2. Solving Linear Equations and Inequalities
2.1   Linear Equations
    2.1 Exercise Set, page 204 (186): 1, 3, 6, 13, 15, 19, 20, 21, 33, 37, 50
2.2   Use a General Strategy to Solve Linear Equations
    2.2 Exercise Set, page 221 (203): 1, 8, 15, 27, 30, 32, 34, 40

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2.3   Use a Problem Solving Strategy
    2.3 Exercise Set, page 243 (225): 1, 6, 11, 15, 16, 19, 23, 25, 27, 32, 37
2.4 Solve a Formula for a Specific Variable
    2.4 Exercise Set, page 263 (245): 1, 3, 4, 6, 21, 24, 30, 32

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2.1

In the following exercises, solve the following equations with constants on both sides.

46. $11 - \frac{1}{5}a = \frac{4}{5}a + 4$

$5(11) - (5)\left(\frac{1}{5}\right)a = (5)\left(\frac{4}{5}\right)a + (5)(4)$

$55 - a = 4a + 20$

$55 - a + a = 4a + a + 20$

$55 = 5a + 20$

$55 - 20 = 5a$

$35 = 5a$

$\boxed{a = 7}$

46. $11 - \frac{1}{5}a = \frac{4}{5}a + 4$

$11 - 4 = \left(\frac{1}{5}\right)a + \left(\frac{4}{5}\right)a$

$\boxed{7 = a}$

Check: $11 - \left(\frac{1}{5}\right)(7) \overset{?}{=} \left(\frac{4}{5}\right)(7) + 4$

$11 - \frac{7}{5} \overset{?}{=} \frac{28}{5} + 4$

$\frac{(11)(5)}{5} - \frac{7}{5} \overset{?}{=} \frac{28}{5} + \frac{4(5)}{5}$

$\frac{55 - 7}{5} \overset{?}{=} \frac{28 + 20}{5}$

$\frac{48}{5} = \frac{48}{5} \checkmark$

Solve and check

43. $9p + 14 = 6 + 4p$

$9p - 4p + 14 = 6 + 4p - 4p$

$5p + 14 = 6$

$5p = -8$

$\boxed{p = -\frac{8}{5}}$

$\begin{array}{r} -1.6 \\ 5\overline{)-8.0} \\ \underline{5} \\ 30 \\ \underline{30} \\ 0 \end{array}$

$9\left(-\frac{8}{5}\right) + 14 \overset{?}{=} 6 + 4\left(-\frac{8}{5}\right)$ $\qquad x = \frac{2}{7}$

$-\frac{72}{5} + 14 \overset{?}{=} 6 - \frac{32}{5}$

$-\frac{72}{5} + \frac{14(5)}{5} \overset{?}{=} 6(\frac{5}{5}) - \frac{32}{5}$

$-\frac{72}{5} + \frac{70}{5} \overset{?}{=} \frac{30}{5} - \frac{32}{5}$

$-\frac{2}{5} = -\frac{2}{5} \checkmark$

$\begin{array}{r} .2857142 \\ 7\overline{)2.0000000} \\ \underline{14} \\ 60 \\ \underline{56} \\ 40 \\ \underline{35} \\ 50 \\ \underline{49} \\ 10 \\ \underline{7} \\ 30 \\ \underline{28} \\ 20 \\ \underline{14} \\ 6 \end{array}$

2.3

2.3

In the following exercises, translate to an equation and then solve it.

7. The quotient of b and -6 is 18.

$\dfrac{b}{-6} = 18$

check

$-108 \overset{?}{=} 18$ $\quad -18$

$$\frac{b}{-6} = 18$$

$$b = (-6)(18)$$

$$\boxed{b = -108}$$

$$\frac{-108}{-6} \overset{?}{=} 18$$

$$\frac{108}{6} \overset{?}{=} 18$$

$$18 = 18 \checkmark$$

$$\begin{array}{r} 18 \\ 6\overline{)108} \\ \underline{6} \\ 48 \\ \underline{48} \\ 0 \end{array}$$

In the following exercises, translate into an equation and solve.

12. Eva's daughter is 15 years younger than her son. Eva's son is 22 years old. How old is her daughter?

Let x = daughter's age in years
Let y = son's age

$$x = y - 15$$

$$y = 22$$

$$\Rightarrow x = 22 - 15$$

$$\boxed{x = 7}$$

Eva's daughter is 7 years old.

