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This Practice Workbook is yours! Use it to see what you know and think about what you might need to work on.

Getting Started

Everything you learn builds on something you have experienced or learned before.

Take Your Time

- Don't rush. Not all math tasks take the same amount of time to complete.

What Might This Look Like?

- Use tools and materials to help you complete the tasks.
- Try “seeing the problem in your mind” to help you reason your way to a solution.

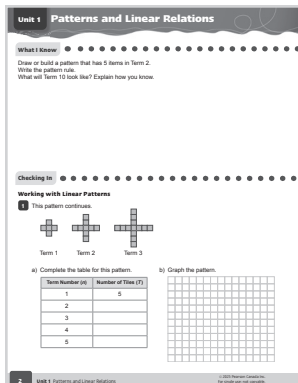
Try Your Best!

- Read over the tasks and think about questions you might have that would help you better understand them.
- Reflect on what you already know and use this information to help you complete the tasks.

Reflect On and Share Your Learning

- Share your thinking and findings—talk about strategies with your friends and family.
- Look back in the Practice Workbook to get ideas to help you solve new problems!

How Is the Practice Workbook Organized?



Patterns and Number Relationships

WATER BOTTLE REFILLING STATION



About how much water does your school use each year?

What would you need to know to be able to answer this question?

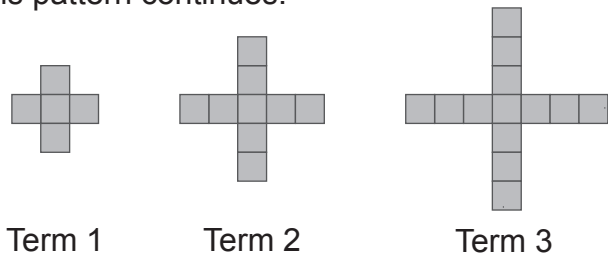
What I Know

Draw or build a pattern that has 5 items in Term 2.
Write the pattern rule.
What will Term 10 look like? Explain how you know.

Checking In

Working with Linear Patterns

1 This pattern continues.



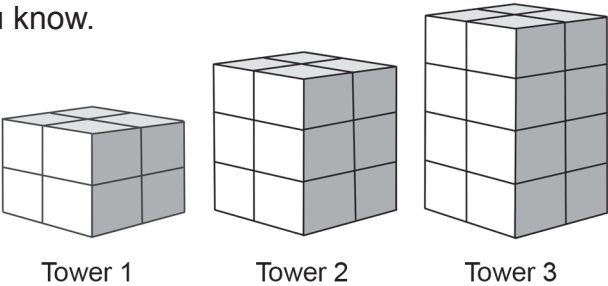
- a) Complete the table for this pattern.
- b) Graph the pattern.

Term Number (n)	Number of Tiles (T)
1	5
2	
3	
4	
5	



- c) Write the pattern rule for the number of tiles.
- d) Write an algebraic expression that describes the relationship between the term number and the number of tiles.
- e) How many tiles will be in Term 20? Show how you know.

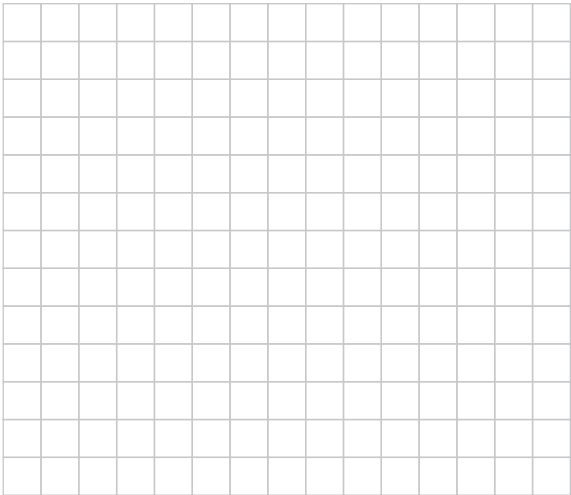
2 A builder is planning to paint the faces of each cube in these miniature towers, not including the base.



a) Complete the table.

