There are 3 jars of beads.

Then, he deposits \$132 and writes a check for \$24.

How many more books do the student need to collect?

2. Rick has \$269 in his bank account.

He writes 250 words each month for three months.

How many beads are there altogether?

3. Each year, Nate keeps a journal of his summer vacation.

Each jar has 472 beads

How many pages does Nate write in his journal in 2 years?

4. Students want to collect 175 books for the school library.

Last week, they collected 83 books and this week they collect 76 books.

How much more money does Rick have in his bank account now then when he started?

Think About It!

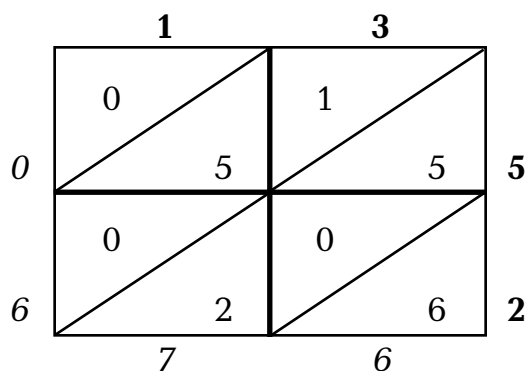
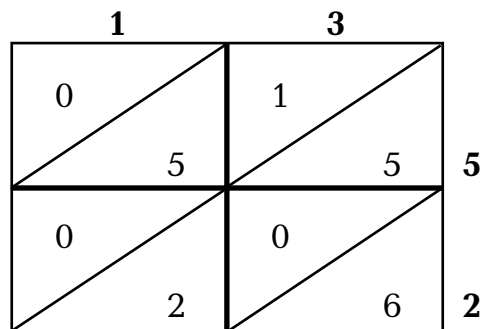
5. **Stretch Your Thinking** Which operation did you use to solve Exercise 1? Is there another operation you could use? Explain.

The Lattice Method

An early method of multiplying is the lattice method.
Here's how it works.

Multiply 13×52 .

- Write one factor along the top of the lattice and the other factor along the right side.
- Multiply each digit of the factors. Record the products inside the lattice so that the ones and tens are separated by a diagonal.
- Add the numbers in the grid along the diagonals, starting from the lower right corner. Record each sum at the end of its diagonal just as you do when adding columns.
- Read the digits down the left and across the bottom. This is the product.

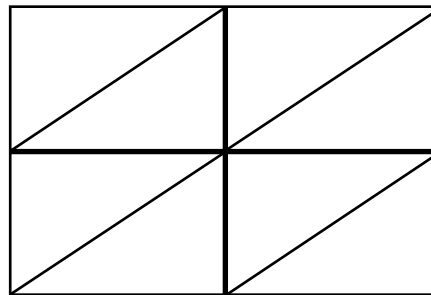
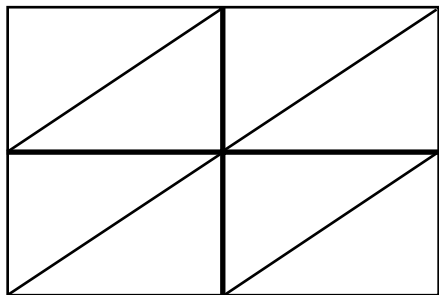


So, $13 \times 52 = 676$.

Use the lattice method to find the product.

1. $31 \times 22 =$ _____

2. $32 \times 56 =$ _____



Think About It!

3.  How does the lattice method use partial products to multiply?

Product Pairs

Elena and Nikolas are doing their homework together. They need to find two pairs of factors that have the same product. Help Elena and Nikolas finish their homework by finding the product for the first pair of factors. Then fill in the missing digit for the second pair of factors so their products are equal.

1.
$$\begin{array}{r} 34 \\ \times 15 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ \times 1\ \square \\ \hline \end{array}$$

2.
$$\begin{array}{r} 46 \\ \times 25 \\ \hline \end{array}$$

$$\begin{array}{r} 50 \\ \times 2\ \square \\ \hline \end{array}$$

3.
$$\begin{array}{r} 54 \\ \times 39 \\ \hline \end{array}$$

$$\begin{array}{r} 81 \\ \times 2\ \square \\ \hline \end{array}$$

4.
$$\begin{array}{r} 75 \\ \times 27 \\ \hline \end{array}$$

$$\begin{array}{r} 45 \\ \times 4\ \square \\ \hline \end{array}$$

5.
$$\begin{array}{r} 44 \\ \times 32 \\ \hline \end{array}$$

$$\begin{array}{r} 88 \\ \times 1\ \square \\ \hline \end{array}$$

6.
$$\begin{array}{r} 90 \\ \times 24 \\ \hline \end{array}$$

$$\begin{array}{r} 80 \\ \times 2\ \square \\ \hline \end{array}$$

7.
$$\begin{array}{r} 64 \\ \times 49 \\ \hline \end{array}$$

$$\begin{array}{r} 56 \\ \times 5\ \square \\ \hline \end{array}$$

8.
$$\begin{array}{r} 38 \\ \times 35 \\ \hline \end{array}$$

$$\begin{array}{r} 95 \\ \times 1\ \square \\ \hline \end{array}$$

Think About It!

9. **Stretch Your Thinking** Find two pairs of 2-digit factors that have the same product. Show your work below.

Product Pages

Cherie's teacher handed out these sheets of paper for homework. Cherie has to circle two factors on each page that will equal the product at the top. Can you help Cherie complete her assignment?

1.

6,000	
120	957
145	90
170	50

2.

18,375	
65	55
245	650
25	75

3.

13,824	
576	288
12	199
448	48

4.

30,375	
50	263
125	675
45	25

5.

9,456	
12	394
788	624
48	144

6.

55,272	
196	344
76	47
564	98

Think About It!

7. **Stretch Your Thinking** In Exercise 6, change the factor 98 to 1176. What would your new product pair be?

Cross-Number Puzzle

Use paper and pencil, mental math, and a calculator to complete the cross-number puzzle. In this puzzle, the comma uses one space. The first one has been done for you.

1 7	,	2 5	0	0		3			4		
						5				6	
7				8							
				9					10		
11											

Across

- product of 25 and 300
- product of 1,530 and 18
- product of 68 and 9
- product of 1,001 and 6
- product of 3,189 and 46
- product of 12 and 10

Down

- product of 83 and 947
- estimated product of 595 and 90
- product of 83 and a factor between 30 and 35
- product of two multiples of 3
- product of 337 and 2
- product of 204 and 3
- factor that when multiplied by 55 gives the product of 5,005

Think About It!

13. Stretch Your Thinking If the clue for 11-across was, "product of 12 and a 2-digit factor" would your answer still work? Explain.

Is It Reasonable?

Jenna forgot her calculator and needs to finish this assignment. Instead of a calculator, use estimation to help Jenna circle the most reasonable answer. The first one is done for you.

A spaghetti dinner costs \$12.65. How much will 40 dinners cost?


- A \$5.60 C \$506.00
B \$56.00 D \$5,600.00

A quick estimate of the cost gives you $\$12 \times 40 = \480 .

So, only answer C is reasonable.

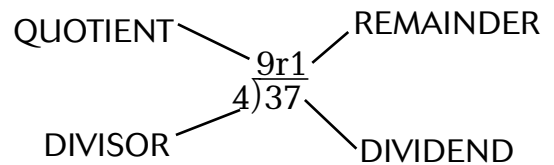
- The distance between the California cities of Sacramento and San Diego is 505 miles. In one week, a jet flies 28 round-trips between Sacramento and San Diego. How far does the jet travel?
A 1,010 miles C 7,070 miles
B 2,020 miles D 28,280 miles
- Ms. Noori is an airline pilot. She flew 2,325 miles one day, 2,539 miles the second day, and 3,142 miles the third day. How many miles did Ms. Noori fly in all?
A 4,864 C 1,681
B 5,467 D 8,006
- A gymnastic outfit costs \$39.59. How much will outfits for a team of 18 gymnasts cost?
A \$71.26 C \$7,126.20
B \$712.62 D \$71,262.00
- A box of canned chili for the school cafeteria costs \$21.09. What is the cost of 47 boxes of chili?
A \$126.54 C \$991.23
B \$253.08 D \$5,947.38
- The Pizza Palace charges \$8.75 for a cheese pizza, \$12.95 for a pepperoni pizza, and \$15.75 for a mixed veggie pizza. Ms. Bin's class buys 4 cheese pizzas, 4 pepperoni pizzas, and 2 mixed veggie pizzas. How much will the class spend on pizza?
A \$31.50 C \$86.80
B \$37.45 D \$118.30
- There are 276 students at the elementary school. The cafeteria manager estimates that each student uses about 28 napkins each month. Which pack of napkins should the cafeteria manager order for next month?
A 500 pack C 10,000 pack
B 1,000 pack D 20,000 pack

Think About It!

7.  Explain how to use front-end estimation with adjusting to get a closer estimate for Exercise 1.

Riddle Time

Use the clues to solve the riddles below. You will need to know the name for each part of a division equation. Use the example at the right as a reminder.



- | | |
|--|--|
| <p>1. My divisor is 5.
I am greater than 4×5.
I am less than 5×5.
My remainder is 1.
What dividend am I? _____</p> | <p>2. My divisor is 9.
I am greater than 7×9.
I am less than 8×9.
My remainder is 7.
What dividend am I? _____</p> |
| <p>3. My divisor is 8.
I am less than 30.
I am greater than 3×8.
My remainder is 5.
What dividend am I? _____</p> | <p>4. My divisor is 6.
I am less than 60.
I am greater than 8×6.
I have no remainder.
What dividend am I? _____</p> |
| <p>5. My dividend is 50.
My remainder is 1.
I am an odd number.
What divisor am I? _____</p> | <p>6. My dividend is 8 times as large as my divisor.
I am an even number less than 15.
What quotient am I? _____</p> |
| <p>7. My remainder is 8.
My dividend is 80.
I am a 1-digit number.
What divisor am I? _____</p> | <p>8. My dividend is 24.
I am 2 more than my quotient.
I have no remainder.
What divisor am I? _____</p> |

Think About It!

9.  Use Exercises 1–8 as a model to write your own division number riddle.

What Fact Am I?

Use the clues to find a solution to each puzzle.

The answer is a division fact.

1. My quotient is 1 less than $27 \div 9$.
I have no remainder. What division fact am I?

3. My quotient is 2 less than $32 \div 8$.
My remainder is 1. What division fact am I?

5. My quotient is 1 less than $50 \div 2$.
My remainder is 1. What division fact am I?

7. My quotient is 2 more than $66 \div 3$.
I have no remainder. What division fact am I?

9. My quotient is 1 less than $65 \div 5$.
My remainder is 4. What division fact am I?

2. My quotient is 1 more than $30 \div 5$.
My remainder is 2. What division fact am I?

4. My quotient is 2 more than $18 \div 9$.
My remainder is 2. What division fact am I?

6. My quotient is 1 more than $72 \div 6$.
My remainder is 2. What division fact am I?

8. My quotient is 2 less than $44 \div 4$.
My remainder is 1. What division fact am I?

10. My quotient is 2 more than $81 \div 9$.
I have no remainder. What division fact am I?

Think About It!

11. **Stretch Your Thinking** Make up a puzzle like the ones on this page. The answer to your puzzle should be a division fact.

What's the Dividend?

Carly finished her math classwork early and rewrote her division problems on a new sheet of paper. When she got home, she saw that she forgot to write the dividend in each problem. Help Carly fill in the missing digits that will make her division exercises true.

$$\begin{array}{r}
 14 \text{ r}1 \\
 4 \overline{) \square \square} \\
 \underline{-4 \downarrow} \\
 17 \\
 \underline{-16} \\
 1
 \end{array}$$

1.

$$\begin{array}{r}
 18 \text{ r}1 \\
 3 \overline{) \square \square} \\
 \underline{-3 \downarrow} \\
 25 \\
 \underline{-24} \\
 1
 \end{array}$$

2.

$$\begin{array}{r}
 31 \text{ r}1 \\
 2 \overline{) \square \square} \\
 \underline{-6 \downarrow} \\
 03 \\
 \underline{-2} \\
 1
 \end{array}$$

3.

$$\begin{array}{r}
 14 \text{ r}4 \\
 5 \overline{) \square \square} \\
 \underline{-5 \downarrow} \\
 24 \\
 \underline{-20} \\
 4
 \end{array}$$

4.

$$\begin{array}{r}
 22 \text{ r}2 \\
 4 \overline{) \square \square} \\
 \underline{-8 \downarrow} \\
 10 \\
 \underline{-8} \\
 2
 \end{array}$$

5.

$$\begin{array}{r}
 14 \\
 6 \overline{) \square \square} \\
 \underline{-6 \downarrow} \\
 24 \\
 \underline{-24} \\
 0
 \end{array}$$

6.


$$\begin{array}{r}
 23 \text{ r}2 \\
 3 \overline{) \square \square} \\
 \underline{-6 \downarrow} \\
 11 \\
 \underline{-9} \\
 2
 \end{array}$$

7.

$$\begin{array}{r}
 13 \text{ r}4 \\
 7 \overline{) \square \square} \\
 \underline{-7 \downarrow} \\
 25 \\
 \underline{-21} \\
 4
 \end{array}$$

8.

Think About It!

9.  Explain how you found the dividend for Exercise 8.

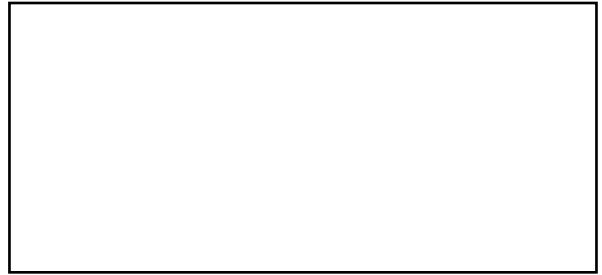
Visible Solutions

Draw a diagram to model each problem.

- Jennifer is arranging flowers into bouquets. She has 27 flowers and needs to put 4 flowers in each bouquet. How many bouquets will Jennifer make?



- The town's swimming league has 6 teams. Each team has 8 swimmers. How many swimmers are there in the town's swimming league?

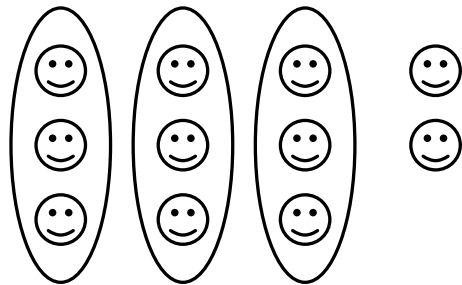


Write a word problem for each diagram and solve.

3.



4.



Think About It!

- WRITE Math** Suppose in Exercise 1, Jennifer puts 5 flowers in each bouquet. Explain how your picture would change.

Find the Pattern

Cherie's class is playing the *Find the Pattern* game. The teacher gives six cards to each student. The one who can use the pattern to figure out the rule and complete the table wins the game. Look at Cherie's cards below and see if you can *Find the Pattern* too.

1. Rule: _____

Input	Output
420	60
49	7
6,300	900
56,000	
	200

2. Rule: _____

Input	Output
2,000	400
25,000	5,000
400	80
	10
30,000	

3. Rule: _____

Input	Output
630	70
810	
27,000	3,000
4,500	500
	9

4. Rule: _____

Input	Output
3,600	900
2,000	500
	4,000
800	200
24,000	

5. Rule: _____

Input	Output
3,200	
40,000	5,000
560	70
24,000	3,000
	600

6. Rule: _____

Input	Output
600	100
7,200	1,200
	6,000
12,000	2,000
4,200	

Estimate This!

Choose a dividend and a divisor from the box for each estimated quotient.
You may use numbers more than once.

6,440	3	524
2,731	8	5

1. 800 _____ ÷ _____

2. 500 _____ ÷ _____

3. 100 _____ ÷ _____

4. 900 _____ ÷ _____

2	815	9
536	969	5

5. 500 _____ ÷ _____

6. 60 _____ ÷ _____

7. 90 _____ ÷ _____

8. 100 _____ ÷ _____

8	6,149	3,044
4	7	731

9. 900 _____ ÷ _____

10. 800 _____ ÷ _____

11. 90 _____ ÷ _____

12. 400 _____ ÷ _____

Think About It!

13. **Stretch Your Thinking** Two numbers have an estimated quotient of 500 and a sum of 3,000. If one of the numbers is a single digit, what two numbers could they be?

Find the Quotient

Use the clue to write a number sentence for each problem, then solve it. You must choose the dividend from a circle and the divisor from a triangle. The quotients will *not* have remainders. You can only use each circle once, but you can use the triangles as many times as you like.

1. Find the least quotient.

2. Find the greatest quotient.

3. Find the quotient closest to 70.

4. Find a 2-digit quotient with a 4 in the ones place.

5. Find a quotient of 75.

6. Find the least quotient that ends with a 5.

7. Find the quotient closest to 50.

760

2

441

5

504

125

7

28

375

8

9

272

Remember the Remainder


Miss Long's science class is learning about volume. They want to fill different-size pitchers to the top with water. Each student will use an 8-ounce cup filled to the top with water. Help Miss Long find the number of students she will need to choose to empty their cups into the pitchers.

The first one is done for you.

Number of ounces in the pitcher	Number of 8-ounce cups completely emptied	Number of ounces the last student pours	Number of students needed to fill the pitcher
1. 12	1	4 ounces	2 students
2. 32			
3. 98			
4. 65			
5. 70			
6.	10	7 ounces	
7.	15	3 ounces	
8.	22	1 ounce	
9.	17	5 ounces	
10.		4 ounces	20 students
11.		7 ounces	15 students

Think About It!

12. **Stretch Your Thinking** Suppose the students used 12-ounce cups. How would your answer change for Exercise 9?

13.  How did you determine the number of ounces in the pitcher for Exercise 10? Explain.

Divide and Conquer

There are 5 division equations below that are missing numbers. Find the number value of each shape to solve all five equations. Determine the value of each shape to make the equation true.

$$315 \div \text{Arrow} = 45$$

$$154 \div \text{Arrow} = 22$$

$$756 \div \text{Arrow} = \square$$

$$\square \div \text{Diamond} = 27$$

$$\text{Triangle} \div \text{Diamond} = \square$$

$$\text{Arrow} = \underline{\hspace{2cm}}$$

$$\text{Diamond} = \underline{\hspace{2cm}}$$

$$\square = \underline{\hspace{2cm}}$$

$$\text{Triangle} = \underline{\hspace{2cm}}$$

Think About It!

1. **Stretch Your Thinking** If you had not been given the first equation, could you still have determined the value of the arrow? Explain.

2. **WRITE Math** How can you check a division problem to make sure you are correct? Explain.

The Great Divide

In this code, a letter is in place of a single digit number. Use the given numbers to solve the equation. Then write the letter for each number at the bottom. Break the code to answer this question:

What do all these division problems have in common?

$IRH \div 3 = 108$	$832 \div H = 208$	$612 \div 6 = ZTR$	$450 \div N = 50$
$UTU \div 5 = 101$	$QTR \div 3 = 200 \text{ r}2$	$735 \div E = 105$	$HZO \div 2 = 209$
$100 \div ZT = 10$	$610 \div R = 305$	$NZU \div 3 = 305$	$QIT \div 3 = 210$
$100 \div 5 = RT$	$NQI \div 9 = 107$	$440 \div H = 110$	$UUR \div 5 = 110 \text{ r}2$

 1 7 2 8 3 9 0 4 7

 6 5 8 0 3 7 9 0

Think About It!

1. **Stretch Your Thinking** Suppose the divisor in the first equation changed from 3 to 4. What would the new equation be?

2. **WRITE Math** Explain why you would have a zero in a quotient.

Days By Threes

Kyle's baseball team begins its season on April 6th and plays every six days throughout April.

Kyle's swimming lessons begin April 3rd and continue throughout April, every three days.


**On the calendar below circle every date that Kyle will play baseball.
Put a check on every date that Kyle will attend a swimming lesson.**

APRIL						
SUN	MON	TUES	WED	THURS	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

1. On which dates does Kyle have swimming lessons?

2. On which dates does Kyle play baseball?

Think About It!

3.  Look at the dates Kyle plays both sports. Is there a pattern? Explain.

4. **Stretch Your Thinking** If Kyle had begun his swimming lessons on April 1st rather than on April 3rd, on how many dates in April would he participate in both sports?

