# Year 7 - Mathematics - Autumn Term: Helpful Hints

Key Word	Definition
Factor	A number that divides a given number exactly, leaving no remainder.
Multiple	The result of one number multiplied by another number.
Square Number	The answer when a number has been multiplied by itself.
Cube Number	The answer when a number is multiplied by itself and then by itself again.
Prime Numbers	A whole number that has exactly two factors.

Square Numbers:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, …

$1^2 = 1 \times 1$ — 1

$2^2 = 2 \times 2$ — 4

$3^2 = 3 \times 3$ — 9

$4^2 = 4 \times 4$ — 16
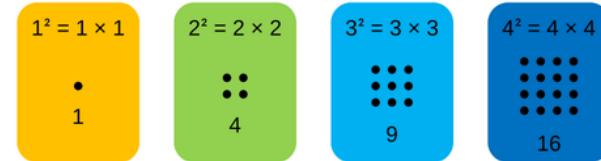
The pattern of dots gives a clue as to where the name square numbers come from…

Multiplication Grid:

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Prime Number Grid:

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

Cube Numbers:

1 is the first cube number, because 1 x 1 x 1 = 1

8 is the second cube number, because 2 x 2 x 2 = 8

27 is the third cube number, because 3 x 3 x 3 = 27

64 is the fourth cube number, because 4 x 4 x 4 = 64

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 −3 −4 −5 −6 −7 −8 −9 −10 −11 −12 −13 −14 −15 −16 −17 −18 −19 −20

Year 7 - Mathematics - Autumn Term: Number

Adding and Subtracting Negative Numbers:

| + | + | ⇒ | + |
| - | - | ⇒ | + |

Same signs, change to positive

| + | - | ⇒ | - |
| - | + | ⇒ | - |

Different signs, change to negative

Multiplying Negative Numbers

positive × positive = positive
$4 \times 5 = 20$

positive × negative = negative
$4 \times -5 = -20$
$-4 \times 5 = -20$

negative × negative = positive
$-4 \times -5 = 20$

Dividing Negative Numbers

positive ÷ positive = positive
$20 \div 5 = 4$

negative ÷ positive = negative
$-20 \div 5 = -4$

positive ÷ negative = negative
$20 \div -5 = -4$

negative ÷ negative = positive
$-20 \div -5 = 4$

Multiples:

Multiples of 4: 4, 8, 12, 16, 20, 24, …

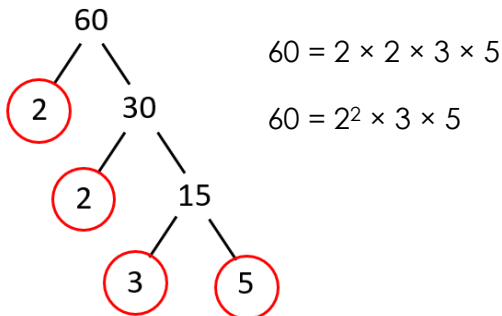**Find the Lowest Common Multiple of 3 and 8:**

Multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27,

Multiples of 8: 8, 16, 24,

LCM = 24

Product of Prime Factors:

Write 60 as a product of its prime factors

60

         2   30

         2   15

         3   5

$60 = 2 \times 2 \times 3 \times 5$

$60 = 2^2 \times 3 \times 5$

Factors:

Factors of 30- write these in multiplication pairs.

1	30
2	15
3	10
5	6

Find the Highest Common Factor of 16 and 20

Find all the factors of both numbers and choose the highest factor that is in both lists.
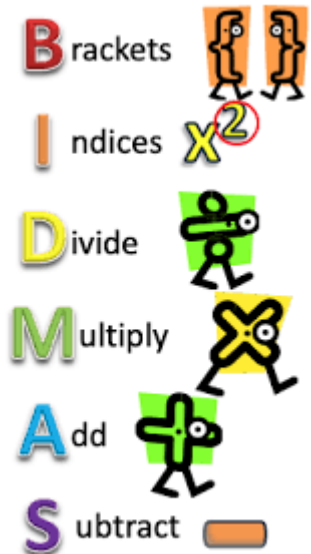
Factors of 16

1	16
2	8
4	4

Factors of 20

1	20
2	10
4	5

Highest common factor = 4

Order of Operation:

Always follow BIDMAS when you have multiple operations in a calculation!

