WORKING IN THE CARTESIAN PLANE

Key Concept

Substitution – This is where you replace a number with a letter

If a = 5 and b = 2

a + b =	5 + 2 = 7
a – b =	5 – 2 = 3
3a =	3 × 5 = 15
ab =	5 × 2 = 10
a^2 =	5^2 = 25

sparx

M932, M544,M888

Key Words

Intercept: Where two graphs cross.
Gradient: This describes the steepness of the line.
y-intercept: Where the graph crosses the y-axis.
Linear: A linear graph is a straight line.
Quadratic: A quadratic graph is curved, u or n shape.

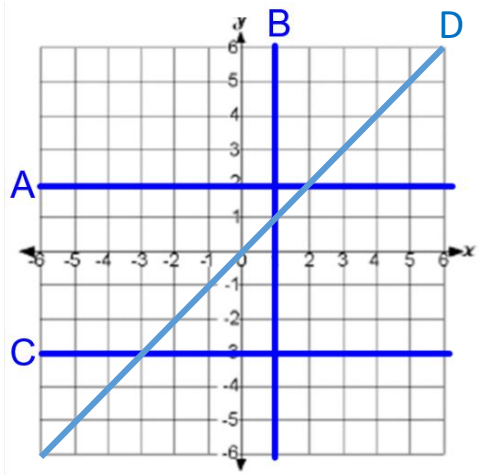
Tip

Parallel lines have the same gradient.

Formula

$$Gradient = \frac{difference\ in\ y's}{difference\ in\ x's}$$

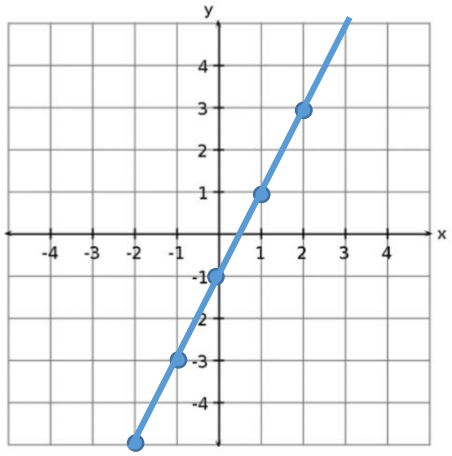
Examples



A: y = 2 B: x = 1
C: y = -3 D: y = x

Draw the graph of y = 2x - 1

X	-2	-1	0	1	2
Y	-5	-3	-1	1	3



Notice this graph has a gradient of 2 and a y-intercept of -1.

Questions

1) What are the gradient and y-intercept of:
a) y = 4x – 3 b) y = 4 + 6x c) y = - 5x – 3
2) Draw the graph of y = 3x – 2 for x values from -3 to 3 using a table.

ANSWERS: 1) a) m = 4, c = -3 b) m = 6, c = 4 c) m = -5, c = -3

COLLECTING AND REPRESENTING DATA

Key Concept
Pie Charts

There are 360 degrees in a pie chart. So you need angles that add to 360°.

Eye colour	F	
Blue	15	× 4 = 60
Brown	43	× 4 = 172
Other	32	× 4 = 128
	= 90	= 360

$\frac{360}{90} = 4$

Key Words

Frequency: Total.
Mean: Total of data divided by the number of pieces of data.
Mode: The value that occurs most frequently.
Median: Middle number when they are in order.
Range: Difference between the largest and smallest values.

Examples

5, 9, 9, 9, 11, 12, 13, 15, 16

Averages

$$Mean = \frac{5+9+9+9+11+12+13+15+16}{9} = \frac{99}{9} = 11$$

Median = 11 (The middle number shown above)

Mode = 9 (This number occurs most often)

Measure of Spread

Range = 16 – 5 = 11
(A bigger range means the data is more spread out)

Questions

1) Find the mean, mode, median and range of:
a) 3, 12, 4, 6, 8, 5, 4 b) 12, 1, 10, 1, 9, 3, 4, 9, 7, 9

2) For the table:
a) Draw a pie chart to show the data.
b) Draw a bar chart to show the data.
c) Work out the mean of the data.

Age	Frequency
11	17
12	11
13	8

sparx

M841, M940, M934, M328, M440, M127, M287, M899, M460, M574

Tips

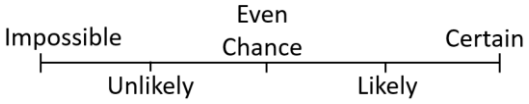
- There can be more than one mode.
- Range is a measure of spread, not an average.
- Bar charts have gaps between the bars.