Tower Number (T)	Number of Faces to Paint (n)
1	20
2	
3	
4	
5	

b) Represent the pattern on a graph.



- c) Write a pattern rule in words that describes the relationship between the two sets of values.
- d) How many faces would have to be painted on Tower 9?
- e) Write an algebraic expression that describes the relationship between the two sets of values. Use the expression to check your answer to part d.
- f) How many faces will you have to paint on Tower 60?

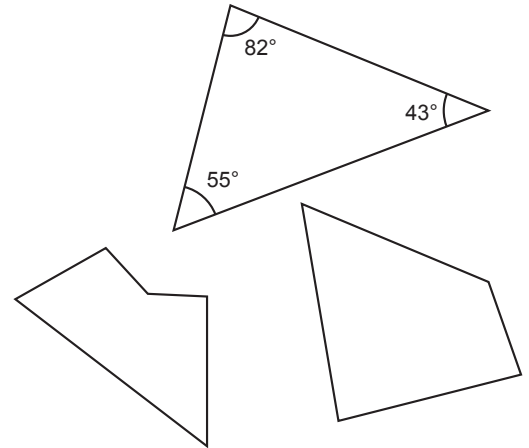
g) How do you know there would never be exactly 799 faces to paint on any of the towers?

3



The table shows the relationship between the number of sides of a polygon and the sum of its interior angles.

Polygon	Number of Sides (n)	Sum of Interior Angles ($^\circ$)
Triangle	3	180
Quadrilateral	4	360
Pentagon	5	540
Hexagon	6	720
Heptagon	7	900



a) What is the sum of the interior angles of an octagon? How did you find out?

b) What is the pattern rule for the sum of the interior angles of an n -sided polygon?

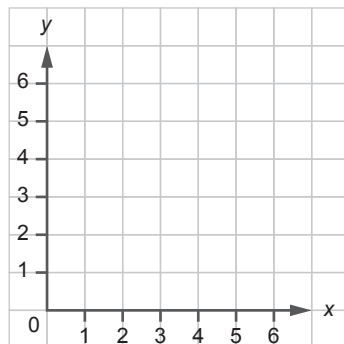
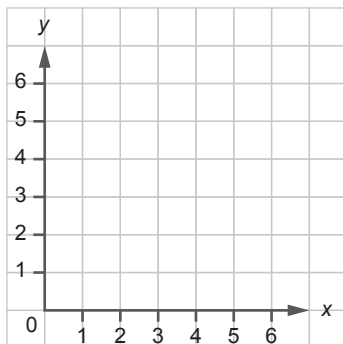
c) What is the sum of the interior angles of an icosagon (20-sided polygon)?

4



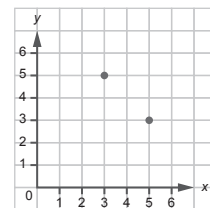
GAME: Rolling Relations!

- Take turns to roll 2 number cubes labelled 1–6. Use the numbers to make an ordered pair. Plot the point on the grid.
- Continue to take turns. The first player to plot 3 points that are part of the same linear relation wins.
- Describe the linear relation you created.



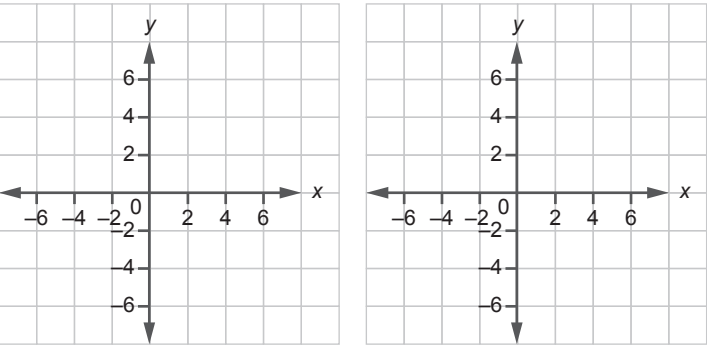
HINT

I could plot (5, 3) or (3, 5).



