Student Workbook

The Problem Solver 5

Activities for Learning Problem-Solving Strategies

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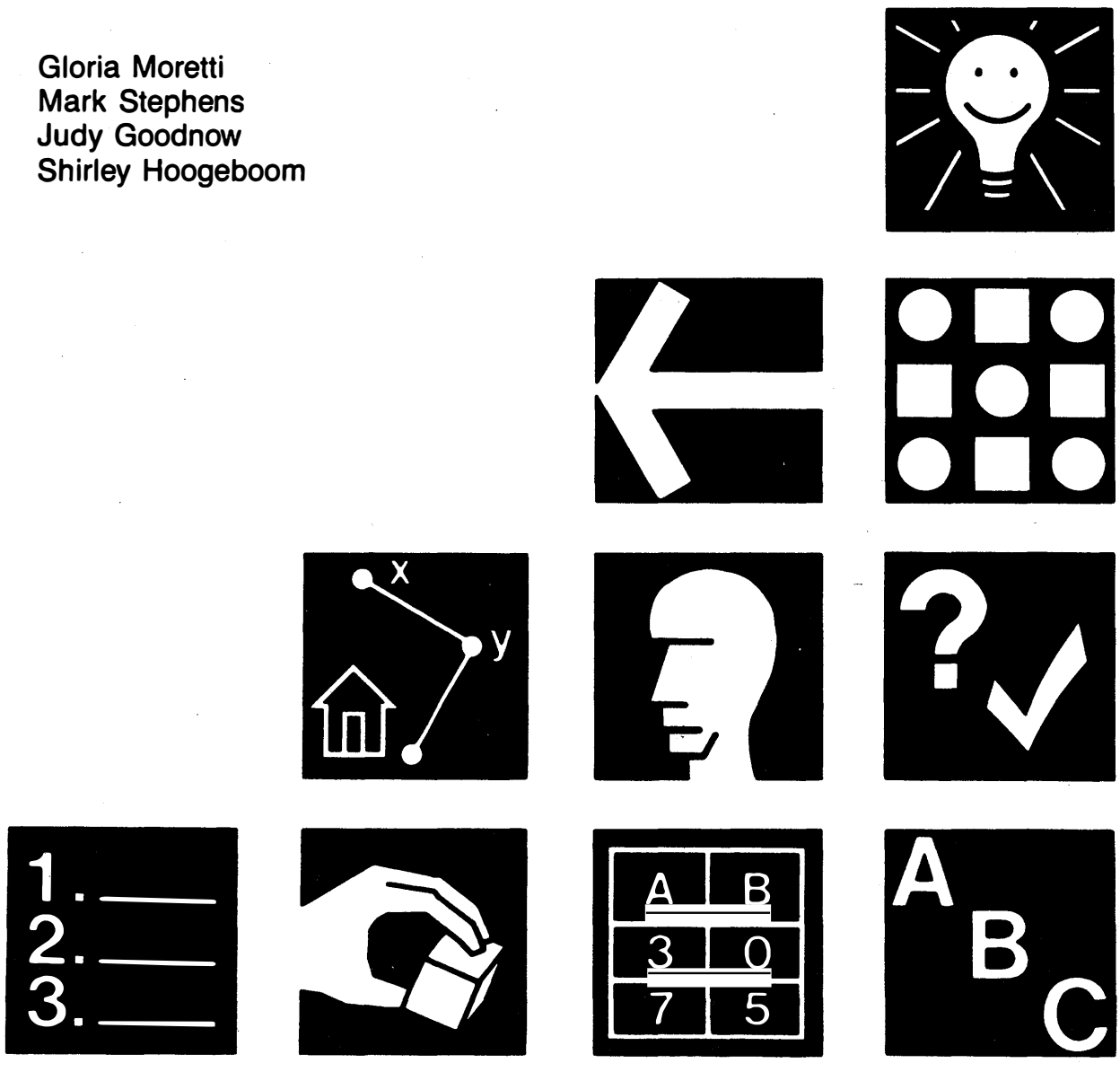

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THE PROBLEM SOLVER 5
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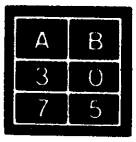
ACT OUT OR USE OBJECTS

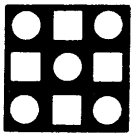
MAKE A PICTURE OR DIAGRAM



USE OR MAKE A TABLE

MAKE AN ORGANIZED LIST

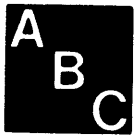
GUESS AND CHECK



USE OR LOOK FOR A PATTERN

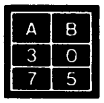
WORK BACKWARDS

USE LOGICAL REASONING



MAKE IT SIMPLER

BRAINSTORM



USE OR MAKE A TABLE

Name

1 It is a busy day at Rappo's Batting Cage, where some of the Little League players come to practice their hitting. Craig and Matt, two good friends, run into each other. "How come I haven't seen you here before?" Craig asks Matt. "Well, our coach brings us every 7 days," Matt said. "How about you?" Craig told him that their coach brings his team every 4 days. How many days will it be until the two friends see each other again at the batting cage?

FIND OUT

- What is the question you have to answer?
- Where are Craig and Matt today?
- How often does Matt come to the batting cage?
- How often does Craig come to the batting cage?

CHOOSE A STRATEGY

- What will be the next day that Matt is at the batting cage? What will be the next day that Craig is at the batting cage?
- Is there a way to organize and lay out the information, to "see" which days Craig and Matt will be at the batting cage?

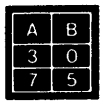
SOLVE IT

- When you make a table, what are you keeping track of in the first row?
- What are you keeping track of in the second row?
- What are you keeping track of in the third row?
- After the fourth day, when is the next day that Craig will be at the batting cage?
- After the seventh day, when is the next day that Matt will be at the batting cage?
- Keep filling in the table, until you find a day when they are both at the batting cage. How many days will it be until the two friends see each other again at the batting cage?

Day	1	2	3	4	5	6	7	
Craig				X				
Matt							X	

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?



USE OR MAKE A TABLE

Name

2 Nathan is excited because today he gets to help his older brother, Tom, at the local fast food stop. Tom is assembling hamburgers, and he tells Nathan to put an onion on every eighth hamburger on the grill, special sauce on every third hamburger, and a slice of cheese on every second hamburger. Out of 100 hamburgers that Tom and Nathan assembled, how many will have all three items on them?

FIND OUT

- What is the question you have to answer?
- What are Tom and Nathan doing?
- Which hamburgers is Nathan putting onions on?
- Which hamburgers is Nathan putting special sauce on?
- Which hamburgers is Nathan putting cheese on?
- How many hamburgers did Tom and Nathan assemble?

CHOOSE A STRATEGY

- Does the first hamburger get onions, special sauce, or cheese? the second hamburger? the third?
- Is there a way to organize and lay out the information, so you can "see" which hamburgers get onions, which ones get special sauce, and which ones get cheese?

SOLVE IT

- When you make a table, what are you keeping track of in the first row?
- What are you keeping track of in the second row?
- What are you keeping track of in the third row?
- What are you keeping track of in the fourth row?
- Which is the first hamburger with an onion? Which is the next hamburger with an onion?
- Which is the first hamburger with sauce? Which is the next hamburger with sauce?
- Which is the first hamburger with cheese? Which is the next hamburger with cheese?
- Do you need to fill in more of the table?
- Keep filling in the table until you find a hamburger with all three.
- Which hamburger is the first to have an onion, special sauce, and cheese?
- Which hamburger is the next one to have all three? Do you see a pattern?
- Out of 100 hamburgers that Tom and Nathan assembled, how many will have an onion, special sauce, and cheese?

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
onion								×										
sauce			×			×												
cheese		×		×														

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

1.
2.
3.

MAKE AN ORGANIZED LIST

Name

3 Lin-Chuan presses his face up against the glass tank at the tropical fish store. There are three types of fish for sale: a bright pink Gourami ($1.20), the nearly invisible Glass fish ($1.80), and the Neon Tetra ($.60) that has an electric blue band. Lin-Chuan steps back and counts his money; he has $6.00. How many different combinations of colorful tropical fish can Lin-Chuan buy with his $6.00?

FIND OUT

- What is the question you have to answer?
- What is Lin-Chuan doing?
- What are the three kinds of fish he sees and how much does each fish cost?
- How much money does Lin-Chuan have to spend on the fish?

CHOOSE A STRATEGY

- What is one possible combination of fish that costs $6.00? Are there a lot more combinations?
- How can you systematically record all the different combinations of fish that will cost $6.00?

SOLVE IT

- Make a list. What do you want to keep track of in the first column of your list? second column? third column?
- Begin with the most expensive fish, the Glass fish. How many of this kind of fish can Lin-Chuan buy with $6.00? Then is there some money left over? How many of what other type of fish can he buy with what is left over?
- Begin with the Glass fish again. Put down a number 1 less than the first row. Is there money left over? How many of the next most expensive fish can he buy with what is left over?
- Begin with the same number in the column for the Glass fish. Is there another combination you can make with the other two types of fish?
- Finish your list. How many different combinations of colorful tropical fish can Lin-Chuan buy with his $6.00?

Glass $1.80	Gourami $1.20	Neon Tetra $.60
3	0	1
2	2	0
2	1	

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your organized list. Is your answer reasonable?

1.___
2.___
3.___

MAKE AN ORGANIZED LIST

Name

4 One evening the small, furry, people-like Weebles, Wobbles, and Widgets hurried about in their secret underground caverns. One particular Widget named Wally wandered off too far, and fell in a ravine. Weebles, Wobbles, and Widgets ran over and tried to think of a way to save poor Wally, but no one had a long enough rope. Then Wendell Wobble had an idea: If they formed a furry chain, holding on to each other, maybe they could reach down the 40 inches to Wally. The Weebles were 12 inches high, the Wobbles were 8 inches high, and the Widgets were 4 inches high. How many different combinations of the small creatures would reach 40 inches?

FIND OUT

- What is the question you have to answer?
- What happened to Wally Widget?
- How far down was Wally?
- How many inches high were the Weebles? the Wobbles? the Widgets?

CHOOSE A STRATEGY

- If you begin with the Weebles, how many could you put together to get close to Wally? Then is there still space left? What can you add to it? Are there a lot more combinations using Weebles and the other creatures?
- How can you systematically record all the possible combinations of creatures that add up to 40 inches?

SOLVE IT

- Make a list. What do you want to keep track of in the first column of your list? in the second column? in the third column?
- Begin with the tallest creatures, the Weebles. How many Weebles could go together to reach Wally? Is there space left over? Which other kind of creature could you add?
- Begin with the Weebles again. Try one fewer Weeble. Then how many Wobbles can you add to reach Wally? Is there space left over, or does this just reach him?
- Begin with the same number of Weebles again. Are there other combinations of creatures you can put together to add up to 40 inches?
- Finish your list. How many different combinations of the creatures would reach 40 inches?

Weebles 12 inches	Wobbles 8 inches	Widgets 4 inches
3	0	1
2	2	

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your organized list. Is your answer reasonable?

ACT OUT OR USE OBJECTS

Name

5 "Attention, class!" said Ms. Stinger, the teacher at the school for Pesky Insects, where insects learn how to be pesky around people. "Today, Professor Herbert Hornet is going to talk about the three S Plan: Sighting, Stalking, and Stinging." Sitting in front of Professor Hornet was Gladys Greenhead Fly, who was to the right of Bonnie Bee. Franklin Flea was between Gladys and Timothy Tick. Wally Wasp was seated beside Franklin and in front of Miguel Mosquito. How are the students arranged in the classroom?

FIND OUT

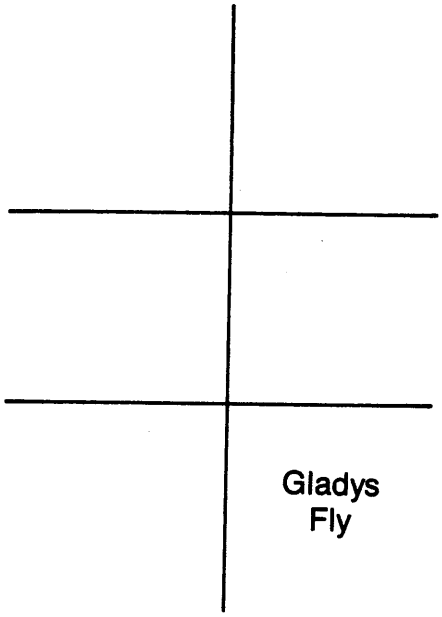
- What is the question you have to answer?
- How many students are in Ms. Stinger's class?
- What do you know about where Gladys Fly is sitting?
- What do you know about where Franklin Flea is sitting?
- What do you know about where Wally Wasp is sitting?

CHOOSE A STRATEGY

- Would it help to have pieces of paper, or something to represent the students, and be able to move them around?

SOLVE IT

- If you use pieces of paper, how would you label them?
- Who is sitting to the right of Bonnie Bee?
- Who is Franklin Flea between?
- Who is Wally Wasp sitting beside? Who is Wally sitting in front of?
- Is there more than one solution for this problem?



LOOK BACK

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ACT OUT OR USE OBJECTS

Name

6 Ralph is spending the summer with his father Robert, who is a forest ranger. From each of the four windows of his lookout station, Ranger Robert can see three campsites. Window 1 looks into campsites A, B, C; window 2 looks into campsites C, E, H; window 3 looks into campsites F, G, H; window 4 looks into campsites A, D, F. One day Ralph counted five campers through each of the four windows in his father's station. There were 14 campers altogether and at least one camper at each campsite. What are the possible arrangements of the campers in the campsites?

FIND OUT

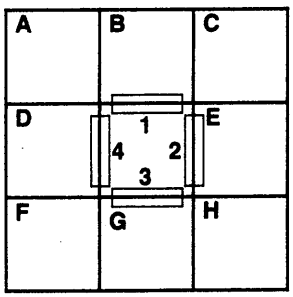
- What is the question you have to answer?
- Where are Ralph and his father?
- How many windows can Ralph look through?
- How many campsites can Ralph see through each window? Which campsites can he see through each window?
- How many campers does Ralph see through each window? How many campers are there altogether?
- How many campsites are there altogether?

CHOOSE A STRATEGY

- Would it help to have pieces of paper to represent different numbers that you could move around?

SOLVE IT

- How many campers are there altogether? How many campers can Ralph see from any one window?
- What are some combinations of numbers that add up to 5?
- When you cut up pieces of paper, do you want 14 separate pieces, or would it be easier to have a piece represent one of the numbers from a combination that adds up to 5?
- Now begin with the campsites Ralph can see from window 1. What do the numbers in these campsites have to add up to? What is a possible arrangement? Now go to window 2. What number is already in campsite C? What numbers can you put in campsites E and H? Now go to window 3. What number is already in campsite H? What numbers can you put in campsites F and G?
- Now go to the last window. How many empty campsites are there? What number do you have to put in the empty campsite?
- Do your numbers all add up to 14?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

MAKE AN ORGANIZED LIST

Name

7 In the movie "Moon Monster," the hero has to win a dart game in order to escape from the Tiny Tidbits. The balloon-dart game has three balloons taped to a board. The balloons are marked 10, 20, and 30 points. The player gets three darts, or three tries to score as many points as possible. The Tiny Tidbits are not too good at this game, so the hero wins with a score of 30 points. How many different ways (0 + 0 + 30 is different from 0 + 30 + 0) could the hero have scored 30 points?

FIND OUT

- What is the question you have to answer?
- How many balloons are taped to the board?
- How are the balloons marked?
- How many tries does a player get?
- What are the possible scores for one try? What if the hero doesn't hit a balloon?
- What is the hero's final score?

CHOOSE A STRATEGY

- If the hero gets 10 on the first try, 20 on the second, and 0 on the third, is this the same as 10 on the first, 0 on the second and 20 on the third? Is there another way for the hero to score 30 points with 10, 20, and 0?
- Is there a systematic way to record all the possible ways the hero can score 30 points?

