

1. Find gradient of straight line between $(3, 2)$ and $(5, 9)$
2. Find gradient of straight line between $(-3, 4)$ and $(2, -5)$
3. Find the distance between $(3, 2)$ and $(5, 9)$
4. Find the distance between $(-3, 4)$ and $(2, -5)$
5. Find the midpoint of $(3, 2)$ and $(5, 9)$
6. Find the midpoint of $(-3, 4)$ and $(2, -5)$
7. Write down the equations of two lines that are parallel
8. Write down the equations of two lines that are perpendicular
9. Find the equation of a line with gradient 2 passing thro $(3, 2)$
10. Find the equation of a line with gradient -3 passing thro $(5, 9)$
11. Find the equation of a line thro $(2, 9)$ and $(4, 17)$
12. Find the equation of a line thro $(3, -3)$ and $(5, -7)$

1. Let $(x_1, y_1) = (3, 2)$ and $(x_2, y_2) = (5, 9)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 2}{5 - 3} = \frac{7}{2}$$

2. Let $(x_1, y_1) = (-3, 4)$ and $(x_2, y_2) = (2, -5)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5 - 4}{2 - (-3)} = \frac{-9}{+5} = -\frac{9}{5}$$

3. Let $(x_1, y_1) = (3, 2)$ and $(x_2, y_2) = (5, 9)$

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

$$d = \sqrt{(5 - 3)^2 + (9 - 2)^2} = \sqrt{2^2 + 7^2} = \sqrt{53}$$

4. Let $(x_1, y_1) = (-3, 4)$ and $(x_2, y_2) = (2, -5)$

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

$$d = \sqrt{(2 - (-3))^2 + (-5 - 4)^2} = \sqrt{5^2 + (-9)^2} = \sqrt{106}$$

5. Let $(x_1, y_1) = (3, 2)$ and $(x_2, y_2) = (5, 9)$

$$\text{Midpoint } M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left(\frac{3 + 5}{2}, \frac{2 + 9}{2} \right)$$

$$M = \left(4, \frac{11}{2} \right)$$

6. Let $(x_1, y_1) = (-3, 4)$ and $(x_2, y_2) = (2, -5)$

$$\text{Midpoint } M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left(\frac{-3 + 2}{2}, \frac{4 + (-5)}{2} \right)$$

$$M = \left(-\frac{1}{2}, -\frac{1}{2} \right)$$

7. Two parallel lines

$$\begin{cases} y = 5x + 1 \\ y = 5x - 3 \end{cases}$$

8. Two perpendicular lines

$$\begin{cases} y = \frac{4}{3}x + 1 \\ y = -\frac{3}{4}x - 3 \end{cases}$$

9. Line with gradient 2 passing through $(3, 2)$

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

$$y - 2 = 2(x - 3)$$

$$y - 2 = 2x - 6$$

$$y = 2x - 6 + 2$$

$$y = 2x - 4$$

10. Line with gradient -3 passing through $(5, 9)$

$$\text{Using } y - y_1 = m(x - x_1)$$

$$y - 9 = -3(x - 5)$$

$$y - 9 = -3x + 15$$

$$y = -3x + 15 + 9$$

$$y = -3x + 24$$

11. Line through $(2, 9)$ and $(4, 17)$
 (x_1, y_1) (x_2, y_2)

$$\text{Using } \frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$$

$$\frac{y - 9}{17 - 9} = \frac{x - 2}{4 - 2}$$

$$\frac{y - 9}{8} = \frac{x - 2}{2}$$

$$y - 9 = \frac{8(x - 2)}{2}$$

$$y - 9 = 4(x - 2)$$

$$y - 9 = 4x - 8$$

$$y = 4x - 8 + 9$$

$$y = 4x + 1$$

12. Line through $(3, -3)$ and $(5, -7)$
 (x_1, y_1) (x_2, y_2)

Using $\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$

$$\frac{y - -3}{-7 - -3} = \frac{x - 3}{5 - 3}$$

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

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

$$y + 3 = -2(x - 3)$$

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

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

$$y = -2x + 3$$