Brackets

Indices x^2

Divide

Multiply

Add

Subtract

Year 7 - Mathematics - Autumn Term: Number

Calculations with decimals

Adding Decimals

$2.24 + 0.6$

	2	•	2	4
+	0	•	6	0
	2	•	8	4

Subtracting Decimals

$0.42 - 0.25$

			3	1
	0	•	4̶	2
−	0	•	2	5
	0	•	1	7

Multiplying Decimals

$1.5 \times 1.2 = 1.8$

×10 ↓   ↓ ×10

$15 \times 12 = 180$

÷10
÷10

1.8

Dividing Decimals

$4.8 \div 0.6$

$$\frac{4.8}{0.6} = \frac{48}{6} = 8$$

So $4.8 \div 0.6 = 8$

Calculations with Fractions

Adding Fractions

Fractions must have the same denominator.

×2   ×5

$$\frac{1}{5} + \frac{1}{2} = \frac{7}{10}$$

×2   ×5

$$\frac{2}{10} + \frac{5}{10} = \frac{7}{10}$$

Subtracting Fractions

Fractions must have the same denominator.

×5   ×4

$$\frac{1}{4} - \frac{1}{5} = \frac{1}{20}$$

×5   ×4

$$\frac{5}{20} - \frac{4}{20} = \frac{1}{20}$$

Multiplying Fractions

Multiply the numerators and denominators together.

(1 x 2)

$$\frac{1}{3} \times \frac{2}{3} = \frac{2}{9}$$

= (2)

= (9)

(3 x 3)

Dividing Fractions

Keep it, Change it, Flip it.

$$\frac{1}{5} \div \frac{1}{3} =$$

Change the sign. Flip the divisor.

KEEP   CHANGE   FLIP
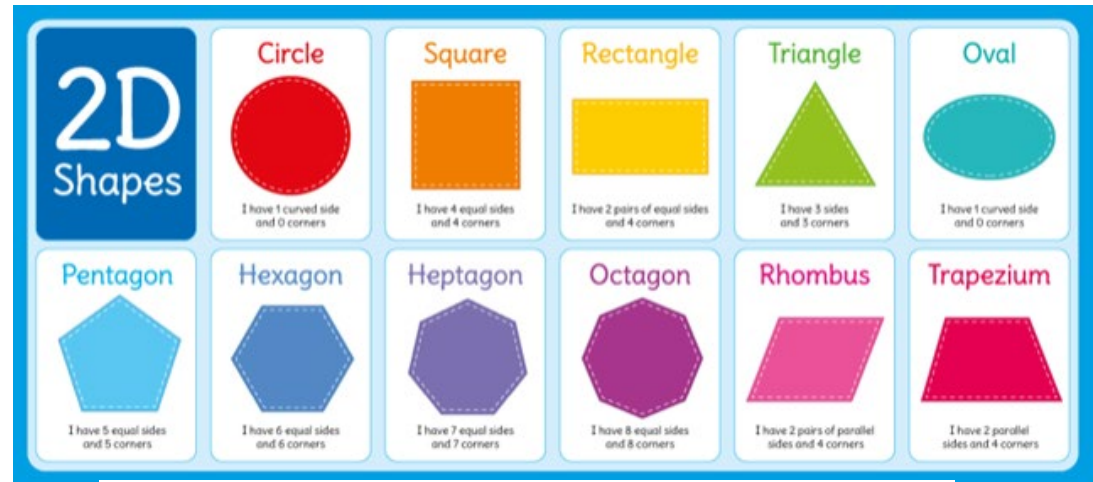
$$\frac{1}{5} \times \frac{3}{1} = \frac{3}{5}$$

Year 7 - Mathematics - Autumn Term: Shape
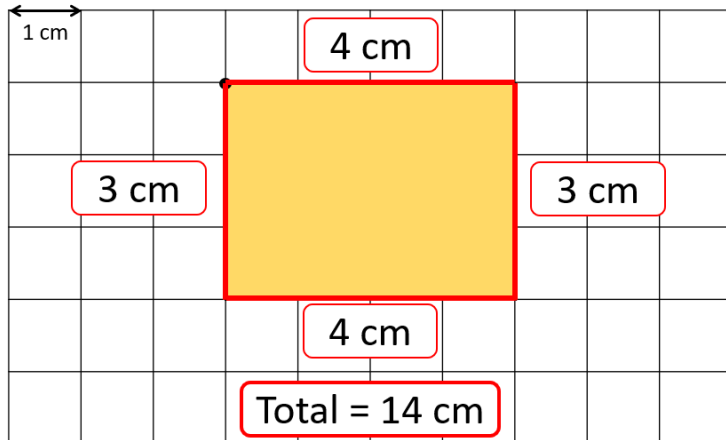
Key Definitions

Key Word	Definition
Perimeter	The distance around the edge of the shape.
Area	The amount of space inside a 2D shape.
Parallel	Two lines that are equal distance from each other that will never meet.
Perpendicular	Two straight lines that meet at 90 degrees.