SOLVE IT

- What are the possible scores for one try?
- What are the possible combinations of numbers that add up to 30 points? First make a list of these combinations.
- If you set up an organized list of the tries, how many columns do you need? What do you want to keep track of in each column?
- Let's begin with one of the combinations of numbers that add up to 30, 30 + 0 + 0. Put this in the first row, with 30 in the column for Try 1. Now put 0 in Try 1, how many different ways can you arrange the same three numbers?
- Now use another combination of numbers that add up to 30. Finish your list. How many different ways could the hero have scored 30 points?

Combinations of 30	Try 1	Try 2	Try 3
10 + 10 + 10			
20 + 10 + 0	30	0	0
30 + 0 + 0	0	30	0

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

1.
2.
3.

MAKE AN ORGANIZED LIST

Name

8 Serena's older sister Carmen is saving for a new sweater that is on sale. She has saved most of her babysitting money to buy it, but she is $9.00 short. She has to earn the rest of the money in the next three days, because the sale will be over in three days. Carmen charges $1.00 an hour to babysit, and she cannot work more than five hours on any day because of school work. How many different ways can she arrange her babysitting hours over the next three days (5 + 4 + 0 is different from 4 + 0 + 5) so that she can earn the $9.00 she needs?

FIND OUT

- What is the question you have to answer?
- How much money is Carmen short for the sweater she wants?
- How many days does Carmen have to get the rest of the money?
- How much does Carmen charge for one hour?
- What is the greatest number of hours Carmen can work on any one day?
- What is the total number of hours that Carmen wants to work?

CHOOSE A STRATEGY

- If Carmen works first 5 hours, then 4 hours, and then 0 hours, is this the same as 5 + 0 + 4? How many different ways could Carmen have put in 5 hours, 4 hours, and 0 hours?
- Is there a systematic way to record all the possible ways that Carmen could have put in her babysitting hours?

SOLVE IT

- What are the different number of hours Carmen can work in one day?
- What are the possible combinations of numbers that add up to 9 hours? Make a list of the different combinations of numbers that add up to 9.
- You can set up a list with a column for each day. Begin with the combination 5 + 4 + 0 and put the 5 in the column for Day 1. Is there another way to arrange these same numbers, with 5 still in the Day 1 column?
- Use 5 + 4 + 0 again, and put 4 in the column for Day 1. How many different arrangements of these three numbers can you make with 4 in the first column?
- Use this same combination once more, with 0 in the first column. How many arrangements can you make?
- Keep adding to your list. How many different ways can she arrange her babysitting hours over the next three days so that she can earn the $9.00 she needs?

Combinations of 9	Day 1	Day 2	Day 3
5 + 4 + 0	5	4	0
5 + 3 + 1	5	0	4
5 + 2 + 2			

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE OR LOOK FOR A PATTERN Name

9 Each winter the elephant seals return to Ano Nuevo State Park on the California coast. On the first day of their return, rangers count 5 elephant seals lying on the beach. On the second day, 6 more seals arrive. On the third day, 7 more seals arrive. Each day the number of seals that arrive increases by one more than the number of seals that arrive the day before. At this rate, how many seals will be on the beach at the end of the eighth day?

FIND OUT

- What is the question you have to answer?
- What is happening at Ano Nuevo State Park?
- How many seals arrive on the first day? on the second day? on the third day?
- How does the number of seals increase each day?

CHOOSE A STRATEGY

- How does the number of seals arriving increase each day?
- Can you use this rate of increase to help you solve the problem?
- Is there a systematic way to record the information?

SOLVE IT

- If you set up a table, what do you want to keep track of in the first row?
- What are you keeping track of in the second row?
- How many seals arrive on the first day? on the second day? on the third day?
- If the number of seals increases each day by 1, how many seals arrive on the fourth day?
- Keep filling in your table, until you fill in the eighth day. How many seals were on the beach at the end of the eighth day?

Day	1	2	3	4	
Seals	5	6	7		

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE OR LOOK FOR A PATTERN

Name

10 Rachel enjoys helping her aunt harvest raspberries and then make jam with them. Rachel and her aunt store the jars on shelves under the stairs in the cellar, where it's cool and dark. The shelves under the stairs are very short at the top and get longer as they go down. There is room on the top shelf for 4 jars of jam. On the second shelf there is room for 4 more jars or a total of 8 jars. Each shelf holds 4 more jars than the shelf directly above it. After Rachel and her aunt fill the seventh shelf, how many jars will be on the seven shelves altogether?

FIND OUT

- What is the question you have to answer?
- What are Rachel and her aunt doing?
- How many jars fit on the top shelf?
- How many jars fit on the second shelf?
- As the shelves go down from the top, how many more jars fit on each shelf than on the shelf before it?

CHOOSE A STRATEGY

- How does the number of jars increase as the shelves go down from the top?
- Can you use this rate of increase to help solve the problem?
- Is there a systematic way to record the information?

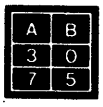
SOLVE IT

- If you set up a table, what are you keeping track of in the first row?
- What do you want to keep track of in the second row?
- How many jars do they put on the top shelf? on the second shelf?
- If the number keeps increasing by 4, how many jars do they put on the third shelf?
- Keep filling in the table. After they fill the seventh shelf, how many jars will be on the seven shelves altogether?

Shelf	1	2	3	4	
Jars	4	8	12	16	

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?



USE OR MAKE A TABLE

Name

11 It is time for the first group of fifth-graders to go on the waterslides at the Slippenslide Water Park. Every half hour a new group is allowed on the slides. There are 24 kids in the first group, and they are given red mats. There are 20 in the second group, and they are given brown mats; then the third group of 22 has green mats; the fourth group of 18 has orange mats; 20 are in the fifth group with blue mats. If this pattern continues, at the end of four hours, how many fifth-graders will have gone down the waterslides?

FIND OUT

- What is the question you have to answer?
- What is happening every half hour at the Water Park?
- How many fifth-graders are in the first group on the slides? in the second group? in the third group? in the fourth group? in the fifth group?

CHOOSE A STRATEGY

- Would it help to record this information so you can see each half hour and the number in each group?
- What strategy can help you figure out how the number of students in each group is changing?

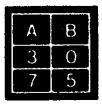
SOLVE IT

- If you set up a table, what are you keeping track of in the first row?
- What do you want to keep track of in the second row?
- What is the difference between the number of kids in the first and second group? between the second and third group? between the third and fourth group? between the fourth and fifth group?
- Do you see a pattern?
- Keep filling in your table, until you have groups for four hours. If the pattern continues, at the end of four hours, how many fifth-graders will have gone down the waterslides?

	$\frac{1}{2}$ hr.	1 hr.	$1\frac{1}{2}$ hrs.	2 hrs.	$2\frac{1}{2}$ hrs.		
Group	1	2	3	4	5		
Number of kids	24	20	22	18	20		

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?



USE OR MAKE A TABLE

Name

12 Marjorie and Anita are up at sunrise. They quietly head for the shore of the lake and their old rowboat. It is 6:00 AM as they row out onto the lake and get their fishing lines ready. In the first half hour they catch 10 trout. In the second half hour they catch 11 trout, and in the third half hour they catch 8 trout. In the fourth half hour they catch 9 trout, and 6 in the fifth half hour. Anita and Marjorie are having such good luck they decide to stay out until they fish for a half hour without catching any trout. At the rate they are catching trout, how long will they be out on the lake?

FIND OUT

- What is the question you have to answer?
- What are Marjorie and Anita doing?
- How many trout do they catch in the first half hour? in the second half hour? in the third half hour? in the fourth half hour? in the fifth half hour?

CHOOSE A STRATEGY

- Would it help to record this information so you can see each half hour and the number of trout they caught?
- What strategy can help you figure out how the number of trout changes from one half hour to the next?

SOLVE IT

- When you set up a table, what do you want to keep track of in the first row?
- What do you want to keep track of in the second row?
- What is the difference in the number of fish they caught in the first half hour and the second half hour? between the second half hour and the third half hour? between the third half hour and the fourth half hour? between the fourth half hour and fifth half hour?
- Is there a pattern? What is it?
- Keep filling in your table. How long will they be out on the lake?

	$\frac{1}{2}$ hr.	1 hr.	$1\frac{1}{2}$ hrs.	2 hrs.	$2\frac{1}{2}$ hrs.		
Every $\frac{1}{2}$ hour	1	2	3				
Number of trout	10	11					

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

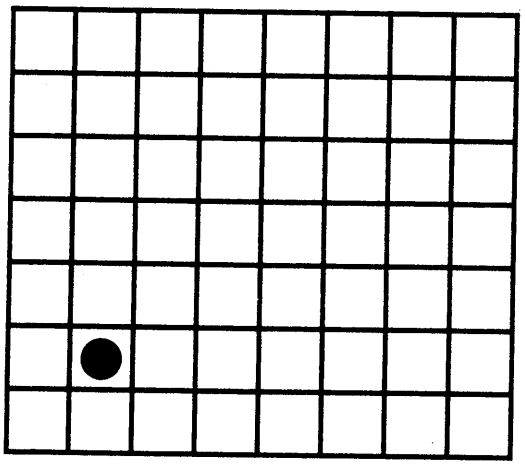
MAKE A PICTURE OR DIAGRAM Name

13 It is a rainy day, and the fifth-grade class must stay inside for recess. Megan and Martha are nearly finished with their checker game. Each player has one piece left on the board. Begin at Megan's red piece and move 2 squares north toward the middle of the board. Now move east 1 square, then go south 1 square and turn east. Go east 3 squares and finally south 1 square. Now place Martha's black piece in this square. How far apart are the two checkers on the checkerboard?

FIND OUT
- What is the question you have to answer?
- What are Megan and Martha doing?
- Which checker do you have the location for?
- What is the set of directions you have for moving from Megan's red piece?

CHOOSE A STRATEGY
- Would it help to draw or use a diagram of the checkerboard?

SOLVE IT
- Where do you want to begin your diagram?
- What is the first direction move you want to mark?
- Then where do you go?
- Keep marking down all the directions.
- When you stop, what are you going to mark on the board?
- How far apart are the two checkers on the checkerboard?



LOOK BACK
- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

MAKE A PICTURE OR DIAGRAM Name

14 Lars and Sven are visiting New York City with their parents. One day, while exploring the city on their own, they realize they are lost. Lars said to Sven, "When we were at the World Trade Center, we were 8 blocks west of the hotel." Sven remembered that after they left the World Trade Center, they went south for 4 blocks, then east for 3 blocks, north for 2 more blocks, then east for 5 blocks. How far away from the hotel are the brothers when they realize they are lost?

FIND OUT

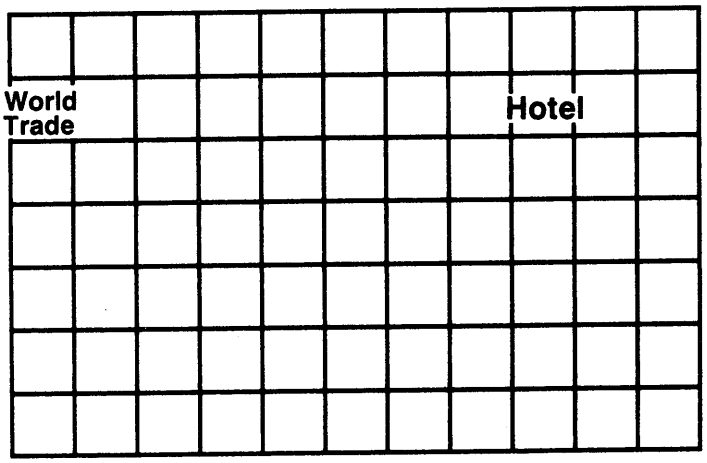
- What is the question you have to answer?
- Where are Lars and Sven and what has happened to them?
- When they were at the World Trade Center, how far were they from the hotel?
- What did Sven remember about where they went from the World Trade Center?

CHOOSE A STRATEGY

- Would it help to draw a diagram, to mark down where Lars and Sven went?

SOLVE IT

- Begin your map at the World Trade Center. What can you mark on your map to the east?
- Where did they go first from the Trade Center?
- Where did they go after that?
- Where did they go next?
- Finish mapping all the directions. Where are they when you finish?
- How far away from the hotel are the brothers, when they realize they are lost?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

GUESS AND CHECK

Name

15 The final event of the first day of the Animalympics is over, the Long Leap, and the results are in. The Copper Medal goes to Flora the Frog, the Brass Medal goes to Sara Spider, and the Tin Medal goes to Gilda Grasshopper. Flora leaped 2 centimeters farther than Sara, who beat last year's distance record by 1 centimeter. Gilda came in last, finishing 1 centimeter behind Sara, tying last year's record. How far did each medal winner jump if their combined total was 544 centimeters?

FIND OUT

- What is the question you have to answer?
- How many medalists were there in the Long Leap?
- What do you know about Flora's leap?
- What do you know about Sara's leap?
- What do you know about Gilda's leap?
- What is the combined total for the three medalists?

CHOOSE A STRATEGY

- Will guessing an answer help you solve this problem?
- How can you use the information from an incorrect guess to help you make another guess?

SOLVE IT

- Would you start by making a guess for Gilda, Sara, or Flora? Why?
- What is your guess?
- If you make a guess for one of the medalists, then can you figure out a distance for the other two?
- How can you check your guess?
- How was your guess? If your guess was wrong, how can you use the information to make another guess?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

GUESS AND CHECK

Name

16 Sue, Peggy, Maggie, and Arlene all collect comic books. Sue collects *Superfrog*, Peggy collects *The Inedible Bulk*, and Maggie and Arlene both collect *Totally Awesome Wonder Woman*. Sue has collected twice as many comic books as Peggy; Maggie has collected three times as many comic books as Peggy, and Arlene has collected two less than three times as many comic books as Peggy. The four friends together have collected 97 comic books. How many comic books does each friend have?

FIND OUT

- What is the question you have to answer?
- Who is collecting comic books?
- What do you know about the number of comic books that Sue has?
- What do you know about the number of comic books that Maggie has?
- What do you know about the number of comic books that Arlene has?
- How many comic books do the four friends have altogether?

CHOOSE A STRATEGY

- Will guessing an answer help you solve this problem?
- How can you use the information from an incorrect guess to help you make another guess?

SOLVE IT

- Would you begin with a guess for Sue, Maggie, Arlene, or Peggy? Why?
- What is your guess?
- If you make a guess for one friend, then can you figure out a number of comic books for each of the other friends?
- How can you check your guess?
- How was your guess? If it was wrong, how can you use the information to make another guess?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

WORK BACKWARDS

Name

17 Rainbow Robots Inc. was putting on a big demonstration. Everyone came to watch the colorful robots wash the windows at the Miller Building. First the big red robot washed one half of all the windows in the building. Then the smaller green robot washed two thirds of the windows that were left. Next the blue robot washed one half of the windows that were left. To the cheers of everyone watching, the tiny yellow robot washed the last 10 windows. How many windows did the Rainbow Robots wash altogether?

FIND OUT

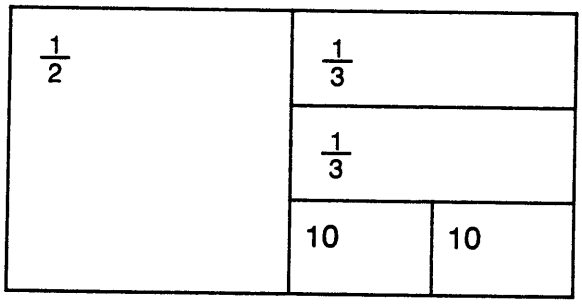
- What is the question you have to answer?
- What are the Rainbow Robots doing?
- What do you know about the number of windows that the red robot washed?
- What do you know about the number of windows washed by the green robot?
- What do you know about the number of windows washed by the blue robot?
- How many windows did the yellow robot wash?

CHOOSE A STRATEGY

- The most important piece of information you have is at the end of the problem; the 10 windows washed by the yellow robot. You will need to work backwards, using this information.

