Kildwick CE VC Primary School
Learning to Live - Living to Love - Loving to Learn

What is Fluency in Maths?

Fluency in maths is about developing number sense and being able to the most appropriate method for the task at hand; to be able to apply a skill to multiple contexts.
The National Curriculum states that pupils should become fluent in the fundamentals of mathematics through varied and frequent practice. While a part of this is about knowing key mathematical facts and recalling them efficiently, fluency means so much more than this as it allows pupils to delve much deeper.

But what are the stages our learners go through in order to become fluent? And how do we decide if a child has attained fluency in a mathematical concept?

Three stages of fluency

1. Simple strategies
Initially, as a child gets to grips with a new skill, they can work out an answer using concrete resources or counting strategies. This will probably help them solve a problem accurately, but it's not the most efficient strategy.

2. Mental calculations
As learners become more proficient with new learning, they reach the second stage of fluency. Learners at this stage can work out an answer in their head. It still requires some thinking and effort as they develop reasoning strategies, but they're well on their way to becoming more efficient.

3. Achieving fluency
Finally, children reach the stage of 'I just knew it'. They can reliably produce accurate answers in an efficient way. This stage often involves using their knowledge flexibly; making connections so that the known can be used to work out the unknown.

How do we know when a learner is fluent?

You can identify a fluent learner when they have a secure understanding of what they're doing and why they're doing it. Fluency is made up of three key parts: efficiency, accuracy and flexibility.

•Efficiency: learners choose efficient strategies and don't get bogged down in too many steps
•Accuracy: learners are accurate in their workings, have great recall of facts and double check their answers
•Flexibility: learners understand that there are many ways to solve a problem

Fluency means that learners can do more than just memorise procedures. To be truly fluent, a child understands the meaning of the operations and their relationships to each other, they have a large knowledge bank of number facts, and a deep understanding of the base ten system.

How we build fluency in the classroom

At Kildwick CE Primary School, each class uses knowledge organisers for their year groups to help direct the teaching of fluency. Teachers provide fluency activities (remembering red) on a daily or weekly basis and ensure there are visual reminders around the classroom to bring it to the forefront of the children's minds.

The relevant knowledge organisers are shared with parents, enabling parents to become involved in learning and have a greater understanding of the expectations in maths for their child. By the end of the year, children should know these facts and the aim is for them to achieve true automaticity so they can recall them instantly.

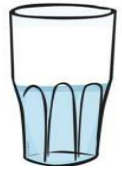
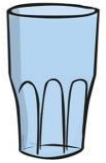
FS Maths Knowledge Mat

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

Number bonds to 5

1	2	3	4	5
0 + 1	0 + 2	0 + 3	0 + 4	0 + 5
	1 + 1	1 + 2	1 + 3	1 + 4
			2 + 2	2 + 3

Capacity

Empty	Half Full	Full
		

Number	Double
0	0
1	2
2	4
3	6
4	8
5	10

Number	Half
0	0
2	1
4	2
6	3
8	4
10	5

Quantity To 10

1		6	
2		7	
3		8	
4		9	
5		10	

Months Of The Year

January	February	March
April	May	June
July	August	September
October	November	December

Time

O'clock
The hour hand points to the time and the minute hand points to 12.

Shapes

circle	
triangle	
square	
rectangle	

Days of the Week

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

Weight

Heavy / Heavier / Heaviest	
Light / Lighter / Lightest	
Balanced / Equal	

Pattern

Colour		blue, red, blue, red
Size		big, small, big, small
Length		long, short, long, short

Year 1: Maths Knowledge Mat

Numerals and Number Vocabulary			
0	zero	10	ten
1	one	20	twenty
2	two	30	thirty
3	three	40	forty
4	four	50	fifty
5	five	60	sixty
6	six	70	seventy
7	seven	80	eighty
8	eight	90	ninety
9	nine	100	one hundred

Symbols and Vocabulary	
+	**plus, add**
-	**minus, subtract**
=	**is equal to**

Odd and Even
Odd numbers end in 1, 3, 5, 7, 9
Even numbers end in 2, 4, 6, 8, 0

Counting
Count forwards and backwards from **any number to and across 100**
Count in **2s 2, 4, 6, 8, 10, 12…**
Count in **5s 5, 10,15, 20, 25, 30…**
Count in **10s 10, 20, 30, 40, 50 …**
Say the number **one more than…**
Say the number **one less than…**

Doubles, halves and quarters		
Number	double	quarter
6	12	
7	14	
8	16	2
9	18	
10	20	
Number	half	quarter
12	6	3
14	7	
16	8	4
18	9	
20	10	5

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

Year 1: Maths Knowledge Mat

Time – Sticky Knowledge

There are **24 hours in a day**

There are **60 minutes in an hour**

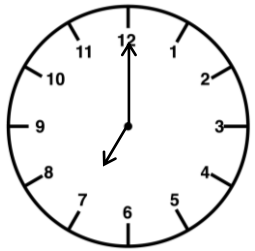
There are **60 seconds in a minute**

A.M. means in the morning

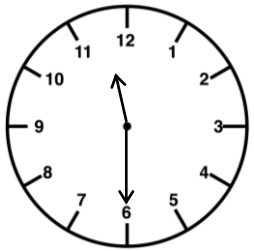
P.M. means in the afternoon

O'Clock is when the minute hand points to the 12 and the hour hand points at the hour.

