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Code: #CA-9187
ISBN 1 74025 951 3

For the Student

Figure it out is a booklet that teaches problem-solving skills. In each lesson, you will learn a strategy that you can use to solve problems. Your teacher will ask you questions to help you use the strategy to solve the first problem in each lesson. Your teacher will also guide you through the second problem in each lesson, giving you some things to think about and ways to help you find the solution. The last two problems in each lesson are for you to do on your own. These problems give you practice using the strategy you have just learned.

A Mixed Practice lesson follows each four lessons. Review lessons for each of the eight strategies are followed by a Final Review, which contains problems to be solved using the strategies presented in the booklet.

By the time you have completed this booklet, you will have learned eight strategies to use when solving problems. The strategies will be useful in school and in your everyday life. Hopefully, you will find that calculators and computers are useful for computation, but human beings are needed to solve problems.

When you Use this Booklet

- Read each problem carefully before you begin to solve it.
- Think about the questions that follow the first two problems in each lesson. They will help you to understand the problems and find the solutions.
- Use the blank space on the page to work through problems. You can write anywhere in this booklet if doing so will help you solve a problem.
- Once you have solved a problem, check your solution to be sure it makes sense.
- Write the solution to a problem on the line that follows the problem.

This ***Figure it out*** booklet was prepared for students by Sandra R. Cohen.

Make a List

1. Using 13 coins, what are all the ways to make $1.10?

Questions

a. What is your estimate of how many correct ways this can be done?

_____

b. What is the most fifty-cent coins you can use in the solution? _____

How do you know this? _____

_____

c. What amounts of five-cent coins can be used? _____

How do you know this? _____

_____

d. Using any amount of coins, find a few ways to make $1.10. If you have used less than 13 coins, how can you bring the total number of coins closer to 13? If you used more than 13 coins, how can you bring the total number of coins closer to 13?

_____

_____

_____

Apply the Strategy

To solve the problem, list as many combinations that you can find of coins with a total value of $1.10. Try to organise the solutions you found. You can make a table like the one at the right in which to record your work.

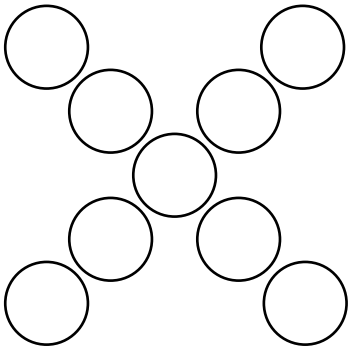
Fifty-cent coins	Twenty-cent coins	Ten-cent coins	Five-cent coins

Solution _____

e. Does every way you have listed use exactly 13 coins and add up to $1.10?

_____

2. Write the following numbers in the circles so that the numbers in each line have the same sum.



1.8, 3.1, 4.4, 5.7, 7, 8.3, 9.6, 10.9, 12.2

Think about:

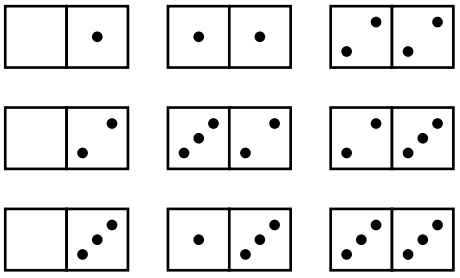
- Which number will you write first? In which circle will you write that number?
- Why might it be a good idea to start solving the problem by writing a number in the middle circle?
- Do you think there is more than one answer? If so, about how many answers do you think there are?

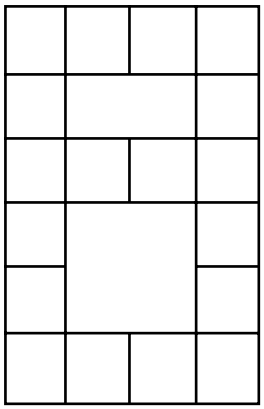
To find the solution, write the given numbers on pieces of paper. Move the numbers around the diagram. Continue to experiment until you find at least one solution.

On your Own

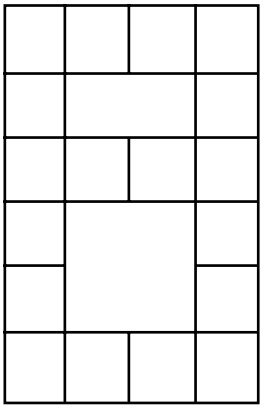
Work with other students. Experiment with the information in the problems to solve them.

3. Show how the dominoes at the right can be used so that the sum of the dots is the same in each horizontal and vertical line below. Try to find two solutions with different sums.





The sum on each side is_____.



The sum on each side is_____.

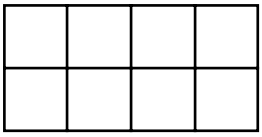
4. Ten-cent coins are placed in a pile, one on top of the other. What will be the value of 1 kilometre of ten-cent coins? (*Hint:* Use a centimetre ruler to help you find the solution.)

_____

Explain how you found your solution.

_____

2. A rectangle is divided into 8 congruent squares as shown. The perimeter of the large rectangle is 60 centimetres. What is the area of each square? (*Hint:* Find the length of each side of each square.)



Think about:

- How do you find the area of a square?
- What do you know about the length and width of a square?
- What are some possible lengths and widths of the large rectangle?
- If the large rectangle is 16 centimetres long and 14 centimetres wide, can you form 8 congruent squares as shown? Why or why not?

To help you solve the problem, use the picture above or draw your own picture. You can also use a model such as grid paper or squares cut from paper.

Solution _____

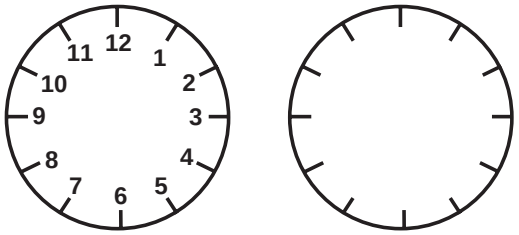
On your Own

Draw a picture or use a model to solve the problems.

3. List the composite numbers between 7 and 17.

_____

Rearrange the numbers on the clock's face so that all the sums of pairs of adjacent numbers will be composite numbers between 7 and 17. Use your list.



4. A cube has a square on 1 face, a star on 1 face, triangles on 2 faces, and circles on 2 faces. The same shapes are not on opposite faces of the cube.

Three views of the cube are shown. In the third view, draw the star and the second circle on the blank faces of the cube.