SOLVE IT

- Begin with the last robot that washed windows. How many windows did the yellow robot wash?
- Now work backwards to the blue robot. If this robot washed one half of the windows that were left, and after the robot is done there are 10 windows left, then how many windows did the blue robot wash?
- Work backwards again to the green robot. Again, if you figure out all the windows that are left when this robot is through, then how many windows did the green robot wash?
- Work backwards to the first robot, the red robot. How many windows did the red robot wash?
- How many windows did the Rainbow Robots wash altogether?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

 Name

18 Mrs. Ridingcap's daughter, whose real name was Colleen, set out for Grandma's house again. This time she was delivering jams and jellies. First she stopped to see Mrs. Parsley, who took in Grandma's mail while Grandma was at the hospital recovering from the wolf. Colleen gave Mrs. Parsley one third of the jars in her basket. Then Colleen set out again, and suddenly the wolf jumped out from behind a bush and grabbed one half of the jars in Colleen's basket. When the wolf ran off, Colleen went on and gave Mr. Woodsman two thirds of what was left in her basket. After thanking him for getting Grandma out of the wolf, Colleen started off for Grandma's house. Colleen had 6 jars of jams and jellies left for Grandma. How many jars did Colleen leave home with?

FIND OUT

- What is the question you have to answer?
- What is Colleen doing?
- What do you know about the number of jars that Colleen gives to Mrs. Parsley?
- What do you know about the number of jars that the wolf steals?
- What do you know about the number of jars that Colleen gives to Mr. Woodsman?
- How many jars does Colleen give to Grandma?

CHOOSE A STRATEGY

- Where in the problem is specific information given?
- If you begin with this information, then what do you need to do?

SOLVE IT

- Begin with the one number that you have, the jars that Colleen gives to Grandma. How many is that?
- If you work backwards, who is the person before Grandma that Colleen gives jars to? If she gives him two thirds of what is left and after she gives him the jars there are 6 left for Grandma, then how many does she give Mr. Woodsman?
- Work backwards again, who steals jars and how many?
- Work backwards to the first person that Colleen gives jars to. How many did Colleen give away first?
- How many jars did Colleen leave home with?

Grandma	Mr. Woodsman	Wolf
× × ×	× × × × × ×	
× × ×	× × × × × ×	

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

MAKE A PICTURE OR DIAGRAM Name

19 Sue's sister has been teaching in Japan and is coming home. Sue and her mother are picking her up at the international airport. They will park the car in the covered garage and take either an elevator, escalator, or stairway to the baggage claim area. From the baggage claim area they will take either an elevator, escalator, or a stairway to the main ticket lobby. From the main lobby, they will take the moving sidewalk or walk to the waiting area for international flights. How many different ways can Sue and her mother take from the garage to the waiting area for international flights?

FIND OUT

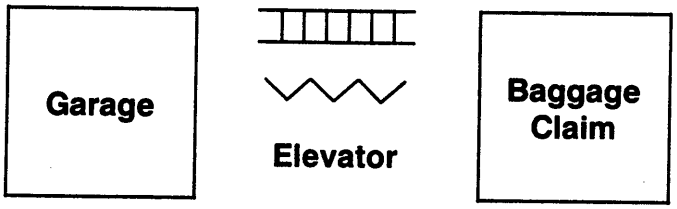
- What is the question you have to answer?
- What are Sue and her mother doing?
- How many ways can they go from the garage to the baggage claim area?
- How many ways can they go from the baggage claim area to the main lobby?
- How many ways can they go from the main lobby to the waiting area for international flights?

CHOOSE A STRATEGY

- It is hard to "see" this problem in your mind. Is there a good way to lay out the information?

SOLVE IT

- Begin with the garage. How many ways do you need to show from the garage to the baggage claim area? Now how many ways do you need to show from the baggage claim area to the main lobby? Then what do you need to show from the lobby to the waiting area?
- Begin with the elevator from the garage. Now choose one way from the baggage claim area to the lobby. How many ways can you choose now to the waiting area?
- Go on the elevator from the garage again. Choose another way from baggage claim to the lobby. Now how many ways are there to the waiting area?
- Can you use the elevator again from the garage and find still another way from the baggage claim area? Add together all the ways you can go on the elevator from the garage to the waiting area. How many ways are there?
- Go through the same steps with each different way from the garage. How many different ways can Sue and her mother take from the garage to the waiting area for international flights?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

MAKE A PICTURE OR DIAGRAM Name

20 Neal and Rhoda are going to Mallory's Department Store to get their picture taken. There are four different doors into the store. Then there is one escalator, one stairway, or two elevators that they can take to the third floor where the photographer is. Once on the third floor there are two different doors into the photographer's studio. How many ways can Neal and Rhoda go from outside the store to the photographer's studio on the third floor?

FIND OUT

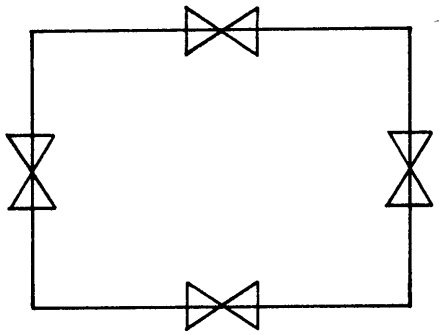
- What is the question you have to answer?
- Where are Neal and Rhoda going?
- How many doors are there into the store?
- How many escalators are there?
- How many stairways are there?
- How many elevators are there?
- How many doors are there into the photographer's studio?

CHOOSE A STRATEGY

- Would it be helpful to "see" this information in the form of a picture or diagram?

SOLVE IT

- Begin by showing the doors into the store. How many are there?
- How many escalators do you need to show? stairways? elevators?
- How many doors go into the photographer's studio?
- Begin with one of the doors into the store. Then how many different ways are there from the first floor to the third floor? Choose one way up to the third floor. Then how many ways are there into the photographer's studio?
- How many different ways are there through one door up to the third floor and into the studio?
- Go through the same steps with the other doors. How many ways are there through each door to the photographer's studio?
- How many ways can Neal and Rhoda go from outside the store to the photographer's studio on the third floor?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE LOGICAL REASONING

Name

21 Four friends are gathered at the old tree stump for a game of Crazy Eights. The owl, rabbit, raccoon, and bear like to play cards together with the same partners. The partners sit across from each other at the old tree stump. The only player without paws is always the bear's partner. The raccoon always gets mad because the bear keeps bumping her left paw. Where is each animal sitting at the old tree stump?

FIND OUT

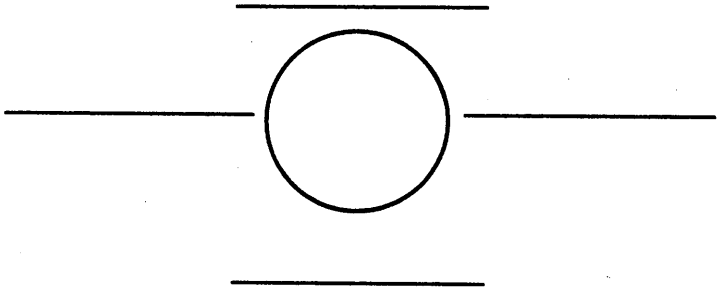
- What is the question you have to answer?
- Who are the players at the Crazy Eight game?
- How are the players sitting at the old stump?
- What do you know about the bear's partner?
- What do you know about the raccoon?

CHOOSE A STRATEGY

- You can use a series of "If this is true, then this must be true," statements to help solve this problem. This is called logical thinking.
- Is there a way to show your work that can be helpful?

SOLVE IT

- What do you want to show in a diagram?
- Begin with one player, the bear. Write bear for one of the places at the stump. What do you know about the bear's partner?
- What do you know about the raccoon? Does this tell you who is sitting next to the raccoon? on which side?
- Does this leave one empty space? Who has to be sitting here?
- Where is each player sitting at the stump?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

22 Frank lies awake in his bunk at the campground listening to the frogs croak. Frank, his brother, and his two sisters are sleeping in bunkbeds in the tent cabin. The sisters and brothers from oldest to youngest are: Millie, Frank, Stevie, and Irene. Frank's younger sister is in the bunk below Stevie's older sister. Frank and Stevie flipped a coin to see who would get the top bunk, and Frank lost. Where are the brothers and sisters sleeping in the cabin?

FIND OUT

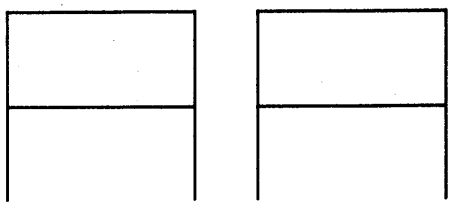
- What is the question you have to answer?
- Where are Frank and his brother and sisters?
- Who are the brothers and sisters, and how do they rank from oldest to youngest?
- Who is below Stevie's older sister?
- What did Frank and Stevie do? Who lost?

CHOOSE A STRATEGY

- What kind of thinking can you use to organize the information in this problem?
- Is there another strategy you can use?

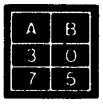
SOLVE IT

- What do you want to show in your diagram?
- What are the names of the sisters? Which sister is the youngest? the oldest? Which sister is on the top? Who is below her?
- What did Frank and Stevie do to decide who got the top bunk? Who is in the top bunk?
- Where are the brothers and sisters sleeping in the cabin?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?



USE OR MAKE A TABLE

Name

23 The newspapers are filled with stories about the new system of planets that has been discovered. Plans are already underway for the first Interplanetary Olympics. Among the participants there will be representatives from the three smallest planets in the system. For every 8 athletes from the planet Trono, there will be 12 athletes from the planet Vermo, and 9 from the planet Cannelo. How many representatives will there be altogether from these three planets at the Interplanetary Olympics if 72 athletes are expected from Cannelo?

FIND OUT

- What is the question you have to answer?
- What are plans being made for?
- How many planets do you know there will be representatives from? What are the names of the planets?
- For every 8 athletes from Trono, how many will come from Vermo and Cannelo?
- How many athletes are expected from Cannelo?

CHOOSE A STRATEGY

- For every 8 athletes from Trono, there will be how many from Vermo and Cannelo? For every 16 athletes from Trono, there will be how many from Vermo and Cannelo?
- How can you keep track of all the different numbers?

SOLVE IT

- When you set up your table, how many rows do you need?
- What do you want to keep track of in the first row?
- What do you want to keep track of in the second row?
- What do you want to keep track of in the third row?
- What do you want to keep track of in the fourth row?
- For every 8 athletes from Trono, how many will come from Vermo? How many will come from Cannelo? What is the total number?
- If there are 16 athletes from Trono, then how many will come from Vermo? How many will come from Cannelo? What is the total number now?
- Keep filling in the table, until you find there are 72 athletes from Cannelo. How many representatives will there be altogether from these three planets at the Interplanetary Olympics if 72 athletes are expected from Cannelo?

Trono	8				
Vermo	12				
Cannelo	9				
Total	29				

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE OR MAKE A TABLE

Name

24 The rules for this year's art contest were: The design must be made of wood or paper. It must contain squares, triangles, hexagons, and parallelograms. For every 10 squares in the design, there must be 6 triangles, 4 hexagons, and 2 parallelograms. Pierre and Monique constructed a beautiful design that contained a total of 242 pieces. How many pieces of each shape did they use?

FIND OUT

- What is the question you have to answer?
- What are the rules for the art contest?
- How many pieces did Monique and Pierre use in their design?

CHOOSE A STRATEGY

- What is a good way to keep track of all the different pieces?

SOLVE IT

- When you set up your table, how many columns do you need?
- What do you want to keep track of in the first column? second column? third column? fourth column? fifth column?
- Begin with the first row and the numbers you have. What can you fill in for the squares, triangles, hexagons, and parallelograms? What is the total number of pieces?
- How many squares go in the next row? How many triangles, hexagons, and parallelograms? What is the total now?
- Keep filling in the table, until you get a total of 242 pieces. How many pieces for each shape did Monique and Pierre use?

□	△	⬡	▱	Total
10	6	4	2	22

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

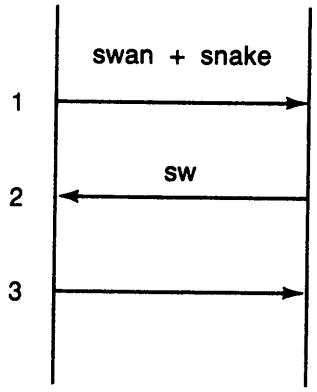
MAKE A PICTURE OR DIAGRAM Name

25 It is the end of a large reunion of animal friends at Fairy Tale Island. Now all the animals have left the island for the mainland except for a snake, a rabbit, and a mouse. They missed the boat to the mainland, and they are cold, tired, and hungry. A beautiful swan, floating nearby, offers to transport the three to the mainland before dark. However, the swan can only take one passenger at a time on her back. The snake and the rabbit cannot be left alone together, and the mouse cannot be left alone with the snake. What is the fewest trips the swan will take to get the three animals to the mainland?

FIND OUT
- What is the question you have to answer?
- Who is left on the island?
- How many passengers can the swan take?
- What are the conditions for the snake and the rabbit?
- What are the conditions for the snake and the mouse?

CHOOSE A STRATEGY
- What is a good way to show all the swan's trips?
- Is there another strategy that would be helpful?

SOLVE IT
- What do you want to show in your diagram? What do you need to keep track of?
- Who do you think should go with the swan first? Why?
- Then the swan comes back to the island, for trip 2. Who should the swan take next? Why?
- Would the swan want to bring one of the animals back to the island? Why would the swan do this?
- Who is on trip 4?
- After four trips, who is safely off the island?
- What is the fewest trips the swan can take?
- Are there different ways to do this?



LOOK BACK
- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

26 "Oh dear," they all sighed as they looked across the stream to the other shore. "It's deeper than we thought," said Jill. "We'll have to ride the pack mule across," said Jill's mother. But the old grumpy pack mule can only carry one adult, or one child, or two children, or one child and one backpack across at one time. If there are two adults, two children, and two backpacks, what is the fewest trips the mule will have to make to get them all across the stream?

FIND OUT

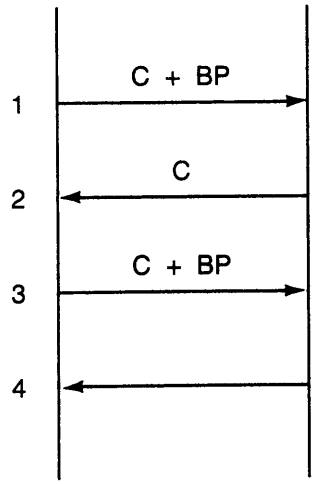
- What is the question you have to answer?
- What is the problem that the hikers have?
- What are the conditions for the mule crossing the stream?
- How many adults are there? How many children? How many backpacks?

CHOOSE A STRATEGY

- Is there a good way to keep track of the mule's trips?
- Is there another strategy that could be helpful?

SOLVE IT

- What do you want to show on your diagram? What do you want to keep track of?
- What are all the different combinations of people and people and packs that the mule can take across?
- Who do you think should go over first?
- Now who should come back on trip 2?
- Who should go over next, on trip 3? Who do you want to come back for trip 4?
- After four trips, who or what is safely across the stream?
- Keep showing the trips, until everyone and all the packs are across. What is the fewest trips the mule can take?
- Are there different ways to do this?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

1.
2.
3.

MAKE AN ORGANIZED LIST

Name

27 There is an eerie glow in the clearing, as the small, strange airships land. Soon tiny creatures are climbing out of the airships. There are two kinds of creatures: purple creatures with two antennas on top of their heads; and blue creatures with pink feet and one large antenna coming from the front of each head. Altogether there are 23 creatures with 35 antennas. How many purple creatures and how many blue creatures climbed out of the airships?

FIND OUT

- What is the question you have to answer?
- What climbed out of the airships that landed?
- How many antennas did the purple creatures have?
- How many antennas did the blue creatures with pink feet have?
- How many creatures were there, and how many antennas did they have altogether?

CHOOSE A STRATEGY

- How can you systematically organize the information in this problem?

