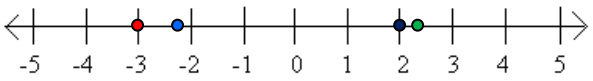
Stage 7 PROMPT Sheet

7/1 Order statements inc using number line



Example: Order -3, -2.25, 2, 2⅓

7/2 Equivalent fractions, decimals & percentages

- **Percentage to decimal to fraction**

27% = 0.27 = $\frac{27}{100}$

7% = 0.07 = $\frac{7}{100}$

70% = 0.7 = $\frac{70}{100}$ = $\frac{7}{10}$

- **Decimal to percentage to fraction**

0.3 = 30% = $\frac{3}{10}$

0.03 = 3% = $\frac{3}{100}$

0.39 = 39% = $\frac{39}{100}$

- **Fraction to decimal to percentage**

$\frac{4}{5}$ = $\frac{80}{100}$ = 80% = 0.8

Change to 100

$\frac{3}{8}$ = 3 ÷ 8 = 0.375 = 37.5%

Divide numerator by denominator

7/3 Find LCM & HCF of 2 numbers

- **LCM**

Write down multiples of each number
Pick out the lowest common multiple
e.g. To find LCM of 12 and 15

- Multiples of 12: 12, 24, 36, 48, 60...
- Multiples of 15: 15, 30, 45, 60

LCM of 12 and 15 = 60

- **HCF**

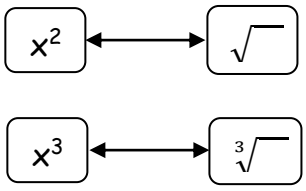
Write down factors of each number
Pick out the highest common factor
e.g. To find the HCF of 12 and 15

- Factors of 12: 1,12,2,6,3,4
- Factors of 15:1,15,3,5

HCF of 12 and 15 = 3

7/4 Use squares & cubes & their roots ~LEARN

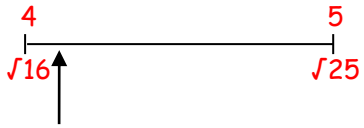
Squares & square roots		Cubes & cube roots	
$1^2 = 1$	$\sqrt{1}=1$	$1^3 = 1$	$\sqrt[3]{1}=1$
$2^2 = 4$	$\sqrt{4}=2$	$2^3 = 8$	$\sqrt[3]{8}=2$
$3^2 = 9$	$\sqrt{9}=3$	$3^3 = 27$	$\sqrt[3]{27}=3$
$4^2 = 16$	$\sqrt{16}=4$	$4^3 = 64$	$\sqrt[3]{64}=4$
$5^2 = 25$	$\sqrt{25}=5$	$5^3 = 125$	$\sqrt[3]{125}=5$
$6^2 = 36$	$\sqrt{36}=6$	$10^3 = 1000$	$\sqrt[3]{1000}=10$
$7^2 = 49$	$\sqrt{49}=7$		
$8^2 = 64$	$\sqrt{64}=8$	**Use of calculator**	
$9^2 = 81$	$\sqrt{81}=9$		
$10^2 = 100$	$\sqrt{100}=10$		
$11^2 = 121$	$\sqrt{121}=11$		
$12^2 = 144$	$\sqrt{144}=12$		
$13^2 = 169$	$\sqrt{169}=13$		
$14^2 = 196$	$\sqrt{196}=14$		
$15^2 = 225$	$\sqrt{225}=15$		
$20^2 = 400$	$\sqrt{400}=20$		



~Estimate value of $\sqrt{n}$

Example: Estimate the square root of 17 (√17)

- Locate the perfect squares at either side of the number 17 (16 and 25)
- Base your estimate on the position of 17(1/9) between the two perfect squares



√17 ≈ 4.1

7/5 Four operations – positive & negative integers

- **Add & Subtract**

Remember the rules:
When subtracting go down the number line
When adding go up the number line

8 + - 2 is the same as 8 – 2 = 6
8 - + 2 is the same as 8 – 2 = 6
8 - - 2 is the same as 8 + 2 = 10

- **Multiply & divide**

Remember the rules:

+ x + = +
- x - = +

} Same signs give +

- x + = -
+ x - = -

} Different signs give +

AND THE SAME RULE APPLIES TO DIVIDE

7/6 Multiply & divide fractions

- **Multiply fractions**

~Write eg 7 as $\frac{7}{1}$

~Change mixed numbers to improper fractions
~Multiply numerators & denominators

Example 1	Example 2	Example 3
$5 \times \frac{2}{3}$ $= \frac{5}{1} \times \frac{2}{3}$ $= \frac{10}{3}$	$\frac{4}{5} \times \frac{2}{3}$ $= \frac{8}{15}$ $= 3\frac{1}{3}$	$1\frac{2}{3} \times 5$ $\frac{5}{3} \times \frac{5}{1}$ $= \frac{25}{3}$ $= 8\frac{1}{3}$

- **Divide fractions**

~Write eg 7 as $\frac{7}{1}$

~Change mixed numbers to improper fractions
~Flip numerator & denominator after ÷ sign
~Multiply numerators & denominators

Example 1	Example 2	Example 3
$5 \div \frac{2}{3}$ $= \frac{5}{1} \times \frac{3}{2}$ $= \frac{15}{2}$ $= 7\frac{1}{2}$	$\frac{4}{5} \div \frac{2}{3}$ $= \frac{4}{5} \times \frac{3}{2}$ $= \frac{12}{10}$ $= 1\frac{2}{10}$ $= 1\frac{1}{5}$	$1\frac{2}{3} \div 5$ $\frac{5}{3} \times \frac{1}{5}$ $= \frac{5}{15}$ $= \frac{1}{3}$

7/7 Order of operations

Bracket
Indices
Divide
Multiply } Do these in the order they appear
Add
Subtract } Do these in the order they appear

e.g. $3 + 7 - 2^2 \times (6 - 5) = 6$

4th, 2nd, 3rd, 1st, 5th

7/8 Rounding decimals

- **Look at the digit required**
- **Look at the first digit NOT required**

e.g. To round 5 . 47 to 1dp

Answer 5.5 — digit NOT required — Is this 5 or more? YES — Increase 4 by 1

e.g. To round 5 . 43 to 1dp

Answer 5.4 — digit NOT required — Is this 5 or more? NO - delete — leave 4 as it is

7/9 Write algebraic expressions

No 'x' or '÷' signs in algebra
2 x a is written 2a
a x b is written ab
a x a is written a^2
a ÷ 2 is written $\frac{a}{2}$

