

MathStars

(a problem solving newsletter)

Vol. 3 No. 1

★★ 1. Fred buys a pencil for 30 cents. Sheila pays with 2 quarters. How many different ways can Sheila get money back? Answer _____. List all of the ways below.

★★ 2. Examine the letters below. Which are symmetric? Draw all lines of symmetry on the letters that are symmetric.

E N S X

★★★ 3. Jason, Trini, and Billy are arguing over who will be first, second, and third in line for lunch. How many different ways can they line up?

★★★ 4. Take a sheet of paper. Fold it in half. Without opening up the sheet of paper, fold it in half again. If you opened up your sheet of paper now, how many sections would there be? Open up your sheet to check out your answer! Repeat this process several times, each time adding one more fold to your sheet of paper. Do you see a pattern?

<i>Number of Folds</i>	<i>Number of Sections</i>
0	1
1	2
2	
3	
4	
5	
6	

Strategy of the Month

Someone said, "A picture is worth a thousand words." Turning the words of a problem into a picture or a diagram can help you "see" the problem. By using the part of your brain that visualizes a situation or object, you may see relationships or information that helps you solve the problem. When someone tells you a story, try turning the words into a motion picture or a cartoon. When reading a description, try "seeing it in your mind's eye." If you can do these things, this strategy may be for you! Try using a picture or make a diagram to solve this problem:

Every bike slot in a bicycle rack was filled. Donna's bike was in the middle. There were six bikes to the right of Donna's. How many bicycles were in the bicycle rack?

MathStars Home Hints

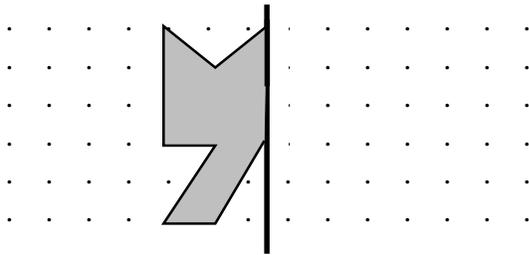
Every year you grow and change in many different ways. Get someone to help you measure and record these data about yourself.

How tall are you? _____

How much do you weigh? _____

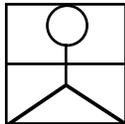
What is the circumference of your head?

- ★★ 5. Draw the flip of the shaded figure to create a symmetrical shape.

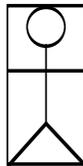


- ★ 6. Are you a square? Measure yourself to find out! You may have a friend mark your height and arm span, but be sure you do the measuring! Please use centimeters.

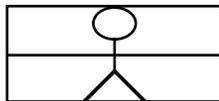
SQUARES HAVE EQUAL HEIGHTS AND ARM SPANS.



TALL RECTANGLES HAVE HEIGHTS THAT ARE LONGER THAN ARM SPANS.

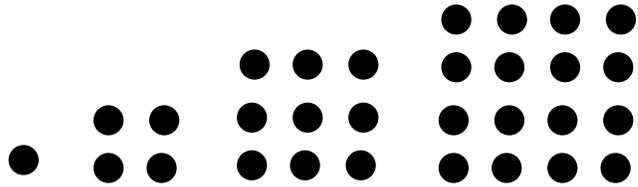


SHORT RECTANGLES HAVE ARM SPANS THAT ARE LONGER THAN THEIR HEIGHTS.



I am a _____ because my height is _____ centimeters and my arm span is _____ centimeters.

- ★★ 7. How many dots are in the next square in this sequence?



- ★★ 8. How many students are in Mrs. Lander's class? _____

What fraction of students in Mrs. Lander's class have birthdays in June? _____

In which month were you born?

			X									
	X		X		X				X	X		
	X	X	X		X			X	X	X		
X	X	X	X	X	X	X	X	X	X	X	X	X
January	February	March	April	May	June	July	August	September	October	November	December	

Put an X where you belong.

Setting Personal Goals

Problem solving is what you do when you don't know what to do. Being a good problem solver will help you be ready to live and work in our changing world. Computers can do computations but people must tell the computers what to do. Good problem solvers know how to make plans and use many different strategies in carrying out their plans. They use all of their past experiences to help them in new situations. We learn to swim by getting in the water; we learn to be good problem solvers by solving problems!

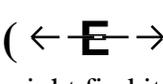
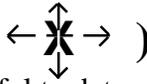
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The purpose of the MathStars Newsletters is to challenge students beyond the classroom setting. Good problems can inspire curiosity about number relationships and geometric properties. It is hoped that in accepting the challenge of mathematical problem solving, students, their parents, and their teachers will be led to explore new mathematical horizons.

As with all good problems, the solutions and strategies suggested are merely a sample of what you and your students may discover. Enjoy!!

Discussion of problems.....

1. **(9 different ways: 1. 2 dimes 2. 4 nickels 3. 20 pennies 4. 1 dime & 2 nickels 5. 1 dime & 10 pennies 6. 2 nickels & 10 pennies 7. 1 nickel & 15 pennies 8. 3 nickels & 5 pennies 9. 1 dime, 1 nickel, & 5 pennies)** Students may use guess and check or systematically write the ways. e.g. Start with one type of coin, then go to two types of coins, and finally go to three types of coins.

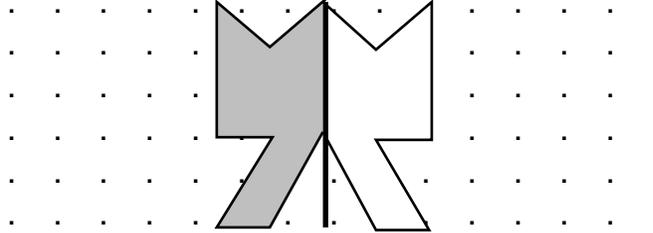
2. ( ) The dotted lines represent the lines of symmetry. Students might find it helpful to determine the lines of symmetry by using a MIRA or a mirror.

3. **(6 different ways)** Students may act out this problem or use manipulatives such as teddy bear counters (one red, one blue, one green) to represent the three students. They should keep a table or chart to record their results.

4.	<i>Number of Folds</i>	<i>Number of Sections</i>
	0	1
	1	2
	2	4
	3	8
	4	16
	5	32
	6	64

With each fold the number of sections doubles. (Students may state this pattern in a variety of ways.)

5.



Students might find it helpful to trace the figure on a piece of waxed paper and then fold it on the line of symmetry to create the symmetrical shape.

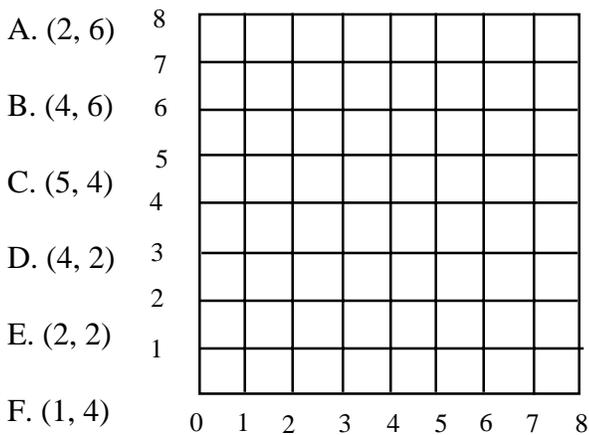
6. **(Answers will vary)** After measuring their height and armspan, students will need to refer to the information on squares, tall rectangles, and short rectangles in order to correctly categorize themselves.
7. **(25 dots)** Students will analyze the dimensions of each square and note that the next square should be a 5 x 5 square.
8. **(25 students; 3/25 have birthdays in June)** Students will need to analyze the graph to determine that there are 25 students and 3 students have June birthdays.

★★ 1. What part of the M&M'S are not orange?

red	3
orange	12
green	5
yellow	9
blue	6
brown	12
light brown	2

Answer: _____ out of _____ are not orange.

★★★ 2. Graph the ordered pairs on the coordinate grid. Connect the dots to make a pattern block. You will need to connect A and F. What is the pattern block that you made?



★★ 3. Roger is a very busy boy. He spends two weeks at basketball camp, one week at church camp, one week at grandma's house, and three weeks at summer camp during his ten week vacation. Estimate how many days he spends at home on his summer vacation.

Answer: _____ days at home on summer vacation.

