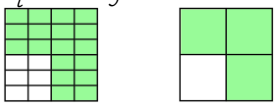
MATHS KNOWLEDGE ORGANISER - YEAR 5

Fractions

Equivalent fractions



$\frac{18}{24} = \frac{3}{4}$

To simplify, divide numerator and denominator by the highest common factor.

Comparing fractions

Convert to the same numerator or denominator to compare.

$\frac{2}{5}$ and $\frac{4}{7} = \frac{4}{5}$ and $\frac{4}{7}$ $\frac{4}{5}$ is larger

$\frac{4}{5}$ and $\frac{17}{20} = \frac{16}{20}$ and $\frac{17}{20}$ $\frac{17}{20}$ is larger

Addition and subtraction

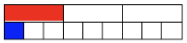
Same denominator

$\frac{4}{7} + \frac{1}{7} = \frac{5}{7}$ $\frac{4}{7} - \frac{1}{7} = \frac{3}{7}$

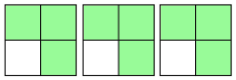
Different denominator

$\frac{5}{8} + \frac{1}{4} = \frac{5}{8} + \frac{2}{8} = \frac{7}{8}$

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



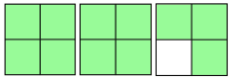
Multiplying a fraction by an integer



$3 \times \frac{3}{4} = \frac{3}{4} + \frac{3}{4} + \frac{3}{4}$

$= \frac{9}{4} = 2\frac{1}{4}$

Mixed numbers and improper fractions



$2\frac{3}{4} = \frac{4}{4} + \frac{4}{4} + \frac{3}{4} = \frac{11}{4}$

Mixed number — Improper fraction

Equivalents

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{1}{4}$	0.25	25%
$\frac{1}{5}$	0.2	20%
$\frac{1}{10}$	0.1	10%
$\frac{1}{100}$	0.01	1%

Place values of decimals

Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths
1	6	9	•	6	7	2
100	60	9		$\frac{6}{10}$	$\frac{7}{100}$	$\frac{2}{1000}$

$169\frac{672}{1000}$

Ordering decimals

First ensure they have the same number of decimal places:

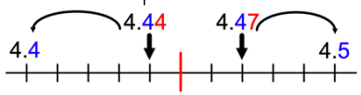
0.09 = 0.090
0.217 = 0.217
0.3 = 0.300

From smallest to largest

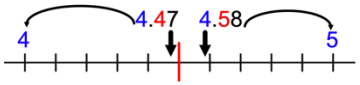
0.09 < 0.217 < 0.3

Rounding fractions

to 1 decimal place



to the nearest whole number



Tables and Graphs

Distance table

Theale			
7.5 km	Reading		
11 km	7.2 km	Purley	
22 km	32 km	33 km	Newbury

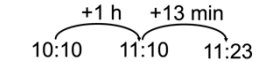
How far is it from Theale to Newbury? 22 km

Timetables

Reading	10:10	11:20
Theale	10:35	--
Thatcham	11:02	12:04
Newbury	11:23	12:25

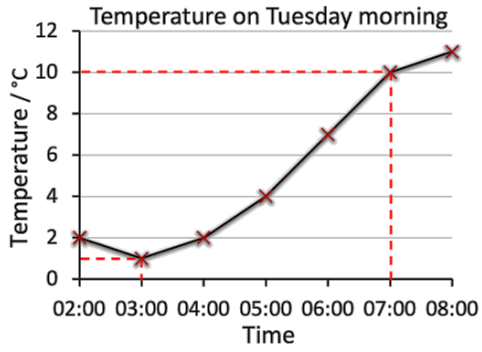
What time does the 11:20 bus from Reading leave Thatcham? 12:04

How long does it take the first bus to get from Reading to Newbury?



