Worked Solutions Attached

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Straight Line Equation $y = mx + c$

1. Find the gradient and y-intercept of the lines with the equations

a) $y = 3x + 7$ b) $y = 5x - 4$ c) $y = \frac{1}{3}x + 5$

d) $y = -2x + 1$ e) $y = -x - 3$ f) $y = 9 - 4x$

g) $y - 8x = 1$ h) $y + 3x = 5$ i) $6x - y = 3$

j) $2y + 8x = 4$ k) $3y - 9x = 15$ l) $2x + 5y = 20$

m) $4x - 3y = 12$ n) $4x + y - 6 = 0$ o) $5x - 7y - 2 = 0$

2. A line which passes through the point (0, 4) has gradient 5.
Write down the equation of the line.

3. A line which passes through the point (0, 2) has gradient -2.
Write down the equation of the line.

4. The gradient of a line is 3. The point with coordinates (4, 2) lies on the line.
Find the equation of the line.

5. A line which passes through the point (4, 23) has gradient 4.
Write down the equation of the line.

6. The gradient of a line is -1. The point with coordinates (5, -1) lies on the line.
Find the equation of the line.

7. A line passes through the points with coordinates (1, 3) and (2, 8).
Find the equation of the line.

8. A line passes through the points with coordinates (2, 11) and (5, 23).
Find the equation of the line.

9. Find the equation of the line which passes through (6, 1) and (8, 9).

10. A line passes through the points with coordinates (3, 5) and (-3, -7).
Find the equation of the line.

11. A line passes through the points with coordinates (5, -3) and (8, -9).
Find the equation of the line.

12. Find the equation of the line which passes through (-4, 2) and (1, 1).

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(1) (a) $y = mx + c$

$y = 3x + 7$

$m = 3$ ✓ $c = 7$ ✓

(b) $y = 5x - 4$

$m = 5$ ✓ $c = -4$ ✓

(c) $y = \frac{1}{3}x + 5$

$m = \frac{1}{3}$ ✓ $c = 5$ ✓

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

$m = -2$ ✓ $c = 1$ ✓

(e) $y = -x - 3$

$m = -1$ ✓ $c = -3$ ✓

(f) $y = -4x + 9$

$m = -4$ ✓ $c = 9$ ✓

(g) $y = 8x + 1$

$m = 8$ ✓ $c = 1$ ✓

(h) $y = -3x + 5$

$m = -3$ ✓ $c = 5$ ✓

(i) $6x - y = 3$

$(\times -1)$ $-y = -6x + 3$

$\Rightarrow y = 6x - 3$

$m = 6$ ✓ $\quad c = -3$ ✓

(j) $2y + 8x = 4$

$(\div 2)$ $y + 4x = 2$

$y = -4x + 2$

$m = -4$ ✓ $\quad c = 2$ ✓

(k) $3y = 9x + 15$

$(\div 3)$ $y = 3x + 5$

$m = 3$ ✓ $\quad c = 5$ ✓

(l) $5y = -2x + 20$

$(\div 5)$ $y = \frac{-2}{5}x + 4$

$m = -\frac{2}{5}$ ✓ $\quad c = 4$ ✓

(m) $-3y = -4x + 12$

$(\times -1)$ $3y = 4x - 12$

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

$m = \frac{4}{3}$ ✓ $\quad c = -4$ ✓

(n) $y = -4x + 6$

$m = -4$ ✓ $\quad c = 6$ ✓

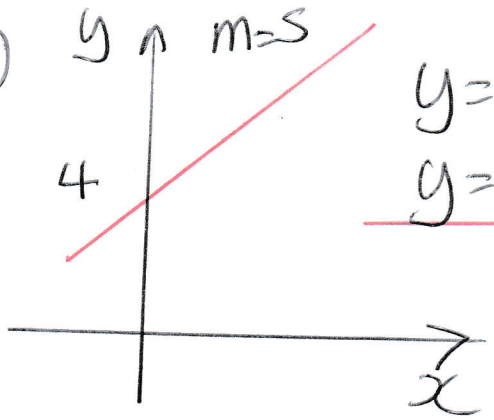
(o) $-7y = -5x + 2$

$(\times -1)$ $7y = 5x - 2$

$(\div 7)$ $y = \frac{5}{7}x - \frac{2}{7}$

$m = \frac{5}{7}$ ✓ $\quad c = -\frac{2}{7}$ ✓

(2)

