

Relations Question Type A

e.g.

$$-\frac{1}{3}y > 2 + \frac{1}{6}y$$

$$-\frac{1}{3}y - \frac{1}{6}y > 2$$

$$-\frac{2}{6}y - \frac{1}{6}y > 2$$

$$-\frac{3}{6}y > 2$$

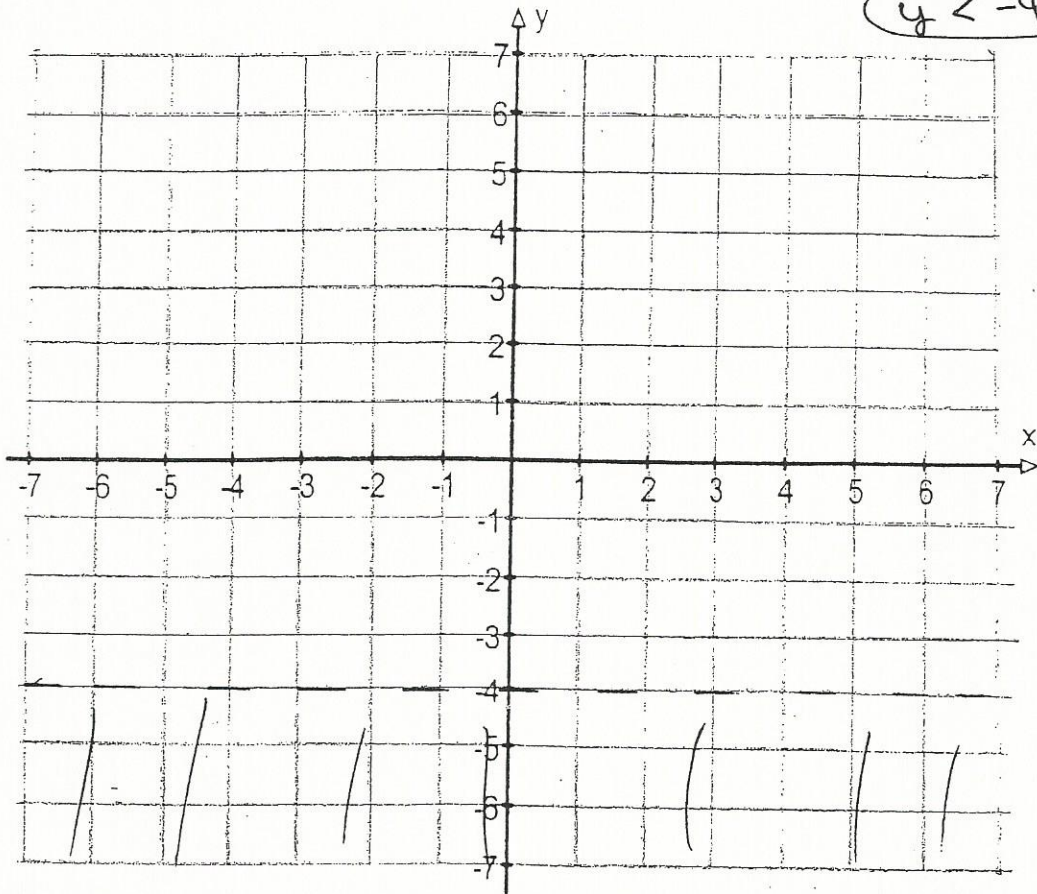
$$\left(\frac{-2}{1}\right) - \frac{1}{2}y > 2 \quad (-2)$$

$y < -4$

Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid -\frac{y}{3} > 2 + \frac{y}{6} \right\}$$

Then determine its domain and range.



Domain: \mathbb{R}

Range: $-\infty, -4[$

$$-\frac{1}{2}y > 3 + \frac{1}{4}y$$

1. Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid -\frac{y}{2} > 3 + \frac{y}{4} \right\}$$

