

## Multi-Step Equations and Inequalities

## Multi-Step Equations

$$\begin{array}{r}
 1. \frac{y}{8} - 15 = 2 \\
 +15 \quad +15 \\
 \hline
 \frac{y}{8} = 17 \\
 (8) \frac{y}{8} = (8) 17 \\
 y = 136
 \end{array}$$

$$\begin{array}{r}
 2. -9p - 15 = 93 \\
 +15 \quad +15 \\
 \hline
 -9p = 108 \\
 \frac{-9p}{-9} = \frac{108}{-9} \\
 p = -12
 \end{array}$$

$$\begin{array}{r}
 3. -2m + 14 = 10 \\
 -14 \quad -14 \\
 \hline
 -2m = -4 \\
 \frac{-2m}{-2} = \frac{-4}{-2} \\
 m = 2
 \end{array}$$

$$\begin{array}{r}
 4. -7 = 7d - 8 \\
 +8 \quad +8 \\
 \hline
 1 = 7d \\
 \frac{1}{7} = \frac{7d}{7} \\
 \frac{1}{7} = d
 \end{array}$$

$$\begin{array}{r}
 5. -7 = -3c + 14 \\
 -14 \quad -14 \\
 \hline
 -21 = -3c \\
 \frac{-21}{-3} = \frac{-3c}{-3} \\
 7 = c
 \end{array}$$

$$\begin{array}{r}
 6. 12y - 11 = 49 \\
 +11 \quad +11 \\
 \hline
 12y = 60 \\
 \frac{12y}{12} = \frac{60}{12} \\
 y = 5
 \end{array}$$

$$\begin{array}{r}
 7. 24 + \frac{h}{4} = 10 \\
 -24 \quad -24 \\
 \hline
 \frac{h}{4} = -14 \\
 (4) \frac{h}{4} = (4) -14 \\
 h = -56
 \end{array}$$

## Multi-Step Equations and Inequalities

## Multi-Step Equations

Page [2 of 7]

$$8. \frac{k}{5} - 13 = 4$$

$$\begin{array}{r} +13 \quad +13 \\ \hline \frac{k}{5} = 17 \end{array}$$

$$(5)\frac{k}{5} = (5)17$$

$$k = 85$$

$$9. -17 + \frac{q}{8} = 13$$

$$\begin{array}{r} +17 \quad +17 \\ \hline \frac{q}{8} = 30 \end{array}$$

$$(8)\frac{q}{8} = (8)30$$

$$q = 240$$

$$10. \quad 24 = \frac{m}{10} + 32$$

$$\begin{array}{r} -32 \quad -32 \\ \hline -8 = \frac{m}{10} \end{array}$$

$$-8(10) = \frac{m}{10}(10)$$

$$-80 = m$$

$$11. \quad -9 = 15 + \frac{v}{3}$$

$$\begin{array}{r} -15 \quad -15 \\ \hline -24 = \frac{v}{3} \end{array}$$

$$-24(3) = \frac{v}{3}(3)$$

$$-72 = v$$

$$12. \frac{m}{-7} - 14 = 2$$

$$\begin{array}{r} +14 \quad +14 \\ \hline \frac{m}{-7} = 16 \end{array}$$

$$\frac{m}{-7}(7) = 16(7)$$

$$m = -112$$

13. Let  $x$  represent the number of weekday aerobics classes.

$$45 + 30x = 165$$

$$\begin{array}{r} -45 \quad -45 \\ \hline 30x = 120 \end{array}$$

$$\left(\frac{1}{30}\right)30x = \left(\frac{1}{30}\right)120$$

$$x = 4$$

## Multi-Step Equations and Inequalities

## Multi-Step Equations

Page [3 of 7]

14.  $b + 18 + 3b = 74$

$$4b + 18 = 74$$

$$\begin{array}{r} -18 \quad -18 \\ \hline 4b = 56 \end{array}$$

$$\frac{4b}{4} = \frac{56}{4}$$

$$b = 14$$

15.  $10x - 3 - 2x = 4$

$$8x - 3 = 4$$

$$\begin{array}{r} +3 \quad +3 \\ \hline 8x = 7 \end{array}$$

$$\frac{8x}{8} = \frac{7}{8}$$

$$x = \frac{7}{8}$$

16.  $18w - 10 - 6w = 50$

$$12w - 10 = 50$$

$$\begin{array}{r} +10 \quad +10 \\ \hline 12w = 60 \end{array}$$

$$\frac{12w}{12} = \frac{60}{12}$$

$$w = 5$$

17.  $19 = 5n + 7 - 3n$

$$19 = 2n + 7$$

$$\begin{array}{r} -7 \quad -7 \\ \hline 12 = 2n \end{array}$$

$$\frac{12}{2} = \frac{2n}{2}$$

$$6 = n$$

18.  $-27 = -3p + 15 - 3p$

$$-27 = -6p + 15$$

$$\begin{array}{r} -15 \quad -15 \\ \hline -42 = -6p \end{array}$$

$$\frac{-42}{-6} = \frac{-6p}{-6}$$

$$7 = p$$

19.  $-x - 8 + 14x = -34$

$$13x - 8 = -34$$

$$\begin{array}{r} +8 \quad +8 \\ \hline 13x = -26 \end{array}$$

$$\frac{13x}{13} = \frac{-26}{13}$$

$$x = -2$$

## Multi-Step Equations and Inequalities

## Multi-Step Equations

Page [4 of 7]

$$20. 2(x + 4) + 6 = 22$$

$$2x + 8 + 6 = 22$$

$$2x + 14 = 22$$

$$\frac{-14}{2x} = \frac{-14}{8}$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$x = 4$$