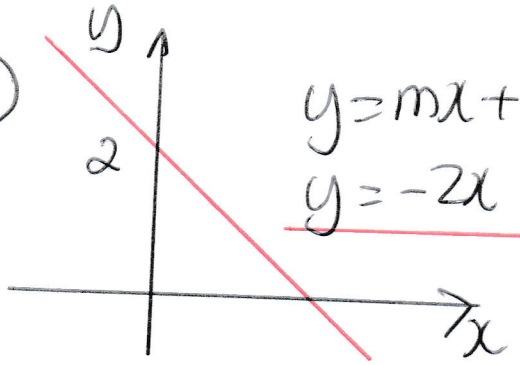


$y = mx + c$

$y = 5x + 4$

POSITIVE 'm' SLOPES UP THE WAY FROM LEFT TO RIGHT

(3)

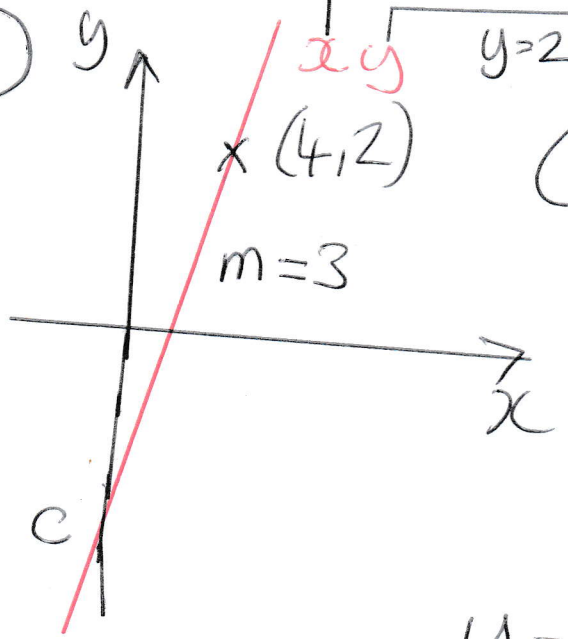


$y = mx + c$

$y = -2x + 2$

NEGATIVE 'm' SLOPES DOWN THE WAY FROM LEFT TO RIGHT

(4)



$x = 4$

$y = 2$

$y = mx + c$

$2 = 3 \times 4 + c$

$2 = 12 + c$

$12 + c = 2$

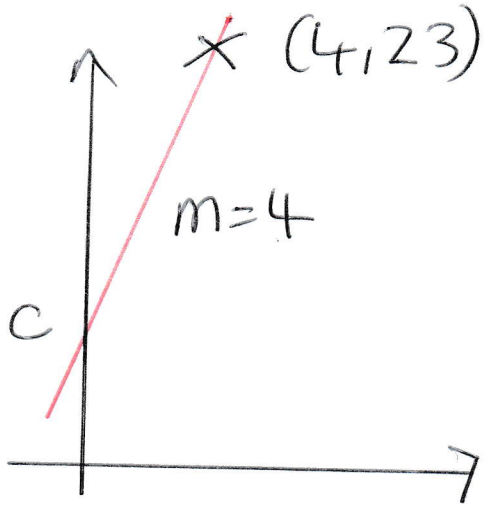
$c = 2 - 12$

$c = -10$

$y = mx - 10$ (SINCE $m = 3$)

$y = 3x - 10$ ✓

(5)



