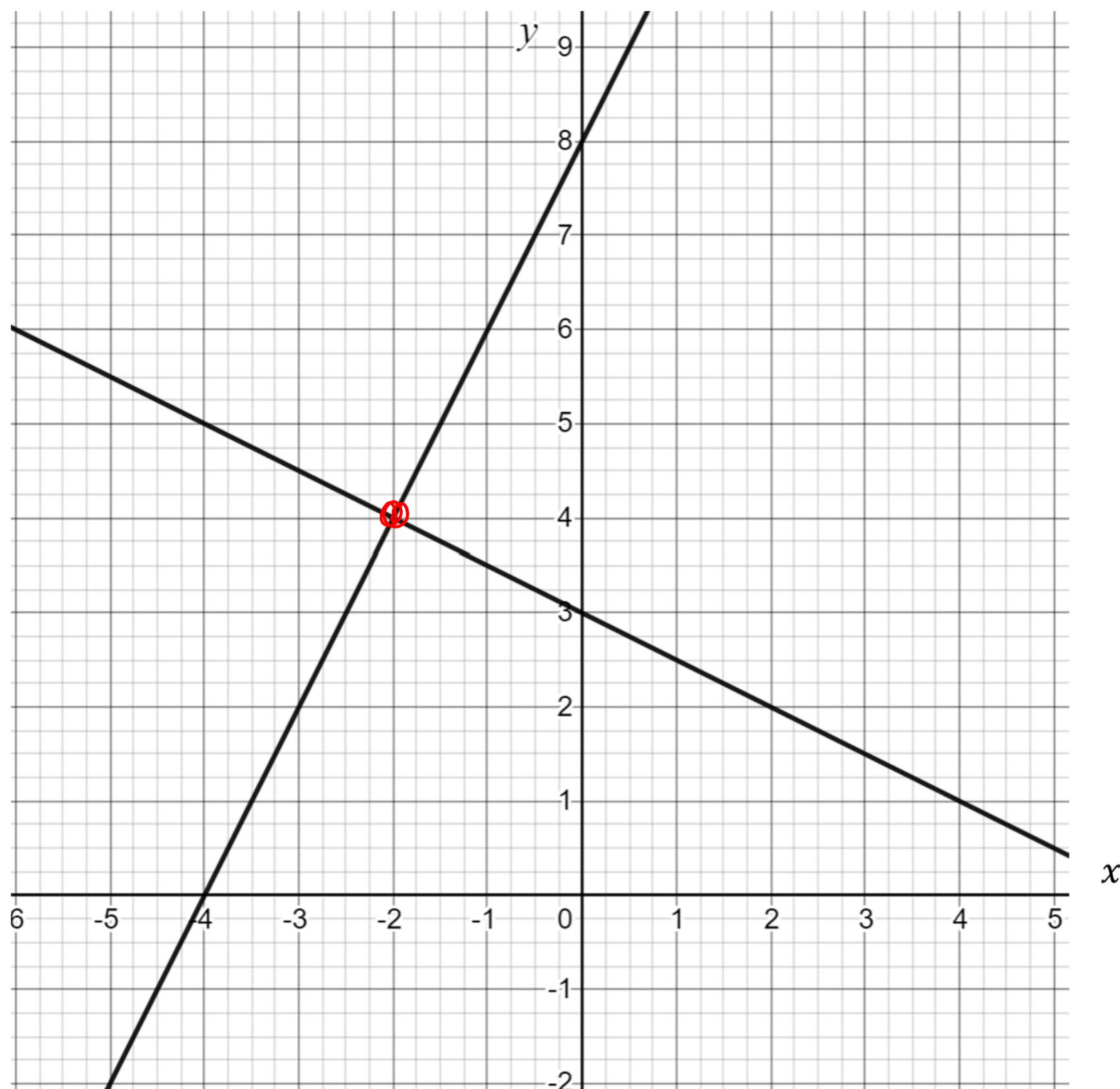# Solving Simultaneous Equations Graphically Exam Practice

Q1. The graphs of $2y + x = 6$ and $y - 2x = 8$ are drawn below:

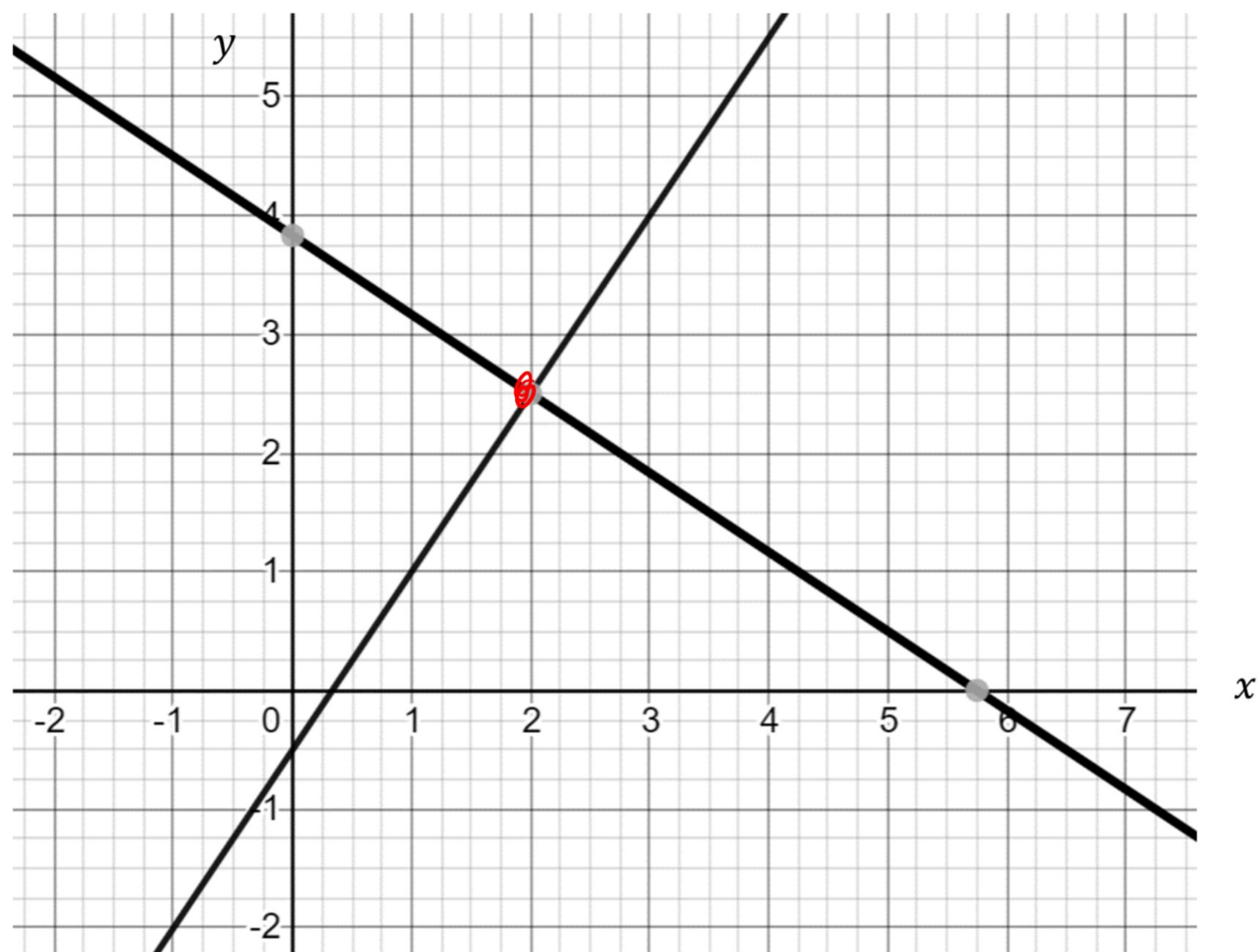Use the graphs to solve the following pair of equations:

$2y + x = 6$

$y - 2x = 8$

Answer: $x = -7, y = 4$

(2 marks)

Q2. The graphs of $3x - 2y = 1$ and $4x + 6y = 23$ are drawn below:

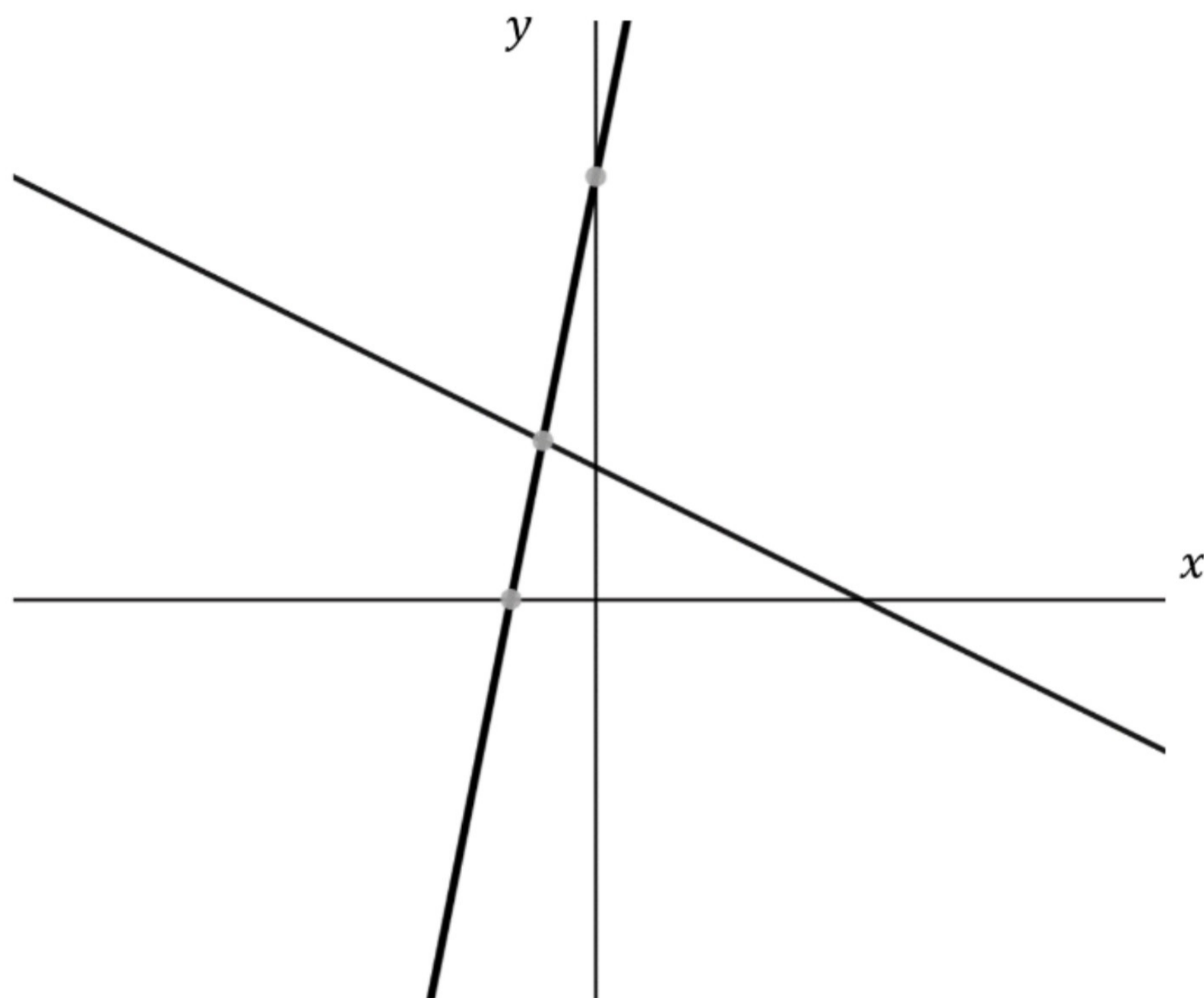Use the graphs to solve the following pair of equations:

$3x - 2y = 1$

$4x + 6y = 23$

Answer: $x=2, y=3$

(2 marks)