Half past is when the minute hand points to the six and the hour hand points past the hour.



Seven o'clock



Half past eleven

Days of the Week

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

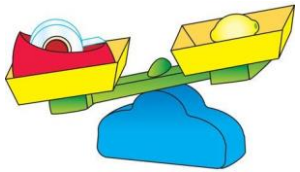
Months of the Year

January
February
March
April
May
June
July
August
September
October
November
December

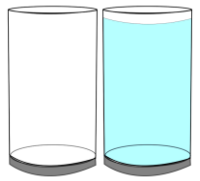
Key Vocabulary - Measurement

long / short
longer / shorter
tall / short
double / half

heavy / light
heavier than…
lighter than…



full / empty
more than…
less than…
half full / half empty



quicker / slower
before / after
first / next
today / yesterday
morning / afternoon / evening

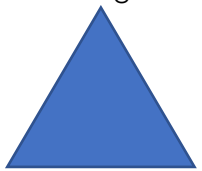
2D Shapes

square

rectangle

circle

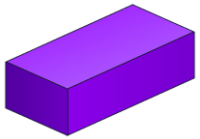
triangle



3D Shapes

cube

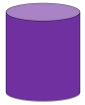
cuboid



sphere

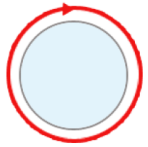
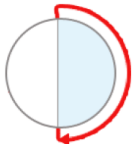
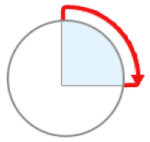
cone

cylinder



pyramid

Direction and Movement

Whole turn	Half turn	Quarter turn	Three- quarter turn
			

Year 2: Maths Knowledge Mat

Read and write numbers to at least 100 in numerals and in words			
0	zero	10	ten
1	one	20	twenty
2	two	30	thirty
3	three	40	forty
4	four	50	fifty
5	five	60	sixty
6	six	70	seventy
7	seven	80	eighty
8	eight	90	ninety
9	nine	100	one hundred

Symbols and Vocabulary	
x	multiply, times
÷	divide
<	is less than
>	is greater than
=	is equal to

Counting to at least 100
Count forwards and backwards from **any number in steps of 2**
Count forwards and backwards from **any number in steps of 3**
Count forwards and backwards from **any number in steps of 5**
Count forwards and backwards from **any number in steps of 10**

Addition and multiplication can be done in any order. But subtraction and division can not!
23 + 11 = 34 11 + 23 = 34
3 x 5 = 15 5 x 3 = 15
23 – 11 = 12 But you can not take 23 coins from 11 coins
10 ÷ 5 = 2 5 ÷ 10 = ½

Using knowledge of number bonds within 20 (from Year 1) to calculate to at least 100
Examples: If 3 + 7 = 10 then 30 + 70 = 100 If 6 – 4 = 2 then 60 – 40 = 20

Multiplication Tables			
x	**2**	**5**	**10**
1	2	5	10
2	4	10	20
3	6	15	30
4	8	20	40
5	10	25	50
6	12	30	60
7	14	35	70
8	16	40	80
9	18	45	90
10	20	50	100
11	22	55	110
12	24	60	120

Fractions	
½	a half
¼	a quarter
¾	three quarters
½ = two quarters	
You can calculate fractions of numbers: ½ of 20 is 10. This is the same as dividing 20 by 2. ¼ of 20 is 5. This is the same as dividing 20 by 4.	

2 Digit Place value	Tens	Ones
Example 56 is	5	6
99	9	9
7	0	7

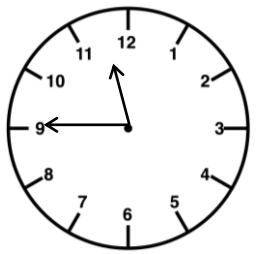
Year 2: Maths Knowledge Mat

Time – Sticky Knowledge

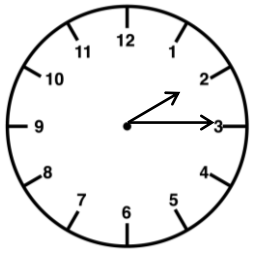
There are **24 hours in a day**

There are **60 minutes in an hour and a clock shows these in 5 minute intervals**

Quarter to is when the minute hand points to the 9 and the hour hand nearly points at the hour.
Quarter past is when the minute hand points to the three and the hour hand points past just the hour.



