

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# **scaffolding for Getting Started** Page 1

STUDENT BOOK PAGES 3-4

Ami, Brandon, and Justine are collecting pennies.

Their goal is to collect 100 pennies each.

They are using a 100 chart to keep track of their progress.

**? How many more pennies does each student need to collect to reach the goal of 100 pennies?**

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

72 Ami

65 Brandon

40 Justine

A. Brandon counts from 65: 75, 85, 95, 96, 97, 98, 99, 100.

How does this show you that he needs  $3 \times 10 + 5$  pennies?

How many jumps of 10 is he making? \_\_\_\_\_

How many jumps of 1 is he making? \_\_\_\_\_

How does this show you that Brandon needs  $3 \times 10 + 5$ ?

\_\_\_\_\_  
\_\_\_\_\_

# Scaffolding for Getting Started

Page 2

STUDENT BOOK PAGES 3-4

- B.** Use the 100 chart to figure out how many more pennies Ami needs to reach 100 pennies. Show how you counted.

\_\_\_\_\_

- C.** Which student can use the equation below to solve the problem?  
How do you know?

$$65 + \square = 100$$

\_\_\_\_\_

\_\_\_\_\_

- D.** Write an equation with a missing number to figure out how many more pennies Justine needs.

How many pennies does Justine have? \_\_\_\_\_

How many pennies is she trying to get? \_\_\_\_\_

Write an equation like the one in Part C. \_\_\_\_\_

- E.** Ami calculated  $100 - 72$  to solve  $72 + \square = 100$ .  
Why do you think she did this?

\_\_\_\_\_

\_\_\_\_\_

- F.** How many more pennies does each student need to reach the goal of 100 pennies?

Ami: \_\_\_\_\_

Brandon: \_\_\_\_\_

Justine: \_\_\_\_\_

# 1.1 Modelling Patterns Page 1

Student Book pages 4–6

## Checking

1. A rectangular table seats 6 people.

There is room for 2 chairs on each side and 1 chair at each end.

Jay joined some of these tables in a row.

### You will need

- square tiles



- counters



- a) Complete the sketches below. Show the number of chairs that fit around 2 tables in a row and 3 tables in a row.



1 table  
6 chairs



\_\_\_\_\_ tables  
\_\_\_\_\_ chairs



\_\_\_\_\_ tables  
\_\_\_\_\_ chairs

- b) Write the number of chairs as a number pattern: 6, \_\_\_\_\_, \_\_\_\_\_, ...

Jay can add \_\_\_\_\_ more chairs each time he adds 1 table.

Complete the table.

Number of tables	1	2	3	4	5	6	7	8	9	10
Number of chairs	6	10								

+4 + \_\_\_\_\_ + \_\_\_\_\_

How many chairs will fit around 10 tables joined in a row? \_\_\_\_\_ chairs

- c) Write the pattern rule for the number of chairs at these tables.

\_\_\_\_\_

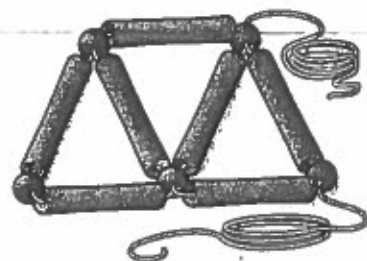
# 1.1 Modelling Patterns Page 2

## Practising

3. Savannah is making a bracelet using long beads and round beads.

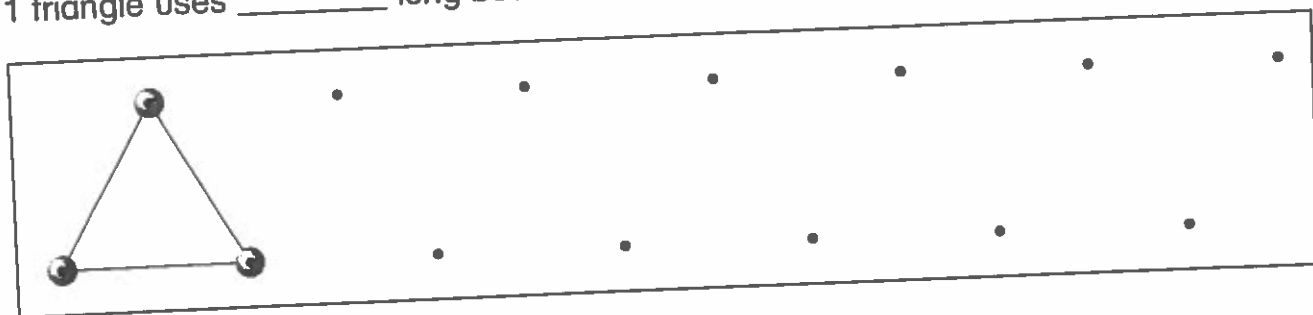
Make a model of Savannah's design.

Use triangle dot paper.



**Step 1:** The first triangle has been drawn.

1 triangle uses \_\_\_\_\_ long beads and \_\_\_\_\_ round beads.



**Step 2:** Draw the beads needed to make the next triangle.

The triangles will be connected.

2 triangles use \_\_\_\_\_ long beads and \_\_\_\_\_ round beads.

**Step 3:** Add more triangles to the bracelet, 1 at a time.

You added \_\_\_\_\_ long beads and \_\_\_\_\_ round bead each time.

Complete the table.

Number of triangles	1	2	3	4	5	6	7	8	9	10
Number of long beads	3	5								
Number of round beads	3	4								

a) A bracelet with 15 long beads will have \_\_\_\_\_ triangles.

b) A bracelet with 12 round beads will have \_\_\_\_\_ triangles.

L

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# 1.1 Modelling Patterns Page 1

Student Book pages 4–6

## GOAL

Use models to represent, extend, and make predictions about number patterns.

## You will need

- square tiles
- counters



4 chairs fit around 1 square table.



How many chairs will fit around 10 square tables in a row?

**Step 1:** Use square tiles and counters to model the problem.



1 table

4 chairs



2 tables

\_\_\_\_\_ chairs



\_\_\_\_\_ tables

\_\_\_\_\_ chairs

**Step 2:** Write the **pattern rule** for the number of chairs.

You started with \_\_\_\_\_ chairs around 1 table.

You added \_\_\_\_\_ more chairs each time you added a table.

The pattern rule is "Start at \_\_\_\_\_ and add \_\_\_\_\_ each time."