Play again! Adjust your strategies so that you are more likely to create a linear relation in fewer turns.

Play again! This time use the numbers rolled to make ordered pairs that have positive and/or negative coordinates.



If you roll a 2 and 5, you could make many different ordered pairs, such as $(2, -5)$, $(2, 5)$, $(-5, 2)$, and $(-5, -2)$.

- 5** Draw a linear relation where one of the terms has 11 items and Term 2 has 5 items. Represent the relation in each way shown.

What might the pattern represent?

- As a picture:

- As a table of values:

Term Number (n)	Term Value (V)
2	5

- As a pattern rule (in words and as an expression):

- As a graph:

6 For each linear pattern, complete the missing representations.

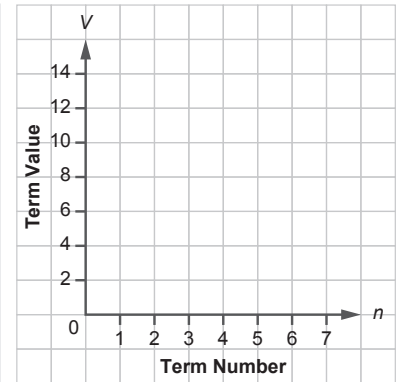
Pattern in Words

Expression

Table of Values

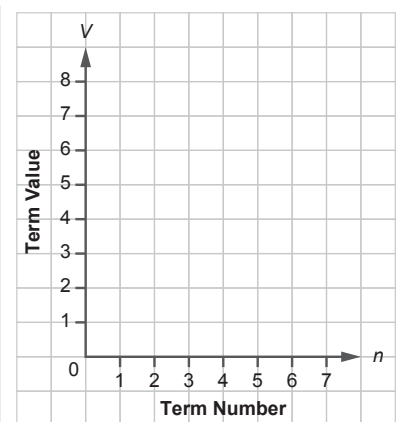
Graph

Term Number (n)	Term Value (V)
1	3
2	7
3	11

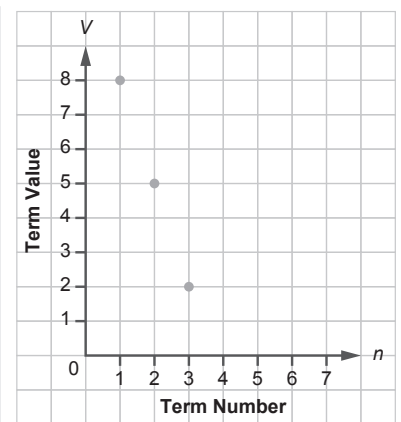


$2n$

Term Number (n)	Term Value (V)
1	
2	
3	

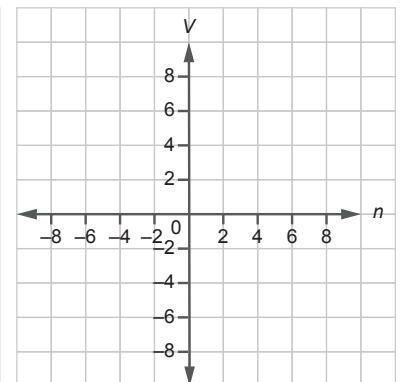


Term Number (n)	Term Value (V)
1	
2	
3	



Start at -6 and add 3 each time.

