# **Problem Solving** Beyond the Classroom



## Problem Solving Beyond the Classroom Primary





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Unit I

#### Addition and Subtraction Within 10 (Heuristics: Systematic Listing)

- 1.1 Part-Whole Model
- 1.2 Comparison Model
- 1.3 Systematic Listing
- 1.4 Put on Your Thinking Caps!

#### Unit 2

#### Shapes & Patterns (Heuristics: Mathematical Investigation with Shapes)

19

27

- 2.1 Making Patterns with Shapes
- 2.2 Mathematical Investigation with Shapes
- 2.3 Put on Your Thinking Caps!

#### Unit 3

#### Addition and Subtraction Within 20 (Heuristics: Look for A Pattern/Numbers)

- 3.1 Part-Whole Model
- 3.2 Draw A Diagram
- 3.3 Put on Your Thinking Caps!

## Unit 4 37

#### Addition and Subtraction Within 40 (Heuristics: Look for A Pattern/ Numbers)

- 4.1 Comparison Model
- 4.2 Look For A Pattern
- 4.3 Put on Your Thinking Caps!

#### Multiplication (Heuristics:Working Backwards)

- 5.1 Part-Whole Model with Multiplication
- 5.2 Working Backwards

Unit 5

5.3 Put on Your Thinking Caps!



48

97

#### Division (Heuristics: Make a Table)

- 6.1 Part-Whole Model with Division
- 6.2 Make A Table
- 6.3 Put on Your Thinking Caps!

### Unit 7 70

#### Addition and Subtraction Within 100 (Heuristics: Mathematical Investigation with Numbers)

- 7.1 Comparison Model With Addition and Subtraction
- 7.2 Mathematical Investigation with Numbers
- 7.3 Put on Your Thinking Caps!

## Unit 8 85

#### Money

#### (Heuristics: Guess and Check)

- 8.1 Part-Whole Model/ Comparison Model
- 8.2 Guess and Check
- 8.3 Put on Your Thinking Caps!

Answer Key



## I.I Part-Whole Model

#### Worked example I

Anne has 5 big stars and 3 small stars. How many stars does Anne have altogether?



### Step 1: Understand the problem How many big stars does Anne have? (5 big stars) How many small stars does Anne have? (3 small stars) What do you want to find? (Total number of the stars)

#### Step 2: Decide on an approach Draw a 'Part-Whole Model'.

Step 3: Solve problem using the selected approach



5 + 3 = 8 Anne has 8 stars altogether.

Step 4: Check the solution 8-5=3

#### Practice 1.1

 There are 6 apples and 4 mangoes in a basket. How many fruits are there in the basket?



There are \_\_\_\_\_\_ fruits in the basket.

There are 10 children in a school bus.
 3 of them alight from the bus.
 How many children are still in the bus?



\_\_\_\_ children are still in the bus.

3. There are 4 glass bottles and 4 plastic bottles in the recycling bin.

How many bottles are there in all?



There are \_\_\_\_\_ bottles in all.

- 4. There are 9 penguins at a zoo.
  - 3 of them are baby penguins.
  - 2 of the adult penguins are male.
  - (a) How many adult penguins are at the zoo?
  - (b) How many female adult penguins are there?



(a) There are \_\_\_\_\_ adult penguins at the zoo.

(b) There are \_\_\_\_\_\_ female adult penguins.

## 1.2 Comparison Model

#### Worked example I

Mary has 8 stickers. Idayu has 3 stickers less than Mary. How many stickers does Idayu have?



Teaching Tip!
Who has less stickers?
(Idayu)
Use shorter bar to

- represent Idayu's stickersUse longer bar to
- represent Mary's stickers

#### Step 1: Represent the data using a model



- Step 2: Write the Math equation 8-3=5
- Step 3: Write the answer statement Idayu has 5 stickers.
- Step 4: Check the solution 8 - 5 = 3 Idayu has 3 stickers less than Mary.

#### Practice 1.2

Peiyi has 9 sticks of satay.
 Evan has 2 sticks of satay less than Peiyi.
 How many sticks of satay does Evan have?





Evan has \_\_\_\_\_\_ sticks of satay.

David buys 8 balloons from the school bookshop.
 Santa buys 5 balloons.
 How many more balloons does David have than Santa?



David has \_\_\_\_\_ more balloons than Santa.

 Grace makes 7 friendship bracelets.
 She makes 2 friendship bracelets more than Nelly. How many friendship bracelets does Nelly make?



## Teaching Tip! Who makes more friendship bracelets?

- Use longer bar to represent this child's friendship bracelets
- Use shorter bar to represent the other child's friendship bracelets

Nelly makes \_\_\_\_\_\_ friendship bracelets.

- \*4. Janet bakes 10 muffins.
  - She bakes 2 chocolate muffins more than raisin muffins.
  - (a) How many raisin muffins does Janet bake?
  - (b) How many chocolate muffins does Janet bake?



@ Teaching Tip!

Which type of muffins does Janet bake more?

- Use longer bar to represent this type of muffins
- Use shorter bar to represent the other type of muffins.

(a) Janet bakes \_\_\_\_\_\_ raisin muffins.

(b) Janet bakes \_\_\_\_\_\_ chocolate muffins.

## **1.3 Systematic Listing**

#### Worked example I

Each shape represents a different number.



What number does each shape represent?

- Step 1: Understand the problem
  - Two numbers add up to 8.
  - The difference between the two numbers is 4.

#### Step 2: Decide on an approach List any two numbers

that add up to 8.

$\bigcirc$	
8	0
7	I
6	2
5	3



#### Step 3: Solve problem using the selected approach

Find the difference between two numbers from the list.

8 - 0 = 8 7 - 1 = 6 6 - 2 = 45 - 3 = 2

From the list, the two numbers that give an answer of 4, when they are subtracted from each other, are 6 and 2.





represents 2

Step 4: **Check the solution** 6 + 2 = 86 - 2 = 4

#### Worked example 2

In a badminton competition, 4 players are left.

In order to find a winner, each player will have to play once with all the other players.

How many games will this take?



#### Step 1: Understand the problem

How many players are left? (4 players are left) How to find a winner? (Each player will have to play once with all the other players) What is the question asking for? (How many games it will take to find a winner)

#### Step 2: Decide on an approach

List out one player with another player systematically.

Step 3: Solve problem using the selected approach Number each player: 1, 2, 3 and 4

First Player	Second Player		
1	2		
L	3 3 games		
1	4		
2	3 ] 2		
2	$4 \int 2 \text{ games}$		
3	4 } I game		

3 + 2 + 1 = 6This will take 6 games.

