SUBJECT:
UNIT: Sequences

Square Numbers	Square Roots	Cube Numbers
1 x 1 = 1	$\sqrt[2]{1} = 1$	1 x 1 x 1 = 1
2 x 2 = 4	$\sqrt[2]{4} = 2$	2 x 2 x 2 = 8
3 x 3 = 9	$\sqrt[2]{9} = 3$	3 x 3 x 3 = 27
4 x 4 = 16	$\sqrt[2]{16} = 4$	4 x 4 x 4 = 64
5 x 5 = 25	$\sqrt[2]{25} = 5$	5 x 5 x 5 = 125

Square Numbers	Square Roots	Cube Roots
6 x 6 = 36	$\sqrt[2]{36} = 6$	
7 x 7 = 49	$\sqrt[2]{49} = 7$	$\sqrt[3]{1} = 1$
8 x 8 = 64	$\sqrt[2]{64} = 8$	$\sqrt[3]{8} = 2$
9 x 9 = 81	$\sqrt[2]{81} = 9$	$\sqrt[3]{27} = 3$
10 x 10 = 100	$\sqrt[2]{100} = 10$	$\sqrt[3]{64} = 4$
11 x 11 = 121	$\sqrt[2]{121} = 11$	$\sqrt[3]{125} = 5$
12 x 12 = 144	$\sqrt[2]{144} = 12$	

Sequences & Nth Term

Sequence:

3, 5, 7, 9, …

1st term, 2nd term, 3rd term, 4th term

three dots means goes on forever (infinite)

("term", "element" or "member" mean the same thing)

Example
Find the nth term rule:

8   10   12   14
  +2   +2   +2

$a = 2$ $2 + b = 8$
              $b = 6$

nth term = 2n + 6

Your turn…
Find the nth term rule:

7   11   15   19
  +4   +4   +4

$a = 4$ $4 + b = 7$
              $b = 3$

nth term = 4n + 3

FIBONACCI SEQUENCE

A series of numbers, starting from 0 where every number is the sum of the two numbers preceding it.

0,1,1,2,3,5,8,13,21,34,55…. and so on

SUBJECT:
UNIT: Expanding & Factorising

Key Words

Expanding

Factorising

Expanding & Factorising Single Brackets

Expand 2(x + 1)

$= 2x + 2$

Expand 3(2x - 4)

$= 6x - 12$

Expand 4x(2x - 5)

$= 8x^2 - 20x$

Factorise 6x + 12

$= 6(x + 2)$

Factorise $x^2 + 3x$

$= x(x + 3)$

Factorise 30x + 40

$= 10(3x + 4)$

Expanding Double Brackets

$(x+2)(x+3)$

$(x+2)(x+3)$

$= x^2 - 3x + 2x + 6$
$= x^2 + 5x + 6$

$(x+5)(x-7)$

$(x+5)(x-7)$

$= x^2 - 7x + 5x - 35$
$= x^2 - 2x - 35$

$(x+4)^2$

$(x+4)^2$
$= (x+4)(x+4)$
$= x^2 + 4x + 4x + 16$
$= x^2 + 8x + 16$

$(x-7)(x-3)$

$(x-7)(x-3)$

$= x^2 - 3x - 7x + 21$
$= x^2 - 10x + 21$

Find the area

$x - 2$

$4x + 3$

To find the area of a rectangle we need to multiply

$(4x+3)(x-2)$

$(4x+3)(x-2)$

$= 4x^2 - 8x + 3x - 6$
$= 4x^2 - 5x - 6$

Factorising Double Brackets

Factorise $x^2 + 7x + 10$

We need to find two numbers that multiply to give 10 and add to give 7. List the factors of 10:

1 x 10
5 x 2...(5 + 2 = 7)

Answer = (x + 2)(x + 5)

Factorise $x^2 + 2x - 8$

We need to find two numbers that multiply to give -8 and add to give 2. List the factors of -8:

1 x -8
-1 x 8
2 x -4
4 x -2 ...(4 + -2 = 2)

Answer = (x + 4)(x -2)

Key Words

equation
solve
inequalities

Solving Equations

Solve 2x + 1 = 7

$$-1 \qquad -1$$
$$2x = 6$$
$$\div 2 \qquad \div 2$$
$$x = 3$$

Solve 2x + 3 = x + 6

$$-3 \qquad -3$$
$$2x = x + 3$$
$$-x \qquad -x$$
$$x = 3$$

Solve 3x - 2 = x + 6

$$+2 \qquad +2$$
$$3x = x + 8$$
$$-x \qquad -x$$
$$2x = 8$$
$$+2 \qquad +2$$
$$x = 4$$

Solving Harder Equations

Solve $\frac{2x+1}{3} = 7$

$$x3 \qquad x3$$
$$2x + 1 = 21$$
$$-1 \qquad -1$$
$$2x = 20$$
$$\div 2 \qquad \div 2$$
$$x = 10$$

Solve $\frac{x}{4} + 1 = 6$

$$-1 \qquad -1$$
$$\frac{x}{4} = 5$$
$$x4 \qquad x4$$
$$x = 20$$

Solving Inequalities

Solve inequalities the same way you would solve a normal equation but remember to include the inequality symbol in your answer.

Solve 3x + 4 ≤ 7

$$-4 \qquad -4$$
$$3x \le 3$$
$$\div 3 \qquad \div 3$$
$$x \le 1$$

Solve 2x + 4 > x + 9

$$-4 \qquad -4$$
$$2x > x + 5$$
$$-x \qquad -x$$
$$x > 5$$

Inequalities

On a number line

An **open circle** means that the value is **not** included:

$x > 2$ x is greater than 2

$x < 5$ x is less than 5
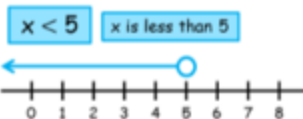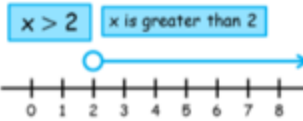
A **filled in circle** means that the value is **included**:

$x \ge 3$ x is greater than or equal to 2

$x \le 6$ x is less than or equal to 6
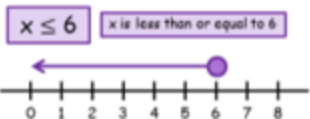
If x is **between** two values, use **two circles**:

$1 < x \le 6$ x is greater than 1, but less than or equal to 6.

Writing inequalities as integers

Write down the integers represented by $2 < x \le 7$	3, 4, 5, 6, 7
Write down the integers represented by $1 \le x \le 4$	1, 2, 3, 4
Write down the integers represented by $4 < x < 9$	5, 6, 7, 8

Key Words

| mean |
| mode |
| median |
| range |

Mode

The most common number

Example:
Find the mode of 2, 2, 4, 5, 6

The answer = 2

Mean

The middle number, but remember to put the numbers in order first!

Example:
Find the median of 2, 4, 1, 5, 6

Order them first: 1, 2, **4**, 5, 6
The middle is 4

Example:
Find the median of 3, 7, 1, 2, 6, 8

Order them first: 1, 2, **3, 6**, 7, 8
The middle is half way between 3 and 6
The answer = 4.5

Median

Add all of your numbers up and divide by how many numbers you have.

Example:
Find the mean of 2, 2, 4, 5, 6

2 + 2 + 4 + 5 + 6 = 19
19 ÷ 5
The answer = 3.8

Range

The biggest number - the smallest number

Example:
Find the range of 2, 2, 4, 5, 6

6 - 2
The answer = 4

SUBJECT:
UNIT: Averages