7/10 Simplify algebraic expressions

- **Collect like terms**

Only like terms can be added & subtracted

e.g. $2a + 3a = 5a$

$6y^2 - 2y^2 = 4y^2$

y^2 and y are UNLIKE terms

e.g. a + 2b cannot be added

a^2 - 2a cannot be subtracted

- **Expand a single bracket**

Multiply everything inside the bracket by what is outside

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

$x(x - 5) = x^2 - 5x$

- **Expand and collect like terms**

Multiply everything inside the bracket by what is outside

Then collect like terms together

$3(x + 2) + 2(x - 5)$

$=3x + 6 + 2x - 10$

$=5x - 4$

Watch for the negative sign in front of the bracket

It changes the sign inside the bracket

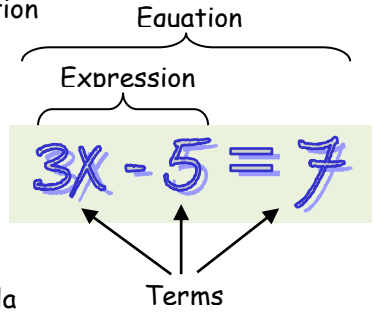
$3(x + 2) - 2(x - 5)$

$=3x + 6 - 2x + 10$

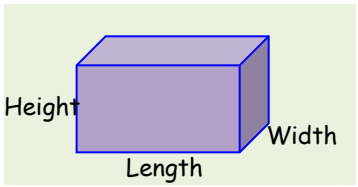
$=x + 16$

7/11 Expressions, formulae, terms

- This is an equation



- This is a formula

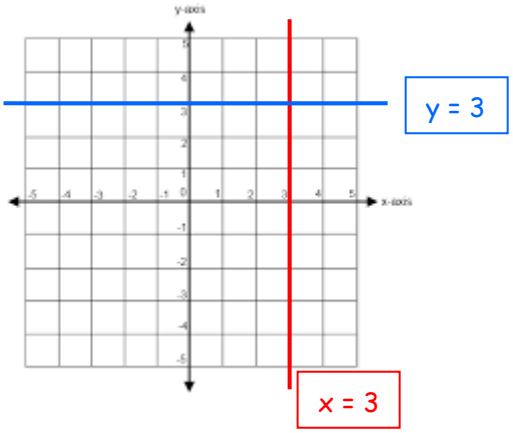


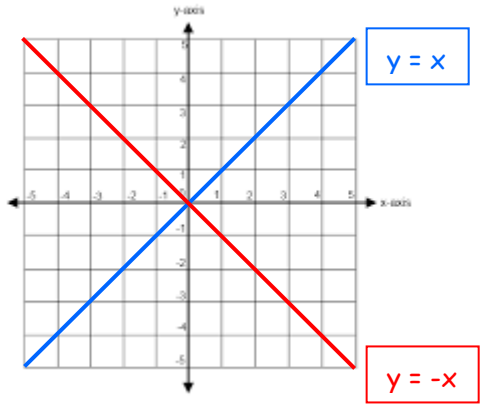
Volume = length x width x height

Substitute values into an expression/formula

Remember the rules from 7/5

7/12 Equations of lines on a grid





7/13 Solve equations

~Multiply out brackets first

~Keep equation balanced - Do the same to both sides

Example: To solve $3(x - 4) = 9$ (expand bracket)

$3x - 12 = 9$ (+12 to each side)

$3x = 21$ (÷3 both sides)

$\frac{3x}{3} = \frac{21}{3}$

$x = 7$

7/14 Generate a sequence

- **Understand position and term**

Position	1	2	3	4
Term	3	7	11	15

Term to term rule= +4

Example:

Given first term e.g. 3

Term to term rule: x2 - 5

Terms of sequence: 3, 1, -3, -11, -27 ...

Special sequences:

Triangular numbers: 1, 3, 6, 10, 15, 21...

Square numbers: 1, 4, 9, 16, 25, 26...

Cube numbers: 1, 8, 27, 64, 125, 216...

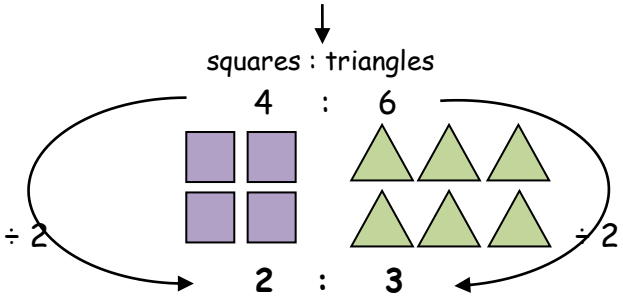
Fibonacci: 0, 1, 1, 2, 3, 5...

Geometric: 2, 6, 18, 54, 162,

Each term is x3

7/15 Ratio

The ratio of squares to triangles can be written



Ratios can be simplified just like fractions

- Ratio can be simplified by cancelling

e.g. 12 : 15
=> 4 : 5

e.g. 30cm : 1m
=> 30 : 100
=> 3 : 1

- Ratio can be written in form 1 : n

e.g. 2 : 5 (÷ both parts by 2)
=> 1 : 2.5

7/16 Divide an amount into a given ratio

Example 1: Divide £40 in the ratio of 1 : 3 : 4
Total number of shares = 1+3+4=8
8 shares = £40
1 share = £40÷8 = £5
3 shares = 3 x £5 = £15
5 shares = 5 x £5 = £25

Example 2: A and B share some sweets in ratio 3:2
A gets 12 sweets
So 3 shares = 12
1 share = 12 ÷ 3 = 4
B gets 2 shares =2 x 4 = 8 sweets

7/17 Express one quantity as fraction/percentage of another

- Make sure that both quantities are expressed in the same unit
- Form a fraction using the two quantities
- Divide to form decimal then percentage

Example 1: Write 50 as a percentage of 80

$\frac{50}{80} = \frac{5}{8}$ = 0.625 = 62.5%

Example 2: Write 80 as a percentage of 50

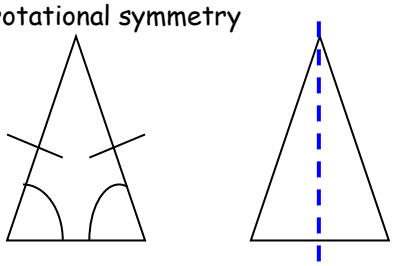
$\frac{80}{50} = \frac{8}{5}$ = 1.6 = 160%