Quarter to 12

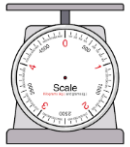


Quarter past 2

Key Vocabulary - Measurement

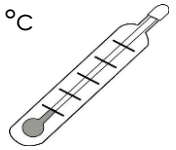
Metre m
Centimetre cm

Kilogram kg
Gram g



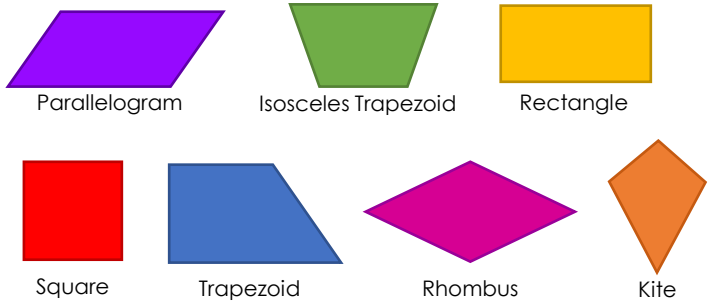
Litre l
Millilitre ml

Degrees centigrade °c

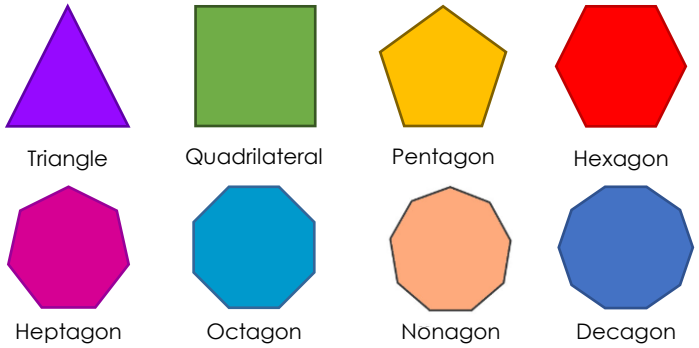


2D Shapes

Quadrilaterals have four sides



A polygon is a 2D shape with straight sides

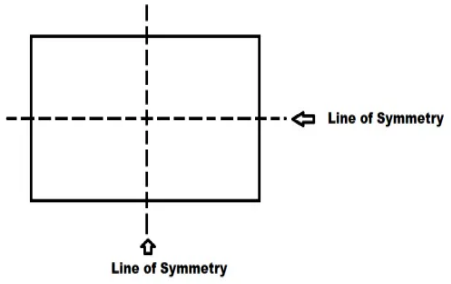


Coins

Pounds £

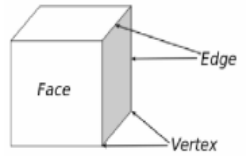
Pence p

Symmetry



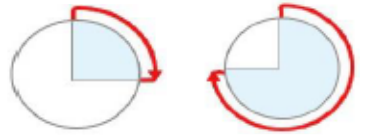
3D Shapes

Faces, edges and vertices



Direction

Quarter turn is 1 right angle
¾ turn is 3 right angles



Year 3: Maths Knowledge Mat

Counting from 0

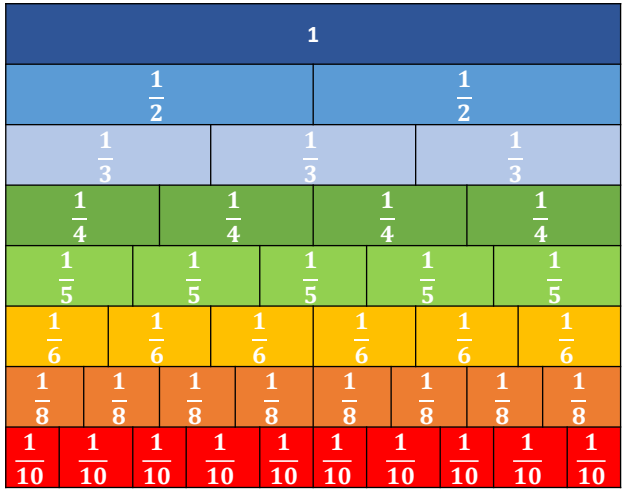
Counting in **multiples of 4** 0, 4, 8, 12, 16, 20, 24, 28, 32…
Counting in **multiples of 8** 0, 8, 16, 24, 32, 40, 48…
Counting in **multiples of 50** 0, 50, 10, 150, 20, 250, 300…
Counting in **multiples of 100** 0, 100, 200, 300, 400, 500…

Vocabulary

100	**hundred**
1000	**thousand**
+ - **X ÷**	**inverse operations**
$\frac{1}{2}$ ←	**Numerator**
$\frac{1}{2}$ ←	**Denominator**

Place value	Thousands	Hundreds	Tens	Ones		Tenths
1238	1	2	3	8	•	0
58.9	0	0	5	8	•	9
3050.4	3	0	5	0	•	4

Fractions



Equivalent Fractions

Examples:

$\frac{1}{2} = \frac{2}{4}$

$\frac{5}{10} = \frac{4}{8}$

Adding fractions

$\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$

Multiplication Tables

x	3	4	8
1	3	4	8
2	6	8	16
3	9	12	24
4	12	16	32
5	15	20	40
6	18	24	48
7	21	28	56
8	24	32	64
9	27	36	72
10	30	40	80
11	33	44	88
12	36	48	96

Formal methods of addition, subtraction and short multiplication and division

768 + 653 becomes

```
  7 6 8
+ 6 5 3
-------
1 4 2 1
  1 1
```

862 - 514 becomes

```
  8 6 2
- 5 1 4
-------
  3 4 8
```

934 - 456 becomes

```
    8  12  1
  ~~9~~ ~~3~~ 4
- 4  5  6
---------
  4  7  8
```

26 x 8 becomes

```
  2 6
x   8
-----
2 0 8
  4
```

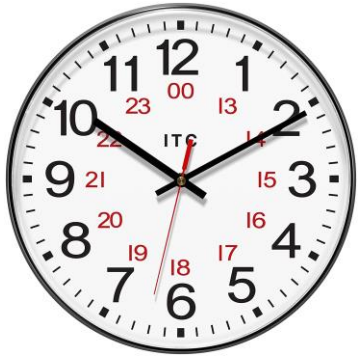
78 ÷ 6 becomes

```
    1 3
   -----
6 | 7 8
    1
```

Year 3: Maths Knowledge Mat

Time – Sticky Knowledge

24 hour clocks



The time is 10.10 in the morning or 22.10 in the evening in 24 hour time.

