

## EXAM 3\_1

1. Reduce the powers, using properties:

(2 points)

a)  $\left(\frac{2}{3}\right)^{-3} \cdot \frac{2^3 \cdot 3^4}{9^2 \cdot 4^3} =$

b)  $\frac{a^{-2} \cdot (ab^3)^2 \cdot (a^2)^5}{a^7 \cdot b^{-3} \cdot (ab)^2} =$

2. Work out and simplify:

(2 points)

a)  $\frac{4}{9} \cdot \frac{3}{2} - \frac{9}{2} \cdot \left(\frac{1}{3} - \frac{1}{2}\right) =$

b)  $\left(\frac{1}{2} - 1\right) \cdot \frac{6}{5} + \frac{3}{2} \cdot \left(\frac{2}{5} - \frac{1}{2}\right) =$

3. Solve graphically and by elimination or substitution:

(2.5 points)

a)  $\begin{cases} x + 2y = 4 \\ x - y = 1 \end{cases}$

b)  $\begin{cases} x + 2y = 4 \\ \frac{x}{2} + y = 1 \end{cases}$

4. Work out the equations of the following lines:

(1.5 points)

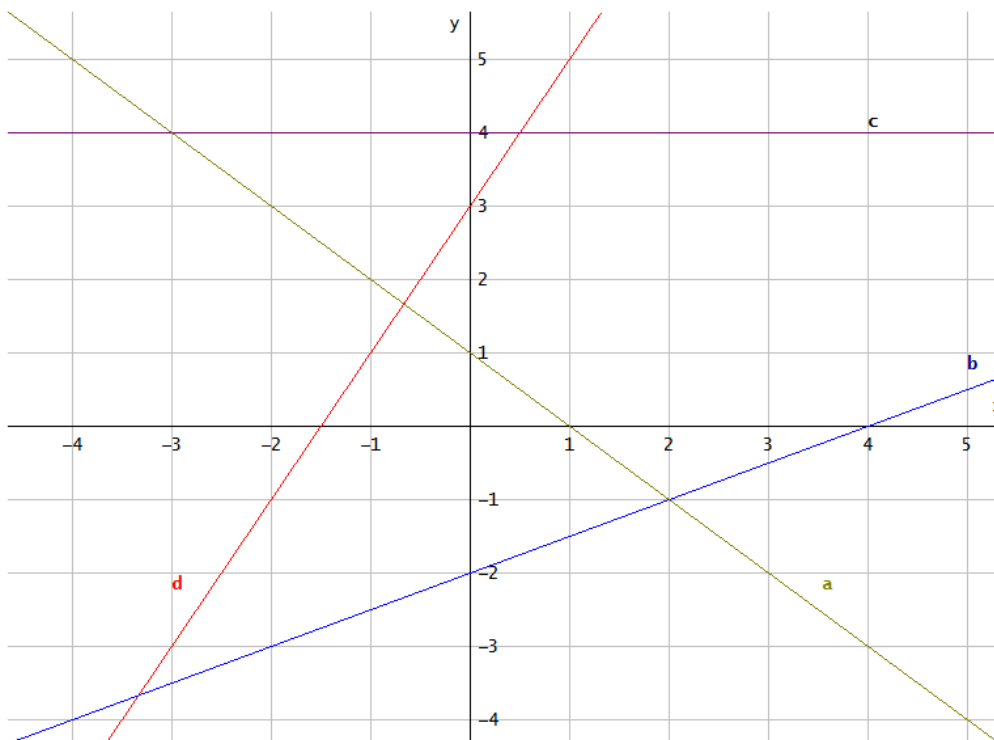
a) The line joining these points: A(-1,1) and B(2,3).

b) The line passes through (1,-2) and cuts the x-axis in -3

c) The line passes through (-2,1) and a slope of 4 .