1 h 13 min

Line graph

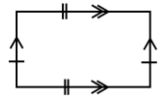


What is the difference between the temperatures at 3 am and 7 am? 10 – 1 = 9°C

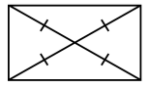
Rectangles *Quadrilaterals - 4 sides*

All angles 90°

Opposite sides equal and parallel



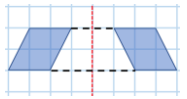
Diagonals equal and bisect each other



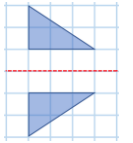
A square is a special rectangle

Transformations

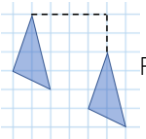
Reflection in a vertical line



Reflection in a horizontal line

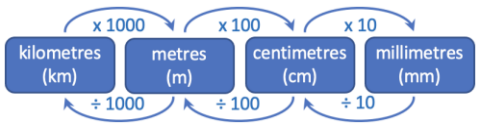


Translation 4 right and 2 down

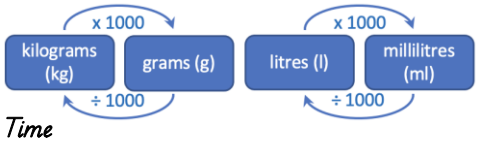


Reflection and translation are *congruent* - shapes stay the same size and shape.

Length

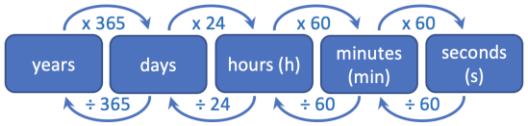


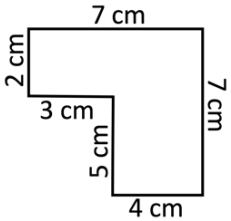
Mass

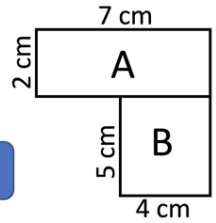


Volume

Time







Perimeter

Perimeter = 2 + 7 + 7 + 4 + 5 + 3
= 28 cm

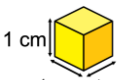
Area

Area of rectangle = length x width

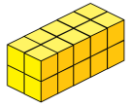
Area A = 7 x 2 = 14 cm^2
Area B = 5 x 4 = 20 cm^2
Total area = 20 + 14
= 34 cm^2

Volume

Measured in cubic units

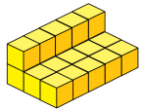


1 cm^3 (1 cubic centimetre) Holds 1 ml water



20 cm^3

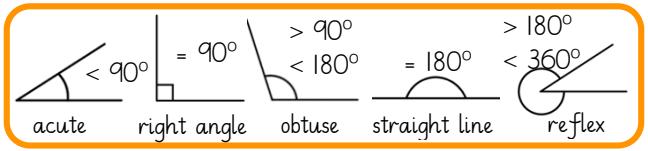
20 cubes



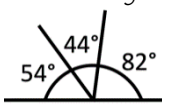
20 cm^3

20 cubes

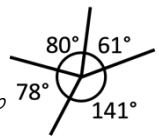
Angles



Angles on a straight line add up to 180°

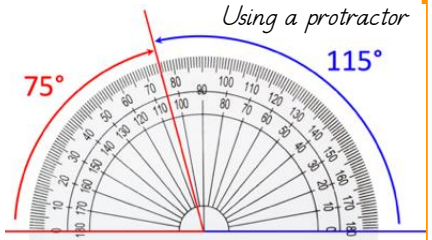


Angles round a point add up to 360°



Measure

Using a protractor



Take care to read the correct scale

MATHS KNOWLEDGE ORGANISER - YEAR 5

Place Value

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
6	9	3	5	1	7	8

6 935 178 = 6 000 000 + 900 000 + 30 000 + 5 000 + 100 +70 + 8

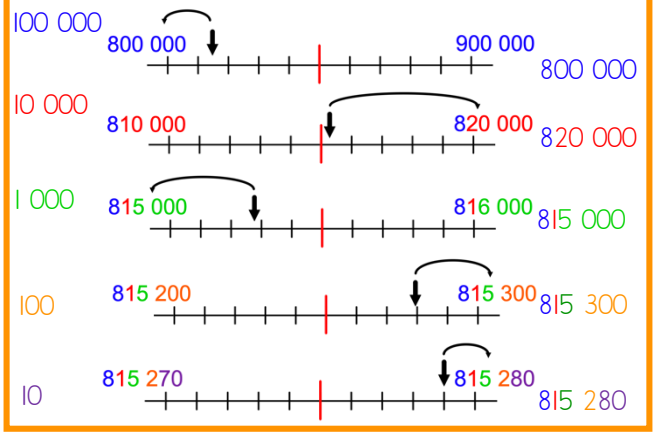
Naming numbers

Group the digits in threes from the right, putting a space or comma between each group. This is where you say million and thousand.