★★★★ 4. There once was a dog who had two fleas, and on each flea there were three hairs, and on each hair there were four mites. How many mites were on the dog? _____

Strategy of the Month

*Your brain is an organizer. It organizes information as it stores that information. When a problem involves many pieces of information, your brain will have an easier time sorting through it if you make an organized list. A list helps you be sure you have thought of all of the possibilities without repeating any of them. Like drawing a picture or making a diagram, making an organized list helps your brain "see" the problem clearly and find a solution. Try **making an organized list** to solve this problem:*

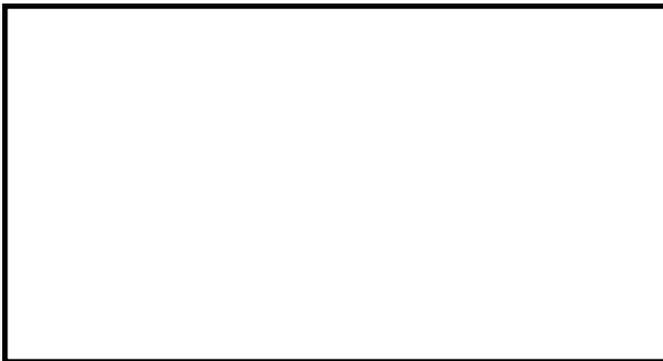
If you must use 15 or fewer coins, how many different combinations of coins can be used to make \$1.00?

MathStars Home Hints

Sometimes the hardest part of solving a problem is just getting started. Having some steps to follow may help you.

1. Understand the information in the problem and what you are trying to find out.
2. Try a strategy you think might help you solve the problem.
3. Find the solution using that strategy or try another way until you solve the problem.
4. Check back to make certain your answer makes sense.

- ★★★★ 5. Mr. Gordon has opened a ball shop. Make a pictograph that shows four volleyballs, six soccer balls, four more basketballs than soccer balls, and five more baseballs than volleyballs. Make each picture equal two.

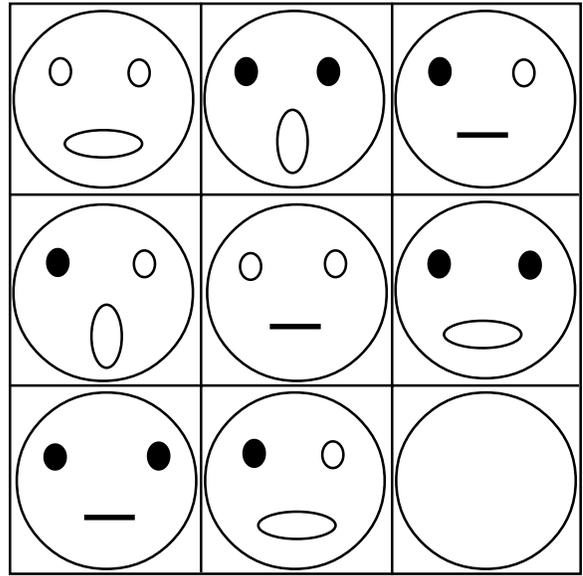


Basketballs Baseballs Volleyballs Soccer balls

- ★★ 6. Harriet plays baseball. She gets four chances to bat. She hits a home run each time she bats. In your head, count how many bases she has to step on to get credit for all home runs.

Answer: _____ bases

- ★★ 7. Draw the face that is missing from the box.



- ★ 8. A dove has two wings. In your head determine how many wings are on ten doves; how many wings are on twenty doves.

Answer: _____ wings on ten doves
and _____ wings on twenty doves.

- ★★ 9. Mr George's class of 26 goes to the gym to play kickball. There are 11 people on a team and four students decide not to play. How many teams can Mr. George's class form?

Answer: _____ teams

Setting Personal Goals

Being able to ask good questions will help you in many ways. Use these to solve problems:

- What information do I know?
- What else do I need to find out?
- What question am I trying to answer?
- Have I missed anything?
- Does my answer make sense?

Set the goal of asking good questions!

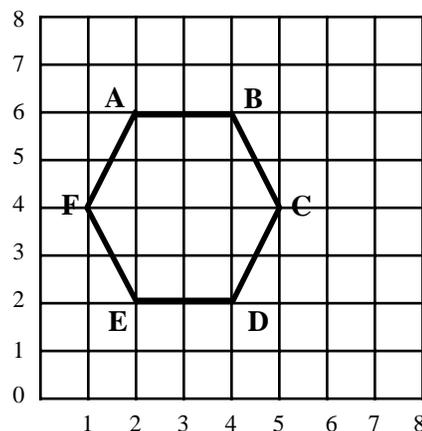
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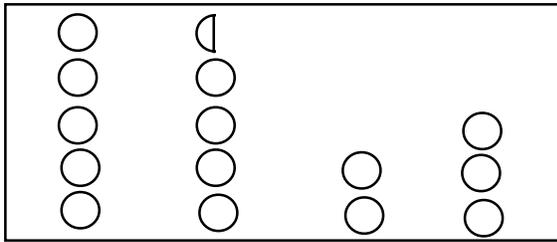
Discussion of problems.....

1. **(37 out of 49 M&Ms are not orange)** Students need to add all the M&Ms first. They must then subtract 12 from this answer. Students may have some difficulty with this problem because of the word "not."
2. **(A = (2,6) B=(4,6) C=(5,4) D=(4,2) E=(2,2) F=(1,4) The figure is a hexagon.)** Students should not have any difficulty with this problem.



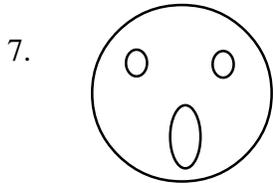
3. **(21 says at home on summer vacation)** Students will determine that Roger is away from home 7 weeks. They can then subtract 7 weeks from 10 weeks to determine that he is home for three weeks or 21 days.
4. **(24 mites)** Students can draw a picture to solve this problem or use manipulatives to represent the fleas, hairs, and mites.

5. (See pictograph)



Basketball Baseball Volleyball Soccerball

6. (16) Students may multiply or count by 4's in their head.



Students may notice the pattern going across and down and from this figure out the missing square. Some students may find the answer by looking at the empty square and find its features by process of elimination.

8. (1. 20 wings 2. 40 wings) Students may multiply two times the number, or they may count by 2's. Students may enjoy making up their own problems similar to this problem.
9. (2) Students may need to make drawings to do this problem (e.g. tally marks, stickmen), or they may subtract and then divide the answer by 11.

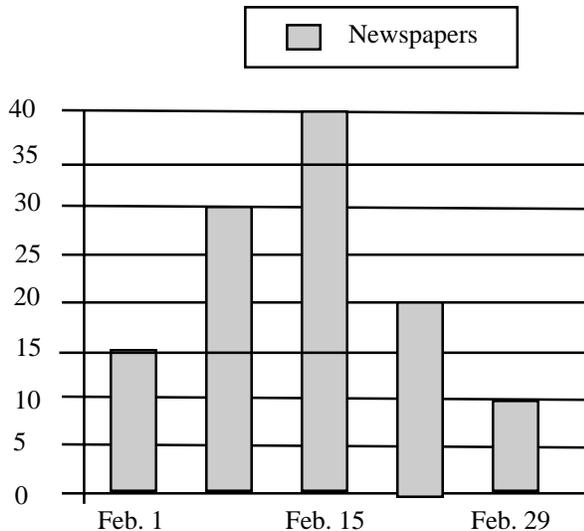
★★★ 1. The Tuttle family went to Sci-zone and bought passes for each show. They spent exactly \$20.00. How many passes could they buy? For which shows?

- \$4.00 Planetarium
- \$3.00 Holograms
- \$6.00 Dinosaurs

★★ 2. The horizontal or vertical distance between two dots in the diagram below is one linear unit. Create a shape that has a perimeter of 12 linear units. (Remember to only use horizontal or vertical lines, diagonal lines are not allowed!)



★ 3. Julie collected newspapers to recycle on Feb. 1 and Feb. 15. How many newspapers did she collect? Answer: _____



★★★★ 4. In the story Ramona Quimby, Age 8, Ramona is eight years old. If the copyright date on the book is 1971, how old is Ramona today?

Strategy of the Month

*Being a problem solver is something like being a detective! A detective has to solve crimes by guessing what happened and checking the guess to see if it fits the situation. For some problems, your best strategy may be to make a guess and then check to see if your answer fits the problem. If not, decide if your guess was too high or too low and then make a second "guesstimate." A good detective keeps records (usually some kind of chart) to help see any patterns and to narrow down the possibilities. You should do this too. The results of incorrect guesses can give you valuable clues to the correct solution. **Guess and then check** the solution to this problem:*

I am a 2-digit number over 50. When you put me in groups of 7, 2 are left over. The sum of my digits is 11. What number am I?

MathStars Home Hints

Memorizing number facts will save you time. Flash cards are one way to learn new facts, but you also might try these ideas:

- play dice or card games in which you need to add, subtract, multiply, or divide.
- learn new facts using ones you already know ($7+7=14$ so $7+8=15$).
- learn facts that are related to each other ($7 \times 6=42$, $6 \times 7=42$, $42 \div 6=7$, $42 \div 7=6$).
- make a list of the facts you need to memorize and learn 5 new facts each week.
- Spend 5-10 minutes every day practicing facts.

