

Review of Patterning and Algebra

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Solutions

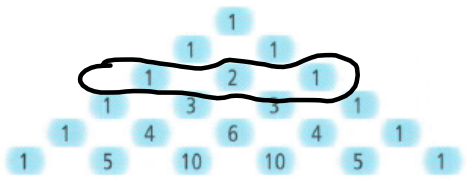
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For questions 1 to 4, match each word to the correct definition.

1. a pattern of numbers
2. a pattern of shapes, lines, or colours that gets smaller as it repeats
3. an item in a pattern
4. a letter that represents a number or numbers
- A fractal
- B n th term
- C origami
- D sequence
- E variable

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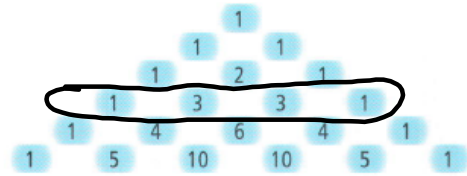
5. Ben is making pancakes for his mother's birthday. He has two toppings: maple syrup and strawberry sauce. In how many different ways can Ben serve the pancakes?



No toppings : 1 way
One topping : 2 ways
Two toppings : 1 way
Total = $1 + 2 + 1$
= 4 ways

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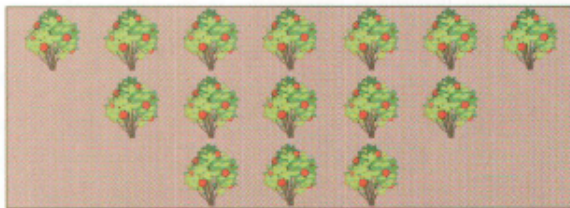
6. Ben's sister Sara arrives home with bananas from the store. In how many different ways can Ben and Sara serve their pancakes now that they have maple syrup, strawberry sauce, and sliced bananas?



No toppings : 1 way
 One topping : 3 ways
 Two toppings : 3 ways
 Three toppings : 1 way
 Total = 1 + 3 + 3 + 1
 = 8 ways

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9. A garden has three rosebushes in the first row, five rosebushes in the second row, seven rosebushes in the third row, and so on.



- a) Describe the pattern in words.
- b) Use a table to show the number of rosebushes in each of the first five rows.
- c) Write a formula to model the number of rosebushes in the n th row.
- d) How many rosebushes are in the 10th row?

Rows	Bushes
1	3
2	5
3	7
4	9
5	11

Increases by 2 for each row.
 $B = 2(10) + 1$
 $B = 20 + 1$
 $B = 21$ bushes

Let $B = \#$ of bushes
 and $n = \text{row } \#$
 $B = 2n + 1$

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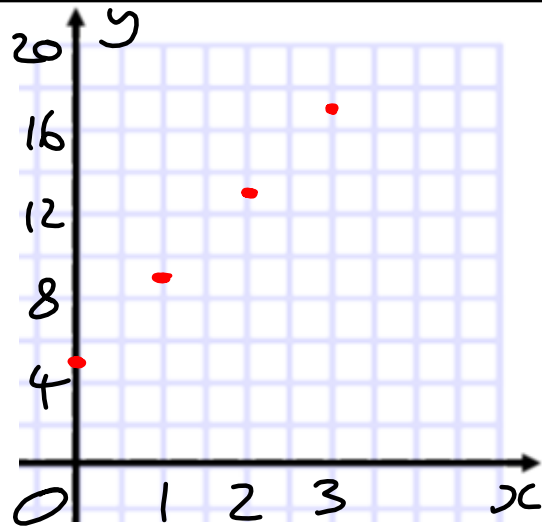
10. Copy and complete a table for each sequence. Extend your table to show two more terms for each sequence.
- a) 3, 8, 13, 18, ... b) $\frac{2}{3}, \frac{4}{3}, \frac{6}{3}, \frac{8}{3}, \dots$
- c) 70, 65, 60, 55, ... d) $2^2, 3^2, 4^2, 5^2, \dots$

