Solutions Algebra-1
Basic Algebraic operations *(continued)*

Quadratic Equations *(continued)*

8. Use formula $a = 2$, $b = -3$, $c = -4$: $x = 2.4$, -0.9

9. Use formula $a = 1$, $b = 2$, $c = -6$: $x = 1.6$, -3.6

Inequalities

1. $8 - x > 3(2x + 5) \rightarrow 8 - x > 6x + 15 \rightarrow x < -1$

2. $3y < 4 - (y + 2) \rightarrow 3y < 2 - y \rightarrow y < \dfrac{1}{2}$

3. $3 - x + 6 < 2x \rightarrow 9 < 3x \rightarrow x > 9$

4. $6x - 2 < 5 - 15x \rightarrow 21x < 7 \rightarrow x < \dfrac{1}{3}$

5. $2 + 5x \geq 8x - 16 \rightarrow 18 \geq 3x \rightarrow x \leq 6$

6. $2 - 15x + 10 \geq 4 - 12x \rightarrow 12 - 15x \geq 4 - 12x$

   $\rightarrow 8 \geq 3x \rightarrow x \leq \dfrac{8}{3} \quad x \leq 2\dfrac{2}{3}$

   $x = 1$ or 2 since x is a positive integer.

7. $3x + 1 \leq 5x + 3 \quad -2 \leq x \quad i.e. \quad x \geq -2$
   $5x + 3 \leq x + 23 \quad 4x \leq 20 \quad i.e. \quad x \leq 5$
   Both are true, so x = {-2, -1, 0, 1, 2, 3, 4, 5}

Changing subject of formula

1. $5Y = 6v - 3w \rightarrow 6v = 5Y + 3w \rightarrow v = \dfrac{5Y + 3w}{6}$

2. $3P = m - s \rightarrow m = 3P + s$

3. $L - 8 = \dfrac{6}{Y} \rightarrow Y(L - 8) = 6 \quad Y = \dfrac{6}{L - 8}$

4. $dt = k - m \rightarrow k = dt + m$

5. $Q - p^2 = 3T \rightarrow T = \dfrac{Q - p^2}{3}$

6. $M + 3 = R^2 t \rightarrow \dfrac{M + 3}{t} = R^2 \rightarrow \sqrt{\dfrac{M + 3}{t}} = R$

7. $A^2 = 4b^2 - c \rightarrow A^2 + c = 4b^2 \rightarrow b = \sqrt{\dfrac{A^2 + c}{4}}$

8. a) $Q - t = 2\sqrt{s} \rightarrow \dfrac{Q - t}{2} = \sqrt{s} \rightarrow \left(\dfrac{Q - t}{2}\right)^2 = s$

   b) $s = \left(\dfrac{3.5 - 2.2}{2}\right)^2 \rightarrow \left(\dfrac{1.3}{2}\right)^2 \rightarrow 0.65^2 \rightarrow 0.4225$

9. $F = f - \dfrac{fv}{s} \rightarrow \dfrac{fv}{s} = f - F \rightarrow fv = s(f - F) \rightarrow v = \dfrac{s(f - F)}{f}$

Algebraic Fractions

1. $\dfrac{1}{2x} - \dfrac{1}{3x} \rightarrow \dfrac{3}{6x} - \dfrac{2}{6x} \rightarrow \dfrac{1}{6x}$

2. $\dfrac{3}{x} + \dfrac{2 - x}{x^2} \rightarrow \dfrac{3x}{x^2} - \dfrac{2 - x}{x^2} \rightarrow \dfrac{4x - 2}{x^2}$

3. $\rightarrow \dfrac{5(x - 2)}{x(x - 2)} - \dfrac{3x}{x(x - 2)} \rightarrow \dfrac{2x - 10}{x(x - 2)} \rightarrow \dfrac{2(x - 5)}{x(x - 2)}$

Fraction Equations

1. $\dfrac{2x + 1}{3} - \dfrac{x}{4} = 2 \rightarrow 4(2x + 1) - 3x = 24 \rightarrow x = 4$

2. $\dfrac{x + 4}{2} - \dfrac{2x + 1}{3} = 1 \rightarrow 3(x + 4) - 2(2x + 1) = 6 \rightarrow x = 4$

3. $3x - \dfrac{5x + 2}{2} = 3 \rightarrow 6x - 5x - 2 = 6 \rightarrow x = 8$

4. $\dfrac{x - 3}{2} + \dfrac{2x - 1}{3} = 4 \rightarrow 3(x - 3) + 2(2x - 1) = 24 \rightarrow x = 5$

5. $\dfrac{x - 2}{3} - \dfrac{x}{2} = \dfrac{1}{4} \rightarrow 4(x - 2) - 6x = 3 \rightarrow x = -5\dfrac{1}{2}$

6. $\dfrac{x}{2} - \dfrac{x + 1}{3} = 4 \rightarrow 3x - 2(x + 1) = 24 \rightarrow x = 26$

7. $\dfrac{m}{3} = \dfrac{1 - m}{5} \rightarrow 5m = 3 - 3m \rightarrow m = \dfrac{3}{8}$

Indices

1. 9 **2.** y^2 **3.** $a^{-4} + 5a^3$ **4.** $2y^3$

5. y^3 **6.** b **7.** $b + 1$ **8.** $a^{\frac{3}{2}} + a^{-\frac{1}{2}}$

Surds

1. $5\sqrt{2}$ **2.** $2\sqrt{6}$ **3.** $\sqrt{3}$ **4.** $3\sqrt{2}$

5. $10\sqrt{2}$ **6.** $6\sqrt{2}$ **7.** $2\sqrt{3} - 2$

8. $f(12) = 3\sqrt{12} \rightarrow 3\sqrt{4 \times 3} \rightarrow 3\sqrt{4}\sqrt{3} \rightarrow 6\sqrt{3}$

9. $\dfrac{3}{\sqrt{5}} \times \dfrac{\sqrt{5}}{\sqrt{5}} \rightarrow \dfrac{3\sqrt{5}}{5}$

10. $\sqrt{\dfrac{3}{24}} \rightarrow \sqrt{\dfrac{1}{8}} \rightarrow \dfrac{1}{\sqrt{4 \times 2}} \rightarrow \dfrac{1}{2\sqrt{2}} \rightarrow \dfrac{1}{2\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}} \rightarrow \dfrac{\sqrt{2}}{4}$

11. $f(2) = \dfrac{3}{\sqrt{2}} \rightarrow \dfrac{3\sqrt{2}}{\sqrt{2}\sqrt{2}} \rightarrow \dfrac{3\sqrt{2}}{2}$

12. $f\left(\dfrac{3}{2}\right) = 4^{\frac{3}{2}} \rightarrow \left(\sqrt{4}\right)^3 \rightarrow 2^3 \rightarrow 8$