

3.2 Simplifying Expressions to Solve Linear Equations

1) $A = 5(x + 3) = 5(x) + 5(3) = 5x + 15$

3) $\frac{3}{5}x + 2 - \frac{1}{10}x - 6$
 $= \frac{3}{5}x - \frac{1}{10}x + 2 - 6$ Group like terms
 $= \frac{6}{10}x - \frac{1}{10}x + 2 - 6$ Write like terms with a common denominator
 $= \frac{5}{10}x - 4$ Combine like terms
 $= \frac{1}{2}x - 4$

5) $6(x + 5) + 2x - 7$
 $= 6x + 30 + 2x - 7$ Distributive property [FACT 2.2]
 $= 6x + 2x + 30 - 7$ Group like terms
 $= 8x + 23$ Combine like terms

7)

a) $c^2 + 3c - 2c^2 + 8c - 5$
 $= c^2 - 2c^2 + 3c + 8c - 5$ Group like terms
 $= -c^2 + 11c - 5$ Combine like terms

b) $-(x + 2) - 3x + 7$
 $= (-1)(x + 2) - 3x + 7$ Special Property of -1 [FACT 2.6c]
 $= -1x - 2 - 3x + 7$ Distributive property [FACT 2.2]
 $= -1x - 3x - 2 + 7$ Group like terms
 $= -4x + 5$ Combine like terms

c) $2 \text{ inches}^2 + 5 \text{ inches} + 7 \text{ inches}^2$
 $= 2 \text{ inches}^2 + 7 \text{ inches}^2 + 5 \text{ inches}$ Group like terms
 $= 9 \text{ inches}^2 + 5 \text{ inches}$ Combine like terms

d) $2(3x - 7) - (x - 4) + 5$
 $= 2(3x - 7) + (-1)(x - 4) + 5$ Special property of -1 [FACT 2.6c]
 $= 6x - 14 - x + 4 + 5$ Distributive property [FACT 2.2]
 $= 6x - x - 14 + 4 + 5$ Group like terms
 $= 5x - 5$ Combine like terms

e) $\frac{5}{3}(x - 6) + x - 4$

$$\begin{aligned}
&= \frac{5}{3}x - \frac{5}{3}(6) + x - 4 && \text{Distributive property [FACT 2.2]} \\
&= \frac{5}{3}x - 10 + x - 4 && \text{Simplify} \\
&\frac{5}{3}x + x - 10 - 4 && \text{Group like terms} \\
&= \frac{5}{3}x + \frac{3}{3}x - 10 - 4 && \text{Write like terms with a common denominator} \\
&= \frac{8}{3}x - 14 && \text{Combine like terms}
\end{aligned}$$

9)

a)

$$\begin{aligned}
2 - 3x + 15 &= 4 + x - 6 \\
-3x + 17 &= x - 2 \\
-4x + 17 &= -2 \\
-4x &= -19 \\
x &= \frac{19}{4} = 4.75
\end{aligned}$$

b)

$$\begin{aligned}
7 &= 4x - 3 - 7x - 11 \\
7 &= -3x - 14 \\
21 &= -3x \\
x &= -7
\end{aligned}$$

c)

$$\begin{aligned}
0.6x + 2 - 1.1x &= 2.6 \\
-0.5x + 2 &= 2.6 \\
-0.5x &= 0.6 \\
x &= -1.2
\end{aligned}$$

d)

$$\begin{aligned}
\frac{1}{4}(2x + 5) - x &= \frac{1}{2}(5x - 2) \\
4 \frac{1}{4}(2x + 5) - x &= 4 \frac{1}{2}(5x - 2) \\
(2x + 5) - 4x &= 2(5x - 2) \\
2x + 5 - 4x &= 10x - 4 \\
-2x + 5 &= 10x - 4 \\
5 &= 12x - 4 \\
9 &= 12x \\
x &= \frac{3}{4} = 0.75
\end{aligned}$$

11)

a) Recall DISTANCE = RATE TIME

$$\begin{aligned}
d_{\text{car1}} &= 40t && \text{First car travels } 40t \text{ miles} \\
d_{\text{car2}} &= 55t && \text{Second car travels } 55t \text{ miles}
\end{aligned}$$

b) $40t + 55t = 57$ The sum of the distances both cars travel is 57 mi

c) $40t + 55t = 57$

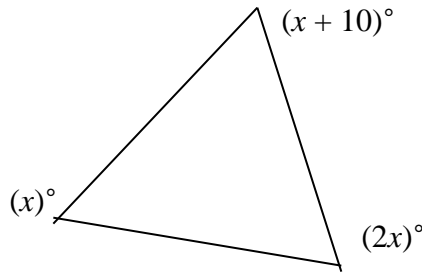
$95t = 57$

$t = \frac{57}{95} = \frac{3}{5} = 0.6$

It will take 0.6 hrs (36 min) for the cars to be 57 miles apart.

13)

a) $m \ A = x$
 $m \ B = x + 10$
 $m \ C = 2x$



b) $m \ A + m \ B + m \ C = 180^\circ$
 $x + (x + 10) + 2x = 180$

c) $x + (x + 10) + 2x = 180$
 $x + x + 10 + 2x = 180$
 $4x + 10 = 180$
 $4x = 170$
 $x = \frac{170}{4} = \frac{85}{2} = 42.5$ $m \ A = 42.5^\circ$

15) Let x be the measure of angle of angle A .

$m \ A = x^\circ$
 $m \ B = (2x + 5)^\circ$
 $m \ C = (x - 15)^\circ$

$m \ A + m \ B + m \ C = 180^\circ$
 $x + (2x + 5) + (x - 15) = 180$
 $x + 2x + 5 + x - 15 = 180$
 $x + 2x + x + 5 - 15 = 180$
 $4x - 10 = 180$
 $4x = 190$
 $x = 47.5$

$m \ A = 47.5^\circ$
 $m \ B = 2(47.5^\circ) + 5^\circ = 95^\circ + 5^\circ = 100^\circ$
 $m \ C = 47.5^\circ - 15^\circ = 32.5^\circ$

Skill and Review

17) $C = \frac{5}{9}(F - 32^\circ)$; $F = 14^\circ$

$$C = \frac{5}{9}[(14^\circ) - 32^\circ]$$

Substitute 14°F for F

$$C = \frac{5}{9}(-18^\circ)$$

$$C = -10^\circ$$

Thus $14^\circ\text{F} = -10^\circ\text{C}$.

19) $-8 + \frac{(-1)^{19} + 6}{9 - 10}$ Fraction bar is a symbol of grouping.

$= -8 + \frac{(-1) + 6}{9 - 10}$ Evaluate exponents and roots from left to right

$= -8 + \frac{5}{9 - 10}$ Perform addition in numerator

$= -8 + \frac{5}{-1}$ Perform work in denominator

$= (-8) + (-5)$ No exponents and roots; perform division

$= -13$ Perform addition

In the calculator, this problem would be entered
 $-8 + ((-1)^{19} + 6) / (9 - 10)$ ENTER: (Result = -13)