## pattern rule

A description of how a pattern starts and how it continues

**Step 3:** Extend the pattern for the number of chairs: 4, 6, 8, \_\_\_\_\_, \_\_\_\_\_, ...

Predict how many chairs will fit around 6 tables. \_\_\_\_\_ chairs

Make and then sketch a model to check.


The model has been started for you.



## 1.1 Modelling Patterns Page 2

**Step 4:** Use the pattern rule to extend the pattern to 10 tables.

Number of tables	1	2	3	4	5	6	7	8	9	10
Number of chairs	4	6	8							

  
 $+2 + \underline{\quad} + \underline{\quad}$

How many chairs will fit around 10 square tables in a row? \_\_\_\_\_

### Reflecting

How did your model help you see how many more chairs fit each time?

---



---

How did your model help you check your prediction?

---



---

How did the pattern rule help you extend the pattern?

---



---

How did the number table help you extend the pattern?

---

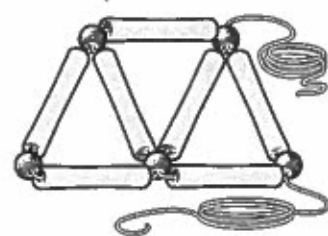


---

# Scaffolding for Lesson 1, Question 3

STUDENT BOOK PAGE 6

3. Savannah is making a bracelet using long blue beads, round red beads, and string.  
Make a model of Savannah's design.



- a) Complete the table to show how the number of long blue beads increases.

Number of triangles	3	4	5	6	7	8	9	10
Number of long blue beads								

How many triangles will be in Savannah's bracelet if she has 15 blue beads? \_\_\_\_\_ triangles

- b) Complete the table to show how the number of round red beads increases.

Number of triangles	3	4	5	6	7	8	9	10
Number of round red beads								

How many triangles can Savannah make with 12 red beads?  
\_\_\_\_\_ triangles

# Chapter 1 Lesson 1

Name: \_\_\_\_\_ Date: \_\_\_\_\_

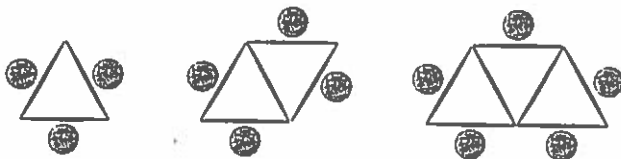
## Modelling Patterns

### GOAL

Use models to represent, extend, and make predictions about number patterns.

You will need toothpicks and pennies.

1. Rebecca made a pattern using toothpicks and pennies. Then she started a number table.



- a) Fill in the shaded cells of Rebecca's number table.

Number of triangles	1	2	3				
Number of toothpicks	3	5					
Number of pennies	3						

- b) Use toothpicks and pennies to extend Rebecca's pattern up to four triangles. Sketch your model.
- c) What is the pattern rule for the number of toothpicks?

What is the pattern rule for the number of pennies?

- d) Predict the number of pennies needed for five triangles.

\_\_\_\_\_ pennies

Make a model to check. Sketch your model.

- e) Extend the pattern for up to seven triangles. Then complete the number table above.

### At-Home Help

A pattern rule is a description of how a pattern starts and how it continues.

For the pattern 2, 6, 10, 14, ..., the pattern rule is "Start at 2 and add 4 each time."



## 1.2 Extending Increasing Patterns Page 1

Student Book pages 8–11

### GOAL

Describe and extend increasing number patterns.

#### Bannock

100 mL	flour
10 mL	baking powder
5 mL	salt
50 mL	butter
	water

Owen needs 5 batches of his bannock recipe.



How much of each ingredient does Owen need to make 5 batches of bannock?

A. Start with baking powder.

Owen needs \_\_\_\_\_ mL of baking powder for 1 batch of bannock.

How much baking powder will he need for 5 batches?

#### Method 1:

Add 10 mL more of baking powder for each batch.

1 batch	10
2 batches	$10 + 10 = 20$
3 batches	$20 + 10 = 30$
4 batches	$30 + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$
5 batches	$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

#### Method 2:

Multiply the number of batches by 10 mL.

1 batch	$1 \times 10 = 10$
2 batches	$2 \times 10 = 20$
3 batches	$3 \times 10 = 30$
4 batches	$4 \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$
5 batches	$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Write the pattern rule for the amount of baking powder in 2 ways.

Method 1: Start with \_\_\_\_\_ and add \_\_\_\_\_ each time.

Method 2: Multiply the number of batches by \_\_\_\_\_.

B. Write the pattern of salt for 5 batches.

5, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Write the pattern rule for the amount of salt.

## 1.2 Extending Increasing Patterns Page 2

C. What are the possible ones digits for amounts of salt? \_\_\_\_\_ or \_\_\_\_\_

Number of batches	1	2	3	4	5
Salt (mL)	5	10			

D. How much of each ingredient is needed to make 5 batches?

Complete the table to show your answer.

Number of batches	Flour (mL)	Baking powder (mL)	Salt (mL)	Butter (mL)
1	100	10	5	50
2	200	20	10	100
3	300	30		
4	400			
5				

### Reflecting

How can you predict the amount of each ingredient needed for 6 batches?

---



---



---



---

How does the table help you see the pattern for the amount of each ingredient?

---



---



---



---


## 1.2 Extending Increasing Patterns Page 1

Student Book pages 8–11

### Checking

1. Look at Jack's recipe.

Jack's Baked Apples	
1	apple
25 mL	brown sugar
10 mL	butter



For 1 apple, you need \_\_\_\_\_ mL of brown sugar and \_\_\_\_\_ mL of butter.

For 2 apples, you need \_\_\_\_\_ mL of brown sugar and \_\_\_\_\_ mL of butter.

For 3 apples, you need \_\_\_\_\_ mL of brown sugar and \_\_\_\_\_ mL of butter.

a) Extend the recipe table for 6 apples.

Number of apples	Brown sugar (mL)	Butter (mL)
1	25	10
2	50	20
3		
4		
5		
6		

b) What does the fifth row of numbers tell you?

---



---

c) Write the pattern rule for each ingredient.

Apples: \_\_\_\_\_

Brown sugar: \_\_\_\_\_

Butter: \_\_\_\_\_

**1.2 Extending Increasing Patterns** Page 2**Practising**

2. Kate's trail mix recipe calls for:

- 250 mL of almonds
- 125 mL of pumpkin seeds
- 50 mL of raisins
- 1 handful of dried apricots

a) Make a table to show 5 times the recipe.

