

## Maths Working Wall

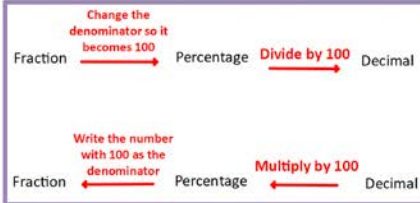
### Percentages:



To find...

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

### FDP:



### Types of number:

**CUBES** 1 8 27 64 125

**SQUARES** 1 4 9 16

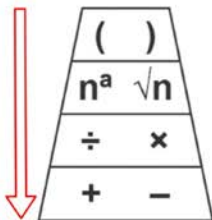
25 36 49 64 81 100

121 144 169 196 225

### PRIME NUMBERS

2	3	5	7	11
13	17	19	23	29
31	37	41	43	47
53	59	61	67	71
73	79	83	89	97

### Order of operations



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



## Maths Working Wall

### Pythagoras:

$$a^2 + b^2 = c^2$$

### Trigonometry:

SOH|CAH|TOA

$$\sin \vartheta = \frac{O}{H} \quad \cos \vartheta = \frac{A}{H} \quad \tan \vartheta = \frac{O}{A}$$

### 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

$$\frac{1}{10}kg = 0.1kg = 100g$$

$$\frac{1}{4}kg = 0.25kg = 250g$$

$$\frac{1}{2}kg = 0.5kg = 500g$$

$$\frac{3}{4}kg = 0.75kg = 750g$$

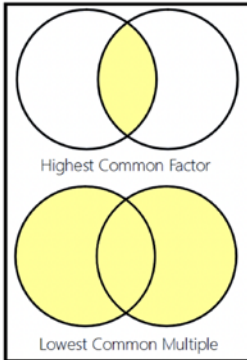
### Index Laws:

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

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

$$a^0 = 1$$

### HCF & LCM:



### AND/OR rules:

and = multiply, or = add

Number	1	2	3	4	5
Probability	x	0.15	0.05	0.2	0.35

$$P(2 \text{ and } 3) = 0.15 \times 0.05 = 0.0075$$

$$P(2 \text{ or } 3) = 0.15 + 0.05 = 0.2$$

### Graphs:

Equation of a straight line:

$$y = mx + c$$

$$\text{gradient}(m) = \frac{\text{change in } y}{\text{change in } x} \quad \text{OR} \quad \text{gradient}(m) = \frac{y_2 - y_1}{x_2 - x_1}$$



1000 metres = 1 kilometre

100cm = 1m

10mm = 1cm

$\frac{1}{10}km = 0.1km = 100m$

$$\frac{1}{4}km = 0.25km = 250m$$

$$\frac{1}{2}km = 0.5km = 500m$$

$$\frac{3}{4}km = 0.75km = 750m$$

### Quadratic Formula:

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

### Factors & Multiples:

Factors of 18 : 1, 2, 3, 6, 9, 18

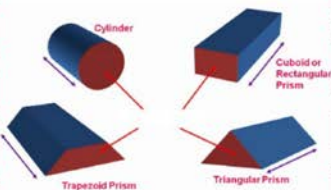
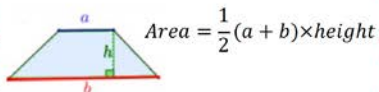
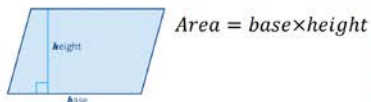
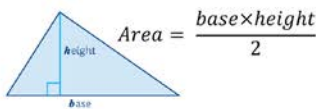
Multiples of 18 : 18, 36, 54, 72, 90, 108...