5. Write the equations of the following lines and give each of their slopes and y-intercepts.

(2 points)



**SOLUTION**

2. Reduce the powers, using properties:

$$a) \left(\frac{2}{3}\right)^{-3} \cdot \frac{2^3 \cdot 3^4}{9^2 \cdot 4^3} = \frac{2^{-3}}{3^{-3}} \cdot \frac{2^3 \cdot 3^4}{(3^2)^2 \cdot (2^2)^3} = \frac{2^{-3} \cdot 2^3 \cdot 3^4}{3^{-3} \cdot 3^4 \cdot 2^6} = \frac{3^4}{3 \cdot 2^6} = \frac{3^3}{2^6}$$

$$b) \frac{a^{-2} \cdot (ab^3)^2 \cdot (a^2)^5}{a^7 \cdot b^{-3} \cdot (ab)^2} = \frac{a^{-2} \cdot a^2 \cdot b^6 \cdot a^{10}}{a^7 \cdot b^{-3} \cdot a^2 \cdot b^2} = \frac{b^6 \cdot a^{10}}{a^9 \cdot b^{-1}} = a \cdot b^7$$

2. Work out and simplify:

$$a) \frac{4}{9} \cdot \frac{3}{2} - \frac{9}{2} \cdot \left(\frac{1}{3} - \frac{1}{2}\right) = \frac{4 \cdot 3}{9 \cdot 2} - \frac{9}{2} \cdot \frac{2-3}{6} = \frac{2}{3} - \frac{9}{2} \cdot \frac{-1}{6} = \frac{2}{3} + \frac{3}{4} = \frac{8+9}{12} = \frac{17}{12}$$

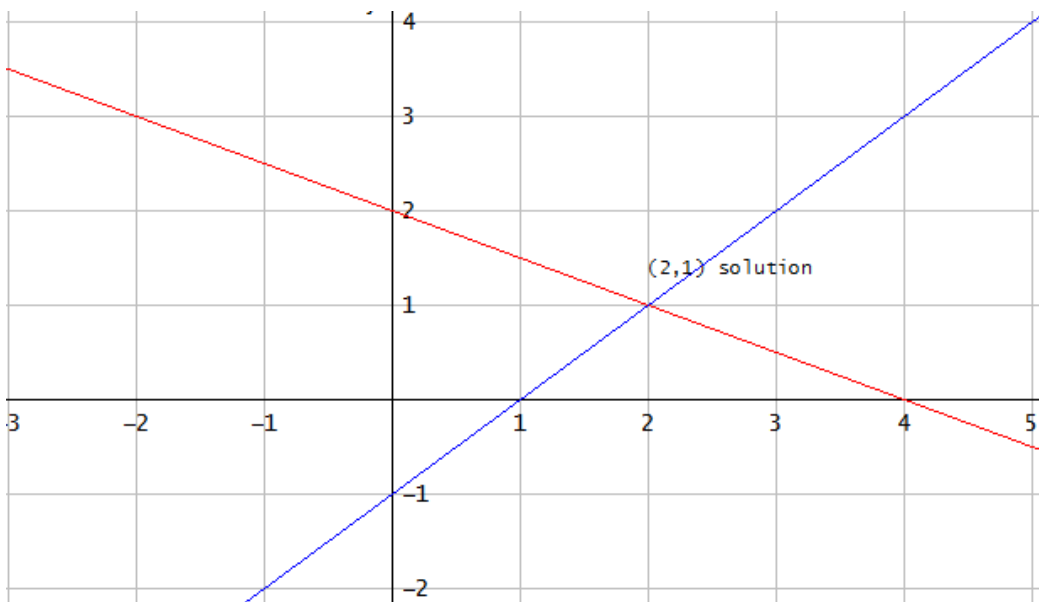
$$b) \left(\frac{1}{2} - 1\right) \cdot \frac{6}{5} + \frac{3}{2} \cdot \left(\frac{2}{5} - \frac{1}{2}\right) = \frac{1-2}{2} \cdot \frac{6}{5} + \frac{3}{2} \cdot \frac{4-5}{10} = -\frac{6}{10} - \frac{3}{20} = -\frac{6}{10} - \frac{3}{20} = \frac{-12-3}{20} = -\frac{15}{20} = -\frac{3}{4}$$