Term Number (n)	Term Value (V)
1	
2	
3	
4	



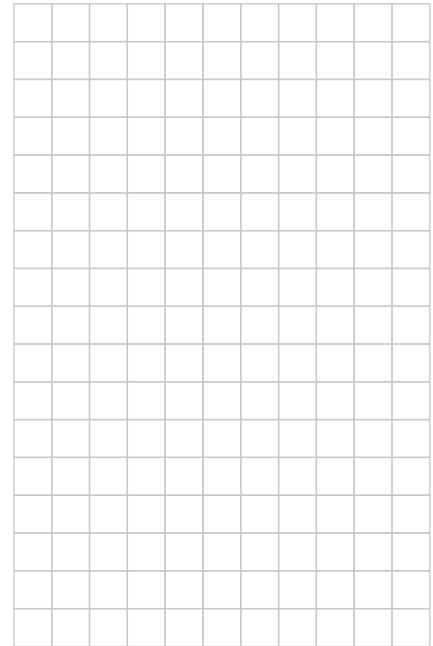
- 7** Determine the missing numbers in each linear pattern.
Then, choose one pattern and explain how you figured out the missing numbers.

- a) 8, 17,,, 44, 53,, 71 b) 485,, 403,, 321,
- c) 17, 11, 5,,, -13, d) 4.75, 5.91,,, 9.39,

- 8** Complete the tables with the missing numbers.
Then, graph both patterns on the same grid.
How are the graphs alike? How are they different?

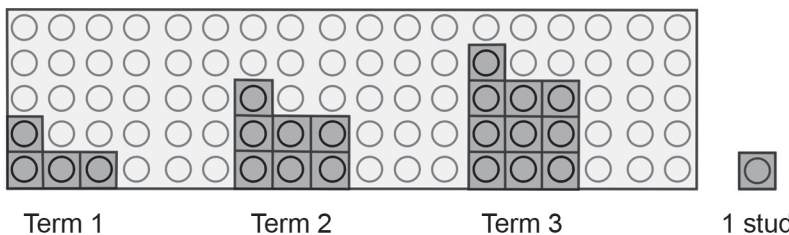
x	y
-2	
-1	
0	3
1	5
2	7

x	y
-2	9
-1	
0	3
1	
2	



Evaluating Expressions

- 9** This pattern can be represented by the expression $3t + 1$, where t is the term number.



Determine the number of studs in each term.

- a) Term 10 b) Term 40 c) Term 99 d) Term 999

10 In question 9, which term would have exactly 100 studs? Justify your reasoning.

11 Write an algebraic expression to represent each situation. Then, evaluate the expression.

- a) Beatrice is saving to buy a bike. They have \$50 in the bank.
They help a neighbour with lawn care and get paid \$12.50 per hour.
If Beatrice works for 13 h, would they have enough to buy a \$199 bike?
Assume the price includes taxes.

- b) Ahmed received a \$50 gift card to their favourite Sunday
Bubble Tea spot.
If a drink costs \$5.75, does Ahmed have enough money
to buy one drink each week for 9 weeks?



12 Circle or state the size of your water bottle:

0.5 L 0.71 L 1 L other:

How many times during a school day do you fill your water bottle?

How much water do you use from the refilling station a day?

Assume you use the same amount of water each day.

Write an expression to represent the number of litres of water you use
in n school days, assuming there are 5 school days in a week.

Use your expression to find the amount of water you use in:

- 1 week
- 1 month (20 days)
- the school year (200 days)

13

**GAME: All Around!**

- Take turns to roll a number cube to assign values to the variables in the perimeter expressions.
- Record the number rolled on one of the blanks on your game board. Continue until each of you has had 6 rolls.
- Evaluate each expression to determine the perimeter of each shape. Then, determine the sum of the perimeters.
- The player with the greater sum wins.

Round 1 $(\quad + \quad) \times 2$ Round 2 $(\quad + \quad) \times 2$ Round 3 $(\quad + \quad) \times 2$	Perimeter of a rectangle $(l + w) \times 2$ All Around! Sum of perimeters	Round 1 $\quad \times 4$ Round 2 $\quad \times 4$ Round 3 $\quad \times 4$ Round 1 $\quad + \quad + \quad$ Round 2 $\quad + \quad + \quad$ Round 3 $\quad + \quad + \quad$
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Play another round! How did your strategies change as you played the game several times?