Factors are multiply to

Multiples are numbers in that times table

## Maths Working Wall

### Shape



Volume of a prism  
= area of cross-section  $\times$  height

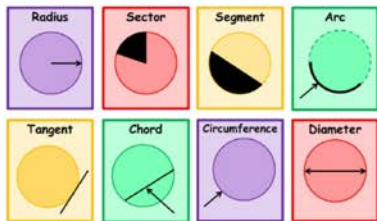
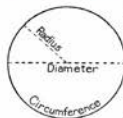
Sum of interior angles in a polygon  
= (number of sides - 2)  $\times$  180

Sum of exterior angles in a polygon  
= 360  $\div$  number of sides

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

Sector Area =  $\pi \times r^2 \times \frac{\text{angle}}{360}$

Arc length =  $\pi \times D$



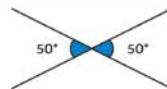
### Angles



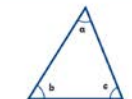
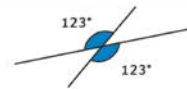
Angles on a straight line  
always total 180°.



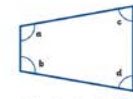
Angles around a point  
always total 360°.



Opposite angles that share a vertex are equal.



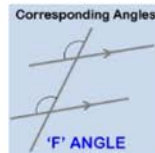
$a + b + c = 180^\circ$



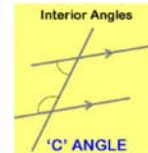
$a + b + c + d = 360^\circ$



Alternate angles  
are equal



Corresponding  
angles are equal

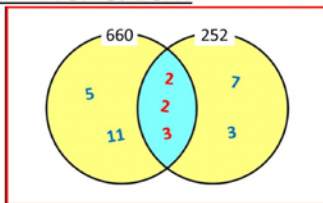


Co-interior angles  
add to 180

## Retrieval Core Maths Knowledge




### Skill 1— HCF & LCM



$660 = 2^2 \times 3 \times 5 \times 11$ $252 = 2^2 \times 3^2 \times 7$
<b>HCF</b> = $2 \times 2 \times 3$ = 12
<b>LCM</b> = $5 \times 11 \times 2 \times 2 \times 3 \times 7 \times 3$ = 13,860

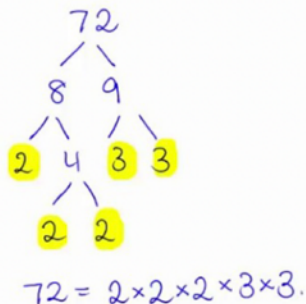
### Skill 2— Squares, cubes and roots

16   $4^2$  or  $4 \times 4 = 16$

$3 \times 3 \times 3$   
 27

$\sqrt{36} = 6$  since  $6^2 = 36$   
 $\sqrt{49} = 7$  since  $7^2 = 49$

### Skill 3— Prime factor decomposition



### Skill 4— Is a term in a sequence?

Is the number 350 in the sequence 5, 8, 11, 14... ?

5, 8, 11, 14 ... is the sequence  $3n + 2$

$$3n + 2 = 350$$

$$3n = 348$$

$$n = 116$$

$\therefore$  Yes, 350 is in the sequence, it is the 116<sup>th</sup> term.

### Skill 5— % increase with a multiplier

Increase £50 by 60%.

$$160\% \times £50 = 1.6 \times £50$$

$$= £80$$

Increase £300 by 2.5%.

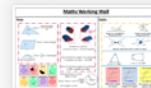
$$102.5\% \times £300 = 1.025 \times £300$$

$$= £307.50$$

Increase £86 by 17.5%.

$$117.5\% \times £86 = 1.175 \times £86$$

$$= £101.05$$



## Retrieval Core Maths Knowledge



Aim High

### Skill 1— Percentages

Increase £40 by 3%  
 $3\% = 0.03$ ,  
 increase of 3% =  $100\% + 3\%$   
 $= 1 + 0.03 = 1.03$   
 $£40 \times 1.03 = £41.20$

A laptop is reduced by 20% in a sale and now costs £450. What was the original cost?

$$\begin{array}{l} \div 4 \quad \text{£450 : 80\%} \quad \div 4 \\ \text{£112.50 : 20\%} \\ \times 5 \quad \text{£562.50 : 100\%} \quad \times 5 \end{array}$$

### Skill 2— Averages

**Mean** – add up the values and **divide** by how many values there are  
**Mean** – put the data in size order and find the middle one. If there are two **middle values**, find the number halfway between them by **adding them together and dividing by 2**.  
**Mean** – Most **frequent**/common. Can have two modes (bi-mode) or no mode.