★★★ 5. At Toys-R-Us you bought an action figure for \$3.98. Tax was twenty cents. If you paid for your purchases with a five dollar bill, what coins could the clerk use if she wanted to use the fewest number of coins possible in returning your change?

★★ 6. FUNCTION MACHINE!

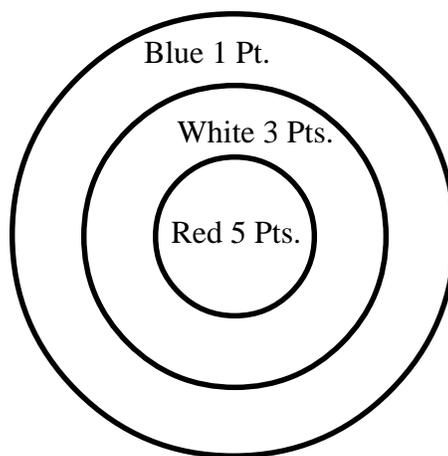
When you put a number in the function machine, it does something to it, and then spits out the changed number! The table of the left shows the numbers that went into this function machine, and the changed number that came out.

<u>IN</u>	<u>OUT</u>
2	4
3	9
4	16

- A. If I put five into the function machine, what number will come out? _____
- B. What does this function machine do to a number that you put in it? _____

★★★ 7. Molly, Emed, and Brian were practicing archery. The chart below is a record of what each person shot. If an arrow in the red zone is worth five points, and arrow in the white zone is worth three points, and an arrow in the blue zone is worth one point, which child had the highest score? _____

STUDENT	RED	WHITE	BLUE
MOLLY	3	4	2
EMED	2	5	3
BRIAN	4	0	4



★★ 8. If you drop a penny on the floor and it spins around on its edge, what solid shape does it look like?

- Circle one: CYLINDER
 SPHERE
 CONE

Setting Personal Goals

Communicating mathematically means that you are able to share your ideas and understandings with others orally and in writing. Because there is a strong link between language and the way we understand ideas, you should take part in discussions, ask questions when you do not understand, and think about how you would explain to someone else the steps you use in solving problems.

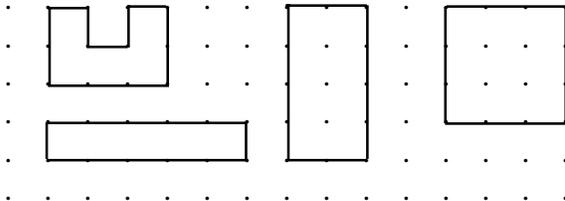
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Discussion of problems.....

1. **(5 passes: 2 Planetarium, 2 Hologram, 1 Dinosaur)** Most students will use guess and check, branches on a tree, or charts.
2. **(Answers will vary)** Students may use a geoboard to explore this problem. Some acceptable answers:



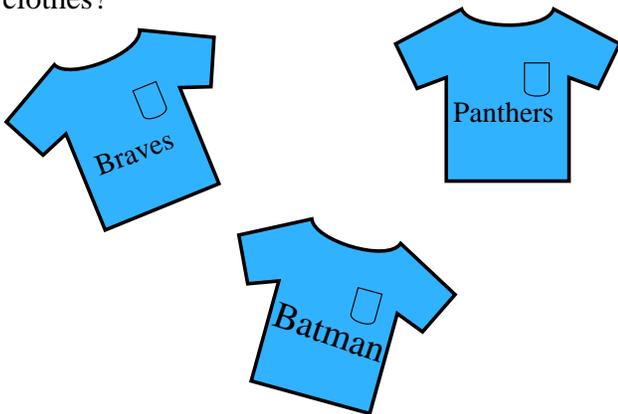
- 3 **(55)** Some students perceive graphing as a straightforward matter of counting and recording their data, without any choice. Students should understand that graphing is much more than this if they are given the opportunity to pose their own questions, collect their own data, analyze their data, and interpret their data.
4. **(In 1996 Ramona will be 32 years old)** The answer will depend on this year's date. Students need to remember that Ramona was eight years old in 1971.

5. **(1 half-dollar, 1 quarter, 1 nickel, and 2 pennies)** The change could be given with the five coins listed. If a 50¢ piece is not used, six coins would be required--3 quarters, 1 nickel, and 2 pennies.
6. **(A: 25; B: Multiplies the number by itself)** Students may give other acceptable answers for part B.
7. **(Molly)** Molly's score was 29, Emed's score was 28, and Brian's score was 24.
8. **(Sphere)** Students will probably need to spin a penny rapidly on its edge to explore this problem.

★★★★ 1. The third grade students at Westview Elementary School built a nature trail behind their school. The trail started and ended at the same place. It had five sides. Two were 60 feet long and the remaining three were 30 feet long.

- A. What is the name of the shape of the nature trail? _____
- B. How long is the nature trail (in feet)? _____
- C. How long is the nature trail (in yards)? _____

★★★ 2. For his birthday Zack gets four pairs of shorts (red, blue, black, and green) and three new T-shirts (a Batman T-shirt, a Braves T-shirt, and a Carolina Panthers T-Shirt). How many different outfits can Zack make with his new clothes?



★ 3. How many rectangles are in the figure below?



★★ 4. During softball practice, Lakisha hits the ball on the average of two out of every four pitches. If she gets ten pitches during practice, how many times would you expect her to hit the ball?

★★★ 5. What number am I? _____

- I AM NOT EVEN***
- I AM GREATER THAN 200***
- THE SUM OF MY DIGITS IS NINE***
- I AM A MULTIPLE OF FIVE***
- I AM LESS THAN 300***
- I AM EVENLY DIVISIBLE BY NINE***

Strategy of the Month

*Noticing patterns helps people solve problems at home, at work, and especially in math class! Math has been called "the study of patterns," so it makes sense to look for a pattern when you are trying to solve a problem. Recognizing patterns helps you to see how things are organized and to make predictions. If you think you see a pattern, try several examples to see if using the pattern will fit the problem situation. Looking for patterns is helpful to use along with other strategies such as make a list or guess and check. How can **finding a pattern** help you solve this problem?*

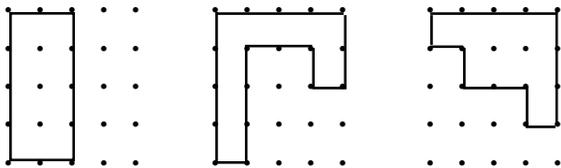
If the first day of a year is a Friday what day of the week is February 19 of the same year?

MathStars Home Hints

Set aside a special time each day to study. This should be a time to do homework, to review, or to do extra reading. Be organized and have a special place in which to work. This place needs to have a good light and to be a place where you can concentrate. Some people like to study with quiet music; others like to sit at the kitchen table. You need to find what works for you!

Remember that when you are reviewing or working on solving problems it may help to study in a group.

★★★ 6. Are all of these geoboards divided in half?



Answer: _____

★★★ 7. Brittany and Chris are playing a game called Carousel. They get six points every time they draw a green card and ten points every time they draw a black card. Whoever scores 150 points first wins the game. Brittany has 82 points now and she has nine cards. Chris has 88 points now and ten cards. How many cards do Brittany and Chris have of each color?

Brittany: Green _____
Black _____

Chris: Green _____
Black _____

★★★ 8. You want to make cookies for a class of 24 students. Using the recipe for cookies, how much sugar would you use? Each recipe will make six large cookies.

1/2 cup flour
1/2 cup sugar
1/2 cup peanut butter



Answer: _____ cup(s) of sugar

★★ 9. There are five players on a basketball team. If ten teams are playing in the tournament on Sunday, how many players are there altogether in the tournament?

Setting Personal Goals

If your goal is to become a more responsible student, it means that you :

- *actively participate in class.*
- *complete your assignments.*
- *have everything you need in class.*
- *ask for help when you do not understand.*
- *be willing to investigate new ideas.*

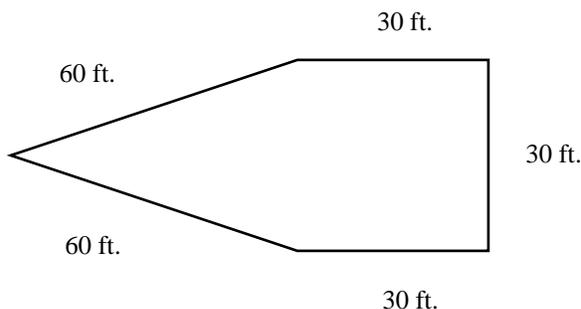
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Discussion of problems.....

1. **(A: Pentagon; B: 210 feet; C: 70 yards)** Students will most likely draw a picture of the trail and label the sides.



2. **(12 outfits)** Students may use cutouts of shirts and shorts or some other manipulative to explore the possible combinations. They need to keep a record of all combinations.
3. **(3)** Students need to realize that squares are also rectangles.
4. **(5)** Most students come to third grade with an intuitive understanding of ratio, proportion, and probability. If they understand the relationship between two and four, they can then identify the number having the same relationship with ten.
5. **(225)** Students will need to know what the terms even, sum, multiple, and divisible mean. They might use a number chart to eliminate numbers as they consider each clue.