7/18 Properties of 2D shapes

TRIANGLES – angles add up to 180^0

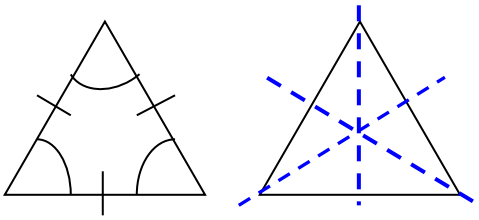
Isosceles triangle

- 2 equal sides
- 2 equal angles
- 1 line of symmetry
- No rotational symmetry



Equilateral triangle

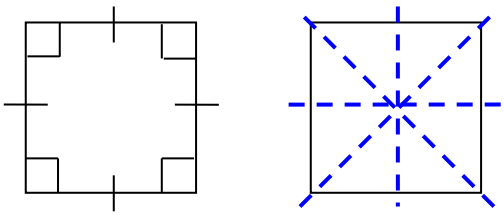
- 3 equal sides
- 3 equal angles - 60^0
- 3 lines of symmetry
- Rotational symmetry order 3



QUADRILATERALS – all angles add up to 360^0

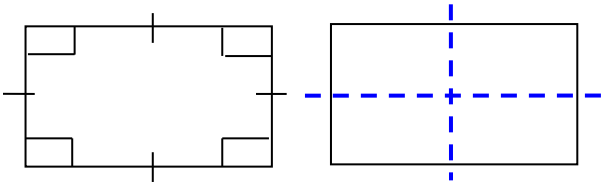
Square

- 4 equal sides
- 4 equal angles - 90^0
- 4 lines of symmetry
- Rotational symmetry order 4



Rectangle

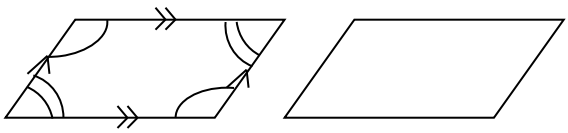
- Opposite sides equal
- 4 equal angles - 90^0
- 2 lines of symmetry
- Rotational symmetry order 2



7/18 Properties of 2D shapes (continued)

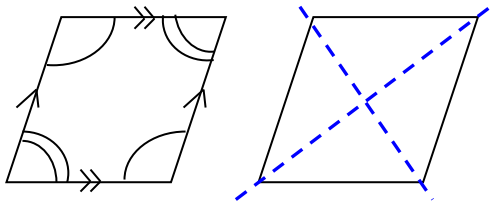
Parallelogram

- Opposite sides parallel
- Opposite angles equal
- NO lines of symmetry
- Rotational symmetry order 2



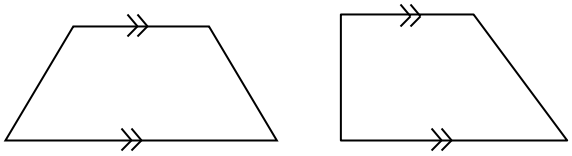
Rhombus (like a diamond)

- Opposite sides parallel
- Opposite angles equal
- 2 lines of symmetry
- Rotational symmetry order 2



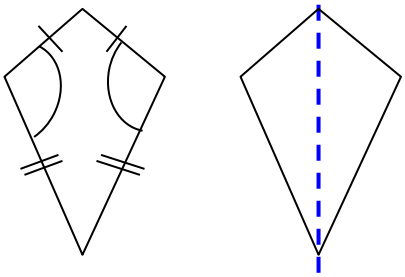
Trapezium

- ONE pair opposite sides parallel



Kite

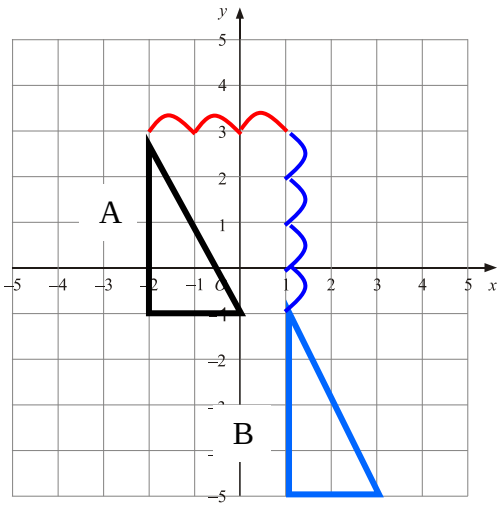
- One pair of opposite angles equal
- 2 pairs of adjacent sides equal
- ONE line of symmetry
- No rotational symmetry