Roman numerals

This clock is showing X to II or 10 to 2.
On some clocks the 4 is IIII and sometimes it is IV

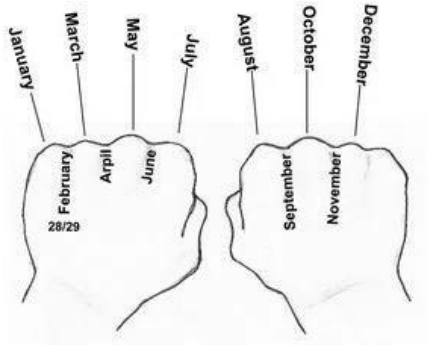
a.m. is from **midnight** until mid-day (noon)
1 to 12 in 24 hour clock time

p.m. is from mid-day (**noon**) until midnight
13 to 24 in 24 hour clock time

There are **365 days in a year.**
A leap year has 366 days. This is February 29th and happens every 4 years.

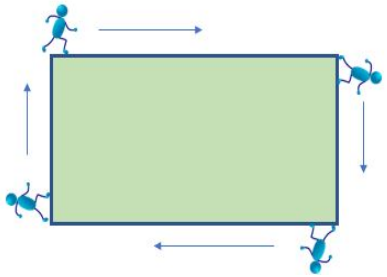
January	31 days
February	28 days
March	31 days
April	30 days
May	31 days
June	30 days
July	31 days
August	31 days
September	30 days
October	31 days
November	30 days
December	31 days

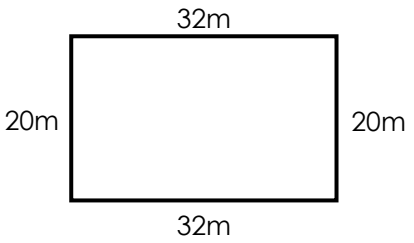
'Knuckle Mnemonic'



Perimeter

Perimeter is the distance around a 2D shape



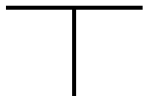


Non symmetrical (irregular) polygons

Polygon/Shape	Regular	Irregular
Triangle		
Quadrilateral		
Pentagon		
Hexagon		
Heptagon		
Octagon		

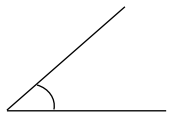
Lines

Parallel



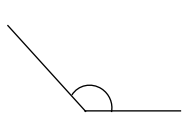
Perpendicular

Angles

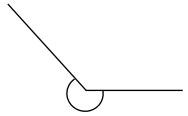


Acute angle
Less than 90°

Right angle
Exactly 90°



Obtuse angle
More than 90°
Less than 180°



Reflex angle
More than 180°
Less than 360°

Year 4: Maths Knowledge Mat

Counting from 0

Counting in **multiples of 6**
0, 6, 12, 18, 24, 30, 36, 42 …

Counting in **multiples of 7**
0, 7, 14, 21, 38, 35, 42, 49…

Counting in **multiples of 9**
0, 9, 18, 27, 36, 45, 54, 63 …

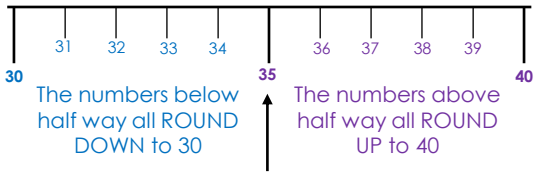
Counting in **multiples of 25**
0, 25, 50, 75, 100, 125, 150…

Counting up and down in **hundredths**

$\frac{1}{100}, \frac{2}{100}, \frac{3}{100}, \frac{4}{100} \ldots\ldots \frac{99}{100}, 1$

A **thousand more** than 4753 is 5753.
A **thousand less** than 4753 is 3753.

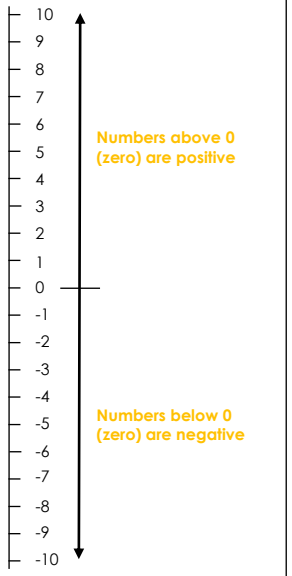
Rounding



Rounding to 100 and 1000 follows the same rule.
350 rounds up to 400
3500 rounds up to 4000

Rounding decimal places also follows the same rule.
3.4 rounds to 3.0 but 3.5 rounds to 4.0
3.04 rounds to 3.00 but 3.05 rounds to 3.10

Negative Numbers



Multiplication Tables
(and 2x,3x,4x,5x,8x,10x from previous years)

x	6	7	9	11	12
1	6	7	9	11	12
2	12	14	18	22	24
3	18	21	27	33	36
4	24	28	36	44	48
5	30	35	45	55	60
6	36	42	54	66	72
7	42	49	63	77	84
8	48	56	72	88	96
9	54	63	81	99	108
10	60	70	90	110	120
11	66	77	99	121	132
12	72	84	108	132	144