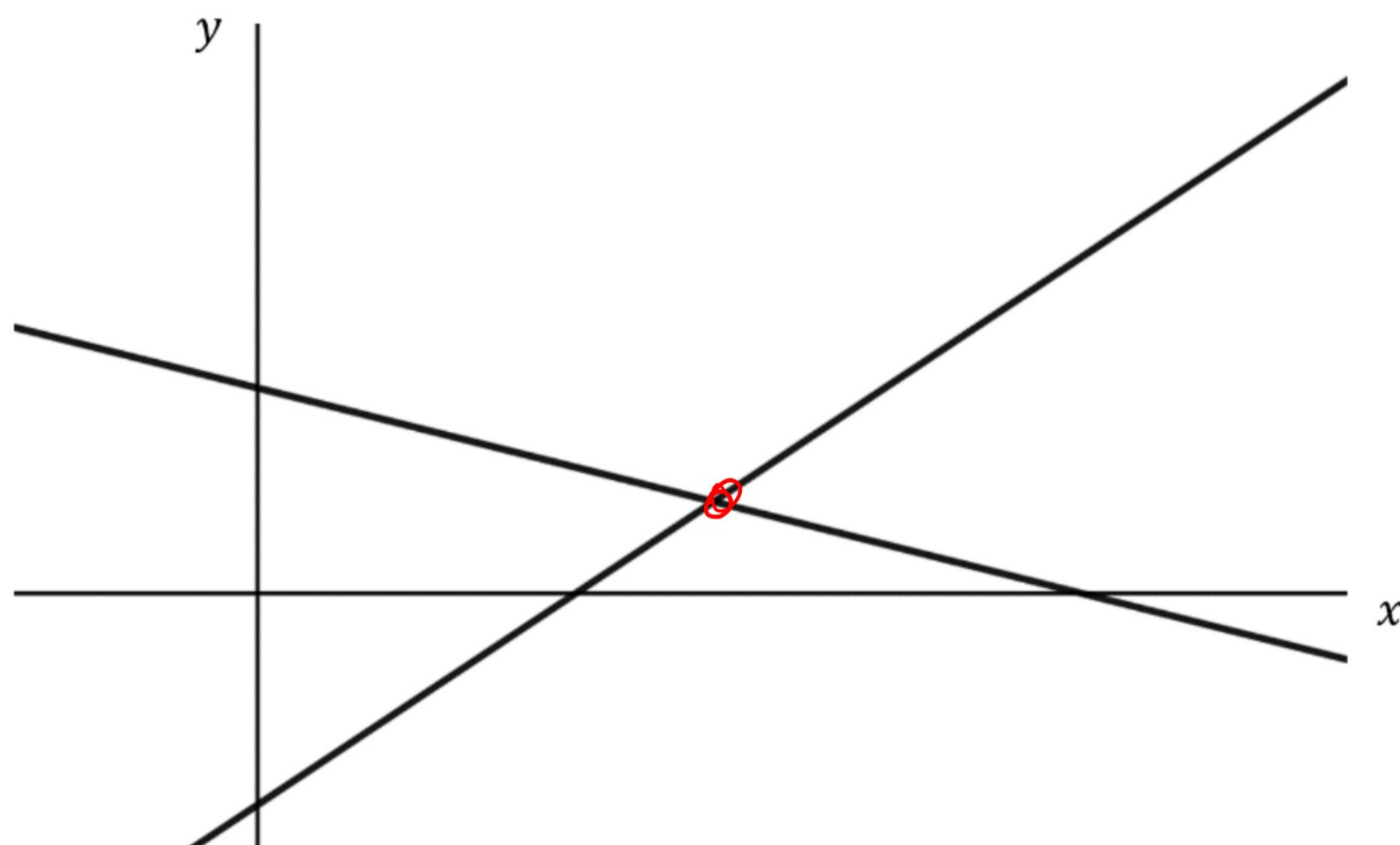Q3. A sketch of the graphs of $y - 5x = 4$ and $4x + 8y = 10$ is shown below:

Find the exact co-ordinates of the point of intersection.

$$y - 5x = 4 \implies 8y - 40x = 32$$

② $8y + 4x = 10$ $8y + 4x = 10$

$$-4x = 22$$

$$\implies x = -\frac{1}{2}, \text{ in } ②$$

$$8y + 4\left(-\frac{1}{2}\right) = 10$$
$$8y - 2 = 10$$
$$8y = 12$$
$$y = \frac{3}{2}$$

Answer: $x = -\frac{1}{2}, \ y = \frac{3}{2}$

(4 marks)

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Q4. A sketch of the graphs of $6x - 9y = 14$ and $2x + 8y = 12$ is shown below:

Find the exact co-ordinates of the point of intersection.

① $6x - 9y = 14$ $-6x - 9y = 14$

② $2x + 8y = 12$ $\underline{6x + 24y = 36}$

$-33y = -22$

$y = \frac{2}{3}$ in (2)

