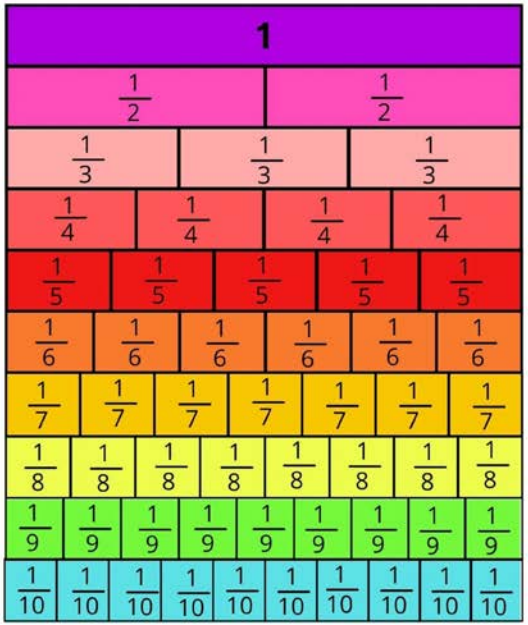
Maths Working Wall

Multiplication Square

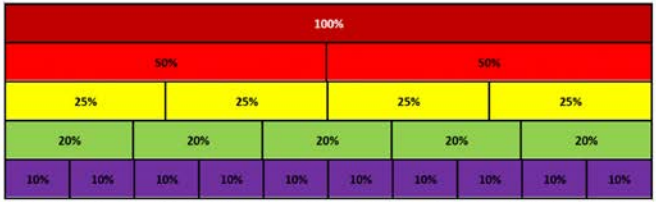
x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	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

Fractions:



Maths Working Wall

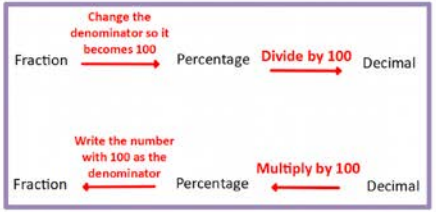
Percentages:



To find...

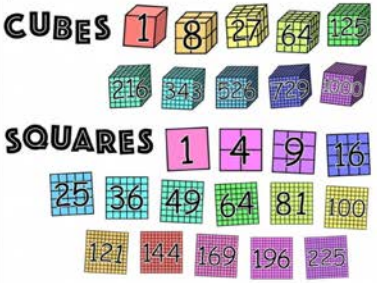
50% divide by 2
10% divide by 10
25% divide by 4
1% divide by 100

FDP:

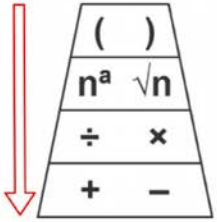


Fraction	Percentage	Decimal
$\frac{1}{2}$	50%	0.5
$\frac{1}{4}$	25%	0.25
$\frac{1}{5}$	20%	0.20
$\frac{1}{10}$	10%	0.10
$\frac{1}{100}$	1%	0.01
$\frac{3}{4}$	75%	0.75

Types of number:



Order of operations

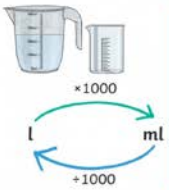


Maths Working Wall

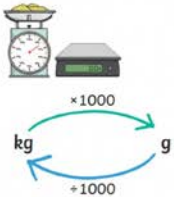
Averages:

Mode = Most frequent piece of data
Median = Once data is ordered smallest to biggest, the median is the middle
Mean = Add all pieces of data together and divide by how many there are
Range = Difference between the biggest and smallest piece of data

Converting Measurements:



1000ml = 1 litre
$\frac{1}{10}$l = 0.1l = 100ml
$\frac{1}{4}$l = 0.25l = 250ml
$\frac{1}{2}$l = 0.5l = 500ml
$\frac{3}{4}$l = 0.75l = 750ml
$\frac{1}{100}$l = 0.01l = 10ml



1000g = 1kg
$\frac{1}{10}$kg = 0.1kg = 100g
$\frac{1}{4}$kg = 0.25kg = 250g
$\frac{1}{2}$kg = 0.5kg = 500g
$\frac{3}{4}$kg = 0.75kg = 750g