Formal methods of short multiplication and division

351 x 7 becomes

$$\begin{array}{r} 3\ 5\ 1 \\ \times\quad\quad 7 \\ \hline 2\ 4\ 5\ 7 \\ \hline 2\ 3 \end{array}$$

91 ÷ 7 becomes

$$\begin{array}{r|l} & 1\ 3 \\ \hline & 2 \\ 7 & 9\ 1 \end{array}$$

Roman Numerals

1 = I	10 = X
2 = II	20 = XX
3 = III	30 = XXX
4 = IV	40 = XL
5 = V	50 = L
6 = VI	60 = LX
7 = VII	70 = LXX
8 = VIII	80 = LXXX
9 = IX	90 = XC
	100 = C

Factors

A **factor pair** is a pair of numbers that, when multiplied will result in a given product.

Factor pairs of 16 are
1 , 16
2 , 8
4 , 4

Year 4: Maths Knowledge Mat

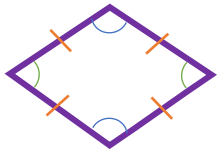
Time – Sticky Knowledge

Digital and analogue clocks

Both clocks show it is 10 o'clock. But only the digital clock shows that it is pm (in the evening) because it is using 24 hour time.

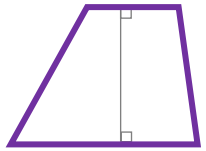
2D Shapes

Rhombus



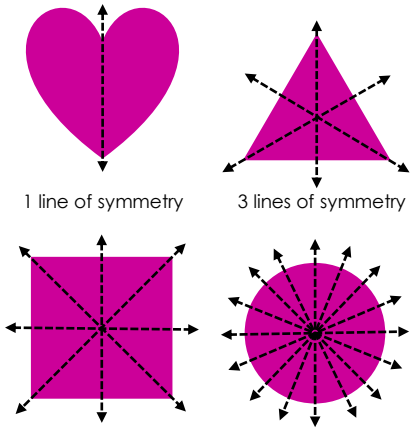
All four sides are the same length, like a square that has been squashed sideways.

Trapezium
(or trapezoid)



Two sides are parallel. Side lengths and angles are not equal.

Symmetry



1 line of symmetry

3 lines of symmetry

4 lines of symmetry

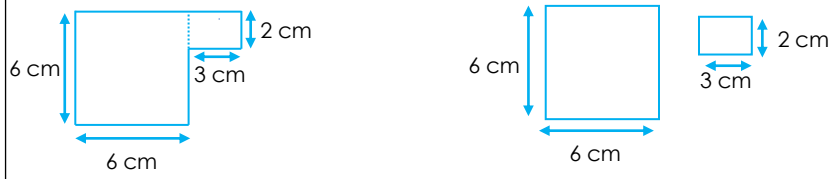
Infinite number of lines of symmetry

Simplifying fractions

$\frac{40}{80} = \frac{20}{40} = \frac{10}{20} = \frac{5}{10} = \frac{1}{2}$ So $\frac{40}{80} = 0.5$

Area

The area of this shape ⟶ EQUALS ⟶ the area of these two



The area of this shape

6

cm²

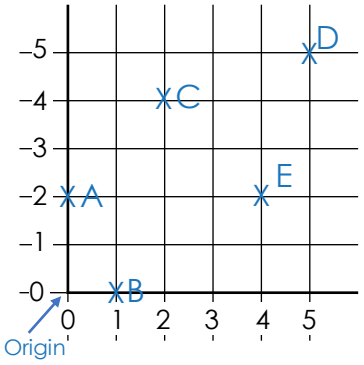
= (6 X 6) + (2 X 3)

= 36 +

= 42

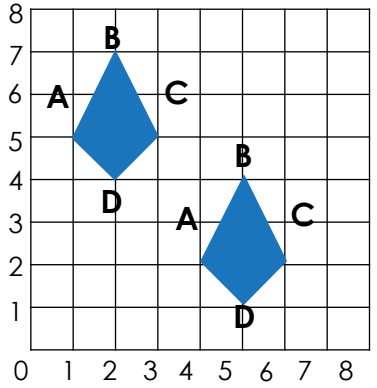
Place value Each row divides by 10	Tens	Ones	•	tenths	hundredths
45	4	5	•	0	0
$4.5 = 4\frac{5}{10} = 4\frac{1}{2}$	0	4	•	5	0
$0.45 = \frac{45}{100}$	0	0	•	4	5

Coordinates



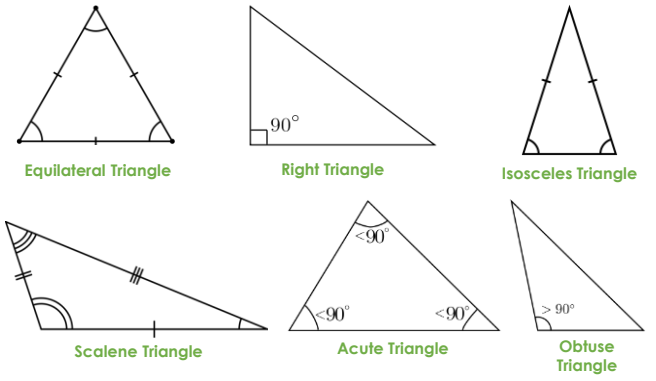
X axis comes first, so

A = (0,2)
B = (1,0)
C = (2,4)
D = (5,5)
E = (4,2)



This shape has been **translated** up and left by -3, -3. (Taken away from each co-ordinate.)