3. Solve graphically and by elimination or substitution:

a) By elimination:

$$\left. \begin{array}{l} x+2y=4 \\ x-y=1 \end{array} \right\} \rightarrow \left. \begin{array}{l} x+2y=4 \\ -x+y=-1 \end{array} \right\} \Rightarrow 3y=3 \Rightarrow y=1 \Rightarrow x-1=1 \Rightarrow x=2 \rightarrow \text{Solution}(2,1)$$

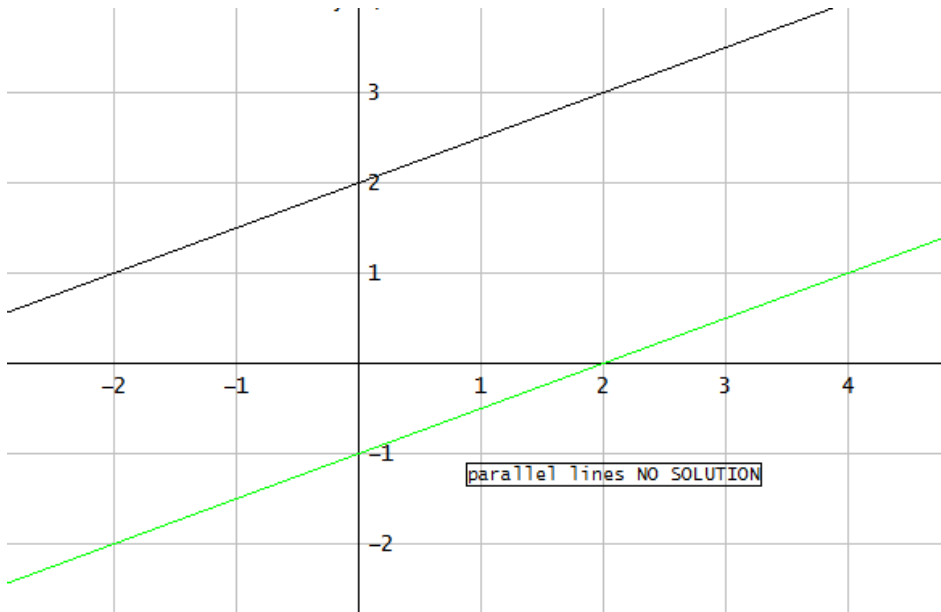
Graphically:  $\left. \begin{array}{l} x+2y=4 \\ x-y=1 \end{array} \right\} \rightarrow \left\{ \begin{array}{l} y = -\frac{x}{2} + 2 \rightarrow \text{slope } -\frac{1}{2}; \text{ y-intercepts } 2 \\ y = x - 1 \rightarrow \text{slope } 1; \text{ y-intercepts } -1 \end{array} \right.$



$$b) \left. \begin{array}{l} -x + 2y = 4 \\ \frac{x}{2} - y = 1 \end{array} \right\} \rightarrow \left\{ \begin{array}{l} y = \frac{x}{2} + 2 \rightarrow \text{slope } \frac{1}{2}; y\text{-intercepts } 2 \\ y = \frac{x}{2} - 1 \rightarrow \text{slope } \frac{1}{2}; y\text{-intercepts } -1 \end{array} \right. \text{parallel lines}$$

By substitution:

$$\left. \begin{array}{l} -x + 2y = 4 \\ \frac{x}{2} - y = 1 \end{array} \right\} \rightarrow x = 2y - 4 \Rightarrow \frac{2y - 4}{2} - y = 1 \Rightarrow 2y - 4 - 2y = 2 \Rightarrow 0y = 6 \rightarrow \text{No solution}$$