SOLVE IT

- When you make a list, you will need two columns. What do you want to keep track of in each column?
- What do you want to keep track of in each row?
- Fill in several rows of your list. Do you have enough creatures that you can combine numbers from each column to make 23?
- Fill in more rows of your list. What are some combinations of numbers that add up to 23?
- When you find two numbers that make 23, what does the combined number of antennas need to be? If there are 16 purple creatures and 7 blue creatures, how many antennas would there be?
- Continue to fill in your list and test combinations of numbers that make 23. How many purple creatures and how many blue creatures climbed out of the airships?

Purple	Blue
1 – 2	1 – 1
2 – 4	2 – 2
3 – 6	3 – 3

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

1.___
2.___
3.___

MAKE AN ORGANIZED LIST

Name

28 Today the leprechauns and the thimbletons are going for their annual hot-air balloon ride to celebrate the first day of spring. The gondola of the balloon is filled with so many leprechauns and thimbletons that the balloon won't rise. The maximum weight for liftoff is 100 pounds, but together the passengers weigh 101 pounds. It is finally decided that one member of the group with the most passengers will have to get off. If each leprechaun weighs three pounds and each thimbleton weighs two pounds, and there are 42 passengers in the balloon, will a leprechaun or a thimbleton have to get off?

FIND OUT

- What is the question you have to answer?
- What are the leprechauns and the thimbletons doing?
- Why won't the balloon go up?
- What is the maximum weight for liftoff? How much weight is there?
- How do they decide to solve their problem?
- How much do the leprechauns weigh? thimbletons?

CHOOSE A STRATEGY SOLVE IT

- How can you systematically organize the information in the problem?
- When you make a list, you will need two columns. What do you want to keep track of in each column?
- What do you want to keep track of in each row?
- Fill in several rows of your list. Do you have enough leprechauns and thimbletons that you can combine numbers from each column to make 42?
- Fill in more rows of your list. What are some combinations from the two columns that make 42? Do you need to continue your list?
- When you find two numbers that make 42, what does the combined weight of these passengers need to be? What do 20 leprechauns and 22 thimbletons weigh?
- Continue to fill in your list and test combinations of numbers that make 42. How many leprechauns and how many thimbletons together weigh 101 pounds?
- Does a leprechaun or a thimbleton have to get out of the balloon?

Leprechaun (3)	Thimbleton (2)
1 – 3	1 – 2
2 – 6	2 – 4
3 – 9	3 – 6

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

GUESS AND CHECK

Name

29 Tired of riding the surf, playing catch, and flying kites, Rory and Pablo are counting birds at the beach. There are lots of birds, especially sea gulls and sandpipers. At one time during the day Rory and Pablo count 142 sea gulls and sandpipers altogether, and 42 more sea gulls than sandpipers. How many sea gulls and how many sandpipers did they count?

FIND OUT

- What is the question you have to answer?
- What do Rory and Pablo see at the beach?
- How many birds did they count altogether?
- How many more sea gulls than sandpipers are there?

CHOOSE A STRATEGY

- Will guessing the answer help you to solve this problem?
- How can you use information from an incorrect guess?

SOLVE IT

- How many birds are there altogether?
- How many more sea gulls than sandpipers are there?
- Which bird do you want to make a guess for? Now should your other number be greater or fewer?
- How can you check your guess? How did you do?
- If your guess was wrong, how can you use the information to make your next guess?
- How many sea gulls and how many sandpipers did they count?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

GUESS AND CHECK

Name

30 Jarrod and Malcolm are at the mini-market once again. "Good morning," said the manager, "this is the sixth day in a row you've been here!" Jarrod and Malcolm have been earning money by collecting cans and bottles, and turning them in at the store. There is a 5-cent refund on cans and a 10-cent refund on bottles. In two months they collected 450 cans and bottles altogether and received $32.50. How many cans and how many bottles did they collect?

FIND OUT

- What is the question you have to answer?
- What are Jarrod and Malcolm doing at the market?
- What is the refund for cans? for bottles?
- How many cans and bottles have they collected altogether?
- How much money did they get for the cans and bottles?

CHOOSE A STRATEGY

- Will guessing the answer help you to solve this problem?
- How can you use the information from an incorrect guess?

SOLVE IT

- What is the total number of the cans and bottles that they collected?
- How much money did they get?
- Make a guess for the cans. What do you have to multiply your number by? What is your total for the cans?
- Make a guess for the bottles. What do you have to multiply your number by? What is your total for the bottles?
- How can you check your guess? How did you do?
- If your guess was wrong, how can you use this information to make your next guess?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

MAKE A PICTURE OR DIAGRAM Name

31 Every July 4th the Mahoneys get together for a picnic, each with a musical instrument. There is one grandmother and one grandfather. There are four mothers and four fathers. One half of the mothers have three daughters, one mother has two daughters, and one mother has one daughter. One half of the fathers have one son. There are three sons-in-law and no daughters-in-law. What is the fewest number of instruments the Mahoneys will bring to the picnic?

FIND OUT

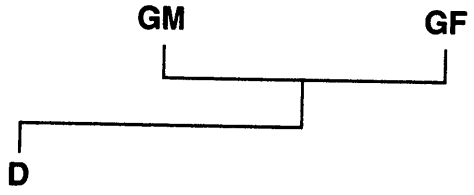
- What is the question you have to answer?
- What do the Mahoneys do every July 4th?
- Who are the oldest members of the Mahoney family?
- How many mothers are in the family? How many fathers?
- How many mothers have three daughters?
- How many mothers have two daughters? How many have one daughter?
- How many sons do the fathers have?
- How many sons-in-law are there? How many daughters-in-law?

CHOOSE A STRATEGY

- How do you want to show all the information in this problem?
- Is there another strategy that would be helpful to use with this problem?

SOLVE IT

- Make a diagram of a family tree. Put the oldest members of the family first. Who goes at the top of the family tree?
- If the grandmother has three sons-in-law, how many daughters do you think she has? Are each of these daughters mothers?
- How many granddaughters do you think there are?
- How many sons are there? Could they be sons or grandsons?
- How many sons-in-law do you need to show? daughters-in-law?
- What is the fewest number of instruments the Mahoneys will bring?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

MAKE A PICTURE OR DIAGRAM Name

32 Recently a census was taken on space station Gamma. Of the 100 residents interviewed, 75 traced their ancestry to the planet Omicron, 85 traced their ancestry to the planet Omega, and 60 residents traced their ancestry to both planets. How many residents had ancestors from ONLY Omicron, and how many residents had ancestors from ONLY Omega?

FIND OUT

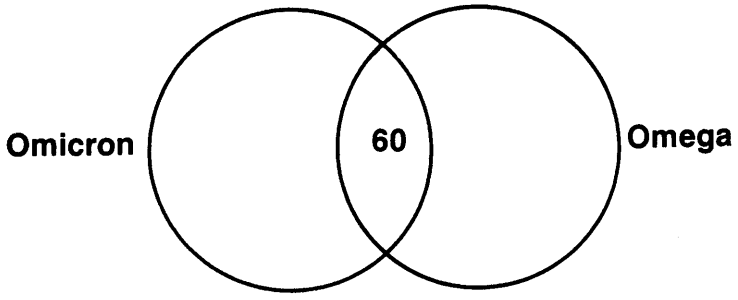
- What is the question you have to answer?
- What were they asking the residents of Gamma about in the census?
- How many residents were interviewed?
- How many residents traced their ancestry to Omicron?
- How many residents traced their ancestry to Omega?
- How many residents traced their ancestry to both Omicron and Omega?

CHOOSE A STRATEGY

- In this problem, where you are trying to separate groups by attributes, you can use a special type of diagram called a Venn diagram. Draw intersecting circles and in the intersections put the number that represents shared group members.
- What other strategy can you use to help organize your thinking about this problem?

SOLVE IT

- Draw two intersecting circles. What are you going to label circle 1? circle 2?
- What number goes in the middle, or the intersection?
- How many residents traced their ancestry to Omicron? How many residents traced their ancestry to both Omicron and Omega? If you want to find the number that had ancestors from ONLY Omicron, subtract the total in the intersection from the number that traced their ancestors to Omicron. How many are left?
- How many residents traced their ancestry to Omega? How many residents traced their ancestry to both Omega and Omicron? How can you find the number that represents the residents that had ancestors from ONLY Omega? How many are left?
- How many residents had ancestors from ONLY Omicron, and how many had ancestors from ONLY Omega?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE OR LOOK FOR A PATTERN Name

33 Delilah woke up, her head full of roses. She had just had her dream again where she is lost, like Alice in Wonderland, in another world. She finds herself in a rectangular rose garden that has three rows of rose bushes and six bushes in each row. Then, just beyond a big hedge, is a second rose garden, with four rows of bushes and seven bushes in each row. After another big hedge is a third rose garden, with five rows of eight bushes. As she tries to run out of the gardens she discovers that there is always another garden with one more row and one more bush in each row than the garden before. Today Delilah woke up in the ninth garden. How many rose bushes are in the ninth garden?

FIND OUT

- What is the question you have to answer?
- What is happening to Delilah?
- How many rows are in the first rose garden? How many bushes are in each row?
- How many rows are in the second garden? How many bushes are in each row?
- How many rows are in the third garden? How many bushes are in each row?
- What is the difference between each garden and the garden before it?
- Where is Delilah in her dream when she wakes up?

CHOOSE A STRATEGY

- If you look at the differences between the gardens, what do you notice?
- How can you organize the information in the problem?

SOLVE IT

- If you make an organized list, what do you want to keep track of in each row?
- What do you know about how each garden is different from the one before it? How many rows will be in the fourth garden? How many bushes will be in each row?
- Fill in the first three rows of your list. What is the total number of bushes in garden 1? garden 2? garden 3?
- Fill in the next row of your list. How many bushes are in this garden?
- What is the difference in the total number of bushes in garden 1 and garden 2? garden 2 and garden 3? garden 3 and garden 4?
- What is the pattern of change?
- Can you use the pattern of change to quickly fill in the table, without having to figure out the number of rows and number of bushes in each row?
- How many bushes are in garden 9?

$$1 - 3 \times 6 = 18$$
$$2 - 4 \times 7 = 28$$

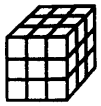
LOOK BACK

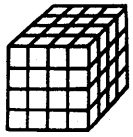
- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE OR LOOK FOR A PATTERN Name

34 Robia's favorite part of the new indoor mall is the beautiful brass and glass sculpture between the two escalators in the center of the mall. Robia likes to ride up one escalator and down the other and look at the sculpture, as it rotates in the light. The top part of the sculpture is one brass and glass cube, and looks like this: 

The second part has eight cubes and looks like this: 

The third part has 27 cubes and looks like this: 

The fourth part has 64 cubes and looks like this: 

If the parts keep increasing in the same way, how many cubes are in the sixth and bottom part of the sculpture?

FIND OUT

- What is the question you have to answer?
- What is Robia looking at?
- How many cubes are in the first part?
- How many cubes are in the second part?
- How many cubes are in the third part?
- How many cubes are in the fourth part?

CHOOSE A STRATEGY

- If you compare each part of the sculpture with the part before it, what do you notice?
- How can you organize the information in the problem?

SOLVE IT

- Do you want to keep drawing the parts of the sculpture or is there an easier way?
- If you make a table, what do you want to keep track of in the first row?
- What do you want to keep track of in the second row?
- If you look at the differences between the number of cubes in each part, do you see a pattern?
- By looking at the number of cubes in each part, do you see a pattern as you go from the top to the bottom? What is the pattern?
- Finish the table. How many cubes are in the bottom part of the sculpture?

Part	1	2	3	4		
Cubes	1	8	27	64		

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

USE LOGICAL REASONING

Name

35 Richard, Diane, Ron, and Mary Louise were talking one day about the places they would like to see. Between them, they wanted to go to the San Diego Zoo, the Golden Gate Bridge, DisneyWorld, and Washington, D.C. Diane has always wanted to see the Congress in session. Both Richard and Ron are allergic to all types of fur and hair. Ron is afraid of heights. Where do you think each person wanted to go?

FIND OUT

- What is the question you have to answer?
- Who is talking about places to see?
- Where do they want to go?
- What do you know about Diane?
- What do you know about Richard?
- What do you know about Ron? What else do you know about Ron?

CHOOSE A STRATEGY

- The information in this problem is given in a set of clues. If you use a series of "If. . .then" statements to solve the problem, what kind of thinking will you be using?
- Is there another strategy you can use to record the information?

SOLVE IT

- When you set up a table, how many columns do you need? How many rows?
- How are you going to label the columns? the rows?
- What do you know about Diane? Can you put a Y in one of the boxes for Diane?
- If you have a Y in a box, then you can put Ns in the other boxes in that row and column. Which boxes can you put Ns in?
- What do you know about Richard? Can you put a Y in a box for him?
- What do you know about Ron? What else do you know about Ron? How many possible places are left? Can you put a Y in a box for Ron?
- Can you draw a logical conclusion for Richard now?
- Where do you think each person wanted to go?

	Mary Louise	Ron	Richard	Diane
Disney				
D.C.				
Bridge				
Zoo				

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

36 It was agreed that Edward, Hai, Michael, and Babak would meet at Babak's house to go trick or treating. The four friends were dressed as a bear, a ghost, an undersea diver, and a soft-drink can. Edward couldn't find his costume, so he grabbed the sheet off his bed. Hai and Michael didn't like animals. Michael didn't know how to swim, and was afraid of water. Can you match each person with a costume?

FIND OUT

- What is the question you have to answer?
- What were the four friends doing?
- What were the friends dressed as?
- What do you know about Edward?
- What do you know about Hai?
- What do you know about Michael? What else do you know about Michael?

CHOOSE A STRATEGY

- What kind of thinking can you use to organize the information in this problem?
- Is there another strategy you can use to record the information?

SOLVE IT

- When you set up a table, how many columns do you need? rows?
- How are you going to label the columns? the rows?
- What do you know about Edward? Can you put a Y in a box for Edward?
- If you put a Y in one of the boxes, then where can you put Ns?
- What do you know about Hai? Can you put a Y in a box for him?
- What do you know about Michael? What else do you know about Michael? Can you put a Y in a box for Michael? Where can you put Ns?
- Can you draw a logical conclusion about Hai now?
- Can you match each person with a costume?

	Edward	Hai	Michael	Babak
bear				
ghost				
diver				
can				

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

ACT OUT OR USE OBJECTS

Name

37 Arlene and Amelia are spending a cold and snowy Saturday doing card tricks in front of the fire. Arlene says, "See if you can arrange ten cards so that when you deal them out they are in reverse order: 10-9-8-7-6-5-4-3-2-ace. The trick is how you deal them out. The first card facing up is 10, and this goes on the table. The second card goes to the bottom of the stack. The third card, which is 9, goes face up on the table. The fourth card goes to the bottom of the stack. Keep putting one card on the table and the next card on the bottom of the stack until you put the ace on the table." How did Amelia arrange the cards in the stack?

FIND OUT

- What is the question you have to answer?
- What are Arlene and Amelia doing?
- How many cards does Amelia have?
- How is Amelia supposed to deal out the cards?
- What is the first card and where does it go?
- Where does the second card go?
- What is the third card and where does it go?
- Where does the fourth card go?
- Where does the ace go?

CHOOSE A STRATEGY

- Would it help to move around pieces of paper that represent the cards?
- Is there another strategy that can help organize your thinking about this problem?

SOLVE IT

- Do you know the number of the first card in the stack that goes on the table? Do you know what the second card is, that goes at the bottom of the stack? the third card? the fourth card? the fifth card?
- Try laying out the cards like this diagram, where each X means you leave a space for a card that goes to the bottom of the stack:

  10 X 9 X 8 X 7 X 6 X

  Be sure to do this with your pieces of paper before going to the next questions.
- When you leave a space after the 6, how many cards does this represent if each space counts as one card? Where do the 10, 9, 8, 7, and 6 go? Where do the cards go that the Xs represent?
- If the card after the 6 goes to the bottom of the stack, then the next card will be where the first X is, or the first card that you put at the bottom of the stack. What card should this be?
- Continue the pattern. Does the card where the second X is go on the table, or to the bottom of the stack? Now what card should the third X be?
- Keep filling in the spaces until you are at the bottom of the stack. How did Amelia arrange the cards?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

ACT OUT OR USE OBJECTS

Name

38 Sylvia Spider spins a web each morning that sparkles in the early morning dew. The web has three circles: an outer circle, a middle circle, and an inner circle. Sylvia divides the circles into eight equal sections. One morning Sylvia noticed 18 dewdrops on the web. There was an even number of dewdrops in each of the three circles, and there was an even number of dewdrops within each of eight sections of the circles. What are two possible arrangements of the dewdrops?

