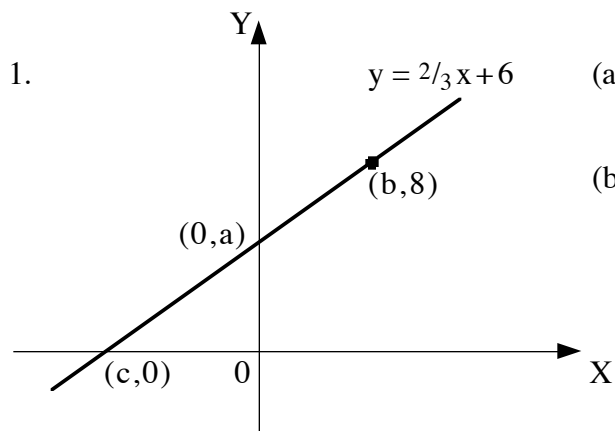


HOME EXERCISE 1: SOLUTIONS



(a) The graph shown has equation $y = \frac{2}{3}x + 6$.
Use the equation to find the values of a , b and c . (3)

(b) Find the equation of the line **parallel** to this line and passing through the point $(2, 5)$. (4)
Write the equation in the form $Ax + By + C = 0$.

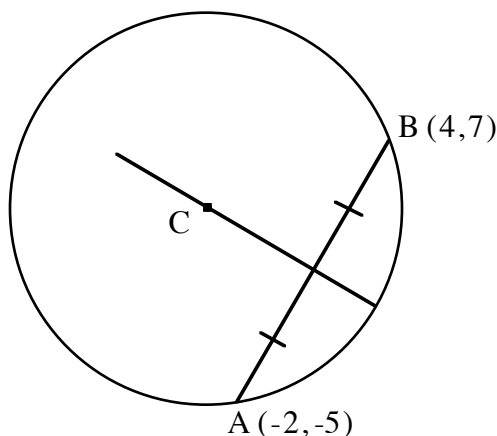
(a)

$$\begin{array}{lll}
 y = \frac{2}{3}x + 6 & y = \frac{2}{3}x + 6 & y = \frac{2}{3}x + 6 \\
 a = \frac{2}{3} \cdot 0 + 6 & 8 = \frac{2}{3} \cdot b + 6 & 0 = \frac{2}{3} \cdot c + 6 \\
 a = 6 & 2 = \frac{2}{3} \cdot b & -6 = \frac{2}{3} \cdot c \\
 & 6 = 2 \cdot b & -18 = 2 \cdot c \\
 & b = 3 & c = -9
 \end{array}$$

(b)

$$\begin{array}{ll}
 y - b = m(x - a) & \\
 y - 5 = \frac{2}{3}(x - 2) & \\
 3y - 15 = 2(x - 2) & \\
 3y - 15 = 2x - 4 & \\
 0 = 2x - 3y + 11 & \\
 2x - 3y + 11 = 0 &
 \end{array}$$

2.



The diagram shows a circle centre C .
The line through C bisects chord AB .
Find the equation of the line through C . (5)
Write the equation in the form $Ax + By + C = 0$.

midpoint of AB

$$\begin{array}{l}
 \frac{-2 + 4}{2}, \frac{-5 + 7}{2} \\
 \frac{2}{2}, \frac{2}{2}
 \end{array}$$

$$M_{AB} (1, 1)$$

gradient of AB

$$\begin{array}{l}
 m_{AB} = \frac{7 - (-5)}{4 - (-2)} \\
 = \frac{7 + 5}{4 + 2} \\
 = \frac{12}{6} \\
 = 2
 \end{array}$$

perpendicular gradient

$$\begin{array}{l}
 m_1 \cdot m_2 = -1 \\
 m_{CM} = -\frac{1}{2}
 \end{array}$$

$$y - b = m(x - a)$$

$$y - 1 = -\frac{1}{2}(x - 1)$$

$$2y - 2 = -1(x - 1)$$

$$2y - 2 = -x + 1$$

$$x + 2y - 3 = 0$$

3. If $g(t) = \frac{t+4}{t-2}$, $t \neq 2$
- (a) find the image of 5 under function g (1)
 - (b) find $g(-2)$ (1)
 - (c) if $g(c) = 2$, find the value of c (1)
 - (d) explain why the function is undefined for $t = 2$. (1)

(a)

$$\begin{aligned} g(5) &= \frac{5+4}{5-2} \\ &= \frac{9}{3} \\ &= 3 \end{aligned}$$

(b)

$$\begin{aligned} g(-2) &= \frac{-2+4}{-2-2} \\ &= \frac{2}{-4} \\ &= -\frac{1}{2} \end{aligned}$$

(c)

$$\begin{aligned} g(c) &= \frac{c+4}{c-2} \\ 2 &= \frac{c+4}{c-2} \\ 2(c-2) &= c+4 \\ 2c-4 &= c+4 \\ 2c-c &= 4+4 \\ c &= 8 \end{aligned}$$

(d)

$$\begin{aligned} g(2) &= \frac{2+4}{2-2} \\ &= \frac{6}{0} \\ &= \text{undefined} \end{aligned}$$

2 has no image under g

4. If $h(x) = x^2 - 2x$, write in simplest form:
- (a) $h(2x)$ (1)
 - (b) $h(x+2)$ (2)
- and hence (c) $h(2x) - h(x+2)$ (1)

(a)

$$\begin{aligned} h(2x) &= (2x)^2 - 2(2x) \\ &= 4x^2 - 4x \end{aligned}$$

(b)

$$\begin{aligned} h(x+2) &= (x+2)^2 - 2(x+2) \\ &= x^2 + 4x + 4 - 2x - 4 \\ &= x^2 + 2x \end{aligned}$$

(c)

$$\begin{aligned} h(2x) - h(x+2) &= 4x^2 - 4x - (x^2 + 2x) \\ &= 4x^2 - 4x - x^2 - 2x \\ &= 3x^2 - 6x \end{aligned}$$