



# Developing the Fundamentals of Problem Solving

PROFESSIONAL DEVELOPMENT

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***Developing the Fundamentals of Problem Solving***

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1

This shape costs \$20.

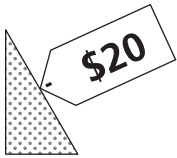
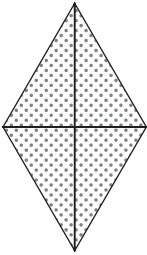
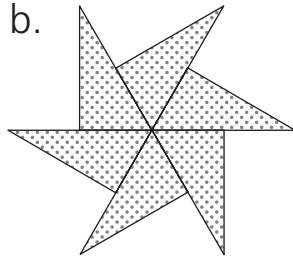


Figure out the cost of each design.

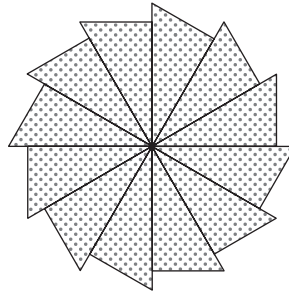
a.



b.



c.



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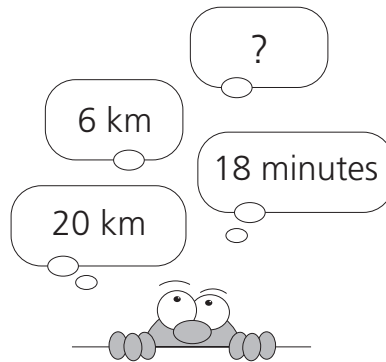
**Prickly  
Problems**

Orange Tank

# 2

Ted can ride his bike 6 km in 18 minutes.

At that speed, about how long will it take Ted to ride 20 km?



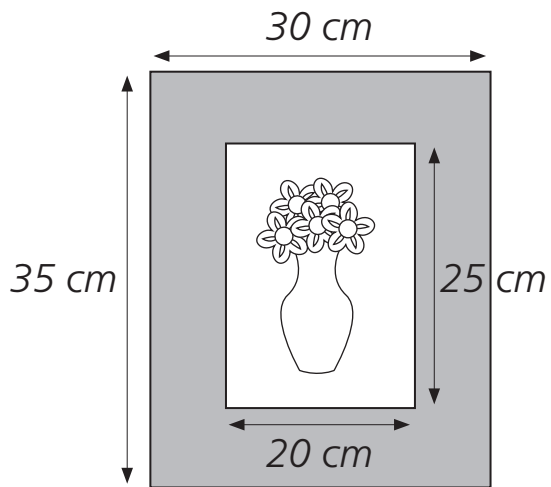
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Green Tank



9

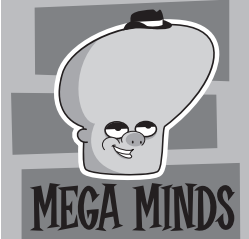


- What is the area of the frame without the picture?
- Write how you figured it out.

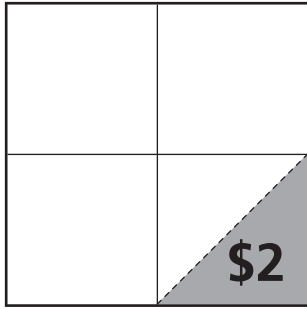
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Green Tank



2



- a. What is the value of the whole shape?
- b. Write how you figured it out.

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Orange Tank



# Remainder Race

15 Start	16	17	20	23	25	27
						30
48	46	45	40	38	36	31
50						
52	53	55	56	60	62	63
						65
80 Finish	78	75	73	72	70	68

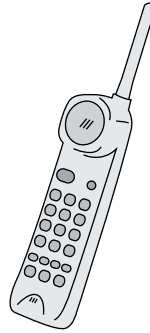
## Rules:

Use a cube with the numbers 2, 3, 4, 5, 6, and 9.  
 Each player places a counter on 15.  
 Take turns to roll the cube and **divide** the number in the space by the number on the cube.  
 Move the number of spaces equal to the **remainder**.  
 Repeat the steps when it is your turn.

## 2

Ari called 3 people to arrange a meeting.  
Each of those people called 3 other people.  
Each of the 3 other people called 3 more people.


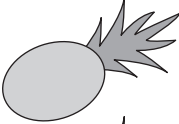
How many people knew about the meeting  
after all calls had been made?