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#### Practice 1.3

I. Each shape represents a different number.



What number does each shape represent? List any two numbers that add up to 9.

$\bigcirc$

represents \_\_\_\_\_



 Seth has 3 erasers more than Yan Ling.
 Each child has more than 4 erasers but less than 10 erasers.

How many erasers can Seth have?





Seth can have \_\_\_\_\_\_ or \_\_\_\_\_ erasers.

3. Robin and Akilah won some game cards. Each child won less than 10 cards. Akilah won 5 game cards less than Robin. What was the minimum number of game cards that Robin won?





The minimum number of game cards that Robin

won was \_\_\_\_\_.

\*4. Three classmates, Anne, Beatrice and Carlene are taking photos of themselves standing in a row. In how many different ways can they stand?



First position	Second position	Third position
----------------	-----------------	----------------

They can stand in \_\_\_\_\_ different ways.

## Put On Your Thinking Caps!

## I. How Many Outfits?

Qing Qing has 3 T-shirts and 3 skirts, each with a different design and number or letter. Each T-shirt can be worn with any of the skirts. How many different outfits can Qing Qing have?

- a. Cut out the shirts and skirts below.
- b. Put them together to form different outfits.
- c. Complete the following table below to find out your answer.





#### BLANK

## Shapes and Patterns (Heuristics: Mathematical Investigations with Shapes)

2.1 Making Patterns With Shapes

### Worked example I

Which shape comes next?



#### Step 1: Understand the problem

How many different shapes are in the pattern? (3 different shapes) What are the shapes? (triangle, square and circle) Is there a repeated pattern? (yes) (3 different shapes) What are the shapes? (Joink For more information to the following sector My Pals are Here! My (3 different shapes)

For more information, refer to the following section in My Pals are Here! Maths P1 (3rd Edition). • Chapter 5, Lesson 5

Step 2: **Decide on an approach** Look for a pattern. Observe the pattern repeats.

#### Step 3: Solve problem using the selected approach



So, the next shape is  $\triangle$ .

#### Step 4: Check the solution



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#### Worked example 2

How many squares are there in this figure?



Let's shade all the possible squares that we can see in the figure.

1997) 1997)		
	142.55	in present
	1.100	

There are 5 possible squares in this figure.

#### Practice 2.1

Each row of shapes forms a pattern. Draw the missing shapes.



3. Shapes form a pattern in each question. Draw the missing shapes.



4. How many squares are there in this figure?

@ Teaching Tip!
<ul> <li>Highlight the squares of different sizes in the</li> </ul>
given figure

There are \_\_\_\_\_ possible squares in this figure.

## 2.2 Mathematical Investigation with Shapes

#### Worked example I

In Figure 1, there are 4 heart-shapes. In Figure 2, there are 6 heart-shapes. In Figure 3, there are 8 heart-shapes. How many heart-shapes are in Figure 5?





Figure I

Figure 2

Figure 3

#### Step 1: Understand the problem

How many heart-shapes are there in Figure 1? (4)

How many heart-shapes are there in Figure 2? (6)

How many heart-shapes are there in Figure 3? (8)

What do you want to find out?

(The number of heart-shapes in Figure 5)

#### Step 2: Decide on an approach

What is the difference in the number of heart-shapes between Figure 1 and Figure 2? (2) Is there a constant increase of number of heartshapes? (Yes) Is there a pattern that you look for? (Yes, an increase of 2 heart-shapes for the next pattern)

The approach is **'Look For A Pattern'** and draw the next diagram.

## Step 3: Solve problem using the selected approach



Figure 5

Step 4:	Chee				
	lst	2nd	3rd	4th	5th
	4,	6,	8,	10,	12

#### Practice 2.2

 How many squares are needed to build Figure 5? Draw Figure 5 in the box provided.



 How many triangles are needed to build Figure 4? Draw Figure 4 in the box provided.



\_\_\_\_ triangles are needed for Figure 4.

 How many squares are needed to build Figure 4? Draw Figure 4 in the box provided.



\_\_\_\_ squares are needed for Figure 4.

How many squares are needed to build Figure 5?
 Draw Figure 5 in the box provided.



\_ squares are needed for Figure 5.

## Put On Your Thinking Caps! I. Shapely Stickers Terry has 3 stickers of different shapes:

Square Triangle Circle

He has to keep them all on one line. In how many ways can he stick them in his album?

Sketch your solution in the table below.

lst shape	2nd shape	3rd shape

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3.1 Part-Whole Model

### Worked example I

There are 20 strawberries. Lena eats 8 strawberries. How many strawberries are left?

#### Step 1: Understand the problem

How many strawberries are there? (20) How many strawberries does Lena eat? (8) What do you want to find? (The number of strawberries left)

### Step 2: Decide on an approach

Draw a part-whole model.



Step 3: Solve problem using the selected approach 20 - 8 = 12

12 strawberries are left.

Step 4: **Check the solution** 12 + 8 = 20

#### Practice 3.1

There are some storybooks on the shelf.
 9 storybooks belong to Yi Ling.
 8 storybooks belong to Pei Ling.
 How many storybooks are on the shelf?





storybooks are on the shelf.

Glen has 9 fishes in a jar.
 Mother buys 6 fishes for him.
 How many fishes does Glen have now?



Glen has \_\_\_\_\_\_ fishes now.

There are 19 rabbits in an Eco garden.
 12 of them are white rabbits.
 The rest are grey rabbits.
 How many grey rabbits are there?



There are grey r	rabbits.
------------------	----------

- \*4. There are 20 people in a playground.
  6 of them are boys and 8 of them are girls. The rest are adults.
  - (a) How many children are there?
  - (b) How many adults are there?



@ Teaching Tip!

 Three subjects are mentioned in the sum – how many parts must the partwhole model have?

(a) There are \_\_\_\_\_ children.

(b) There are \_\_\_\_\_ adults.
# 3.2 Draw A Diagram

#### Worked example I

Karri sets up a game stall. He wants to arrange 21 boxes in a triangular arrangement. How many boxes will Karri use to make the bottom row of the arrangement?



#### 🛥 Link

For more information, refer to the following section in My Pals are Here! Maths P1 (3rd Edition).