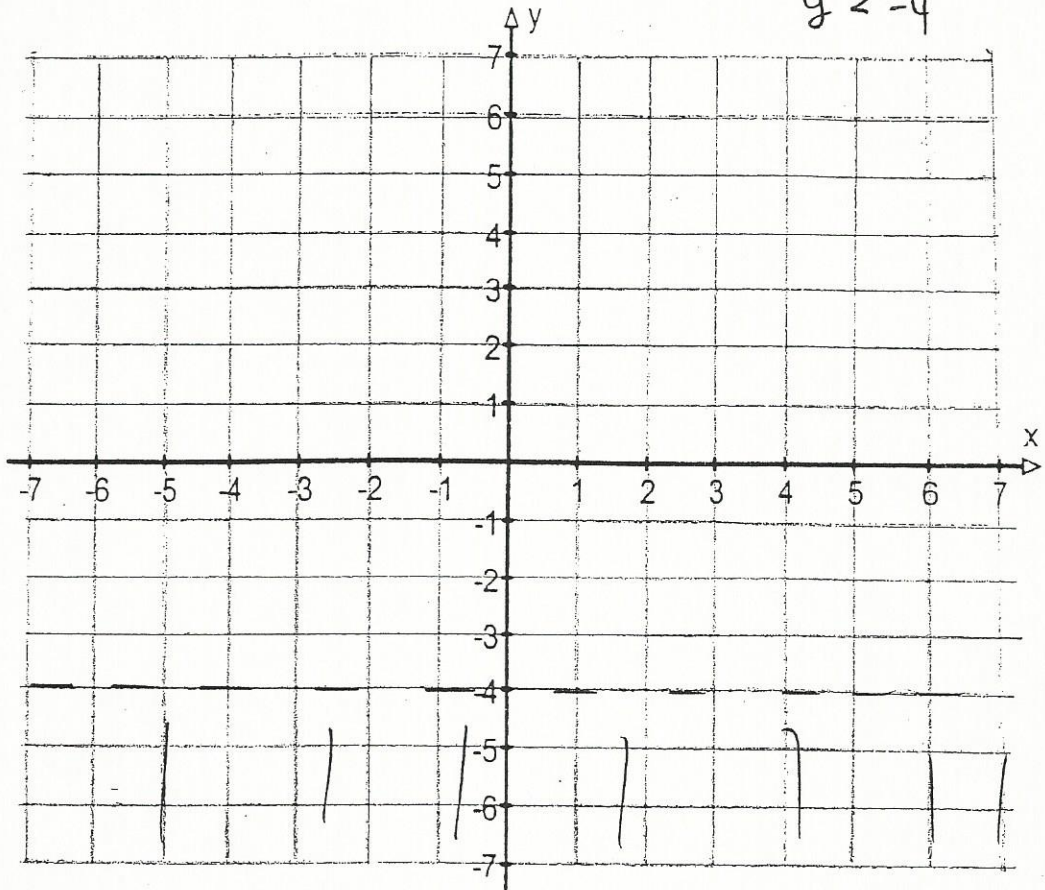
$$-\frac{1}{2}y - \frac{1}{4}y > 3$$

$$-\frac{2}{4}y - \frac{1}{4}y > 3$$

$$\left(-\frac{2}{4}\right)y - \frac{1}{4}y > 3 \left(-\frac{3}{4}\right)$$

$$y < -4$$

Then determine its domain and range.



Domain: _____

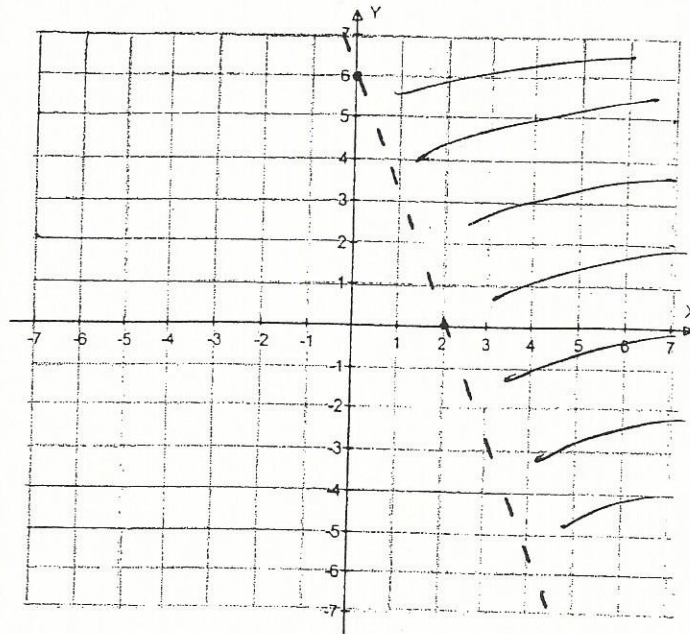
\mathbb{R}

Range: _____

$-\infty, -4 [$

2. Graph the following relation in a Cartesian plane:

$$R = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{x}{2} - 1 > \frac{-y}{6} \right\}$$



Then determine its domain and range.

Domain: \mathbb{R} Range: \mathbb{R}

$$\frac{1}{2}x - 1 > -\frac{1}{6}y$$

$$\left(\frac{6}{1}\right) \frac{1}{6}y > \left(-\frac{1}{2}x + 1\right) \frac{6}{1}$$