Triangles



Year 5: Maths Knowledge Mat

Rounding

78,543

To the **nearest 10** is	78,540
To the **nearest 100** is	78,500
To the **nearest 1000** is	79,000
To the **nearest 10,000** is	80,000
To the **nearest 100,000** is	100,000

67.53

To the **nearest 10** is	70
To the **nearest whole number** is	68
To **one decimal place** is	67.6

Multiplying a fraction by a whole number

If you have a **proper** fraction multiplied by a whole number, it is going to be **less** than that whole number

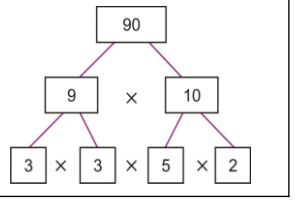
$$\frac{3}{5} \times 2$$

$$\frac{3}{5} \times \frac{2}{1} = \frac{6}{5} = 1\frac{1}{5}$$

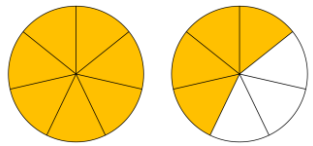
Prime Numbers

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

Prime factors



Converting a mixed number to an improper fraction



$$1\frac{4}{7} = \frac{11}{7}$$

Place value Each row divides by 10	Tens	Ones	.	tenths	hundredths	thousandths
36.7	3	6	.	7	0	0
3.67	0	3	.	6	7	0
0.367	0	0	.	3	6	7

$36.7 = 36\frac{7}{10}$ $3.67 = 3\frac{67}{100}$ $0.367 = \frac{367}{1000}$

Percentages %

'part per hundred' **50% = $\frac{50}{100}$** **25% = $\frac{25}{100}$**

50% of 100 = 50 25% of 100 = 25
50% of 200 = 100 25% of 200 = 50
50% of 300 = 150 25% of 300 = 75

$\frac{1}{2}$ = 0.5 = 50% $\frac{1}{4}$ = 0.25 = 25%

$\frac{1}{5}$ = 0.2 = 20% $\frac{2}{5}$ = 0.4 = 40%

Formal methods of multiplication and division

3741 x 6 becomes

$$\begin{array}{r} 3\ 7\ 4\ 1 \\ \times \qquad 6 \\ \hline 2\ 2\ 4\ 4\ 6 \\ \hline 4\ \ 2 \end{array}$$

485 ÷ 11 becomes

$$\begin{array}{r} 4\ 4\ \text{r}1 \\ 11\overline{)\,4\ 8\ 5} \\ \quad 4 \end{array}$$

34 x 26 becomes

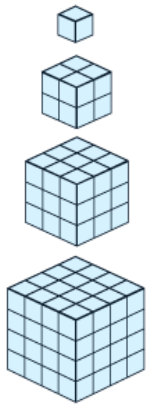
$$\begin{array}{r} \ \ 2 \\ 3\ 4 \\ \times\ 2\ 6 \\ \hline 6\ 8\ 0 \\ 2\ 0\ 4 \\ \hline 8\ 8\ 4 \end{array}$$

134 x 27 becomes

$$\begin{array}{r} \ \ 2\ \ 2 \\ 1\ 3\ 4 \\ \times\ \ 2\ 7 \\ \hline 2\ 6\ 8\ 0 \\ 9\ 3\ 8 \\ \hline 3\ 6\ 1\ 8 \\ \hline 1\ \ 1 \end{array}$$

Square and cubed numbers

$1^2 = 1 \times 1 = 1$
$2^2 = 2 \times 2 = 4$
$3^2 = 3 \times 3 = 9$
$4^2 = 4 \times 4 = 16$
$5^2 = 5 \times 5 = 25$
$6^2 = 6 \times 6 = 36$
$7^2 = 7 \times 7 = 49$
$8^2 = 8 \times 8 = 64$
$9^2 = 9 \times 9 = 81$
$10^2 = 10 \times 10 = 100$



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**

Year 5: Maths Knowledge Mat

Measures – Sticky Knowledge

1 km = 1000 m
1 m = 100 cm
1 cm = 10 mm

1 kg = 1000 g

1 l = 1000 ml

Imperial measures

1 mile = 1.6 km
I yard = 0.91 m
1 foot = 30 cm
1 inch = 2.54 cm

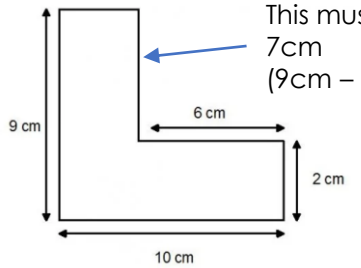
1 lb (pound) = 0.45 kg

1 pint = 0.57 litre

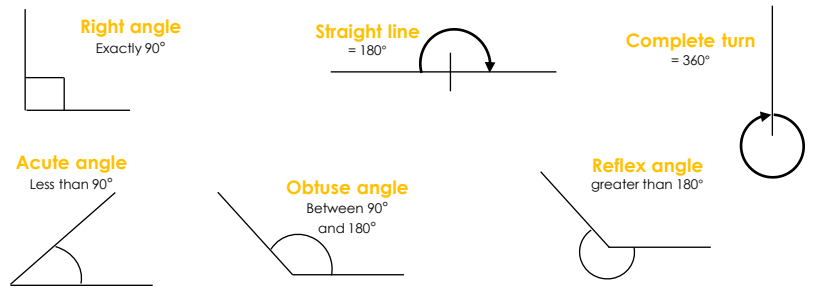
Perimeter

This must be 4 cm (10cm – 6cm)