The Sieve of Eratosthenes

Eratosthenes was a Greek mathematician. He invented a method of finding prime numbers. This method is called the “Sieve of Eratosthenes.” A sieve is a way to sift, or separate, one item from another. This sieve “sifts” out composite numbers, leaving only primes.

Use the hundred chart below to find the prime numbers less than 100.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Step 1: Cross out number 1, because it is not prime.

Step 2: Circle number 2 because it is the first prime number.
Then cross out all of the multiples of 2.

Step 3: Circle 3, the next number that is not crossed out. Then cross out all the multiples of 3.

Step 4: Circle 5, the next number that is not crossed out. Then cross out all the multiples of 5.

Step 5: Continue this until each number has either been circled or crossed out. You have circled all the prime numbers from 1 to 100.

Think About It!

- Stretch Your Thinking** Extend the hundred chart to 130. Then list all the prime numbers from 1 to 130.

101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130

Prime and Composite Servings

Isabelle makes lasagna for a different group of family members every Wednesday. On the chart below match the serving description on the left with the number description on the right by placing the letters A–F correctly on the answer lines.

Serving Descriptions	Number Description
A. Isabelle serves 22 pieces of lasagna.	1. _____ My factors are 1 and 7; I am prime.
B. Isabelle serves 1 piece of lasagna to every person in a group of 1 less than 20 people.	2. _____ My factors are 1, 2, 7, and 14; I am composite.
C. Isabelle serves 7 people, 2 pieces of lasagna each.	3. _____ My factors are 1, 2, 3, 4, 6, 8, 12, and 24; I am composite.
D. Isabelle serves 7 people, one piece of lasagna each.	4. _____ My factors are 1 and 19; I am prime.
E. Isabelle makes 16 pieces of lasagna but drops one piece on the floor and must therefore throw it away. She serves the rest to her guests.	5. _____ My factors are 1, 2, 11, and 22; I am composite.
F. Isabelle serves 8 people, 3 pieces of lasagna each.	6. _____ My factors are 1, 3, 5, and 15; I am composite.

Think About It!

7. **Stretch Your Thinking** What if in Exercise E Isabelle had not dropped one portion of lasagna? Would her serving amount now be composite or prime? What are the factors of this number?

Prime Factor Puzzles

Use prime factors to complete each puzzle.

1. Find the missing prime factors of 12.

The product along each row and column is the same.

2	2		= 12
			= 12
2	3		= 12
= 12	= 12	= 12	

2. Find the missing prime factors of 110.

The product along each row and column is the same.

	2		= 110
11		2	= 110
			= 110
= 110	= 110	= 110	

Think About It!

3. **Stretch Your Thinking** Which prime factors would you use to make your own puzzle for the number 132?

4. **WRITE Math** Explain how you determined which prime factors were used to complete Exercise 2.

Pattern Imposters

Each series is meant to create a pattern of four numbers. One number does not belong in the pattern. It is an imposter and does not follow the rule that the rest of the pattern is following. Write this number on the line below each exercise. Then write the rule you used.

1. 7 | 3 | 9 | 27 | 81

3. 2 | 1 | 4 | 8 | 16

5. 19 | 22 | 17 | 20 | 28

7. 5 | 7 | 9 | 11 | 14

9. 1 | 4 | 2 | 8 | 5

11. 5 | 9 | 8 | 12 | 10

13. 11 | 3 | 9 | 7 | 5

2. 1 | 4 | 5 | 7 | 10

4. 5 | 15 | 25 | 27 | 35

6. 1 | 3 | 9 | 18 | 27


8. 4 | 8 | 20 | 16 | 32

10. 1 | 2 | 4 | 16 | 64

12. 2 | 3 | 9 | 27 | 81

14. 5 | 10 | 15 | 25 | 20

Think About It!

15.  How did you find the rule in Exercise 11? Explain.

16. **Stretch Your Thinking** Write a rule that could be used for four numbers beginning with the number 1. Then complete the number pattern using your rule.

1						
---	--	--	--	--	--	--

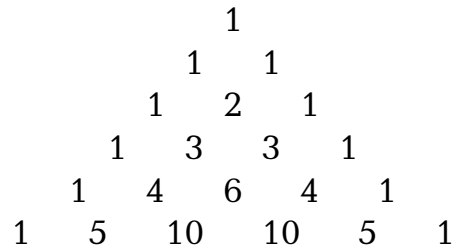
Pascal's Triangle

This triangle is called Pascal's Triangle.

To get the next row of numbers in the triangle, add the two numbers above.

The first row contains only one number, 1.

The second row contains 1 and 1.



1. Find the sum of the numbers in the third row. _____
2. Find the sum of the numbers in the fourth row. _____
3. Find the sum of the numbers in the fifth row. _____
4. What pattern do you notice?

5. Use the pattern to predict the sum of the numbers in the seventh row.

6. What are the numbers in the seventh row?

7. What other patterns do you notice in Pascal's Triangle?

Think About It!

8. **Stretch Your Thinking** What if the first row of the triangle has only one number, 2, and the second row has 2 and 2. What are the numbers in the sixth row?

9. **WRITE Math** Explain how you drew your conclusion about the pattern you found in Exercise 4.

Recess Survey

Peter conducted a survey of his fourth grade class. His results are shown in the following tally table.

Favorite Recess Activity	
Activity	Tally
Tether ball	###
Tag	
Soccer	###
Swings	
Four Square	###

1. What was Peter's survey question?

2. How many students were surveyed?

3. What was the most popular activity?

4. Which activity is twice as popular as Tag?

Peter would like to use the information from his tally table to make a frequency table that is easy to understand. Help Peter organize the information from the tally table by listing the activities from most frequent to least frequent. Use numbers instead of tally marks.

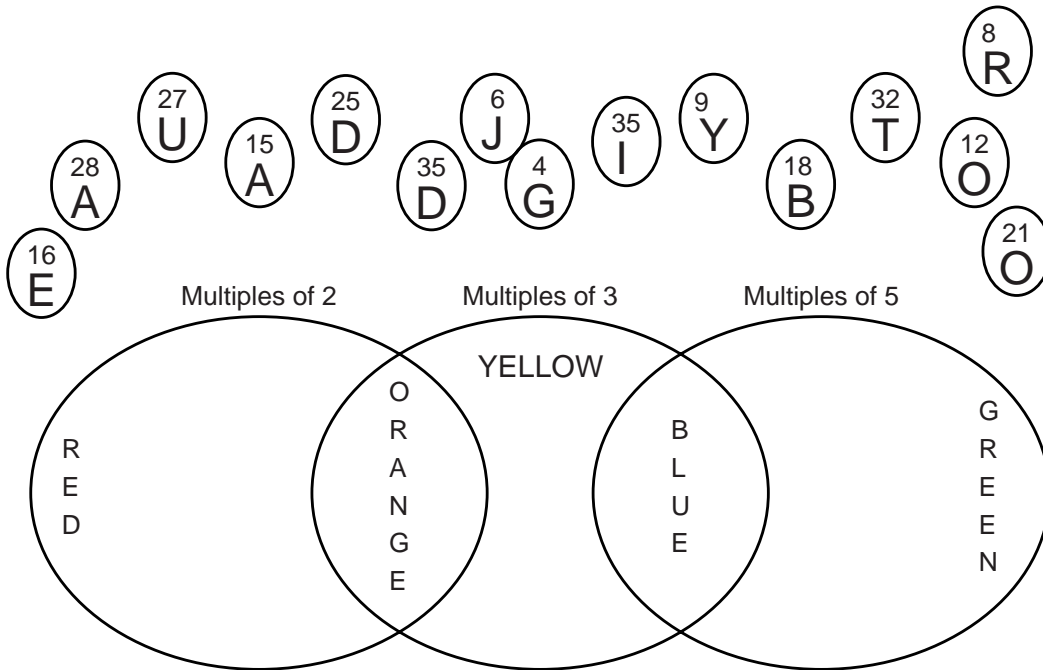
Favorite Recess Activity	
Activity	Frequency

Think About It!

5. Create a bar graph using the frequency table data.
6.  Explain how frequency tables and graphs help organize data.

Venn's Message

Write the letters below in the correct area of the Venn diagram. The labels tell which multiples belong in each area. Sort the letters according to its number and the multiples. Then unscramble the letters in each colored area to solve the message below.



Message:

YELLOW

GREEN

BLUE

RED

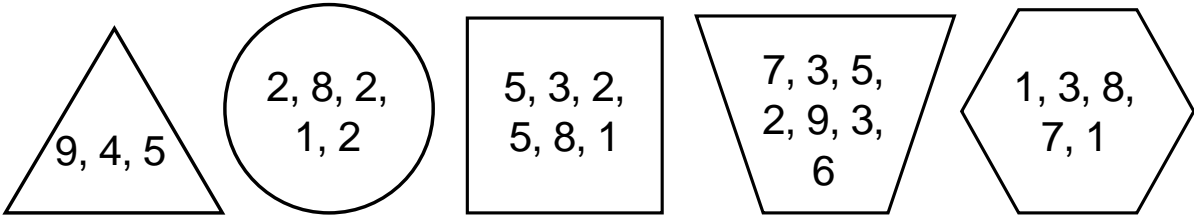
ORANGE
 _____ !

Think About It!

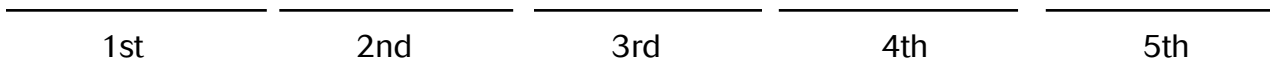
- WRITE Math** How did you know how to place a letter if its number was odd? Explain.
- Stretch Your Thinking** Suppose the first label changed from "Multiples of 2" to "Multiples of 4". Would the message change? Explain.

Average Logic

The shapes below are out of order. Each shape contains a set of numbers. Using the clues, redraw the shapes in the proper order.



- The numbers in the shape in 1st place have a median of 5 and a mode of 3.
- The numbers in the shape in 3rd place have a median and mode that are equal.
- The numbers in the shape in 5th place have a median of 4.
- The numbers in the shape directly to the right of the circle have a mode of 1.
- The numbers in the shape in 2nd place do not have a mode.



Think About It!

1. **WRITE Math** When solving the puzzle above, does it help to rewrite the data set from least to greatest? Explain.

2. **Stretch Your Thinking** If a 7 was added to the triangle's data set how would the median be calculated? Explain.

Plot the Code

Sarah's teacher used a code to write the following comment on her spelling test.

1, 8, 7, 6, 8, 3, 7, 4, 2, 6, 3, 7, 8, 4, 5, 4, 3, 7,

4, 8, 2, 4, 7, 6, 8, 3, 8, 5, 2, 7, 3, 8, 3, 3, 6, 8

Plot an X in each box above the number for each piece of data in the code. Then put your finger on the top of each column and follow the row across to the letter on the left. Write that letter below each number to decipher the code. The first one has been done for you.

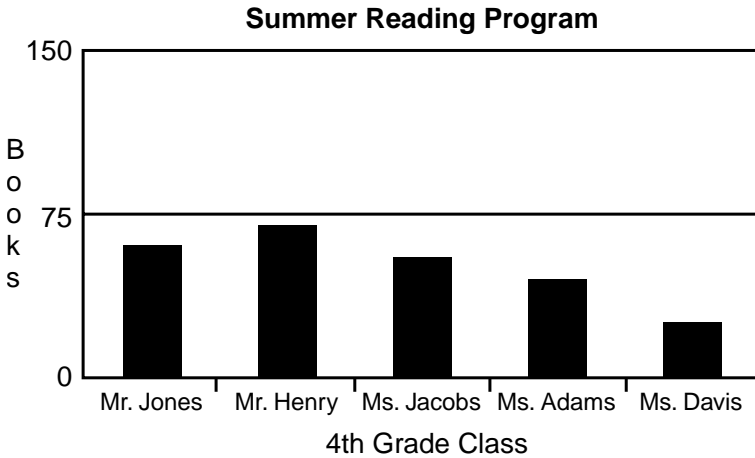
B								
P								
O								
E								
J								
U								
R								
S	X							
	1	2	3	4	5	6	7	8
	S							

Think About It!

- WRITE Math** What strategy did you use to keep from plotting the same number more than once?
- Stretch Your Thinking** Sarah says the mode of the data set is 3. Is that correct? Explain.

Choose an Interval

The 4th grade at Lincoln Elementary School participated in a summer reading program. The following chart shows the amount of books read per class.



Sam drew this graph. His classmates had a difficult time reading the data

Can you help Sam? Choose a more appropriate interval to make it easier to accurately read the data. Use the information on the right to redraw the graph.

- Ms. Jones – 60 Books
- Mr. Henry – 10 more books than Ms. Jones’ class
- Ms. Jacobs – 55 Books
- Ms. Adams – 10 fewer books than Ms. Jacobs’ class
- Mr. Davis – 25 Books

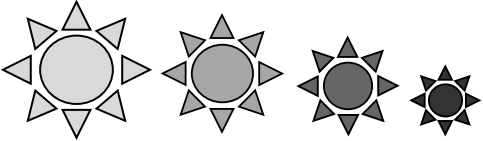

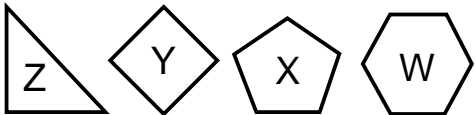
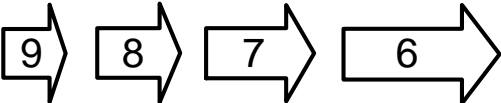
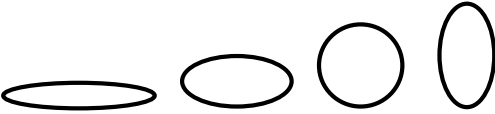
Think About It!

1. **WRITE Math** Why is choosing a reasonable interval for your graph so important?


2. **Stretch Your Thinking** If Mr. Henry’s class read 175 books, what interval would you choose for the graph? Explain.

Patterns

Draw your prediction of what comes next. Write the generalization you made that shows a relationship or connection within the pattern.

Pattern	Prediction	Generalization
		
		
		
		
		
<p>1 3 5 7 9</p>		

Think About It!

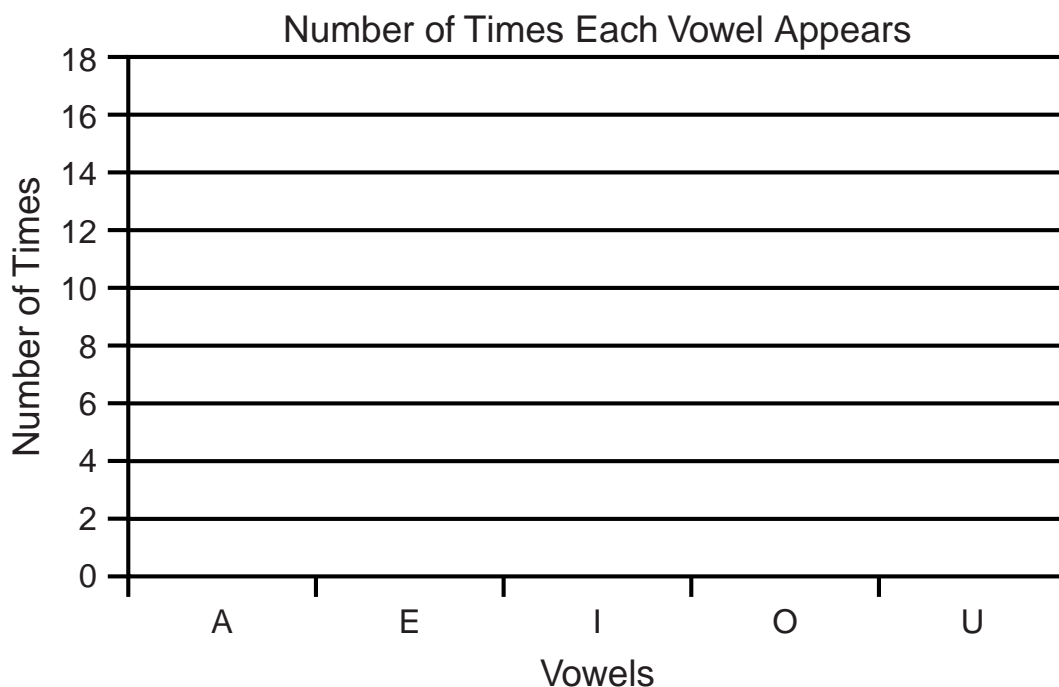
1.  How do you recognize a pattern?

2. **Stretch Your Thinking** Write or draw your own pattern.

Letter Graph

1. Fill in the number of times each vowel appears in these directions. Then use the data to complete the bar graph below.

Vowel	Number of Times
A	
E	
I	
O	
U	



Think About It!

2. **Stretch Your Thinking** Look at the bar graph. Make a prediction. Which vowel occurs most often in written English? Which vowel occurs least often? Explain.

What Is Your Favorite Color?

Haley surveyed the boys and girls in her class to find out their favorite colors. Haley's results are in the tally tables below.

Boys

Favorite Color	Number of Students
Red	I
Blue	II
Green	I
Yellow	II
Purple	III
Orange	II

Girls

Favorite Color	Number of Students
Red	II
Blue	I
Green	IIII
Yellow	I
Purple	I
Orange	III

- Use the data to make a double-bar graph. Decide on a title, labels, and a scale for the graph. Then draw two bars for each color.

Think About It!

- Compare the bars. Which colors had the most and fewest votes for favorites among the boys and the girls?
- How many students were surveyed in all?

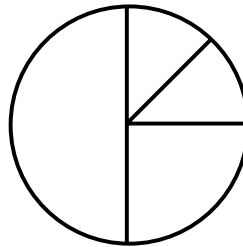
Do It Yourself

Look at the data in each table. Use it to label the circle graph. Then complete the graph by coloring each part a different color.

1.

Favorite Snack	Votes
Peanuts	2
Popcorn	2
Fruit	4
Chips	8

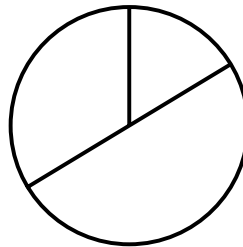
Favorite Snack



2.

Class President	Votes
Brandi	4
Shanda	12
Arnold	8

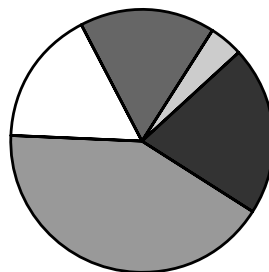
Class President



3.

Favorite Color	Votes
Red	4
Blue	10
Green	1
Yellow	5
Other	4

Favorite Color



Think About It!

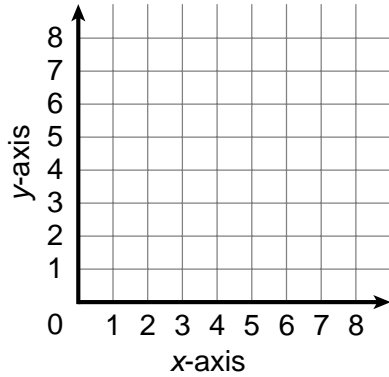
4.  In Exercise 3, what do you think "Other" means?

Connect the Points

Graph the ordered pairs on each grid. Then connect the points in the order you graphed them. Write the name of the plane figure you made: *triangle*, *square*, or *pentagon*.

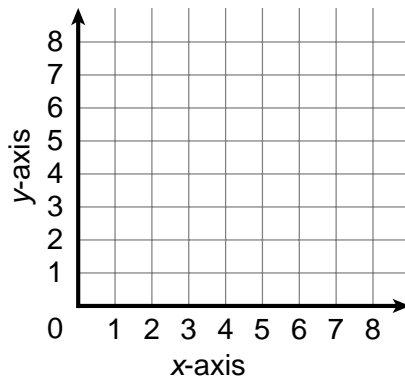
1. $(2,2)$; $(2,6)$; $(6,6)$; $(6,2)$

Figure: _____



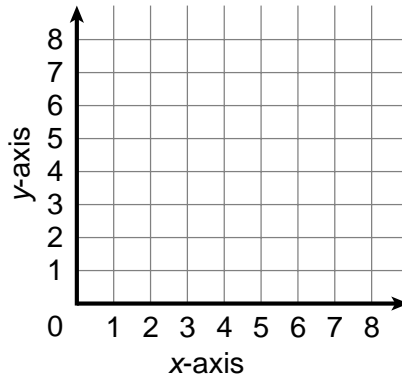
2. $(0,0)$; $(1,5)$; $(3,7)$; $(7,3)$; $(5,1)$

Figure: _____



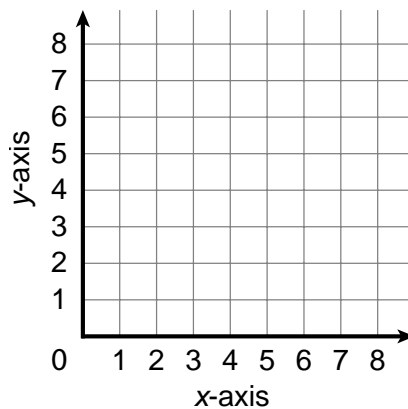
3. $(3,5)$; $(6,1)$; $(8,8)$

Figure: _____



Think About It!