6. **(Yes)** Most students will not realize that a figure can be divided into half with both halves not being the same shape; however, they must be the same size. Students may want to use geoboards to practice making shapes like these.
7. **(Brittany: Green 2, Black 7; Chris: Green 3, Black 7)** Students will add black and green cards until they arrive at the correct answer. Many students will use drawings and guess and check to solve this problem; however, it was designed to use the different operations to solve the problem.
8. **(2 cups of sugar)** Students will first figure out how many recipes it will take to make 24 cookies. They will then have to find the total of the $\frac{1}{2}$ cup measurements. You may want to have measuring cups out in a center for students to use.
9. **(50 players)** This problem is designed for students to multiply; however, some students may use repeated addition.

MathStars

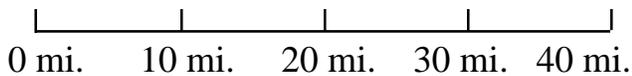
a problem solving newsletter

Vol. 3 No. 5

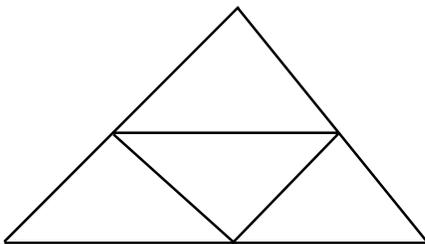
★★★★ 1. Steven, Jency, Cameron, and Ali like to collect things. Among the four students, they collect T-shirts, rocks, baseball cards, and shells. Jency likes to collect only rocks. Ali collects two items but she doesn't collect T-shirts or shells. Cameron collects the same thing as Jency and Steven. Steven likes to collect only those things that Ali doesn't like to collect. What does each child collect?

Steven: _____
 Jency: _____
 Cameron: _____
 Ali: _____

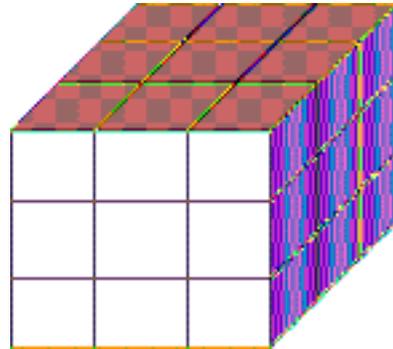
★ 2. Chad and his family hiked a 40 mile stretch of the Appalachian Trail this summer. On this section of the Appalachian Trail there is an aide station every ten miles. After hiking 23 miles, Chad tripped and seriously injured his arm. Circle the closest aide station his family should use.



★★ 3. How many triangles can you find in this picture?



★★★ 4. How many small cubes would it take to build the rectangular prism below? _____



★★★ 5. You are taking a survey at Tina's doughnut shop. You observe 16 cars going through the "drive through." Every person, driver and passenger, orders a doughnut. Some cars only contain one person, a driver. No car contains more than four people, including the driver.

Estimate the fewest doughnuts that could be sold. _____

Estimate the most doughnuts that could be sold to the nearest ten. _____

Strategy of the Month

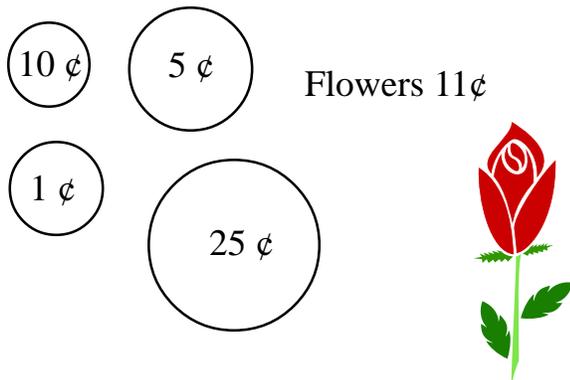
*Sometimes mathematical ideas are hard to think about without something to look at or to move around. Drawing a picture or using objects or models helps your brain "see" the details, organize the information, and carry out the action in the problem. Beans, pennies, toothpicks, pebbles, and cubes are good manipulatives to help you model a problem. You can use objects as you guess and check or look for patterns. Try **using objects** to help you solve this problem:*

Twenty-seven cubes are placed together to make a large cube that is painted on the outside. How many small cubes will have 2 and only 2 faces painted?

MathStars Home Hints

Remember when you had "Show and Tell" in kindergarten? Now you have a great deal to share in mathematics. Talk to the folks at home about what you are learning. Show them your papers and tell them about what is happening in your math class. Let them see that you are doing problems in class similar to these. Each week choose an assignment that you are proud of and display it somewhere in your house.

★★★ 6. How many flowers can Worth buy with these coins if a flower costs 11 cents?



Answer: _____ flowers

★★ 7. Here are some clues to find my secret shape.

*I am a four sided figure.
I have four right angles.
People that don't have any fun are called me.*

What am I?

Answer: _____

★★ 8. These are the blocks needed to make one tent:



Number of Tents	Number of Triangles	Number of Trapezoids
1	2	1
2	4	2
3		
4		
5		
6		

How many triangles and trapezoids will you need to make six tents?

Answer: _____ triangles
 _____ trapezoids

Setting Personal Goals

Mathematics is all around us. We use it every day in personal living and in all of our school work. When we read graphs in social studies, gather and use data in science investigations, or count in music or physical education, we are using mathematics. We make connections in our math classes also; for example, measurement skills help us in solving many geometry problems and classification skills help us in organizing data. We use computation in many different situations. You will become a stronger mathematics student by making connections.

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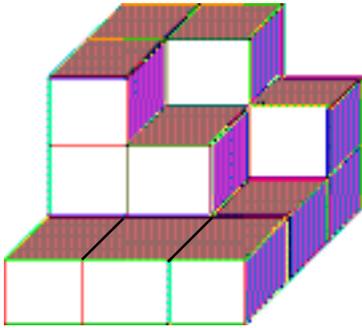
Discussion of problems.....

1. **(Steven: T- shirts and shells; Jency: Rocks; Cameron: T-shirts, rocks, and shells; Ali: Rocks and baseball cards)** Students might choose to organize the information in a matrix. An example:

	T-shirts	Shells	Rocks	Baseball cards
Steven	Yes	Yes	X	X
Jency	X	X	Yes	X
Cameron	Yes	Yes	Yes	X
Ali	X	X	Yes	Yes

2. **(20 miles)** Students should understand that 23 rounds to 20.
3. **(5)** Students might start counting the small triangles and then move to the largest.
4. **(27 cubes)** Students may use wooden blocks, base ten cubes, or other appropriate manipulatives to build the rectangular prism and solve the problem.
5. **(Answers may vary; 60)** Students may multiply, draw cars, or make a table to arrive at their estimates.
6. **(3)** Students should realize that they will have money left over. They may use a diagram or add up all their money and divide by 11.
7. **(Square)** Students should follow each clue to find the geometrical shape. Some students may say rectangle; however, that is not correct because it does not fit with clue 3.
8. **(6 trapezoids and 12 triangles)** Some students may multiply 1 x 6 for trapezoids and 2 x 6 for triangles; however, the problem was designed for them to complete the table. Students may enjoy designing their own patterns.

★★ 1. How many blocks do you need to complete this solid cube? Answer: _____

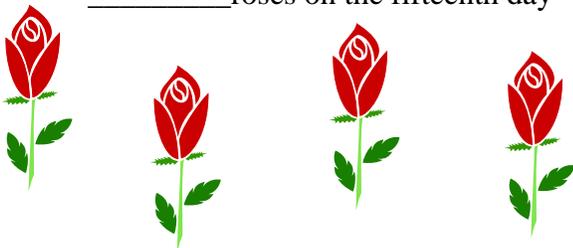


★ 2. Brenda went to visit her boyfriend at college. Her car's gas gauge looked like figure A when she started. It looked like figure B when she got to the college. If her gas gauge was working correctly, could she return home without adding gas? Answer: _____



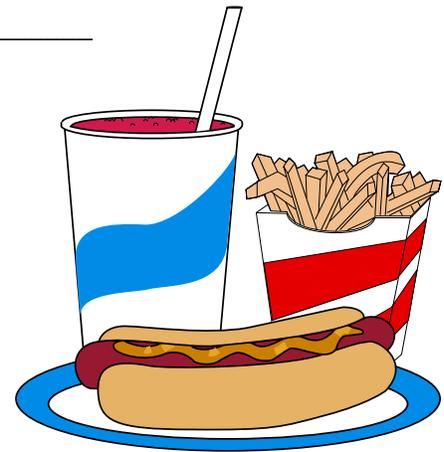
★★★★ 3. Madeline sells five roses on the first day, seven roses on the second day, ten on the third day, fourteen on the fourth day. If Madeline continues her selling pattern, how many roses will she sell on the tenth day? How many will she sell on the fifteenth day?