- **Translate a shape**

You need to know:

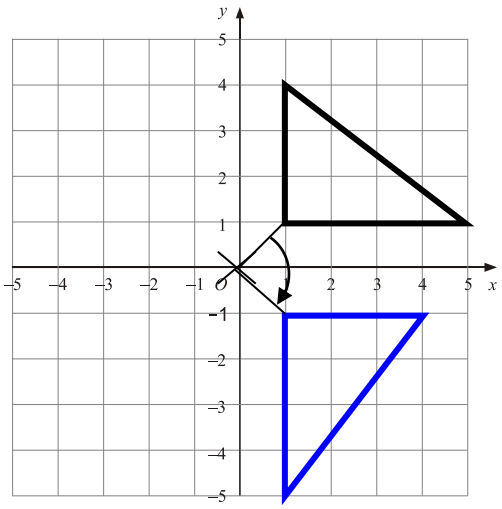
- How to move it e.g. **3 Right 4 Down** $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$



- **Rotate a shape**

You need to know:

- Angle e.g. 90^0
- Direction e.g. clockwise
- Centre of rotation e.g.(0,0)



In translation, rotation & reflection the shape and its image are congruent

- **Reflect a shape in a line**

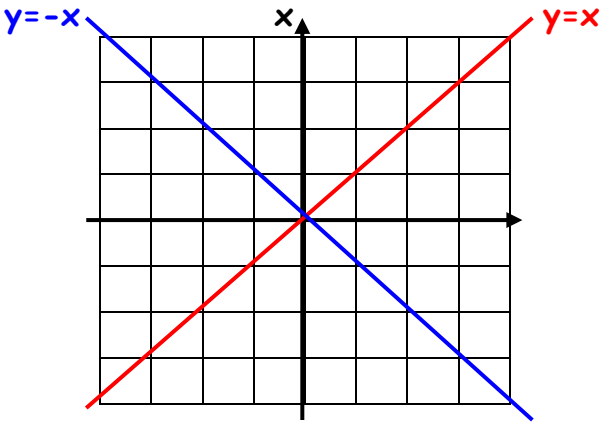
The line could be vertical, horizontal or diagonal

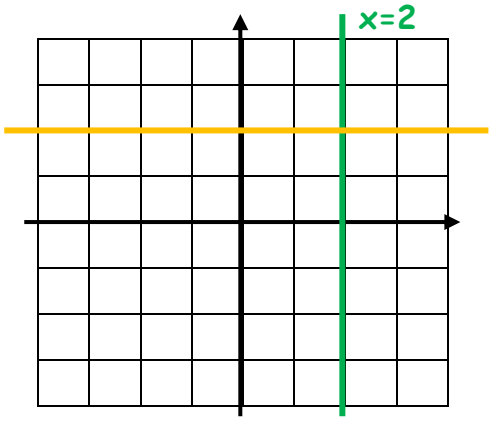
On a grid:

The vertical line would be called x = ?

The horizontal line would be called y = ?