Term	(a)	(b)	(c)	(d)
1	3	$\frac{2}{3}$	70	2^2
2	8	$\frac{4}{3}$	65	3^2
3	13	$\frac{6}{3}$	60	4^2
4	18	$\frac{8}{3}$	55	5^2
5	23	$\frac{10}{3}$	50	6^2
6	28	$\frac{12}{3}$	45	7^2

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11. Plot the ordered pairs on a grid. Describe the pattern. Then, write an equation that models the pattern.

x	0	1	2	3
y	5	9	13	17



Increasing by 4

$$\Rightarrow 4n$$

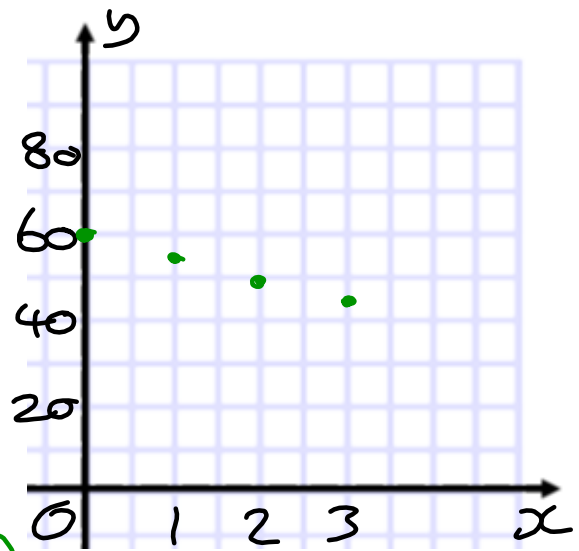
$$\text{0th term} = 5$$

$$\Rightarrow \text{Formula is } 4n + 5$$

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12. At a skateboard park, there is a low rail to skate down. Makayla's height as she skates down the rail is recorded in the table.

Distance Travelled Along the Rail, d (m)	Makayla's Height Above the Ground, h (cm)
0	60
1	55
2	50
3	45



- a) List the ordered pairs. Then, plot them on a grid.
- b) Describe the pattern in words.
- c) Write an equation to model the pattern.

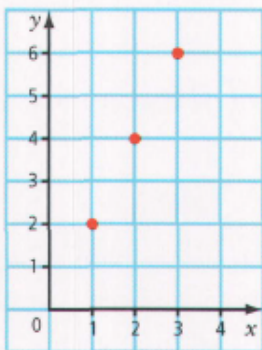
$(0, 60)$ $(1, 55)$ $(2, 50)$
 $(3, 45)$

$$h = 60 - 5n$$

Decreasing by 5

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13. a) Make a table of values for the ordered pairs plotted on the grid.



- b) Extend your table to show three more values for x and y .
- c) Describe the pattern of points.
- d) Write an equation to model the pattern.

x	y
1	2
2	4
3	6
4	8
5	10
6	12

Increasing by 2

$$y = 2x$$

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14. Study the pattern of stacked 1-cm squares.



Diagram 1 Diagram 2 Diagram 3

- Use a table to record the perimeter of each shape.
- Describe the relationship between the perimeter of a shape and the diagram number.
- Model the relationship with a formula.
- Which diagram in the pattern would have a perimeter of 44 cm?

Position	Perimeter
1	4
2	8
3	12

Perimeter equals diagram # times 4.

$$P = 4n$$

$$44 = 4n$$

$$\Rightarrow n = 11$$

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15. You are planning a checkers tournament.

A player who wins a game advances to play against another winner in the next round. A player who loses a game is eliminated.

- How many checkers players can enter a tournament that takes five rounds to find the overall winner?
- How many players can enter a tournament that needs n rounds?

$$2^5 = 32$$

$$2^n$$

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