**Step 1:** Write each ingredient at the top of a column.

**Step 2:** Write the amount of each ingredient for 1 batch.

**Step 3:** Extend the table for 5 batches.

Number of batches	Almonds (mL)			
1	250			
2	500			
3				
4				
5				

b) Write the pattern rule for each ingredient.

**Almonds:** \_\_\_\_\_

**Pumpkin seeds:** \_\_\_\_\_

**Raisins:** \_\_\_\_\_

**Dried apricots:** \_\_\_\_\_

c) Look in the table at the pattern in the ones digits for each ingredient.

Will Kate ever use exactly 264 mL of an ingredient? How do you know?

\_\_\_\_\_  
\_\_\_\_\_

# Chapter 1

## Lesson 2

# Extending Increasing Patterns

### GOAL

Describe and extend increasing number patterns.

1. What is a pattern rule for each pattern?

a) 1, 3, 5, 7, ...

Pattern rule: \_\_\_\_\_

b) 5, 10, 15, ...

Pattern rule: \_\_\_\_\_

c) 12, 22, 32, ...

Pattern rule: \_\_\_\_\_

2. Fill in the next three numbers in each pattern.

a) 2, 3, 4, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

b) 20, 25, 30, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

c) 3, 6, 9, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

3. Kate made a table to show the ingredients for chocolate macaroons.

a) Extend Kate's pattern for up to five batches. Fill in the table.

Number of batches	Butter (mL)	Chocolate squares	Coconut (mL)
1	100	5	250
2	200	10	500

b) Write each pattern rule.

Pattern rule for butter: \_\_\_\_\_

Pattern rule for chocolate squares: \_\_\_\_\_

Pattern rule for coconut: \_\_\_\_\_

### At-Home Help

In an increasing number pattern, each number is greater than the number before.

- 10, 11, 12, ... is an increasing number pattern. The pattern rule is "Start at 10 and add 1 each time."
- 50, 100, 150, 200, ... is an increasing number pattern. The pattern rule is "Start at 50 and add 50 each time."



# 1.3 Extending Decreasing Patterns Page 1

Student Book pages 12–14

## GOAL

Describe and extend decreasing number patterns.

Janae's class camping trip is 42 days away.

She created a pattern to show the number of weeks until the trip.

Her pattern is 42, 35, 28, 21, . . .



**How many weeks does Janae have to wait until her camping trip?**

**A.** Why do you think Janae started her pattern at 42?

\_\_\_\_\_

**B.** By how much do the numbers in the pattern decrease each time?

42, 35, 28, 21, . . .  
  
 -7   -   -

The numbers decrease by \_\_\_\_\_ each time.

How can Janae use her pattern to count the number of weeks?

**Hint:** There are 7 days in 1 week.

\_\_\_\_\_

**C.** Janae's pattern rule is "Start at \_\_\_\_\_ and subtract \_\_\_\_\_ each time."

**D.** How many weeks does Janae have to wait until the trip?

**Step 1:** Extend the pattern below until there are 0 days.

**Step 2:** Count the number of weeks.

42, 35, 28, 21, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Number of weeks: 1   2   \_\_\_\_\_

Janae has to wait \_\_\_\_\_ weeks until her class camping trip.

**1.3 Extending Decreasing Patterns** Page 2**Reflecting**

42, 35, 28, 21, ...      27, 20, 13, 6, ...

How are these 2 patterns the same?

**Hint:** By how much do the patterns change each time?

How are these 2 patterns different?

**Hint:** How does each pattern start?

Suppose that Janae's camping trip is 27 days away.

She wants to show the number of weeks until the trip.

Which pattern should she use? \_\_\_\_\_

Explain your choice.



# 1.3 Extending Decreasing Patterns Page 1

Student Book pages 12–14

## Checking

1. There are 56 days until Darren's grandparents come for a visit.

Darren created a pattern to show the number of weeks until they arrive.

Here is how the pattern starts: 56, 49, 42, 35, . . .

a)  $56 - 49 =$  \_\_\_\_\_

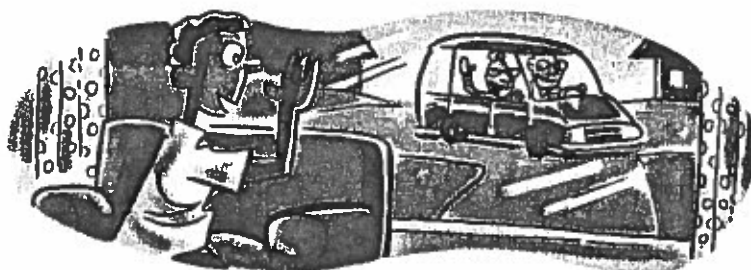
$49 - 42 =$  \_\_\_\_\_

$42 - 35 =$  \_\_\_\_\_

The numbers in Darren's pattern decrease by \_\_\_\_\_ each time.

How many days are there in 1 week? \_\_\_\_\_

Why are the numbers in the pattern decreasing by 7?



b) What is Darren's pattern rule?

c) How many weeks are there until Darren's grandparents come for a visit?

**Step 1:** Extend the pattern below until there are 0 days.

**Step 2:** Count the number of weeks.

56, 49, 42, 35, \_\_\_\_\_

Number of weeks: 1 2 \_\_\_\_\_

There are \_\_\_\_\_ weeks until Darren's grandparents visit.

**1.3 Extending Decreasing Patterns** Page 2**Practising**

2. Shanti had 75¢ in nickels.

She gave a nickel to each of her cousins.

Here is her pattern: 75, 70, 65, 60, 55, ...

a) What is Shanti's pattern rule?

b) Shanti gave away all her nickels. How many cousins does she have?

Extend the pattern until you reach 0, and then count the number of cousins.

75, 70, 65, 60, 55, \_\_\_\_\_

Number of 1 2 \_\_\_\_\_  
cousins:

Shanti has \_\_\_\_\_ cousins.

3. The house numbers on Lakeshore Drive decrease by 4.

The first house is 196.

a) Use the table to show the numbers of the first 8 houses.

House	House number
1st	196
2nd	192
3rd	
4th	
5th	
6th	
7th	
8th	

b) How many houses are on Lakeshore Drive if the number on the last house is 152? Extend the pattern further until you reach 152.