ANSWERS: 1) a) Mean = 6, Mode = 4, Median = 5, Range = 9 b) Mean = 6.5, Mode = 9, Median = 8, Range = 11 2) a) Angles 170°, 110°, 80° c) 11.75

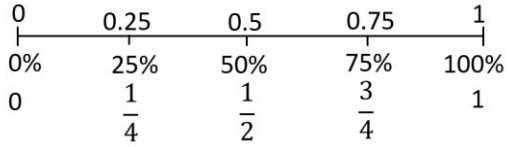
PROBABILITY

Key Concept

Chance



Probability



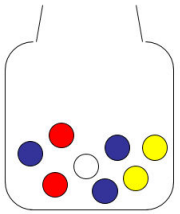
Probabilities can be written as:

- Fractions
- Decimals
- Percentages

Key Words

Probability: The chance of something happening as a numerical value.
Impossible: The outcome cannot happen.
Certain: The outcome will definitely happen.
Even chance: The are two different outcomes each with the same chance of happening.
Expectation: The amount of times you expect an outcome to happen based on probability.

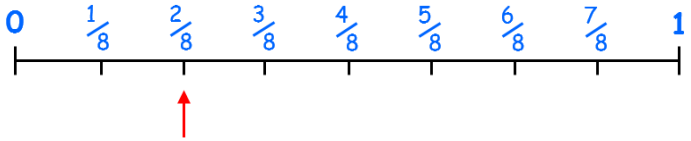
Examples



1) What is the probability that a bead chosen will be **yellow**.
Show the answer on a number line.

$$Probability = \frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes}$$

$$P(Yellow) = \frac{2}{8} = \frac{1}{4}$$



2) How many **yellow** beads would you **expect** if you pulled a bead out and replaced it 40 times?

$$\frac{1}{4} \times 40 = \frac{1}{4} of 40 = 10$$

sparx

Clip Numbers

M655,M941, M938

Tip

Probabilities always add up to 1.

Formula

$$Expectation = Probability \times no.\ of\ trials$$

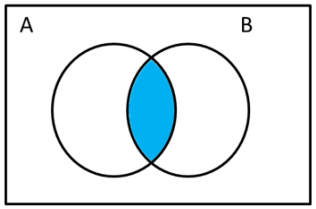
Questions

In a bag of skittles there are 12 red, 9 yellow, 6 blue and 3 purple left.
Find: a) P(Red) b) P(Yellow) c) P(Red or purple) d) P(Green)

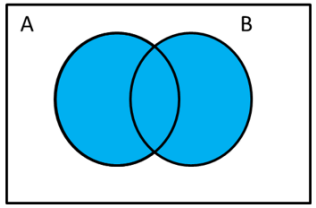
ANSWERS: 1) a) $\frac{12}{30} = \frac{2}{5}$ b) $\frac{9}{30} = \frac{3}{10}$ c) $\frac{15}{30} = \frac{1}{2}$ d) 0

FURTHER PROBABILITY

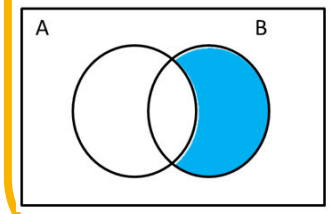
Key Concept



P(A ∩ B)



P(A U B)



P(A' ∩ B)

hegartymaths

359,360, 374-388, 422-424

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Key Words

Probability: The chance of something happening as a numerical value.
Impossible: The outcome cannot happen.
Certain: The outcome will definitely happen.
Even chance: The are two different outcomes each with the same chance of happening.
Mutually Exclusive: Two events that cannot both occur at the same time.

Formula

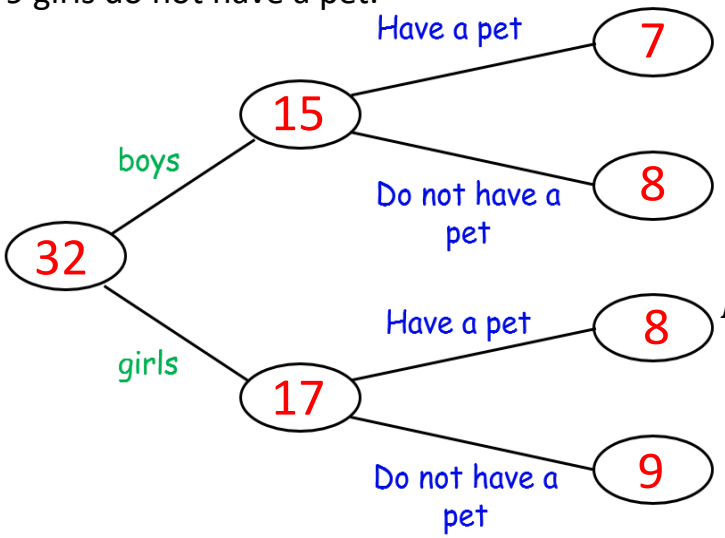
$P(A \cap B) = P(A) \times P(B)$

$P(A \cup B) = P(A) + P(B)$

or $(non\ ME)\quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Examples

In Hannah's class there are 32 students.
15 of these students are boys.
7 of the boys have a pet.
9 girls do not have a pet.



$$P(boy) = \frac{15}{32}$$

$$P(Girl\ with\ pet) = \frac{8}{32}$$

Questions

1) Draw a two-way table for the question above.
2) Find the probability that a pupil chosen is a boy with no pets.
3) A girl is chosen, what is the probability she has a pet?

ANSWERS: 2) $\frac{8}{32}$ 3) $\frac{8}{17}$