(4,23) $m=4$

SUB $x=4$, $y=23$ AND $m=4$

INTO $y = mx + c$

$23 = 4 \times 4 + c$

$23 = 16 + c$

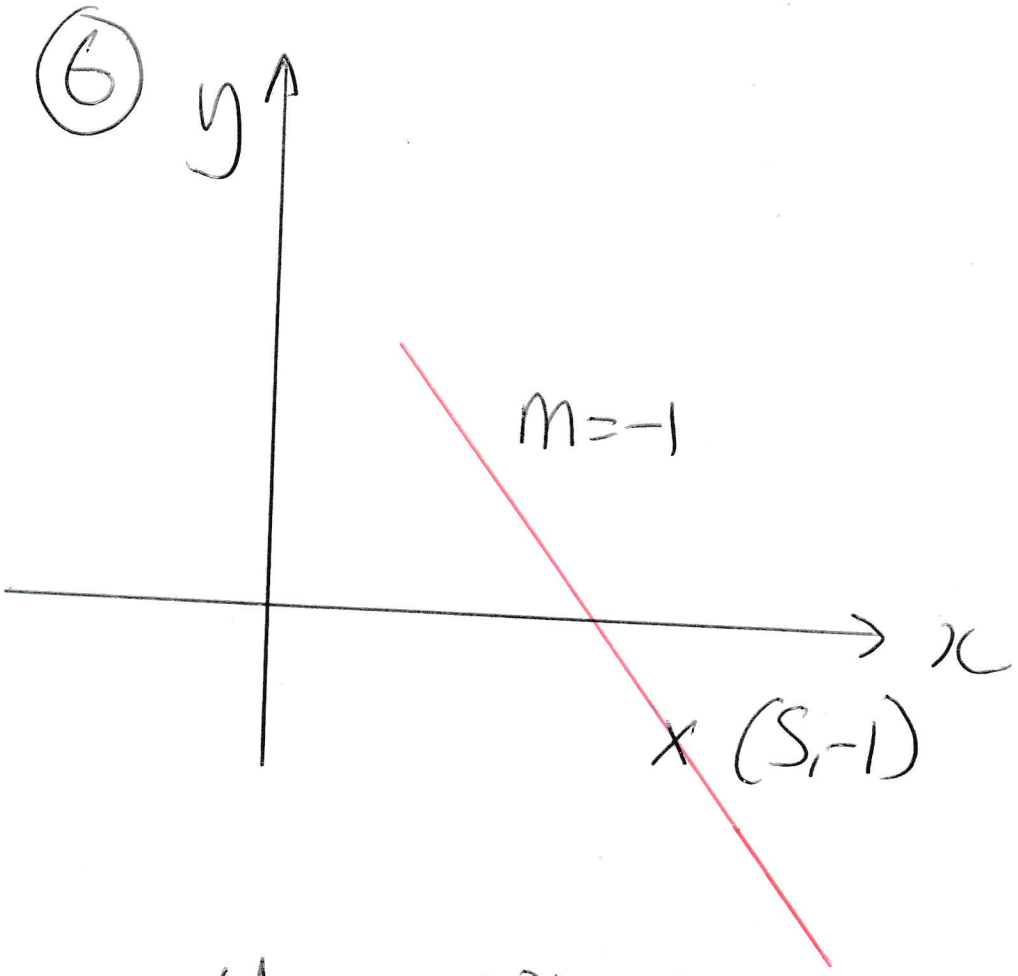
$c = 23 - 16$

$c = 7$

$y = mx + c$

$\Rightarrow y = 4x + 7$ ✓

⑥



$y = mx + c$

$(5, -1)$ $m = -1$

x y

$-1 = -1 \times 5 + c$

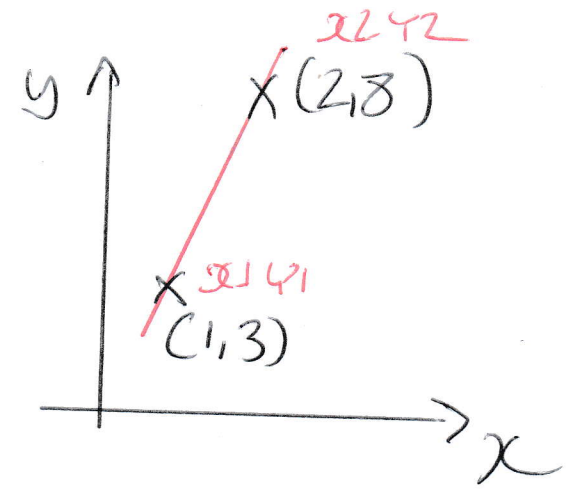
$-1 = -5 + c$

$-5 + c = -1$

$c = -1 + 5 = 4$

$\therefore$ $y = mx + c$, $y = -x + 4$ ✓

(7)