..., 172, 168, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_, ...

152 Lakeshore Drive is the \_\_\_\_\_th house.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Scaffolding for Lesson 3, Question 5

STUDENT BOOK PAGE 14

5. Erin put 4 carrot sticks in each plastic bag. She used the pattern 19, 15, 11, 7, 3 to figure out how many plastic bags she needed.

- a) How does Erin's pattern show 19 divided by 4?

Erin is making groups of \_\_\_\_\_ in each bag.

When she starts, there are \_\_\_\_\_ carrot sticks.

Making groups of \_\_\_\_\_ out of 19 is the same as showing 19 divided by 4.

- b) What does the 3 in the pattern represent?  
19, 15, 11, 7, ③

After Erin makes the first bag, she has  $19 - 4 =$  \_\_\_\_\_ carrots.

Use this information to continue filling in the chart below.  
Start with 19 carrots.

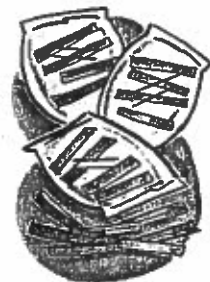
Bag number	Carrots left
After Bag 1	
After Bag 2	
After Bag 3	
After Bag 4	

What does the 3 in the pattern represent?

---

---

- c) How many plastic bags did Erin need? \_\_\_\_\_



Chapter 1  
**Lesson 3**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

# Extending Decreasing Patterns

## GOAL

Describe and extend decreasing number patterns.

1. What is a pattern rule for each pattern?

a) 10, 8, 6, ...

Pattern rule: \_\_\_\_\_

b) 15, 14, 13, ...

Pattern rule: \_\_\_\_\_

c) 90, 85, 80, ...

Pattern rule: \_\_\_\_\_

2. Fill in the next three numbers in each pattern.

a) 77, 76, 75, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

b) 1000, 900, 800, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

c) 24, 20, 16, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

3. Owen is packing his collection of 150 comic books into boxes.

10 comics fit in each box. Owen created a pattern to show the number of boxes he needs. His pattern is 150, 140, 130, ....

a) Why do the numbers in Owen's pattern decrease by 10 each time?

\_\_\_\_\_

b) What is Owen's pattern rule? \_\_\_\_\_

c) How many boxes does Owen need? \_\_\_\_\_ boxes

4. Jay bought 47 jelly beans. Starting the next day, he ate 5 jelly beans every day. How many days did it take for Jay to eat all the jelly beans?

\_\_\_\_\_

\_\_\_\_\_

## At-Home Help

In a decreasing number pattern, each number is less than the number before.

- 50, 40, 30, ... is a decreasing number pattern. The pattern rule is "Start at 50 and subtract 10 each time."
- 20, 18, 16, 14, ... is a decreasing number pattern. The pattern rule is "Start at 20 and subtract 2 each time."

## 1.4 Describing Number Patterns in Games

Student Book page 15

### What number pattern game can you create?

#### Step 1: Types of patterns

Will players create increasing or decreasing patterns?

\_\_\_\_\_

#### Step 2: Creating patterns

Here is an example:

- Roll 1 die to determine the starting number.
- Roll again to determine the increase each time.

How will players create their patterns in your game?

\_\_\_\_\_  
\_\_\_\_\_

#### Step 3: Describing patterns

How will players describe their patterns?

\_\_\_\_\_  
\_\_\_\_\_

#### Step 4: Rules

Here is an example:

- Players place counters on a 100 chart to determine the fifth element in their pattern.
- The player whose pattern has the greatest fifth element wins.

Will you use a 100 chart in your game? \_\_\_\_\_

Describe the rules of your game.

\_\_\_\_\_  
\_\_\_\_\_

#### You will need

- dice
- number cards for 0 to 9
- counters
- a 100 chart



E-B Name: \_\_\_\_\_ Date: \_\_\_\_\_

## 1.4 Describing Number Patterns in Games

Student Book page 15

### GOAL

Describe the patterns in a number pattern game.

Follow the steps to play a number pattern game.

**Step 1:** Toss a coin.

**Heads:** Make increasing patterns.

**Tails:** Make decreasing patterns.

The patterns will be \_\_\_\_\_ patterns.

**Step 2:** Roll 2 dice.

The numbers rolled are the digits in the starting number for your pattern.

The starting number for your pattern is \_\_\_\_\_.

**Step 3:** Roll 1 die.

The number rolled is how much you will add or subtract each time.

You will add or subtract \_\_\_\_\_ each time.

**Step 4:** Write the rule for your pattern.

\_\_\_\_\_

**Step 5:** The third element in your pattern is your score.

Extend your pattern to the third element.

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
Your score is \_\_\_\_\_.

Play this game with 2 or more players.  
The highest score wins.

### You will need

- 2 dice
- a coin



Rebecca tossed Tails. Everyone will make decreasing patterns.



Rebecca's starting number can be 25 or 52.



Rebecca's pattern will be "subtract by 3 each time."

Rebecca's pattern rule is "Start at 52 and subtract 3 each time."

Rebecca's pattern is 52, 49, 46, . . . , so her score is 46.

Chapter 1  
**Lesson 4**

# Describing Number Patterns in Games

## GOAL

Create a number pattern game and describe the patterns.

1. Shanti, Kate, and Mateo are playing a number pattern game on a 100 chart. Shanti moves 2 spaces each turn. Kate moves 5 spaces each turn. Mateo moves 3 spaces each turn. The person who passes 100 first wins the game.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Shanti starts at 10. What number is she on after 3 turns? \_\_\_\_\_
- Kate starts at 2. What number is she on after 3 turns? \_\_\_\_\_
- Mateo starts at 4. What number is he on after 3 turns? \_\_\_\_\_
- Write a pattern rule for each player.

Shanti's pattern rule: \_\_\_\_\_

Kate's pattern rule: \_\_\_\_\_

Mateo's pattern rule: \_\_\_\_\_

- Predict who will win the game. Explain your thinking.