FIND OUT

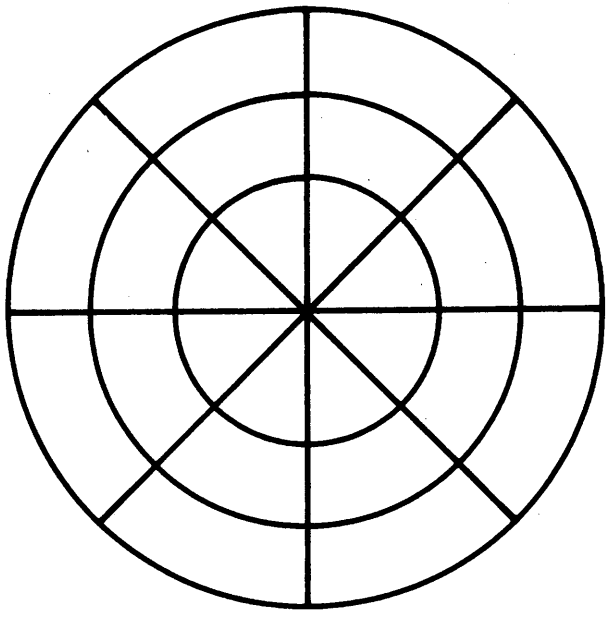
- What is the question you have to answer?
- What does Sylvia do each morning?
- How many circles does the web have?
- How does Sylvia divide up the circles?
- How many dewdrops did Sylvia notice in the web?
- How were the dewdrops divided up within the three circles?
- How were the dewdrops divided up within the eight sections of the circles?

CHOOSE A STRATEGY

- Would it help to move around pieces of paper that represent the dewdrops?
- What do you need to start with?

SOLVE IT

- If you use pieces of paper for the dewdrops, how many do you need?
- What are the conditions for arranging the dewdrops in the circles? in the eight sections?
- Do you want to start with a whole circle or one of the eight sections?
- After you arrange the dewdrops, how can you check your answer?
- Find two different ways to arrange the dewdrops. Can you find more ways to make an arrangement?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

39 "I found another one!" shouted Jason, as he lifted a chocolate cat from its hiding place. At the community center Halloween party, the kids were hunting for chocolate cats. When Jason and his friends Nick and Shiela got tired of searching the trees and bushes, they got together and counted their chocolate cats. The combined number of cats that Nick and Shiela found was 19, the combined total for Nick and Jason was 18, and the total for Shiela and Jason was 21. How many chocolate cats did each friend find?

FIND OUT

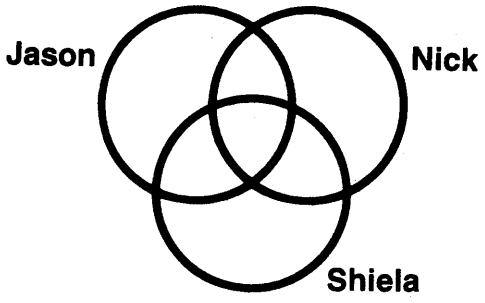
- What is the question you have to answer?
- What were the three friends doing?
- What was the combined total of chocolate cats that Nick and Shiela found?
- What was the combined total for Nick and Jason?
- What was the combined total for Shiela and Jason?

CHOOSE A STRATEGY

- You can use a series of "If. . .then" statements to solve this problem. What kind of thinking do you call this?
- Is there a special kind of diagram that you can use to show the information in the problem?

SOLVE IT

- When you make your Venn diagram, how many intersecting circles do you need? What are you going to label each circle?
- Each total given in the problem is for the number of chocolate cats that two people found. Where does each total go on the diagram?
- Each circle has four sections. You need to find the number in each circle that is outside the intersections. Begin with Nick. What number can you estimate for Nick's circle?
- Now how can you find a number for Jason's circle?
- How can you find a number for Shiela's circle?
- After you fill in a number for Shiela's circle check your answer. If you add the number for Shiela and Jason, what does the total need to be? What does the total need to be for Nick and Jason? What should the total be for Shiela and Nick?
- How were your estimates?
- How many chocolate cats did each friend find?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

40 Morris, Esther, and Abigail have prize-winning vegetables in the Most Unusual Vegetable display at the Addington County Fair. To qualify for the display, each vegetable has to be an unusual shape and weigh at least 5 pounds. Morris' prize-winning vegetable is a squash shaped like a 747, Esther has a cucumber that looks like a duck, and Abigail has a turnip shaped like a foot. The combined weight of Morris' and Esther's vegetables is $11\frac{1}{2}$ pounds. Esther's and Abigail's vegetables together weigh 12 pounds, and Abigail's and Morris' vegetables together weigh $10\frac{1}{2}$ pounds. Prizes are awarded according to weight, with first prize going to the heaviest vegetable. Who won the first, second, and third prizes?

FIND OUT

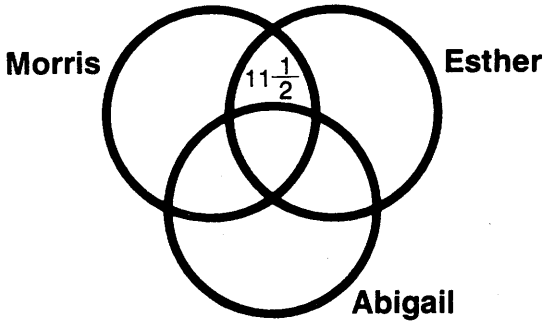
- What is the question you have to answer?
- What are Morris, Esther, and Abigail doing?
- How did a vegetable qualify for the display?
- What is the combined weight of Morris' and Esther's vegetables? Esther's and Abigail's vegetables? Abigail's and Morris' vegetables?
- How were the prizes awarded?

CHOOSE A STRATEGY

- You can use a series of "If. . .then" statements to solve this problem. What kind of thinking do we call this? Is there a special kind of diagram that would help you organize the information in the problem?

SOLVE IT

- When you make your Venn diagram, how many intersecting circles do you need? What do you want to label each circle?
- How are the weights given for the vegetables?
- There are four sections in each circle. Where do you want to put the combined weight for two vegetables? Where do you want to put the combined weight for Morris' and Esther's vegetables?
- Fill in all the combined weights that are given in the problem. What other section of the circles do you need to fill in?
- Make an estimate for the weight of Morris' vegetable. Now can you fill in a number for Esther?
- Fill in the rest of the sections. Check all your numbers. What does the total have to be for Esther and Abigail? Morris and Abigail?
- Who won the first, second, and third prize?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

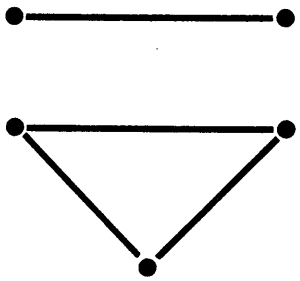
41 The prairie dogs were having a town meeting to talk about the blackfooted ferret that was terrorizing the neighborhood. One town councildog suggested building a network of tunnels connecting every burrow to every other burrow. Then someone said, "Are you crazy? We have nine burrows. That's too many tunnels and too much money to build them!" If each tunnel costs $1.00 to build, how much would it cost the prairie dogs to connect every burrow with every other burrow?

FIND OUT
- What is the question you have to answer?
- What does the councildog suggest at the meeting?
- How many burrows would they have to connect?
- How much would each tunnel cost?

CHOOSE A STRATEGY
- Would it help to solve this problem with a smaller number of burrows?
- Are there other strategies you can use with the first one?

SOLVE IT
- When you set up a table, what do you want to keep track of?
- If you begin with two burrows and draw a diagram, how many tunnels will be needed?
- If you connect three burrows, how many tunnels will be needed?
- How many tunnels will be needed for four burrows?
- Do you see a pattern in the way the number of tunnels increases?
- How much would it cost the prairie dogs to connect every burrow with every other burrow?

Burrows	Tunnels
2	1
3	3



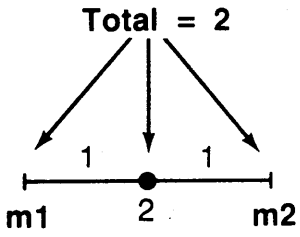
LOOK BACK
- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

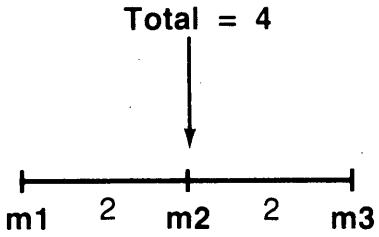
42 Tulips, tulips, everywhere! There are tulips of every color and size — all arranged on floats for the first Tulip Bowl Parade. There are nine marshals stationed every two blocks along the parade route, to help control the crowd. The marshals will meet after the parade to make a report. Because the marshals are not used to their wooden shoes, what is the fewest number of combined blocks they could walk for their meeting?

FIND OUT
- What is the question you have to answer?
- What are the marshals doing?
- How far apart are the marshals?
- What is the condition for a meeting place after the parade?

CHOOSE A STRATEGY
- Would it help to solve this problem first for two or three marshals?
- How can you organize the information in the problem?

SOLVE IT
- If you make a diagram for two marshals, what labels do you need to put on your diagram?
- Make an organized list. What do you want to keep track of?
- What are possible meeting places for two marshals? Is any one place the best place to meet?
- If you make a diagram for three marshals, what are the possible meeting places? Is there one place that is best?
- Keep making diagrams for more marshals and fill in your list. Do you see a pattern, as the marshals and number of blocks increases?
- Where is the place where the marshals will meet so that together they will travel the fewest number of blocks?





M	B
2	2
3	4

LOOK BACK
- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

WORK BACKWARDS

Name

43 The movie "Patrick's Great Adventure" has four groups of weird and wonderful creatures. In the movie, Patrick and his dog get lost in a cave and meet one half of the movie creatures, which are the Fuzzies. After escaping from the Fuzzies they meet one fourth of the creatures in the movie, which are Wuzzies. Then they fall into an underground cavern, where they run into one eighth of the movie creatures, which are Furlaps. Finally they run past four Curlaps and find their way home. How many creatures did Patrick and his dog escape from, and how many were in each group?

FIND OUT

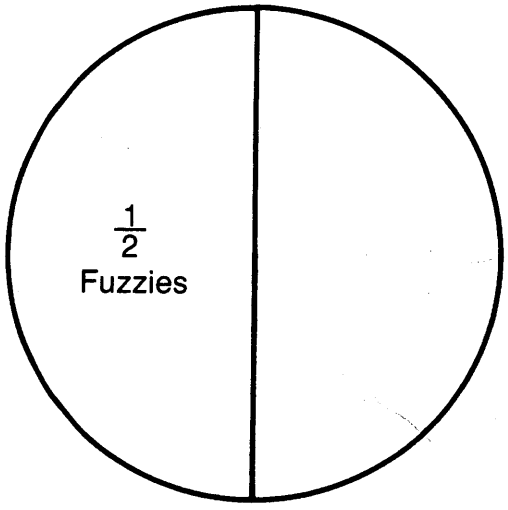
- What is the question you have to answer?
- How many groups of creatures are in the movie?
- What do you know about the number of Fuzzies they met?
- What do you know about the number of Wuzzies there are?
- What do you know about the number of Furlaps they ran into?
- How many Curlaps did they get past?

CHOOSE A STRATEGY

- To solve this problem you need to begin with the specific information you have, the number of Curlaps. What can you do now?
- Is there a good way to lay out the information in the problem?

SOLVE IT

- What kind of diagram would you make?
- How can you divide up the diagram? How can you label each part?
- Which group do you have a definite number for? Begin with this number and work backwards. Where does this number go on the diagram?
- What can you fill in now?
- Keep working backwards, until you fill in the whole diagram. How many creatures did Patrick escape from, and how many were in each group?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

WORK BACKWARDS

Name

44 Nellie's soccer team is having a great season. The team is being coached by Nellie's mother, who has divided the team into five groups: $\frac{1}{2}$ the players are forwards, $\frac{1}{6}$ are wings, $\frac{1}{6}$ are halfbacks, $\frac{1}{12}$ are fullbacks, and 2 others are goalies. How many players are on Nellie's team, and how many are in each group?

FIND OUT

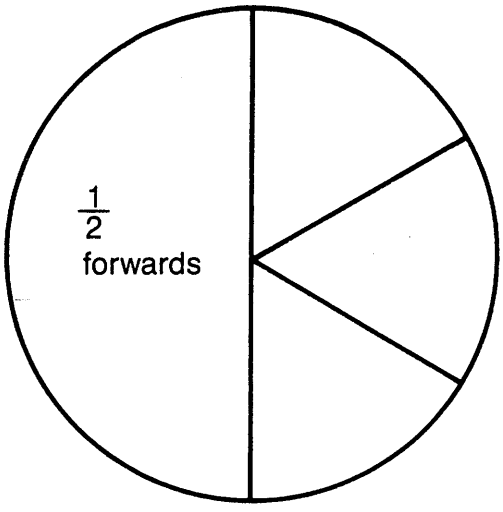
- What is the question you have to answer?
- How many groups did Nellie's mother divide the team into?
- What do you know about the number of forwards?
- What do you know about the number of wings?
- What do you know about the number of halfbacks?
- What do you know about the number of fullbacks?
- How many goalies are on the team?

CHOOSE A STRATEGY

- To solve this problem you need to begin with the specific information you have, the number of goalies. What can you do now?
- Is there a good way to lay out the information in the problem?

SOLVE IT

- What kind of diagram would you make?
- How can you divide up the diagram? How do you want to label each part?
- Which group do you have a definite number for? Begin with this number and work backwards. Where does this number go on the diagram?
- What can you fill in next?
- Keep working backwards. How many players are on Nellie's team, and how many in each group?



LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

45 Little Bo Peep has lost her sheep and can't tell where to find them. So she invited Little Miss Muffet over to have tea and talk about the problem. Half way through their curds and whey, the doorbell rang. A message was tacked to the front door that said: IF YOU EVER WANT TO SEE YOUR SHEEP AGAIN, MEET ME IN FRONT OF OLD MOTHER HUBBARD'S EXACTLY 1500 MINUTES FROM RIGHT NOW (1:00 PM FRIDAY). On what day and at what time will Little Bo have to go to Old Mother Hubbard's?

FIND OUT

- What is the question you have to answer?
- What was the note about on Little Bo Peep's door?
- What time did the note say to be at Old Mother Hubbard's?
- When was the note written?

CHOOSE A STRATEGY

- Would it be easier to solve this problem if you start with a fewer number of minutes?

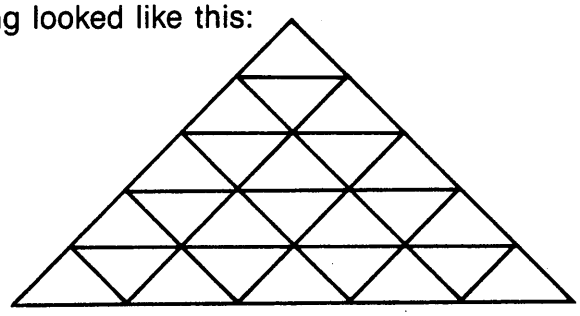
SOLVE IT

- If you use 150 minutes instead of 1500, how could you divide this up?
- How many hours later would 150 minutes be?
- How many minutes are in a day? Is 1500 minutes going to be more than a day?
- First find out how many hours it will be. How much time is left over after one day?
- On what day and at what time will Little Bo have to go to Old Mother Hubbard's?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

46 Larry's father was an architect. Larry enjoyed watching his father draw up blueprints for the buildings he was working on. One night Larry watched his father as he designed a building that looked like a big pyramid made up of small triangles. The building looked like this:



"Gosh," said Larry, leaning over his father's drafting table, "look at all the triangles! There are 25." His father said there were really more than 25 triangles in the diagram. How many triangles are there altogether?