14

Predict which expression has:

Predictions

a) the greatest value for $n = 2$

.....

b) the least value for $n = 2$

.....

c) the greatest value for $n = 100$

.....

d) the least value for $n = 100$

.....

Determine the values for $n = 2$ and $n = 100$ to justify your predictions.

	$n = 2$	$n = 100$
$3n + 5$		
$4n - 4$		
$10n - 12$		
$20n + 3$		
$40n - 400$		

Expressions

i) $3n + 5$

ii) $4n - 4$

iii) $10n - 12$

iv) $20n + 3$

v) $40n - 400$

Bringing It Together

15 Use these numbers to create the various patterns below.

2 4 9 3 10 12 0
1 16 8 6 5 -4 -8
-9 -3 -10 -2 -1 18 -6

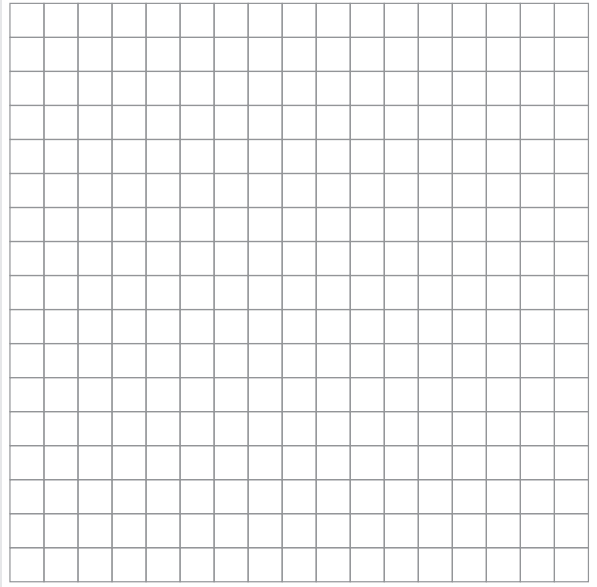
Bonus:
You may choose to add
2 numbers of your choice.
Your choice:

Make each pattern unique. Numbers may be used more than once.

• An increasing linear pattern:

.....,,

x	y
1	
2	
3	



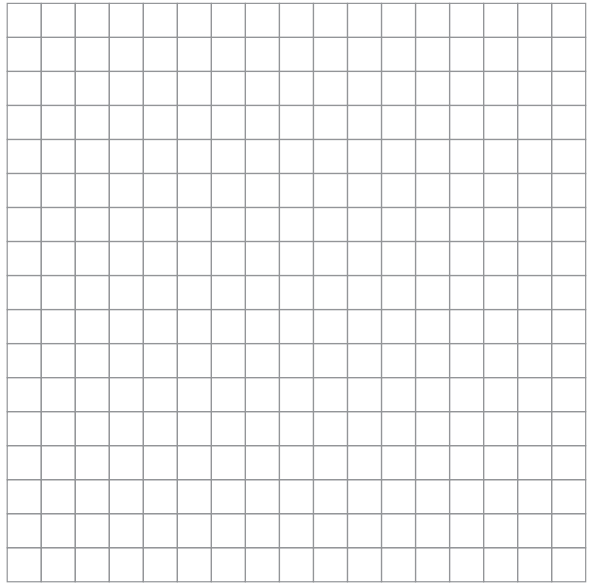
• A non-linear pattern:

.....,,

• A decreasing linear pattern:

.....,,

x	y
1	
2	
3	



• A repeating pattern:

.....,,

Choose one of your patterns. Write an algebraic expression to represent it.
Evaluate the expression for a value of your choice.

What I Learned

Reflect on the different ways you represented patterns (in words, in a table of values, using an expression, as a graph). Which one are you most comfortable with using? Use an example to explain.