2D shapes to learn:

2D Shapes

Circle — I have 1 curved side and 0 corners

Square — I have 4 equal sides and 4 corners

Rectangle — I have 2 pairs of equal sides and 4 corners

Triangle — I have 3 sides and 3 corners

Oval — I have 1 curved side and 0 corners

Pentagon — I have 5 equal sides and 5 corners

Hexagon — I have 6 equal sides and 6 corners

Heptagon — I have 7 equal sides and 7 corners

Octagon — I have 8 equal sides and 8 corners

Rhombus — I have 2 pairs of parallel sides and 4 corners

Trapezium — I have 2 parallel sides and 4 corners

Perimeter:

The **perimeter** of a shape is the **distance around its edge**.
Add all the sides together.

1 cm

4 cm

3 cm   3 cm
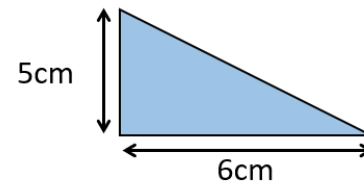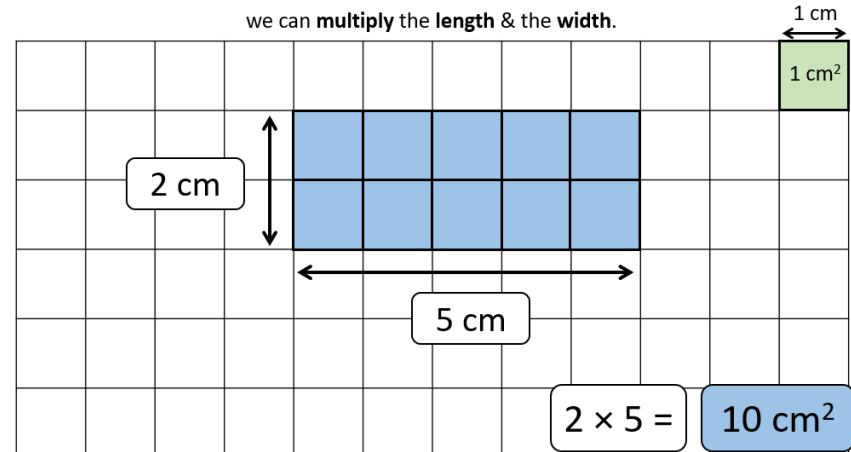
4 cm

Total = 14 cm

Units:
Area: mm^2, cm^2, m^2
Perimeter: mm, cm, m

Area:

To find the area of a rectangle quickly, we can **multiply** the **length** & the **width**.

1 cm

1 cm²

2 cm

5 cm

$2 \times 5 =$ 10 cm²

Area of a triangle $= \dfrac{Base \times Height}{2}$

5cm

6cm

$$A = \frac{5 \times 6}{2} = 15cm^2$$

Year 7 - Mathematics - Autumn Term: Algebra

Key Definitions

Key Word	Definition
Simplify	Collecting like terms within an expression.
Expand	Multiply out a bracket.
Factorise	Put brackets into an expression by taking out the highest common factor.
Substitute	Replacing variables in an expression with their numerical values.

Topic Vocabulary

Variable	A letter to represent a value. The value can change.	$\widehat{2x} + 5$
Coefficient	The number attached a variable.	$\widehat{2x} + 5$
Term	The separate parts of expressions, Or equations	$\widehat{2x} \, \widehat{+ \, 5}$
Expression	Any combination of letters & numbers.	$\widehat{2x + 5}$
Equation	Two equal expressions. They can be solved to find the value of variables.	$2x + 5 = 8$
Formula	Two equal expressions. Values are substituted to evaluate one variable.	$A = \dfrac{b \times h}{2}$

Simplifying

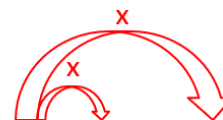When simplifying collect the like terms (same letters).

$$a + a + a = 3a$$

$$5a - a = 4a$$

$$2a + 5b + a + 3b = 3a + 8b$$

Expanding

To expand brackets you need to multiply everything inside the brackets by whatever is outside the bracket.

$$5(x + 2) = 5x + 10$$

Factorising

$$4x + 20$$
$$\div 4 \quad \div 4$$

Highest Common Factor

$$4$$

Put the common parts outside the bracket

$$4(x + 5)$$