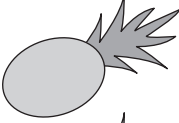



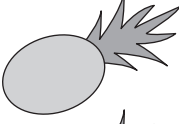
7


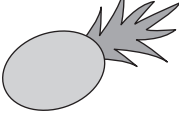
$$\text{Watermelon slice} = 2 \text{ Pineapple}$$

Complete these.

a. 6  = \_\_\_\_\_ 

b. 15  = \_\_\_\_\_ 

c. \_\_\_\_\_  = 24 

d. \_\_\_\_\_  = 36 

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**THOROUGH  
THINKERS**

Orange Tank

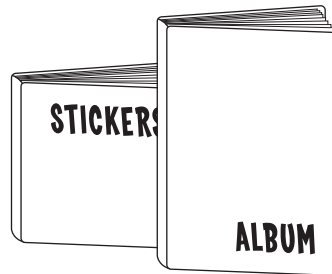
# 10

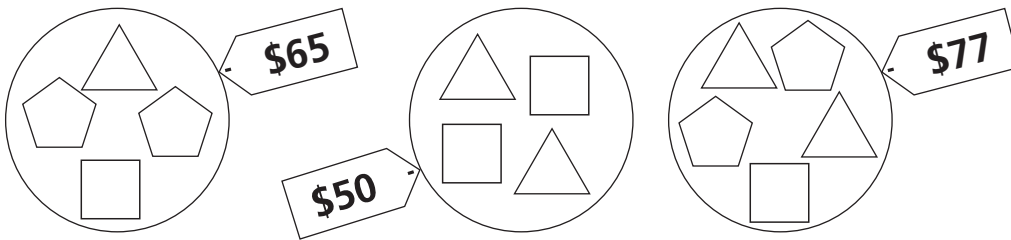
A book of stickers and an album cost a total of \$16.

You can buy 3 books of stickers for the same price as one album.

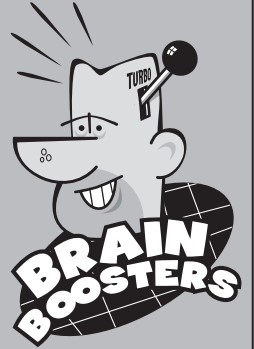
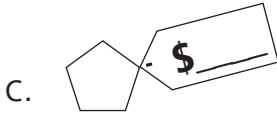
What is the price of

- a. one book of stickers?
- b. one album?





Same shapes cost the same amount.



# Take or Tally

$12 - \underline{\quad} = \square$

$11 - \underline{\quad} = \square$

$10 - \underline{\quad} = \square$

$9 - \underline{\quad} = \square$

$8 - \underline{\quad} = \square$

$7 - \underline{\quad} = \square$

Tally

Cube 1: 1, 1, 2, 2, 3, 3

Cube 2: 6, 7, 8, 9, 10, 11

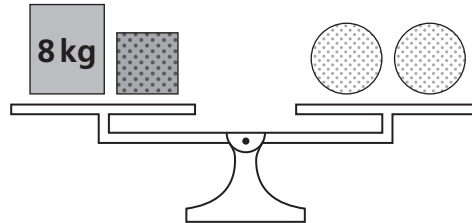
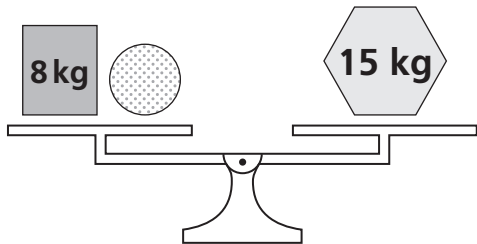
Roll both cubes and write the numbers in empty spaces to complete a true number sentence.

Draw a tally if you cannot.

Win if you write 6 true sentences

Lose if you draw 5 tallies.

Same shapes weigh the same.

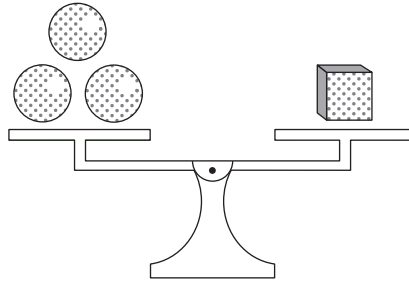
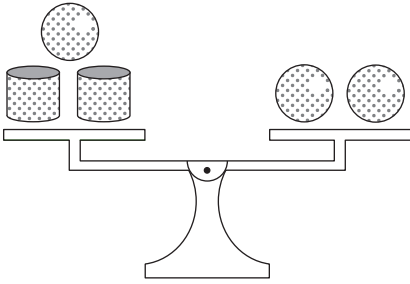