Chapter 6, Lesson |

#### Step 1: Understand the problem

How many box/es are at the 1st row?	(1)
How many boxes are at the 2nd row?	(2)
How many boxes are at the 3rd row?	(3)
How many boxes are at the 4th row?	(4)
How many boxes will Karri use?	(21)

# Step 2: Decide on an approach

Continue to draw a diagram, using 21 boxes.

#### Step 3: Solve problem using the selected approach



# Step 4: Check the solution

I + 2 + 3 + 4 + 5 + 6 = 2I

Karri will use 6 boxes to make the bottom row of the arrangement.

## Practice 3.2

 Aileen is queuing at an ice-cream stall. She is behind 5 children. There are 4 boys and 3 girls behind her. How many children are there in the queue?



@ Teaching Tip! • Draw a simple 'queue' line to determine the individual position of each child.

There are \_\_\_\_\_\_ children in the queue.

 Clinton is taller than Anwar but shorter than Bin Wan. Devi is shorter than Bin Wan but taller than Clinton. Who is the tallest and who is the shortest?

shortest

tallest

is the tallest and \_\_\_\_\_\_ is

the shortest.

Four children have decided to play a card game at a circular table.
 Where does each child sit?

Use these clues to help you to write the children's names on the empty chairs around the table.

- Jeremy, Samy, Vivien and Junaida are playing a card game.
- Junaida is the dealer and deals the first card to her left.
- Samy gets the first card.
- Jeremy, who is sitting across from Samy, wins the game.



\*4. Mrs. Gopal is having a birthday party for Matthew. Mrs. Gopal has 9 people on her invitation list. Matthew has 8 people on his invitation list. Mrs. Gopal has noticed that 5 people from her list are on Matthew's list. How many invitation cards do they need to send out altogether?



Draw a model based on the problem above. Use I square to represent I guest. Colour the squares that represent guests that appear on both lists.

They need to send out \_\_\_\_\_ invitation cards altogether.

# Put On Your Thinking Caps!

## I. Nimble Numbers

Use numbers 1 to 7 and place one number in each square. Move the numbers around until the sum of each of 3 squares joined by a straight line is exactly the same.



- (a) What is the sum of 3 squares in your solution?
- (b) Share your solution with your partner. Record your partner's solution below.





4.1 Comparison Model

## Worked example I

Sue folded 35 paper cranes. She folded 7 paper cranes more than Colin. How many paper cranes did Colin fold?



### Step 1: Understand the problem She folded 7 paper cranes more than Colin. This also means: Colin folded 7 paper cranes less than Sue.

What do you want to find? (The number of paper cranes folded by Colin)

#### Step 2: Decide on an approach Draw a 'Comparison Model'.

#### Step 3: Solve problem using the selected approach



#### Step 4: Check the solution

$$35 - 28 = 7$$

Sue folded 7 paper cranes more than Colin.

#### Practice 4.1

 During school recycling day, Aziz collected 27 empty cans. Samuel collected 5 cans more than Aziz. How many empty cans did Samuel collect?



@ Teaching Tip!
Who collected more
Ans:
Who gets the
longer bar?
Ans:
To find the value of
the longer bar,
we

Samuel collected \_\_\_\_\_\_ empty cans.

There are 14 more cars than vans at a carpark.
 32 cars are at the carpark.
 How many vans are there in the carpark?



@ Teaching Tip!
Are there more cars
or vans?
Ans:
Do cars or vans get the longer bar?
Ans:
To find the value of
the shorter bar,
we

There are \_\_\_\_\_\_ vans in the carpark.

 Keith made 28 clay vases during Art lesson. He made 9 vases less than Jacob. How many clay vases did Jacob make?



Teaching Tip! Who made less clay vases?
Ans:
Who gets the shorter bar?
Ans:
To find the longer bar,
we

Jacob made \_\_\_\_\_ clay vases.

- \*4. Three children collected seashells at the beach Anne and Benny collected a total of 29 seashells. Anne and Cheryl collected a total of 37 seashells.
  - (a) Between Benny and Cheryl, who collected more? How many more?



Ø Tea Which collec	ching Tip! h 2 children ted more?
Ans:	
Which the lo	h 2 children get onger bars?
Ans:	
To fir	d the difference,
we	

\_\_\_\_\_ collected \_\_\_\_\_ more

seashells than \_\_\_\_\_.

(b) Anne collected I more seashell than Benny but 7 less seashells than Cheryl. How many seashells did Anne collect?

#### @ Teaching Tip!

Anne and Benny collected the same number of seashells if we add I seashell to their total.

Anne and Cheryl collected the same number of seashells if we take away 7 from their total.

\_\_\_\_\_-7

+ |

Anne collected \_\_\_\_\_\_ seashells.

# 4.2 Look For A Pattern

#### Worked example I

Find the next three numbers in the following pattern. 2, 4, 7, 11, \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_

# Step 1: Study the numbers given and look for a pattern.

Look at the difference between each pair of numbers.



The difference between each pair of numbers increases by I for every pair.

Step 2:Write out the next<br/>three numbers.Image: Constraint of the section in<br/>11 + 5 = 16<br/>16 + 6 = 22<br/>22 + 7 = 29Image: Constraint of the section in<br/>My Pals are Herel Maths P1<br/>(3rd Edition).<br/>• Chapter 7, Lesson 4

Ζ,	4,	/,	1	Ι,	16,	22,	29,
$\subseteq$	$\sim$ $\sim$	<u> </u>		<u> </u>	/ <u> </u>		_
+	2	+3	+4	+5	+6	+7	

#### Step 3: Write the answer.

The next three numbers are 16, 22 and 29.

#### Practice 4.2

1. Find the next three numbers in each of the following patterns.

(a) 10, 13, 16, 19, 22, \_\_\_\_\_, \_\_\_\_, \_\_\_\_,

(b) I, 6, II, I6, 2I, \_\_\_\_\_, \_\_\_\_, \_\_\_\_,

2. Find the next two numbers in each of the following patterns.

(a) 15, 16, 18, 21, 25, \_\_\_\_\_, \_\_\_\_

(b) I, 2, 5, 10, 17, \_\_\_\_\_, \_\_\_\_

 Find the next three numbers in each of the following patterns.

(a) 3, 5, 9, 15, \_\_\_\_\_, \_\_\_\_, \_\_\_\_

(b) 40, 35, 32, 27, \_\_\_\_\_, \_\_\_\_, \_\_\_\_,

\*4. Candice drew 6 pictures on Monday, 5 pictures on Tuesday, and so on, with 1 picture less the following day. On which day would Candice draw a total of 20 pictures?



