PLOTTING AND INTERPRETTING GRAPHS

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.

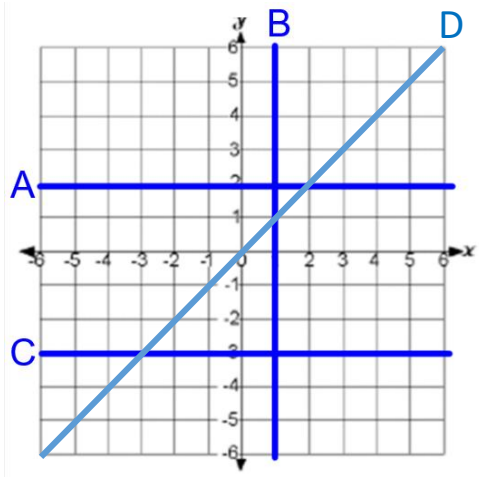
Tip

Parallel lines have the same gradient.

Formula

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

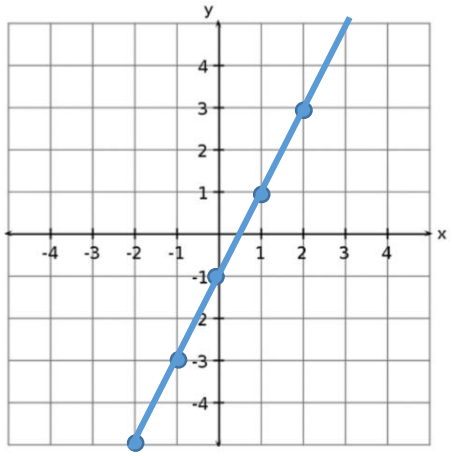
Examples



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.

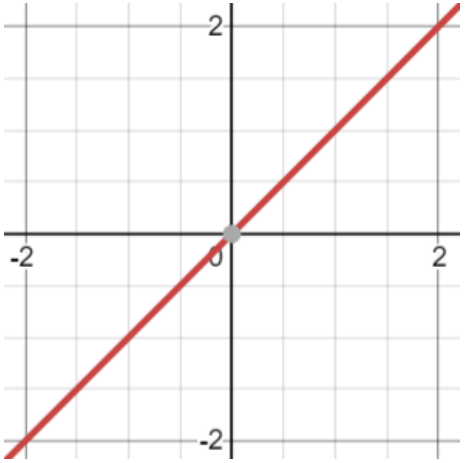
Questions

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

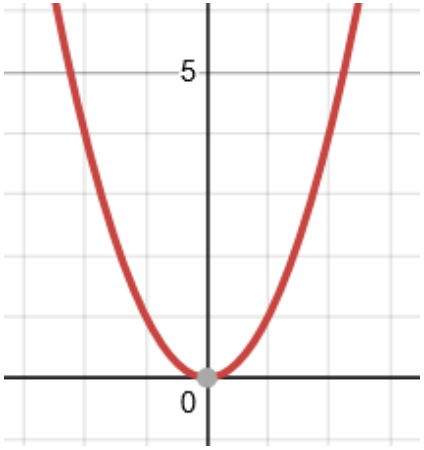
TYPES OF GRAPH

Examples



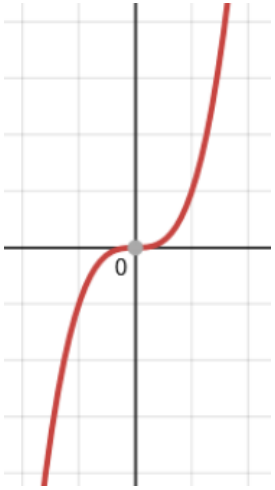
Linear graphs

$y = x$



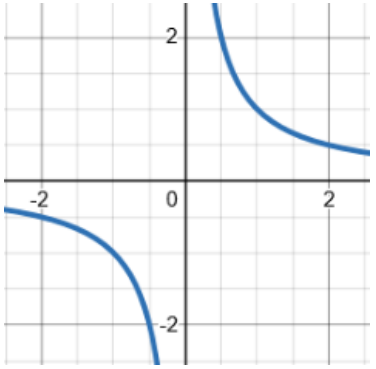
Quadratic graphs

$y = x^2$



Cubic graphs

$y = x^3$



Reciprocal graphs

$y = \frac{1}{x}$

sparx

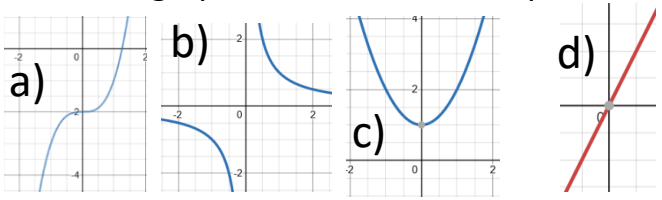
U980

U593

Key Words

Quadratic
Cubic
Reciprocal
Linear
Graph

Match the graph with the correct equation:



1) $y = 2x$
2) $y = \frac{1}{x}$
3) $y = x^3 - 2$
4) $y = x^2 + 1$

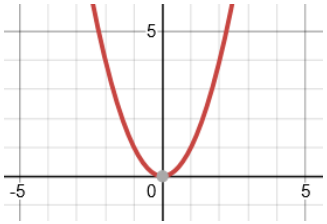
ANSWERS: 1d 2b 3a 4c

NON-LINEAR GRAPHS

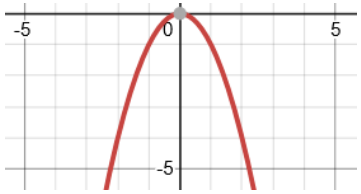
Key Concepts

A quadratic graph will always be in the shape of a parabola.

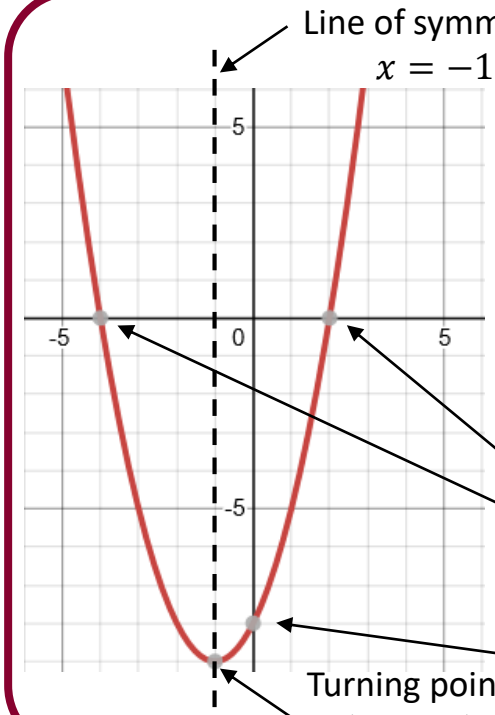
$y = x^2$



$y = -x^2$



The roots of a quadratic graph are where the graph crosses the x axis. The roots are the solutions to the equation.



Examples

$$y = x^2 + 2x - 8$$

A quadratic equation can be solved from its graph.
The roots of the graph tell us the possible solutions for the equation.
There can be 1 root, 2 roots or no roots for a quadratic equation. This is dependant on how many times the graph crosses the x axis.

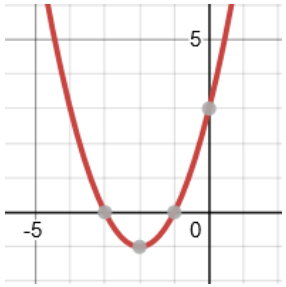
Roots $x = -4$
$x = 2$

y intercept = -8

sparx

U989
U667
U769

Key Words
Quadratic
Roots
Intercept
Turning point
Line of symmetry



Identify from the graph of $y = x^2 + 4x + 3$:

1) The line of symmetry
2) The turning point
3) The y intercept
4) The two roots of the equation

ANSWERS 1) $x = -2$ 2) $(-2, -1)$ 3) 3 4) $x = -1$ and $x = -3$

DISTANCE-TIME GRAPHS

Key Concepts

A **distance-time** graph plots time against the distance away from a starting point.

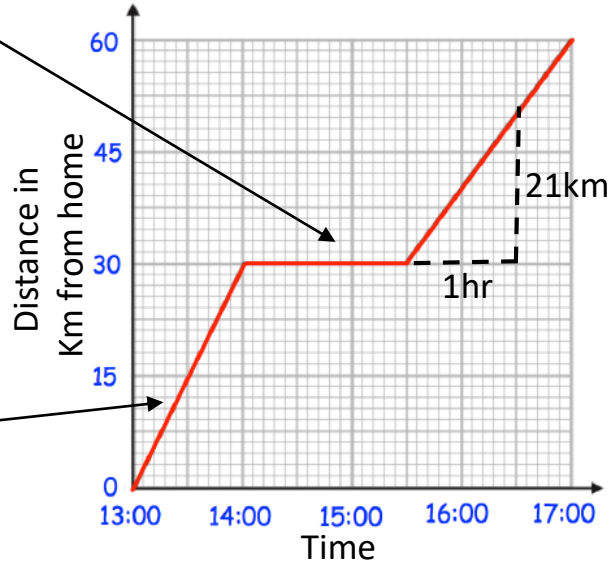
Speed can be calculated from these graphs by finding the gradient of the graph.