$\Longrightarrow 2x + 8\left(\frac{2}{3}\right) = 12$
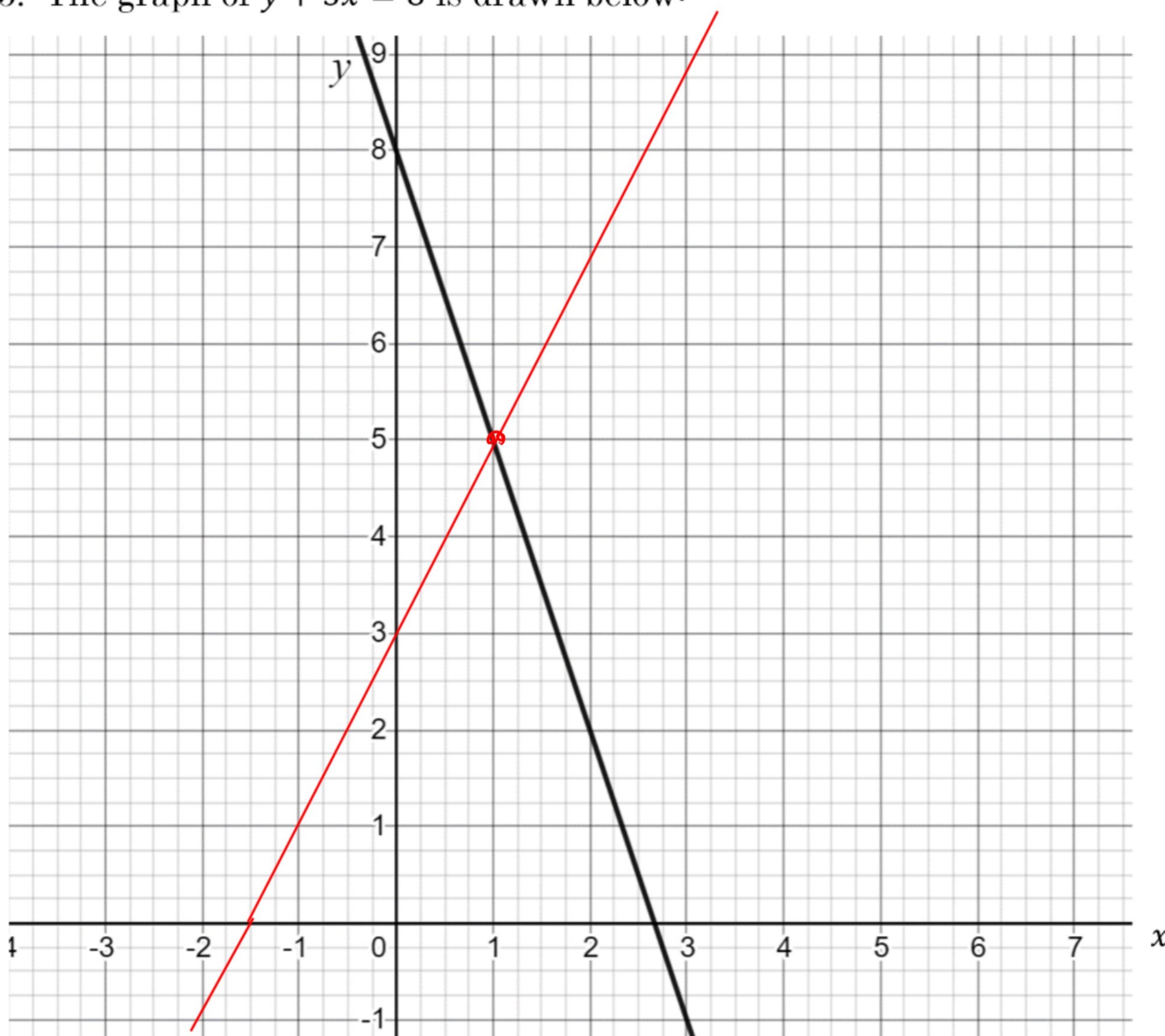
$2x + \frac{16}{3} = \frac{36}{3}$

$2x = \frac{20}{3}$

$x = 20/6$

Answer: $x = \frac{20}{6}, y = \frac{2}{3}$

(4 marks)

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Q5. The graph of $y + 3x = 8$ is drawn below:

By drawing a suitable line on the grid solve following pair of equations:

$y - 2x = 3$ $\Rightarrow$ find x, y intercepts to draw

$y + 3x = 8$ line is easiest.

