

Section 3.3 Linear Equations: Clearing Fractions and Decimals

Section 3.3 Practice Exercises

1. (a) clearing fractions

(b) clearing decimals

3. $5(x+2)-3=4x+5$

$$5x+10-3=4x+5$$

$$5x+7=4x+5$$

$$x+7=5$$

$$x=-2$$

5. $3(2y+3)-4(-y+1)=7y-10$

$$6y+9+4y-4=7y-10$$

$$10y+5=7y-10$$

$$3y+5=-10$$

$$3y=-15$$

$$y=-5$$

7. $7x+2=7(x-12)$

$$7x+2=7x-84$$

$$2 \neq -84$$

No solution

9. 18, 36

11. 100; 1000; 10,000

13. 30, 60

15. $\frac{1}{2}x+3=5$

$$2\left(\frac{1}{2}x+3\right)=2(5)$$

$$x+6=10$$

$$x=4$$

17. $\frac{2}{15}z+3=\frac{7}{5}$

$$15\left(\frac{2}{15}z+3\right)=15\left(\frac{7}{5}\right)$$

$$2z+45=21$$

$$\frac{2z}{2}=\frac{-24}{2}$$

$$z=-12$$

19. $\frac{1}{3}q+\frac{3}{5}=\frac{1}{15}q-\frac{2}{5}$

$$15\left(\frac{1}{3}q+\frac{3}{5}\right)=15\left(\frac{1}{15}q-\frac{2}{5}\right)$$

$$5q+9=q-6$$

$$4q=-15$$

$$q=-\frac{15}{4}$$

21. $\frac{12}{5}w+7=31-\frac{3}{5}w$

$$5\left(\frac{12}{5}w+7\right)=5\left(31-\frac{3}{5}w\right)$$

$$12w+35=155-3w$$

$$15w=120$$

$$w=8$$

23. $\frac{1}{4}(3m-4)-\frac{1}{5}=\frac{1}{4}m+\frac{3}{10}$

$$20\left[\frac{1}{4}(3m-4)-\frac{1}{5}\right]=20\left(\frac{1}{4}m+\frac{3}{10}\right)$$

$$5(3m-4)-4=5m+6$$

$$15m-20-4=5m+6$$

$$15m-24=5m+6$$

$$10m=30$$

$$m=3$$

25. $\frac{1}{6}(5s+3)=\frac{1}{2}(s+11)$

$$6\left[\frac{1}{6}(5s+3)\right]=6\left[\frac{1}{2}(s+11)\right]$$

$$5s+3=3(s+11)$$

$$5s+3=3s+33$$

$$2s=30$$

$$s=15$$

27. $\frac{2}{3}x+4=\frac{2}{3}x-6$

- $$3\left(\frac{2}{3}x+4\right)=3\left(\frac{2}{3}x-6\right)$$
- $$2x+12=2x-18$$
- $$12\neq-18$$
- No solution
- 29.** $\frac{1}{6}(2c-1)=\frac{1}{3}c-\frac{1}{6}$
- $$6\left(\frac{1}{6}(2c-1)\right)=6\left(\frac{1}{3}c-\frac{1}{6}\right)$$
- $$2c-1=2c-1$$
- $$-1=-1$$
- All real numbers
- 31.** $\frac{2x+1}{3}+\frac{x-1}{3}=5$
- $$3\left(\frac{2x+1}{3}+\frac{x-1}{3}\right)=3(5)$$
- $$2x+1+x-1=15$$
- $$3x=15$$
- $$x=5$$
- 33.** $\frac{3w-2}{6}=1-\frac{w-1}{3}$
- $$6\left(\frac{3w-2}{6}\right)=6\left(1-\frac{w-1}{3}\right)$$
- $$3w-2=6-2(w-1)$$
- $$3w-2=8-2w$$
- $$5w=10$$
- $$w=2$$
- 35.** $\frac{x+3}{3}-\frac{x-1}{2}=4$
- $$6\left(\frac{x+3}{3}\right)-6\left(\frac{x-1}{2}\right)=6(4)$$
- $$2(x+3)-3(x-1)=24$$
- $$2x+6-3x+3=24$$
- $$-x+9=24$$
- $$-x=15\Rightarrow x=-15$$
- 37.** $9.2y-4.3=50.9$
- $$10(9.2y-4.3)=10(50.9)$$
- $$92y=552$$
- $$y=6$$
- 39.** $0.05z+0.2=0.15z-10.5$
- $$100(0.05z+0.2)=100(0.15z-10.5)$$
- $$-10z=-1070$$
- $$z=107$$
- 41.** $0.2p-1.4=0.2(p-7)$
- $$10(0.2p-1.4)=10[0.2(p-7)]$$
- $$2p-14=2p-14$$
- $$0=0$$
- All real numbers
- 43.** $0.20x+53.60=x$
- $$100(0.20x+53.60)=100(x)$$
- $$20x+5360=100x$$
- $$5360=80x$$
- $$67=x \text{ or } x=67$$
- 45.** $0.15(90)+0.05p=0.1(90+p)$
- $$100[0.15(90)+0.05p]=100[0.1(90+p)]$$
- $$1350+5p=900+10p$$
- $$-5p=-450$$
- $$p=90$$
- 47.** $0.40(y+10)-0.60(y+2)=2$
- $$100[0.40(y+10)-0.60(y+2)]=100(2)$$
- $$40y+400-60y-120=200$$
- $$-20y+280=200$$
- $$-20y=-80$$
- $$y=4$$
- 49.** $0.12x+3-0.8x=0.22x-0.6$
- $$100(0.12x+3-0.8x)=100(0.22x-0.6)$$
- $$12x+300-80x=22x-60$$
- $$-90x+300=-60$$
- $$-90x=-360$$
- $$x=4$$
- 51.** $0.06(x-0.5)=0.06x+0.01$
- $$0.06x-0.03=0.06x+0.01$$
- $$-0.03\neq 0.01$$
- No solution