\_\_\_\_\_

- Model the game. Who wins? \_\_\_\_\_

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Mid-Chapter Review—Frequently Asked Questions

STUDENT BOOK PAGE 19

**Q:** How can you extend a pattern?

**A:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Q:** How can you describe increasing and decreasing patterns?

**A:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**1.5 Solving Problems Using Patterns** Page 1

Student Book pages 16–18

**Checking**

2. Use a pairing strategy to calculate  $20 + 30 + 40 + 50 + 60 + 70 + 80$ .

$$20 + 30 + 40 + 50 + 60 + 70 + 80$$

Each pair of numbers shown above adds up to \_\_\_\_\_.

There are \_\_\_\_\_ pairs with this sum in the expression.

So, the sum of the pairs is  $3 \times 100 =$  \_\_\_\_\_.

Which number in the addition sentence is not part of a pair? \_\_\_\_\_

Add this number to  $3 \times 100$  to calculate the sum of the expression. \_\_\_\_\_

**Practising**

3. Tara is piling up firewood.

How many logs are in the pile?

**Make a Plan**

Look for a pattern.

**Carry Out the Plan**

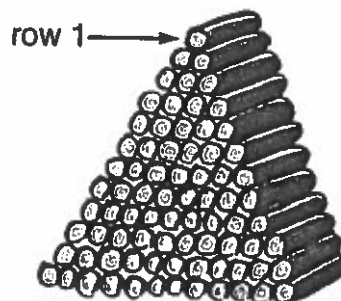
There is 1 log in row 1.

There are \_\_\_\_\_ logs in row 2.

There are \_\_\_\_\_ logs in row 3.

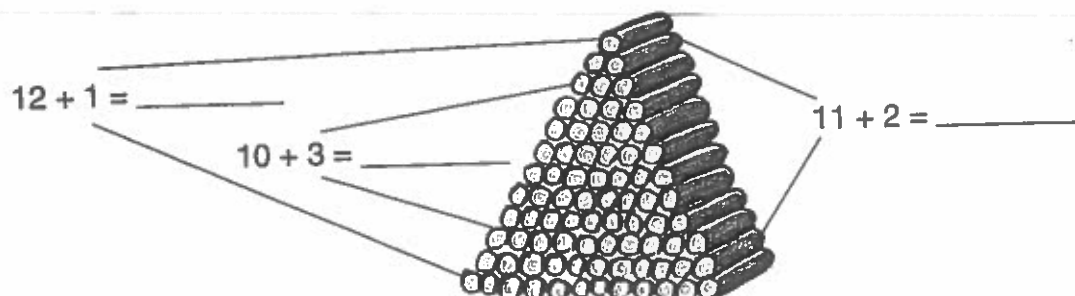
There are \_\_\_\_\_ logs in row 4.

The pattern is 1, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, . . . .



# 1.5 Solving Problems Using Patterns Page 2

Use a pairing strategy to determine the number of logs in the pile.



The other pairs of rows that will have the same number of logs are:

$$9 + \underline{\hspace{2cm}} = 13$$

$$8 + \underline{\hspace{2cm}} = 13$$

$$7 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Each pair has \_\_\_\_\_ logs.

There are \_\_\_\_\_ rows of logs in the pile.

Take half. There are \_\_\_\_\_ pairs of rows.

\_\_\_\_\_ pairs with \_\_\_\_\_ logs in a pair is \_\_\_\_\_ groups of \_\_\_\_\_.

There are \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_ logs in the pile.

7. Use a pattern to add the numbers in this expression.

$$1 + 2 + 3 + 4 + 5 + 6 + \dots + 18 + 19 + 20$$

There are 20 numbers, so there are \_\_\_\_\_ pairs of numbers.

$$1 + 20 = \underline{\hspace{2cm}} \text{ is the value of a pair.}$$

The value of the expression is:

$$\underline{\hspace{2cm}} \text{ (number of pairs)} \times \underline{\hspace{2cm}} \text{ (value of a pair)} = \underline{\hspace{2cm}}.$$

L

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# 1.5 Solving Problems Using Patterns Page 1

Student Book pages 16–18

## GOAL

Identify patterns to solve problems.

Jay is playing with building blocks.

He places the blocks in a stack.



How many blocks are there in this stack?

Solve the problem without counting the blocks.

## Make a Plan

Look for a pattern in the blocks.

## Carry Out the Plan

Count the number of blocks in a few rows to look for a pattern.

The pattern is 2, \_\_\_\_\_, \_\_\_\_\_, ...

This is an increasing pattern.

There is 1 more block in each row as you go down the stack.

Now count the number of blocks in the bottom rows.

The pattern is 7, \_\_\_\_\_, \_\_\_\_\_, ...

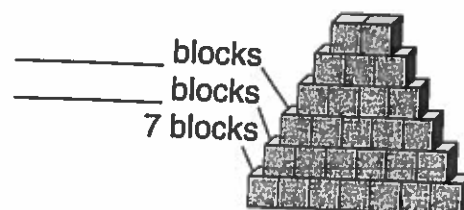
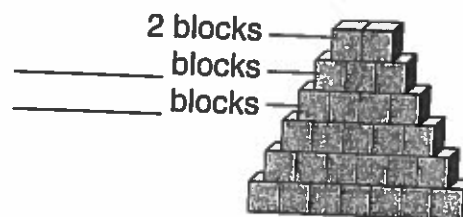
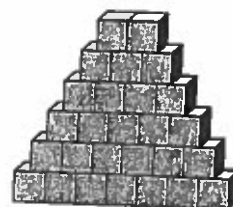
This is a decreasing pattern.

There is 1 less block in each row as you go up the stack.

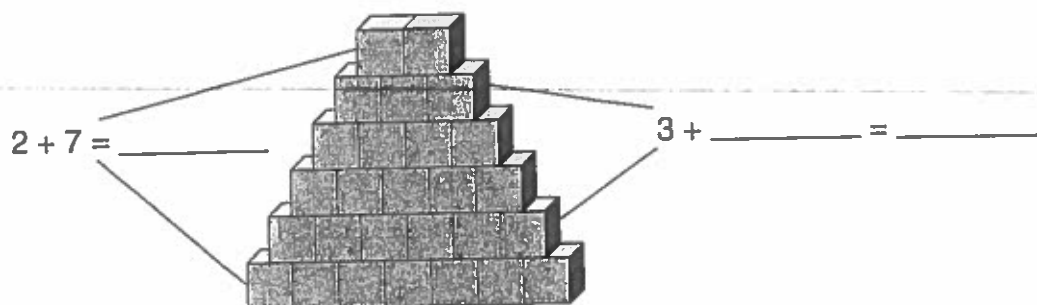
The pattern going down is 1 more each time.