Gradient $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-3}{2-1} = \frac{5}{1} = 5$

x y

$(1, 3)$, $m = 5$

$y = mx + c$

$3 = 5 \times 1 + c$

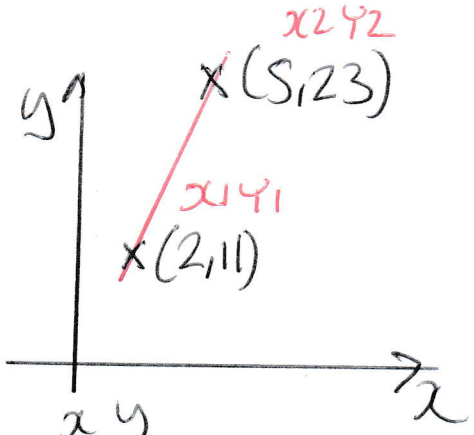
$3 = 5 + c$

$c = -2$

$y = mx + c$

$y = 5x - 2$ ✓

(8)



$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{23-11}{5-2}$

$= \frac{12}{3} = 4$

x y

$(2, 11)$, $m = 4$

$y = mx + c$

$11 = 4 \times 2 + c$

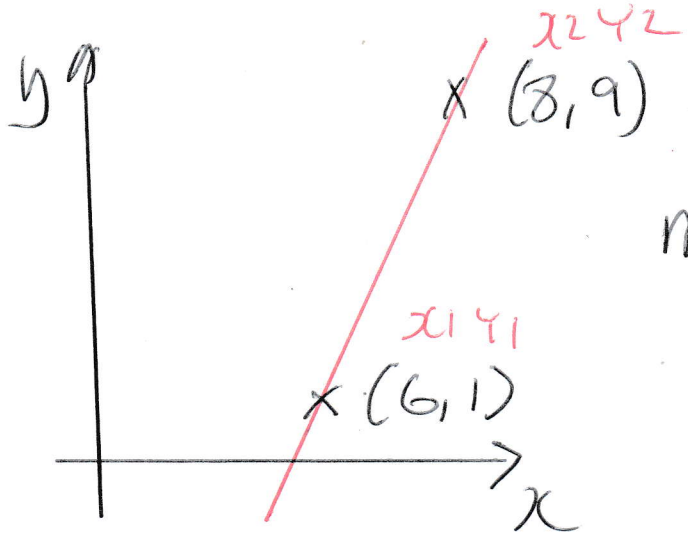
$11 = 8 + c$

$c = 3$

$y = mx + c$

$y = 4x + 3$ ✓

(9)