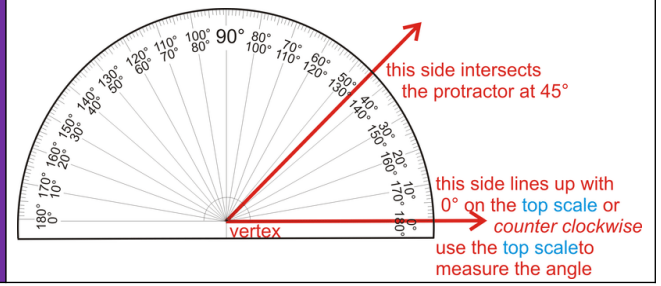
This must be 7cm (9cm – 2cm)



Angles



Using a protractor

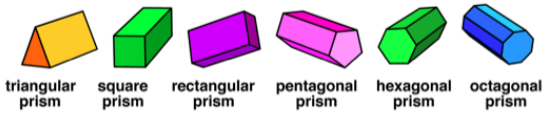


3D Shapes

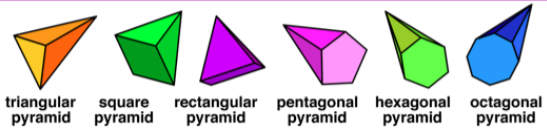
Solid (3D) shapes are three-dimensional shapes having length, breadth and height.

Examples

Prisms



Pyramids



Platonic solids

Roman Numerals

Symbol	Value
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Dates

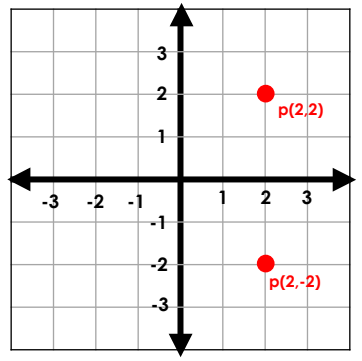
2020 = MMXX
2021 = MMXXI
2022 = MMXXII
2023 = MMXXIII
2024 = MMXXIV

1066 = MLXVI

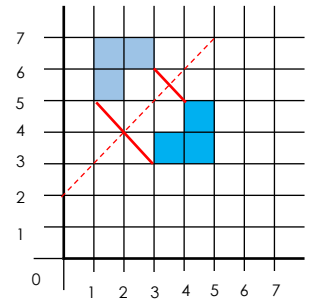
1939 = MCMXXXIX

Coordinates

P has been reflected in the x axis



The shape has been reflected in the dotted line y=x+2



Year 6: Maths Knowledge Mat

Rounding

8,378,543

To the **nearest 10,000** is 8,380,000
To the **nearest 100,000** is 8.400,000
To the **nearest 1,000,000** is 8,000,000
To the **nearest 10,000,000** is 10,000,000

Multiplying a fraction by a fraction

$\frac{3}{5} \times \frac{6}{8} = \frac{3 \times 6}{5 \times 7} = \frac{18}{35}$

$\frac{3}{4} \times \frac{1}{3} = \frac{3 \times 1}{4 \times 3} = \frac{3}{12} =$ reduces to $\frac{1}{4}$

Percentages

On a calculator

36% of 76
0.36 x 76
Change to a decimal and multiply

Increasing

Increase £70 by 14%
14% of 70 = 0.14 x 70 = £9.80
New amount = £70 + £9.80
=£79.80

Fraction to %

$\frac{15}{20} \overset{\times 5}{=} \frac{75}{100} = 75\%$

Or 15÷20 x 100 = 75%

Decreasing

Decrease £70 by 14%
14% of 70 = 0.14 x 70 = £9.80
New amount = £70 - £9.80
=£60.20

Without a calculator

50% - half
25% - half and half
75% - 50% + 25%
10% - divide by 10
5% - half 10%
20% - double 10%

Calculations with mixed numbers

Add Mixed Numbers

$8\frac{1}{2} + 3\frac{3}{4}$

$= \frac{17}{2} + \frac{15}{4}$ Change to improper fractions

$= \frac{17}{2} \times \frac{2}{2} + \frac{15}{4}$ Change to common denominator

$= \frac{34}{4} + \frac{15}{4}$

$= \frac{49}{4}$ Add the numerators

$= 12\frac{1}{4}$ Change to mixed numbers

Subtract Mixed Numbers

$8\frac{1}{2} - 4\frac{3}{4}$

$= \frac{17}{2} - \frac{15}{4}$ Change to improper fractions

$= \frac{17}{2} \times \frac{2}{2} - \frac{15}{4}$ Change to common denominator

$= \frac{34}{4} - \frac{15}{4}$

$= \frac{19}{4}$ Subtract the numerators

$= 4\frac{3}{4}$ Change to mixed numbers

Adding fractions

$\frac{1}{2} + \frac{1}{3} = ?$

$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$ $\quad \frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$

$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

Mean Average

The sum of all data points divided by the number of data points

BODMAS

B → Bracket
O → Of
D → Division
M → Multiplication
A → Addition
S → Subtraction

BODMAS EXAMPLE

$40 - (5 \times 2^2 + 7)$

Brackets 1st then use ODMAS inside the brackets

$40 - (5 \times \mathbf{4} + 7)$	(2^2)
$40 - (\mathbf{20} + 7)$	(Multiply 5 x 4)
$40 - \mathbf{27}$	(Add 20 + 7)
Answer = 13	

Ratio

Ratio compares values.
A **ratio** says how much of one thing there is compared to another thing.
Ratio 3:1. There are 3 blue squares to 1 yellow square.

