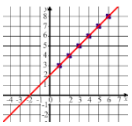
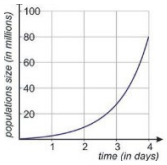
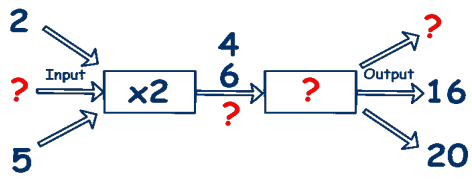
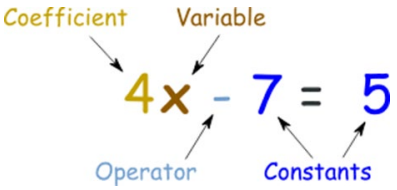
Year 7 – Maths Knowledge Organiser #1
Autumn 2021

Algebraic Thinking

Name: Class:

Topic/Skill	Definition/Tips	Examples
Exploring Sequences		
Sequence	Ordered sets of numbers, shapes or other mathematical objects, arranged according to a specific rule.	2, 5, 8, 11, 14, … 1, 10, 100, 1000, …
Term*	One of the values that features in a **sequence**.	2, 5, 8, … the 2nd **term** is 5 7, 6, 5, … the **term** in the 3rd **position** is 5
Position	Where in a **sequence** the **term** is located.	
Term-to-term rule	Rule which allows you to find the next **term** in a **sequence** if you know the previous **term**.	1st **term** is 2. **Term-to-term rule** is 'add 3'. **Sequence** is: 2, 5, 8, 11…
Linear	The **difference** between the **terms** is constant, which will form a straight line on a graph.	**Sequence** 3, 4, 5, 6, 7, 8, … would form the following graph when plotted: 
Non-linear Geometric	The **difference** between the **terms** is not constant, which will form a curve on a graph.	
Ascending	Increase in value.	3, 7, 9, 11, 131 are in **ascending** order
Descending	Decrease in value.	131, 11, 9, 7, 3 are in **descending** order
Fibonacci	**Sequence** where the next **term** is found by adding up the previous two **terms**.	The **Fibonacci** sequence is: 0,1,1,2,3,5,8,13,21,34, …
Understanding and using Algebraic notation		
Operation	A mathematical process.	+ − × ÷
Function	Mathematical relationship between 2 **variables.** The 2nd value depends on (is a **function** of) the 1st.	
Input	Value that is **operated** on to produce an **output.**	
Output	Value that is produced when an **input** has been **operated** on.	

Inverse	Each mathematical **operation** has an opposite that 'undoes' the original **operation**.	$(+ \leftrightarrow -)\ (\times \leftrightarrow \div)$
Variable	A letter used to represent any number.	x *or* y
Term*	One part of an **expression**, **equation** or formula which may be a number, a **variable** or a product of both.	$4x + 3y$ has 2 terms
Coefficient	The number in front of the **variable** (letter).	$4x$ → coefficient is 4 
Expression	Mathematical statement which contains one or more **terms**. It can include numbers, variables and arithmetic operations.	$4x + 3y - 2x$
Substitute	Replace letters in an **expression** with known values.	If d=5 then substituting into 3d+6 would be (3x5) + 6 = 21
Equality and Equivalence		
Equals signs	A way of representing how values relate to each other.	= Equal to ≈ Roughly equal to ≠ Not equal to ≡ Identity (always equal to)
Equivalent	Has the same value, but written in a different form. Either form can be used and the value is unchanged.	$y + y + y$ is **equivalent** to $3y$
Inequality	Similar to an **equation**, but the unknown has a range of values, not just a single value.	$>$ Greater than $\geq$ Greater than or equal to $<$ Less than $\leq$ Less than or equal to
Equation	**Expressions** connected by an **equals** sign.	5x – 2 = 2x + 7
Solve an equation	**Solving** an equation is to find the numerical value of a **variable**. *When you solve an equation, work step by step and line up the equals signs.*	2x + 3 = 9 2x = 6 (subtract 3) x = 3 (divide by 2)
Index	The number of times a constant or **variable** has been multiplied by itself.	4^5 is the same as $4 \times 4 \times 4 \times 4 \times 4$
Simplify	Combining the **like** terms in an expression.	$4x + 3y - 2x$ is **simplified** to $2x + 3y$
Formula	**Equation** which has a real-life application.	Area of a circle = πr^2

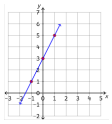
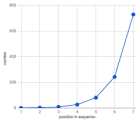
Year 7 Maths Knowledge Organiser #1 Questions:

1. Find the next two terms in this linear sequence: 3, 7, 11, _ , _

2. Find the next two terms in these linear sequences:

a) 870, 760, 650, _, _ b) 4.15, 4.35, 4.55, _, _

3. Which of these sequences are linear?

a)  b)  c) 16, 14, 12, 10, 8, ... d) 0, 1, 1, 2, 3, 5, 8, 13, ...