The diagonal line would be called y = x or y = -x

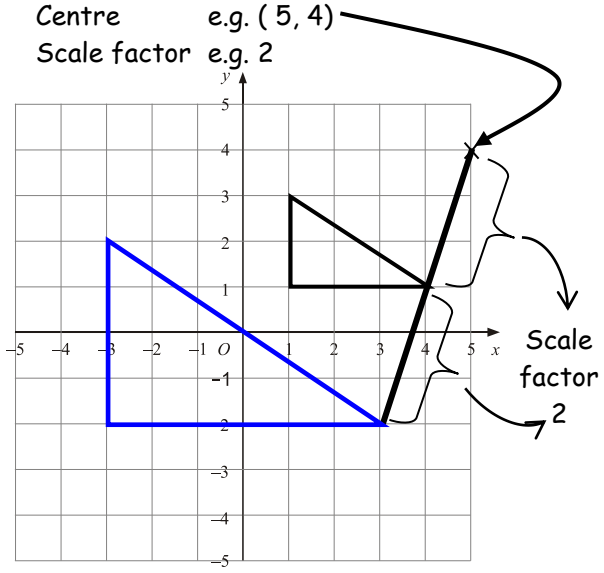




- **Enlargement a shape**

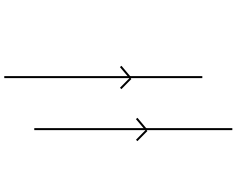
You need to know:

- Centre e.g. (5, 4)
- Scale factor e.g. 2

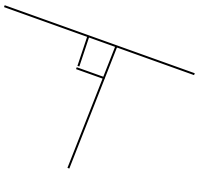


The image is **similar**; all lengths are 2 times the original

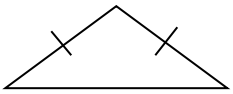
7/20 Conventions for labelling



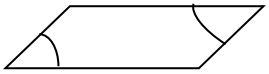
parallel lines



perpendicular lines



equal lines



equal angles

A point is labelled using ONE letter

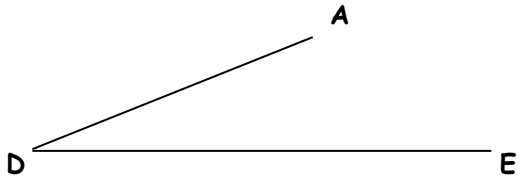
P •

A line is labelled using TWO letters according to its start point and end point

A _____ B

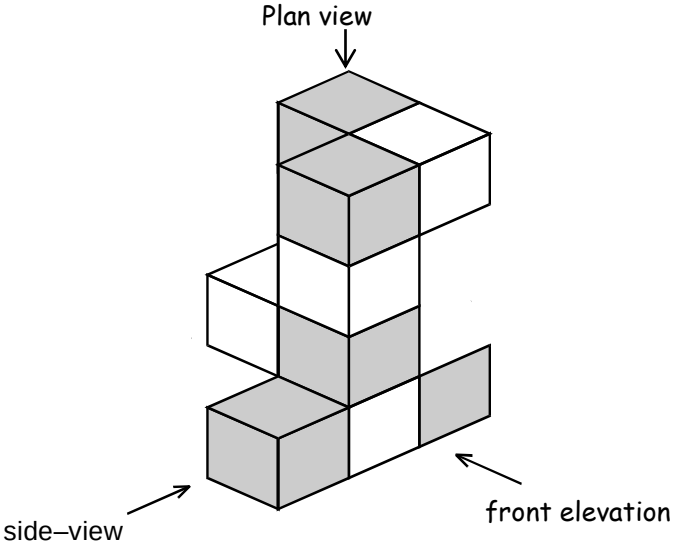
Line AB

An angle is labelled using THREE letters with the vertex letter in the middle

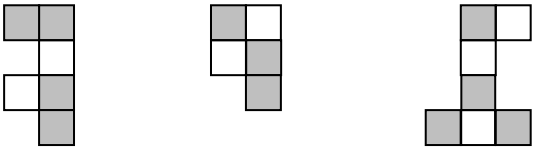


Angle ADE or angle EDA

7/21 Plans & elevations



Side view | Plan view | Front elevation



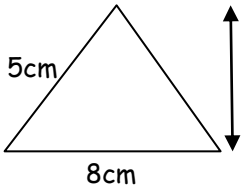
7/22 Know & use formulae for areas

- **Area of triangle**

Area of triangle = $\frac{b \times h}{2}$

$= \frac{8 \times 5}{2}$

$20cm^2$

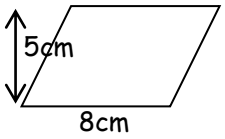


- **Area of parallelogram**

Area of parallelogram = b x h

= 8 x 5

= $40cm^2$

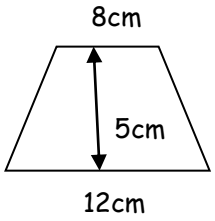


- **Area of trapezium**

Area of trapezium = $\frac{(a + b) \times h}{2}$

$= \frac{(8 + 12) \times 6}{2}$

$= 60cm^2$

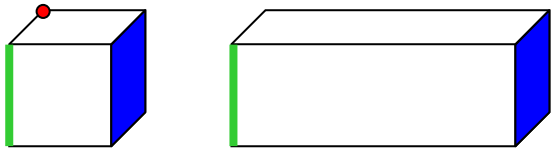


7/23 Properties of 3D shapes

PRISMS- same cross section through length

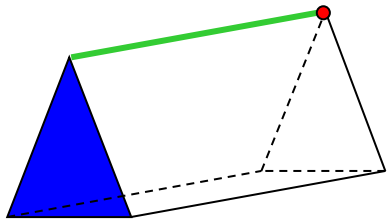
Cube and cuboid

- 6 faces
- 12 edges
- 8 vertices

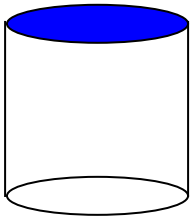


Triangular prism

- 5 faces
- 9 edges
- 8 vertices



Cylinder – special prism

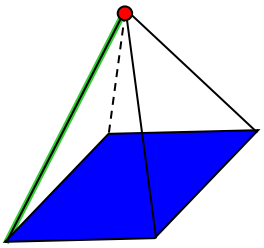


~~7/23 Properties of 3D shapes (continued)~~

PYRAMIDS- a point opposite the base

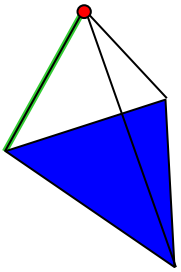
Pyramid – square based

- 5 faces
- 8 edges
- 5 vertices

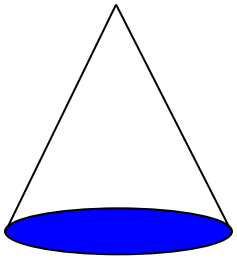


Pyramid – triangular based

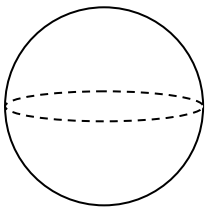
- 4 faces
- 6 edges
- 4 vertices



Cone – special pyramid



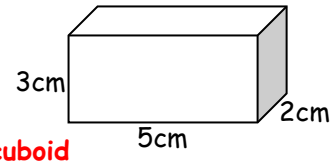
SPHERES- ball shape



7/24 Volume & Surface Area of cuboids

- **Volume of cuboid**

Volume = l x w x h
= 5 x 3 x 2
= 30cm^3

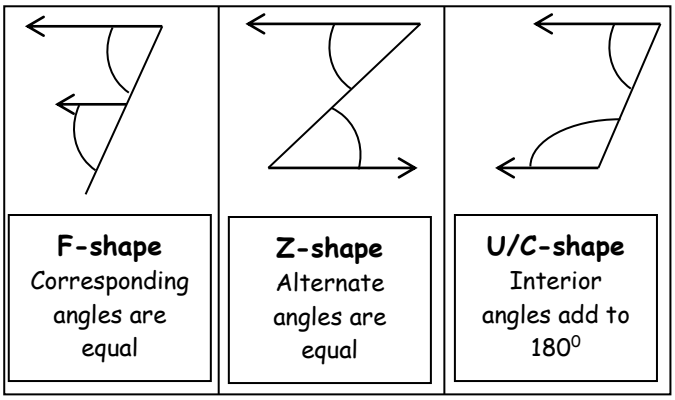


- **Surface area of cuboid**

Front = 5x3 = 15
Back = 5x3 = 15
Top = 5x2 = 10
Bottom = 5x2 = 10
Side = 3x2 = 6
Side = 3x2 = 6

} Total Surface Area =62cm^2

7/25 Angles and parallel lines



F-shape	Z-shape	U/C-shape
Corresponding angles are equal	Alternate angles are equal	Interior angles add to 180^0

7/26 Words and probability

- **Language**

Examples of probability words are

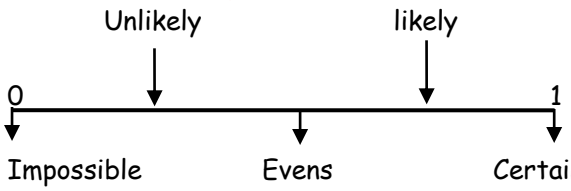
- **certain**
- **likely**
- **even chance**
- **unlikely**
- **impossible**