4. **Stretch Your Thinking** Draw a plane figure on the coordinate grid. What ordered pairs describe the figure?

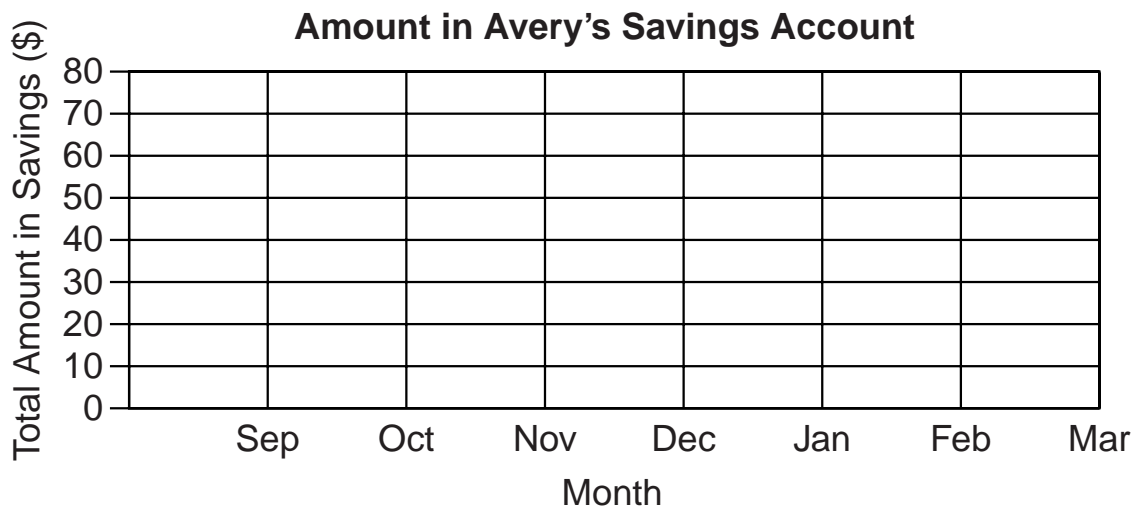


Where's the Data?

Avery keeps track of the money in her savings account each month. She made a line graph to show the data. However, some of the data was lost.

- Use the table to help Avery complete the line graph. Connect your points. Then, use the line graph to help her complete the table.

Month	Total Amount in Savings Account
September	\$10
October	
November	\$60
December	
January	\$50
February	
March	\$70



Think About It!

- Stretch Your Thinking** What trend do you notice in the graph?

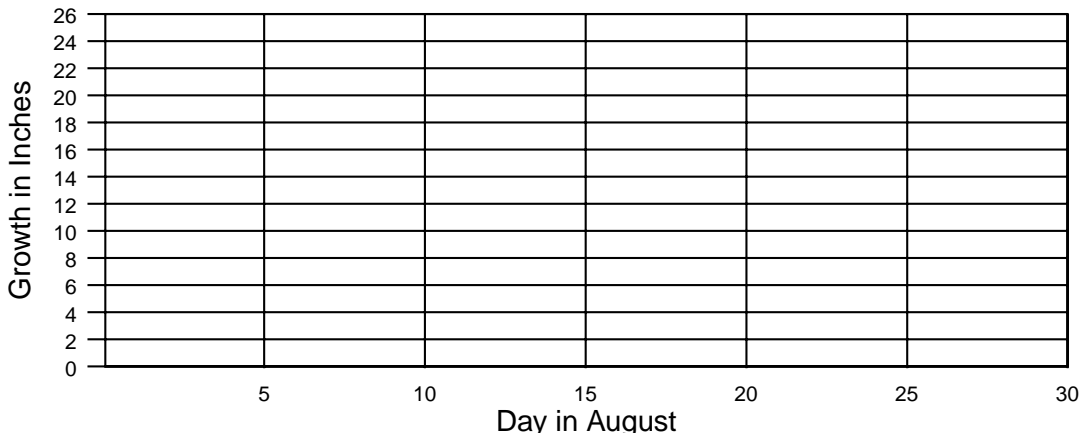
Rafael's Tomato Plants

Rafael has two plants: a cherry tomato plant and a San Marzano tomato plant. During August, Rafael kept track of how much his cherry tomato plant grew every 5 days. He knew that the San Marzano tomato plant grew exactly 2 inches every 5 days.

Day in August	Cherry Plant Growth in inches	San Marzano plant growth in inches
5	6	8
10	10	
15	14	
20	15	
25	18	
30	23	

1. Complete the line graph to show how fast Rafael's cherry tomato plant grew.
2. Then complete the table. Find how high the San Marzano plant had grown every 5 days.
3. Use a different color pencil or pen to make another line on the same graph. Show the growth of the San Marzano plant.

Rafael's Tomato Plants Growth



Think About It!

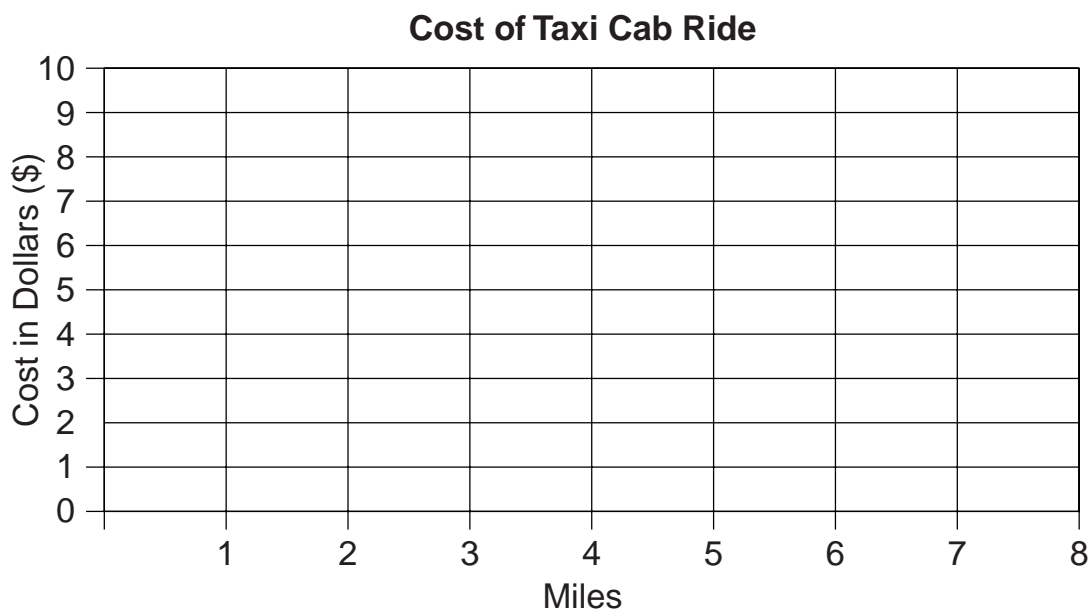
4. **Stretch Your Thinking** What do you notice about the two lines you drew?

Take a Taxi

You can use a line graph to solve a rate problem like the one below.

A taxi driver charges \$2 at the start of a trip. Each additional mile costs \$1. How much would it cost to ride in the taxi for 5 miles?

- On the graph, mark the point (0, 2) to show the start of the trip.
- Mark the point that shows how much it costs to take the cab 1 mile.
It costs $\$2 + \1 to take the cab 1 mile. So, the next point on the graph is (1, 3).
- Continue marking points on the graph until you mark the point (5,).
- Read the graph. How much would it cost to take the cab 5 miles? _____



Think About It!

- Stretch Your Thinking** How much would it cost to take the cab for 8 miles?
- WRITE Math** Explain how you found the answer to Exercise 5.

Imaginary Experiment

Suppose you need to plan a weather experiment for science class. What kind of experiment will you choose?

Think about these questions:

- Will you measure temperature, amount of sunshine, wind direction, humidity (amount of moisture in the air), or something else?
- Will you measure each hour? Each day? Each week?

1. Describe which experiment you will do.

2. How will you record your data?

3. What graph will you use to display your data? Explain.

4. Start your graph in the space below. Label the title. Label the vertical axis and the horizontal axis. Choose a scale and interval for the graph, if necessary.

Weather Maps

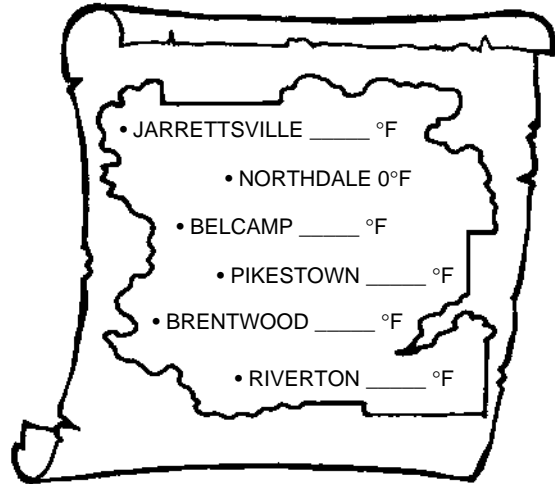
To complete the weather maps, solve the clues for each map.

Write the missing temperatures for each town.

Clues for Map A

1. The temperature in Jarrettsville is 5°F warmer than Northdale.
2. The temperature in Belcamp is 17°F less than in Jarrettsville.
3. The temperature in Pikestown started at 8°F and went up 6°F .
4. The temperature in Brentwood is less than 19°F , but more than 17°F .
5. The temperature in Riverton is 5°F warmer than Belcamp.

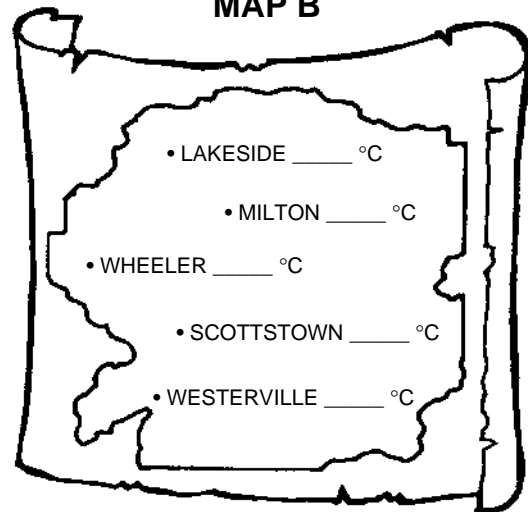
MAP A



Clues for Map B

6. The temperature in Lakeside is between 1°C and 3°C .
7. The temperature in Milton started at the same temperature as Lakeside but went up by 4°C .
8. Scottstown's temperature is 16°C below the freezing point of water.
9. The temperature in Wheeler is 23°C more than in Scottstown.
10. The temperature in Westerville is 10°C less than in Wheeler.

MAP B



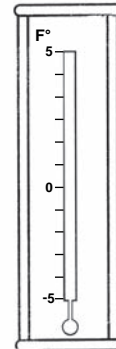
Think About It!

11. What is the difference in temperature from the lowest temperature to the highest temperature on each map?

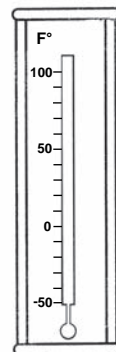
How Cold Is It?

Use the thermometers to record the temperatures at various times and days. Then solve the problems.

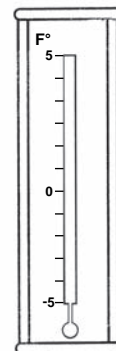
1. Tony checks the thermometer at his house every morning. On Monday, the temperature is 1°F . On Tuesday, the temperature falls by three degrees. On Wednesday, the temperature rises 5 degrees. On Thursday the temperature falls 6 degrees. Use the thermometer to mark the temperature on each day. Compare the temperature on Monday to the temperature on Thursday. Which is greater?



2. Jodi looks up the average temperatures in her town for the past year. In June, the average temperature was 80°F . In October the average temperature was $\frac{1}{2}$ the average temperature in June. In December, the average temperature was 50 degrees less than in October. In January, the average temperature was 10 degrees less than in December. Use the thermometer to mark the average temperatures of each month. Was the average temperature in January greater than or less than -30°F ?



3. Theresa records the temperature at her house at different times of the day. At 1 p.m., it is 5°F . At 7 p.m. it is two degrees less than at 1 p.m. At midnight the temperature has fallen five degrees from the temperature at 7 p.m. At 6 a.m. the temperature is four degrees higher than the temperature at midnight. Use the thermometer to mark the temperatures at Theresa's house at each time. Compare the temperature at Theresa's house at 7 p.m. to the temperature at 6 a.m. Which is greater?





Think About It!

4. What is the difference in temperature from the lowest temperature to the highest temperature in each exercise?

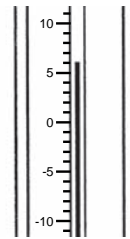
Acting Out Can Help!

Act it out to solve.

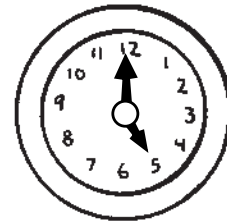
1. An architect is designing a storage building in the shape of a staircase. The tallest part of the building has 5 storage compartments. The shortest part of the building has 1 storage compartment. How many storage compartments will be in the building?

<p>a. Start with 5 cubes to show the tallest part of the building.</p> 	<p>b. Place 4 cubes to show the next tallest part.</p> 	<p>c. Continue until you make a staircase. Count the boxes to find the total number of storage boxes in the building. How many boxes are there?</p> <p>_____</p>
--	--	--

2. At 9:00 P.M., the temperature in Greenwood is 8°F. By midnight it drops to -6°F, and by 9:00 A.M. it has dropped another 5°F. What was the change in temperature from 9:00 P.M. to 9:00 A.M.?



3. The hands of a clock are as shown at right. The minute hand moves two and one-half turns around the clock. What time is it now?



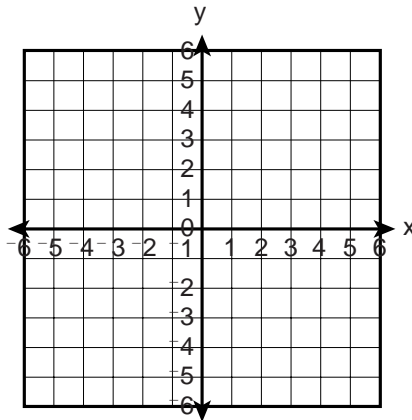
4. John, Aaron, Melanie, Katie, and Will are about to play a math game. Before they start, they all shake hands once. How many times in all do the students shake hands?

5. Write a problem that you can act out to solve.

Family Reunion

Todd is helping to plan his family reunion at a state park. He made the following map for his family. Help Todd label the map. Then answer the questions.

Map of Our Family Reunion



- Label the map.
 - The picnic tables are at $(2,0)$.
 - The basketball court is at $(-1,-2)$.
 - The swimming pool is at $(-2,3)$.
 - The bathrooms are at $(5,5)$.
 - The volleyball court is at $(-5,-3)$.
 - The barbecue pit is at $(4,-4)$.
 - The baseball field is at $(1,3)$.
- Meli is at the picnic tables. She wants to go to the swimming pool. She walks 1 unit up and 4 units left. How far and in what direction does Meli still have to walk?

- Todd is meeting Hector. He starts at the barbecue pit and walks 5 units left and 2 units up. Hector starts at the swimming pool and walks 5 units down and 1 unit right. Where do the two boys meet? Name the place and the ordered pair.

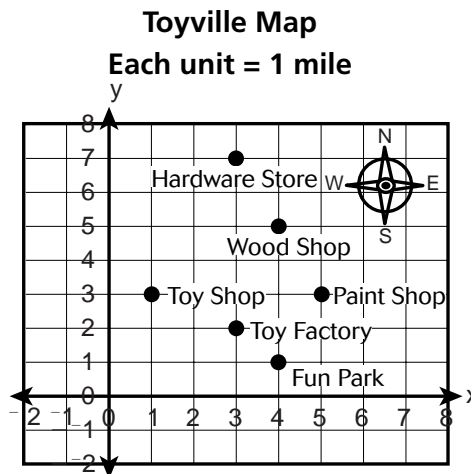
- Sheri is walking from the volleyball court to the bathrooms. She wants to stop at the picnic tables on her way. What path could Sheri take?

Toyville Distances

On a map, a smaller length is used to represent a larger distance. On the map of Toyville below, 1 unit = 1 mile. For example, if the map shows a length of 6 units, the distance in Toyville is 6 miles. Use the map to answer the questions.

On a map:

- north means to move *up*.
- south means to move *down*.
- east means to move *right*.
- west means to move *left*.



- Romeo bikes from the Toy Shop to the Paint Shop. Callie bikes from the Toy Factory to the Hardware Store. How much farther does Callie bike than Romeo?

- Marilu bikes from Fun Park to the Wood Shop. She then bikes 1 mile east and then south to the Paint Shop. How many miles does Marilu bike?

- Tiffany starts at the Toy Shop. She bikes north 2 miles and then east 3 miles. Where is Tiffany now?

- The people of Toyville are building a children's playhouse 2 miles west and 1 mile south of the Wood Shop.
 - Find and label the Playhouse on the map.
 - What ordered pair gives its location?

Rules are Changing

When an equation has two variables, you can find different values for the variables and still have a true equation. What happens when an equation has three variables?

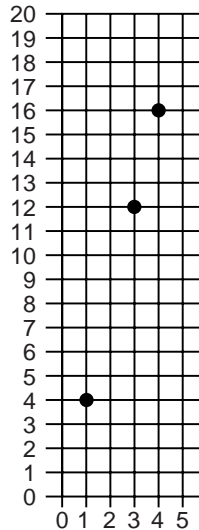
Complete each table for the rule shown. Choose any values of b and c that make the equation true.

<p>1. Rule: $a = b + c$</p> <p>$2 = 1 + \underline{\quad}$</p> <p>$4 = \underline{\quad} + 3$</p> <p>$5 = \underline{\quad} + \underline{\quad}$</p> <p>$12 = \underline{\quad} + \underline{\quad}$</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">a</th> <th style="width: 33%;">b</th> <th style="width: 33%;">c</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>1</td> <td></td> </tr> <tr> <td>4</td> <td></td> <td>3</td> </tr> <tr> <td>5</td> <td></td> <td></td> </tr> <tr> <td>12</td> <td></td> <td></td> </tr> </tbody> </table>	a	b	c	2	1		4		3	5			12		
a	b	c														
2	1															
4		3														
5																
12																
<p>2. Rule: $a = b \times c$</p> <p>$4 = 2 \times \underline{\quad}$</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">a</th> <th style="width: 33%;">b</th> <th style="width: 33%;">c</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>2</td> <td></td> </tr> <tr> <td>6</td> <td></td> <td>3</td> </tr> <tr> <td>15</td> <td></td> <td></td> </tr> <tr> <td>20</td> <td></td> <td></td> </tr> </tbody> </table>	a	b	c	4	2		6		3	15			20		
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<p>3. Rule: $a = b \times c$</p> <p>$10 = 5 \times \underline{\quad}$</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">a</th> <th style="width: 33%;">b</th> <th style="width: 33%;">c</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>5</td> <td></td> </tr> <tr> <td></td> <td>2</td> <td>2</td> </tr> <tr> <td></td> <td>10</td> <td></td> </tr> <tr> <td></td> <td>12</td> <td></td> </tr> </tbody> </table>	a	b	c	10	5			2	2		10			12	
a	b	c														
10	5															
	2	2														
	10															
	12															

4. Look at the tables you made. Can an equation with three values be true? Explain your thinking.

Where Did Bryan's Points Go?

Oops! Bryan accidentally erased part of his graph of an equation. Help him find the missing points.



1. Copy the data from the graph into the function table.

Input, x	1	2	3	4	5
Output, y					

2. What is the table's rule? Write an equation.

Use the rule to complete the function table.