$$y > -\frac{6}{2}x + 6$$

$$y > -3x + 6$$

$$0 > 6$$

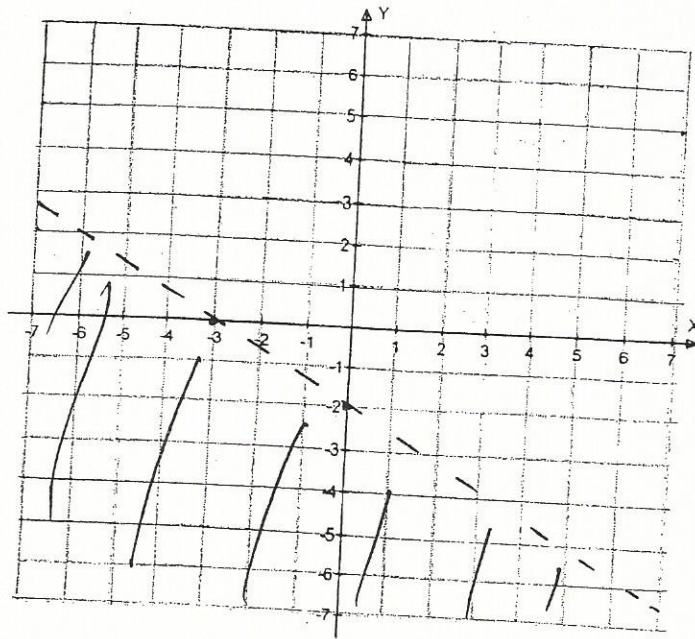
$$0 = -3x + 6$$

$$\frac{3x}{3} = \frac{6}{3}$$

$$x = 2$$

Graph the following relation in a Cartesian plane:

$$R = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{x}{3} + 1 < \frac{-y}{2} \right\}$$



Then determine its domain and range.

Domain: \mathbb{R}

Range: \mathbb{R}

$$\frac{1}{3}x + 1 < -\frac{1}{2}y$$

$$\left(\frac{2}{1}\right) \frac{1}{2}y < \left(-\frac{1}{3}x - 1\right) \frac{2}{1}$$

$$y < -\frac{2}{3}x - 2$$

$$0 = -\frac{2}{3}x - 2$$

$$\left(\frac{3}{2}\right) \frac{2}{3}x = -\cancel{2} \left(\frac{3}{\cancel{2}}\right)$$

$$x = -3$$

$$\text{Try } (0,0) \\ 0 < -2$$

4. Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{y}{2} < -2 + \frac{y}{6} \right\}$$

Then determine its domain and range.