$$\text{Dotted Circle} = \underline{\quad} \text{ kg}$$


$$\text{Dotted Square} = \underline{\quad} \text{ kg}$$




11



 = 12 kg

a.  = \_\_\_\_ kg

b.  = \_\_\_\_ kg

Thinking Mathematically and Problem Solving

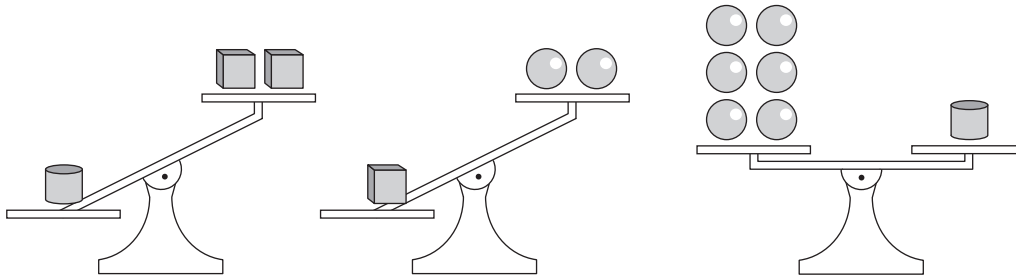
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Orange Tank





# 17

Each shape is a whole number of kilograms.



 = 12 kg

a.  = \_\_\_\_ kg

b.  = \_\_\_\_ kg

Thinking Mathematically and Problem Solving

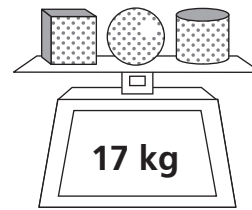
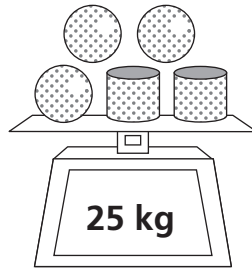
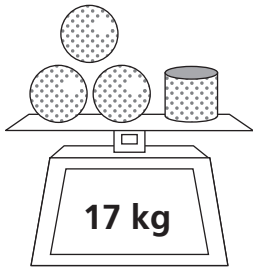
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
**Prickly  
Problems**

Purple Tank

17



Same shapes are the same number of kilograms.

- a.  = \_\_\_\_ kg
- b.  = \_\_\_\_ kg
- c.  = \_\_\_\_ kg

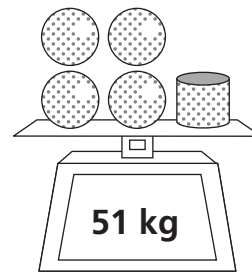
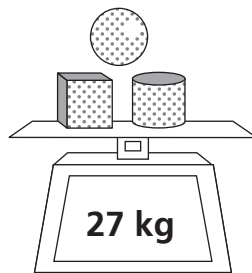
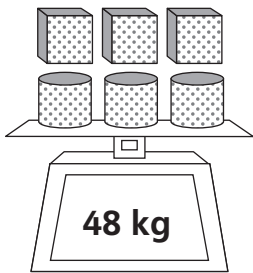
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
Green Tank



5



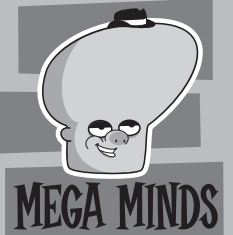
Same shapes are the same number of kilograms.

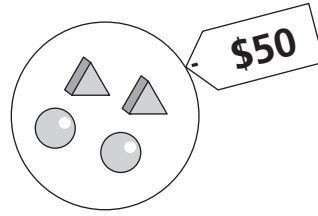
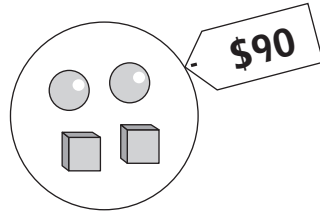
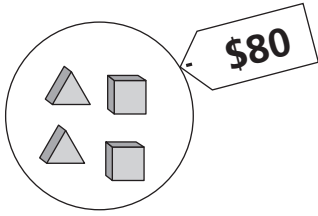
- a.  = \_\_\_\_ kg
- b.  = \_\_\_\_ kg
- c.  = \_\_\_\_ kg

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Red Tank





Same shapes are the same price.