3. Now use the function table to fix Bryan's graph of the equation.

Think About It!

4. **Stretch Your Thinking** Use the table, graph or the rule above to answer the following questions.

What is y when $x = 6$?

What is y when $x = 10$?

5. **WRITE Math** Bryan says that the graph and the function table have the same rule. Explain why.

Graph Match

Match each graph to the description of one of its points.
Then write the graph's rule.

1. Description: there will be one water bottle for each camper on a trip.

Graph _____

Rule: $y =$ _____

2. Description: 6 ears of corn sell for \$2.

Graph _____

Rule: $y =$ _____

3. Description: The restaurant table can seat five people at one table.

Graph _____

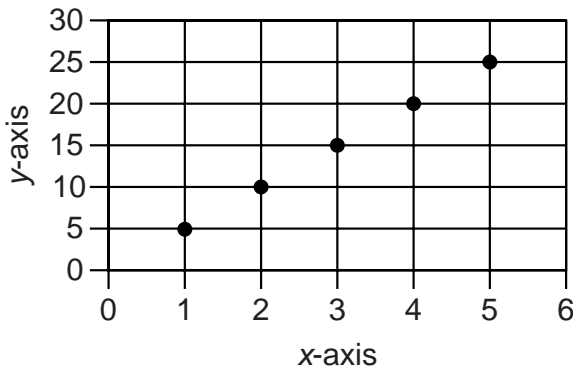
Rule: $y =$ _____

4. Description: 2 people wear 4 shoes.

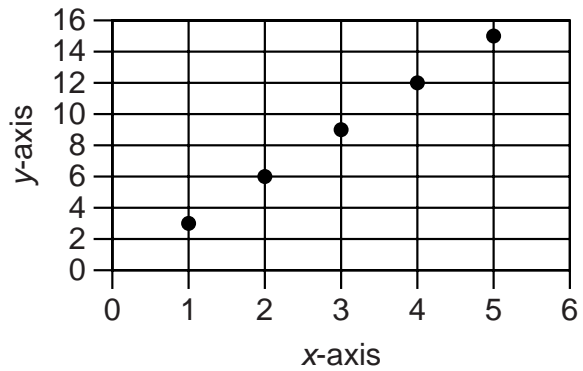
Graph _____

Rule: $y =$ _____

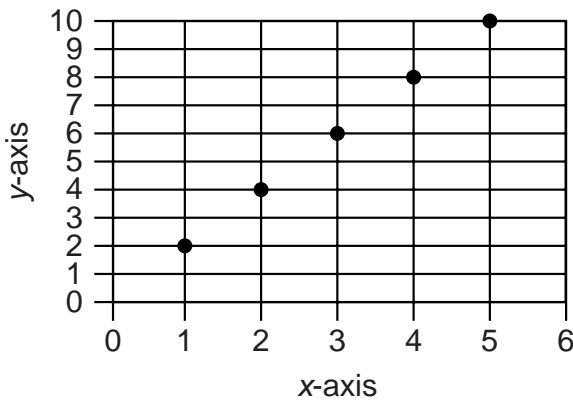
GRAPH A



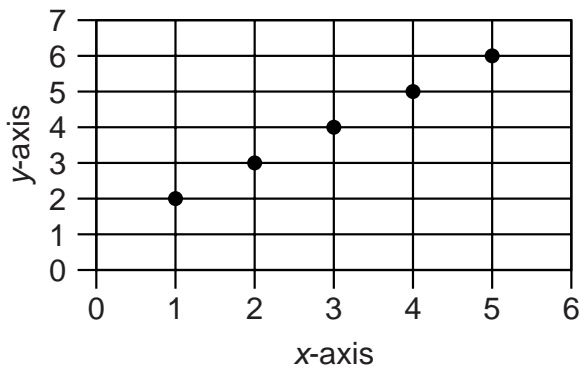
GRAPH B



GRAPH C



GRAPH D



What Fraction is Red?

A group of children picked red, green, and yellow apples at an apple orchard. Each child picked a different number of apples. For exercises 1–8, write an equivalent fraction showing the amount of red apples picked.

1. Anna picked 2 red apples and 4 green apples.

3. Sam picked 1 red apple and 3 green apples.

5. Shawana picked 1 red apple and 5 green apples.

7. Kelly picked 4 red apples, 2 green apples, and 1 yellow apple.

2. Jorge picked 3 green apples and 2 red apples.


4. Ling picked 3 green apples and 7 red apples.

6. Matt picked 3 green apples and no red apples.

8. Jack picked 2 red apples, 3 green apples, and 3 yellow apples.

Think About It!

9. **Stretch Your Thinking** Suppose that Matt picked 3 red apples and no green apples. How would that change your fraction for Exercise 6?

10.  How did you know what number to use as your numerator, and what number to use as your denominator, for Exercise 8?

Color the Equivalent Fractions

Color the picture below by finding fractions that are equivalent to the fractions shown in the key. You may use models to help you identify equivalent fractions.

$$\frac{1}{2} = \text{green}$$

$$\frac{1}{3} = \text{yellow}$$

$$\frac{1}{4} = \text{light blue}$$

$$\frac{1}{5} = \text{black}$$

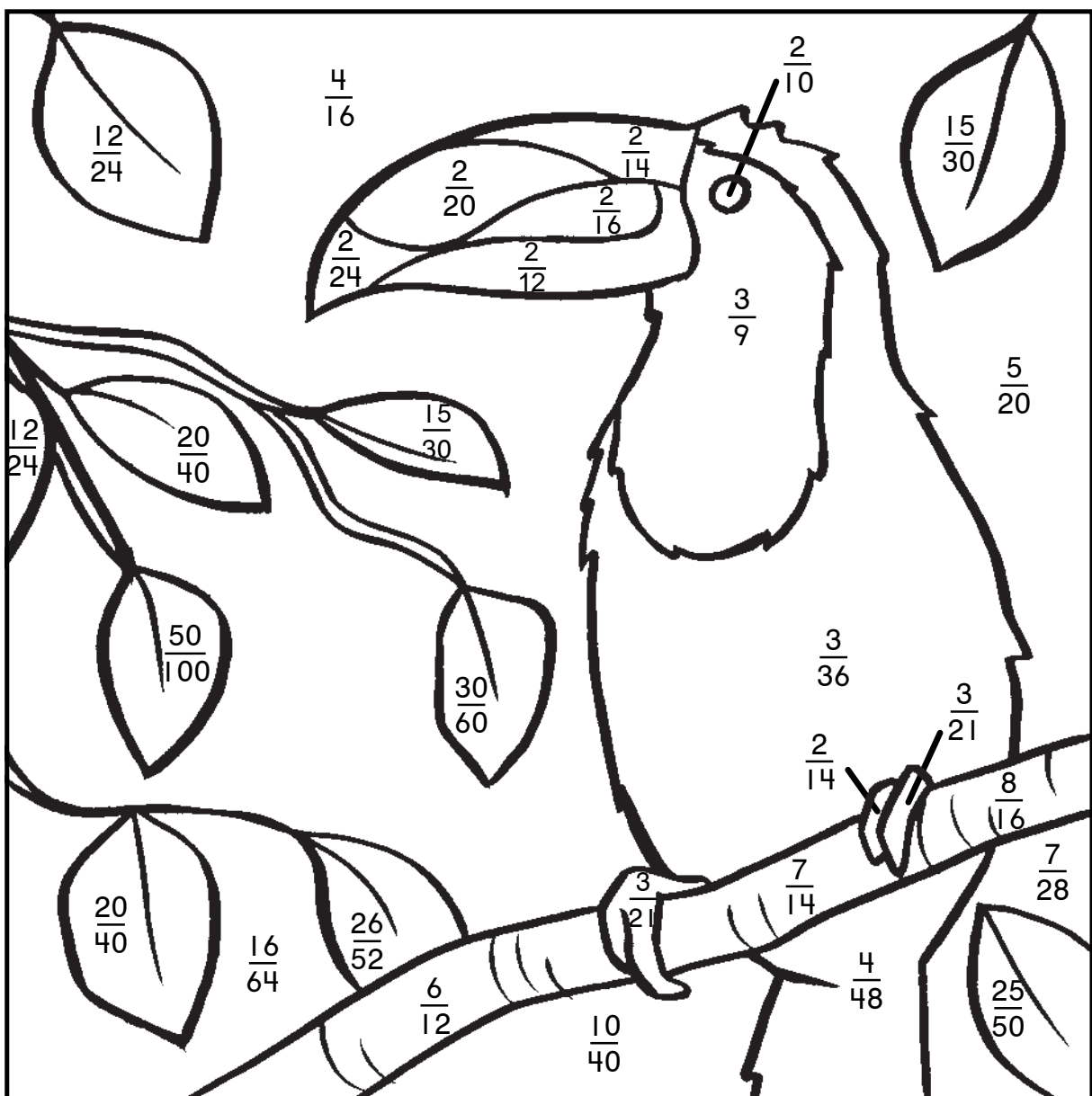
$$\frac{1}{6} = \text{brown}$$

$$\frac{1}{7} = \text{dark blue}$$

$$\frac{1}{8} = \text{pink}$$

$$\frac{1}{10} = \text{orange}$$

$$\frac{1}{12} = \text{red}$$



Fraction Riddles

Each riddle describes a fraction. Read the riddle and write the fraction.

1. Name a fraction greater than $\frac{1}{2}$, but less than $\frac{3}{4}$, with a numerator of 2.

2. Name a fraction less than $\frac{1}{3}$, whose denominator is the product of 2 times 2.

3. Name a fraction less than 1, but greater than $\frac{3}{4}$ with odd numbers as the numerator and the denominator.


4. Name a fraction greater than $\frac{1}{2}$, but less than $\frac{2}{3}$, with a denominator that is a multiple of 2.

5. Name a fraction less than $\frac{1}{2}$, but greater than $\frac{1}{3}$, that is equivalent to $\frac{6}{15}$.

6. Name a fraction greater than $\frac{3}{4}$, but less than $\frac{7}{8}$, with an even number as a numerator and an odd number as a denominator.

Think About It!

7. Write your own fraction riddle, similar to the ones above. Include the solution to your riddle.

8.  Explain how you named the fraction in Exercise 6.

Mix-and-Match Fractions

Use the digits to write fractions in order from least to greatest.
Each digit may only be used once.

1. 2, 3, 1, 4, 8, 5

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

2. 5, 8, 3, 7, 4, 1

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

3. 4, 12, 3, 6, 2, 10

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

4. 3, 8, 5, 9, 1, 2

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

Use the digits to write fractions in order from greatest to least.
Each digit may only be used once.

5. 6, 4, 2, 1, 3, 5

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

6. 9, 7, 6, 5, 3, 2

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

7. 9, 7, 6, 5, 3, 2

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$

8. 4, 3, 1, 6, 8, 7

$$\frac{\square}{\square}, \frac{\square}{\square}, \frac{\square}{\square}$$


Think About It!

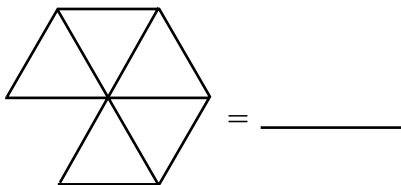
9. **Stretch Your Thinking** Suppose that the 3 was replaced with a 2 in Exercise 8. Will the fractions still be in the same order? If not, write the fractions in the correct order.

10. **WRITE Math** Explain how you decided what fractions to write for Exercise 4.

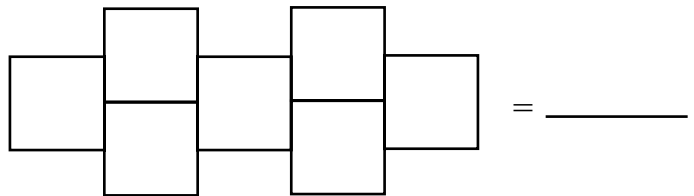
Mixed Number Shapes

Each shape represents a unit fraction. Write a mixed number to represent the figure made with each shape.

1.  = $\frac{1}{2}$

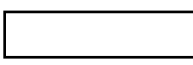


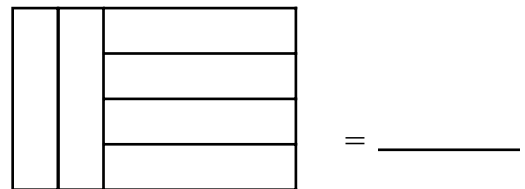
2.  = $\frac{1}{4}$



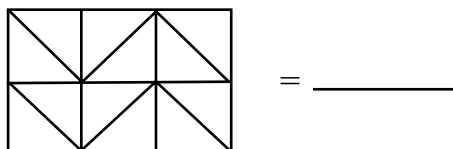
3.  = $\frac{1}{3}$



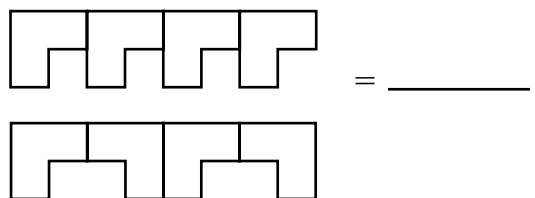
4.  = $\frac{1}{5}$



5.  = $\frac{1}{6}$



6.  = $\frac{1}{8}$



Think About It!

7. In the space below, draw a shape that represents a unit fraction. Then draw a figure that represents $2\frac{1}{4}$ using your shape.



8. **Stretch Your Thinking** If the shape in Exercise 4 represented $\frac{1}{4}$, what mixed number would the figure represent?

Mixed Number Maze


Follow the path from start to finish by finding the greater fraction or mixed number. You may move up, down, right, or left. You may not move diagonally.

START

$\frac{1}{2}$	$\frac{1}{3}$	$1\frac{3}{5}$	$1\frac{3}{10}$	$1\frac{3}{8}$	$1\frac{2}{3}$
$\frac{5}{8}$	$\frac{2}{5}$	$1\frac{1}{4}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$2\frac{3}{5}$
$\frac{9}{10}$	$1\frac{1}{8}$	$1\frac{2}{5}$	$1\frac{1}{2}$	$1\frac{3}{8}$	$2\frac{7}{8}$
$\frac{3}{4}$	$1\frac{1}{10}$	$1\frac{1}{3}$	$1\frac{2}{5}$	$1\frac{5}{8}$	$2\frac{11}{12}$
$\frac{7}{8}$	$1\frac{1}{5}$	$2\frac{1}{3}$	$2\frac{5}{8}$	$3\frac{1}{8}$	$3\frac{1}{5}$

END

Think About It!

-  Explain how you found your way through the maze.

A Hidden Sequence

Each set of fractions on the left should be ordered from least to greatest but is missing a fraction or mixed number. Find the missing fraction or mixed number from the list at the right and write it on the line. Then write the letter in the blanks below to spell a word.

R	$\frac{3}{8}$, _____, $\frac{1}{2}$	$1\frac{5}{8}$
I	$\frac{2}{6}$, _____, $\frac{2}{3}$	$2\frac{1}{3}$
T	$1\frac{1}{2}$, _____, $1\frac{3}{4}$	$\frac{2}{5}$
R	$1\frac{3}{4}$, _____, $1\frac{11}{12}$	$1\frac{9}{11}$
C	$2\frac{2}{5}$, _____, $2\frac{5}{7}$	$\frac{3}{4}$
E	$2\frac{1}{4}$, _____, $2\frac{3}{8}$	$2\frac{1}{2}$
I	$1\frac{1}{8}$, _____, $1\frac{3}{8}$	$\frac{1}{2}$
F	$\frac{2}{3}$, _____, $\frac{7}{8}$	$1\frac{1}{4}$

$\frac{15}{8}$

$2\frac{1}{3}$

$1\frac{9}{11}$

$\frac{2}{5}$

$1\frac{1}{4}$

$\frac{3}{4}$

$\frac{1}{2}$

$2\frac{1}{2}$

Think About It!

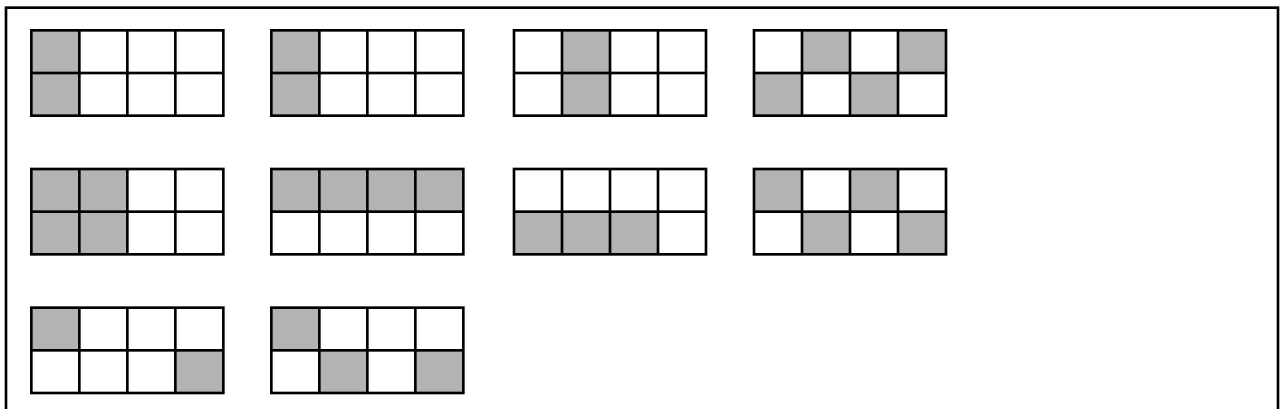
1. **Stretch Your Thinking** Would your answer remain the same for Exercise T, if $1\frac{1}{2}$ was changed to $1\frac{3}{8}$? Explain.

2. **WRITE Math** How did the mixed numbers help you cross out some possible answers?

Color Them In

Circle the pieces to show two fractions you could add to find the sum. Each piece may only be used once. Then color the shaded parts.

- Circle the two pieces that have a sum of $\frac{7}{8}$.
Color the shaded parts red.
- Circle the two pieces that have a sum of $\frac{5}{8}$.
Color the shaded parts purple.
- Circle the two pieces that have a sum of 1.
Color the shaded parts yellow.
- Circle the two pieces that have a sum of $\frac{3}{4}$.
Color the shaded parts blue.
- Circle the two pieces that have a sum of $\frac{2}{4}$.
Color the shaded parts green.



Think About It!

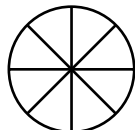
- Draw two shapes, with some shaded equal parts, to show two fractions that have a sum of $\frac{5}{6}$.
- WRITE Math** Explain how you decided which rectangles to circle for Exercise 3.



Pizza Party

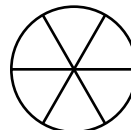
Mr. McGee had a pizza party. He now has some pizza left over. Help him figure out how much of each type of pizza he has left. Use the circle and write a number sentence for each type of pizza. The first one is done for you.

1. The cheese pizza was cut into 8 equal slices. Guests ate 6 of these slices. What fraction of the cheese pizza is left?



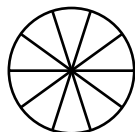
$$\frac{8}{8} - \frac{6}{8} = \frac{2}{8} \text{ or } \frac{1}{4}$$

2. The pepperoni pizza was cut into 6 equal slices. Guests ate 3 of these slices. What fraction of the pepperoni pizza is left?



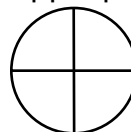
$$\underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

3. The mushroom pizza was cut into 10 equal slices. Guests ate 7 of these slices. What fraction of the mushroom pizza is left?



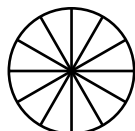
$$\underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

4. The ham and pineapple pizza was cut into 4 equal slices. Guests ate 4 of these slices. What fraction of the ham and pineapple pizza is left?



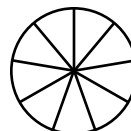
$$\underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

5. The sausage pizza was cut into 12 equal slices. Guests ate 8 of these slices. What fraction of the sausage pizza is left?



$$\underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

6. The veggie pizza was cut into 9 equal slices. Guests ate 5 of these slices. What fraction of the veggie pizza is left?



$$\underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Think About It!

7. **Stretch Your Thinking** Mr. McGee has $\frac{3}{8}$ of a pepper and onion pizza left. Write a problem about the pepper and onion pizza. Use the problems above as guides.

Riddle Fun

Solve each problem. Match the sum or difference in the boxes to fraction under the blank spaces below the riddle. Then write the letter of the answer on the blank space to solve the riddle. Show answers in simplest form. Some letters are not used in the riddle.