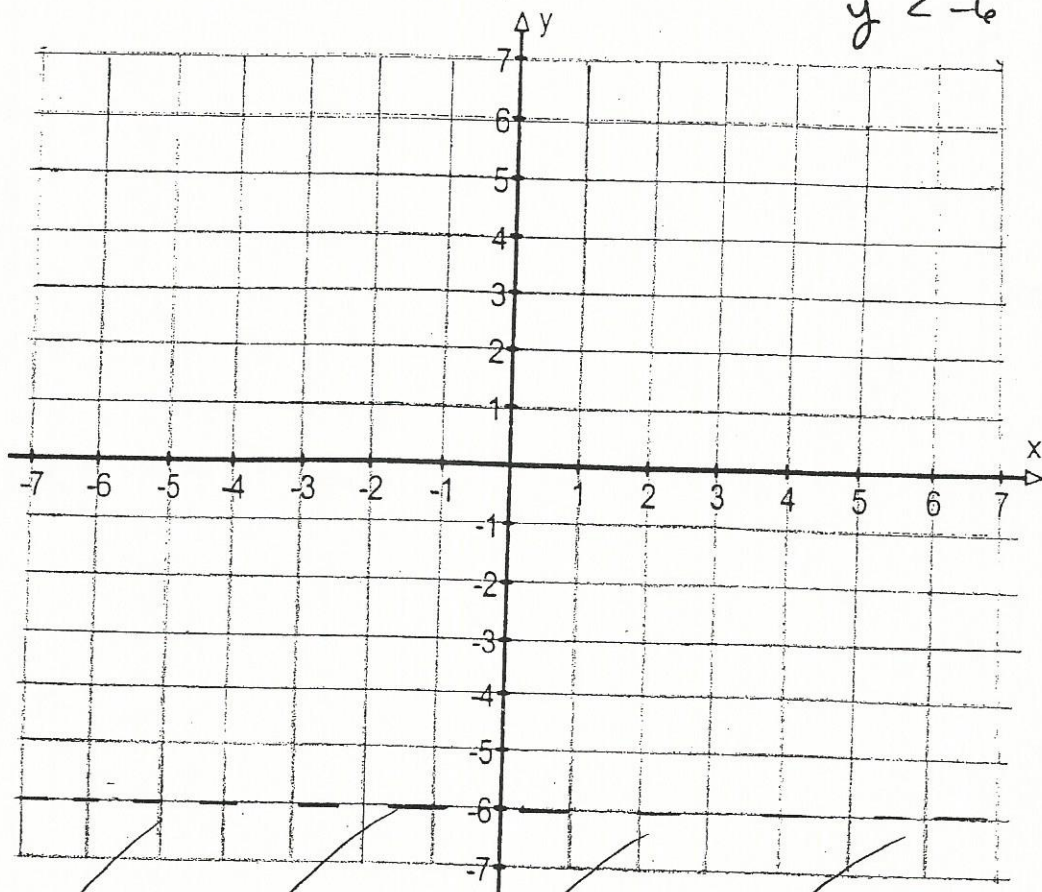
$$\frac{1}{2}y - \frac{1}{6}y < -2$$

$$\frac{3}{6}y - \frac{1}{6}y < -2$$

$$\frac{2}{6}y < -2$$

$$\left(\frac{3}{1}\right)\frac{1}{3}y < -2(3)$$

$$y < -6$$



Domain: _____

\mathbb{R}

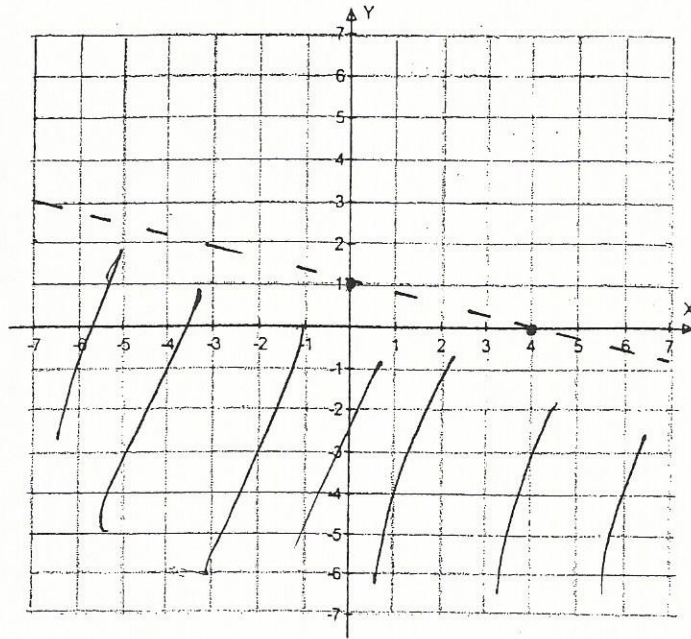
Range: _____

$-\infty, -6 [$

5.

Graph the following relation in a Cartesian plane:

$$R = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{x}{8} - \frac{1}{2} < \frac{-y}{2} \right\}$$



Then determine its domain and range.

Domain: \mathbb{R} Range: \mathbb{R}

$$\frac{1}{8}x - \frac{1}{2} < -\frac{1}{2}y$$

$$\left(\frac{2}{1}\right)\frac{1}{2}y < \left(-\frac{1}{8}x + \frac{1}{2}\right)\frac{2}{1}$$