- a. \$ \_\_\_\_\_
- b. \$ \_\_\_\_\_
- c. \$ \_\_\_\_\_



# Key Problem Solving Strategies

1. Act it out
2. Guess and check
3. Make a table
4. Draw a picture
5. Make a list
6. Look for a pattern
7. Work backwards
8. Work a simpler problem

## Other Strategies

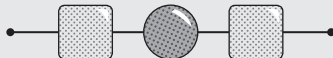
1. Use logical reasoning
2. Use visual thinking
3. Change your point of view
4. Experiment
5. Write an equation

	Number and Operations	Algebra			
Act it out					
Guess and check					
Make a table					
Draw a picture					
Make a list					
Look for a pattern					
Work backwards					
Work a simpler problem					
Other strategies					

# How do we create a good problem-solving environment?

- Be a model problem solver
- Allow for risk taking and mistake making
- Ask good questions
- Require students to justify their thinking
- Understand that it is not a straight path to the solution

This is one chain.



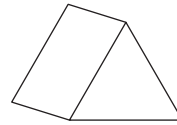
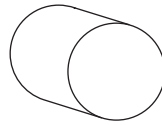
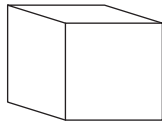
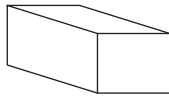
Mariko made some more chains like this.

She used 8 .

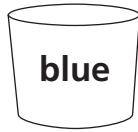
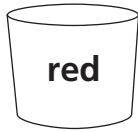
- How many chains did she make?
- How many  did she use?



*Blocks*



*Paints*



Follow these steps.

- Choose one type of block.
- Choose one type of paint.
  - a. How many different painted blocks can you make?
  - b. Write how you figured it out.

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**THOROUGH  
THINKERS**

Orange Tank

# 17

Ella and her friends are having lunch.

Talia is sitting next to Ella.

Chloe is sitting between Dharma and Isabel.

Dharma is across from Ling.

Isabel is across from Ella.

Copy the table and the seats.

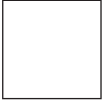
Write the names on the seats.

		Ella

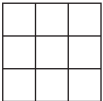


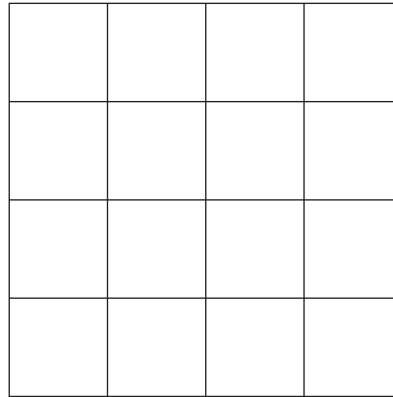
# 15

How many of these squares are in the big square?

a. There are \_\_\_\_\_  .

b. There are \_\_\_\_\_  .

c. There are \_\_\_\_\_  .



# 5

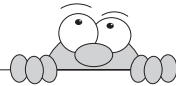
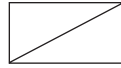
Take a rectangular sheet of paper.

Cut it on the diagonal to make two congruent triangles.

Use the two triangles to make different shapes by joining them vertex to vertex and side to side.

- How many different shapes can you make?
- Draw the shapes.

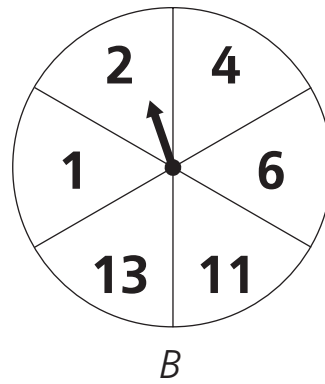
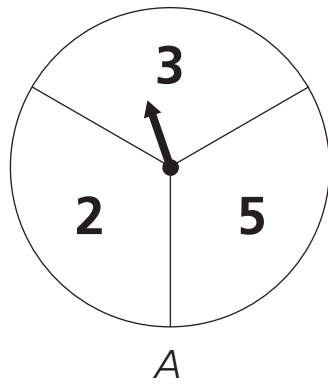
One shape you can make is the rectangle you started with.



**HINT**



## 2



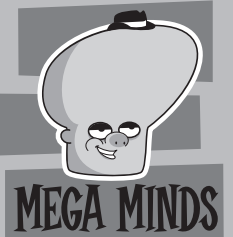
Elizabeth and Jake are playing a game where each player spins both spinners and adds the two numbers.

- Elizabeth scores one point if the sum is a square number.
  - Jake scores one point if the sum is a prime number.
- a. Who has the greater chance of scoring a point?
- b. Write how you figured it out.

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Blue Tank



	Number and Operations	Algebra	Geometry	Measurement	Data Analysis and Probability
Act it out					
Guess and check					
Make a table					
Draw a picture					
Make a list					
Look for a pattern					
Work backwards					
Work a simpler problem					
Other strategies					