2.3

In the following exercises, solve each number word problem

18. Three times the sum of a number and nine is 12. Find the number.

Let $x =$ the number

$$3(x + 9) = 12$$

$$x + 9 = 4$$

$$\boxed{x = -5}$$

check $\quad 3(-5 + 9) \overset{?}{=} 12$

$$3(4) \overset{?}{=} 12$$

$$12 = 12 \quad \checkmark$$

$$\boxed{\text{The number is } -5}$$

2.3

In the following exercises, solve.

33. The width of a rectangular window is 24 inches. The area is 624 square inches. What is the length?

Let $L =$ length (in inches)

$$(24 \text{ in})(L) = 624 \text{ in}^2$$

$$24 L = 624 \text{ in}$$

$$L = \frac{624 \text{ in}}{24}$$

$$L = \frac{312}{12} \text{ in}$$

$$\boxed{L = 26 \text{ in}}$$

$$\begin{array}{r} 26 \\ 12\overline{)312} \\ 24 \\ \hline 72 \end{array}$$

$$l = 26 \text{ in}$$

$$\frac{\begin{array}{r}72\\72\end{array}}{0}$$

The length of the rectangular window is 26 inches.

2.4

In the following exercises, use the formula $d = rt$.

memorize

        d = distance
        r = rate
        t = time

2. Solve for r

      a. when $d = 420$ and $t = 6$

      b. in general

(a) $420 = r(6)$

$$r = \frac{420}{6}$$

$$\boxed{r = 70}$$

(b) $d = rt$

$$\boxed{r = \frac{d}{t}}$$

$$r = \frac{420}{6} = \boxed{70}$$

MTH 111 quiz 3 (group quiz) closed book, closed notes, calculator OK

1. Solve and check $3(x - 4) + 2 = 2x$
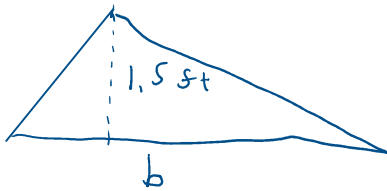
$$3x - 12 + 2 = 2x$$

$$3x - 10 = 2x$$

$$\boxed{x = 10}$$

$$3x - 10 = 2v$$
$$\boxed{x = 10}$$

check $\quad 3(10-4) + 2 \overset{?}{=} 2(10)$

$\qquad\qquad 3(6) + 2 \overset{?}{=} 20$

$\qquad\qquad 18 + 2 \overset{?}{=} 20$

$\qquad\qquad 20 = 20 \checkmark$

2. hint: carry units throughout calculation.

A triangular flag has area 0.75 square feet and height 1.5 foot. What is its base?

1.5 ft

b

$$area = \left(\tfrac{1}{2}\right)(base)(height)$$

Let $b = base$

$$\left(\tfrac{1}{2}\right)(b)(1.5 \text{ ft}) = 0.75 \text{ ft}^2$$

$$(2)\left(\tfrac{1}{2}\right) b (1.5) \text{ ft} = (2)(0.75) \text{ ft}^2$$

$$(1.5)b = 1.50 \text{ ft}$$

$$b = \frac{1.50}{1.5} \text{ ft}$$

$$\boxed{b = 1 \text{ ft}}$$

The base of the triangular flag is 1 foot.

3.

Solve the formula $P = 2L + 2W$ for L.

$$2L = P - 2W$$

$$\boxed{L = \frac{P - 2W}{2} = \frac{P}{2} - W}$$

4. Classify the equation $x = x + 1$.

Contradiction

5. hint: carry units throughout calculation.

Adam rides his bike at a uniform rate of 12 miles per hour for $3\frac{1}{2}$ hours. What distance has he traveled?

Let d = distance traveled

$d = rt$, r = rate, t = time

$d = \left(12 \frac{mi}{hr}\right)\left(3\frac{1}{2} \, hr\right)$

$d = (12)\left(3 + \frac{1}{2}\right) mi$

$d = \left[(12)(3) + 12\left(\frac{1}{2}\right)\right] mi$

$d = (36 + 6) mi$

$d = 42 \, mi$

Adam traveled 42 miles on his bike.

6. Simplify $\dfrac{8 \times 10^3 \times 2 \times 10^{-1}}{4 \times 10^{-3}}$ and write answer in scientific notation.

$\dfrac{(8)(2) \times 10^{3 \, -1}}{4 \times 10^{-3}}$

$= (2)(2) \times \dfrac{10^2}{10^{-3}}$

$= 4 \times 10^{2-(-3)}$

$= 4 \times 10^{2+3}$

$= 4 \times 10^5$