$$y < -\frac{2}{8}x + 1$$

$$y < -\frac{1}{4}x + 1$$

$$0 = -\frac{1}{4}x + 1$$

$$\left(\frac{4}{1}\right)\frac{1}{4}x = 1\left(\frac{4}{1}\right)$$

$$x = 4$$

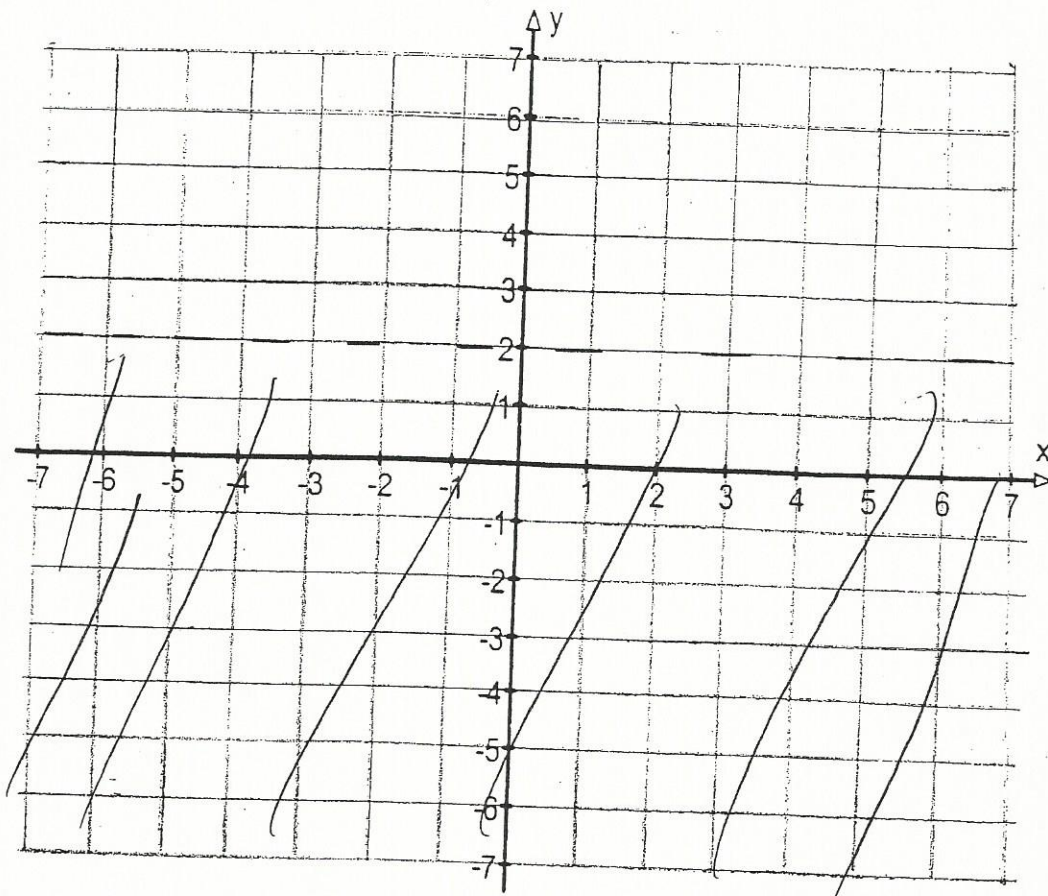
$$0 < 1$$

6.

Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid -\frac{y}{4} > -\frac{1}{4} - \frac{y}{8} \right\}$$

Then determine its domain and range.

Domain: \mathbb{R} Range: $-\infty, 2[$

$$-\frac{1}{4}y > -\frac{1}{4} - \frac{1}{8}y$$

$$-\frac{1}{4}y + \frac{1}{8}y > -\frac{1}{4}$$

$$-\frac{2}{8}y + \frac{1}{8}y > -\frac{1}{4}$$

$$\begin{pmatrix} -2 \\ -1 \end{pmatrix} \cdot \frac{1}{8}y > -\frac{1}{4} \begin{pmatrix} -8 \\ 1 \end{pmatrix}$$

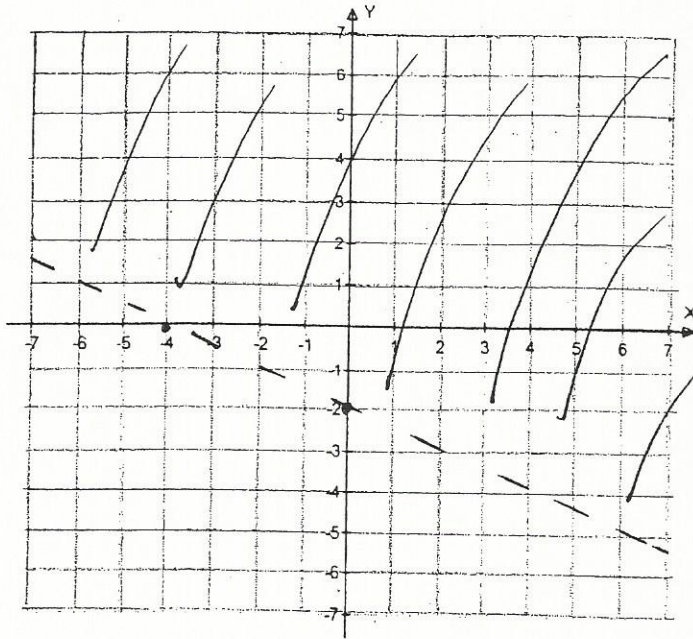
$$y < \frac{8}{4}$$

$$y < 2$$

7.

Graph the following relation in a Cartesian plane:

$$R = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{x}{4} + 1 > \frac{-y}{2} \right\}$$



Then determine its domain and range.

Domain: \mathbb{R} Range: \mathbb{R}

$$\frac{1}{4}x + 1 > -\frac{1}{2}y$$

$$\left(\frac{2}{1}\right) \frac{1}{2}y > \left(-\frac{1}{4}x - 1\right) \frac{2}{1}$$