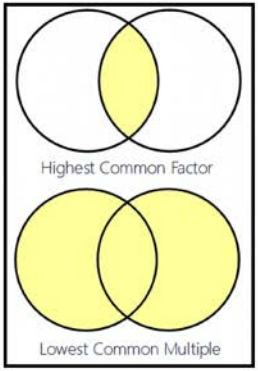
Index Laws:

$$a^m \times a^n = a^{m+n}$$

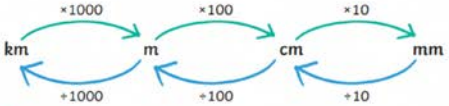
$$a^m \div a^n = a^{m-n}$$

$$a^0 = 1$$

HCF & LCM:



Scatter graphs – Types of correlation:



1000 metres = 1 kilometre
100cm = 1m
10mm = 1cm
$\frac{1}{10}$km = 0.1km = 100m
$\frac{1}{4}$km = 0.25km = 250m
$\frac{1}{2}$km = 0.5km = 500m
$\frac{3}{4}$km = 0.75km = 750m

Graphs:

Equation of a straight line:

$$y = mx + c$$

$$gradient(m) = \frac{change\ in\ y}{change\ in\ x}$$

Factors & Multiples:

Factors of 18 : 1, 2, 3, 6, 9, 18
Multiples of 18 : 18, 36, 54, 72, 90, 108...

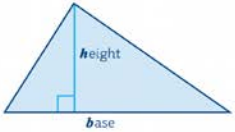
Factors are numbers that multiply to get that number

Multiples are numbers in that times table

Maths Working Wall

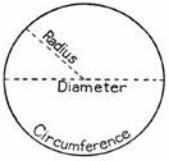
Shape

$$Area = length \times width$$



$$Area = \frac{base \times height}{2}$$

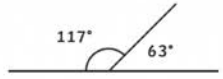
$$Area = base \times height$$



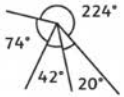
$$Circumference = \pi \times D$$

$$Area = \pi \times r^2$$

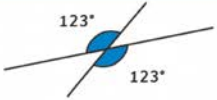
Angles



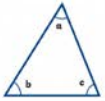
Angles on a straight line always total 180°.



Angles around a point always total 360°.



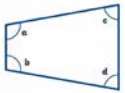
Opposite angles that share a vertex are equal.



a + b + c = 180°

Sum of Interior Angles = (n − 2) × 180°

Pentagon
n = 5
(5 - 2) × 180° = 540°
540° ÷ 5 = 108°



a + b + c + d = 360°

Retrieval Core Maths Knowledge

Be Determined

Skill 1— Factorising

Factorisation is the reverse of expanding brackets. Ie you take out a common factor and put brackets into the expression. To factorise you should look for common factors for every term

Factorise $12x + 4$.

$4(3x + 1)$

4 is the HCF of 12 and 4.

Factorise $3p^3 - 2p^2 + 8p$.

$p(3p^2 - 2p + 8)$

Skill 2— Expanding Brackets

To expand (multiply out) brackets, every term in the bracket is multiplied by the term outside the bracket

Expand $3(x + 2)$.

$3x + 6$

$3 \times x = 3x$ and $3 \times 2 = +6$

Expand and simplify $4y(2y - 3) - 3y(y - 2)$.

$8y^2 - 12y - 3y^2 + 6y$

$= 5y^2 - 6y$

Note that $-3y \times -2 = +6y$

Skill 3— Substitution

Substitution means replacing variables with numbers.

If $y = 4$ and $t = 6$, work out the value of $7y - 6t$.

$7y - 6t = 7 \times 4 - 6 \times 6$

$= 28 - 36$

$= -8$

If $q = 5$, $r = 2$ and $z = -3$, work out the value of $rq + z^2$.

$rq + z^2 = 2 \times 5 + (-3)^2$

$= 10 + 9$

$= 19$

Use brackets as the negative sign is also squared.