$$21. 1 - 3(n + 5) = -8$$

$$1 - 3n - 15 = -8$$

$$-3n - 14 = -8$$

$$\frac{+14}{-3n} = \frac{+14}{6}$$

$$\frac{-3n}{-3} = \frac{6}{-3}$$

$$n = -2$$

$$22. 4.3 - 1.4(p + 7) = -9.7$$

$$4.3 - 1.4p - 9.8 = -9.7$$

$$-5.5 - 1.4p = -9.7$$

$$\frac{+5.5}{-1.4p} = \frac{+5.5}{-4.2}$$

$$\frac{-1.4p}{-1.4} = \frac{-4.2}{-1.4}$$

$$p = 3$$

$$23. 1.8 + 6n - 3.2 = 7.6$$

$$-1.4 + 6n = 7.6$$

$$\frac{+1.4}{6n} = \frac{+1.4}{9}$$

$$\frac{6n}{6} = \frac{9}{6}$$

$$n = 1.5$$

$$24. 0 = 9\left(k - \frac{2}{3}\right) + 33$$

$$0 = 9k - 6 + 33$$

$$0 = 9k + 27$$

$$\frac{-27}{-27} = \frac{-27}{9k}$$

$$\frac{-27}{9} = \frac{9k}{9}$$

$$-3 = k$$

## Multi-Step Equations and Inequalities

## Multi-Step Equations

25.  $6(t - 2) - 76 = -142$

$6t - 12 - 76 = -142$

$6t - 88 = -142$

$\begin{array}{r} +88 \quad +88 \\ \hline 6t = -54 \end{array}$

$\frac{6t}{6} = \frac{-54}{6}$

$\frac{6t}{6} = \frac{-54}{6}$

$t = -9$

26. Let  $x$  represent the number of laps Karen ran. Then $3x$  represents the number Abby ran, and  $\frac{3x + 4}{7}$ 

represents the number Jill ran, which equals 1.

$\frac{3x + 4}{7} = 1$

$(7) \frac{3x + 4}{7} = (7)1$

$3x + 4 = 7$

$\begin{array}{r} -4 \quad -4 \\ \hline 3x = 3 \end{array}$

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

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

$x = 1$

27.  $12h = 9h + 84$

$12h - 9h = 9h - 9h + 84$

$3h = 84$

28.  $-10p - 8 = 2p$

$-10p + 10p - 8 = 2p + 10p$

$-8 = 12p$

29.  $6q = 18 - 2q$

$6q + 2q = 18 - 2q + 2q$

$8q = 18$

30.  $-4c - 6 = -2c$

$-4c + 4c - 6 = -2c + 4c$

$-6 = 2c$

31.  $-7s + 12 = -9s$

$-7s + 7s + 12 = -9s + 7s$

$12 = -2s$

$\frac{12}{-1} = \frac{-2s}{-1}$

$\frac{12}{-1} = \frac{-2s}{-1}$

$-12 = 2s$

32.  $6 + \frac{4}{5}a = \frac{9}{10}a$

$6 + \frac{4}{5}a - \frac{4}{5}a = \frac{9}{10}a - \frac{4}{5}a$

$6 = \frac{1}{10}a$

## Multi-Step Equations and Inequalities

## Multi-Step Equations

Page [6 of 7]

33.  $9t = 4t + 120$

$9t - 4t = 4t - 4t + 120$

$5t = 120$

$\frac{5t}{5} = \frac{120}{5}$

$t = 24$

34.  $42 + 3b = -4b - 14$

$42 + 3b + 4b = -4b + 4b - 14$

$42 + 7b = -14$

$42 - 42 + 7b = -14 - 42$

$7b = -56$

$\frac{7b}{7} = \frac{-56}{7}$

$b = -8$

35.  $\frac{6}{11}x + 4 = \frac{2}{11}x + 16$

$\frac{6}{11}x - \frac{2}{11}x + 4 = \frac{2}{11}x - \frac{2}{11}x + 16$

$\frac{4}{11}x + 4 = 16$

$\frac{4}{11}x + 4 - 4 = 16 - 4$

$\frac{4}{11}x = 12$

$\left(\frac{11}{4}\right)\frac{4}{11}x = \left(\frac{11}{4}\right)12$

$x = 33$

36.  $1.5a + 6 = 9a + 12$

$1.5a - 1.5a + 6 = 9a - 1.5a + 12$

$6 = 7.5a + 12$

$6 - 12 = 7.5a + 12 - 12$

$-6 = 7.5a$

$\frac{-6}{7.5} = \frac{7.5a}{7.5}$

$-0.8 = a$

37.  $32 - \frac{3}{8}y = \frac{3}{4}y + 5$

$32 - \frac{3}{8}y + \frac{3}{8}y = \frac{3}{4}y + \frac{3}{8}y + 5$

$32 = \frac{9}{8}y + 5$

$32 - 5 = \frac{9}{8}y + 5 - 5$

$\left(\frac{8}{9}\right)27 = \left(\frac{8}{9}\right)\frac{9}{8}y$

$24 = y$

## Multi-Step Equations and Inequalities

## Multi-Step Equations

Page [7 of 7]

38. 
$$\begin{aligned} -6 - 8c &= 3c + 16 \\ -6 - 8c + 8c &= 3c + 8c + 16 \\ -6 &= 11c + 16 \\ -6 - 16 &= 11c + 16 - 16 \\ -22 &= 11c \\ \frac{-22}{11} &= \frac{11c}{11} \\ -2 &= c \end{aligned}$$

39. Let  $x$  represent the number of lessons.

$$\begin{aligned} 5x + 60 &= 11x \\ 5x - 5x + 60 &= 11x - 5x \\ 60 &= 6x \\ \frac{60}{6} &= \frac{6x}{6} \\ 10 &= x \end{aligned}$$

They would have to take 10 lessons.