$\frac{5}{8} + \frac{1}{8} = \frac{\quad}{\mathbf{E}}$	$\frac{1}{4} + \frac{1}{4} = \frac{\quad}{\mathbf{B}}$	$\frac{9}{10} - \frac{2}{10} = \frac{\quad}{\mathbf{I}}$	$\frac{11}{12} - \frac{1}{12} = \frac{\quad}{\mathbf{R}}$
$\frac{1}{4} + \frac{3}{4} = \frac{\quad}{\mathbf{S}}$	$\frac{1}{6} + \frac{3}{6} = \frac{\quad}{\mathbf{L}}$	$\frac{3}{8} - \frac{2}{8} = \frac{\quad}{\mathbf{N}}$	$\frac{5}{10} + \frac{8}{10} = \frac{\quad}{\mathbf{A}}$
$\frac{3}{6} - \frac{1}{6} = \frac{\quad}{\mathbf{U}}$	$\frac{2}{12} + \frac{5}{12} = \frac{\quad}{\mathbf{G}}$	$\frac{5}{9} - \frac{1}{9} = \frac{\quad}{\mathbf{J}}$	$\frac{7}{8} - \frac{5}{8} = \frac{\quad}{\mathbf{O}}$
$\frac{5}{8} + \frac{4}{8} = \frac{\quad}{\mathbf{W}}$	$\frac{6}{7} - \frac{3}{7} = \frac{\quad}{\mathbf{D}}$	$\frac{2}{3} + \frac{2}{3} = \frac{\quad}{\mathbf{N}}$	$\frac{5}{12} - \frac{3}{12} = \frac{\quad}{\mathbf{P}}$

What type of bird is able to write?

$$\frac{1\frac{3}{10}}{\quad} \quad \frac{1}{6} \quad \frac{3}{4} \quad \frac{1}{8} \quad - \quad \frac{7}{12} \quad \frac{1}{3} \quad \frac{7}{10} \quad \frac{1\frac{1}{3}}{\quad}$$

Think About It!

- WRITE Math** How do you know when you need to simplify a sum or difference?
- Stretch Your Thinking** Suppose that Exercise U was $\frac{11}{12} - \frac{7}{12}$, would you get the same answer?

What's the Rule?

Write a rule for each function table.

1.

Input, x	Output, y
$\frac{1}{10}$	$\frac{4}{10}$
$\frac{3}{10}$	$\frac{6}{10}$
$\frac{5}{10}$	$\frac{8}{10}$
$\frac{7}{10}$	1

Rule: _____

2.

Input, a	Output, b
1	$\frac{11}{12}$
$\frac{9}{12}$	$\frac{8}{12}$
$\frac{6}{12}$	$\frac{5}{12}$
$\frac{3}{12}$	$\frac{2}{12}$

Rule: _____

3.

Input, d	Output, s
17	$16\frac{1}{2}$
15	$14\frac{1}{2}$
13	$12\frac{1}{2}$
11	$10\frac{1}{2}$

Rule: _____

4.

Input, f	Output, g
$\frac{1}{2}$	2
$2\frac{1}{2}$	4
$4\frac{1}{2}$	6
$6\frac{1}{2}$	8

Rule: _____

Think About It!

5. Use fractions to complete the function table for the equation.

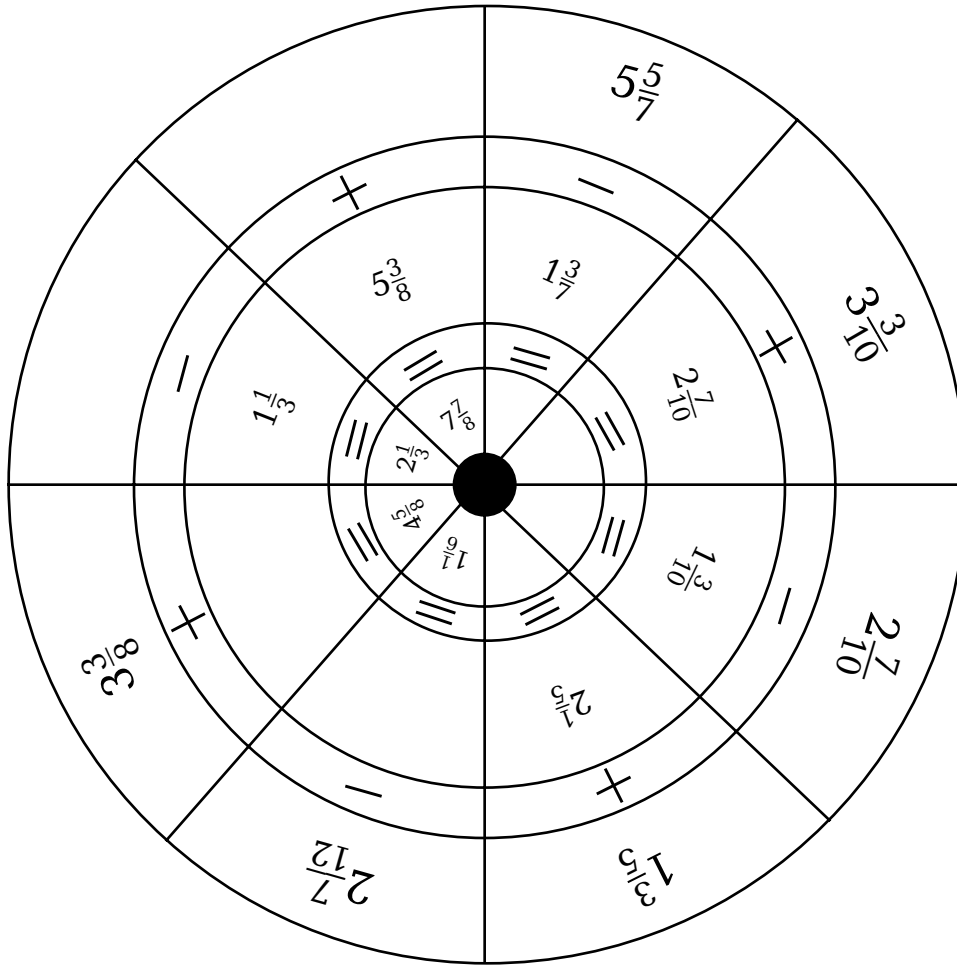
$$y = x - \frac{1}{8}$$

Input, x	Output, y

6. **Stretch Your Thinking** Explain how you wrote a rule for Exercise 4.

Fraction Circle

Fill in the missing numbers on the fraction circle. Work from the outside of the circle to the inside of the circle using the operations shown.



Think About It!

- WRITE Math** Explain how you found the missing number for $2\frac{7}{12} - \square = 1\frac{1}{6}$.
- When you add mixed numbers, how is it similar to when you add fractions? How is it different?

Sticker Collection

Kaley wants a record of the 100 stickers in her collection. Write a decimal and a fraction to answer each question.

1. What part of the collection is smile stickers?

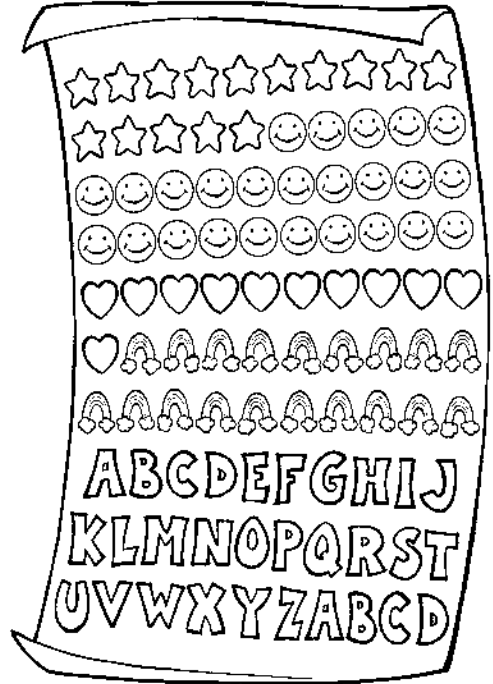
2. What part of the collection is star stickers?

3. What part of the collection is heart stickers?

4. What part of the collection is rainbow stickers?

5. What part of the collection is letter stickers?

6. What part of the collection is NOT letter stickers?



Think About It!

7. **Stretch Your Thinking** Suppose Kaley trades 5 rainbow stickers for 5 smile stickers. What part of her collection will be rainbow stickers? What part will be smile stickers? Write the decimal and fraction for each.

8. **WRITE Math** Explain how you decided what part of Kaley's sticker collection is NOT letter stickers.

Match the Cards

Maya is playing a *Match the Cards* game. Help her sort the cards into pairs. Draw a line to match pairs of cards with equivalent decimals. Not all the cards have a match.

0.4	0.5	0.35
0.43	0.40	0.3
0.8	0.30	0.05
0.50	0.80	0.08

Think About It!

- Stretch Your Thinking** What if you had a card labeled 0.050? What card or cards would it be equivalent to? Explain.

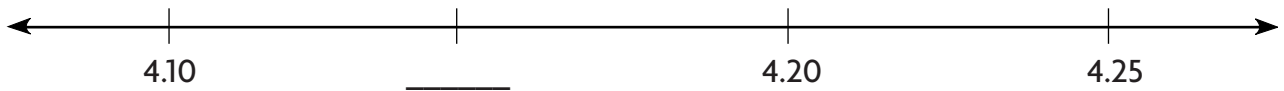
Riddlegram

To answer this riddle, write the letter from the boxes below that is equivalent to each fraction or decimal in the riddle. Some letters will be used more than once.

Riddle: *Why do you measure a snake in inches?*

_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3.75	$3\frac{2}{10}$	3.7	$\frac{7}{10}$	0.35	0.50	$3\frac{2}{10}$	$3\frac{9}{10}$	3.01	$3\frac{2}{10}$	3.3
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	!
3.01	$\frac{7}{10}$	3.6	$3\frac{2}{10}$	$\frac{25}{100}$	3.8	0.12	$3\frac{2}{10}$	$3\frac{1}{5}$	$3\frac{9}{10}$	

U $\frac{35}{100}$	T 3.9	E 3.2	N 0.25	y $3\frac{3}{10}$
C $3\frac{7}{10}$	A 0.7	F $\frac{12}{100}$	O $3\frac{4}{5}$	v $3\frac{3}{5}$
	H $3\frac{1}{100}$	B $3\frac{75}{100}$	S $\frac{1}{2}$	



Think About It!

1. **WRITE Math** Explain how you would decide which fraction can complete the number line below.
2. **Stretch Your Thinking** Place the following numbers in order from least to greatest: 1.5, $1\frac{1}{5}$, $1\frac{55}{100}$. Explain your thinking.

A-Mazing Decimals!


Work your way through the maze one square at a time by moving from the least decimal to the greatest decimal. You can move across, down, or up, but not diagonally. You can only move one square at a time and you must always move to a square of greater value than your current square.

START
↓
HERE

0.02	0.05	0.03	0.20	0.04	0.67	1.84	1.90	2.02	1.99
0.01	0.15	0.17	0.23	0.09	1.17	1.33	1.03	2.23	2.0
0.54	0.1	0.08	0.44	1.02	1.05	0.99	0.2	2.44	2.43
0.51	0.07	0.55	0.39	0.92	0.27	2.5	2.58	2.47	2.37
1.8	1.19	1.04	2.04	4.8	2.85	2.68	2.69	2.06	3.78
3.52	2.5	1.40	5.7	1.1	3.1	3.01	3.04	3.40	4.00

FINISH ↑
HERE

Think About It!

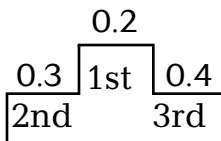
-  **WRITE Math** Explain how you determined which path to take through the maze above.

First-Second-Third

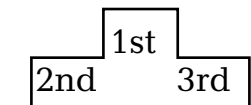
At the Number Olympics, people in the audience were confused by who was in first, second, and third place. Sort the information in the table to show who was in each place. (HINT: first place was always the least number and third place was always the greatest number.)

EVENT	SCORES	EVENT	SCORES
Number Put	0.3, 0.4, 0.2	Fraction Jump	0.96, 1.53, 0.8
Decimal Hurdles	4.20, 4.28, 4.27	Area Swim	0.61, 0.67, 1.32
High Number	0.3, 0.28, 0.4	Number Beam	3.5, 3.05, 3.47
Freestyle Numbers	1.23, 0.84, 1.1	Perimeter Swim	2.34, 2.4, 2.05

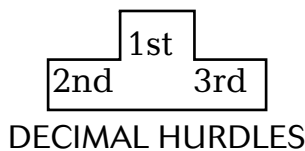
For each event listed, put their numbers in their proper place on the number stands. The first stand has been done for you.



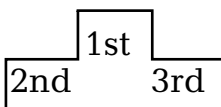
NUMBER PUT



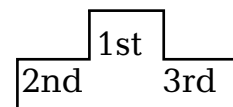
FRACTION JUMP



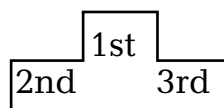
DECIMAL HURDLES



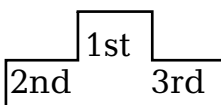
AREA SWIM



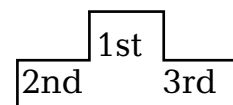
NUMBER BEAM



HIGH NUMBER



FREESTYLE NUMBERS



PERIMETER SWIM

Mystery Number

Use the clues below to draw conclusions and find each person's mystery number.

NAME	MYSTERY NUMBER
Jane	
Lynn	1.15
Jennifer	
Robert	4.05
Holly	
Vince	4.09
Glenn	

CLUE 1:

The least digit in all numbers is in the hundredths place.

CLUE 2:

Vince's number is the greatest number.

CLUE 3:

Holly's number is the least number in the group.

CLUE 4:

Jennifer's number is 4 hundredths less than Robert's.

CLUE 5:

Jane's number is the same as Lynn's number except the number in the one's place is different.

CLUE 6:

Glenn's number has the same digits as Lynn's, except the number in the tenths place is different.

CLUE 7:

The least number is 0.14 less than Lynn's number.

CLUE 8:

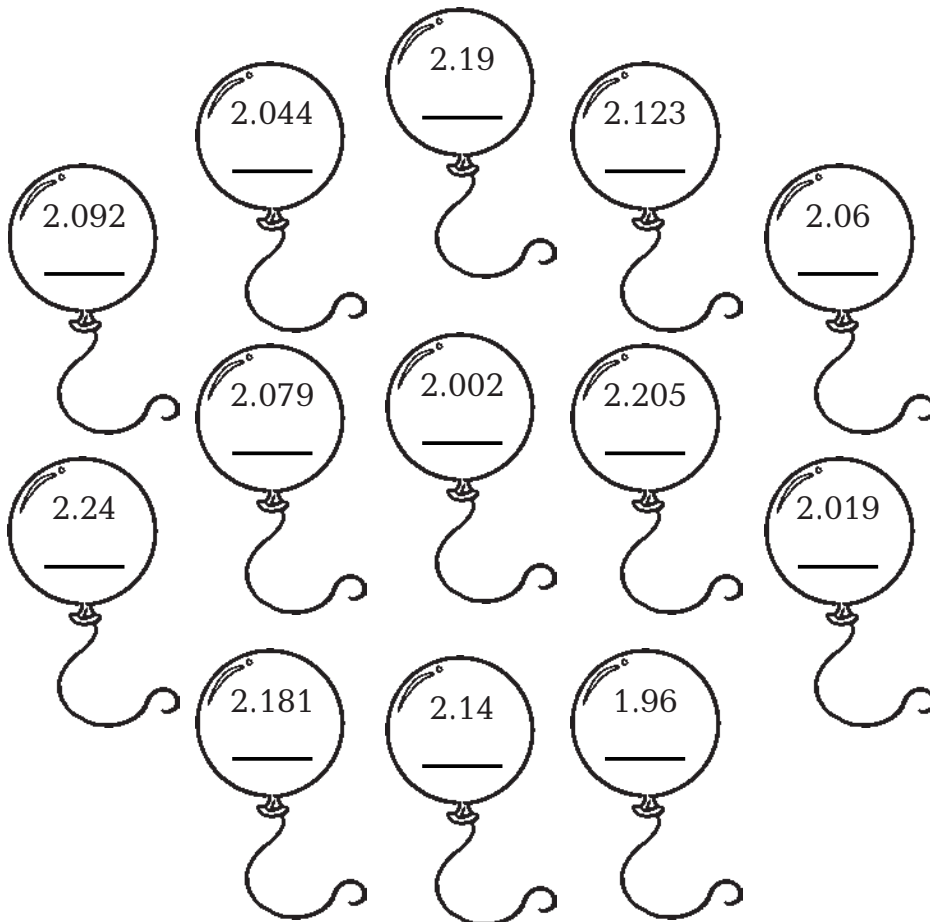
The digit in the tenths place of Glenn's number is one less than the number in the hundredths place.

CLUE 9:

The ones digit in Jane's number is 2 less than the ones digit of the greatest number.

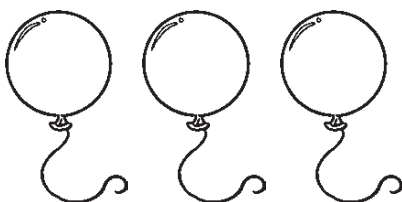
Decimal Balloons

Round the decimals in the balloons to the nearest tenth. Then color the balloons you round to 2.0 blue, color the balloons you round to 2.1 green, and color the balloons you round to 2.2 red.



Think About It!

- Write a decimal in each balloon below. One balloon should round to 2.0, another balloon should round to 2.1, and the third balloon should round to 2.2. Shade the balloons using the guide given above.

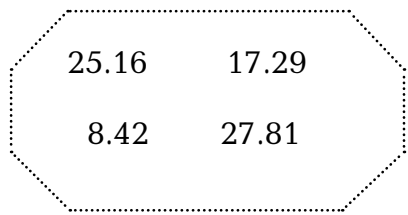


- WRITE Math** Explain how you rounded the balloon labeled 2.044 above.

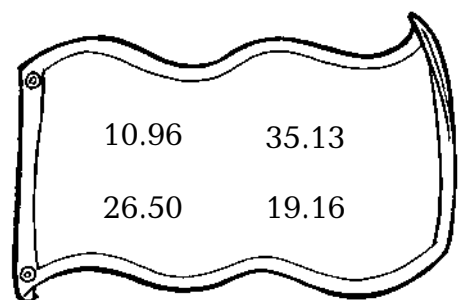
Rounding Addends

Each whole number below represents an estimated sum.
 Circle the two addends in the shapes that, when rounded, equal the estimated sum given.

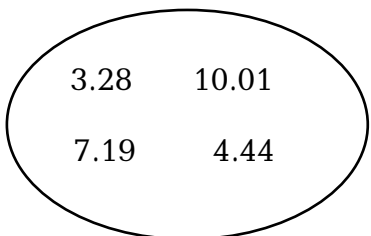
1. 33



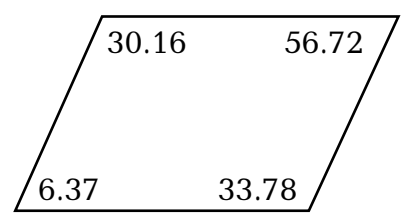
2. 46



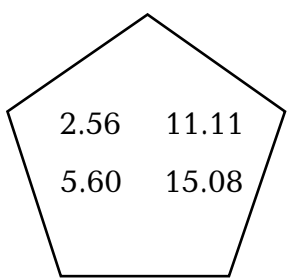
3. 11



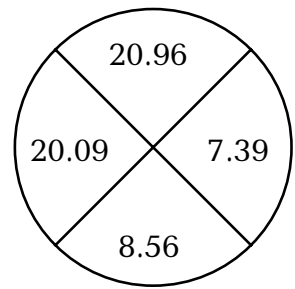
4. 63



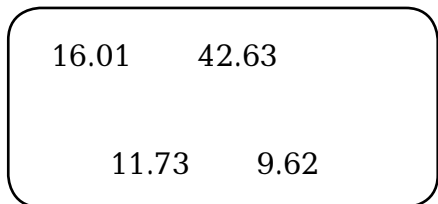
5. 17



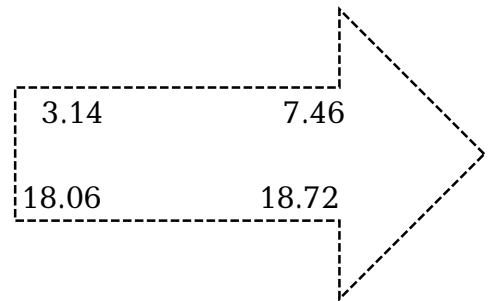
6. 28



7. 53



8. 37



Think About It!