FIND OUT

- What is the question you have to answer?
- What is Larry's father doing?
- What does the building look like?
- How many triangles did Larry think were in the building?
- What did Larry's father tell him about the number of triangles?

CHOOSE A STRATEGY

- Would it make it easier to solve the problem by starting with the smallest triangles and counting them?
- Is there another strategy you can use here?

SOLVE IT

- What do you know about the number of triangles in the diagram?
- If you begin with one size of triangle and just count them, what can you start with?
- How many different sizes of triangles are there in the diagram? If you begin with the smallest and then work toward the largest, what is the next size after the smallest triangles?
- Make a list of all the sizes of triangles, and how many you count for each size. How many triangles are there altogether?

△'s 1 row high = 25

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

BRAINSTORM Name

47 Hap, the crossing guard, is very popular with the students at Springdale Elementary School. Along with his usual morning smile, Hap has a daily riddle. One of the favorites was this one: How do 5 and 9 more make 2?

FIND OUT

- What is the question you have to answer?
- What does Hap have for the students each day?

CHOOSE A STRATEGY

- When the strategies you know about don't apply to a problem, and you don't know where to begin. . . relax, and open up your mind to any and all possibilities. Explore everything you think of; reasonable or unreasonable. We call this "brainstorming."

SOLVE IT

- What is your first thought, when you read or hear this riddle?
- Begin to think of all the things you can do with 5 and 9. Would writing them out make a difference?
- Try to think of all the places where you see a 5 and a 9. Where are some places you might see a 5 and a 9?
- Play with all the ideas you can think of, what and where a 5 and 9 could be. How can 5 and 9 more make 2?

LOOK BACK

- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

BRAINSTORM Name

48 Mary Mary Quite Contrary has more than silver bells and cockle shells in her garden these days. She has gone into the produce business and is growing cabbages, beans, corn, beets, lettuce, and tomatoes. She has cleverly arranged her nine prize-winning cabbage plants in eight straight rows, with three plants in each row. What does Mary's cabbage patch look like?

FIND OUT
- What is the question you have to answer?
- What is Mary Mary Quite Contrary doing these days?
- How many cabbage plants does she have?
- How did she arrange her cabbage plants?

CHOOSE A STRATEGY
- When the strategies you know about don't seem to work, what can you do?

SOLVE IT
- What is your visual picture of this problem? Does it seem possible?
- Think of all the ways that the plants can be arranged. Do they have to be separate rows? Can one plant be in more than one row at a time?
- Make lots of diagrams. What does Mary's cabbage patch look like?

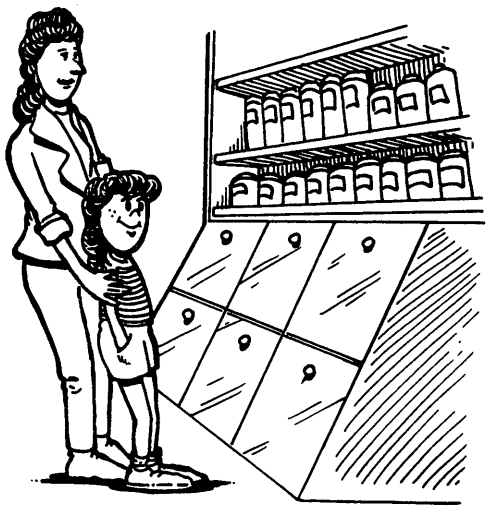
LOOK BACK
- Read the problem again. Look at the information given and the main question. Review your work. Is your answer reasonable?

Name

49 Lena is helping her father empty the coins from the commercial washing machines he services. Lena's father lets her count the coins in the machine with the smallest amount of money. The washing machines take only 50-cent pieces, quarters, and dimes. If Lena counts $2.00 in coins, how many different combinations of coins could Lena have counted?

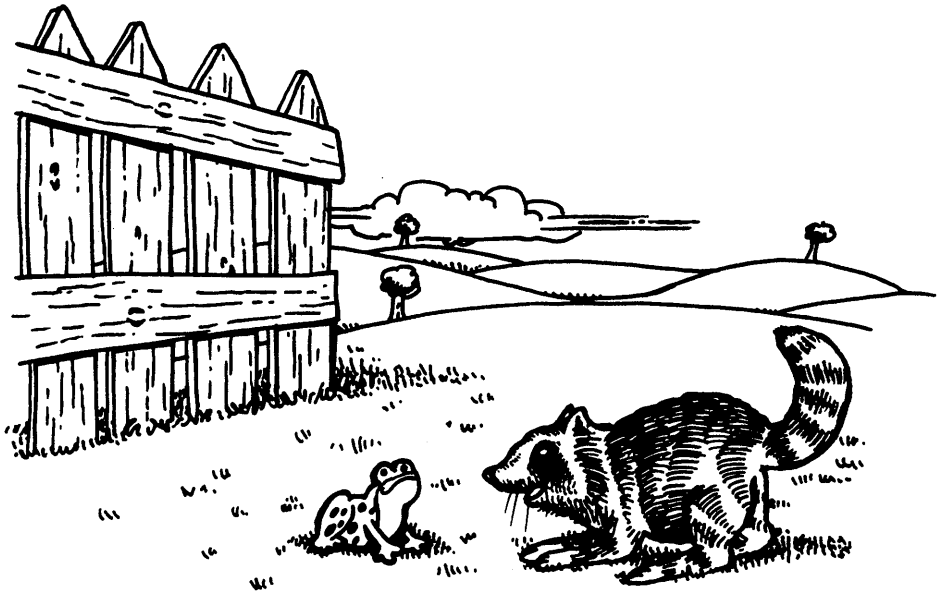
Name

50 Adriana and her mother are buying snacks for the family hike in the Green Mountains. They are standing in front of two rows of three bins with clear plastic lids at the store. The banana chips are above the malt balls and to the left of the trail mix. The nuts and raisins are to the right of the carob chips and below the sunflower seeds. How are the snacks arranged in the bins?



Name

51 Past Phillip's house at the end of the road were empty fields. Phillip had lots of visitors to his yard. A large brown toad and a small raccoon came regularly. The toad came every 3 days, and the raccoon came every 7 days. How many times in six weeks would Phillip see the toad and the raccoon on the same day?



Name

52 Molly is going to do some errands on her way to Marta's apartment. She goes north 3 blocks, stops at the bakery and turns right. She goes east for 2 blocks and then turns left and goes 1 block north to the cleaners. Then she turns right, goes east 1 block, and turns right again. She goes 4 blocks south to Marta's apartment. When Molly leaves her friend's apartment, what is the quickest way for her to go home?

Name

53 Amber and Victoria finish the geometric design they have been working on for art class. They made a design with hexagonal tiles arranged in rows. There is one tile in the first row, with two tiles fitting under it in the second row, and three tiles fitting under that row. Each row has one more tile than the row directly above it. If Amber and Victoria used a total of 36 tiles in their design, how many rows of tiles are there?

Name

54 Clancy, Nancy, and Mary Ellen are at the supermarket together. Each of the girls has part of the list of things they need for the cookout. As they go to the checkout stands, they decide to each get in a different line to save time. As Clancy gets in line, she notices that there are three more people in front of her than are in front of Nancy, and there are two times as many people in front of Mary Ellen as there are in front of Nancy. The total number of people in front of Clancy, Nancy, and Mary Ellen is 11. How many people are in front of each of the girls?

Name

55 Graciela, Arthur, Bernice, and Marcus are sitting down to play a card game. Each player is sitting across from his or her partner. Arthur is sitting to Bernice's left. Graciela is mad at her partner, because she thinks he isn't paying attention. Where is everyone sitting at the table?

Name

56 There is usually a line at the Pitch-A-Penny booth at the school carnival. If you can get 20 points you win a giant pizza from the Pizza Castle. Each player can toss four pennies, one at a time, at four plates. The largest plate is worth 5 points, the two middle-sized plates are worth 10 points each, and the very small plate is worth 20 points. How many possible ways can you earn 20 points with four penny tosses?

Name

57 Barnyard and Barley's circus is in town, and Lorena is going with her father. They have seats in the balcony. When Lorena and her father arrive at the performance, they can choose from six entrances to the ground floor of the main arena. There are two stairways and one elevator that go to the balcony. How many different paths can Lorena and her father take from outside the arena to the balcony?

Name

58 Mele is feeding some of the many exotic fish that live in the coral reefs off the island of Tonga. This is the largest of a chain of islands in the South Pacific. Mele has brought a cooked banana from home to give to the fish. As the fish nibble on the banana, Mele counts 24 fish, some with five large green spots and some with six blue spots. Altogether she counts 139 spots on the fish that eat her banana. How many of the fish had five spots?

Name

59 It is noon at the sandwich shop, and Kathy and Jill are making sandwiches for the lunchtime rush. Today's specials are egg salad or ham and cheese. During the first 15 minutes, Kathy makes 5 egg salad sandwiches and Jill makes 7 ham and cheese sandwiches. During the second 15 minutes Kathy makes 9 egg salad and Jill makes 10 ham and cheese. During the third 15-minute period, Kathy makes 14 egg salad and Jill makes 14 ham and cheese. In the fourth 15-minute period Kathy makes 20 egg salad, and Jill makes 19. If Kathy and Jill make sandwiches for an hour and a half at this rate, how many sandwiches will each one make during the last 15-minute period?

Name

60 "Oh no!" shouted Ken to his family, as they hiked along in the Grand Tetons. "I left the other pack in the car — the one that had the food for breakfast and lunch today." Everyone was disappointed. They had started hiking before dawn and were very hungry. When they were packing up for the trip they had put one sixth of the food packets into the separate pack. Then Ken had packed two fifths of the packets left. Next Darlene put one half of what was left in her pack. Then Kelly and Kasey each packed one third of what was left. Finally Kendra put the last 5 packets in her pack. How many packets did the family begin with altogether for the trip?

Name

61 Boris Bear called a meeting of the bears and marmots of northern Yosemite, to talk about the problems with campers. The number of campers was increasing, and they were making more noise and leaving more trash. Altogether 178 bears and marmots attended the meeting, and there were 44 more bears than marmots. How many marmots and how many bears came to the meeting?

Name

62 Astronomers all over the world were amazed at the discovery of a new solar system. Doctor Star reported that there was a sun fifty times larger than our own, and around it a whole system of planets. Doctor Star reported that there were four planets in the first orbit, nine planets in the second orbit, and 16 planets in the third orbit. If the orbits continued containing planets at the same rate, how many planets would be in the sixth orbit?

Name

63 Danielle is lost in the jungle with her pet crocodile, her monkey, and her pet parrot with a broken wing. She comes across a rickety rope bridge that goes over a huge river with rapids. Danielle realizes that she will have to hold on to the side of the bridge with one hand while holding an animal friend with the other hand, as they cross the bridge. She can't leave the crocodile with the monkey and she can't leave the parrot with the crocodile. What is the fewest trips Danielle will have to make across the rickety bridge to get all her friends over the river?

Name

64 Sol's grandfather is showing Sol his apple orchard. He tells Sol that when they planted the trees many years before that, for every 11 rows of Red Delicious, they planted 7 rows of Yellow Delicious, 5 rows of Pippin, and 3 rows of Gravenstein. If there are 18 rows of Gravenstein in the orchard, how many rows of trees are there altogether?

Name

65 "You're kidding," said Caleb to his friend Donna. "You want to be THAT when you grow up?" Alice, Barclay, Caleb, and Donna are talking about what they want to do when they grow up. Caleb enjoys helping his younger brother learn his math facts. Donna gets motion sickness. Both Donna and Barclay hate to go camping or hiking. Together they want to be a doctor, a pilot, a forest ranger, and a teacher. Can you match each person with each occupation?

Name

66 There are lots of ball players at Los Amigos School. There are 70 girls and boys who play soccer in the fall, 60 who play softball or baseball in the spring, and 45 who play both soccer and softball or baseball. There are 85 ball players altogether at the school. How many play ONLY soccer, and how many play ONLY baseball or softball?

Name

67 As Rita and Yvonne were filling the cardboard flats with eggs, Rita made up a puzzle. Each 6-by-4 flat held 24 eggs. Rita said to Yvonne, "Try to find two different ways to place 10 eggs in the flat so that each row and each column has an odd number of eggs." Can you do this?

Name

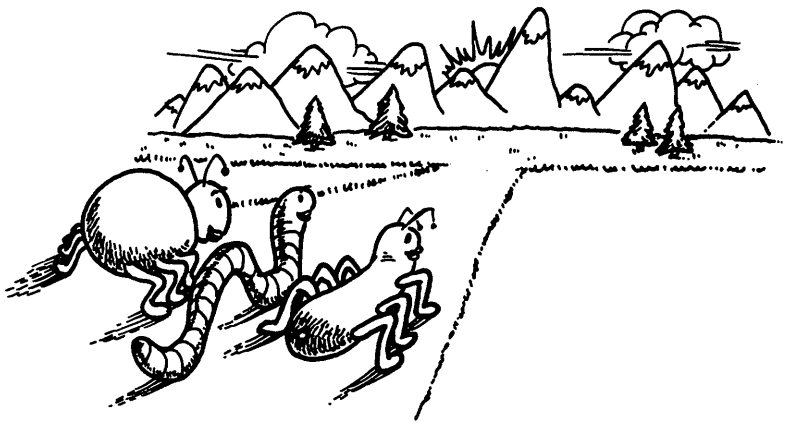
68 On the night of Carmella's slumber party there was a terrible storm. The main road washed out, so Carmella and her ten girlfriends decided to have a "phone party" instead. The idea was for each friend to talk to every other friend. With all 11 friends taking part in the phone party, what was the fewest number of calls that would have been made?

Name

69 Stacey has a collection of coins from five different countries. Half the coins are from England, $\frac{1}{6}$ are from Switzerland, $\frac{1}{6}$ are from France, $\frac{1}{12}$ are from Italy, and 7 are from Spain. How many coins are in the collection, and how many are from each country?

Name

70 Auditions are being held for another Dizzy production in the Enchanted Forest. Small critters have been crawling for days to Sunny Meadow. It has been quite a struggle for three old screen veterans: Henrietta Hunchbug, Millicent Minchworm, and Doris Daycrawler. Together Henrietta and Millicent traveled a total of 27 meters, Millicent and Doris together traveled 29 meters, and Doris and Henrietta together hunched and crawled a total of 32 meters to get to Sunny Meadow. How far did each critter friend travel?



Name

71 Jerry is down to the last problem in the Matholympics: he has to make five triangles using five straight lines. At first he thought it was impossible, then he solved it and became the star. How did Jerry solve the problem?

Name

72 Little Jack Horner sat in the corner eating his mixed fruit pie. The pie contained 17 raspberries, 3 peach slices, 28 apple slices, 4 pear slices, 89 raisins, 67 cherries, and, of course, two plums. How many times will Little Jack have to stick his thumb into the pie before he is sure to pull out two pieces of the same kind of fruit?

Name

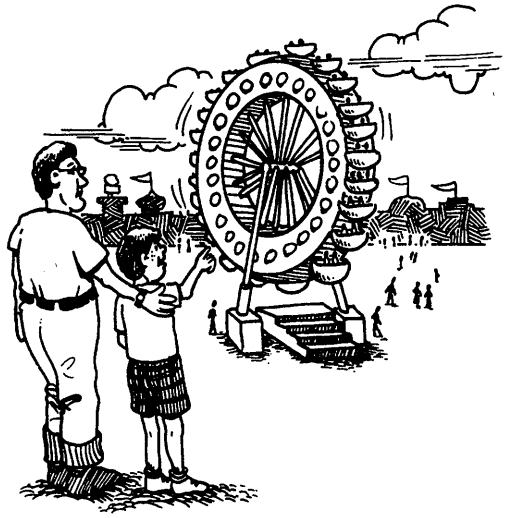
73 Every year the monarch butterflies come to the milkweed field behind Grandma Tinkerman's cottage. Usually a huge number arrives and then each day some of them disappear. This year 2000 butterflies arrive. On the first day after they arrive, 100 butterflies disappear. On the second day twice that amount disappear, or 200 butterflies are gone. Each day the number of butterflies that disappear doubles from the number that leaves the day before. How many days will it take for all the butterflies to disappear?