6,935,178 Six million, nine hundred and thirty-five thousand, one hundred and seventy-eight

1 256 210 One million, two hundred and fifty-six thousand, two hundred and ten

Rounding *815 279 to the nearest*



Mental addition

247 + 152
= 247 + 100 + 50 + 2
= 347 + 50 + 2
= 397 + 2
= 399

altogether
add
sum
total

Written addition

```
  1687
+  955
  2642
  1 1 1
```

subtraction

689 – 227
= 689 – 200 – 20 – 7
= 489 – 20 – 7
= 469 – 7
= 462

take away
difference
less than
minus
How many more?

subtraction

```
  4 15  9  1
  5 6 1  1
-   9 5 5
  4 6 4 6
```

Multiplication

Multiply by 1 digit

```
  475
x   7
 3325
 5 3
```

x	400	70	5
7	2800	490	35

2800 + 490 + 35 = 3325

Multiply by 2 digits

```
  475
x  37
 3325
 5 3
14250
21
17575
```

x	400	70	5
7	2800	490	35
30	12000	2100	150

12000 + 2800 + 2100 + 490 + 150 + 35 = 17575

Division 12342 ÷ 6

Short division ("chunking")

```
                12342
6 x 2000 =      12000  -
                  342
6 x   50 =        300  -
                   42
6 x    7 =         42  -
+ 2057              0
```

Short division ("bus stop")

```
    02057
  ┌──────
6 │ 1 2 3 4 2
```

Long division

1	16
2	32
3	48
4	64
5	80
6	96
7	112
8	128
9	144
10	160
11	176
12	192

First write out the times table

```
          01397
       ┌────────
    16 │ 22352
16 x 1   16000  -
          6352
16 x 3    4800  -
          1552
16 x 9    1440  -
           112
16 x 7     112  -
             0
```

Making links and using facts

475 x 7 = 3325 (x2, x2)

so 475 x 14 = 6650

475 x 7 = 3325

so

475 x 8 = 3325 + (475 x 1)

475 x 9 = 3325 + (475 x2)

Roman numerals

	I = 1	
4 = IV	5 = V	6 = VI
9 = IX	10 = X	11 = XI
40 = XL	50 = L	60 = LX
90 = XC	100 = C	110 = CX
400 = CD	500 = D	600 = DC
900 = CM	1000 = M	1100 = MC

Examples

999		
900	90	9
CM	XC	IX
CMXCIX		

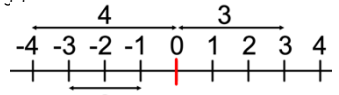
1984			
1000	900	80	4
M	CM	LXXX	IV
MCMLXXXIV			

Negative numbers

3 – 6 = -3

-4 + 5 = 1

Difference between -4 and +3 = 7



Difference between -3 and -1 = 2

The difference between two numbers must be positive.

Times tables

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Factors, multiples and prime numbers

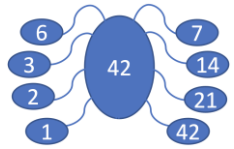
Factors: multiply together to give a product.

Factors of 24	Factors of 18	Common factors	Highest common factor
1, 2, 3, 4, 6, 8, 12, 24	1, 2, 3, 6, 9, 18	1, 2, 3, 6	6

Multiples: all the products of a number multiplied by integers

Multiples of 8	Multiples of 10	Lowest common multiple
0, 8, 16, 24, 32, 40, 48...	10, 20, 30, 40, 48...	40

Use a factor bug to find all the pairs



Prime number: 2 factors (1 and itself)

Composite number: more than 2 factors

The number 1: only has 1 factor, so it is neither prime, nor composite

Prime numbers to 20

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

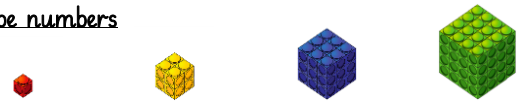
Square numbers

1 4 9 16 25

1 x 1 = 1^2 2 x 2 = 2^2 3 x 3 = 3^2 4 x 4 = 4^2 5 x 5 = 5^2

Square numbers have an odd number of factors

Cube numbers



1 8 27 64

1 x 1 x 1 = 1^3 2 x 2 x 2 = 2^3 3 x 3 x 3 = 3^3 4 x 4 x 4 = 4^3

Multiply by 10, 100, 1000

Digits move 1 or more places to the left

x 10
x 100
x 1000

Divide by 10, 100, 1000

Digits move 1 or more places to the right

÷ 10
÷ 100
÷ 1000