

Given two points (x_1, y_1) and (x_2, y_2)

Distance $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

Slope $\frac{y_2 - y_1}{x_2 - x_1}$

If we have a line $ax + by + c = 0$ then

$$m = \frac{-a}{b}$$

Equation of a line (or tangent) with a slope **m** and point (x_1, y_1)

$$y - y_1 = m(x - x_1)$$

The area of a triangle with vertices $(0, 0)$ (x_1, y_1) and (x_2, y_2)

$$\frac{1}{2} |x_1 y_2 - x_2 y_1|$$

Intersection of Lines

Identify the point of intersection of the lines $5x + 2y = 7$ and $2x - y = 10$

To find the point of intersection of two lines do a simultaneous equation. This gives you an x and y value which make the point.

Show A Point is on a Line

Investigate if the point $(3, 4)$ is on the line $3x + y - 13 = 0$

Put the point into the equation for x and y. If the equation works out the point is on the line.

Cutting x and y axis

Find the points where the line $3x - 4y = 12$ cuts the x and y axis
A line cuts the y axis at $x = 0$
A line cuts the x axis at $y = 0$

Distance

$a(3, 4)$ and $b(6, -1)$ are two points, find the distance between them $|ab|$

Label the points (x_1, y_1) and (x_2, y_2) and fill them into the distance formula -

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint

$a(3, 4)$ and $b(6, -1)$ are two points, find the midpoint of ab

Label the points (x_1, y_1) and (x_2, y_2) and fill them into the midpoint formula -

$$(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$$

Slope Given Points

$a(3, 4)$ and $b(6, -1)$ are two points, find the slope of ab

Label the points (x_1, y_1) and (x_2, y_2) and fill them into the slope

$$\text{formula - } \frac{y_2 - y_1}{x_2 - x_1}$$

Perpendicular Slope

Find the slope of the line perpendicular to $3x + 5y + 7 = 0$

Turn the slope upside down and change the sign?

Slope is $m = -\frac{3}{5}$ so the perpendicular slope is $m = +\frac{5}{3}$

Slope Given Line

Find the slope of $3x + 5y + 7 = 0$

If we have a line $ax + by + c = 0$ then

$$m = -\frac{a}{b} \quad m = -\frac{3}{5}$$

Equation of a Line

Find the equation of a line passing through the point $(3, 4)$ with a slope -3

Use the formula $y - y_1 = m(x - x_1)$ where you are given the slope m and you know one of the points (x_1, y_1) .

If you are given two of the points but NOT the slope use the slope formula to get the slope and then EITHER point.

Translations

Find the image of $(3, 1)$ through the point $(1, 2)$
This means moving a point through a point and out the same distance and direction the other side.

Symmetry

Find the image of $(2, -3)$ under (i) S_x (ii) S_y and (iii) S_o

To move through the x axis change the sign of the y value. To move through the y axis change the sign of the x value. To move through the origin change the signs of the x and y part.

The Line Q2 Paper 2