9. Name two decimals, other than the ones shown, that have the same estimated sum as shown in Exercise 6.

10. **WRITE Math** Explain how you decided which decimals to circle for Exercise 1.

Model Connection

Draw lines to match the problem shown in each rectangle with the model that represents the sum. Write the sum on the line below the matching model.

$0.23 + 0.09 + 0.02$

$0.02 + 0.49 + 0.03$

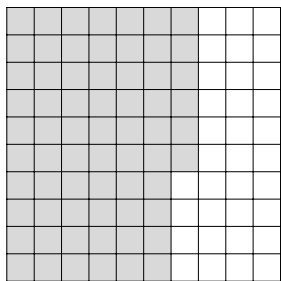
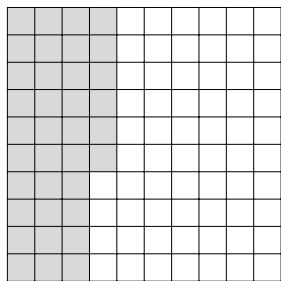
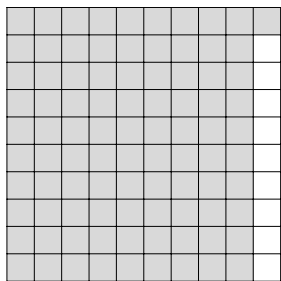
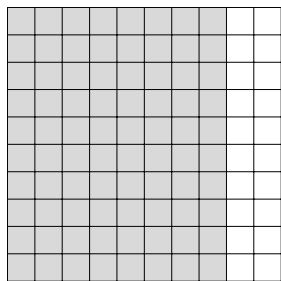
$0.12 + 0.12 + 0.12$

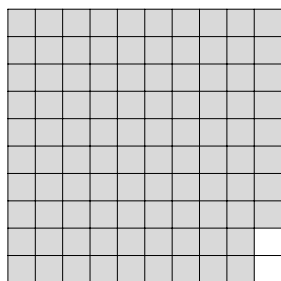
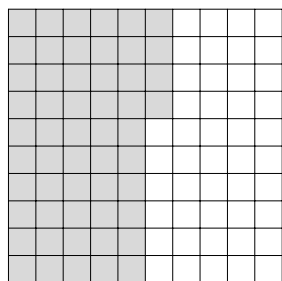
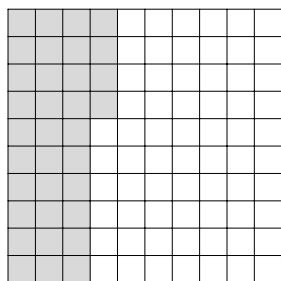
$0.45 + 0.47 + 0.06$

$0.82 + 0.09 + 0.00$

$0.33 + 0.23 + 0.10$

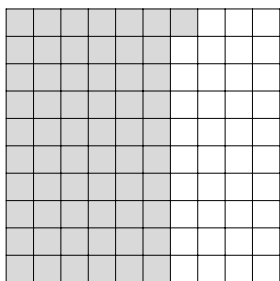
$0.29 + 0.20 + 0.31$





Think About It!

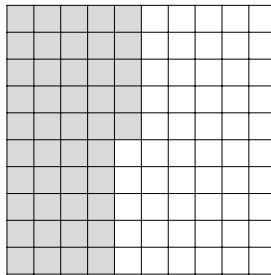
- The model below shows a decimal. Write an addition number sentence that could result in the sum represented in the model.

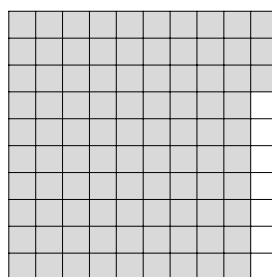
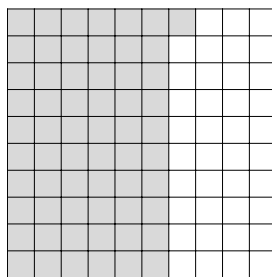


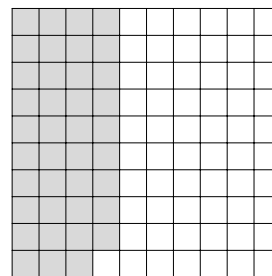
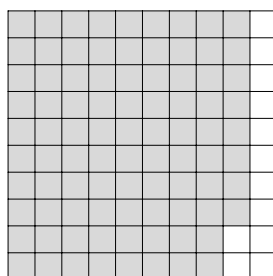
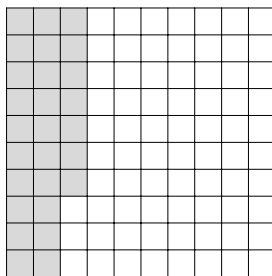
- WRITE Math** Explain the strategy you used to match the addition sentences to the models.

Model Building

Subtract 0.25 from the decimal shown in each model below, then write the subtraction equation on the line provided.



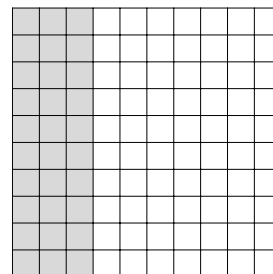




Think About It!

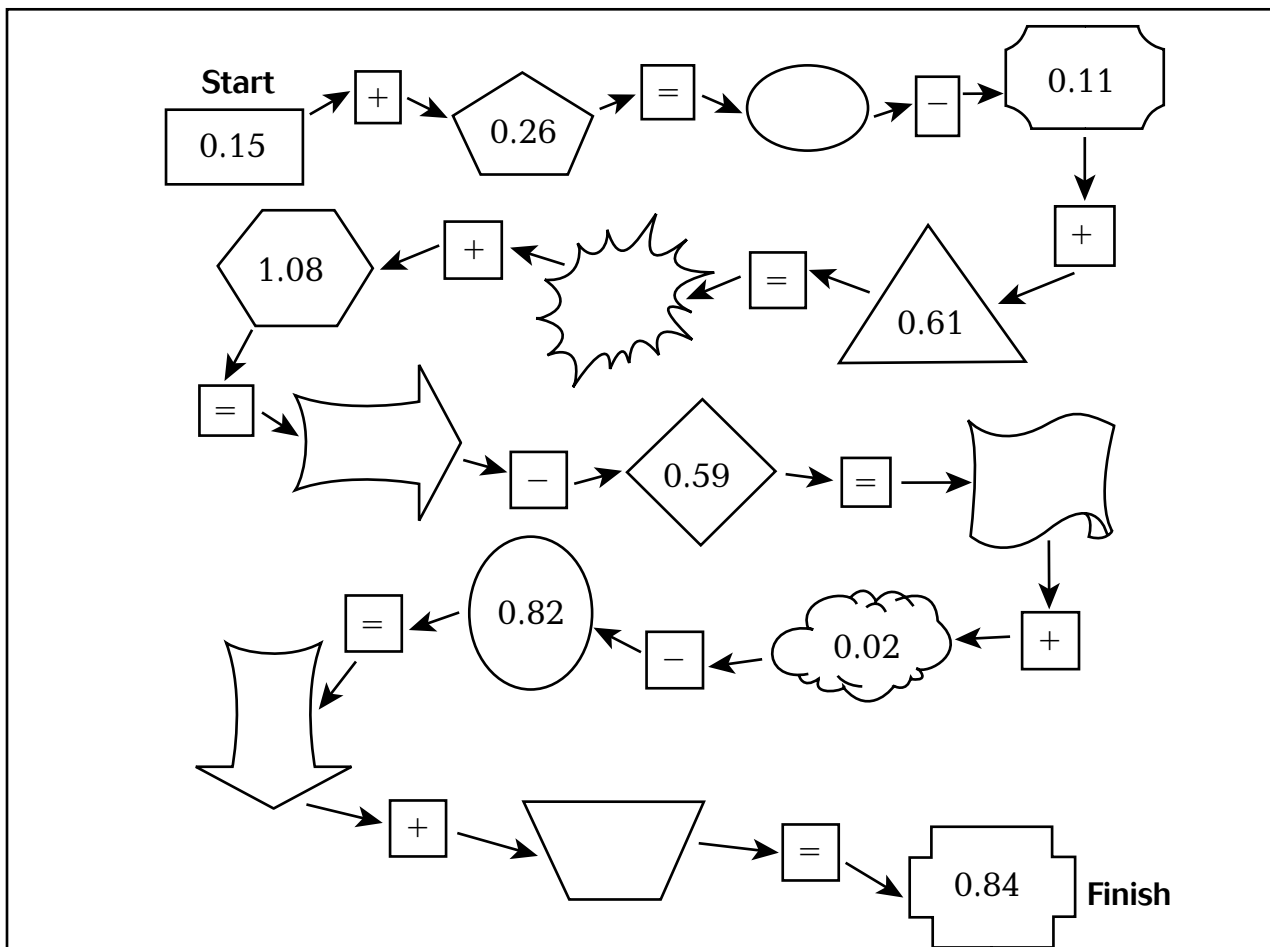
1. **WRITE Math** Without subtracting, can you tell which model will create the least difference? Explain.

2. Create a problem that will have a greater difference than the greatest difference found above. Shade the model.



Follow the Path

Begin at Start and follow the arrows around the path. Add or subtract the decimals along the path. Then record your sums and differences in the empty figures to complete the path.



Think About It!

1. **WRITE Math** Explain the strategy you used to find the last missing number in the path.

2. **Stretch Your Thinking** What if the first number on the path was 0.25. How would the sums and differences on the path change?

Buying and Learning

Isaac buys some school supplies at the store. He has the money shown below in his savings.



The store is selling rolls of tape for \$1.16, two-pocket folders for \$0.64, spiral notebooks for \$0.79, rulers for \$0.83, and marker sets for \$1.24. Isaac needs two of one item and one of another item. He spends \$2.90 in all.

- Use the table at the right to show the school supplies and their individual costs as well as the costs for two of each item.
- Which item did Isaac buy 2 of? Which item did Isaac buy one of? _____

- Isaac is going to pay for his school supplies with exact change. Show three different coin combinations in the boxes below that Isaac can use from the money he has saved.

a.

b.

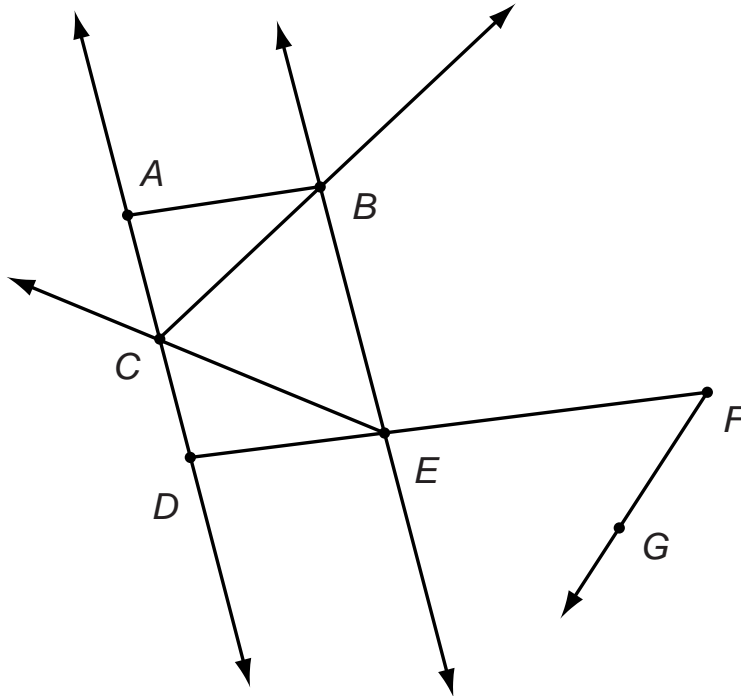
c.

Think About It!

- WRITE Math** Explain what methods you used to find different ways to show the same amount for Exercise 3.

Please Line Up

The figure below is all mixed up. List all of the rays, line segments, and lines you can find.



Line Segments: _____

Rays: _____

Lines: _____

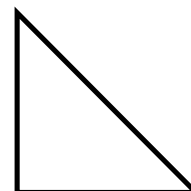
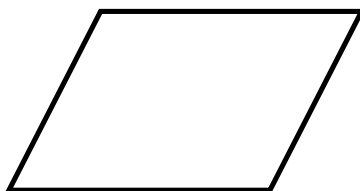
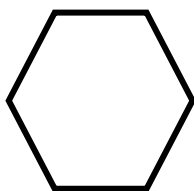
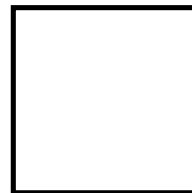
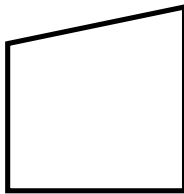
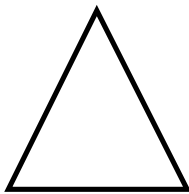
Think About It!

1. **Stretch Your Thinking** Suppose line AD was removed from the figure. How many line segments would disappear? Explain.

2. **WRITE Math** What is the difference between line AC and line CD ? Explain.

Figure It Out

Six students in Mr. Brown's class drew the shapes below. Use the clues and write the student's name in their shape.



- Joey's shape appears to have only right angles.
- Monica's shape appears to have right and acute angles.
- Bobby's shape appears to have only obtuse angles.
- Kim's shape appears to have obtuse and acute angles.
- Elaine's shape appears to have obtuse, right and acute angles.
- Kendra's shape appears to have only acute angles.

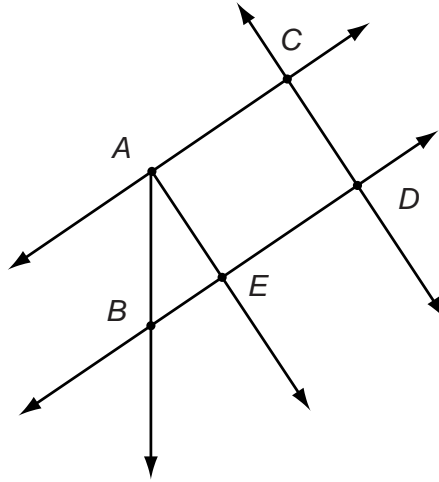
Think About It!

1. **Stretch Your Thinking** Suppose you cut the hexagon in half. Would the two resulting shapes still appear to have only obtuse angles? Explain.

2. **WRITE Math** If a shape appears to have only obtuse angles, what does that tell you about the shape? Explain.

Crossing Over Lines

Frank writes his observations of the following figure. Please review what he wrote. Write agree or disagree and explain why.



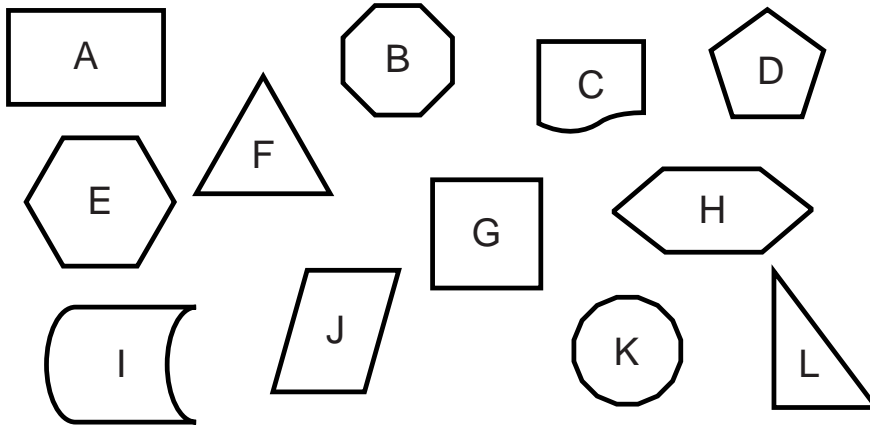
- | | | |
|---|---|--|
| <p>1. I'm sure that line CD is parallel to ray AB.</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>2. I think that line AC appears to be perpendicular to line CD.</p> <p>_____</p> <p>_____</p> | |
| <p>3. I can tell that angle BAE is an obtuse angle.</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>4. I see line BD intersects ray AE at point B.</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>5. I count five intersecting points.</p> <p>_____</p> <p>_____</p> <p>_____</p> |

Think About It!

- | | |
|--|---|
| <p>6. Stretch Your Thinking Suppose ray AB was line AB. Would it ever intersect with line CD? Explain.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>7. WRITE Math If two lines are parallel, will they ever intersect? Explain.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> |
|--|---|

Paper Shapes

Mr. Hines cut different shapes out of construction paper for an art project. Each student chose a few shapes. Use the clues below to write the letters of the shapes that each student chose. You may use each shape more than once.



Jenn only chose shapes with 4 straight sides.

Jacob chose shapes that were not regular polygons.

Lindsey chose only hexagons.

Mike chose regular polygons with more than 3 sides.

Glenn only chose shapes that were not polygons.

Heather only chose triangle shapes.

Pete chose shapes that had right angles.

Think About It!

1. **Stretch Your Thinking** Suppose Jacob had only chosen shapes that were regular polygons. Would Jacob have had more pieces of paper? Explain.

2. **WRITE Math** Is a polygon that has opposite sides that are parallel always a regular polygon? Explain.

Triangle Construction

Rick's class made a chart of the three types of triangles and the three types of angles. Help Rick's class draw the appropriate triangle described in each square.

Note: some squares may remain blank.

Triangle Classification Chart	Right	Acute	Obtuse
Equilateral			
Isosceles			
Scalene			

Think About It!

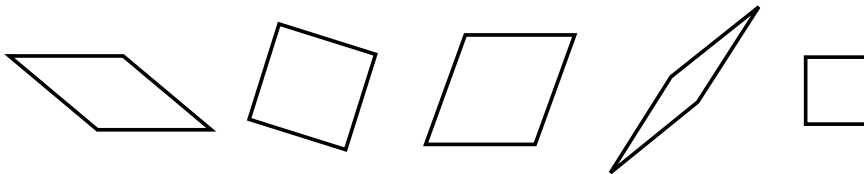
1. **Stretch Your Thinking** Is it possible to draw a right triangle that has two right angles? Explain.

2. **WRITE Math** Were all 9 triangles possible to draw? Explain.

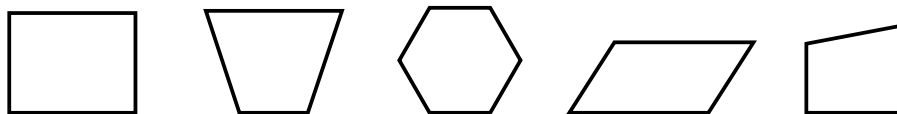
Which Quadrilateral

Mr. Luna draws the two groups of shapes below. Then he draws the third group. Choose which shapes from the third group belong in the first group.

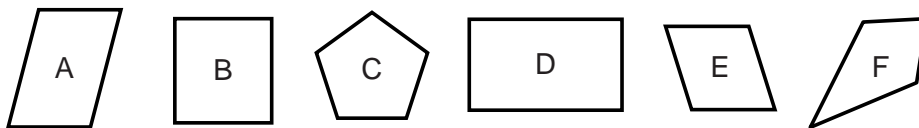
All the shapes in the first group have something in common.



None of the shapes in the second group are like any of the shapes in the first group.



Circle the shapes in the third group that belong in the first group.



How did you classify the shapes in the first group?

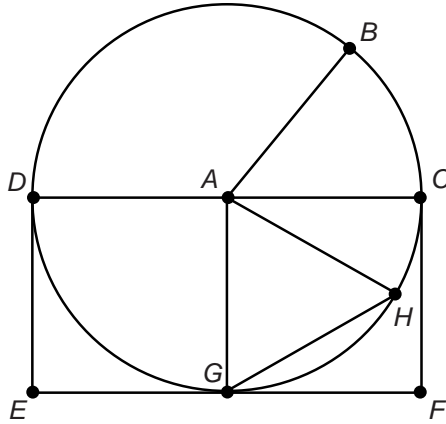
Think About It!

1. **Stretch Your Thinking** What does the hexagon in group two have in common with the first group? Explain.

2. **WRITE Math** Is a square classified as a rectangle or a rhombus? Explain.

The Circle Tells All

Roy is doing his math homework. He can only remember that Circle A has a radius of 6 cm. Use the properties of Circle A to help Roy answer the questions.