Candice would draw a total of 20 pictures on \_\_\_\_\_.

# Put On Your Thinking Caps!

## I. Cool Cakes

Katy prepared 24 cupcakes for her party. She tried different ways to put them on the tray. She always put the same number of cupcakes in each row.



Think of all the different possible arrangements. Record each arrangement on the given grid. Colour each arrangement.

(a) How many different ways are there?

(b) Write a sentence to describe two of these arrangements.

				AU100.0					
P1449 30 14 14 14 14 14 14 14 14 14 14 14 14 14									
				P					
							-		
		-			- manual income	 			
				-					



# Multiplication (Heuristics: Working Backwards)

# 5.1 Part-Whole Model With Multiplication

# Worked example I

Matthias has 3 fish tanks. He puts 8 fish in each fish tank. How many fish does Matthias have altogether?

#### Step 1: Understand the problem

How many fish tanks does Matthias have? (3)

How many fish are there in each fish tank? (8)

What are you trying to find? (Total number of fish in 3 fish tanks)

#### Step 2: Decide on an approach

Draw 3 fish tanks with 8 fish each. Use repeated addition.

Step 3: Solve problem using the selected approach





## Step 4: Check the solution 8 + 8 + 8 = 24 Matthias has 24 fish altogether.



## Practice 5.1

 There are 9 bicycles at the bicycle parking area. How many wheels are there altogether?





There are \_\_\_\_\_\_ wheels altogether.

5 children shared the strawberries in the basket equally.
 Each of them got 6 strawberries.
 How many strawberries were in the basket?

	_	

strawberries were in the basket.

3. There are 5 dogs and 6 chickens in a garden. How many legs are there altogether?



@ Teaching Tip!

- How many legs does a dog have?
- How many legs does a chicken have?

There are \_\_\_\_\_ legs altogether.

\*4. Tracy sets up a stall to sell her home-made ice-cream. On the 1st day, she sold 3 ice-cream cones. On the 2nd day, she sold 6 ice-cream cones. On the 3rd day, she sold 9 ice-cream cones. If she follows this pattern, how many ice-cream cones will she sell on the 7th day?

She will sell \_\_\_\_\_\_ ice-cream cones on the 7th day.

# 5.2 Working Backwards

## Worked example I

Lycia was in her class one day when all of a sudden her classmates started showing signs of stomach pain. At 10.00 am, half of her classmates were sent home. At 11.00 am, half of the remaining classmates were sent home. At 12.00 noon, half of the remaining classmates were sent home.

Lycia, Joo En and Justin were the only 3 left.

How many children were in the class at the beginning of the day?

# Step 1: Understand

**the problem** What happened to the

children in class?

@ Teaching Tip!

 Start working from the end result to find answer.

(They were sent home because they were showing signs of stomach pain)
How many children were sent home at 10.00 am?
(Half of the class)
How many children were sent home at 11.00 am?
(Half of the remaining classmates)
How many children were sent home at 12.00 noon?
(Half of the remaining classmates)
How many children were in the class after 12.00 noon?
(3 children)
What do you want to find?
(The number of children in the class at the beginning of the day)

### Step 2: Decide on an approach

Use a '**Part-whole Model**' to show the number of children present in class at each stage. Work backwards to find the answer.



# Step 3: Solve problem using the selected approach



|2 + |2 = 24

24 children were in the class at the beginning of the day.

#### Step 4: Check the solution

At	10.00 am:	$24 \div 2 = 12$
At	11.00 am:	$12 \div 2 = 6$
At	12.00 noon:	6 ÷ 2 = 3

## Practice 5.2

Maria went shopping at three shops. 1. At the 1st shop, she spent half of her money. At the 2nd shop, she spent half of her remaining money. At the 3rd shop, she spent half of her remaining money. Maria was left with \$5.

How much money did Maria take on her shopping trip?

At the beginning		
lst shop		
	2nd shop	\$5
	3r	d shop

Maria took \_\_\_\_\_\_ on her shopping trip.

 Celine is weighing fruits at a fruit stall using balancing scales.
 She found that one mango weighs the same as 3 apples.
 One apple weighs the same as 2 oranges.
 One orange has the same weight as 6 cherries.
 How many cherries will Celine need to balance one mango?



Celine will need \_\_\_\_\_\_ cherries to balance one mango.

\*3. In a park, there are 3 more women than men. The number of men is 5 less than the number of boys. There are twice as many boys as girls. There are 4 less babies than girls.
2 babies are in the park. How many people are there in the park?



There are \_\_\_\_\_ people in the park.

# Put On Your Thinking Caps!

# I. Triangle Tables

Hui Hui is asked to arrange triangle-shaped tables in a row to form a long dinner table. Each side of the table can seat only one person.



She needs to figure out the number of seats available if she puts different numbers of triangle-shaped tables together.



- (a) If 5 triangle-shaped tables are placed in a row similar to those shown above, how many seats will there be?
- (b) Find out the number of seats available if 10 tables are arranged in a row.

Number of tables	I	2	3	4	5	6	7	8	9	10
Number of Seats	3	4								



# Division (Heuristics: Make a Table)

# 6.1 Part-Whole Model With Division

## Worked example I

There are 12 circles and 8 squares. Kevin separates each shape into 2 groups. How many circles and how many squares are there in each group?

#### Step 1: Understand the problem

How many shapes are there? (2) How many circles are there? (12) How many squares are there? (8) How many groups are needed? (2) Is there an equal number of each shape in the groups? (Yes)

#### Step 2: Decide on an approach

Use diagrams and models.

## Step 3: Solve problem using the selected approach





#### Step 4: Check the solution

6 + 6 = 124 + 4 = 8

There are 6 circles and 4 squares in each group.

#### Practice 6.1

 3 children share 18 muffins equally. How many muffins does each child get?



Each child gets \_\_\_\_\_ muffins.

 The children are arranging plants in the school garden. There are 27 plants altogether. They arrange the plants in 3 rows. How many plants are there in each row?



There are \_\_\_\_\_ plants in each row.

3. Carol sews 32 ribbons on her dolls. There are 4 ribbons on each doll. How many dolls does Carol have?

> @ Teaching Tip! Thinking Mathematically Divide 32 in groups of 4:

Carol has dolls.

\*4. Glen has 8 game cards. He buys 4 game cards every day. How many days does it take him to collect a total of 32 game cards?



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# 6.2 Make A Table

#### Worked example I

Kai Chun starts her savings plan. On the 1st day, she saves 1 coin in her piggy bank.