$$y > -\frac{2}{4}x - 2$$

$$y > -\frac{1}{2}x - 2$$

$$0 > 0 - 2$$

$$0 > -2$$

$$0 = -\frac{1}{2}x - 2$$

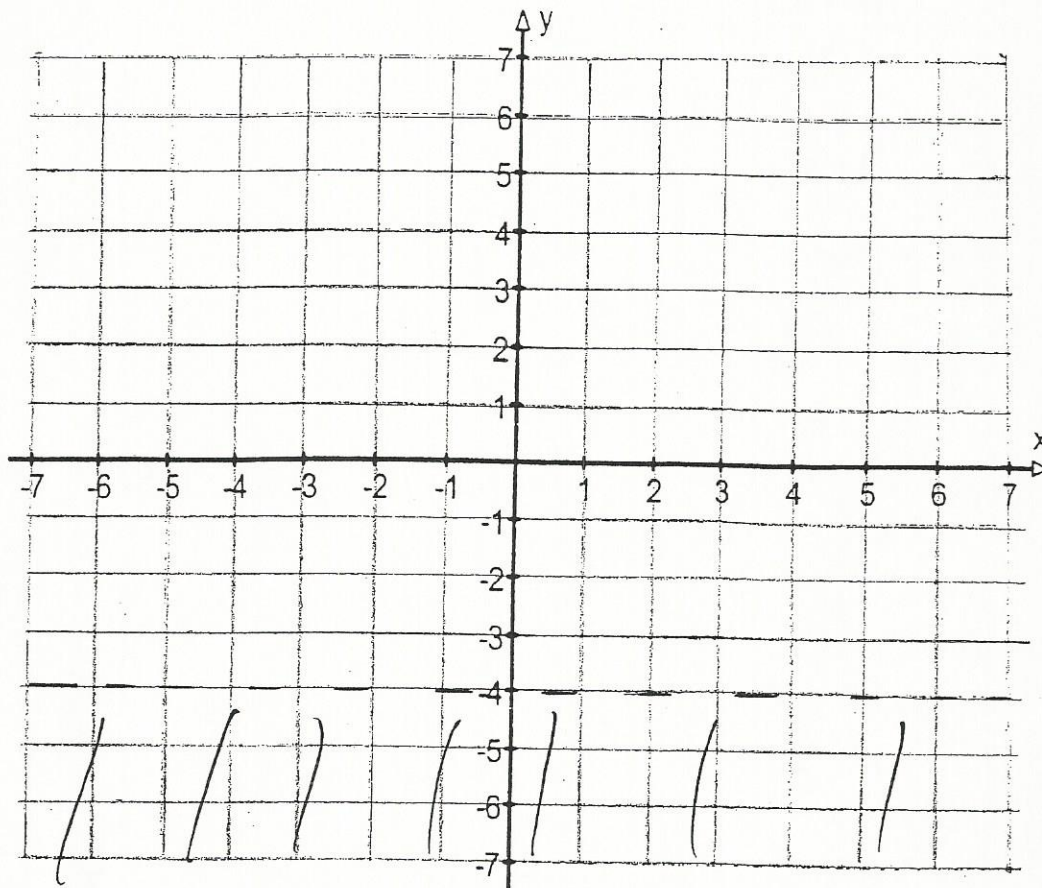
$$\left(\frac{2}{1}\right) \frac{1}{2}x = -2 \left(\frac{2}{1}\right)$$

$$x = -4$$

8. Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid -\frac{y}{12} > 1 + \frac{y}{6} \right\}$$

Then determine its domain and range.



Domain: \mathbb{R}

Range: $-\infty, -4[$

$$-\frac{1}{12}y > 1 + \frac{1}{6}y$$

$$-\frac{1}{12}y - \frac{1}{6}y > 1$$

$$-\frac{1}{12}y - \frac{2}{12}y > 1$$

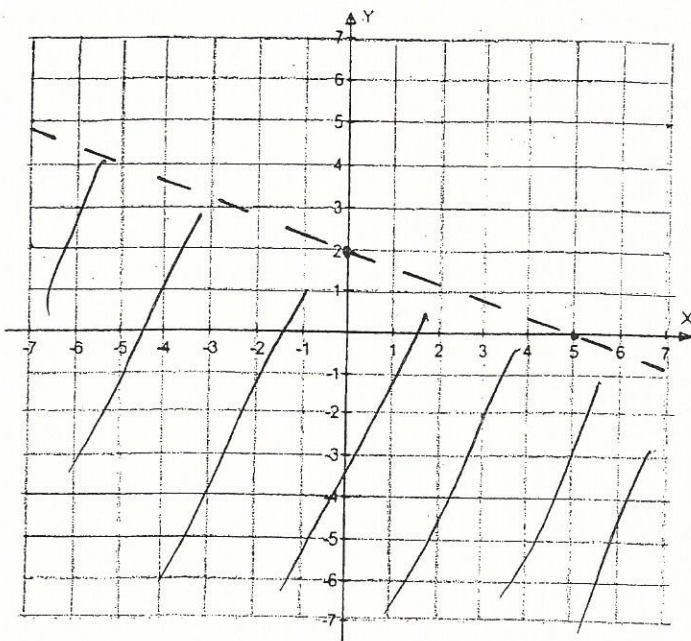
$$-\frac{3}{12}y > 1$$

$$\left(\frac{-4}{1}\right) \frac{-1}{4}y > 1 \left(\frac{-4}{1}\right)$$

$$y < -4$$

9. Graph the following relation in a Cartesian plane:

$$R = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{x}{5} - 1 < \frac{-y}{2} \right\}$$



Then determine its domain and range.