1. What is the length of line segment AB ? _____
2. What is the length of diameter DC ? _____
3. What is the perimeter of rectangle $CDEF$? _____
4. What is the perimeter of equilateral triangle AGH ? _____
5. What is the area of rectangle $CDEF$? _____

Think About It!

6. **Stretch Your Thinking** How many triangles equivalent to equilateral triangle AGH would fit inside the circle without overlapping? Explain.

7. **WRITE Math** How were you able to determine the length of chord GH ? Explain.

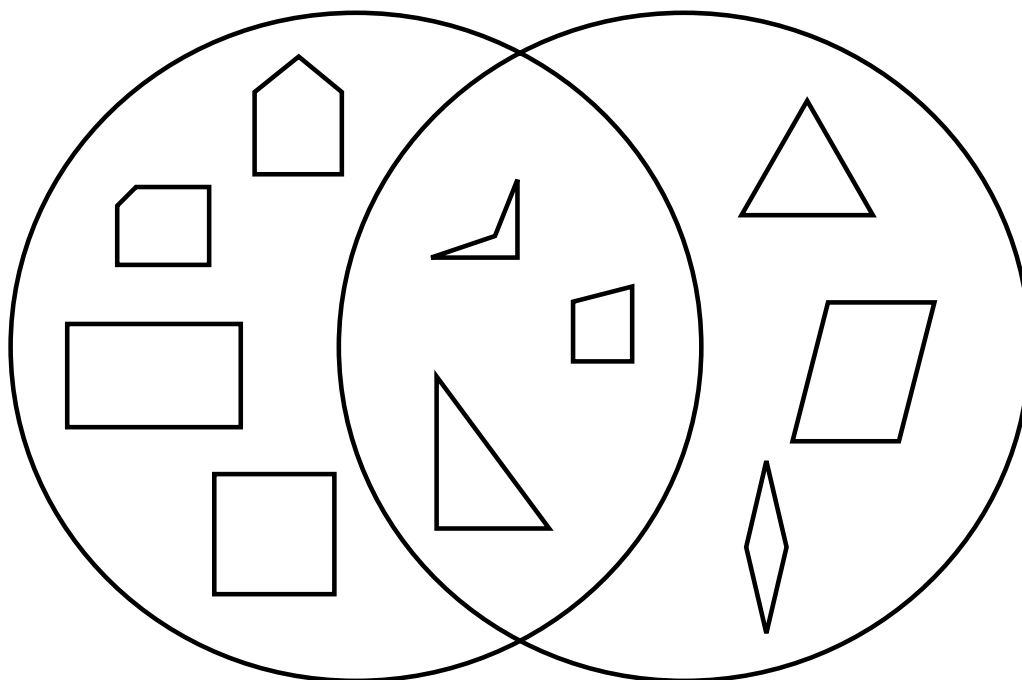
Venn's Figures

Jason solves a problem with 10 different figures. He organizes the figures with a Venn diagram but forgets to label the circles. Help Jason label the circles below.

Left:

Center:

Right:



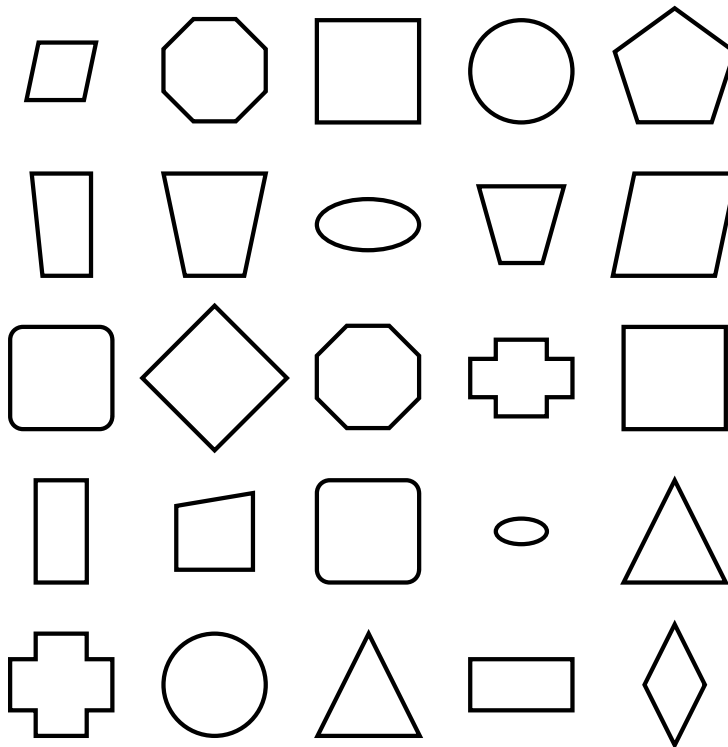
Think About It!

1. **Stretch Your Thinking** Write a word problem that uses the Venn diagram as a solution.

2. **WRITE Math** When using a Venn diagram, what questions do you ask yourself before labeling the circles? Explain.

Figure Pairs

The pattern below is filled with pairs of figures that appear to be congruent figures. Find all the congruent pairs and color them red. If a figure does not have a congruent pair, color it yellow.



1. What is revealed when you color in the figures?

2. One figure is missing a similar or congruent pair. Which figure is it?

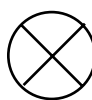
Think About It!


3. **Stretch Your Thinking** You found congruent pairs in the exercise above. Can three figures all be congruent to each other? Explain.

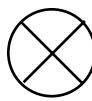
4. **WRITE Math** How do you know when two figures are congruent? Explain.

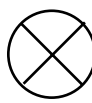
The Wheel Game

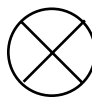
Five friends take turns spinning a wheel once every round. Follow the clues to determine the position of the wheel after each turn. Write the shape that each person lands on and draw the wheel at the end of each players turn. Then draw the wheel at the end of round 1.

 1. Phil's spin rotates the wheel 180° clockwise. _____

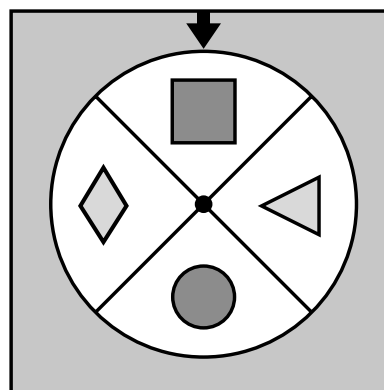
 2. Eric spins the wheel three fourths counterclockwise. _____

 3. Nancy makes a half spin counterclockwise. _____

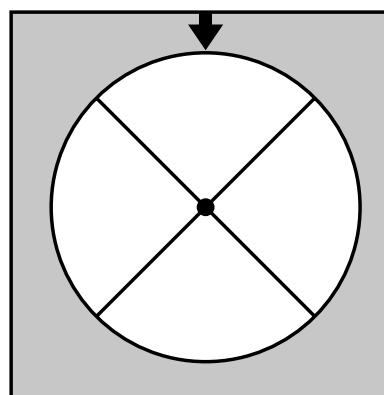
 4. Cliff's spin goes a quarter spin to the left. _____

 5. Kim's spin goes 270° to the right. _____

Start of Round 1



End of Round 1



Think About it!

6. **Stretch Your Thinking** Suppose Phil's spin goes counterclockwise where does it land? Explain

7. **WRITE Math** Explain how you can keep track of the position of the wheel after each turn.

Alphabet Riddle

Unscramble the letters below to answer the two-word solution to the riddle.

C E F
G O R
T U S

Riddle: Felipe bought five pets at the pet store. His friend said, "Yuck!" Felipe said, "They're adorable!" What type of pet did Felipe buy?

Unscramble the letters with only one line of symmetry.

Unscramble the letters with either zero or two lines of symmetry.

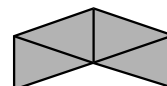
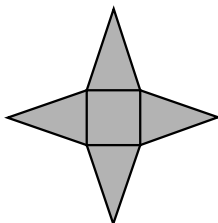
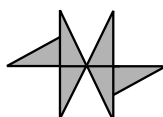
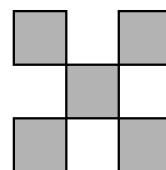
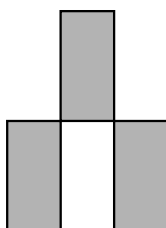
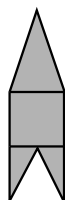
Think About It!

1. **Stretch Your Thinking** Which letters above have rotational symmetry? Explain.

2. **WRITE Math** Explain the difference between line and rotational symmetry.

Jorge's Solution

Natalie's table group made the figures below with wooden blocks. She asked Jorge if he could pick out which one was hers. Natalie told Jorge that her figure had a line of symmetry, used only congruent shapes and had rotational symmetry. How could you help Jorge organize and solve this problem?



Explain your solution:

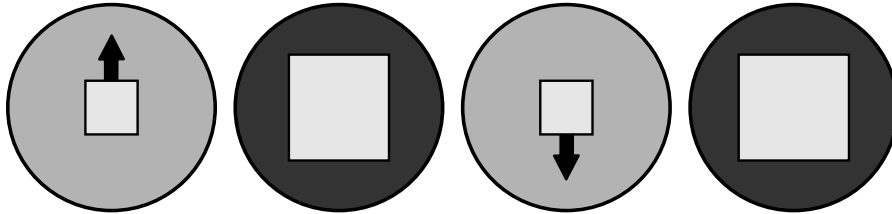
Think About It!

1. **Stretch Your Thinking** If you removed the square from the center of the middle figure in the second row, could it have been Natalie's figure? Explain.

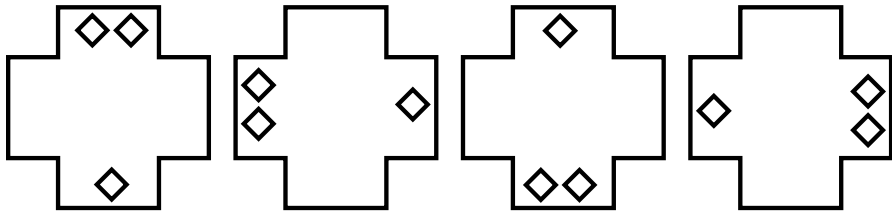
2. **WRITE Math** Is there another way you could have solved this problem? Explain.

Follow the Patterns

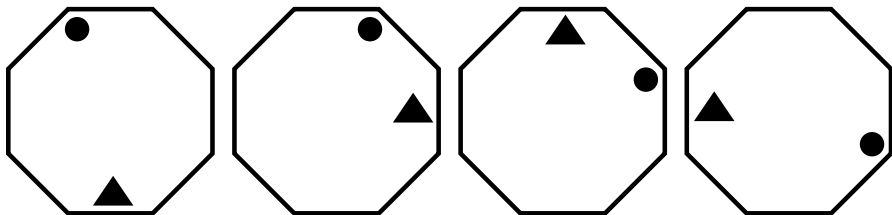
Mike is finishing his geometric pattern drawing for math class. Help Mike draw the next figure in the pattern. Write the rule for each pattern in the space provided.



Rule = _____



Rule = _____



Rule = _____

Think About It!

1. **Stretch Your Thinking** How many figures will be in each pattern before the pattern repeats?

Circle pattern = _____

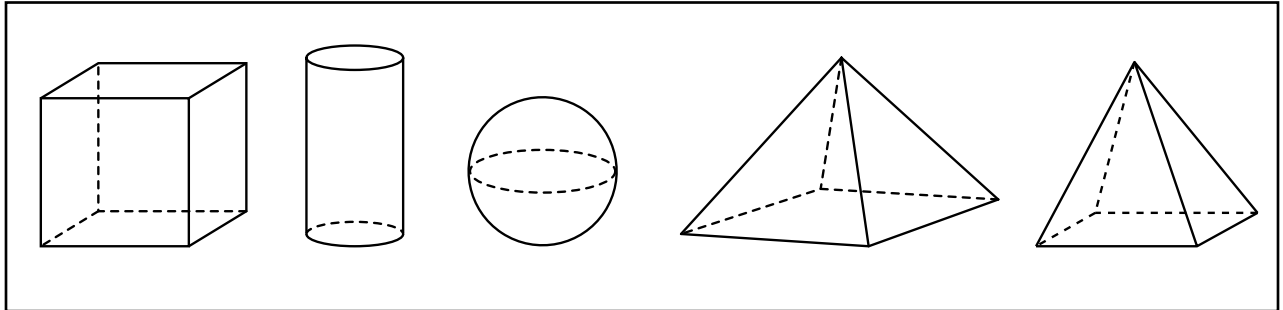
Cross pattern = _____

Octagon pattern = _____

2. **WRITE Math** Explain the types of things you look for when determining pattern.

Solid Figure Riddles

Solve the riddles by choosing the best match from the solid figures in the box below.



1. I have 5 faces and 8 edges. At least one of my faces is a rectangle.

I am a _____.

2. I have a curved face and 2 circular bases.

I am a _____.

3. I am a curved surface with no edges or vertices.

I am a _____.

4. I am made of 6 square faces.

I am a _____.

5. Some of my faces are triangles but my base is a square.

I am a _____.

Think About It!

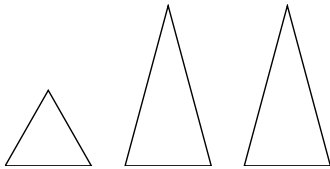
6. **Stretch Your Thinking** Write a riddle that can be solved by a solid figure. Choose a figure that is not shown on this page.

7. **WRITE Math** Which riddle above has two possible answers? Explain.

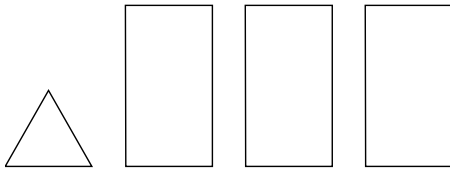
Missing One

Each collection of shapes has the potential to make a net for a model, but each collection is missing one face. Draw in the missing face for each collection of shapes, then put the shapes together to draw a net for the model named in each problem.

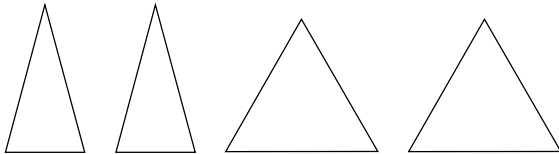
1. Triangular pyramid



2. Triangular prism



3. Rectangular pyramid



4. Rectangular prism



Think About It!

5. **Stretch Your Thinking** Can you change your net for the rectangular prism to make a cube? Explain why or why not. Then try it.


Room with a Special View

When designing a room, a designer draws the room as it would appear if viewed from above. The drawing shows where furniture pieces such as tables, chairs, or beds are placed in the room.

1. In the space below, design your dream bedroom. Draw it as it would appear from above. Include at least one bed, dresser, bookcase, and other furniture. Also show the door and windows.



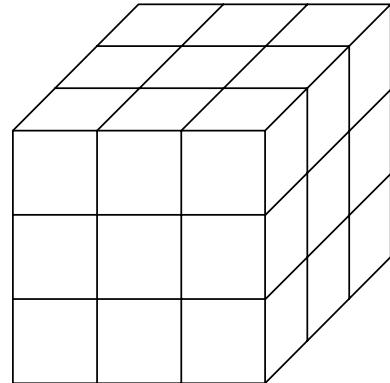
Think About It!

2.  How could you use your drawing to place the furniture in an actual bedroom?
3. **Stretch Your Thinking** Suppose you draw a kitchen from above. What shape would you use to show the refrigerator? The table and chairs? The kitchen counter?

Cube Questions


For 1-2, use the cube. Make a model or use any strategy to solve.

1. The cube at right is made up of 27 smaller cubes. The 6 faces of the larger cube are painted orange. Tell how many smaller cubes have:
 - a. one face painted orange _____
 - b. two faces painted orange _____
 - c. three faces painted orange _____
 - d. no faces painted orange _____
 - e. all faces painted orange _____



2. How many faces are painted orange in all? Explain.

Think About It!

3.  What if the top and bottom of the larger cube in Exercises 1 and 2 were painted blue? Write an equation that can be used to find how many faces of the smaller cubes would be painted blue (b). Then solve.

4. **Stretch Your Thinking** Suppose you make a large cube out of smaller cubes and paint all the faces. Four of the smaller cubes have no faces painted. How many cubes are in the larger cube? Explain.

Guess Who

Can you tell me who I am?

1. I am the unit used to measure the length of a pencil.	_____
2. I am the unit used to measure the distance traveled in a car.	_____
3. I am the unit used to measure the length of a boat.	_____
4. I am the unit used to measure the length of your classroom.	_____
5. I am the unit used to measure the length of a soccer field.	_____
6. There are 5 of me in 60 inches.	_____
7. There are 8 of me in 24 feet.	_____
8. There are 3 of me in 108 inches.	_____
9. I am equal to 24 inches plus 1 yard.	_____
10. I am equal to 11 feet minus 24 inches.	_____
11. I am equal to 25 inches plus 47 inches.	_____

Think About It!

12. **Stretch Your Thinking** If you added 120 inches to Exercise 9, how would it change your answer? Explain.

13. **WRITE Math** Explain why is there more than one type of customary unit of measure.

Who is Tallest?

There are 7 players on a basketball team. Their heights are 202, 148, 180, 205, 175, 150 and 198 centimeters. Use the clues to match their names to their heights.

James	_____
Mario	_____
Austin	_____
Nigel	_____
Arden	_____
Tim	_____
Brian	_____

1. Nigel is half a meter shorter than Tim.
2. Arden is 2 centimeters taller than 2 meters.
3. Austin is 1 decimeter and 8 centimeters shorter than Tim.
4. Mario is 3 decimeters taller than James.
5. Brian is one and a half meters tall.

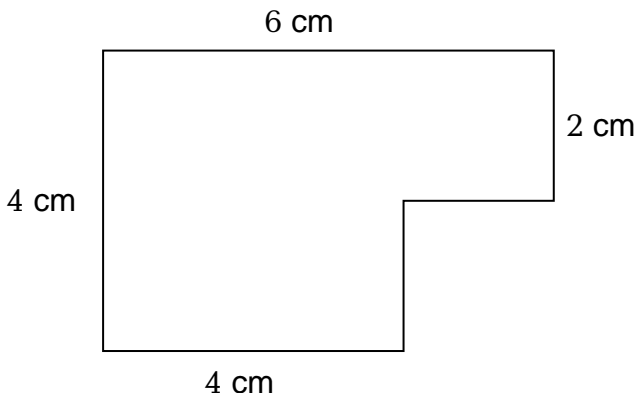
Think About It!

6. **Stretch Your Thinking** Nigel is the shortest player on the team. If Nigel were to grow 4 decimeters, how many players would be shorter than him? Explain.

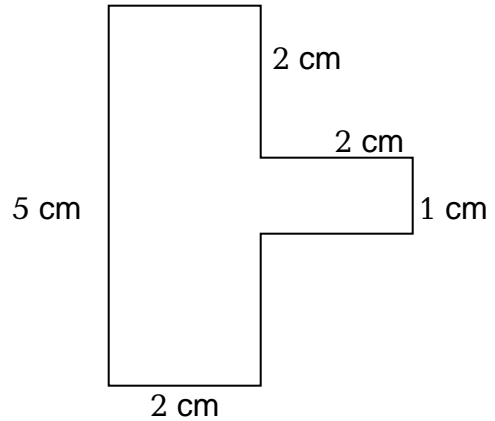
7. **WRITE Math** Explain the difference in converting units of measure with the metric system and converting units of measure with the customary system?

Going Around

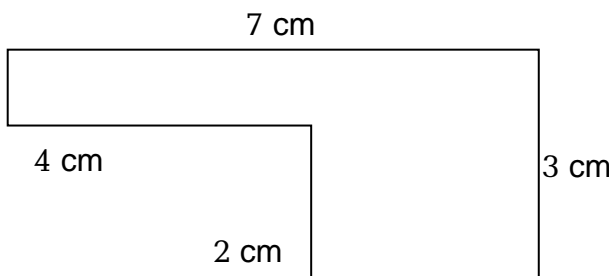
Help! The figures below only have some of their sides labeled.
Fill in the missing labels and calculate the perimeters.



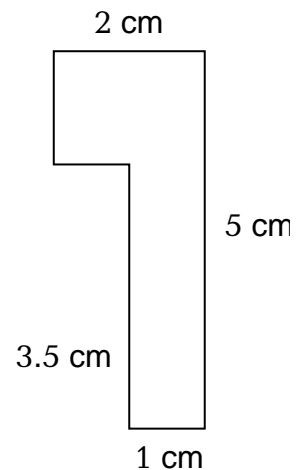
Perimeter = _____



Perimeter = _____



Perimeter = _____



Perimeter = _____

Think About It!