Name

74 Mom, Dad, Daniel, and Marty are having a family meeting at the square kitchen table. Each family member is on one side of the table. The kids can't sit next to each other because there has been a big fight. Mom starts the meeting by turning to her right and asking Marty to explain what happened. Where is everyone sitting at the table?

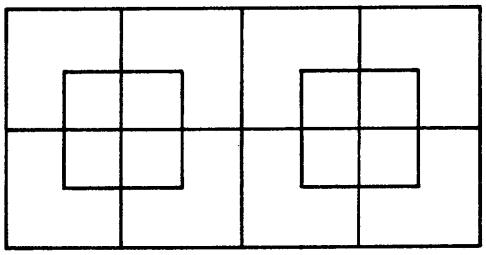
Name

75 Benny and his father have gone to the Here's America amusement park. Benny's favorite rides are the Loop-the-Loop, which spins him upside down and takes 10 coupons to ride; Careening Cars, which takes 7 coupons; the Frantic Ferris Wheel, which takes 5 coupons; and the Mad Musketeer, which takes 2 coupons. Benny's father gets Benny a book of tickets with 32 coupons. If Benny uses all the tickets for his favorite rides, how many different combinations of rides could he take?



Name

76 Mary Liz and Brenda were looking at the tile design on the wall. "How many squares do you think are in the design?" Mary Liz asked Brenda. What was Brenda's answer?

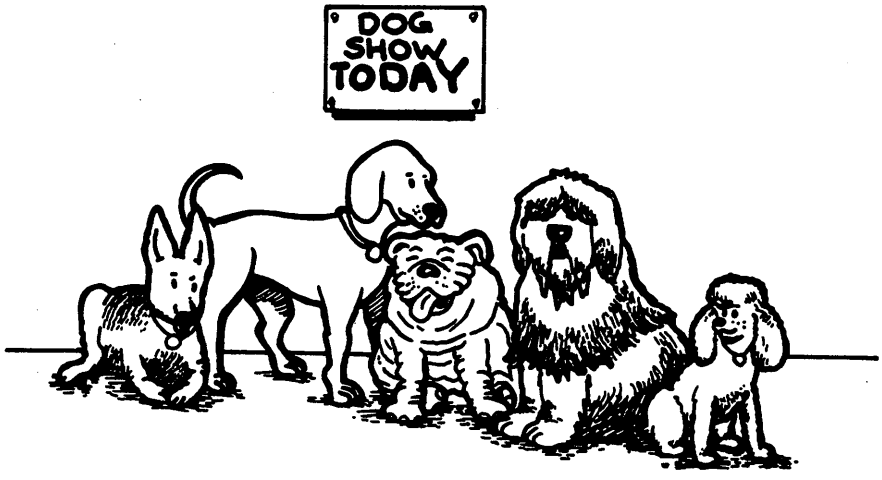


Name

77 Brenda is delivering Girl Scout cookies in the 15-story office building where her mother works. She has four boxes of cookies to deliver. She takes the box of chocolate chip cookies to an office that is two floors below the top of the building. She delivers the chocolate-covered mints six floors above the floor where she takes the creme-filled sandwich cookies. She delivers the oatmeal-raisin cookies nine floors below the chocolate chip cookies and one floor above the creme-filled sandwich cookies. What is the number of each floor where Brenda delivers cookies?

Name

78 Maria is taking a picture of the dogs that won ribbons at the neighborhood dog show. As Maria aims her camera, the black mutt is to the right of the golden retriever, and behind the poodle. The irish setter is in front of the golden retriever, and to the left of the german shepherd. The labrador is between the golden retriever and the black mutt. How were the dogs arranged for their picture?



Name

79 Beginning October 1, Josh's and Jill's soccer teams are using the Hillview School field for soccer practice. Jill's team uses the field every 3 days and Josh's team uses it every 5 days. During October, how often would the teams use the field on the same day?

Name

80 Kelly counted all the bags of recyclable trash piled up at the curb, as she walked to her friend's house. There were half as many bags of colored glass as there were bags of newspaper; there were four times as many bags of newspaper as there were bags of aluminum cans; and there were two more bags of clear glass than bags of newspaper. If there were 35 bags altogether in front of the houses, how many bags of each recyclable item were there?

Name

81 Wilbur was the middle brother of three pigs that lived near each other. Wilbur decided to add on to his house, and went to the forest one day with a wheelbarrow to collect sticks. On his way home, Wilbur passed his brother's brick home. His brother asked if he could have one fifth of Wilbur's bundles of sticks. Wilbur kindly gave his brother the bundles and went on his way. Soon afterward Wilbur tripped and lost one half of his load down a deep ravine. About a mile further on, he swerved to miss a squirrel and ran into a lake. Wilbur and all his bundles went into the lake, but Wilbur was able to rescue one half of what was left. Poor Wilbur arrived home with only 10 bundles of sticks. How many bundles did Wilbur have when he left the forest?

Name

82 Seth and Sergio are going on a plane trip to visit their grandparents. Both boys want to sit by the window. To settle the argument they have decided to play a game, and whoever wins gets the window seat. They will use a die whose six faces are marked 1, 2, 3, 4, 5, and 6. They will take turns rolling the die 3 times in a row. The first player to roll a total of 6 points in the 3 rolls is the winner. How many different ways (1 + 4 + 1 is different from 1 + 1 + 4) can the winner combine 3 rolls of the die to total 6?

Name

83 This is Peggy Sue's first day in fifth grade. Her classroom is on the second floor of Public School 137. There are four street entrances to the school. There are four stairways to the second floor, and there are two doors to Peggy Sue's classroom. How many different paths can she take from outside the school to her classroom?

Name

84 Ryan's brother Clay held on to the large package that had arrived for Ryan's birthday. The package came from their uncle in Australia. "Now," said Clay, "on this package are purple stamps worth 40 cents and green stamps worth 30 cents. There are 25 stamps on the package, $9.00 worth of postage. Tell me how many stamps there are of each color and the package is yours!" Can you help Ryan solve the problem and open his package?

Name

85 The Strawberry Patch is a local dessert shop where everything is made of strawberries. On Jasmine's first day on the job, she makes 3 strawberry shortcakes the first hour, 5 the second hour, 6 the third hour, and 8 the fourth hour. She also makes strawberry sundaes: 6 the first hour, 7 the second hour, 5 the third hour, and 6 the fourth hour. At this rate, how many shortcakes and sundaes altogether will Jasmine make during her first eight hours at the Strawberry Patch?

Name

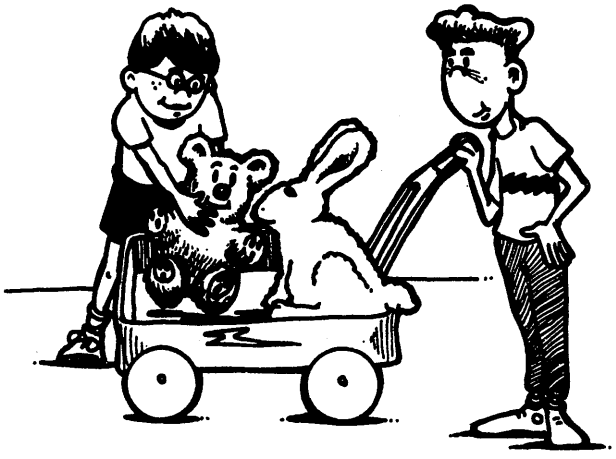
86 Calvin's little brother jumped up and down. "I can hear it! Here it comes!" shouted Calvin. Around the corner came the Thanksgiving Day Parade. Half the people in the parade were on floats; $\frac{1}{4}$ of the people were in marching bands; the clowns made up $\frac{1}{8}$ of the parade; T.V. stars made up $\frac{1}{16}$ of the people in the parade; and then there were 8 city officials. How many people were in the parade, and how many were in each group?

Name

87 From what heavy seven-letter word can you take away two and have eight left?

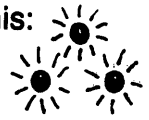
Name

88 Chris designed a game for his little sister Kate's birthday party. First he collected wagons, teddy bears, stuffed rabbits, and lions. The object of the game is for each player to take two teddy bears, two rabbits, and two lions across the lawn in a wagon to the finish line. They have to follow these rules: Rabbits and lions cannot be in the wagon at the same time, nor can the rabbits be left alone with the lions at either the start or the finish line. What is the fewest number of trips a player can take?

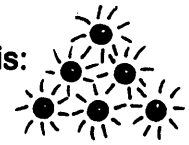


Name

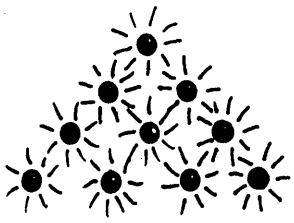
89 The crowd waits and watches the big, dark Christmas tree that has been set up downtown for the opening of the Christmas season. There are big lights that look like candles on the tree. The mayor is ready to turn on the lights, one row at a time. When he flips the switch, the top light goes on, and then one at a time, each row lights up. When the first two rows are on they look like this:



When the next row is lighted, the tree looks like this:



When the next row is lighted, the tree look like this:



At this rate, how many lights will be on if there are eight rows of lights?

Name

90 The streets of the downtown area were lined with people for the 15th Annual Antique Car Parade. Brent stood at the very edge of the curb, and as the antique cars went by, he counted 8 Model A Fords and 7 Packards for every 9 Model T Fords. If there were 216 cars in the parade, how many were Model T's, how many were Model A's, and how many were Packards?

Name

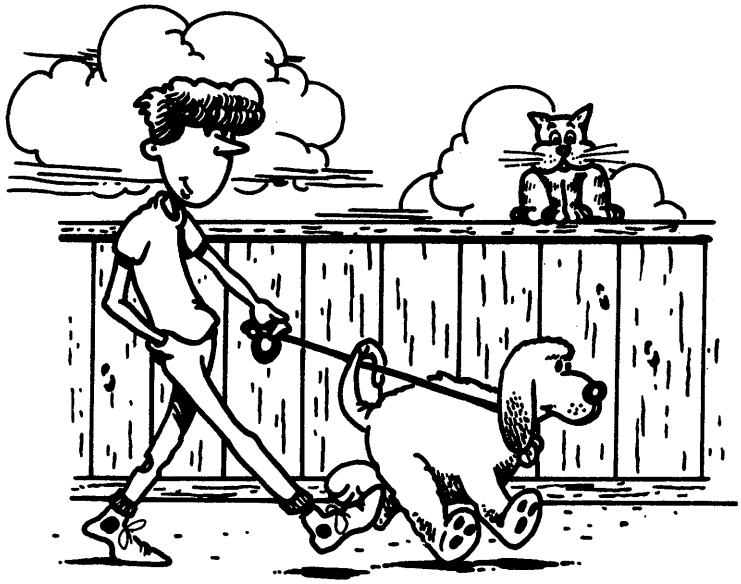
91 Mia is approaching her goal of 119 points for the video game. She wants to put her initials on the computerized list of Top Ten Point Scorers for the game. She moves Freddie the Frog all over the terminal screen and at last she does it. Freddie the Frog eats a total of 22 critters: worms (worth 6 points each), bugs (worth 7 points each), and butterflies (worth 4 points each). If Mia earned the total of 119 points, how many critters of each type did her frog eat?

Name

92 Val, Emika, Trina, and Evan are cutting out magazine pictures to make collages called "All About Me." They have cut out pictures of a ballet dancer, a biker, a runner, and a chess player. Emika is always on her toes. Trina and Val can't sit still very long, and Val hates to run. Which picture do you think each person put on their collage?

Name

93 At the King School, some sixth-graders made a survey of the number of students who owned cats and dogs. Of the 123 kids who answered the question, 102 had a cat, 88 had a dog, and 67 had both a cat and a dog. How many students had ONLY a cat, and how many had ONLY a dog?

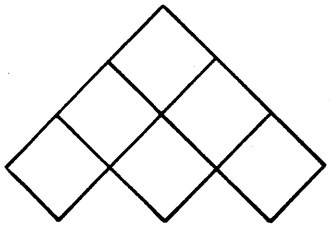


Name

94 Amelia made up a card trick and said to her friend Arlene, "Arrange seven cards so that when you deal them out they are in order: ace-2-3-4-5-6-7. Turn the first card, which is the ace, face up on the table. Put the next three cards at the bottom of the stack. Put the next card, which is the 2, face up on the table. Then put the next three cards at the bottom of the stack. Keep repeating this pattern until all the cards are on the table." How did Arlene arrange the cards in the stack so that she could do this?

Name

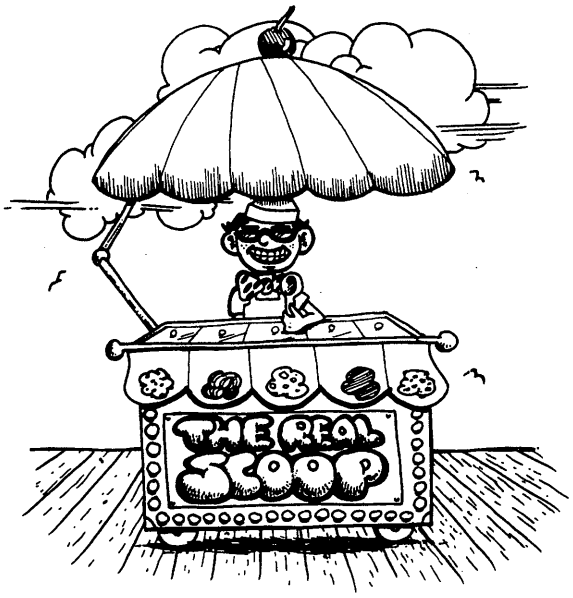
95 Alicen has been watching the workmen construct the building across the street. Now there are some artists making a tile mosaic in the shape of a diamond, with square tiles of many colors. The first three rows of the design look like this:



If the widest row of the diamond consists of 10 tile squares, and then the design decreases to one by repeating the pattern in reverse, how many tiles will the artists use altogether?

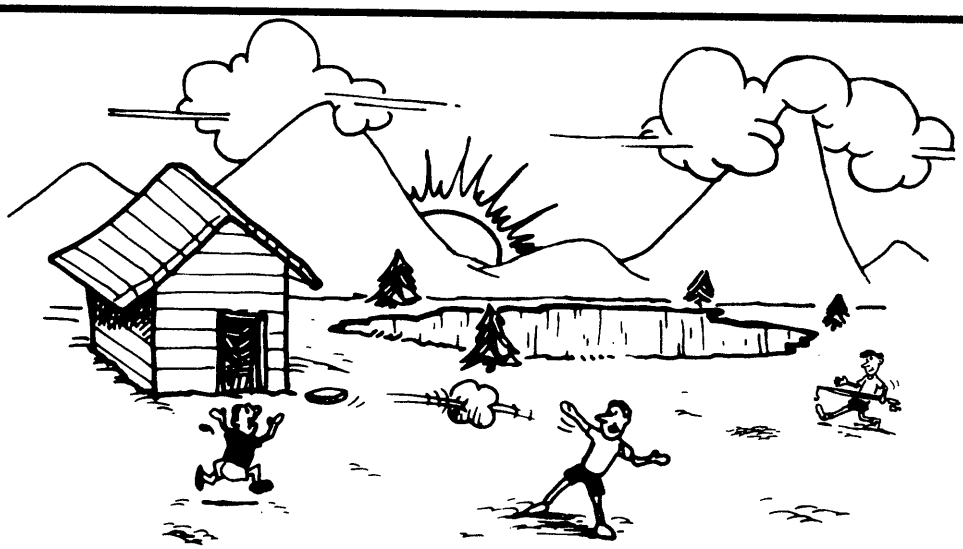
Name

96 It was hot at the boardwalk. The Real Scoop was doing very well. Russell had just served up 55 cones, some single scoops, some double scoops, and some triple scoops. If he served up a total of 103 scoops, how many of the cones were single scoops, how many were double scoops, and how many were triple scoops?



