

REVISION – Linear Relations

EXTRA QUESTIONS

1) Solve for x and graph solutions on a number line.

a) $2x + 7 < x - 4$

b) $\frac{3x + 4}{x - 7} \geq -2$

c) $4(x + 3) - 2x > \frac{x}{2}$

d) $\frac{1}{x + 3} < \frac{3}{2}$

e) $9x - 8 \leq 2(x - 4)$

f) $\frac{x}{2} + \frac{3x}{4} \geq 5$

2) Solve the multi step equations

a) $12 + 5x - 8 = 12x - 10$

b) $\frac{x + 2}{x - 3} = 2$

c) $\frac{5x}{2} = 3x + 5$

d) $2(3x - 4) = 3x + 1$

e) $3x = 5(x + 3) - 3$

f) $4x + 7 - 6x = 5 - 4x + 4$

g) $\frac{x}{2} + \frac{x}{3} = 5$

h) $\frac{3x - 1}{3x + 2} = 4$

i) $\frac{x - 5}{2} = \frac{x + 2}{3}$

j) $3(5x - 2) + 4x = 9x + 6 - 2x$

k) $\frac{5x + 6}{4} = 3x - 2$

l) $5(2x + 3) = 3(4x + 1) - 2(3x + 2)$

ANSWERS

1)

$$\begin{aligned} \text{a.) } 2x + 7 &< x - 4 \\ 2x - x &< -4 - 7 \\ x &< -11 \end{aligned}$$

$$\begin{aligned} \text{b.) } \frac{3x + 4}{x - 7} &\geq -2 \\ 3x + 4 &\geq -2(x - 7) \\ 3x + 4 &\geq -2x + 14 \\ 3x + 2x &\geq 14 - 4 \\ 5x &\geq 10 \\ x &\geq \frac{10}{5} \\ x &\geq 2 \end{aligned}$$

$$\begin{aligned} \text{c.) } 4(x + 3) - 2x &> \frac{x}{2} \\ 4x + 12 - 2x &> \frac{x}{2} \\ 2x + 12 &> \frac{x}{2} \\ 2(2x + 12) &> x \\ 4x + 24 &> x \\ 4x - x &> -24 \\ 3x &> -24 \\ x &> \frac{-24}{3} \\ x &> -8 \end{aligned}$$

$$\begin{aligned} \text{d.) } \frac{1}{x + 3} &< \frac{3}{2} \\ 2 \times 1 &< 3(x + 3) \\ 2 &< 3x + 9 \\ 2 - 9 &< 3x \\ -7 &< 3x \\ \frac{-7}{3} &< 3 \end{aligned}$$

$$\begin{aligned} \text{e.) } 9x - 8 &\leq 2(x - 4) \\ 9x - 8 &\leq 2x - 8 \\ 9x - 2x &\leq -8 + 8 \\ 7x &\leq 0 \\ x &\leq \frac{0}{7} \\ x &\leq 0 \end{aligned}$$

$$\begin{aligned} \text{f.) } \frac{x}{2} + \frac{3x}{4} &\geq 5 \\ \frac{2x}{4} + \frac{3x}{4} &\geq 5 \\ \frac{5x}{4} &\geq 5 \\ 5x &\geq 5 \times 4 \\ 5x &\geq 20 \\ x &\geq \frac{20}{5} \\ x &\geq 4 \end{aligned}$$

Q2.

$$\begin{aligned}\text{a)} \quad 12 + 5x - 8 &= 12x - 10 \\ 12 - 8 + 10 &= 12x - 5x \\ 14 &= 7x \\ \frac{14}{7} &= x \\ 2 &= x\end{aligned}$$

$$\begin{aligned}\text{b)} \quad \frac{x+2}{x-3} &= 2 \\ x+2 &= 2(x-3) \\ x+2 &= 2x-6 \\ 2+6 &= 2x-x \\ 8 &= x\end{aligned}$$

$$\begin{aligned}\text{c)} \quad \frac{5x}{2} &= 3x+5 \\ 5x &= 2(3x+5) \\ 5x &= 6x+10 \\ 5x-6x &= 10 \\ -x &= 10 \\ x &= -10\end{aligned}$$

$$\begin{aligned}\text{d)} \quad 2(3x-4) &= 3x+1 \\ 6x-8 &= 3x+1 \\ 6x-3x &= 1+8 \\ 3x &= 9 \\ x &= \frac{9}{3} \\ x &= 3\end{aligned}$$

$$\begin{aligned}\text{e)} \quad 3x &= 5(x+3)-3 \\ 3x &= 5x+15-3 \\ 3x-5x &= 12 \\ -2x &= 12 \\ x &= \frac{12}{-2} \\ x &= -6\end{aligned}$$

$$\begin{aligned}\text{f)} \quad 4x+7-6x &= 5-4x+4 \\ 4x-6x+4x &= 5+4-7 \\ 2x &= 2 \\ x &= \frac{2}{2} \\ x &= 1\end{aligned}$$

$$\begin{aligned}\text{g)} \quad \frac{x}{2} + \frac{x}{3} &= 5 \\ 6 \times \frac{x}{2} + 6 \times \frac{x}{3} &= 6 \times 5 \\ 3x+2x &= 30 \\ 5x &= 30 \\ x &= \frac{30}{5} \\ x &= 6\end{aligned}$$

$$\begin{aligned}\text{h)} \quad \frac{3x-1}{3x+2} &= 4 \\ 3x-1 &= 4(3x+2) \\ 3x-1 &= 12x+8 \\ -1-8 &= 12x-3x \\ -9 &= 9x \\ \frac{-9}{9} &= x \\ -1 &= x\end{aligned}$$

$$\begin{aligned}
 \text{i)} \quad & \frac{x-5}{2} = \frac{x+2}{3} \\
 & 3(x-5) = 2(x+2) \\
 & 3x-15 = 2x+4 \\
 & 3x-2x = 4+15 \\
 & x = 19
 \end{aligned}$$

$$\begin{aligned}
 \text{j)} \quad & 3(5x-2) + 4x = 9x+6-2x \\
 & 15x-6+4x = 7x+6 \\
 & 19x-6 = 7x+6 \\
 & 19x-7x = 6+6 \\
 & 12x = 12 \\
 & x = \frac{12}{12} \\
 & x = 1
 \end{aligned}$$

$$\begin{aligned}
 \text{k)} \quad & \frac{5x+6}{4} = 3x-2 \\
 & 5x+6 = 4(3x-2) \\
 & 5x+6 = 12x-8 \\
 & 5x-12x = -8-6 \\
 & -7x = -14 \\
 & x = \frac{-14}{-7} \\
 & x = 2
 \end{aligned}$$

$$\begin{aligned}
 \text{i)} \quad & 5(2x+3) = 3(4x+1) - 2(3x+2) \\
 & 10x+15 = 12x+3-6x-4 \\
 & 15-3+4 = 12x-6x-10x \\
 & 16 = -4x \\
 & \frac{16}{-4} = x
 \end{aligned}$$