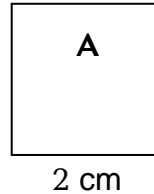
- Stretch Your Thinking** Draw a straight line in each figure to divide it into two rectangles. Label the length of each new line.

- WRITE Math** Explain how you determined the lengths of the sides that were not labeled.

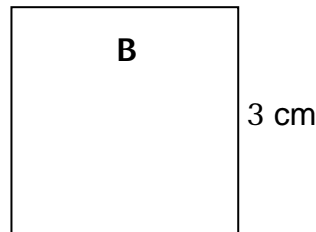
Match the Perimeter

Write the figure's letter next to the best match for its possible perimeter equation.

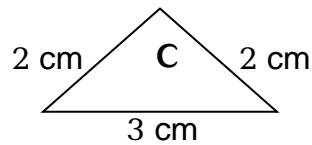
_____ 1. $4 + 6$



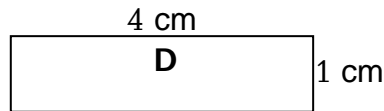
_____ 2. 4×2



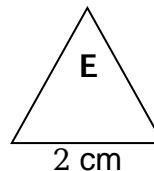
_____ 3. 3×2



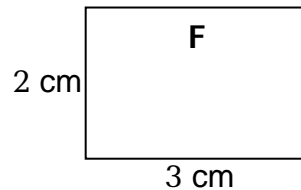
_____ 4. 4×3



_____ 5. $(2 \times 4) + (2 \times 1)$



_____ 6. $3 + 2 + 2$



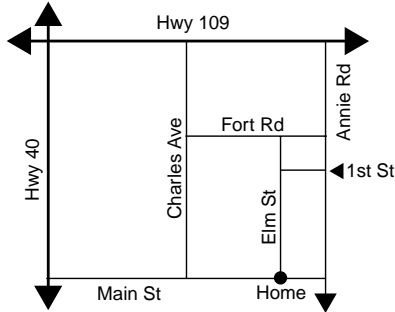
Think About It!

7. **Stretch Your Thinking** If Figure B's sides increased by 2 cm, how would that change its perimeter?

8. **WRITE Math** Explain why (2×3) and 6 are equivalent.

Running the Perimeter

John is training to run in a marathon. Below is a map of his home town. He lives on the corner of Main St. and Elm St. He always starts his training routes from his house and runs in a rectangle. He averages 4 miles per hour. Fill in the missing information in the table.



- Elm Street is 3 miles long
- Charles Avenue is 5 miles long
- Fort Road is 3 miles long
- 1st Street is 1 mile long
- Main Street is 6 miles long

Hours	Training Route	Length	Width	Perimeter Formula
2 1/2	Home to Fort Rd. to Charles Ave. back home on Main St.	2 mi	3 mi	$(2 \times 2) + (2 \times 3) = 10$
3		3 mi		
	Home to Annie Rd. to Hwy 109 to Hwy 40 back home on Main St.			$(2 \times 6) + (2 \times 5) = 22$ mi
1 1/2			2 mi	
		3 mi	5 mi	

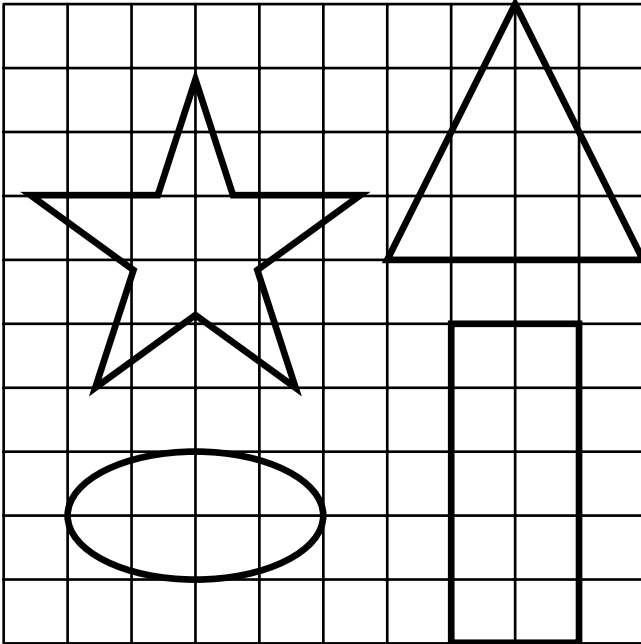
Think About It!

1. **Stretch Your Thinking** How many different possible training routes could John run?

2. **WRITE Math** All the distances for a one and a half hour training run were not given. Explain how you were able to determine the route.

Figure the Area

The figures cover a number of square units on the grid.



ESTIMATE

Look at the figures. Put them in order of their areas from least to greatest.

Estimate the area of each figure.

Area of the star

Area of the oval

Area of the triangle

Area of the rectangle

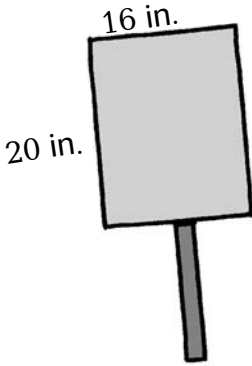
Think About It!

1. **Stretch Your Thinking** If you double the height of the rectangle, will it double the area? Explain.

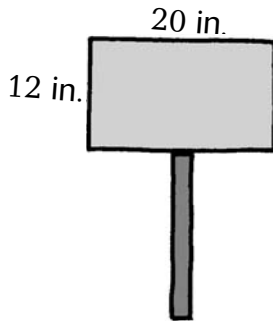
2. **WRITE Math** Explain how to find the area of a rectangle without counting the covered square units?

Sign Area

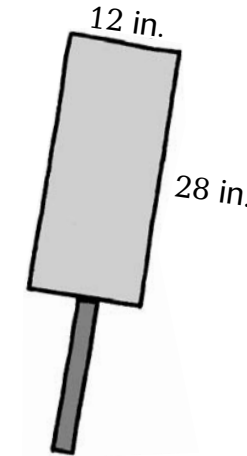
Angie, Bobby, Sue, Jake, and Sam each made a sign for the school parade. Follow the clues and write the correct name on each sign.



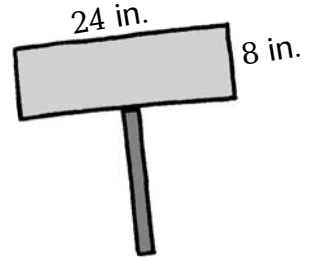
Sign A



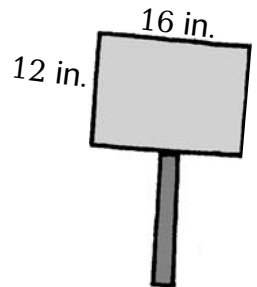
Sign B



Sign C



Sign D



Sign E

- Sue’s sign has the greatest area.
- Bobby’s sign and Jake’s sign have the same area.
- Bobby’s sign is wider than Jake’s.
- Sam’s sign is 80 square inches greater than Angie’s.
- Angie’s sign has an area of 240 square inches.

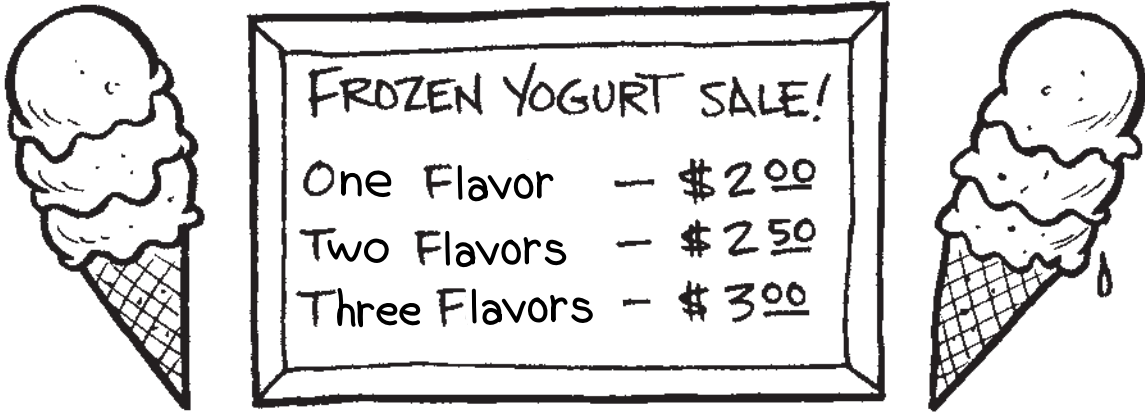
Think About It!

1. **Stretch Your Thinking** If you doubled the lengths of the sides of Angie’s sign, would it double the area? Explain.

2. **WRITE Math** Explain why using a formula to calculate the area is easier than counting the square units.

Three Scoops

Peter's fourth grade class had a frozen yogurt sale to raise money for classroom supplies. They sold three flavors: vanilla, chocolate and strawberry. The frozen yogurt was served on either a sugar cone or a cake cone. All frozen yogurt cones had 3 scoops.



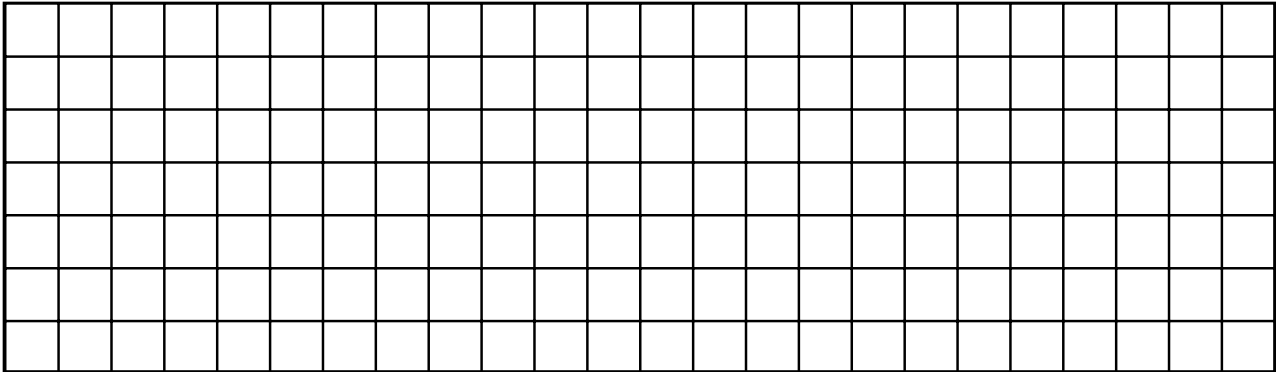
Peter's class sold one of each possible frozen yogurt flavor and cone combination. How much money did they raise? List the combinations and prices below.

Think About It!

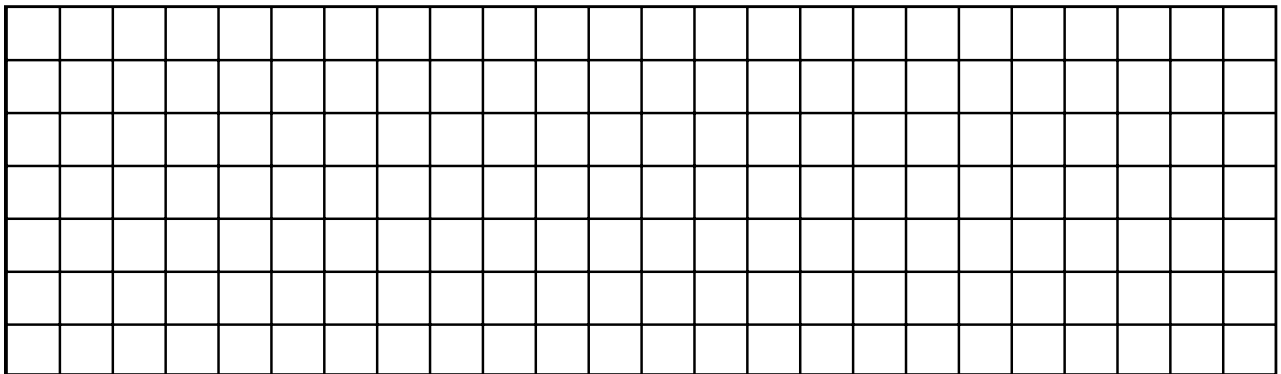
- Stretch Your Thinking** If mint frozen yogurt was added to the menu, how many different two flavor combinations would there be? Explain.
- WRITE Math** How did you organize the different combinations of frozen yogurt cones?

Find All the Rectangles

Think of at least four rectangles that have a perimeter of 16 cm. Draw them below and then find the area of each.



Think of at least four rectangles that have an area 24 cm sq. Draw them below and then find the perimeter of each.



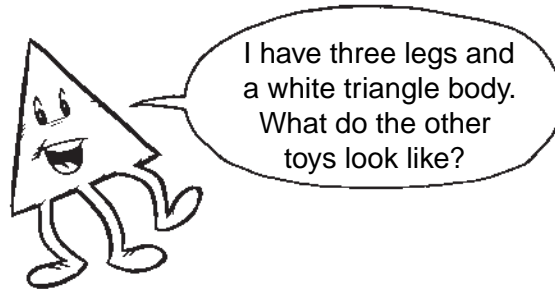
Think About It!

1. **Stretch Your Thinking** Can the perimeter of a rectangle be an odd number? Explain.

2. **WRITE Math** What patterns do you see in your drawings?

How Many Toys?

A toy maker decides to make a group of stuffed toys that are all different. The bodies are either a circle or a triangle. They either have two legs or three legs. They are white, red or blue.



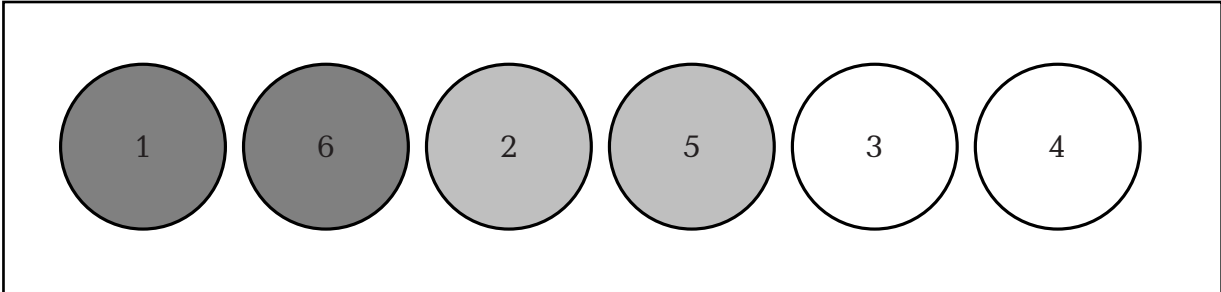
In the space below draw all the possible combinations that the toy maker creates.

Think About It!

- Stretch Your Thinking** Suppose the toy bodies could have also have been a square. How many more toys could have been made? Explain.
- WRITE Math** How did you organize your solution? Explain.

Disk List

Janet and Bill are playing a game in math class. They take turns tossing 3 plastic disks. They multiply the numbers that land face up to determine their scores.



In the space below, make an organized list of all possible outcomes and calculate the possible scores. If Janet needs at least 50 more points to win, what are the possible winning combinations? _____

First Disk	Second Disk	Third Disk	Score

Think About It!

1. **Stretch Your Thinking** If a fourth disk was added that had a 0 and a 3, how many winning combinations would there be? Explain.

2. **WRITE Math** What is the most likely outcome? Explain.

Connect the Outcomes

Draw a line from the outcome to the problem that it describes.

Then explain.

1. Sally tossed a penny and it landed on heads 10 times in a row. What are the chances that it will land on heads on her next toss? Explain:

Impossible

2. Ann Marie bought a bag with 1 red, 3 yellow and 4 pink candies inside. If she reaches in the bag and pulls out 5 candies, what are the chances that at least one of them will be pink? Explain:

Unlikely

3. Chris rolled two dice during a game. The dice need to total at least 7 to win. What are the chances he won? Explain:

Equally Likely

4. Cathy put a CD in a stereo. There were 9 songs on the CD and her favorite song was Track 1. If she pushed random play, what is the chance that the stereo played her favorite song? Explain:

Likely

5. Amanda had 12 colored pencils in her pencil box. There were 3 red, 4 blue, 4 green and 1 yellow. If 5 pencils fell to the floor, what are the chances that they would have all been the same color? Explain:

Certain

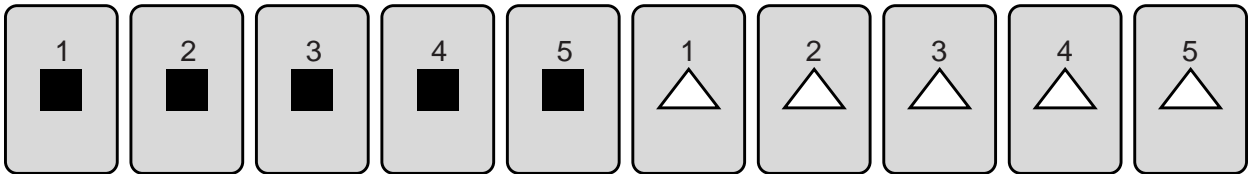
Think About It!

6. **Stretch Your Thinking** Suppose that another red candy was added to the bag in Exercise 2. Would that change the possible outcome? Explain.

7. **WRITE Math** Can you name a situation where an outcome would be equally likely? Explain.

Probability Cards

The following pack has 10 cards: 5 have squares and 5 have triangles. Each set of shapes is numbered 1 through 5. The pack is shuffled and placed face down before each problem.



1. What is the mathematical probability of choosing a triangle? Explain the likeliness.

2. What is the mathematical probability of choosing a 3? Explain the likeliness.

3. What is the mathematical probability of choosing a card with a number greater than a 2? Explain the likeliness.

4. What is the mathematical probability of choosing a card that is NOT odd? Explain the likeliness.

5. If two cards are chosen, what is the mathematical probability that they will both be squares? Explain the likeliness.

Think About It!

6. **Stretch Your Thinking** If triangle cards 6 – 10 were added to the pack, how would that change the probability in Exercise 1? Explain.

7. **WRITE Math** How did you find all the possible outcomes in Exercise 5? Explain.

Experimental Cubes

Ms. Diamond placed 20 cubes in a bag. She challenged her class to guess how many cubes of each color there were.

The only rule was that only one of the cubes could be out of the bag at one time. The class decided to take turns pulling 20 cubes each and recording the results.

1. After the first trial the results were yellow 5, green 4 and black 11. What is the experimental probability for each color? Predict how many of each color there are in the bag.

2. After five trials the results were 50 black, 24 yellow, 24 green and 2 orange. Change your prediction to match the results.

3. After 20 trials the results were 18 orange, 79 yellow, 182 black and 121 green. What is the experimental probability for each color?

4. What is your final prediction based on all the results of the experiment.

5. According to your prediction, what is the mathematical probability for each of the colors in the bag?

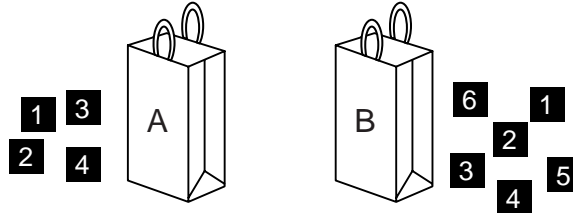
Think About It!

6. **Stretch Your Thinking** How is it possible that there was no orange cube in the first trial? Explain.

7. **WRITE Math** Why did your prediction change throughout the experiment? Explain.

Guessing Game

Ms. Woods placed number tiles 1, 2, 3, 4 into bag A. She then placed number tiles 1, 2, 3, 4, 5, 6 into bag B. She was going to pull out all 4 of the tiles in bag A to form a 4 digit number and 2 tiles from bag B to form a 2 digit number. She challenged her class to decide whether it was more likely to guess the 4-digit number from bag A or the 2-digit number from bag B.



Predict which one will be more likely. _____

Draw a tree diagram of all possible outcomes for each bag.

For which bag would you be more likely to guess the number? _____

Think About It!

1. **Stretch Your Thinking** Suppose Ms. Woods gave her class the option of guessing a 3-digit number using the tiles from bag A. Would that change your answer? Explain.

2. **WRITE Math** Write a multiplication sentence to show your answer. Explain.