Formal methods of multiplication and division

134 x 27 becomes

```
    2  2
    1  3  4
X       2  7
-----------
    2  6  8  0
       9  3  8
-----------
    3  6  1  8
    1  1
```

564 ÷ 15 becomes

```
15 | 5  6  4
     4  5  0   15 X 30
     -------
     1  1  4
     1  0  5   15 X 7
     -------
        3  7
```

$\frac{9}{15} = \frac{3}{5}$

Answer: $37\frac{3}{5}$

432 ÷ 15 becomes

```
      2  8 . 8
15 | 4  3  2 . 0
     3  0
     -------
     1  3  2
     1  2  0
     -------
        1  2  0
        1  2  0
        -------
              0
```

Answer: 28.8

384 ÷ 11 becomes

```
          3  4  r10
          5
11 | 3  8  4
```

Answer: $34\frac{10}{11}$

Year 6: Maths Knowledge Mat

Algebra

One step equation e.g. y + 14 = 20

Undo addition or subtraction - 14 -14

y = 6

Two step equation e.g. 2x + 5 = 11

Undo addition or subtraction -5 -5

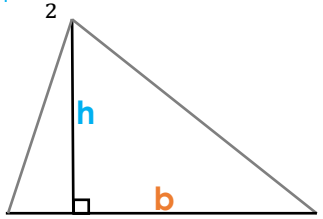
2x = 6

Undo multiplication or division x ÷ 2 6 ÷ 2

x = 3

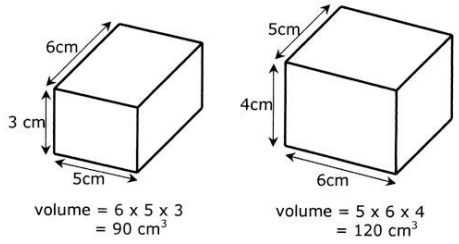
Area of a triangle

Area = $\frac{1}{2}$ x b x h = $\frac{bh}{2}$

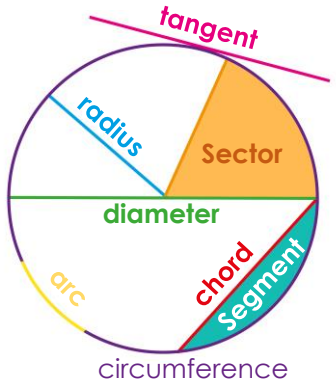


Volume

volume = length x width x height

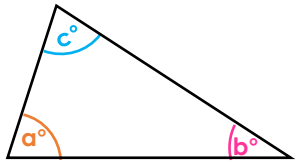


Circles

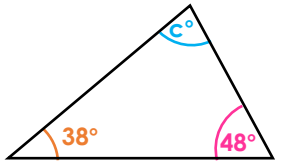


The **diameter** is twice the **radius**

Angles in a triangle

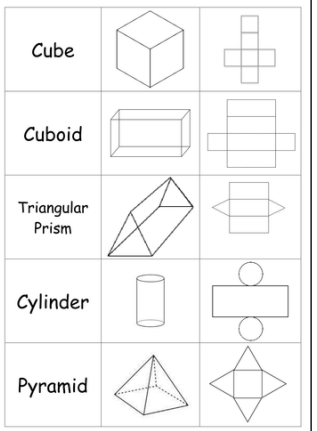


a° + b° + c° = 180°



38° + 60° + c° = 180°
c° = 180° - 98
c° = 82°

Nets of 3D shapes



Square Numbers		Square Roots	
1^2	1	$\sqrt{1}$	1
2^2	4	$\sqrt{4}$	2
3^2	9	$\sqrt{9}$	3
4^2	16	$\sqrt{16}$	4
5^2	25	$\sqrt{25}$	5
6^2	36	$\sqrt{36}$	6
7^2	49	$\sqrt{49}$	7
8^2	64	$\sqrt{64}$	8
9^2	81	$\sqrt{81}$	9
10^2	100	$\sqrt{100}$	10
11^2	121	$\sqrt{121}$	11
12^2	144	$\sqrt{144}$	12
13^2	169	$\sqrt{169}$	13

Cube Numbers		Cube Roots	
1^3	1	$\sqrt{1}$	1
2^3	8	$\sqrt{8}$	2
3^3	27	$\sqrt{27}$	3
4^3	64	$\sqrt{64}$	4
5^3	125	$\sqrt{125}$	5

Vocabulary	
factors	numbers that you multiply together to get other numbers
multiple	the result of multiplying a number by an integer
HCF	**Highest Common Factor** - the largest factor shared by two or more numbers
LCM	**Lowest Common Multiple** - the smallest number that is a multiple of two or more numbers.