Problem Recognition Exercises: Equations vs. Expressions

$$\begin{aligned}
 53. \quad & -3.5x + 1.3 = -0.3(9x - 5) \\
 & 10(-3.5x + 1.3) = 10(-0.3(9x - 5)) \\
 & -35x + 13 = -3(9x - 5) \\
 & -35x + 13 = -27x + 15 \\
 & -8x + 13 = 15 \\
 & -8x = 2 \Rightarrow x = -0.25
 \end{aligned}$$

$$\begin{aligned}
 55. \quad & 0.2x - 1.8 = -3 \\
 & 0.2x = -1.2 \Rightarrow x = -6
 \end{aligned}$$

$$\begin{aligned}
 57. \quad & \frac{1}{4}(x+4) = \frac{1}{5}(2x+3) \\
 & 20\left[\frac{1}{4}(x+4)\right] = 20\left[\frac{1}{5}(2x+3)\right] \\
 & 5(x+4) = 4(2x+3) \\
 & 5x+20 = 8x+12 \\
 & -3x = -8 \Rightarrow x = \frac{8}{3}
 \end{aligned}$$

$$\begin{aligned}
 59. \quad & 0.05(2t-1) - 0.03(4t-1) = 0.2 \\
 & 100[0.05(2t-1) - 0.03(4t-1)] = 100(0.2) \\
 & 10t - 5 - 12t + 3 = 20 \\
 & -2t - 2 = 20 \\
 & -2t = 22 \Rightarrow t = -11
 \end{aligned}$$

$$\begin{aligned}
 61. \quad & \frac{2k+5}{4} = 2 - \frac{k+2}{3} \\
 & 12\left(\frac{2k+5}{4}\right) = 12\left(2 - \frac{k+2}{3}\right) \\
 & 3(2k+5) = 24 - 4(k+2) \\
 & 6k+15 = 24 - 4k - 8
 \end{aligned}$$

$$6k + 15 = -4k + 16$$

$$10k = 1$$

$$k = \frac{1}{10}$$

$$\begin{aligned}
 63. \quad & \frac{1}{8}v + \frac{2}{3} = \frac{1}{6}v + \frac{3}{4} \\
 & 24\left(\frac{1}{8}v + \frac{2}{3}\right) = 24\left(\frac{1}{6}v + \frac{3}{4}\right) \\
 & 3v + 16 = 4v + 18
 \end{aligned}$$

$$-v = 2$$

$$v = -2$$

$$\begin{aligned}
 65. \quad & \frac{1}{2}a + 0.4 = -0.7 - \frac{3}{5}a \\
 & 10\left(\frac{1}{2}a + 0.4\right) = 10\left(-0.7 - \frac{3}{5}a\right) \\
 & 5a + 4 = -7 - 6a
 \end{aligned}$$