Domain: \mathbb{R}

Range: \mathbb{R}

$$\frac{1}{5}x - 1 < -\frac{1}{2}y$$

$$\left(\frac{2}{1}\right) \frac{1}{2}y < \left(-\frac{1}{5}x + 1\right) \frac{2}{1}$$

$$y < -\frac{2}{5}x + 2$$

$$0 = -\frac{2}{5}x + 2$$

$$\left(\frac{5}{2}\right) \frac{2}{5}x = 2 \left(\frac{5}{2}\right)$$

$$x = 5$$

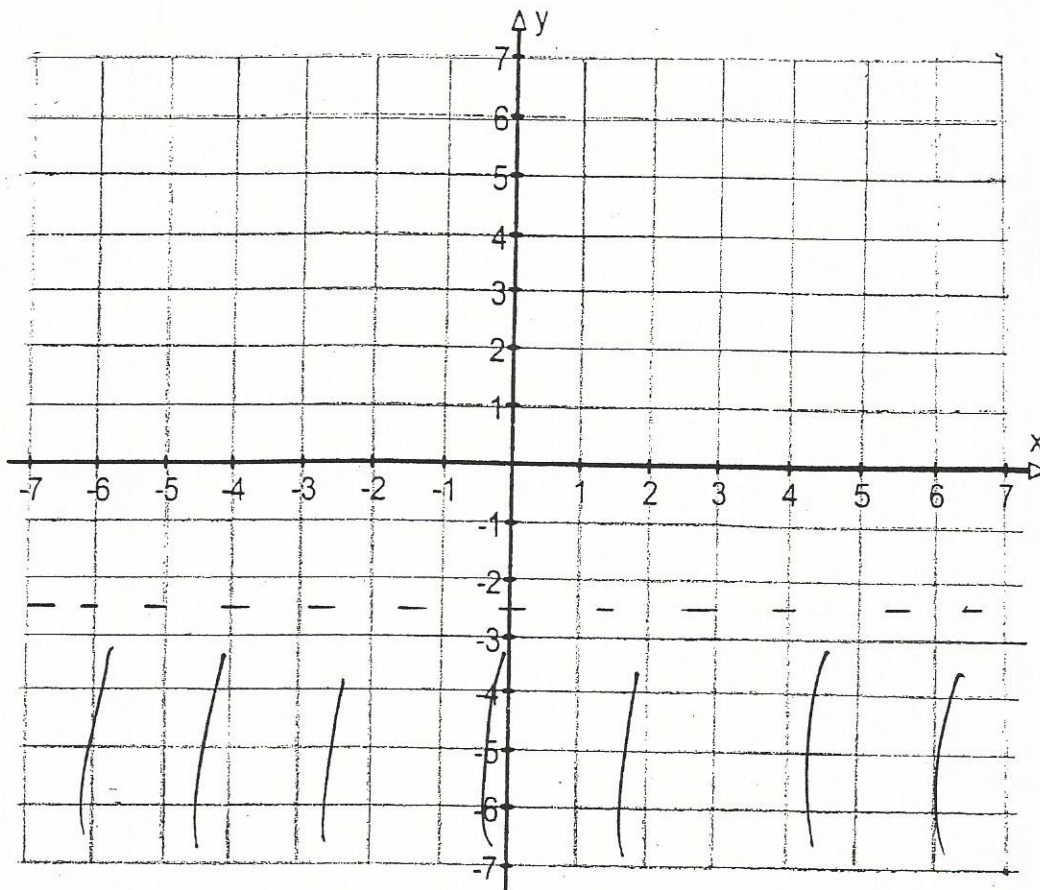
$$0 < 0 + 2$$

$$0 < 2$$

10. Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid -\frac{y}{5} > \frac{1}{3} - \frac{y}{15} \right\}$$

Then determine its domain and range.



Domain: \mathbb{R} Range: $-\infty, -2\frac{1}{2} [$

$$-\frac{1}{5} y > \frac{1}{3} - \frac{1}{15} y$$

$$-\frac{1}{5} y + \frac{1}{15} y > \frac{1}{3}$$

$$-\frac{3}{15} + \frac{1}{15} y > \frac{1}{3}$$

$$\left(\frac{-15}{15}\right) - \frac{2}{15} y > \frac{1}{3} \left(\frac{-15}{2}\right)$$

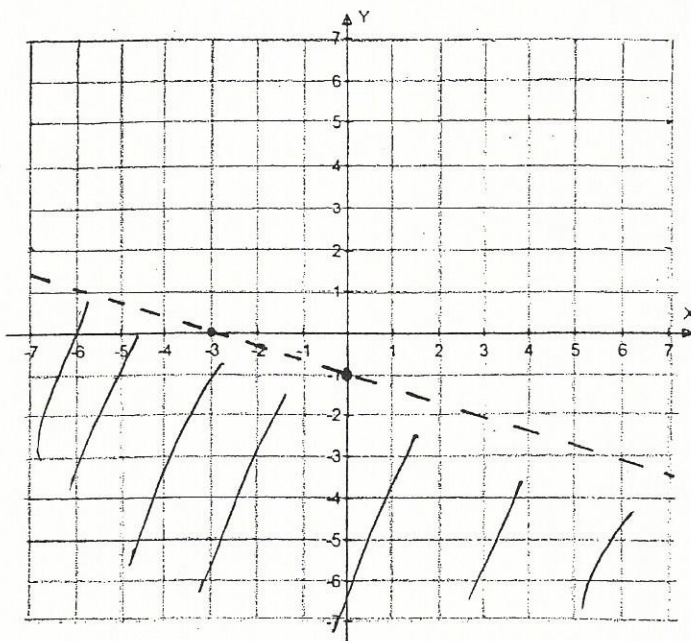
$$y < \frac{-15}{6}$$

$$y < -2\frac{3}{6}$$

$$y < -2\frac{1}{2}$$

11. Graph the following relation in a Cartesian plane:

$$R = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid \frac{x}{9} + \frac{1}{3} < \frac{-y}{3} \right\}$$



Then determine its domain and range.