On the 2nd day, she saves 2 coins.

On the 3rd day, she saves 4 coins.

If Kai Chun continues to double the number of coins she saves from the previous day, how many coins will be put in her piggy bank on the 7th day?

### Step 1: Understand the problem

How much does Kai Chun save on the 1st day?

(1 coin)

(2 coins)

How much does Kai Chun save on the 2nd day?

# Teaching Tip! Make a table

 Organizing data in a table makes answering neat and clear

How much does Kai Chun save on the 3rd day? (4 coins) How does Kai Chun continue her savings plan? (Double the number of coins)

What do you want to find?

(Number of coins to be saved on 7th day)

#### Step 2: Decide on an approach

Make a table to find out the answer.

## Step 3: Solve problem using the selected approach

Day	lst	2nd	3rd	4th	5th	6th	7th
Coins		2	4	8	16	32	64
		+	+2	+4	+8	+16	+32

64 coins will be placed in her piggy bank on the 7th day.

#### Step 4: Check the solution



## Practice 6.2

 Diemen is 18 years old and Lynette is 14 years old. The sum of their ages adds up to 32. How old will Diemen be when the sum of their ages is 56?

 Diemen
 Lynette
 Total

 18
 14
 18 + 14 = 32

Draw a table to find out the answer:

Diemen will be \_\_\_\_\_ years old.

2. Amelia began a breeding programme with her pet rabbits.

In the 1st month there were 4 rabbits. In the 2nd month there were 7 rabbits. In the 3rd month there were 12 rabbits In the 4th month there were 19 rabbits. How many rabbits were there in the 6th month?

Month	lst	2nd	3rd		
Number	4	7	12		

There were \_\_\_\_\_\_ rabbits in the 6th month.

 All of the 39 pupils have to choose a sport to play. They have a choice of badminton, netball and basketball.
 5 more pupils choose badminton than netball, while 5 more pupils choose basketball than badminton. How many pupils choose each sport?

<b>Sport</b> Netball	Number of pupils who choose each sport								
	I								
Badminton	6								
Basketball	11								
Total	18								

\_\_\_\_\_ pupils choose Netball.

\_\_\_\_\_ pupils choose Badminton.

\_\_\_\_\_ pupils choose Basketball.
4. While making a line of 40 cookies, Eric creates the following pattern.

He places chocolate chips on every 3rd cookie and puts cherries on every 5th cookie along the line.

Which cookies are completed with both chocolate chips and cherries?

Chocolate chips	Cherries
	17
	-

\_\_\_\_\_ cookies are completed with chocolate chips and cherries.

# Deut On Your Thinking Caps!

# I. Terrific Tables

You have invited some friends to your party. You are arranging the square tables in a row. Each side of the table can seat only one person.



You need to figure out the number of seats available when you put the square tables together.

2 tables	3 tables	4 tables

- (a) If 5 square tables are placed in a row similar to those as shown above, how many seats will there be?
- (b) Find the number of seats available when 10 tables are arranged in a row.

Number of tables	I	2	3	4	5	6	7	8	9	10
Number of seats	4	6								



7.1 Comparison Model With Addition and Subtraction

### Worked example I

Lisa loves her hairclip collection. She has 20 more red hairclips than blue hairclips. She also has 10 less green hairclips than blue hairclips. Lisa has 15 green hairclips. How many hairclips does Lisa have in all?



### Step 1: Understand the problem How many green hairclips does Lisa have?

(15)

How many more blue than green hairclips does she have?

(10 more)

How many more red hairclips than blue hairclips does she have?

(20 more)

What do you want to find?

(Total number of hairclips)

# Step 2: Decide on an approach Use a 'Comparison Model'.



# Step 3: Solve problem using the selected approach 15 + 10 = 25 (blue hairclips) 25 + 20 = 45 (red hairclips) 15 + 25 + 45 = 85

Lisa has 85 hairclips in all.

# Step 4: **Check the solution** 85 - 45 = 4040 - 25 = 15 (green hairclips)

# Practice 7.1

 There are 50 children in a playground. There are 30 more boys than girls. How many girls are there?



There are \_\_\_\_\_ girls.

- Shafur has 48 rubber bands.
   Amin has 18 fewer rubber bands than Shafur.
   Devi has 12 fewer rubber bands than Amin.
  - (a) How many fewer rubber bands does Devi have than Shafur?

Devi has \_\_\_\_\_\_ fewer rubber bands than Shafur.

(b) How many rubber bands do they have in all?

They have \_\_\_\_\_\_ rubber bands in all.

- \*3. In a box stacking competition, 6 children fared as follows:
  - Ben built his stack 4 boxes lower than Adam's stack.
  - · Cindy built hers 8 boxes higher than Ben's.
  - Derek built with 3 boxes less than Cindy.
  - Eileen built her stack with 6 boxes more than Derek.
  - Fanny stacked 25 boxes, which is 5 boxes more than Eileen's stack.

How many boxes were needed altogether?



Fanny : 25
Eileen :
Derek:
Cindy :
Ben :
Adam :
boxes were needed altogether.

\*4. Sami baked 30 cupcakes.

Janet baked 10 fewer cupcakes than Sami. Wei Ling baked 15 more cupcakes than Sami.

(a) How many fewer cupcakes did Janet bake than Wei Ling?

Janet baked \_\_\_\_\_\_ fewer cupcakes than Wei Ling.

(b) How many cupcakes did the children bake altogether?

The children baked \_\_\_\_\_\_ cupcakes altogether.

# 7.2 Mathematical Investigation with Numbers

### Worked example I

A group of children start to plant trees in a garden.

On day I they plant I tree.

On day 2 they plant 3 trees.

On day 3 they plant 6 trees.

On day 4 they plant 10 trees.

If they continue this way to increase the number of trees planted after each day, how many trees will they plant on day 10?

### Step 1: Understand the problem

How many trees do they plant on day 1? (1 tree) How many trees do they plant on day 2? (3 trees) How many trees do they plant on day 3? (6 trees)

How many trees do they plant on day 4? (10 trees)

What do you want to find?

(Number of trees planted on day 10)

### Step 2: Decide on an approach

Can you see a pattern? (Yes) Form a table to show the pattern.