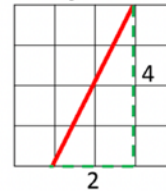
### Skill 3— $n^{\text{th}}$ term

Find the  $n^{\text{th}}$  term of 11, 7, 3, -1, -5, ...

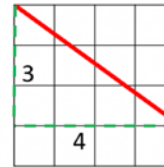
- Find the common difference, in this case, it is **-4**.
- Write out the multiples of your common difference  
**-4, -8, -12, -16, -20**
- Write how you get from your new sequence **-4n**, to your original sequence. In this case, **+15** to each term.

### Skill 4— Gradients of line segments

Find the gradient of the lines



$$\begin{aligned} \text{Gradient (m)} &= \\ \frac{\text{difference in } y}{\text{difference in } x} &= \frac{4}{2} = 2 \end{aligned}$$



$$\begin{aligned} \text{Gradient (m)} &= \\ \frac{\text{difference in } y}{\text{difference in } x} &= -\frac{3}{4} \end{aligned}$$

### Skill 5— Index laws and negative indices

$$\begin{aligned} x^a \times x^b &= x^{a+b} \\ \frac{x^a}{x^b} &= x^{a-b} \\ (x^a)^b &= x^{ab} \end{aligned}$$

$$x^{-a} = \left(\frac{1}{x}\right)^a$$



## Retrieval Core Maths Knowledge



Be Brave

### Skill 1— Equation of line

$y = mx + c$  where  $m$  is gradient and  $c$  is the y-intercept

Gradient of line:  $m = \frac{\text{change in } y}{\text{change in } x}$

Find the equation of the line between (4, 2) and (6, 8):

$$m = \frac{8-2}{6-4} = \frac{6}{2} = 3 \quad y = 3x + c$$

$$2 = 3 \times 4 + c$$

$$c = -10$$

Equation:  $y = 3x - 10$

### Skill 2— Solving Simultaneous equations by elimination

$$3x + y = 11 \quad \dots 1 \times 2$$

$$9x + 2y = 28 \quad \dots 2$$

$$6x + 2y = 22 \quad \dots 1$$

$$9x + 2y = 28 \quad \dots 2$$

$$3x = 6$$

$$3 \times 2 + y = 11$$

$$x = 2$$

$$y = 5$$

### Skill 3— Error intervals

Measure	Approximation	Error interval
12cm	Nearest cm	$11.5 \leq n < 12.5$
120m	2 significant figures	$115 \leq n < 125$
8.9km	1 decimal place	$8.85 \leq n < 8.95$
24cm	Truncated to nearest cm	$24.0 \leq n < 25$

### Skill 4— Quadratic sequences

- 1) Find the 2<sup>nd</sup> difference & halve it to find the  $n^2$  coefficient
- 2) Subtract the quadratic from the original sequence
- 3) Express the remainder as a linear sequence
- 4) Join the quadratic with the linear sequence

$\begin{matrix} & +2 & +2 & +2 \\ & \swarrow & \swarrow & \swarrow \\ +5 & +7 & +9 & +11 \\ \swarrow & \swarrow & \swarrow & \swarrow \\ 6, & 11, & 18, & 27, & 38 \end{matrix}$

Quadratic =  $1n^2$

n	1	2	3	4	5
Original	6	11	18	27	38
Quadratic: $1n^2$	1	4	9	16	25
Remainder	5	7	9	11	13

$1n^2 + 2n + 3$

$2n + 3$

### Skill 5— Angles in Polygons

sum of interior angles =  $180^\circ(n - 2)$

interior angle + exterior angle =  $180^\circ$

$$\text{number of sides}(n) = \frac{360^\circ}{\text{Exterior angle}}$$

$$\text{Exterior angle} = \frac{360^\circ}{n}$$

