

# 1 PRACTICE SOLVING FOR $X$ (for beginners)

a)  $2x - x - 5 = 5$

b)  $4x + 6 = 3x - 4$

c)  $x + 9 = 9$

d)  $5 - 2x = -3 - x$

e)  $-7x + 7 = 7 - 6x - 7$

f)  $72 = 9x$

g)  $2x + 4x - 8 = 2x + 32$

h)  $\frac{1}{2}x + x - \frac{1}{2} = \frac{5}{2}$

i)  $1 + \frac{1}{x} = 2$ , where  $x \neq 0$

j)  $-1 = \frac{1}{4}(x - 20)$

## 2 SOLUTIONS

a) Answer:  $x = 10$

$$\begin{aligned} 2x - x - 5 &= 5 \\ 2x - x - 5 + 5 &= 5 + 5 \\ 2x - x &= 10 \\ x &= 10 \end{aligned}$$

b) Answer:  $x = -10$

$$\begin{aligned} 4x + 6 &= 3x - 4 \\ 4x + 6 - 6 &= 3x - 4 - 6 \\ 4x &= 3x - 10 \\ 4x - 3x &= 3x - 10 - 3x \\ x &= -10 \end{aligned}$$

c) Answer:  $x = 0$

$$\begin{aligned} x + 9 &= 9 \\ x + 9 - 9 &= 9 - 9 \\ x &= 0 \end{aligned}$$

d) Answer:  $x = 8$

$$\begin{aligned} 5 - 2x &= -3 - x \\ 5 - 2x - 5 &= -3 - x - 5 \\ -2x &= -8 - x \\ -2x + x &= -8 - x + x \\ -x &= -8 \\ -1 \cdot -x &= -1 \cdot -8 \\ x &= 8 \end{aligned}$$

In the second to the last equation of letter (d), we multiplied both sides of  $-x = -8$  by  $-1$  so that we can eliminate the negative sign of  $x$ .

e) Answer:  $x = 7$

$$\begin{aligned} -7x + 7 &= 7 - 6x - 7 \\ -7x + 7 &= -6x \\ -7x + 7 + 6x &= -6x + 6x \\ -7x + 6x + 7 &= 0 \\ -x + 7 - 7 &= 0 - 7 \\ -x &= -7 \\ -1 \cdot -x &= -1 \cdot -7 \\ x &= 7 \end{aligned}$$

f) Answer:  $x = 8$

$$\begin{aligned} 72 &= 9x \\ \left(\frac{1}{9}\right) \cdot 72 &= \left(\frac{1}{9}\right) \cdot 9x \\ \frac{72}{9} &= \frac{9}{9}x \\ 8 &= x \end{aligned}$$

g) Answer:  $x = 10$

$$\begin{aligned} 2x + 4x - 8 &= 2x + 32 \\ 6x - 8 &= 2x + 32 \\ 6x - 8 + (8 - 2x) &= 2x + 32 + (8 - 2x) \\ 6x - 8 + 8 - 2x &= 2x + 32 + 8 - 2x \\ 6x - 2x + 8 - 8 &= 2x - 2x + 32 + 8 \\ 4x &= 40 \\ \frac{1}{4} \cdot 4x &= \frac{1}{4} \cdot 40 \\ \frac{4}{4} \cdot x &= \frac{40}{4} \\ x &= 10 \end{aligned}$$

h) Answer:  $x = 2$

$$\begin{aligned} \frac{1}{2}x + x - \frac{1}{2} &= \frac{5}{2} \\ \frac{1}{2}x + x - \frac{1}{2} + \frac{1}{2} &= \frac{5}{2} + \frac{1}{2} \\ \frac{1}{2}x + x &= \frac{6}{2} \\ \frac{1}{2}x + x &= 3 \\ \frac{3}{2}x &= 3 \\ \frac{2}{3} \cdot \frac{3}{2}x &= \frac{2}{3} \cdot 3 \\ 1 \cdot x &= \frac{6}{3} \\ x &= 2 \end{aligned}$$

i) Answer:  $x = 1$

$$\begin{aligned}1 + \frac{1}{x} &= 2, \quad \text{where } x \neq 0 \\ \frac{x+1}{x} &= 2 \\ x \cdot \frac{x+1}{x} &= x \cdot 2 \\ \frac{x(x+1)}{x} &= 2x \\ \frac{x}{x}(x+1) &= 2x \\ 1 \cdot (x+1) &= 2x \\ x+1 &= 2x \\ x+1-x &= 2x-x \\ 1 &= x\end{aligned}$$

j) Answer:  $x = 16$

$$\begin{aligned}-1 &= \frac{1}{4}(x-20) \\ 4 \cdot (-1) &= 4 \cdot \frac{1}{4}(x-20) \\ -4 &= \frac{4}{4}(x-20) \\ -4 &= 1 \cdot (x-20) \\ -4 &= x-20 \\ -4+20 &= x-20+20 \\ 16 &= x\end{aligned}$$