# Step 3: Solve problem using the selected approach

Make a table to observe the pattern

Day	Number of trees	Pattern
	I	
2	3	1 + 2 = 3
3	6	1 + 2 + 3 = 6
4	10	+ 2 + 3 + 4 = 10
5	15	+ 2 + 3 + 4 + 5 =  5

From the table, we are able to observe the following pattern:

Day I:	I	@ Teaching Tip!
Day 2:	1 + 2 = 3	• Find out the
Day 3:	1 + 2 + 3 = 6	difference in the
Day 4:	1 + 2 + 3 + 4 = 10	number of trees in between every two days.

Hence, Day 10: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55

They will plant 55 trees on day 10.

### Step 4: Check the solution



# Practice 7.2

I. It takes 4 toothpicks to make a square.



It takes 7 toothpicks to make 2 squares.



It takes 10 toothpicks to make 3 squares.



How many toothpicks will it take to make 10 squares?

Number of Squares	Number of toothpicks	Pattern
I	4	
2	7	
3	10	
4	13	

It will take \_\_\_\_\_\_ toothpicks to make 10 squares.

Problem Solving Beyond the Classroom • Primary 1 • 77

2. Some square tiles are used to form the figures as shown below:



How many square tiles are needed to form Figure 6?

Figure	Number of Squares	Pattern
Ι	I	
2	4	5
3	9	
4		

\_ squares are need to form Figure 6.

3. Shaun uses circles to form the figures as shown below:



How many circles does Shaun need to form Figure 8?

Figure	Number of circles	Pattern
I		
2		
3		
4		

Shaun needs \_\_\_\_\_\_ circles to form Figure 8.

# Put On Your Thinking Caps!

# I. Making Shapes

Cut out 12 equal squares from a piece of paper. Each side of the square is 1 unit long. The distance around the tile is 4 units.



(a) Use your square cut-outs to make a shape with a distance of 12 units.

Record and colour your shape on the grid papers on the next 2 pages.

How many squares do you need?

(b) How many possible shapes of 12 units can you find?



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# 8.1 Part-Whole Model / Comparison Model

# Worked example I

Three sisters paid \$60 for a present for their mother's birthday. The eldest sister paid \$10 more than the second sister. The second sister paid \$10 more than the youngest sister. How much did the youngest sister pay for the present?



# Step 1: Understand the problem How much did the present cost? (\$60)Who paid the most amount of money? (The eldest sister) Who paid the least amount of money? (The youngest sister) How much more money did the second sister pay than the youngest sister? (\$10)How much more money did the eldest sister pay than the second sister? (\$10)How much more money did the eldest sister pay than the youngest sister? (\$20)What do you want to find? (The amount paid by youngest sister)

### Step 2: Decide on an approach

Draw a '**Comparison Model**'. Draw the least amount first.

# Step 3: Solve problem using the selected approach



\$60 - \$10 - \$20 = \$30
\$30 ÷ 3 = \$10
The youngest sister paid \$10 for the present.

### Step 4: Check the solution

Youngest sister:	\$10
Second sister:	\$10 + \$10 = \$20
Eldest sister:	\$20 + \$10 = \$30

Total = \$10 + \$20 + \$30 = \$60

## Practice 8.1

 Vicky paid \$48 for a board game and \$25 for a doll. She still had \$27 left. How much did Vicky have at first?

Vicky had \_\_\_\_\_ at first.

The cash register shows \$32.
 Keith gives the cashier one \$5 note and three \$10 notes.
 How much change will Keith get?





Keith will get \_\_\_\_\_ change.

3. Julie paid \$45 for a watch and \$8 less for a purse. How much did Julie pay altogether?



Julie paid \_\_\_\_\_\_ altogether.

\*4. Lydia has 10 notes. One of them is a \$50 note.
She has no \$5 note.
The notes make up \$100.
How many \$50, \$10 and \$2 notes does Lydia have?

Write the value of the notes in the boxes provided.



\$100

Lydia has \_\_\_\_\_\_ \$50 note, \_\_\_\_\_ \$10

notes and \_\_\_\_\_\_\$2 notes.

# 8.2 Guess and Check

### Worked example I

At a café, there are 3-legged stools and 4-legged stools for customers to sit on.Vincent counts 15 stools with a total of 50 legs altogether. How many 3-legged stools are there in the café?

#### Step 1: Understand @ Teaching Tip! the problem **Guess & check** What types of stools are Make a guess at the café? Check against the problem Repeat process until (3-legged stools and answer is found 4-legged stools) How many stools did Vincent count? (15 stools) How many legs of the stools are there altogether?

(50 legs) What do you want to find? (The number of 3-legged stools)

### Step 2: Decide on an approach

Use Guess and check strategy.

Step 3: Solve problem using the selected approach Using 'Guess & check', the total number of the stools must always be the given number which is 15.

3-legged stools	4-legged stools	Total number of legs	Check
<b>8</b> × 3 = 24	7 x 4 = 28	24 + 28 = 52	×
<b>9</b> × 3 = 27	6 x 4 = 24	27 + 24 = 51	×
<b>IO</b> × 3 = 30	5 x 4 = 20	30 + 20 = 50	$\checkmark$

There are 10 3-legged stools.

### Step 4: Check the solution

3-legged stools:	$3 \times 10 = 30$
	50 - 30 = 20
4-legged stools:	20 ÷ 4 = 5
Total:	10 + 5 = 15 stools

### Practice 8.2

 Carrie bakes 80 cupcakes. She wants to split them between her friends, Christine and Dolly, making sure that Christine receives exactly 12 more than Dolly. How many cupcakes does Dolly get?

Dolly	Christine (add 12)	Total number	Check

Dolly gets \_\_\_\_\_ cupcakes.

 Imax collects local and foreign stamps. He has 90 stamps in his collection, with 26 more foreign stamps then local stamps. How many foreign stamps does Imax collect?

Foreign stamps	Local stamps (subtract 26)	Total number	Check

Imax collects \_\_\_\_\_\_ foreign stamps.

 A baker bakes 100 tarts and cream puffs each day. He bakes 18 more tarts than cream puffs. How many of each type does he bake?

Cream	Tarts	Total	Check
puffs	(add 18)	number	

He bakes	cream puffs and
tarts.	

\*4. Devi sold small pouches at \$2 each and large pouches at \$3 each.

She sold 15 pouches and collected a total of \$36.

How many large pouches did Devi sell?

Large pouches (\$3 each)	Small pouches (\$2 each)	Total number	Check

Devi sold \_\_\_\_\_ large pouches.



# I. Cheeky Chocolate

Glen makes 5 squares using 16 chocolate bars as shown below.



He wants to reduce the number of squares from 5 to 4 by moving only 2 chocolate bars.