The pattern going up is 1 less each time.

You can add rows from the top and bottom to make pairs of rows that have the same number of blocks.



# 1.5 Solving Problems Using Patterns Page 2



Number of blocks in the middle pair of rows: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

Quick method to determine the number of pairs of rows:

Count the number of rows. \_\_\_\_\_ rows

Take half. \_\_\_\_\_ rows  $\div 2 =$  \_\_\_\_\_ pairs

There are \_\_\_\_\_ pairs of rows. Each pair has \_\_\_\_\_ blocks.

This is 3 groups of 9.

There are \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_ blocks in the stack.

## Reflecting

A stack of blocks has 20 rows.

The top row has 2 blocks and the bottom row has 21 blocks.

Each row has 1 more block than the row before it.

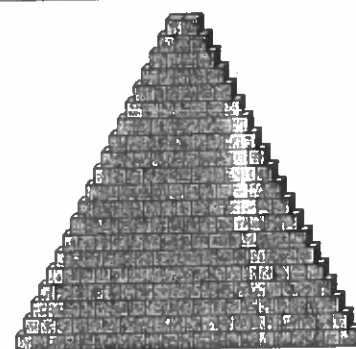
### Jay's Solution:

Half of 20 rows is 10 rows.

There are  $2 + 21 = 23$  blocks in a pair of rows.

So, there are  $10 \times 23 = 230$  blocks.

Explain why Jay's solution is correct.




---

---

---

---

---

# Chapter 1

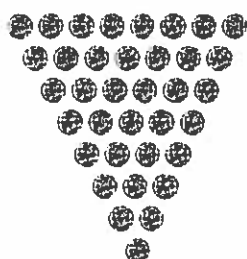
## Lesson 5

# Solving Problems Using Patterns

### GOAL

Identify patterns to solve problems.

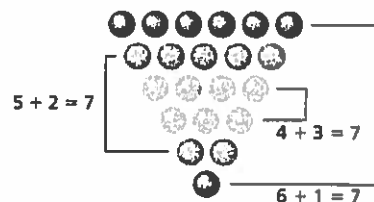
1. Owen is counting his penny collection. He arranged the pennies in a triangle.



- a) What is the sum of the top and bottom rows? \_\_\_\_\_ pennies
- b) How can you use a pattern to count the pennies?  
 \_\_\_\_\_  
 \_\_\_\_\_
- c) How many pennies does Owen have?  
 \_\_\_\_\_

### At-Home Help

You can use patterns to figure out the sum of numbers. How many marbles are there?



The sum of the top and bottom rows is 7.  
 The sum of the second top and bottom rows is 7.  
 The sum of the two middle rows is 7.  
 $7 + 7 + 7 = 21$   
 There are 21 marbles.

2. What is the sum of the numbers in the pattern 2, 4, 6, 8, 10, 12, 14, 16? Sydney calculates  $2 + 16 = 18$ . Use a pattern to finish Sydney's work.
- \_\_\_\_\_
- \_\_\_\_\_

3. Calculate the sum of the numbers in each pattern.

a) 5, 10, 15, 20, 25, 30

Sum: \_\_\_\_\_

b) 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

Sum: \_\_\_\_\_

# Describing Relationships Using Expressions

Chapter 1

## Lesson 6

### GOAL

Use variables in expressions.

1. Brandon is going to visit his grandparents in 7 days from today. He wrote an expression for the date he is leaving:  $t + 7$ .

a) What does the  $t$  represent?

\_\_\_\_\_

b) Why is the number 7 in the expression?

\_\_\_\_\_

2. Write an expression for each student's age. The first one is done for you.

a) Jolie is 5 years older than her brother.

$b + 5$

b) Tyler is 1 year older than his sister. \_\_\_\_\_

c) Beth is 10 years older than her sister. \_\_\_\_\_

d) Matthew is 2 years younger than his brother. \_\_\_\_\_

3. What does each expression mean?

a)  $b + 1$  \_\_\_\_\_

c)  $m - 5$  \_\_\_\_\_

b)  $p + 3$  \_\_\_\_\_

d)  $10 + f$  \_\_\_\_\_

4. Rose has \$15 more than Jon.

a) Write an expression for the amount of money Rose has. Use addition. \_\_\_\_\_

b) Write an expression for the amount of money Jon has. Use subtraction. \_\_\_\_\_

### At-Home Help

A **variable** is a letter or symbol that represents a number.

An **expression** is a phrase that uses operations with numbers and variables.

For example,  $a + 3$  is an expression with the variable " $a$ " in it.

The variable  $a$  represents any number.

The expression  $a + 3$  means 3 more than a number.



**1.6 Describing Relationships Using Expressions** Page 1

Student Book pages 22–25

**Checking**

1. The date of the first Friday in November can be represented by the variable  $f$ .

Write the letter  $f$  on the first Friday in the calendar.

November						
Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

Write an expression using  $f$  for each of the following dates in November.

- a) the first Tuesday

The first Tuesday is \_\_\_\_\_ days before the first Friday.

Write an expression for the date of the first Tuesday.  $f -$  \_\_\_\_\_

- b) the first Saturday

The first Saturday is \_\_\_\_\_ day after the first Friday.

Write an expression for the date of the first Saturday.  $f +$  \_\_\_\_\_

- c) the second Friday

The second Friday is \_\_\_\_\_ days \_\_\_\_\_ the first Friday.

Write an expression for the date of the second Friday. \_\_\_\_\_

- d) the third Friday

Write an expression for the date of the third Friday. \_\_\_\_\_

## 1.6 Describing Relationships Using Expressions Page 2

### Practising

6. Allison is 3 years older than Jack.

- a) Write 2 expressions to compare Allison's age with Jack's age.

Use addition in one expression and subtraction in the other expression.

#### First expression:

Choose a variable to represent Jack's age. \_\_\_\_\_

Allison is \_\_\_\_\_ years \_\_\_\_\_ than Jack.

Write an expression to represent Allison's age. \_\_\_\_\_

#### Second expression:

Choose a variable to represent Allison's age. \_\_\_\_\_

If Allison is 3 years older than Jack, then Jack is \_\_\_\_\_ years \_\_\_\_\_ than Allison.

Write an expression to represent Jack's age. \_\_\_\_\_

- b) The same expressions can be used to compare the ages of Allison's parents.  
Write your expressions from part a) below.