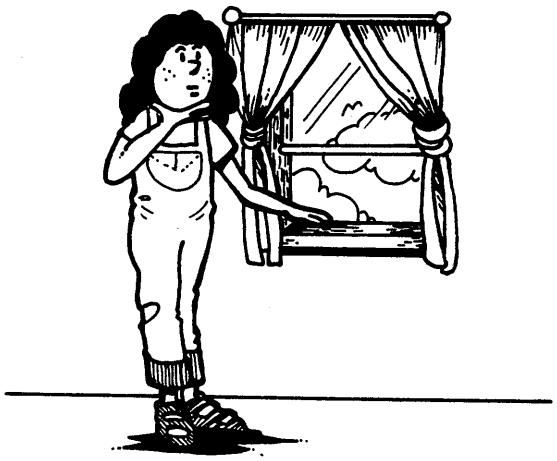
Name

97 Camp Whitewater, the local Boy Scout camp, is open for the summer. Once again the woods are alive with shouts, games, and the running feet of happy campers. On the first day, four campers arrive, filling up one cabin. The next day eight new campers arrive, filling up 2 more cabins. Each day, the number of new campers is double the number of the new campers the day before. If the campers keep arriving at this rate, how many cabins will be filled at the end of the sixth day of opening week?



Name

98 It is Saturday, and Ramona is waiting for her friend Rhonda. Ramona started thinking about the different ways that Rhonda could get to her apartment from the street. There are two stairways in front of the building and one stairway on the side of the building. Each stairway goes up to a door that leads into the lobby of the apartment building. Then there is a stairway and two elevators up to the third floor where Ramona's apartment is. How many different ways can Rhonda take from outside the building to Ramona's apartment?



Name

99 Charmaine proudly holds on to the $12.00 that she and her sisters have saved for a Father's Day present. She is looking at the four kinds of fishing lures on display: Blue Bugs, which cost $5.00 each; White Wheelies, which cost $3.00 each; Green Darters, which cost $2.00 each; and Pink Puffins, which cost $1.00 each. How many different combinations of fishing lures can Charmaine buy with $12.00?

Name

100 Ming-Lee and Lin-Po are collecting tadpoles for their science classes at school. Every day they collect the tadpoles that show the earliest signs of becoming frogs at the creek near Lin-Po's house. On Tuesday they collected two more new tadpoles than they collected on Monday, and on Wednesday they collected 11 more than one half the number they counted on Monday. How many did they count on Monday, if they counted a total of 53 new tadpoles in the three days?

Name

101 "Hello Grandma?" Charlie said, "I'm lost!" Charlie was visiting his grandparents for the summer and that morning he went out for a long bike ride. When he discovered he was lost, he was in front of the public library on Walnut Street. He explained this to his grandmother who said, "Go north for two blocks on Walnut until the road dead ends. Turn left and go past the park for two blocks. Turn right and go north three blocks to Elm. Turn right on Elm, and the house is two blocks down." From the library, how many blocks is Charlie from his grandmother's house if he could go in a straight line?

Name

102 "Here we go!" shouted Grandma Tinkerman. She was taking her six grandchildren: Putzy, Muggs, Tillie, John, Oscar, and Roy, for a ride on the lake in her speedboat. Everyone was strapped in and holding on. Putzy dragged her left hand in the water and sprayed John, who was sitting directly behind her, in the face. Muggs said he was squashed between Putzy and Tillie. Oscar was mad because he didn't get a seat on the side, where he could drag his hand in the water. Where were all the grandchildren sitting in the boat?

Name

103 Warren's mother handed him a sheet of paper. "Here is your summer chore schedule," she said. "It begins on July 1." Warren moaned, "Oh no! You mean I have to wash the car every sixth day, take out the trash every third day, and clean up my room every twelfth day?" If Warren continues with this schedule through August, how many times will he have to do all three chores on the same day?

Name

104 Poor Rapunzella. The king locked her in the tower for so long that her hair grew and grew. At last the king has decided that if someone can cut her hair to just three feet, and not an inch shorter, then he will let her out of the tower. The first night some children line up and cut off three feet of her hair. The second night a few knights from the castle stand on each other's shoulders and cut off one fifth of the rest of her hair. The third night a cabinet maker and sail maker cut one half of the rest of her hair. On the fourth night, a mountain climber named Sven, scaled the tower and cut off three fourths of what was left of Rapunzella's hair, leaving exactly three feet. At last Rapunzella was free! How long was Rapunzella's hair before the children cut off the first three feet?

Name

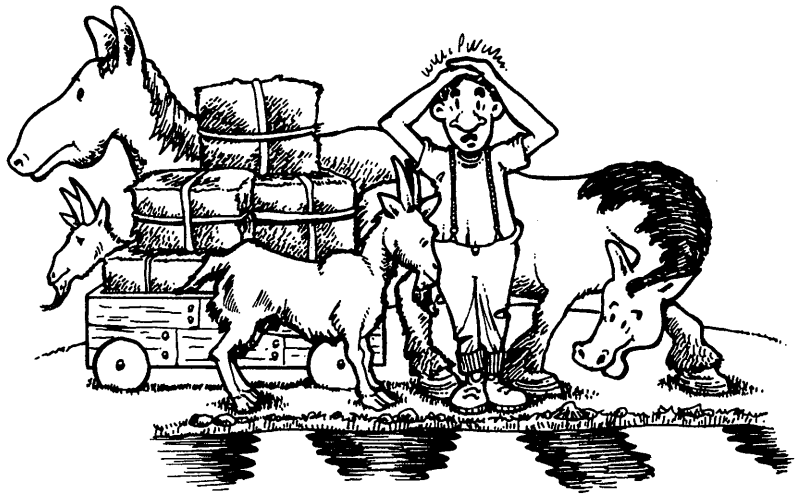
105 "Step right up, folks!" announces Marilyn, in her loudest carnival voice. "Three ping pong balls for a quarter! Step right up!" Marilyn is in charge of the booth, and a game that she created herself. Each player gets three throws at four glass bowls labeled 1, 2, 3, and 4. If the ball drops in any one of the bowls, then the player gets the number of points marked on the bowl. A player that scores 8 points wins a big pink teddy bear. How many different ways (0 + 4 + 4 is different from 4 + 0 + 4) can a player score 8 points?

Name

106 "Here we go!" shouts Darryl as the attendant locked the safety bar in place across the ferris wheel chair. Darryl likes to ride the ferris wheel, and today he is riding with his mother, Carol, and her sister, Cheryl, and Cheryl's son, Merrill. Merrill's cousin's mother and Merrill's aunt's sister are not riding in the same chair. Cheryl's sister's son is riding in a different car than his mother's sister. How are they paired up in the ferris wheel chairs?

Name

107 Seth is on his way to market to sell a load of hay, seven horses, and five goats. He comes to a river and must use a small raft to get across. Seth can take the seven horses or the load of hay, or the five goats across at one time. Seth cannot leave the horses or the goats alone with the hay because they will eat it! What is the fewest number of trips Seth has to take to get the hay, horses, and goats across the river?



Name

108 Rachel and Jonna are sisters who share a paper route. They take turns delivering the papers each day. They have decided to time themselves, to see if they can improve their service. On the first day that Rachel times herself, it takes her 80 minutes to deliver the paper. For the next four days that she delivers the papers it takes her 79, 77, 76, and 74 minutes. On the first day that Jonna times herself, she takes 80 minutes. Her next four times are 76, 77, 73, and 74 minutes. At the end of 24 days, both Rachel and Jonna will deliver the papers 12 times. If they keep delivering papers at the same rate, which sister will have the shortest delivery time on her last delivery day?

Name

109 One day, outside of Briones School, the bike racks were full. There was a colorful combination of red, blue, and yellow bikes. Together there was a total of 39 red and yellow bikes. There was a combined total of 40 blue and red bikes, and 41 yellow and blue bikes. How many blue bikes, how many red bikes, and how many yellow bikes were in the bike racks that day?

Name

110 On a rainy summer afternoon Gail and Shannon were making up puzzles for the checkerboard. It was Gail's turn to make up a puzzle that Shannon had to solve. Gail said, "Find two different ways to place 14 checkers on the board, so that each row and each column on the 8-by-8 board has an odd number of checkers." Can you solve this puzzle?

Name

111 The newspapers are full of the new discovery: the tomb of Great Pharaoh Mathematicus. Just inside the stone door was a pyramid of alabaster eggs. Next to the pyramid of eggs was a sign: WHOEVER COUNTS THE EGGS ON THE BOTTOM WILL BE LUCKY, WHOEVER MOVES THEM TO DO SO WILL NOT BE! The top two rows looked like this: 

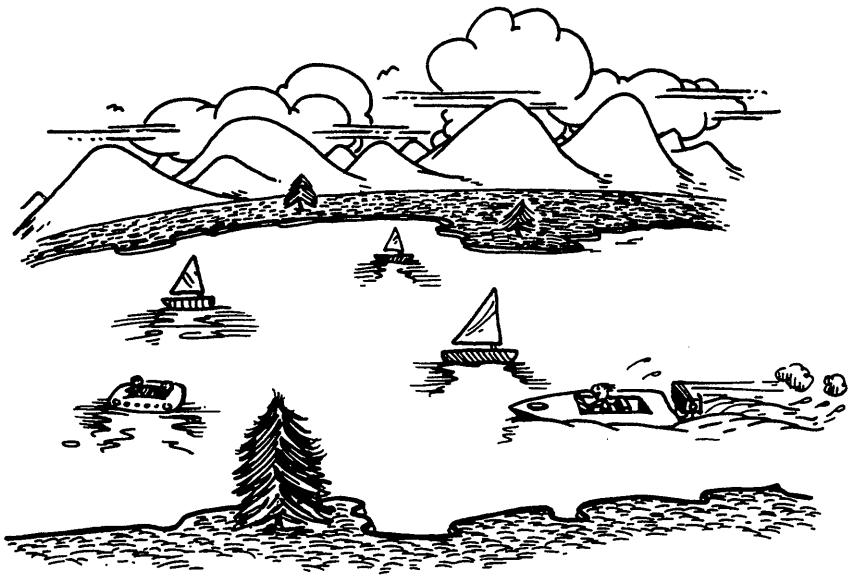
and contain 4 eggs. The top three rows looked like this: 

and contain 10 eggs. The top four rows looked like this: 

and contain 20 eggs.
At this rate, how many huge eggs were in the seventh row, at the bottom of Mathematicus' pyramid?

Name

112 It was July 4th at Loon Lake. Billy was counting all the boats out on the lake. For every 20 powerboats he counted 7 windsurfers, 14 sailboats, and 3 rubber rafts. If Billy counted 42 windsurfers, how many boats did he count altogether, and how many of each kind?



Name

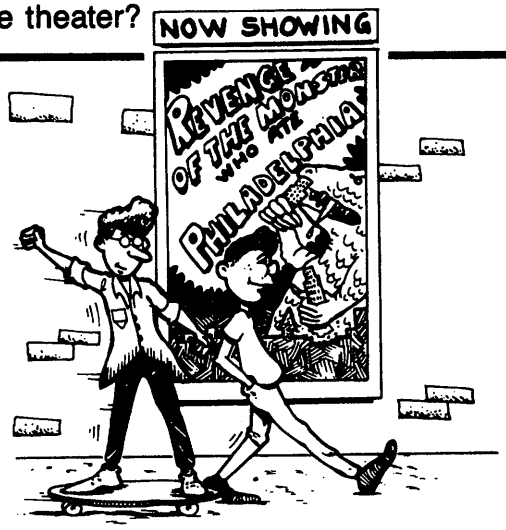
113 Raul and Derrick are playing a computer game called Ski Patrol. You are on the ski patrol and have to make different runs down the mountain, sometimes making ski jumps along the way. You get 15 points for a ski run completed, and 20 points for a ski jump completed successfully. Together Raul and Derrick score 430 points for making a combined total of 25 ski runs and jumps. How many ski runs and how many ski jumps have they made?

Name

114 Bruce and Leslie are looking for chairs for Thanksgiving dinner. Everyone in the family is coming. There is one grandmother, one grandfather, three mothers, and three fathers. Each father has two daughters and each daughter has two brothers. The grandmother and grandfather have two sons-in-law and one daughter-in-law. How many chairs do Bruce and Leslie need to find?

Name

115 Libby, Yoeman, Wilbur, Zack, and Veruschka are meeting at the Regency Cinema to see "Revenge of the Monster Who Ate Philadelphia." They have agreed to be downtown in time for the bargain matinee. Yoeman and Veruschka have to pay for transportation to the theater. Zack and Libby don't need to worry about locking up their means of transportation. Zack carries a pair of shoes in his backpack, so he won't have to watch the movie with just his socks on. Yoeman likes to watch the city from the window as he rides to the theater. If the five friends come by skateboard, bus, bike, roller skates, and the subway, can you match each friend with each way of getting to the theater?

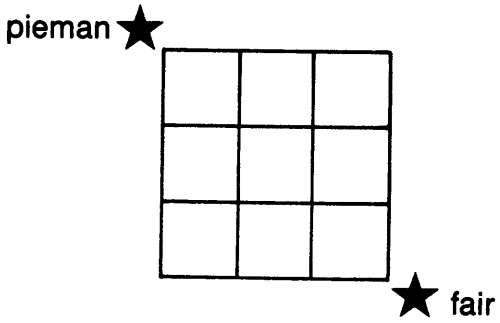


Name

116 The Flying Wannabees, a trapeze act, are trying to improve their safety record. They have designed a new safety net, which they put together wherever they perform. With their net, each supporting pole is connected to every other supporting pole with heavy rope. If their safety net has 13 supporting poles, how many separate pieces of rope must be used to connect all the poles?

Name

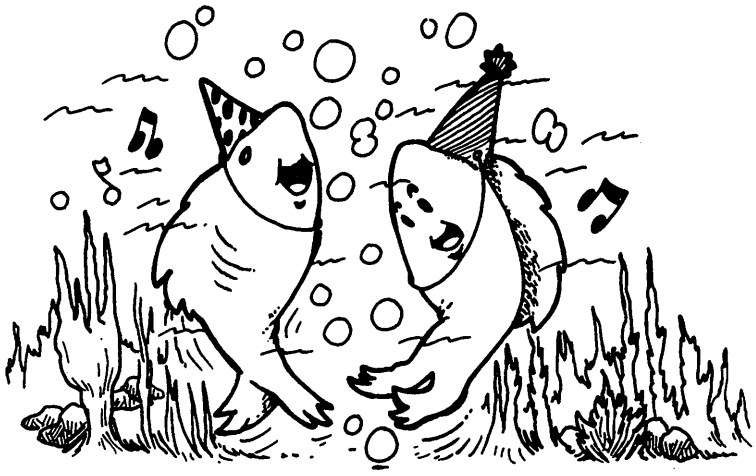
117 Simple Simon met a pieman going to the fair. The pieman was lost and asked Simple Simon for directions to the fair. The fair was at the southeast corner of town and the pieman was at the northwest corner of town. The city blocks that the pieman could travel on looked like this:



How many different sets of directions could Simple Simon give to the pieman?

Name

118 Each year down at the bottom of the sea, the codfish hold their annual ball. This year $\frac{1}{3}$ of the invited guests are codfish, since they are giving the party; $\frac{2}{6}$ of the guests are in the tuna family; $\frac{1}{6}$ are flounders, who get in everyone's way; $\frac{1}{12}$ are salmon, who always want to dance upstream; and the last 32 are electric eels, who provide the lighting. How many fish are coming to the party, and how many are in each group?



Name

119 Kelly and Rosalie watched the hot-air balloons rise into the air. There was a polka-dot balloon that together with a blue striped balloon went a total of 140 yards into the air. The combined distance for the striped balloon with the red balloon was 135 yards. The red and polka-dotted balloon rose a combined total of 155 yards. Which balloon was the highest?

Name

120 An old pirate had 21 barrels. Seven were full of gold and silver. Seven were half full, and seven were empty. How did the pirate divide them among his three sons so all had equal amounts of gold and silver and an equal number of barrels?