Skill 4—Averages

Here are seven numbers:

4 5 9 7 4 4 6

The **mode** is the data value which occurs most often.
The mode of these numbers is 4.
The **median** is the middle value. Write the values in order, smallest to largest. The median is:

4 4 4 ⑤ 6 7 9

The **mean** is the total of all the values added together divided by how many values there are.
The mean is:

$(4 + 5 + 9 + 7 + 4 + 4 + 6) \div 7 = 5.57$

Range = largest value − smallest value
The range of these numbers is:

$9 - 4 = 5$

Skill 5— Probability

An event that is **certain** to happen has a probability of 1.
An event that is **impossible** has a probability of 0.
The probability of rolling a 6 on a dice is

$P(6) = \frac{1}{6}$

The probability of a coin landing heads up is

$P(\text{heads}) = \frac{1}{2}$

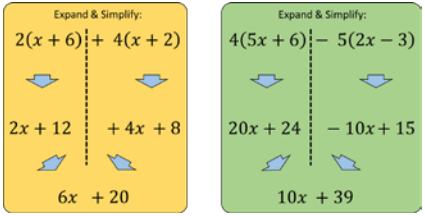
Golden rule

$$\text{Probability} = \frac{\text{number of successful outcomes}}{\text{total number of possible outcomes}}$$

Retrieval Core Maths Knowledge

Aim High

Skill 1—Expand and Simplify



Skill 2— Substitution

By substituting values, calculate the value of T when $b = -5$

$T = 2b^2 - 3b$

$T = 2\times b\times b - 3\times b$ ← 1) Write the formula out in long form.

$T = 2\times(-5\times-5) - (3\times-5)$ ← 2) Substitute.

$T = 2\times(25) - (-15)$ ← 3) Work out following BIDMAS

$T = 50 + 15$

$T = 65$

Skill 3—Factorising

Single bracket

Factorise: $12x^3 - 15x^2$

1) Find the HCF of the terms.

2) Divide each term by the HCF.

$\frac{12x^3}{3x^2} = 4x$ $\quad \frac{-15x^2}{3x^2} = -5$

$3x^2(\ 4x\ -5\ )$

Check by expanding the bracket.

Skill 4—Types of Average and Range

A dice is rolled 5 times. Find the Mean, Median, Mode & Range for this set of scores: 1,0,6,2,1.

1, 0, 6, 2, 1

place in order

0, 1, 1, 2, 6

Mean = (0+1+1+2+6) ÷ 5
= 10 ÷ 5
= 2

The average with the most work!
The sum of all the data values divided by,
the total number of data values.

Median = 1
Middle data value after
Put in ascending order

Range = 6 – 0
= 6
The difference between the highest and lowest data value.
This shows us the spread of the data.

Mode = 1
Most common data value

Skill 5—Probability. Expectation

If we roll the dice 12 times, how many times do we expect to score a 2?

$P(2) = \frac{1}{6}$

We would expect to roll a 2 once in six rolls.

Number of trials = 12

$\frac{1}{6}\times 12 = 2\ times$

We randomly pick a cube then replace it. If we make 60 picks, how many times do we expect to pick a red cube?

$P(Red) = \frac{2}{3}$

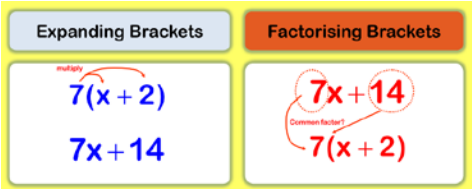
Number of trials = 60

$\frac{2}{3}\times 60 = 40$ times

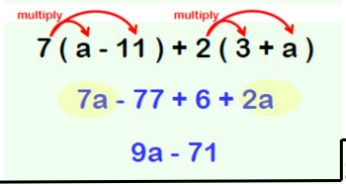
Retrieval Core Maths Knowledge

Be Brave

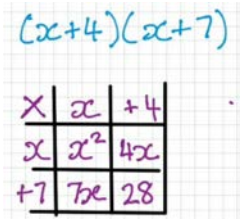
Skill 1— Expanding & Factorising



Skill 2— Expanding 2 single brackets



Skill 3—Expanding double brackets



$= x^2 + 4x + 7x + 28$

$= x^2 + 11x + 28$

Skill 4— Mean from a frequency table

Age	Frequency	fxA
7	1	1x7=7
8	4	4x8=32
9	2	2x9=18
10	3	3x10=30
	10	87

$\frac{87}{10} = 8.7$

Skill 5—Sample space diagram

A 6-sided and a 4-sided die are thrown and their scores added.

Score on 2nd Dice \ Score on 1st Dice	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10

What is P(4 or 7)?

$= P(4) + P(7)$

$= \frac{3}{24} + \frac{4}{24} = \frac{7}{24}$