Linear Equations in One Unknown

Solution

1. **(a)**
$$2m-\frac{1}{5}=m+\frac{1}{20}$$
$$2m-m=\frac{1}{20}+\frac{1}{5}$$
$$m=\frac{(1+4)}{20}$$
$$m=\frac{5}{20}$$
$$m=\frac{1}{4}$$

(b)
$$\frac{4}{7}-\frac{y}{2}=1$$
$$\frac{8-7y}{14}=1$$
$$8-7y=14$$
$$8-14=7y$$
$$7y=-6$$
$$y=\frac{-6}{7}$$

2. **(a)**
$$7m+6=3m-2$$
$$7m-3m+6=-2$$
$$4m+6=-2$$
$$4m=-2-6$$
$$4m=-8$$
$$m=\frac{-8}{4}$$
$$=-2$$

(b)
$$28-3n=5n+4$$
$$28-3n-5n=4$$
$$28-8n=4$$
$$-8n=4-28$$
$$-8n=-24$$
$$n=\frac{-24}{-8}$$
$$=3$$

3. **(a)**
$$5(3h-8)+2=7$$
$$15h-40+2=7$$
$$15h-38=7$$
$$15h=7+38$$
$$15h=45$$
$$h=\frac{45}{15}=3$$

(b)
$$3(7-2k)+4=-11$$
$$21-6k+4=-11$$
$$25-6k=-11$$
$$-6k=-11-25$$
$$-6k=-36$$
$$k=\frac{-36}{-6}=6$$

4. **(a)**
$$6(5x-2)+12=60$$
$$30x-12+12=60$$
$$30x=60$$
$$x=\frac{60}{30}$$
$$x=2$$

(b)
$$12-(7-4x)=25$$
$$12-7+4x=25$$
$$5+4x=25$$
$$4x=25-5$$
$$4x=20$$
$$x=\frac{20}{4}=5$$

5. **(a)**
$$\frac{3n-2}{5}=\frac{1}{2}$$
$$10\left(\frac{3n-2}{5}\right)=10\times\frac{1}{2}$$
$$2(3n-2)=5$$
$$6n-4=5$$
$$6n=9$$
$$n=\frac{9}{6}=\frac{3}{2}$$

(b)
$$\frac{5}{3}+\frac{v}{6}=3$$
$$\frac{v}{6}=3-\frac{5}{3}$$
$$\frac{v}{6}=\frac{4}{3}$$
$$6\left(\frac{v}{6}\right)=6\left(\frac{4}{3}\right)$$
$$v=8$$

6. **(a)**
$$\frac{k}{4}+6=k$$
$$\frac{k}{4}-k+6=0$$
$$-\frac{3}{4}k+6=0$$
$$-\frac{3}{4}k=0-6$$
$$-\frac{3}{4}k=-6$$
$$\left(-\frac{4}{3}\right)\left(-\frac{3}{4}k\right)=\left(-\frac{4}{3}\right)(-6)$$
$$k=8$$

(b)
$$\frac{3}{8}f+3=\frac{7}{8}f-5$$
$$8\left(\frac{3}{8}f+3\right)=8\left(\frac{7}{8}f-5\right)$$
$$3f+24=7f-40$$
$$24=7f-40-3f$$
$$24=4f-40$$
$$24+40=4f$$
$$64=4f$$
$$\frac{64}{4}=f$$
$$f=16$$

7. **(a)**
$$\frac{x}{5}=-x+6$$
$$5\left(\frac{x}{5}\right)=5(-x+6)$$
$$x=-5x+30$$
$$x+5x=30$$
$$6x=30$$
$$x=\frac{30}{6}=5$$

(b)
$$5+\frac{2}{3}y=-y$$
$$5+\frac{2}{3}y+y=0$$
$$5+\frac{5}{3}y=0$$
$$\frac{5}{3}y=0-5$$
$$\frac{5}{3}y=-5$$
$$\frac{3}{5}\times\frac{5}{3}y=\frac{3}{5}(-5)$$
$$y=-3$$

8. Let the cost of an audio tape be \$$x$. Then the cost of a video tape will be \$$3x$. We have
$$3x+2\times3x=360$$
$$3x+6x=360$$
$$9x=360$$
$$x=\frac{360}{9}$$
$$x=40$$

$\therefore$ The cost of an audio tape is \$40 and the cost of a video tape is \$120.

9. Let n be the greater number. Then the other number is $n-2$ according to the question,
$$n+(n-2)=32$$
$$2n-2=32$$
$$2n=32+2$$
$$2n=34$$
$$n=\frac{34}{2}=17$$

$\therefore$ The greater number is 17.

10. Let Tim originally has $\$P$. Then Abby originally has $\$(1\,200 - P)$.

$$(1200 - P) - 150 = P + 150$$
$$1050 - P = P + 150$$
$$1050 = P + 150 + P$$
$$1050 = 2P + 150$$
$$1050 - 150 = 2P$$
$$900 = 2P$$
$$\frac{900}{2} = P$$
$$P = 450$$

$\therefore$ Tim originally has \$450.

11. Let n be the present age of Charles. Then 5 years ago, his age was $n - 5$.

$$41 - 5 = 4(n - 5)$$
$$36 = 4n - 20$$
$$36 + 20 = 4n$$
$$56 = 4n$$
$$\frac{56}{4} = n$$

$\therefore n = 14$

$\therefore$ The present age of Charles is 14.

12. Let $\$P$ be Zoe's share. Then Karen's share is $\$(288 - P)$.

$$288 - P = \frac{1}{2}P + 18$$
$$288 = \frac{1}{2}P + 18 + P$$
$$288 = \frac{3}{2}P + 18$$
$$288 - 18 = \frac{3}{2}P$$
$$270 = \frac{3}{2}P$$
$$\frac{2}{3} \times 270 = \frac{2}{3} \times \frac{3}{2}P$$

$\therefore P = 180$

$\therefore$ Zoe's share is \$180.