\_\_\_\_\_

One of the variables above represents Allison's mother's age.

The other variable represents Allison's father's age.

Compare the parents' ages.

One parent is \_\_\_\_\_ years \_\_\_\_\_ than the other parent.

The other parent is \_\_\_\_\_ years \_\_\_\_\_ than the other parent.





L Name: \_\_\_\_\_ Date: \_\_\_\_\_

## 1.7 Using Equations to Solve Problems Page 1

Student Book pages 26–29

### GOAL

Use **equations** to represent and solve problems.

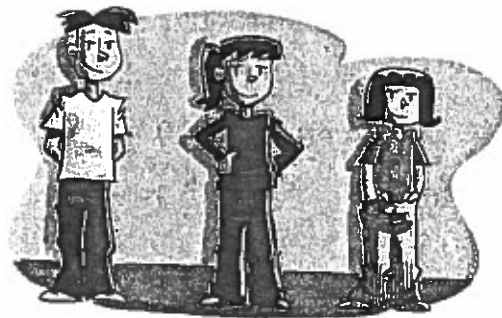
Brendan is 5 years older than Clara.

Brendan is 15 years old.

 How old is Clara?

Brendan's age: \_\_\_\_\_ years old

Brendan's age: \_\_\_\_\_ years older than Clara



You do not know Clara's age.

Use the variable  $c$  to represent Clara's age.

Write an expression that represents Brendan's age.

$c + \underline{\hspace{2cm}}$

Now, write an equation using  $c + \underline{\hspace{2cm}}$  and 15.

**Brendan's age**                      **Brendan's age**

$c + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

To **solve the equation**, you need to figure out the value of  $c$ .

What number can be added to 5 to get 15?

Find out by subtracting 5 from 15.

$15 - 5 = \underline{\hspace{2cm}}$ , so  $c = \underline{\hspace{2cm}}$ .

Check:  $\underline{\hspace{2cm}} + 5 = 15$

Clara is  $\underline{\hspace{2cm}}$  years old.

### equation

A mathematical sentence in which the value on the left side is the same as the value on the right side

### solve the equation

Figure out the value of the missing number in the equation

## 1.7 Using Equations to Solve Problems Page 1

Student Book pages 26–29

### Checking

1. a) A Kodiak bear is 120 cm taller than a black bear.

The Kodiak bear is 305 cm tall.

How tall is the black bear?

Let  $b$  represent the black bear's height.

**Kodiak's height**

120 cm taller than a black bear

or 120 cm taller than  $b$

or  $b + \underline{\hspace{2cm}}$

**Kodiak's height**

305 cm

Write an equation:  $b + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Solve the equation.

The black bear is  $\underline{\hspace{2cm}}$  cm tall.

- b) A grizzly bear is 95 cm shorter than a Kodiak bear.

The Kodiak bear is 305 cm tall.

How tall is the grizzly bear?

**Kodiak's height**

95 cm  $\underline{\hspace{2cm}}$  than a grizzly

**Kodiak's height**

305 cm

Choose a variable to represent the grizzly bear's height.

Write an equation:  $\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Solve the equation.

The grizzly bear is  $\underline{\hspace{2cm}}$  cm tall.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Scaffolding for Lesson 7, Question 8

STUDENT BOOK PAGE 29

8. Sarah is 6 years older than Louis.  
Louis is 13 years old.  
Sarah is 3 years younger than Isaac.

a) Which statement in the problem compares Sarah's age with Louis's age?

\_\_\_\_\_

Write an equation to compare Sarah's age with Louis's age.

\_\_\_\_\_

b) How old is Sarah? \_\_\_\_\_

c) Write an equation to compare Sarah's age with Isaac's age.

Which statement in the problem compares Sarah's age to Isaac's age?

\_\_\_\_\_

Write the equation. \_\_\_\_\_

d) How old is Isaac? \_\_\_\_\_

Chapter 1  
**Lesson 7**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

# Using Equations to Solve Problems

**GOAL**

Use equations to represent and solve problems.

1. Solve each equation. Check your answer.

a)  $p + 2 = 3$  \_\_\_\_\_

Check: \_\_\_\_\_

b)  $b + 5 = 8$  \_\_\_\_\_

Check: \_\_\_\_\_

c)  $s - 1 = 4$  \_\_\_\_\_

Check: \_\_\_\_\_

d)  $4 + m = 10$  \_\_\_\_\_

Check: \_\_\_\_\_

2. Matthew is 3 years older than his brother.

a) Write an expression for Matthew's age. \_\_\_\_\_

b) Matthew is 10 years old. Write an equation that compares Matthew's age with his brother's age. \_\_\_\_\_

c) Solve the equation to calculate the age of Matthew's brother.

**At-Home Help**

An **equation** is a mathematical sentence in which the value on the left side is the same as the value on the right side.

To solve an equation like  $a + 3 = 5$ , you need to figure out the value of the variable. The equation says that 3 more than a number is 5, so the number must be 2.

You can also subtract 3 from 5 to calculate the value of  $a$ .

$5 - 3 = 2$ , so  $a = 2$

Check:  $2 + 3 = 5$

3. Justine has some money. Her mother gave her \$4 more. Now Justine has \$16.

How much money did Justine start with?

Use an equation.

4. Nadia baked 12 cookies. She ate some of the cookies. Now she has 7 cookies left.

How many cookies did Nadia eat?

Use an equation.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Equation Cards

### Lesson 8: Creating Problems

#### Math Game: Matching Equations with Solutions

STUDENT BOOK PAGES 30-31

$50 - s = 26$	$g + 111 = 150$	73
$75 + q = 100$	$p - 140 = 440$	56
$t + 12 = 77$	$a + 123 = 456$	450
$m + 19 = 69$	$99 + d = 798$	315
$93 - b = 20$	24	39
$35 + 21 = f$	25	580
$900 - 450 = n$	65	333
$620 - k = 305$	50	699

Chapter 1  
**Lesson 8****Creating Problems****GOAL****Create and solve problems for given equations.**

1. Sydney wrote a problem for the equation  $7 + a = 15$ :

Rachel has \$7. She earned \$15 more.

How much money does she have now?

- a) What is wrong with Sydney's problem? \_\_\_\_\_

- b) Fix Sydney's problem so it matches the equation. \_\_\_\_\_

- c) Solve the problem. Check your answer.