• if $x = 0$, $y - 2(0) = 3$

   $\therefore (0,3)$ is y-intercept

• if $y = 0$, $0 - 2x = 3$ $\Rightarrow$ $x = -\frac{3}{2}$
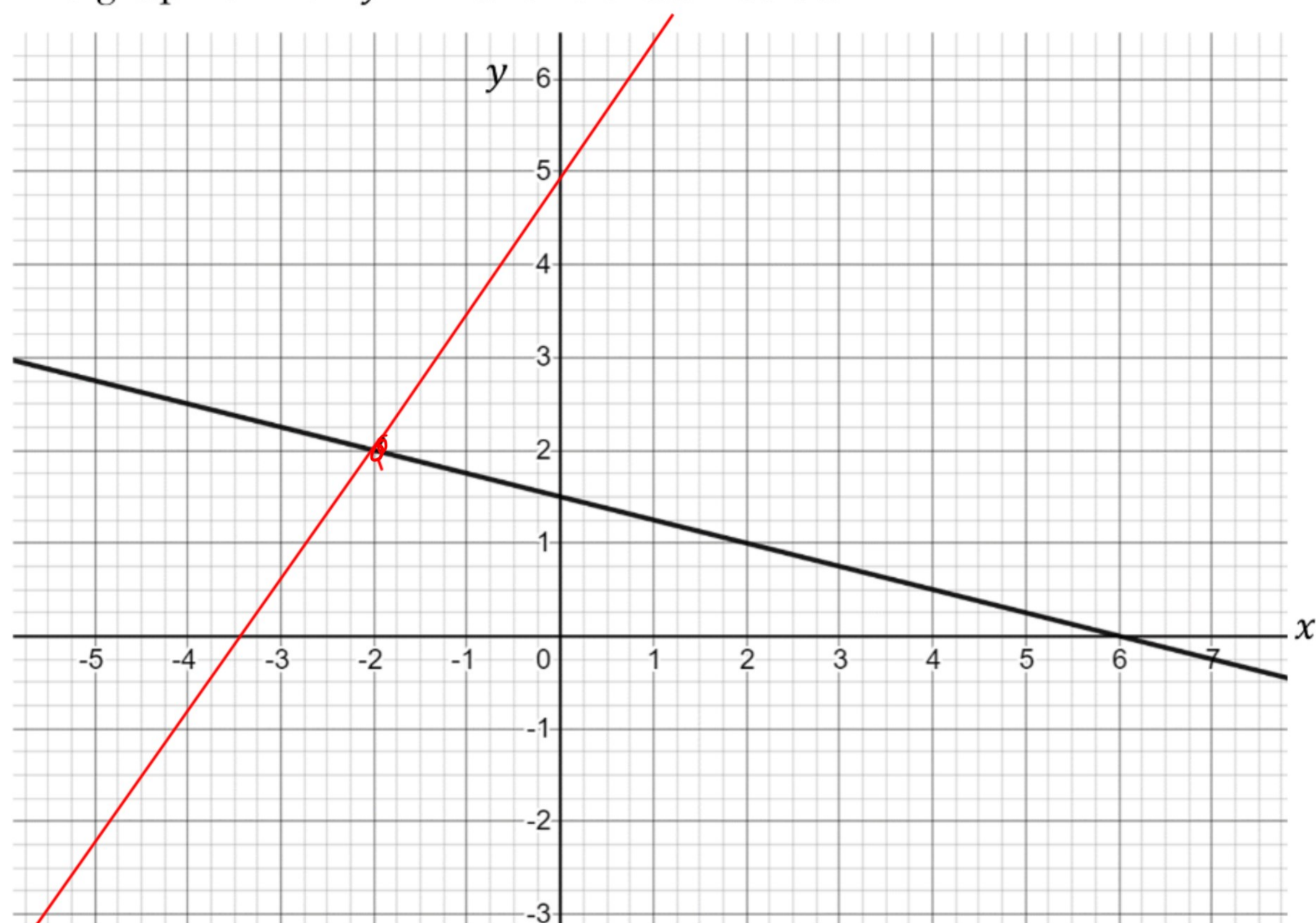
   $\therefore (-\frac{3}{2}, 0)$ is x-intercept

Answer: $x = 1, y = 5$

(3 marks)

Q6. The graph of $x + 4y = 6$ and is drawn below:

By drawing a suitable line on the grid, solve following pair of equations:
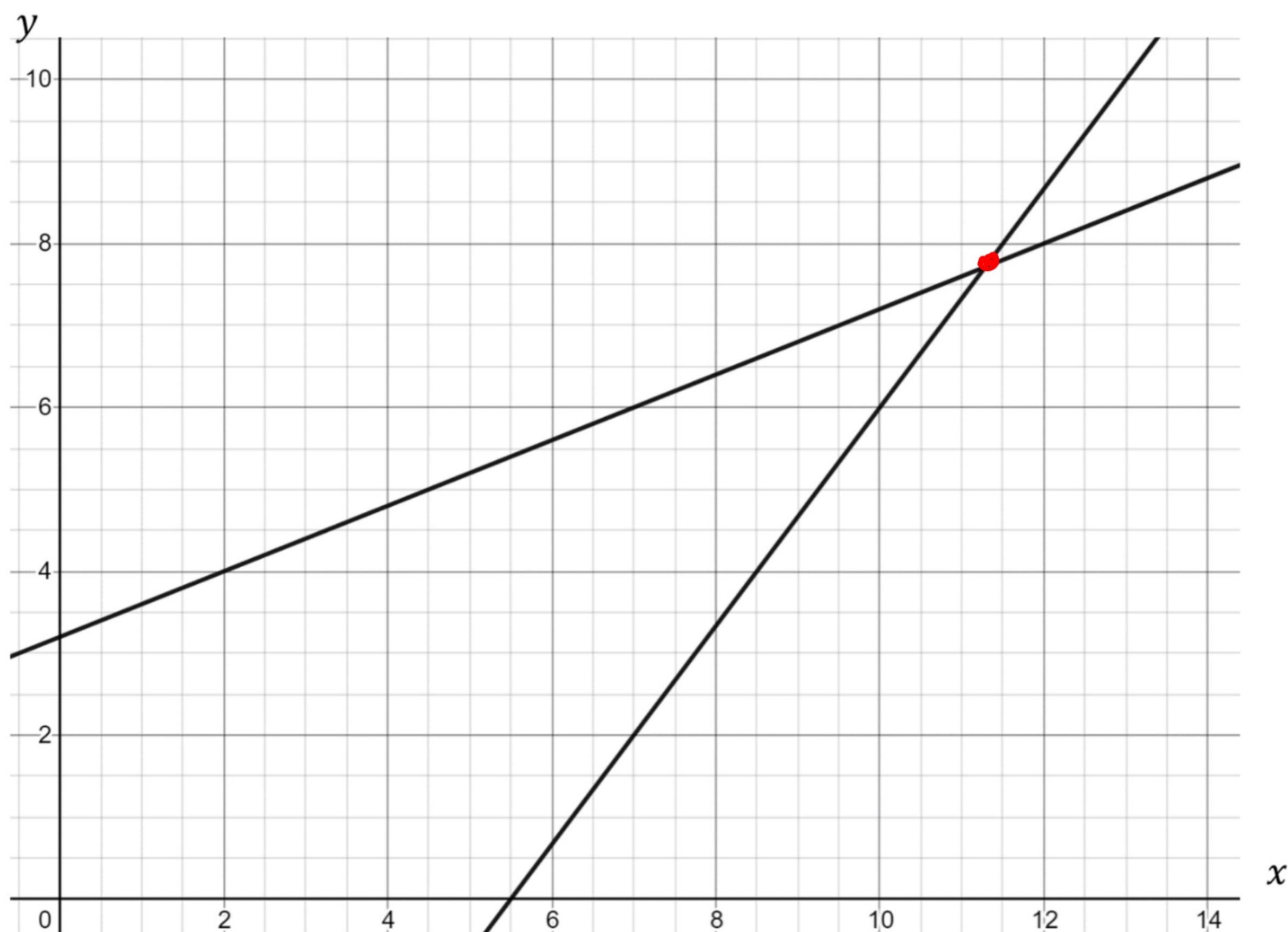
$2y - 3x = 10$ $\Rightarrow$

x	-1	0
y	3.5	5

$x + 4y = 6$

Answer: $x = -2, y = 2$

(3 marks)

Q7. (i) Using the grid below, estimate the solution of the equations
$4x - 3y = 22$ and $5y - 2x = 16$

Answer: $x = 11.25, y = 7.75$

(2 marks)

(ii) How many solutions would the following set of equations have:

$4x - 3y = 22$, $6y - 8x = 16$

• gradient $6y - 8x = 16$ is $\frac{4}{3}$

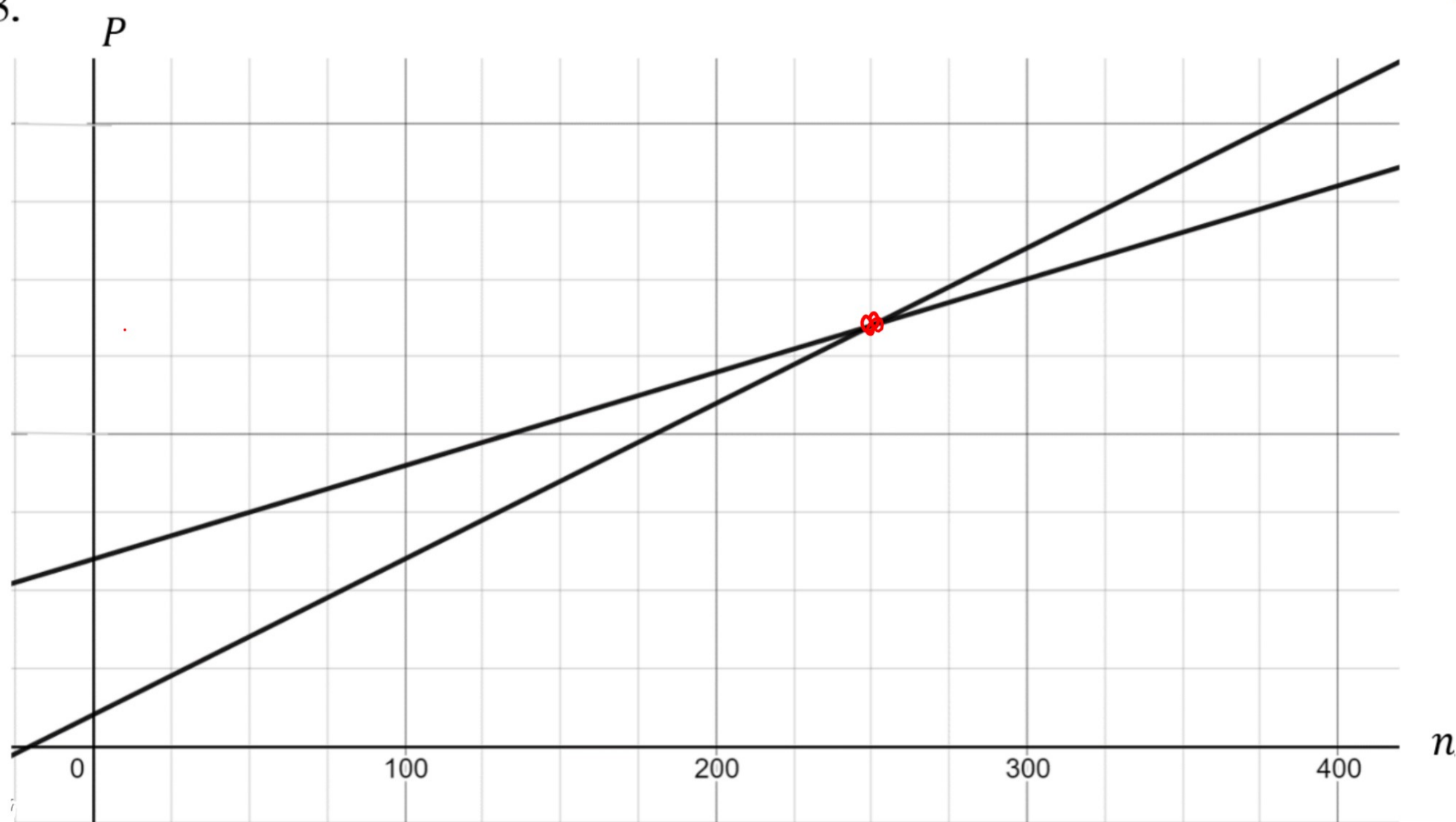$\left(\begin{array}{l} 6y = 8x + 16 \\ y = \frac{8x}{6} + \frac{16}{6} \end{array} \right)$

• gradient $4x - 3y = 22$ is $\frac{4}{3}$ also
• lines are parallel, so never meet.

Answer: None

(2 marks)

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Q8.

In a firm, the profit P (£1000's), from the number n of items sold is modelled by 2 staff. One claims the model should be $P = 0.5n + 20$, the other says it should be $P = 0.34n + 60$.

The boss will award a staff pay-rise if the two models predict the same profit, provided that this profit exceeds £135,000. Decide if there will be a pay-rise.

- Both models agree when $n = 250$ items.
- $P = 0.5(250) + 20 \Rightarrow P = 145,000$
- $P = 0.34(250) + 60 \Rightarrow P = 145,000$

- $145,000 > 135,000$ so a payrise will be awarded.

Answer: _Yes, payrise_

(3 marks)