Math 70
Exam 2 Solutions

1. To find the temperature in degrees Fahrenheit, evaluate the formula with $C = 30$.

$$F = \frac{9}{5}(30) + 32 = 54 + 32 = 86$$

Note: $\frac{9}{5}(30) = \frac{9}{5}\cdot\frac{30}{1} = \frac{270}{5} = 54$ or you can simplify the numerator and denominators before multiplying the fractions.

So, the temperature is 86° Fahrenheit.

2. (a) Distribution with the inner set of parenthesis: $2y[3y + 2(y - 1)] = 2y[3y + 2y - 2]$

You can distribute the $2y$ into the brackets or you can combine like terms inside the brackets. I will be combining like terms first:

$$\begin{aligned} \Rightarrow \quad 2y[3y + 2y - 2] &= 2y[5y - 2] \\ &= 2y(5y) - 2y(2) \\ &= 10y^2 - 4y \end{aligned}$$

So, $2y[3y + 2(y - 1)]$ simplifies to $10y^2 - 4y$.

(b) Using the product rule for exponents: $x^8 \cdot x^3 = x^{8+3} = x^{11}$.

(c) $$\begin{aligned} (-4ab^3)(9a^2b^5) &= (-4 \cdot 9)(a \cdot a^2)(b^3 \cdot b^5) \\ &= -36a^{1+2}b^{3+5} \\ &= -36a^3b^8 \end{aligned}$$

3. (a) Simplifying the right-side of the equation: $x + 3 = -4 \quad \Rightarrow \quad x = -7$ (Subtracting 3 from both sides)

Solution: $x = -7$

Check: Left-side of equation: $-7 + 3 = -4$
Right-side of equation: $-12 + 8 = -4$ ✓

(b) Dividing both sides by 5: $y = \frac{1.5}{5} = 0.5$

Solution: $y = 0.5$

Check: Left-side of equation: $5(0.5) = 1.5$
Right-side of equation: 1.5 ✓

(c) Combining like terms on the left-side of the equation:

$$\begin{aligned} 4x &= 6 \\ \Rightarrow \quad x &= \frac{6}{4} = \frac{3}{2} \end{aligned} \quad \text{(Dividing both sides by 4 and simplifying)}$$

Solution: $x = \frac{3}{2}$

Check: Left-side of equation: $3\left(\frac{3}{2}\right) + \frac{3}{2} = \frac{9}{2} + \frac{3}{2} = \frac{12}{2} = 6$
Right-side of equation: 6 ✓

(d) Distributing the left-side of the equation:

$$\begin{aligned} 4x - 4(2) &= 2x + 2 \\ 4x - 8 &= 2x + 2 \\ 2x - 8 &= 2 \qquad \text{(Subtracting } 2x \text{ from each side.)} \\ 2x &= 10 \qquad \text{(Adding 8 to each side.)} \\ x &= 5 \qquad \text{(Dividing both sides by 2.)} \end{aligned}$$

Solution: $x = 5$

Check: Left-side of equation: $4(5-2) = 4(3) = 12$
Right-side of equation: $2(5) + 2 = 10 + 2 = 12$ ✓

(e) Here are a couple of ways to solve this:

- $\frac{x}{6} = 1 - \frac{3}{2}$ (Subtracting $\frac{3}{2}$ from each side.)

  $\frac{x}{6} = \frac{2}{2} - \frac{3}{2} \quad \Rightarrow \quad \frac{x}{6} = -\frac{1}{2}$

  $\Rightarrow \quad x = 6(-\frac{1}{2}) = -3$

- Clearing the fractions:
  The LCD of the denominators 6 and 2 is 6. Multiplying both sides by 6:

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

  $$6\left(\frac{x}{6}\right) + 6\left(\frac{3}{2}\right) = 6$$

  $x + 9 = 6$ since $6\left(\frac{3}{2}\right) = 9$.

  $x = -3$ (Subtracting 9 from both sides.)

Solution: $x = -3$

Check: Left-side of equation: $\frac{-3}{6} + \frac{3}{2} = \frac{-3}{6} + \frac{9}{6} = \frac{6}{6} = 1$
Right-side of equation: 1 ✓

4. **Unknowns:** Pounds of peanuts = x Pounds of chocolate = $3x$

Equation: Since we want a total of 20 pounds when we combing peanuts and chocolate, the equation is $x + 3x = 20$.

Combining the like-terms on the left side: $4x = 20$

$x = 5$ (Dividing both sides by 4.)

$\Rightarrow$ You need 5 pounds of peanuts and 15 pounds of chocolate.

5. Using the equation $Distance = Rate(Time)$, we have that

$$Distance = (1.4 \ \frac{\text{ft}}{\text{min}})(20 \text{ min}) = 28 \text{ feet}.$$

So, Sam will travel 28 feet in 20 minutes.

Extra Credit:
No matter how you tip, you will have to pay the \$40 for the dinner and $\$40(0.10) = \$4$ for the tax, which would give you a total of \$44 not including the tip.

If you apply the tip to just the bill without tax, then you are tipping on the amount of \$40. So, you would give a tip of $\$40(0.15) = \$6$.

If you apply the tip to the bill including tax, then you are tipping on the amount of \$44. So, you would give a tip of $\$44(0.15) = \$6.60$.

So, if you tip on the pre-tax amount, you leave a tip of \$6. If you tip on the post-tax amount, you leave a tip of \$6.60.

Answer: The difference is \$0.60.