Other words:

- **Equally likely** – when all outcomes have the same chance of occurring
- **Biased** – when all outcomes do NOT have the same chance of occurring
- **Randomness** – outcomes that cannot be predicted
- Equally likely – Outcomes that have an equal chance of occurring

7/27 Probability scale

- **Probability scale**



- **Probability as a number** (fraction/decimal)

P(event) = No. of outcomes which give the event
Total number of outcomes

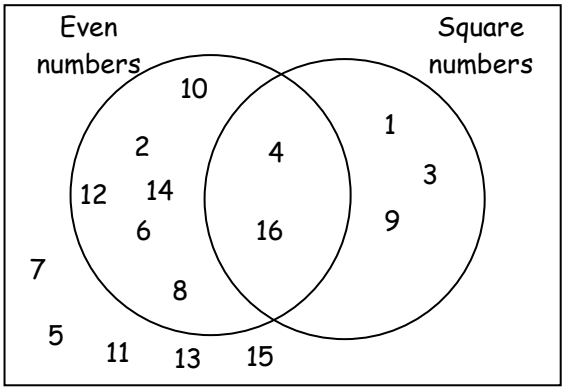
7/28 Enumerate sets

Example: Find possible ways of arranging A, B, C

A B C
A C B
B A C
B C A
C A B
C B A

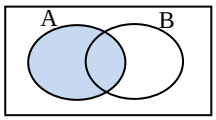
} Notice the system

Example: Arrange numbers 1-16 in Venn diagram

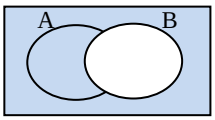


Now sets can be enumerated
Example: Even square numbers: {4, 16}

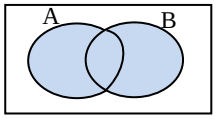
Set notation for Venn diagrams indicated by shaded part:



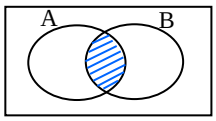
Set A



Set B'



Set A ∪ B



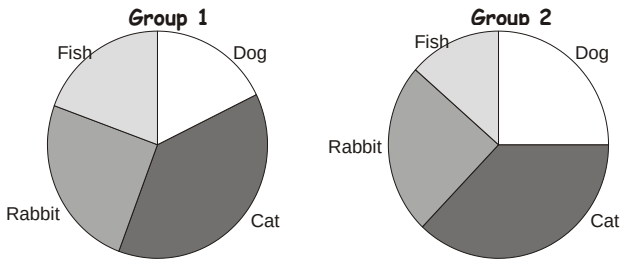
Set A ∩ B

7/29 Construct a pie chart

Transport	Frequency	Angle per person	Angle
Car	13	x 9	117^0
Bus	4	x 9	36^0
Walk	15	x 9	135
Cycle	8	x 9	72

Total frequency = 40
360^0 ÷ 40 = 9^0 per person

- **Interpret a pie chart**



- When we are not told how many people are in the survey, we can only comment on proportion, by comparing the sizes of sectors in each pie chart

e.g. there is a larger proportion of the population who have a dog in Class 2 than Class 1

It does NOT mean there are more people who have a dog

7/30 Measures of central tendency & range

~from a list

- Mode – most frequent measure
- Median – middle measure (put them in order)
- Mean – total of measures ÷ no. of measures
- Range – Highest minus lowest measures spread

~from a table

Age in years(x)	Frequency(f)	fx
2	3	6
3	5	15
4	2	8
	Σf=10	**Σfx=29**

Mean = $\frac{\Sigma fx}{\Sigma f} = \frac{29}{10}$ = age 2.9 yr

Mode (what there is most of) = age 3 yr

Median (middle) (10 + 1)÷2=5.5th person=age 3 yr

Range (highest minus lowest) = 4 – 2 = 2 yr

~ Compare distributions of 2 sets of data

Use a measure of average and a measure of spread

- Compare an average of each distribution

e.g. mean, median, mode

- Compare the spread of each distribution

e.g. range

- Make sure comments relate to the context

e.g. the boys are taller on average than the girls since the mean is larger for the boys