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{9-1}{8-6} = \frac{8}{2}$$

$$= 4$$

x y

(6, 1), $m = 4$

$y = mx + c$

$1 = 4 \times 6 + c$

$1 = 24 + c$

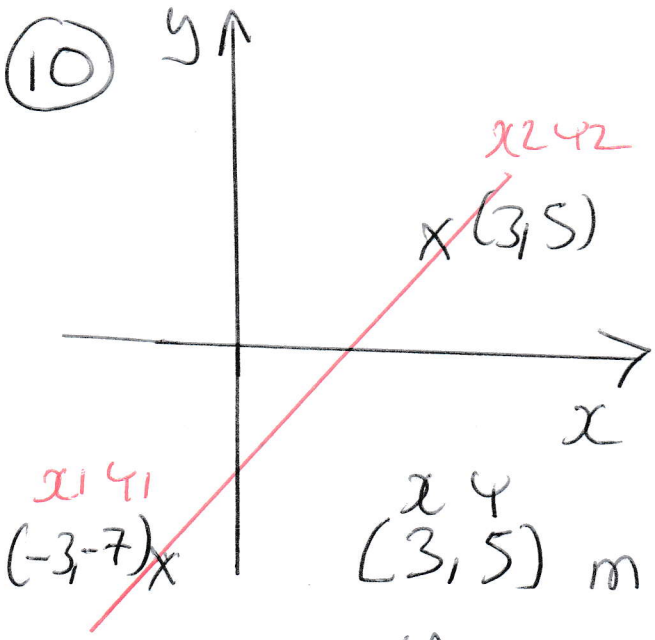
$c = 1 - 24$

$c = -23$

$y = mx + c$

$y = 4x - 23$ ✓

(10)



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{5-(-7)}{3-(-3)} = \frac{5+7}{3+3}$$

$$= \frac{12}{6} = 2$$

x y

(3, 5) $m = 2$

$y = mx + c$

$5 = 2 \times 3 + c$

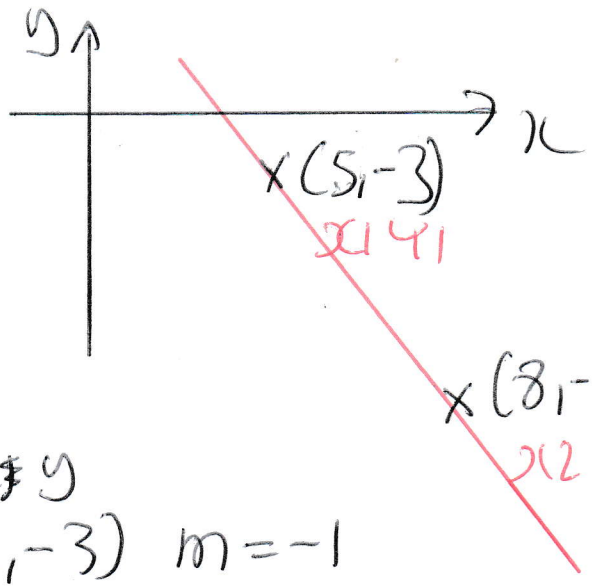
$5 = 6 + c$

$c = 5 - 6 = -1$

$y = mx + c$

$y = 2x - 1$ ✓

(11)



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-9 - (-3)}{8 - 5}$$

$$= \frac{-9 + 6}{3} = -\frac{3}{3}$$

$$= -1$$

x y

(5, -3) $m = -1$

$y = mx + c$

$-3 = -1 \times 5 + c$

$-3 = -5 + c$

$-5 + c = -3$

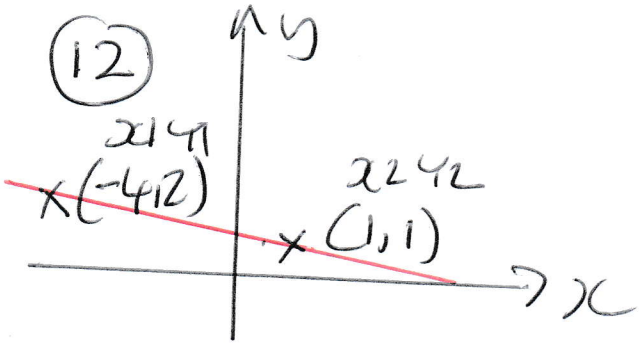
$c = -3 + 5$

$c = 2$

→ $y = mx + c$

$y = -x + 2$ ✓

(12)



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{1 - 2}{1 - (-4)} = -\frac{1}{5}$$

x y

(1, 1) $m = -\frac{1}{5}$

$y = mx + c$

$1 = -\frac{1}{5} \times 1 + c$

$c = 1 + \frac{1}{5}$

$c = 1\frac{1}{5} = \frac{6}{5}$

→ $y = mx + c$

$y = -\frac{1}{5}x + \frac{6}{5}$ ✓