2. Use the information to write a problem that matches the equation.

- a) Brandon ate more grapes than Matthew. Equation:  $m + 9 = 13$

Problem: \_\_\_\_\_

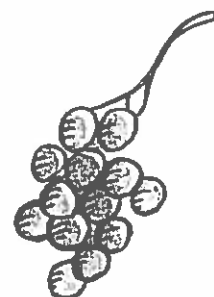
- b) Maya is younger than her sister. Equation:  $s - 4 = 11$

Problem: \_\_\_\_\_

3. Solve the problems in Question 2. Check your answers.

a)

b)



## 1.8 Creating Problems

Student Book page 30



**What problems can you create using the spinner and the equation cards?**

**Step 1:** Spin the spinner twice and turn over an equation card from the pile.

**Step 2:** Create a word problem using the equation and the 2 objects you landed on.

Owen landed on puppies and money. He drew the equation  $25 + a = 75$ . He wrote this problem:

A poodle puppy gets 25¢ allowance.

A golden Lab puppy gets 75¢ allowance.

The poodle puppy wants to get the same allowance as the golden Lab puppy. How much more money does the poodle puppy need to get?

Follow the steps to create a word problem.

### You will need

- Problem Spinner (blackline master)
- Equation Cards (blackline master)
- scissors
- a paper clip



Solve your problem.

---

---

---

---

---



---

---

---

---

---

## 1.8 Creating Problems

Student Book page 30

### GOAL

Create and solve problems for given equations.



**What problems can you create using the spinner and the equation  $5 + n = 12$ ?**

### You will need

- Problem Spinner (blackline master)
- scissors
- a paper clip



**A.** Owen spun the spinner twice. He landed on children and money. He wrote a problem using the equation  $5 + n = 12$ .

Kevin gets \$5 allowance. Steve gets \$12 allowance.

Kevin wants to receive the same allowance as Steve. How much more money does he need to get?

Solve  $5 + n = 12$  to answer the question.

Kevin needs to earn \_\_\_\_\_.

**B.** Spin the spinner twice. Record the 2 objects you landed on.

\_\_\_\_\_ and \_\_\_\_\_

Create a problem with these 2 objects and the equation  $5 + n = 12$ .

---

---

---

---

---

Solve your problem.

---

---

---

---

---



# Chapter 1

## Test Yourself

Circle the correct answer.

1. What is the pattern rule for the number of circles?

- A. Start at 1 and add 3 each time.
- B. Start at 4 and add 1 each time.
- C. Start at 4 and add 2 each time.
- D. Start at 0 and add 4 each time.



2. How much sugar is needed to make three cakes?

Number of cakes	Flour (mL)	Eggs	Milk (mL)	Sugar (mL)	Oil (mL)
1	500	2	200	300	50

- A. 900 mL
- B. 600 mL
- C. 300 mL
- D. 100 mL

3. How much flour is needed to make three cakes?

- A. 500 mL
- B. 750 mL
- C. 1000 mL
- D. 1500 mL

4. Maya had 25 prizes. She gave 5 prizes to each student: 25, 20, 15, ...  
Maya gave away all her prizes. How many students were there?

- A. 3 students
- B. 4 students
- C. 5 students
- D. 6 students

5. What is the sum of the numbers in this pattern: 3, 6, 9, 12, 15, 18?

- A. 21
- B. 63
- C. 42
- D. 76

6. Owen worked 12 minutes more than Rachel did.

Which expression represents the amount of time Owen worked?

- A.  $r + 12$
- B.  $r - 12$
- C.  $12 - r$
- D.  $r + 12 + 12$

7. Solve the equation  $p - 7 = 3$ .

- A.  $p = 7$
- B.  $p = 3$
- C.  $p = 4$
- D.  $p = 10$

8. Solve the equation  $8 + n = 15$ .

- A.  $n = 23$
- B.  $n = 7$
- C.  $n = 8$
- D.  $n = 15$

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Chapter Review—Frequently Asked Questions

STUDENT BOOK PAGE 32

**Q:** How can you use variables and equations to solve a problem that involves a missing number?

**A:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Q:** How can you solve an equation?

**A:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Chapter 1 Test** Page 1

30

Grade 5 Patterns

1. Luke made this pattern of suns using circles and triangles.



- 5 a) How many suns can Luke make using 56 triangles? \_\_\_\_\_ suns  
Use a sketch or a model.

- 3 b) How many triangles will Luke need to make 9 suns?  
Use a table.

2. At the start of a game, each player has 5 balls and 7 sticks.

- a) Make a table to show the number of balls and the number of sticks for 1 to 4 players.

- 3 b) Write pattern rules for the patterns in your table.

- 2  
c) 42 sticks were given out at the start of the game.  
How many people were playing the game?

- 1  
3. Kayla had 48 tokens to play at the arcade. Each game cost the same number of tokens. Here is what the pattern looked like:

48, 44, 40, 36,...

- 1 a) Why do the numbers in Kayla's pattern decrease by 4?

- 1 b) What is Kayla's pattern rule?

- 1 c) Kayla used all of her tokens. How many games did Kayla play?

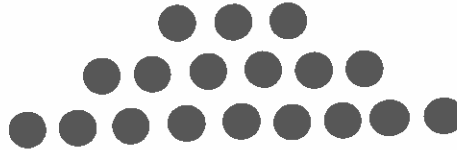
17

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Chapter 1 Test Page 2

4. Liam set up a display of cans at the store so that there are three cans in the first row, six in the second row, nine in the third row, and so on.



- a) Extend the pattern. How many cans would be in the eighth row? \_\_\_\_\_

2.

- b) Use a pattern to show how many cans there are, in total, in the eight rows.  
Write a number sentence to show the sum.

3.

5. Write an expression for each situation.

a) 7 less than a number \_\_\_\_\_

b) 12 more than a number \_\_\_\_\_

c) 29 more than a number \_\_\_\_\_

d) 29 less than a number \_\_\_\_\_

4.

6. The Calgary Tower is about 30 m taller than the Skylon Tower in Niagara Falls.  
Write two expressions to compare the heights of the two towers.  
Use addition in one expression and subtraction in the other expression.

2.

7. Write a problem that can be solved using each equation.  
Then, use the equation to solve your problem.

a)  $15 + q = 38$

b)  $m - 8 = 47$

2.

13