Full Solutions

1. Evaluate/simplify by substitution.

Solution: $A = 3p - 2q = 3(-2) - 2(4) = -6 - 8 = -14$.
$B = \dfrac{p^2}{q} = \dfrac{(-2)^2}{4} = \dfrac{4}{4} = 1$.
$A + B = -14 + 1 = -13$.

2. Solve the linear equation.

Solution: $4(2x - 3) - 5 = 3x + 7 \Rightarrow 8x - 12 - 5 = 3x + 7 \Rightarrow 8x - 17 = 3x + 7$
$\Rightarrow 5x = 24 \Rightarrow x = \dfrac{24}{5} = 4.8$.

3. Absolute value.

Solution: (a) $|2x - 5| = 9 \Rightarrow 2x - 5 = 9$ or $2x - 5 = -9$. First: $2x = 14 \Rightarrow x = 7$.
Second: $2x = -4 \Rightarrow x = -2$.
(b) $|x + 1| \leq 4 \Rightarrow -4 \leq x + 1 \leq 4 \Rightarrow -5 \leq x \leq 3$. Interval: $[-5, 3]$.

4. Literal equation.

Solution: $F = \dfrac{9}{5}C + 32 \Rightarrow F - 32 = \dfrac{9}{5}C \Rightarrow C = \dfrac{5}{9}(F - 32)$.

5. Exponent rules.

Solution: $(a^3b^{-2})^2 = a^6b^{-4}$. Dividing by $a^{-1}b^4$ gives $a^{6-(-1)}b^{-4-4} = a^7b^{-8} = \dfrac{a^7}{b^8}$.
At $a = -2,\ b = \dfrac{1}{2}$: $\dfrac{(-2)^7}{(1/2)^8} = \dfrac{-128}{1/256} = -128 \cdot 256 = -32768$.

6. Quadratic: factor and solve.

Solution: $x^2 - 5x - 24 = (x-8)(x+3) = 0 \Rightarrow x = 8$ or $x = -3$.
Intercepts are $(8, 0)$ and $(-3, 0)$.

7. Solve the system.

Solution: From $4x - y = 1$ we get $y = 4x - 1$. Substitute in $2x + 3y = 7$: $2x + 3(4x - 1) = 7 \Rightarrow 2x + 12x - 3 = 7 \Rightarrow 14x = 10 \Rightarrow x = \dfrac{5}{7}$.
Then $y = 4x - 1 = 4 \cdot \dfrac{5}{7} - 1 = \dfrac{20}{7} - \dfrac{7}{7} = \dfrac{13}{7}$. Solution: $\left(\dfrac{5}{7}, \dfrac{13}{7}\right)$.

8. Function $f(x) = 2x^2 - 3x + 1$.

Solution: $f(-2) = 2(4) - 3(-2) + 1 = 8 + 6 + 1 = 15$.
$f(k) = 2k^2 - 3k + 1$ (already simplified).
$f(a+1) - f(a) = \Big[2(a+1)^2 - 3(a+1) + 1\Big] - \Big[2a^2 - 3a + 1\Big]$
$= 2(a^2 + 2a + 1) - 3a - 3 + 1 - 2a^2 + 3a - 1 = 4a - 2$.

9. Piecewise.

Solution: $p(-3)$ uses $x + 4$: $-3 + 4 = 1$. $p(0)$ uses x^2: $0^2 = 0$.
$p(2)$ uses x^2: $2^2 = 4$. $p(5)$ uses constant 6: 6.

10. Modeling.

Solution: $C(m) = 2.50 + 1.80m$. $C(6) = 2.50 + 1.80 \cdot 6 = 2.50 + 10.80 = 13.30$.
\$20 budget: $2.50 + 1.80m \le 20 \Rightarrow 1.80m \le 17.50 \Rightarrow m \le \dfrac{17.50}{1.80} \approx 9.72$. Greatest whole number of miles: 9.