The chocolate bars cannot overlap one another or be removed.

Can you help Glen?

You can use 16 straws or pencils of the same length to help you figure out the answer.

Show your result by sketching in the space below.

# **Answer Key**

Unit 1

#### Practice 1.1





There are 10 fruits in the basket.



10 - 3 = 77 children are still in the bus.



4 + 4 = 8There are 8 bottles in all.



9 - 3 = 6(a) There are 6 adult penguins.



- 6 2 = 4
- (b) There are 4 female adult penguins.

#### Practice 1.2



9-2=7Evan has 7 sticks of satay.



8-5=3David has 3 balloons more than Santa.



7 - 2 = 5Nelly makes 5 friendship bracelets.

4. Chocolate

Raisin



10 - 2 = 8Find number bond of 8



(a) Janet bakes 4 raisin muffins.

(b) Janet bakes 6 chocolate muffins.

#### Practice 1.3

•		$\bigcirc$
-	9	0
	8	1
	7	2
	6	3
	5	4

6 - 3 = 3



**2.**  $\frac{\text{Yan Ling}}{5 + 3} = 8$ 6 + 3 = 9

Seth can have 8 or 9 erasers.

3.	Rob	in			Akilah
	9	-	5	=	4
	8		5	=	3
	7	-	5	=	2
	6	_	5	=	1

The minimum number of game cards that Robin won was 6.

•	First	Second position	Third position
ſ	A	В	С
T	A	С	В
ſ	В	A	С
Ī	В	C	A
T	С	A	В
T	С	В	A

Anne = A Beatrice = B Carlene = C

They can stand in 6 different ways.

#### Put On Your Thinking Caps!

I. How Many Outfits?

T-shirt	1	1	1	2	2	2	3	3	3
Skirt	a	Ь	с	a	b	С	a	b	С

(3 x 3 = 9 outfits) Qing Qing can make 9 different outfits.

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### Unit 2

#### Practice 2.1





**3.** (a)



(b) The shaded squares move l step to the right each time and back to the extreme left after reaching the extreme right.



4.

9 squares

	·····
4 squares	L square
T squares	1 oquar o

| + 4 + 9 = |4|

There are 14 possible squares in this figure.

### Practice 2.2



9 squares are needed to build Figure 5.



16 triangles are needed for Figure 4.



13 squares are needed for Figure 4.



| + 2 + 3 + 4 + 5 + 6 = 2121 squares are needed for Figure 5. Put On Your Thinking Caps!

I. Shapely Stickers



 $(3 \times 2 \times 1 = 6 \text{ ways})$ There are 6 posible ways.

### Unit 3

#### Practice 3.1



9 + 8 = 17 17 storybooks are on the shelf.



white

19 - 12 = 7

grey

There are 7 grey rabbits.



6 + 8 = 14

(a) There are 14 children.

20 - 14 = 6 (b) There are 6 adults.

#### Practice 3.2





9 + 3 = 12 They need to send out 12 invitation cards altogether.

### Put On Your Thinking Caps!

I. Nimble Numbers

There are several ways to show a solution.





### Unit 4

Practice 4.1



27 + 5 = 32Samuel collected 32 empty cans.







20

28 + 9 = 37 Jacob made 37 clay vases.

4. (a)

Anne	Benny	
Anne	Cher	ryl

#### 37 - 29 = 8

Cheryl collected 8 more seashells than Benny.



Anne collected 15 seashells.

#### Practice 4.2

(a) 25, 28, 31 (22 + 3 = 25, 25 + 3 = 28, 28 + 3 = 31)
(b) 26, 31, 36 (21 + 5 = 26, 26 + 5 = 31, 31 + 5 = 36)

- 2. (a)
  30, 36
  (Pattern: ,+ 1, + 2, + 3, + 4, + 5, + 6)
  (25 + 5 = 30, 30 + 6 = 36)
  - (b) 26, 37 (Pattern:, + 1, + 3, + 5, + 7, + 9, + 11) (17 + 9 = 26, 26 + 11 = 37)
- 3. (a)
  23, 33, 45
  (Pattern:, + 2, + 4, + 6, + 8, + 10, + 12)
  (15 + 8 = 23, 23 + 10 = 33, 33 + 12 = 45)

### (b)

- 24, 19, 16 (Pattern:, - 5, - 3, - 5, - 3, - 5, - 3) (27 - 3 = 24, 24 - 5 = 19, 19 - 3 = 16)
- 4. Mon Tue Wed Thu Fri 6+ 5+ 4+ 3+ 2 = 20

Candice would draw a total of 20 pictures on Friday.

#### Put On Your Thinking Caps!

- I. Cool cakes
  - (a) These are 8 different ways.
  - (b) 24 rows of I cupcake each;
    I row of 24 cupcakes each;
    I2 rows of 2 cupcakes each;
    2 rows of 12 cupcakes each;
    8 rows of 3 cupcakes each;
    3 rows of 8 cupcakes each;
    6 rows of 4 cupcakes each;
    4 rows of 6 cupcakes each
    (any two)

Unit 5

#### Practice 5.1



 $2 \times 9 = 18$ There are 18 wheels altogether.

- 2. ?
  - $5 \times 6 = 30$

30 strawberries were in the basket.







She will sell 21 ice-cream cones on the 7th day.

### Practice 5.2

I. At the beginning

\$20	\$20				
l st shop	\$10	\$	10		
	2nd shop	\$5	\$5		

3rd shop

\$20 + \$20 = \$40 Maria took \$40 on her shopping trip.

2. | apple → 6 + 6 = 12 cherries' | mango → 12 + 12 + 12 = 36 cherries

Celine will need 36 cherries to balance one mango.



Total = 3 + 5 + 7 + 9 + 11 = 35 Shun Wan saved 35 coins in five days.





### Put On Your Thinking Caps!

- I. Triangle Tables
  - (a) 7 seats
  - (b) 12 seats

Number of tables	1	2	3	4	5	6	7	8	9	10
Number of seats	3	4	5	6	7	8	9	10	11	12

### Unit 6

#### Practice 6.1







 $27 \div 3 = 9$ There are 9 plants in each row.











? days

 $24 \div 4 = 6$ It takes him 6 days to collect a total of 24 cards.

### Practice 6.2

١.	Diemen	Lynette	Total		
	18	14	18 + 14 = 32		
	18 + 4 = 22	14 + 4 = 18	22 + 18 = 40		
	18 + 8 = 26	14 + 8 = 22	26 + 22 = 48		
	18 + 12 = 30	14 + 12 = 26	30 + 26 = 56		

Diemen will be 30 years old.