Answer: _____ roses on the tenth day
 _____ roses on the fifteenth day



★★★ 4. There are 77 french fries in a large order of fries. A small order of fries is one-third the size of a large order of fries. Estimate how many fries are in the small order.

Answer: _____



Strategy of the Month

When a problem involves data with more than one characteristic, **making a table, chart, or graph** is a very good way to organize the information. It helps your brain to identify patterns and to discover any missing data. Tables help you record data without repeating yourself. Making a table or chart is especially useful for certain problems about probability and for some logic problems. Sometimes tables and charts are included in your information and you need to read through them carefully to understand the data you need to solve your problem. Creating a graph is also a good way to organize and visualize information. **Make a table** to solve this problem:

A school cafeteria sells popsicles for 50¢, nutty buddies for 80¢, and ice cream sandwiches for 60¢. If a student spent \$6.00 in May for frozen snacks what could the student have purchased?

MathStars Home Hints

Everyone learns from sharing, and you can continue to learn by teaching others about the new mathematics ideas you are learning. Become a teacher and help a younger student. Explain what you have learned and what else you want to know. Good teachers set goals and evaluate the progress made toward reaching these goals. You will continue to be a learner whenever you become a teacher.

- ★★★ 5. You have been given 24 square ceramic tiles. Complete the chart below showing the dimensions of all the rectangles you can make with 24 square tiles.

<i>LENGTH</i>	<i>WIDTH</i>

- ★★ 6. What number am I? _____

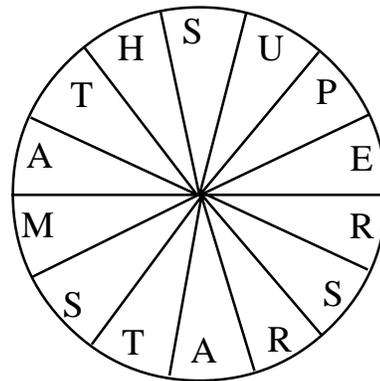
I AM SMALLER THAN 200
I AM A MULTIPLE OF 10
YOU CAN MAKE ME IF YOU HAD ONLY QUARTERS
I AM AN EVEN NUMBER
THE SUM OF MY DIGITS IS SIX

- ★★★ 7. The circle below has the words "MATH SUPER STARS" written around the edge, with one letter in each section. Create a spinner using the circle by placing a paper clip and a pencil point at the center of the circle and spinning the paper clip.

If you spin the spinner 100 times, which letter (A, E, H, M, P, R, S, T, or U) do you think will the spinner land on most often? _____

Create a spinner and spin the paper clip 100 times. Using the chart below, record the letter the paper clip fell on each time. Was your prediction correct?

A _____
 E _____
 H _____
 M _____
 P _____
 R _____
 S _____
 T _____
 U _____



Setting Personal Goals

Perseverance means that you do not give up easily. Good problem solvers try different strategies when they are stumped and are not discouraged when they cannot find an answer quickly. They stick to the task, using all of their previous experiences to make connections with what they know and the problem they are trying to solve. If something does not work, they discard the unsuccessful idea and try again using a different strategy.

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Discussion of problems.....

1. **(10)** Some students may look at the cubes in layers and decide how many are missing from each layer and then find the total number missing. Some students may figure out how many cubes are needed in all and then subtract from that number the number of cubes shown. Cubes should be available for those students who wish to build the model.
2. **(No)** This problem involves visual discrimination and measurement. Students need to notice that the gas guage is showing under $\frac{1}{2}$ of a tank when they arrive. They then use their knowledge of fractions to complete the problem.
3. **(59 roses on the 10th day; 124 roses on the 15th day)** Students will need to find the rule in order to continue the pattern. Rule: add the number of roses corresponding to the number of the day to the previous number of roses sold. (i.e. 5, 7, 10, 14, 19, 25, 32, 40, ...)
4. **(25 or 26 french fries)** Students need to be able to estimate one-third of 77. They may round up or down.
5. **(See table)** Students may use squares of paper or square tiles to solve this problem.

LENGTH	WIDTH
1	24
2	12
3	8
4	6

6. **(150)** Students may use a number chart to help them solve this problem by crossing out "classes" of numbers as they read through the clues. They also may use the multiples of ten and determine which multiple satisfies all clues.

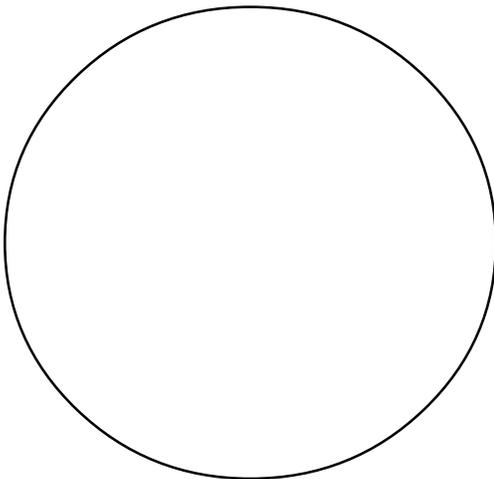
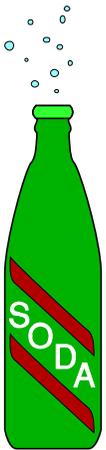
7. **(S, A, T, and R are acceptable choices)** The students also should have recorded the results of their spins.

Math Stars

a problem solving newsletter

Vol. 3 No. 7

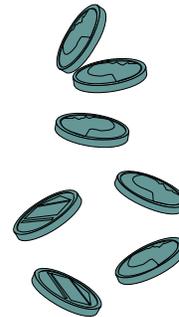
★★★ 1. The students in Mrs. Neal's third grade class conducted a survey to determine what kind of soft drinks their friends liked. They found that $\frac{1}{2}$ of the class liked Coca-Cola best, $\frac{1}{4}$ of the class liked Dr. Pepper best, and $\frac{1}{4}$ of the class liked Mountain Dew best. Use the circle below to construct a graph that illustrates their findings. Be sure to label each section with the type of soft drink it represents.



★★★★ 2. What are the dimensions of all the different rectangular quilts that can be made with 18 individual squares (you must use all 18 quilt squares)? _____

What are the dimensions of the largest square quilt that can be made if you have 18 individual quilt squares (hint: you won't be able to use all 18 individual quilt squares)? _____

★★ 3. Jenny has seven coins. Their total value is 48 cents. What coins does Jenny have?



★ 4. Using the digits 0-4 once and only once, what is the largest odd number you can write?

Strategy of the Month

*Some problems are difficult to "see" even if you draw a picture. For these problems, it can be helpful to actually **act out the problem**. When you role play with friends or people at home, you may discover the solution as you act out the problem. Or you may recognize another strategy that will help you find the answer. Sometimes "acting out" a problem can be done with manipulative materials. To find the solution to the problem below, become the director and choose your cast to act this out:*

There are four boys in the Grant family. Alex is older than Terry and younger than Stuart, Ross is not the oldest or the youngest. Alex does not have two older brothers. Write the names of the boys from oldest to youngest.

MathStars Home Hints

Calculators are important tools. They do not replace mathematical thinking; you must tell the calculator what numbers and operations to use. Calculators allow students to focus their energies on solving problems and to easily try alternative solutions. They also allow students to solve problems that were too difficult for pencil and paper. Number sense and good estimation skills are important when students use technology to carry out computations. Explore some "what if" situations with the calculator. "What if the cost of gas goes up 4¢... What if we build the patio 2 feet wider..."

★★ 5. Neil drops a green, blue, white, and black marble into a bag. He picks one marble out of the bag and places it back in the bag. He repeats this 12 times. He has recorded his results below. Use the chart to answer questions.

Green | | | |

Blue |

White ||||

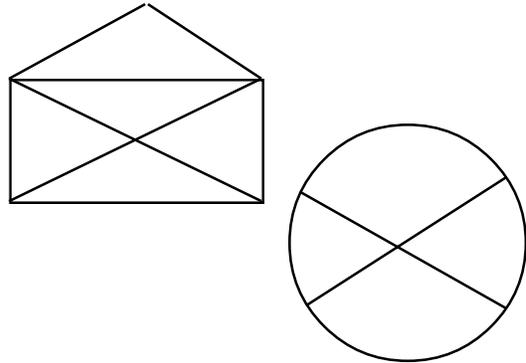
Black | |

1. Which marble comes up the most times? _____
2. How many times? _____
3. What are the possibilities that Neil will pull out a white marble, according to his chart? _____

★★ 6. Sam went on a picnic. While eating his lunch he saw spiders and ants on his blanket. He looked closely and noticed that the spiders had eight legs and the ants had six legs. He saw 26 legs in all. How many spiders and ants did he see?