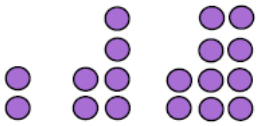
4. Find the next two terms in these geometric (non-linear) sequences:

a) 2, 6, 18, _ , _ b) 180, 18, 1.8, _ , _

5. Find the missing terms in the linear sequence: 2, _ , 8, _ , _ , 17

6. Complete the table to represent the sequence.

If this was shown as a graph, would the points form a straight line?



Term	1	2	3	4
Number of circles				

7. Write the first ten terms of a sequence that increases by 6 and has the first term 2.

8. What is the term-to-term rule for these sequences?

a) 17, 15, 13, 11, 9, … b) 1, 5, 9, 13, 17, … c) 3, 6, 12, 24, …

9. Find the missing numbers for these function machines:

a) ____ → × 3 → 54

b) ____ → × 3 → 5.4

c) 0.6 → ____ → 5.4

10. Simplify these expressions:

a) $a + a + a + a + a + a$ b) $3b + 2b - b$ c) $\frac{20c}{4}$

11. What expression will have the greatest value when $x = 3$?

a) $2x$ b) $x - 2$ c) $3x - 4$

12. Which of these equations form straight line graphs? (it may be more than one)

a) $x^2 + 3$ b) $x - 6$ c) $4x + 1$ d) $2 - \frac{x}{3}$

13. Write an expression to show each output

a) $x \rightarrow$ +3 $\rightarrow$

b) $x + 2 \rightarrow$ +3 $\rightarrow$

c) $x \rightarrow$ × 3 $\rightarrow$

d) $x + 2 \rightarrow$ × 3 $\rightarrow$

14. Substitute $a = 2$, $b = 4$ and $c = 6$ into these expressions

a) $3a - b$ b) $c + ab$ c) $\frac{a+b}{c}$

15. True or false, are these expressions equivalent to each other?

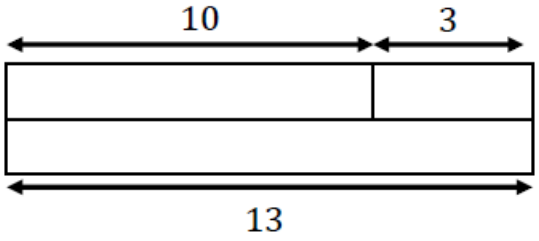
a) $5n \times 2$ b) $2 \times 5n$

16. Place the correct symbol to compare these numbers or expressions. Choose from $=, \neq, \approx$

The first has been done for you.

a) 10 $\boxed{\approx}$ 9.8674 b) -6 ☐ 8 c) $2a + a$ ☐ $4a - a$ d) 201,031 ☐ 200,000 e) $6y$ ☐ $3 \times y$

17. What are the four facts (fact family) represented by this bar model? One has been done for you



10 + 3 = 13

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18. Solve these equations. *Remember to substitute your answer back into the equation to check.*

$a + 46 = 85$ $\frac{c}{6} = 50$

$32 = b - 8.2$ $90 = 10d$

19. Ahmed thinks of a number. He subtracts 18 from this number and gets 13.

a) Show this information as an equation using the letter *n*

b) Solve the equation to find Ahmed's number.

20. Match these problems involving indices to their solution. You will not use all of the possible answers.

a) 5^2

b) 3^3

c) 4^3

d) 2^4

Possible answers:

10, 12, 16, 18, 25, 27, 32, 64

Answers

1) 15, 19 **2)** a) 540, 430 b) 4.75, 4.95 **3)** a) and c) **4)** a) 54, 162 b) 0.18, 0.018 **5)** 2, 5, 8, 11, 14, 17

Term	1	2	3	4
Number of circles	2	6	10	14

6) Yes it will. **7)** 2, 8, 14, 20, 26, 32, 38, 44, 50, 56 **8)** a) subtract 2 b) add four c) double or multiply by 2 **9)** a) 18 b) 1.8 c) x 9 **10)** a) $6a$ b) $4b$ c) 5c **11)** a) 6 **12)** b, c and d **13)** a) $x + 3$ b) $x + 5$ c) $3x$ d) $3x + 6$ **14)** a) 2 b) 14 c) 1 **15)** true **16)** b) $\neq$ c) $=$ d) $\approx$ e) $\neq$ **17)** $3 + 10 = 13$, $13 - 10 = 3$, $13 - 3 = 10$ **18)** $a = 39$ $b = 40.2$ $c = 300$ $d = 9$ **19)** a) $n - 18 = 13$ b) $n = 31$ **20)** a) 25 b) 27 c) 64 d) 16