$$11a = -11$$

$$a = -1$$

$$\begin{aligned}
 67. \quad & 0.8 + \frac{7}{10}b = \frac{3}{2}b - 0.8 \\
 & 10\left(0.8 + \frac{7}{10}b\right) = 10\left(\frac{3}{2}b - 0.8\right) \\
 & 8 + 7b = 15b - 8
 \end{aligned}$$

$$-8b = -16$$

$$\begin{aligned}
 b &= \frac{-16}{-8} \\
 &= 2
 \end{aligned}$$

Problem Recognition Exercises

1. Expression: $-4b + 18$

3. Equation:

$$\frac{y}{4} = -2$$

$$4 \cdot \frac{y}{4} = 4(-2)$$

$$y = -8$$

5. Equation:

$$3(4h - 2) - (5h - 8) = 8 - (2h + 3)$$

$$12h - 6 - 5h + 8 = 8 - 2h - 3$$

$$7h + 2 = -2h + 5$$

$$9h = 3$$

$$h = \frac{1}{3}$$

7. Expression:

$$\begin{aligned} & 3(8z-1)+10-6(5+3z) \\ & = 24z-3+10-30-18z \\ & = 6z-23 \end{aligned}$$

9. Equation:

$$\begin{aligned} 6c+3(c+1) & = 10 \\ 6c+3c+3 & = 10 \\ 9c & = 7 \\ c & = \frac{7}{9} \end{aligned}$$

11. Equation:

$$\begin{aligned} 0.5(2a-3)-0.1 & = 0.4(6+2a) \\ 10[0.5(2a-3)-0.1] & = 10[0.4(6+2a)] \\ 10a-15-1 & = 24+8a \\ 10a-16 & = 24+8a \\ 2a & = 40 \\ a & = 20 \end{aligned}$$

13. Equation:

$$\begin{aligned} -\frac{5}{9}w + \frac{11}{12} & = \frac{23}{36} \\ 36\left(-\frac{5}{9}w + \frac{11}{12}\right) & = 36\left(\frac{23}{36}\right) \\ -20w + 33 & = 23 \\ -20w & = -10 \\ w & = \frac{-10}{-20} = \frac{1}{2} \end{aligned}$$

15. Expression:

$$\begin{aligned} \frac{3}{4}x + \frac{1}{2} - \frac{1}{8}x + \frac{5}{4} \\ & = \frac{6}{8}x - \frac{1}{8}x + \frac{2}{4} + \frac{5}{4} \\ & = \frac{5}{8}x + \frac{7}{4} \end{aligned}$$

17. Equation: no solution

19. Equation:

$$\frac{2x-1}{4} + \frac{3x+2}{6} = 2$$

$$12\left(\frac{2x-1}{4} + \frac{3x+2}{6}\right) = 12(2)$$

$$3(2x-1) + 2(3x+2) = 24$$

$$6x-3+6x+4 = 24$$

$$12x+1 = 24$$

$$12x = 23$$

$$x = \frac{23}{12}$$

21. Equation: $4b-8-b = -3b+2(3b-4)$

$$3b-8 = -3b+6b-8$$

$$3b-8 = 3b-8$$

all real numbers

23. Equation:

$$\frac{4}{3}(6y-3) = 0$$

$$8y-4 = 0$$

$$8y = 4$$

$$y = \frac{1}{2}$$

25. Expression:

$$3(x+6) - 7(x+2) - 4(1-x)$$

$$= 3x+18-7x-14-4+4x$$

$$= 0$$

27. Expression:

$$3-2[4a-5(a+1)]$$

$$= 3-2[4a-5a-5]$$

$$= 3-2[-a-5]$$

$$= 3+2a+10$$

$$= 2a+13$$

29. Equation:

$$4+2[8-(6+x)] = -2(x-1)-4+x$$

$$4+2[8-6-x] = -2x+2-4+x$$

$$4+2[2-x] = -x-2$$

$$4+4-2x = -x-2$$

$$-2x+8 = -x-2$$

$$-x = -10$$

$$x = 10$$

31. Expression: $\frac{1}{6}y + y - \frac{1}{3}(4y - 1)$
 $= \frac{1}{6}y + y - \frac{4}{3}y + \frac{1}{3}$

$$= \frac{1}{6}y + \frac{6}{6}y - \frac{8}{6}y + \frac{1}{3}$$
$$= -\frac{1}{6}y + \frac{1}{3}$$