 Month
 Ist
 2<sup>nd</sup>
 3<sup>rd</sup>
 4<sup>th</sup>
 5<sup>th</sup>
 6<sup>th</sup>

 Number
 4
 7
 12
 19
 28
 39

 +3
 +5
 +7
 +9
 +1
 1

There were 39 rabbits in the 6th month.

Sport	Number of pupils who choose each sport							
Netball	1	2	3	4	5	6	7	8
Badminton	6	7	8	9	10	11	12	13
Basketbal	11	12	13	14	15	16	17	18
Total	18	21	24	27	30	33	36	39

Netball – 8; Badminton – 13; Basketball – 18

chocolate chips	cherries
3	5
6	10
9	15
12	20
15	25
18	30
21	35
24	40
27	
30	
33	
36	
39	

The 15th and 30th cookies are completed with both chocolate chips and cherries.

### Put On Your Thinking Caps!

I. Terrific Tables

Number of tables	I	2	3	4	5	6	7	8	9	10
Number of seats	4	6	8	10	12	14	16	18	20	22

- (a) 12 seats
- (b) 22 seats

### Unit 7

#### Practice 7.1



$$50 - 30 = 20 \longrightarrow 2$$
 units  
 $20 \div 2 = 10 \longrightarrow 1$  unit  
There are 10 girls.



- (a) Devi has 30 fewer rubber bands than Shafur.

Amin  $\longrightarrow$  48 - 18 = 30 Devi  $\longrightarrow$  30 - 12 = 18 Total  $\longrightarrow$  48 + 30 + 18 = 96

(b) They have 96 rubber bands.

3. Fanny: 25
Eileen: 25 - 5 = 20
Derek: 20 - 6 = 14
Cindy: 14 + 3 = 17
Ben: 17 - 8 = 9
Adam: 9 + 4 = 13

Total:

25 + 20 + 14 + 17 + 9 + 13 = 98 98 boxes were needed altogether.





(a) Janet baked 25 fewer cupcakes than Wei Ling.

Janet  $\longrightarrow$  30 - 10 = 20 Wei Ling  $\longrightarrow$  30 + 15 = 45 Total  $\longrightarrow$  30 + 20 + 45 = 95

(b) The children baked 95 cupcakes altogether.

#### Practice 7.2

۱.	Number of squares	Number of toothpicks	Pattern
	1.	4	1 + 3 = 4
	2	7	I + 3 + 3 = 7 (add 2 times of 3)
	3	10	1 + 3 + 3 + 3 = 10 (add 3 times of 3)
	4	13	1 + 3 + 3 + 3 + 3 = 13 (add 4 times of 3)

For 10 squares:

 $3 \times 10 = 30$ 

$$| + 30 = 3|$$

It will take 31 toothpicks to make 10 squares.

2.	Figure	Number of squares	Pattern
	1		x   =
Ĩ	2	4	$2 \times 2 = 4$
Ī	3	9	3 × 3 = 9
Ī	4	16	$4 \times 4 = 16$

For Figure 6: 6 x 6 = 36 (Or 6 + 6 + 6 + 6 + 6 = 36) 36 squares are needed to form Figure 6.
3.	Squares	Number of arrows	Pattern
		4	$  \times 4 = 4$
	2	8	2 × 4 = 8
	3	12	$3 \times 4 = 12$
	4	16	$4 \times 4 = 16$

# For Figure 10: $10 \times 4 = 40$ Hairu uses 40 arrows to form Figure 10.

<b>1</b> . [	Figure	Number of circles	Pattern
T	- 1	1	I
t	2	5	1 + 4 = 5
t	3	9	1 + 4 + 4 = 9
	4	14	1 + 4 + 4 + 4 = 13

For Figure 8: 1 + 4 + 4 + 4 + 4 + 4 + 4 + 4 = 29  $Or 4 \times 7 = 28$ 1 + 28 = 29Shaun needs 29 circles to form Figure 8.

### Put On Your Thinking Caps!

- I. Making shapes
  - Answers will vary. (a) Accept all shapes with a distance of 12 units. Possible answers are: 3, 4, 5, 6, 7, 8 and 9 tiles.

7 possible shapes. (b)



5 tiles







## Unit 8

ł

## Practice 8.1

•	\$48	\$25	\$27

\$48 + \$25 + \$27= \$100 Vicky had \$100 at first.

#### **2.** 5 + 10 + 10 + 10 = 35





35 - 32 = 3Keith will get \$3 change.

?

Watch
Purse

\$45

\$45 - \$8 = \$37 \$45 + \$37 = \$82 Julie paid \$82 altogether.

4. 1 × \$50 = \$50 5 × \$2 = \$10

 $4 \times \$10 = \$40$ 

Lydia has 1 \$50 note, 4 \$10 notes and 5 \$2 notes.

## Practice 8.2

۱.	Dolly	Christine (add 12)	Total number	Check
	30	30 + 12 = 42	30 + 42 = 72	×
	32	32 + 12 = 44	32 + 44 = 76	×
	34	34 + 12 = 46	34 + 46 = 80	$\checkmark$

Dolly gets 34 cupcakes

2.	Foreign stamps	Local stamps (subtract 26)	Total number	Check
	50	50 - 26 = 24	50 + 24 = 74	×
	55	55 - 26 = 29	55 + 29 = 84	×
	57	57 – 26 = 3	57 + 31 = 88	×
	58	58 - 26 = 32	58 + 32 = 90	$\checkmark$

Imax collects 58 foreign stamps

3.	Cream puffs	Tarts (add 18)	Total number	Check
	35	35 + 18 = 53	35 + 53 = 88	×
	40	40 + 18 = 58	40 + 58 = 98	×
	41	41 + 18 = 59	4 I + 59 = 100	~

He bakes 41 cream puffs and 59 tarts.

 The total number of small pouches and large pouches must always be 15.

Large pouches (\$3 each)	Small pouches (\$2 each)	Total amount	Check
\$3 × 8 = \$24	\$2 × 7 = \$14	\$24 + \$14 = \$38	×
\$3 × 7 = \$21	\$2 × 8 = \$16	\$21 + \$16 = \$37	×
\$3 x 6 = \$18	\$2 x 9 = \$18	\$18 + \$18 = \$36	$\checkmark$

Devi sold 6 large pouches.

## Put On Your Thinking Caps!

I. Cheeky Chocolate





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