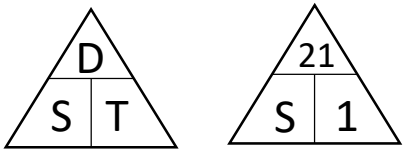
Horizontal lines are sections where the object is stationary.

Examples

Horizontal sections are where the object is stationary

Diagonal lines show the object moving away from home or moving closer to home





$$Speed = \frac{distance}{time}$$

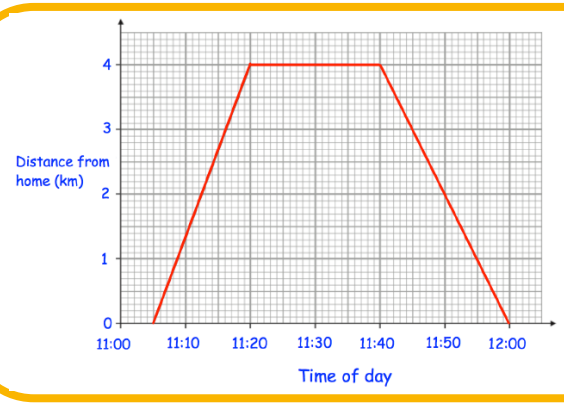
$$Speed = \frac{21}{1}$$

$$Speed = 21km/h$$

sparx

Key Words

Distance
Time
Speed
Gradient
Stationary



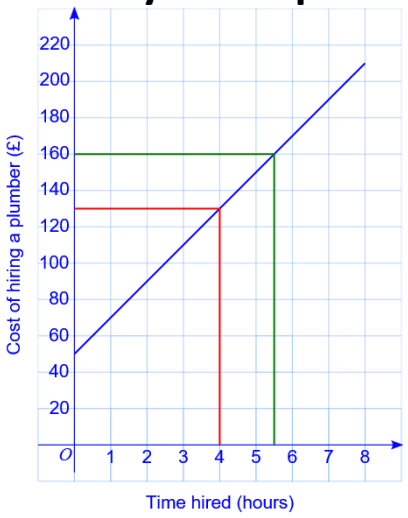
A distance-time graph shows the journey of someone from home to the shop and back again.

1) How long were they at the shop for?
2) How far away from home is the shop?
3) How far did they travel in total?
4) What speed did they travel on the way to the shop in km/h?

ANSWERS: 1) 20 minutes 2) 4km 3) 8km 4) 16km/h

USING GRAPHS

Key Concept

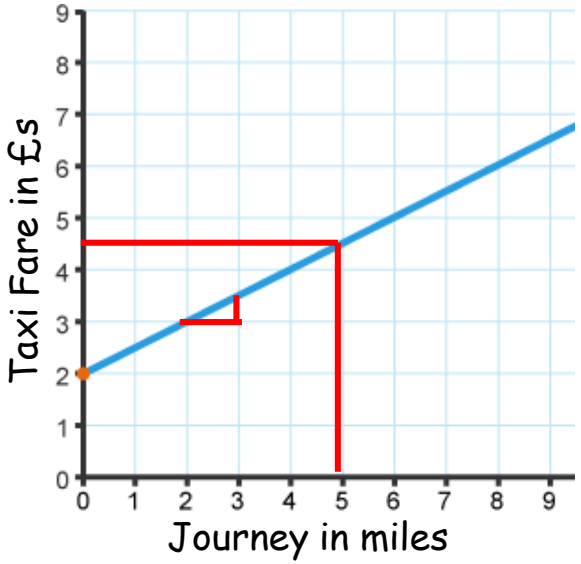


Gradient – The extra cost incurred for every extra hour.
y-intercept – The minimum payment to the plumber.

Key Words

Conversion graph: A graph which converts between two variables.
Intercept: Where two graphs cross.
y-intercept: Where a graph crosses the y-axis.
Gradient: The rate of change of one variable with respect to another. This can be seen by the steepness.
Simultaneous: At the same time.

Examples



What is the minimum taxi fair?
£2, this is the y-intercept.

What is the charge per mile?
50p, every extra mile adds on 50p.

How much would a journey of 5 miles cost?
£4.50, See line drawn up from 5 miles to the graph, then drawn across to find the cost.

sparx

M932, M658
M843, M771

Tip
The solution to two linear equations with two unknowns is the coordinates of the intercept (where they cross).

Questions
1) For the graph above a) A journey is 8 miles, what is its cost?
b) A journey cost just £3, how far was the journey?
2) Draw a graph to show the exchange rate £1 = $1.4.

ANSWERS: 1) a) £6 b) 2 miles