Domain: \mathbb{R}

Range: \mathbb{R}

$$\frac{1}{9}x + \frac{1}{3} < -\frac{1}{3}y$$

$$\left(\frac{3}{1}\right)\frac{1}{3}y < \left(-\frac{1}{9}x - \frac{1}{3}\right)\frac{3}{1}$$

$$y < -\frac{3}{9}x - \frac{3}{3}$$

$$y < -\frac{1}{3}x - 1$$

$$0 = -\frac{1}{3}x - 1$$

$$\left(\frac{3}{1}\right)\frac{1}{3}x = -1\left(\frac{3}{1}\right)$$

$$x = -3$$

$$0 < 0 - 1$$

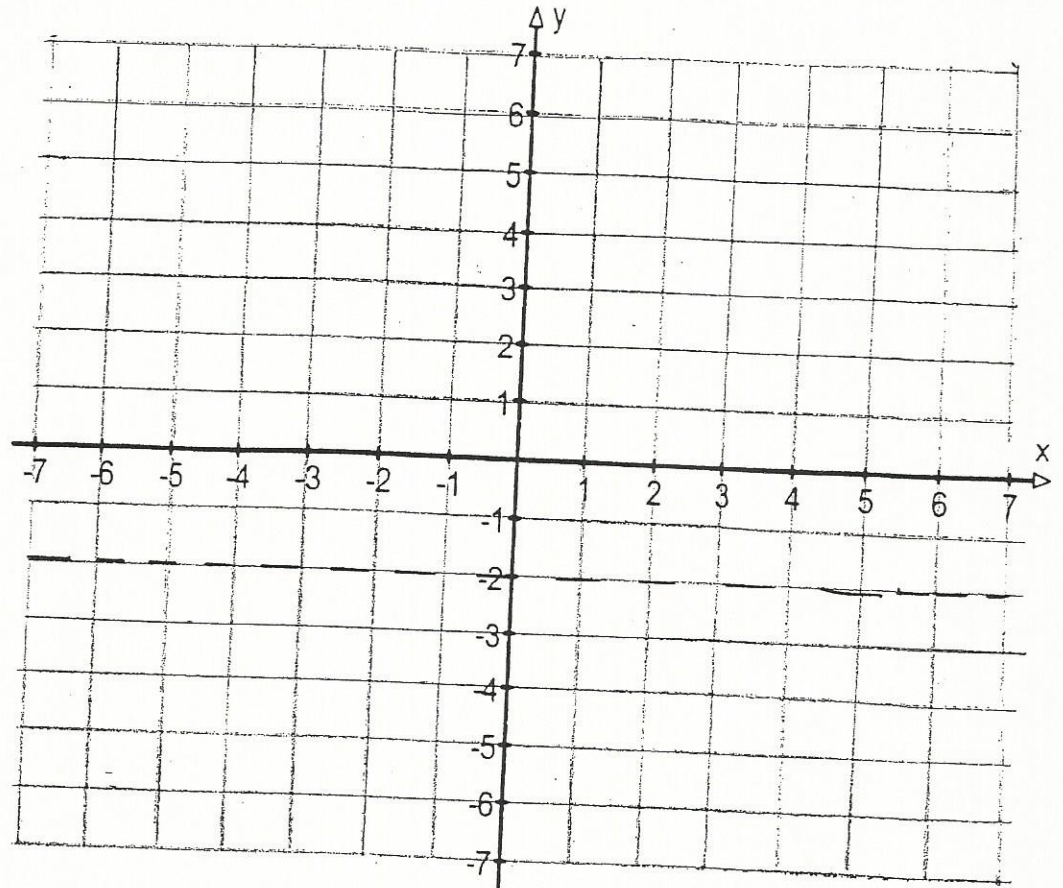
$$0 < -1$$

12.

Graph the following relation in a Cartesian plane:

$$S = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid -\frac{y}{8} < -\frac{1}{4} - \frac{y}{4} \right\}$$

Then determine its domain and range.

Domain: \mathbb{R} Range: $-\infty, -2[$

$$-\frac{1}{8}y < -\frac{1}{4} - \frac{1}{4}y$$

$$-\frac{1}{8}y + \frac{1}{4}y < -\frac{1}{4}$$

$$-\frac{1}{8}y + \frac{2}{8}y < -\frac{1}{4}$$

$$\left(\frac{2}{1}\right)\frac{1}{8}y < -\frac{1}{4}\left(\frac{2}{1}\right)$$

$$y < -\frac{2}{4} \quad y < -2$$