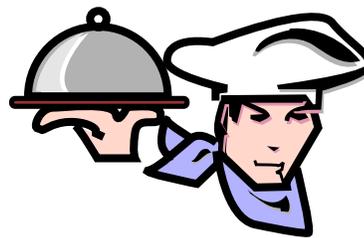
Answer: _____ spiders and _____ ants.

★★★ 7. Which puzzle can you trace without lifting your pencil or going over a line twice? Put an X on the place where you started.



★★★ 8. For supper Jeff went to a buffet. He could choose from among these meats: ham, steak, and fried chicken. He can also choose as a vegetable either green beans or mashed potatoes. What are all the possible ways that he can eat supper if he has only 1 meat and 1 vegetable?

What are the chances that he will eat ham and green beans? _____ out of _____



Setting Personal Goals

Accuracy is very important to everyone. Pharmacists must always measure accurately when preparing prescriptions and carpenters must cut supporting boards precisely to fit. Careless mistakes may be avoided in the classroom by computing carefully, checking back over work, and writing numbers clearly and neatly. Remember: If work is worth doing, it is worth doing well.

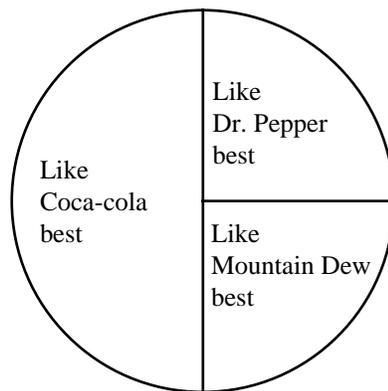
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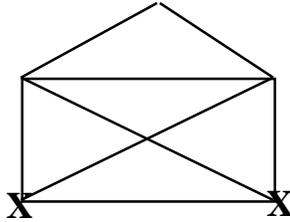
Discussion of problems.....

1. **(See graph)** Graphs may vary in appearance but all should show the circle sectioned off in one half and two quarters. Each section should be labeled appropriately.



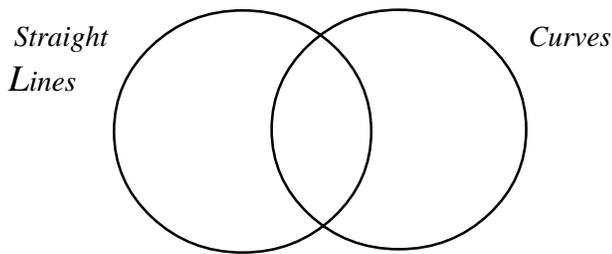
2. **(1 x 18; 2 x 9; 3 x 6; largest square 4 x 4)** Students may use square pieces of paper or tiles to explore this problem.
3. **(1 quarter, 1 dime, 2 nickels, 3 pennies)** Students will probably use guess and check and a chart to keep track of the combinations of coins.
4. **(43,201)** This problem provides a good review of place value concepts and odd/even numbers.
5. **(1. White marble; 2. 5; 3. 5 out of 12)** Students might like to try this activity to compare their results to Neil's results.

6. **(1 spider and 3 ants)** Some students may need to make a drawing for this problem. Other students may add the number of legs on each animal until they reach 26.
7. **(The envelope shaped puzzle)** The diagram below shows two possible starting points. Students may enjoy making their own puzzles for others to trace.

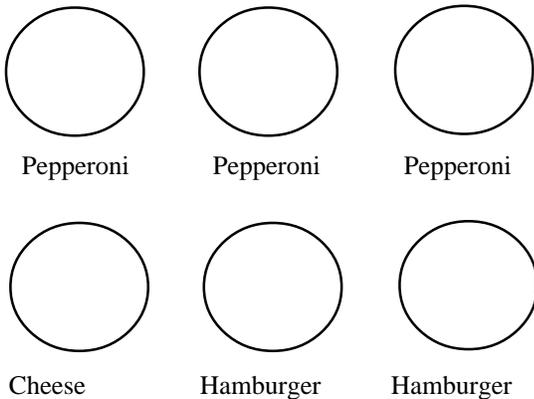


8. **(6 different combinations; 1 out of 6)** Students will most likely make a drawing to answer the question. Some students will find it helpful to use manipulatives to represent the food items.

★★★ 1. a. Which numbers 1 - 10 have straight line segments?
 b. Which numbers 1 - 10 have curves?
 Make a Venn diagram showing where the numbers belong.



★★ 2. Mrs. Davis baked 6 pizzas. Her class of 24 students ate all of the pizzas. Show how Mrs. Davis cut the pizzas so that everyone got an equal amount of each type.



★★★ 3. If you were to color a hundreds board on every seventh number beginning with the number 7, what number have you colored after coloring 12 numbers?

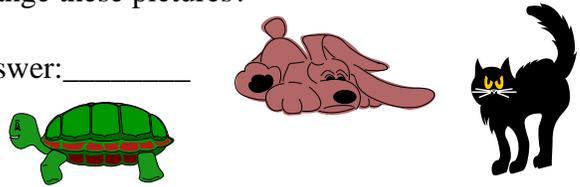
Answer: _____

★ 4. What are the equations that you can find using numbers from one to ten that fit these clues:
 Clue 1: The addends are both odd.
 Clue 2: The sum of the digits is ten.

List the equations:

★★★★ 5. Chelsea colored a turtle, dog, and cat in her coloring book. She wants to surprise her Mom by hanging them on the refrigerator in a triangle. How many different ways can Chelsea arrange these pictures?

Answer: _____



Strategy of the Month

*What do you do if you have a problem that seems to be very complicated? It may have a lot of large numbers, too much information, or multiple conditions. One approach is to create a simpler problem like the one you need to solve. As you solve the easier problem, you may see the way to solve the more difficult one. Or you may discover a different process that will work with the harder problem. The trick is to be sure that your simpler problem is enough like the original one that the patterns or process you use will help you with the harder situation. **Make a simpler problem first as you solve this:***

The pages in a book are numbered from 1 to 256. How many times is the digit 4 printed?

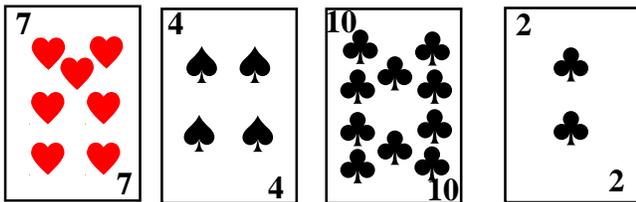
MathStars Home Hints

Math skills develop as you apply concepts learned in school to real life situations.

Which product is the best buy? How many tiles will it take to cover the kitchen floor?

What time should we start baking the turkey so that we can have dinner at 7 p.m.? What do the statistics tell us about the two baseball players?

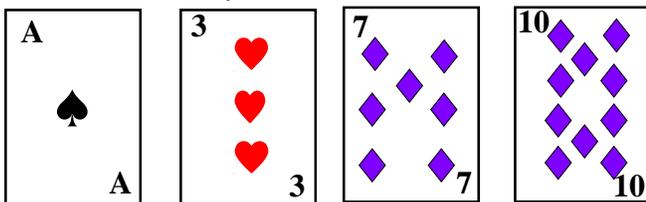
- ★★ 6. Jerry dealt four cards to himself and Ryan. These are the cards that were dealt to Ryan:



Card showing:



Cards dealt to Jerry:



The ace (A) equals one and all the other cards equal the value on the card. Each player must make a problem that equals the one card showing. Show all the ways they can equal six using only their cards.

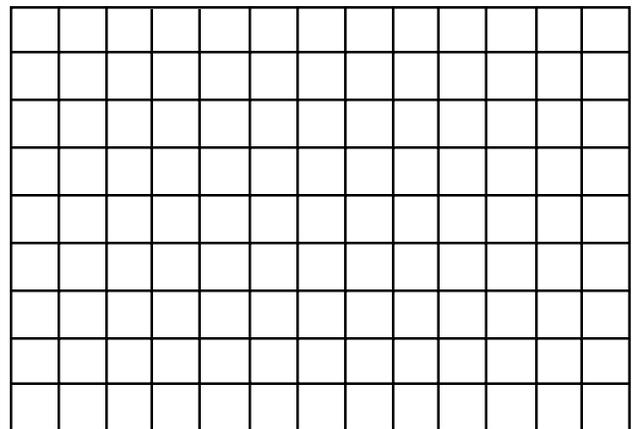
Jerry: _____

Ryan: _____

- ★★ 7. It takes about three hours and 45 minutes to drive from Micheal's house to his grandmother's house. If his family wants to arrive at his grandmother's house by 5:30 p.m., when should they leave their house? _____



- ★★ 8. Using the graph paper below, create two different designs, each composed of five squares, that have the same area (five squares), but have different perimeters. In each arrangement each square must touch another square at least at one point.