4. Work out the equations of the following lines:

a) The line joining these points: A(-1,1) and B(2,3).

$$m = \frac{3-1}{2-(-1)} = \frac{2}{3} \rightarrow y = y_0 + m(x - x_0) \rightarrow y = 1 + \frac{2}{3}(x + 1) \rightarrow y = 1 + \frac{2}{3}x + \frac{2}{3} \rightarrow y = \frac{2}{3}x + \frac{5}{3}$$

b) The line passes through (1,-2) and cuts the x-axis in -3

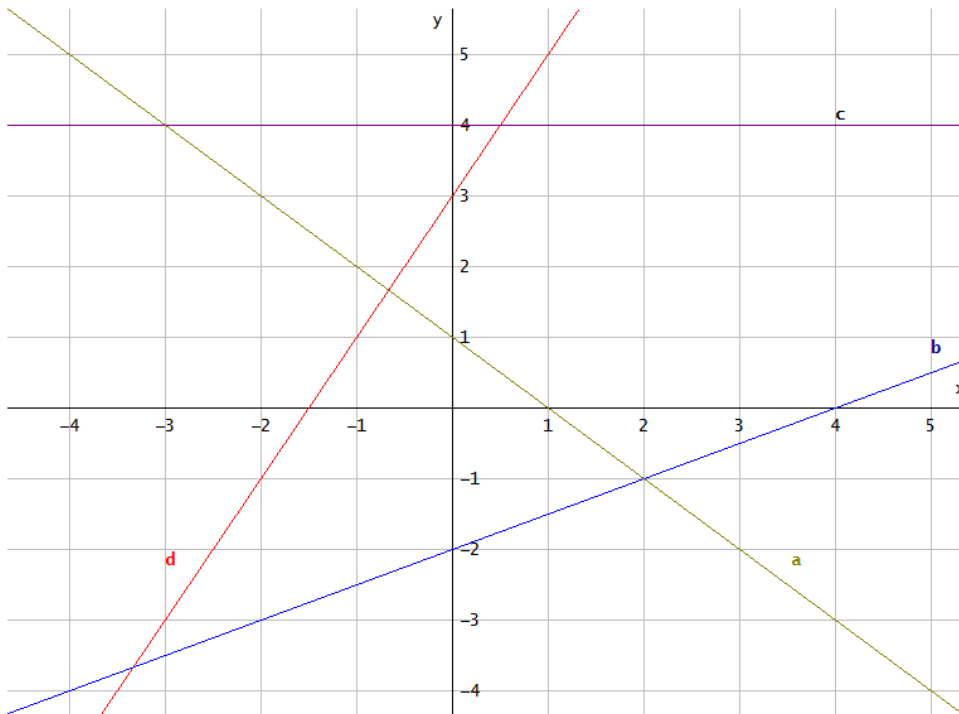
So, the line passes through points (1,-2) and (-3,0)

$$m = \frac{0+2}{-3-1} = -\frac{1}{2} \rightarrow y = y_0 + m(x - x_0) \rightarrow y = 0 - \frac{1}{2}(x + 3) \rightarrow y = -\frac{1}{2}x - \frac{3}{2}$$

c) The line passes through (-2,1) and a slope of 4.

$$y = y_0 + m(x - x_0) \rightarrow y = 1 + 4(x + 2) \rightarrow y = 1 + 4x + 8 \rightarrow y = 4x + 9$$

5. Write the equations of the following lines and give each of their slopes and y-intercepts.



- a) y-intercepts 1, slope -1, so the equation is  $y = -x + 1$
- b) y-intercepts -2, slope  $1/2$ , so the equation is  $y = \frac{1}{2}x - 2$
- c) y-intercepts 3, slope 2, so the equation is  $y = 2x + 3$
- d) horizontal line, so the equation is  $y = 4$