Setting Personal Goals

Confidence means that you believe in yourself. You can become a more confident problem solver by learning to use a variety of strategies. If your first idea does not work, don't give up; just try another way! Working with a buddy also helps. You need to remember that there is usually more than one way to solve a problem and that practice always helps us learn.

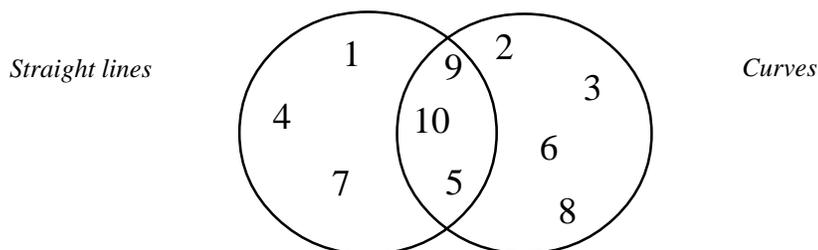
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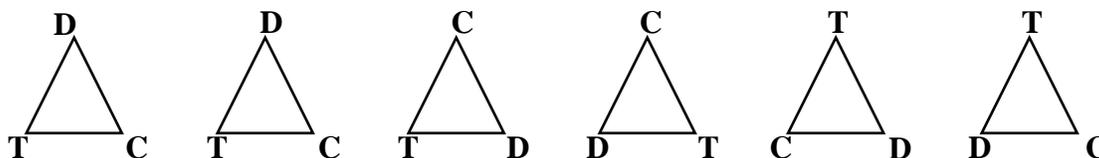
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Discussion of problems.....

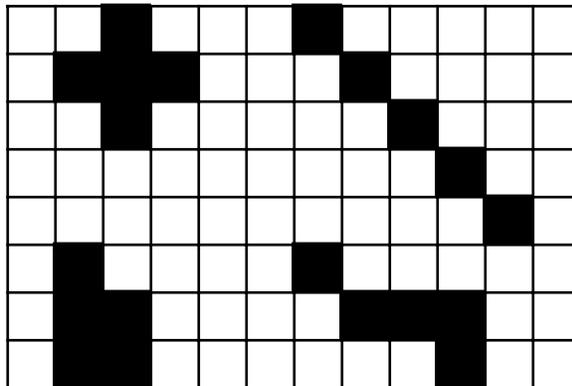
- (See diagram) Note that the typed version of some numerals is different from the handwritten form. (ex.9)



- (1. 8 pieces; 2. 8 pieces; 3. 8 pieces; 4. 24 pieces; 5. 12 pieces; 6. 12 pieces) Students may forget that each student needs one piece of each type of pizza. Your class may enjoy making pizzas with this problem.
- (84) To solve this problem many students will continue the pattern beginning with 7. However, some students may know that to get the answer you multiply.
- (7 + 3 = 10; 9 + 1 = 10; 5 + 5 = 10) Students will use operational sense and number theory. Students need to list odd numbers then add them together to find the sum of 10.
- (6 different possibilities) Most students will make a drawing:

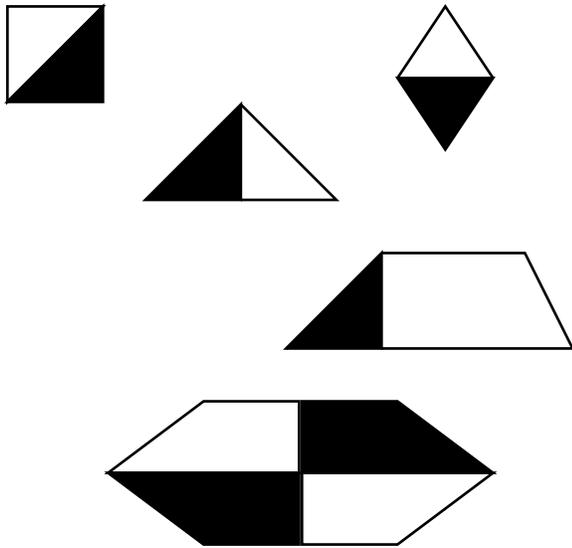


6. **(Ryan: $10 - 4 = 6$, $4 + 2 = 6$; Jerry: $10 - A - 3 = 6$)** Students may use guess and check with problems using addition, subtraction, and multiplication.
7. **(1:45 p.m.)** Students may use different strategies to solve this problem. Some will work backwards starting at 5:30. Others may estimate and determine whether that time plus 3 hours and 45 minutes gives 5:30.
8. **(Answers may vary)** Students can use five squares of paper or tiles to explore the variety of solutions. Examples of some solutions follow:



★★★★ 1. Horn's hardware shop sells batteries, flashlights, and lightbulbs. They sell $\frac{1}{3}$ as many flashlights as batteries. They sell $\frac{1}{2}$ as many lightbulbs as batteries. If they sell 15 lightbulbs, how many flashlights do they sell? _____

★★ 2. Cross out the pattern block that does not belong in the set.



Why does it not belong? _____

★★★ 3. Each morning Colonel Rogers runs around his office building. He makes five left turns. He runs an equal distance between each turn. His office building is named after this shape. What is the shape? _____

★★ 4. Robin went to the store to buy a new hat. Robin couldn't make up her mind between the six different hats below.



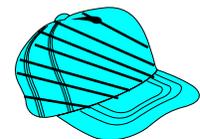
2 hats with dots



1 plain hat



2 hats with flowers



1 hat with stripes

If she closes her eyes and picks one hat, what are the chances that she will get a hat with a flower?

What are the chances she will get a plain hat?

Strategy of the Month

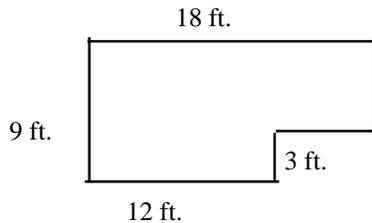
*What if you know the result of a situation, but you don't know the beginning? For example, you might know that you end up with thirteen baseball cards after doing a certain number of trades and you want to figure out how many cards you had before the trading started. In that case you need to work backwards; you have to think about your actions in reverse order. This strategy works for any sequence of actions when you know the end result rather than the starting place. Try **working backwards** to solve this problem:*

Jo gave a number problem to Nelda. She told her to pick a number, add 10 to it, double that sum, and then subtract 5. Nelda's answer was 39. What number did she start with?

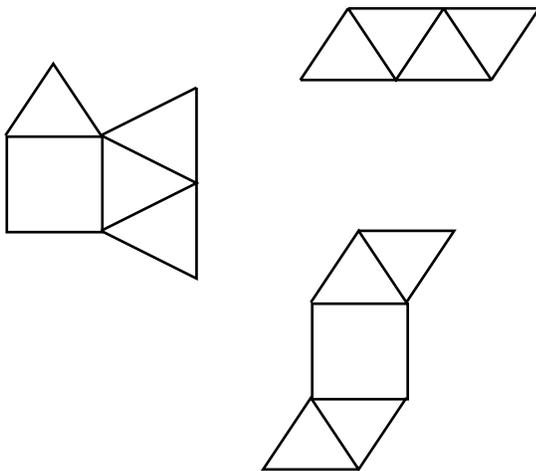
MathStars Home Hints

Mathematics can make life easier for you when you become a good estimator. Spatial estimation helps you plan how you will rearrange your furniture or how far to jump to cross a puddle of water. Using estimation helps you know if you have enough money for your purchases before you get to the check-out line. We become good estimators by practicing. Use your number sense and spatial sense to think about what the answers to problems will be before you start to solve them.

- ★★★ 5. Determine the perimeter of Allen's bedroom. _____



- ★★★ 6. Which arrangement below will fold to create a square pyramid?



- ★★ 7. Mrs. Glenn has 26 children in her class. If a van will hold six children, how many vans should Mrs. Glenn arrange to have so that everyone can go to the museum? _____

- ★★★★ 8. To answer the questions below, you may use the digits 1-9 once and only once. To help you keep track of the numbers you have used, mark out each number in the following list as you use it! 1 2 3 4 5 6 7 8 9

A. Make a two-digit number as close as possible to 60. _____

B. Make a three digit number that is as close as possible to 800. _____

C. Make a two-digit, odd number that rounds up to 40. _____

D. Make a two-digit, even number that rounds up to 50. _____

- ★★★★ 9. The area of a square is 25 square centimeters. What is the perimeter of the square? The perimeter of the square is _____ centimeters.

Setting Personal Goals

When you encounter a new situation, you use all of your previous experiences to figure out the current problem. Reasoning mathematically means using your brain power to think logically and sequentially, to put prior knowledge with new information. Set the goal of developing mathematical power and use your thinking power to achieve the goal!

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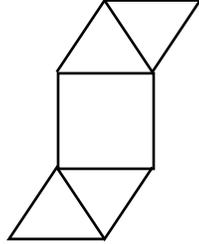
Discussion of problems.....

1. **(10 Flashlights)** To solve this problem, students first need to use the number 15 to figure out how many batteries are sold. They then will be able to determine $\frac{1}{3}$ of that amount which is the number of flashlights sold.
2. **(See figure below)** This is the correct answer because half of the figure is not shaded. Students should see the answer to this problem. This problem is also a good review for fractions.



3. **(Pentagon)** Students need to have a clear understanding of sides of a shape (polygon) to solve this problem. Some students may make a drawing of 5 left turns with equal distance between each turn.
4. **(Hat with a flower: 2 out of 6; Plain hat: 1 out of 6)** Students deal with probability in this problem. They are to find the total number of hats and then see how many have a flower or are plain. Some students may get confused with this process and try to subtract the two numbers to get their answer.
5. **(54 feet)** Students need to determine the two missing dimensions each of which is six feet. They can then determine the perimeter.

6. **(See figure below)** Students are likely to copy each arrangement, cut out, and fold to determine which net forms the square pyramid (square base with four triangular lateral faces meeting at a vertex).

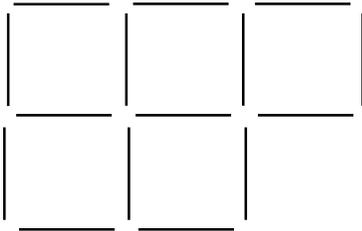


7. **(5)** Students need to realize that in this real-world division problem, reporting the remainder as part of the answer is not appropriate. They must round up to the next whole number.
8. **(A. 59; B. 812; C. 37; D. 46)** This provides a good review of place value concepts and rounding. Number tiles would be an appropriate manipulative for this problem.
9. **(20 cm.)** Students will find it helpful to use 25 square pieces of paper or tiles to form the square and then determine the perimeter.

★★★ 1. Brittany has a small pack of M&Ms. When she opens the bag she finds six red, two green, three light brown, six brown, no yellow, three blue, and four orange M&Ms. What part of her bag is either orange, brown, or green?

Answer: _____

★★★ 2. Examine this arrangement of toothpicks. Right now there are five squares. How could you remove three toothpicks so there would only be three squares? Sketch your solution below!



★★★★ 3. In November Katlin will play basketball every third day, beginning on November 3rd. She is also scheduled to play soccer every fourth day, beginning on November 4th. On what days will Katlin be playing both basketball and soccer? _____

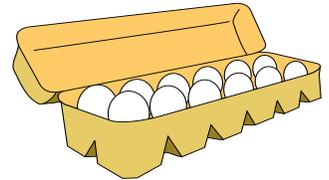


★ 4. Without using paper and pencil, figure out how many numbers from 1 to 50 have a 6 in the number.

Answer: _____

★★ 5. Harvey collects eggs on his grandfather's farm. His grandfather pays him two cents for each egg. His grandfather gives him \$1.32. In your head figure out how many eggs Harvey collected?

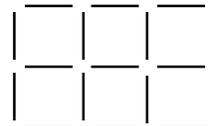
Answer: _____ eggs



Strategy of the Month

You have tried many ways to solve problems this year. Already you know that when one strategy does not lead you to a solution, you back up and try something else. Sometimes you can find a smaller problem inside the larger one that must be solved first. Sometimes you need to think about the information that is missing rather than what is there. Sometimes you need to read the problem again and look for a different point of view. Sometimes you need to tell your brain to try to think about the problem in an entirely different way - perhaps a way you have never used before. Looking for different ways to solve problems is like brainstorming. Try to solve this problem.

Build this toothpick design. Remove 5



toothpicks and leave only 3 squares that are the same size.

MathStars Home Hints

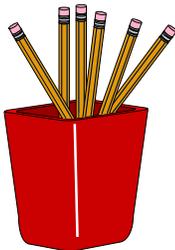
Identifying the mathematics that is all around you can be lots of fun. Think about the geometry and spatial visualization you use in playing video games or when you play golf or basketball. When your parents parallel park, they are using their spatial skills too. When you track a hurricane, you use coordinates. When you check the stock market or read the latest sports statistics, you are using mathematics. With your family or friends go on a math scavenger hunt. Who can identify mathematics in the most unusual places?

★★ 6. This graph shows how many pencils five students in Mrs. Alread's class had in their desks one day last week. Based on this information, about how many pencils would you expect to find in the desks of the entire class of 20 kids? _____

NUMBER OF PENCILS IN EACH STUDENT'S DESK

		X		
X		X		X
X		X	X	X
X		X	X	X
X	X	X	X	X

ELISA ROGER LAUREN IESHA SAM



★★ 7. For the third grade bake sale, Molly baked four dozen cookies. Only two and one-half dozen of her cookies sold. Does she have enough cookies left over to give each of her 16 classmates a cookie? _____

★★★ 8. Lance really wants to buy a pair of LA Gear shoes, but he is also concerned that he get the best deal possible (he worked hard for his money). In the newspaper he notices the following two advertisements:

SEARS
50% Off SALE

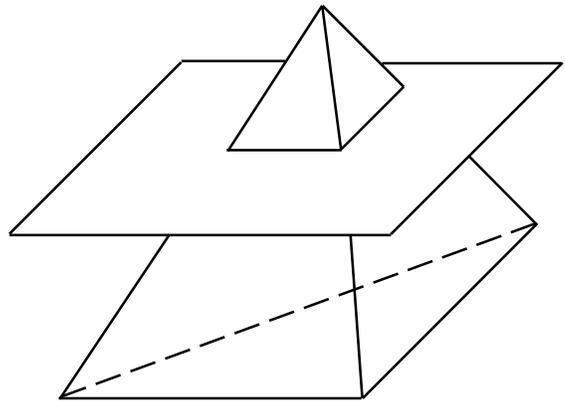
LA GEAR SHOES
REG. PRICE \$50
NOW 50% OFF!

PENNEY'S
\$10 OFF COUPON
ANY ITEM IN STORE
LA GEAR SHOES
\$39.99
(REG. PRICE)

Which store has the best deal on LA Gear shoes?

★★★ 9. After reviewing her records, the school dietitian noticed that about two out of every four students at her school eat a hot lunch everyday. Based on this information, how many hot meals for lunch should she prepare if there are 800 students at her school? _____

★★ 10. Pretend you sliced the top off of the triangular pyramid below. What is the shape of the new top of the pyramid? _____



Setting Personal Goals

Students who recognize the value of mathematics are well on their way to becoming mathematically powerful citizens. Valuing mathematics means that we appreciate the richness, power, and usefulness of mathematics. Without math there would be no roads or bridges, computers or movies, banks or fast food restaurants. How can you become mathematically powerful?

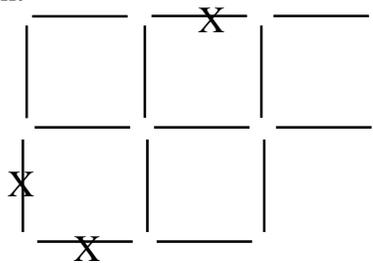
About these newsletters...

The purpose of the MathStars Newsletters is to challenge students beyond the classroom setting. Good problems can inspire curiosity about number relationships and geometric properties. It is hoped that in accepting the challenge of mathematical problem solving, students, their parents, and their teachers will be led to explore new mathematical horizons.

As with all good problems, the solutions and strategies suggested are merely a sample of what you and your students may discover. Enjoy!!

Discussion of problems.....

1. **(12/24)** To solve this problem, students first need to determine the total number of M&Ms in the bag and then the number that are orange, green, or brown. Students may have difficulty with this problem because of the involvement of more than one color.
2. **(Answers will vary)** Students may use toothpicks, straws, or another manipulative to explore this solution. One possible solution:



3. **(the 12th and the 24th)** Students may use a calendar to mark the days; they may also consider patterns. Ex. 3, 6, 9, 12, 15, 18, 21, 24, ...
4, 8, 12, 16, 20, 24, 28, ...
4. **(5)** In this problem students are using mental arithmetic which is an alternative to using paper and pencil. They will say numbers and make a mental note of how many sixes they said.
5. **(66 eggs)** Students will need to count by 2's or divide to see how many times \$.02 will go into \$1.32.

6. **(Any number of pencils between 60 and 80)** For the given students the average number of pencils is between three and four. For a class of 20, between 60 and 80 pencils would be an appropriate estimate.
7. **(Yes)** Students may use manipulatives to act out the problem.
8. **(Sears)** Students need to consider all information. For example, some may assume that the shoes from Penney's are the best deal because their original price is lower.
9. **(400 hot meals)** Most third grade students have an intuitive understanding of ratio and proportion. They should realize that two is half of four and then determine half of 800.
10. **(Triangle)** Students may draw the hidden line (dotted line) at the base of the small pyramid created by the slice.