Here are the solutions to the 30 algebra questions.

Answers for Algebra 1

1. **Answer**: 21
   - [cite_start]$a(c-b) = 3(5-(-2)) = 3(5+2) = 3(7) = 21$ [cite: 1315]
2. **Answer**: 18
   - [cite_start]$x^2 - 3x = (-3)^2 - 3(-3) = 9 - (-9) = 9 + 9 = 18$ [cite: 1398]
3. **Answer**: $6x^2 - 2x$
   - [cite_start]$7x + 3x(2x-3) = 7x + 6x^2 - 9x = 6x^2 - 2x$ [cite: 1571, 1574]
4. **Answer**: $x^2 + 8x + 15$
   - [cite_start]$(x+5)(x+3) = x(x+3) + 5(x+3) = x^2 + 3x + 5x + 15 = x^2 + 8x + 15$ [cite: 1620]
5. **Answer**: $x = 18$
   - [cite_start]$5x - 3(x-1) = 39 \implies 5x - 3x + 3 = 39 \implies 2x = 36 \implies x = 18$ [cite: 1796]
6. **Answer**: $x = 2$
   - [cite_start]$(x+3)^2 = (x+2)^2 + 9 \implies x^2 + 6x + 9 = (x^2 + 4x + 4) + 9 \implies 6x + 9 = 4x + 13 \implies 2x = 4 \implies x = 2$ [cite: 1817]
7. **Answer**: $x = \frac{13}{5}$ or 2.6
   - [cite_start]$\frac{x+3}{4} = \frac{2x-1}{3} \implies 3(x+3) = 4(2x-1) \implies 3x + 9 = 8x - 4 \implies 13 = 5x \implies x = \frac{13}{5}$ [cite: 1857]
8. **Answer**: The numbers are 25, 26, and 27.
   - Let the numbers be $x, x+1, x+2$.
   - [cite_start]$x + (x+1) + (x+2) = 78 \implies 3x + 3 = 78 \implies 3x = 75 \implies x = 25$ [cite: 1930]
9. **Answer**: $x = 2, y = 1$
   - From $2x + y = 5$, we get $y = 5 - 2x$.
   - Substitute into the second equation: $3x - 2(5-2x) = 4 \implies 3x - 10 + 4x = 4 \implies 7x = 14 \implies x = 2$.
   - [cite_start]Substitute $x = 2$ back into $y = 5 - 2x \implies y = 5 - 4 = 1$. [cite: 2128]
10. **Answer**: $x = 4, y = 2$
    - Multiply the first equation by 2: $2(x + 2y) = 2(8) \implies 2x + 4y = 16$.
    - Subtract the second equation from this: $(2x + 4y) - (2x + 3y) = 16 - 14 \implies y = 2$.
    - [cite_start]Substitute $y = 2$ back into $x + 2y = 8 \implies x + 4 = 8 \implies x = 4$. [cite: 2132, 2133]

Answers for Algebra 2

1. **Answer**: $(a+b)(h+k)$
   - [cite_start]$ah + ak + bh + bk = a(h+k) + b(h+k) = (a+b)(h+k)$ [cite: 84, 90]
2. **Answer**: $(x+5)(x-3)$
   - You need two numbers that multiply to -15 and add to +2. [cite_start]These are +5 and -3. [cite: 131, 136]
3. **Answer**: $(5m-9n)(5m+9n)$
   - [cite_start]This is a difference of two squares: $(5m)^2 - (9n)^2$. [cite: 238, 248, 249]
4. **Answer**: $x = \frac{1}{2}$ or $x = -\frac{2}{3}$
   - [cite_start]$6x^2 + x - 2 = 0 \implies (2x-1)(3x+2) = 0$. [cite: 368, 369]
5. **Answer**: $x = \frac{3+\sqrt{41}}{4}$ or $x = \frac{3-\sqrt{41}}{4}$
   - Using $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ with $a=2, b=-3, c=-4$.
   - [cite_start]$x = \frac{3 \pm \sqrt{(-3)^2-4(2)(-4)}}{2(2)} = \frac{3 \pm \sqrt{9+32}}{4} = \frac{3 \pm \sqrt{41}}{4}$ [cite: 464, 472]
6. **Answer**: $x = 5 + \sqrt{42}$ or $x = 5 - \sqrt{42}$
   - [cite_start]$x^2 - 10x - 17 = 0 \implies (x-5)^2 - 5^2 - 17 = 0 \implies (x-5)^2 - 42 = 0 \implies (x-5)^2 = 42 \implies x = 5 \pm \sqrt{42}$ [cite: 579, 584]
7. **Answer**: The numbers are 8 and 11.
   - Let the numbers be *x* and *x*+3. Their product is $x(x+3) = 88$.
   - $x^2 + 3x - 88 = 0 \implies (x+11)(x-8) = 0$. [cite_start]Since the numbers are positive, $x = 8$. [cite: 682]
8. **Answer**: The length is 12 cm.
   - Let the width be *w*. The length is *w*+7. Area is $w(w+7) = 60$.
   - $w^2 + 7w - 60 = 0 \implies (w+12)(w-5) = 0$. Since width must be positive, $w = 5$.
   - [cite_start]The length is $5 + 7 = 12$ cm. [cite: 689, 690]
9. **Answer**: $(x, y) = (-3, -2)$ and $(1, 2)$
   - Substitute $y = x + 1$ into the second equation: $x + 1 = x^2 + 3x - 2$.
   - $0 = x^2 + 2x - 3 \implies 0 = (x+3)(x-1)$. So $x = -3$ or $x = 1$.
   - If $x = -3, y = -3 + 1 = -2$. [cite_start]If $x = 1, y = 1 + 1 = 2$. [cite: 730, 740, 742, 744]
10. **Answer**: $(x, y) = (-0.31, -3.63)$ and $(-3.19, -9.37)$
    - From $2x - y = 3$, we get $y = 2x - 3$. Substitute into the second equation: $2x - 3 = 2x^2 + 9x - 1$.
    - $0 = 2x^2 + 7x + 2$. Using the quadratic formula, $x = \frac{-7 \pm \sqrt{7^2-4(2)(2)}}{4} = \frac{-7 \pm \sqrt{33}}{4}$.
    - $x \approx -0.31$ or $x \approx -3.19$.

- If $x \approx -0.31, y \approx 2(-0.31) - 3 = -3.62$. [cite_start]If $x \approx -3.19, y \approx 2(-3.19) - 3 = -9.38$. [cite: 746, 762, 784]

Answers for Algebra 3

1. **Answer**: $\frac{x-2}{x-1}$
   - [cite_start]$\frac{x^2+x-6}{x^2+2x-3} = \frac{(x+3)(x-2)}{(x+3)(x-1)} = \frac{x-2}{x-1}$ [cite: 2251]
2. **Answer**: $\frac{9x-3}{20}$
   - [cite_start]$\frac{5(x+1)}{20} + \frac{4(x-2)}{20} = \frac{5x+5+4x-8}{20} = \frac{9x-3}{20}$ [cite: 2333]
3. **Answer**: $a = \frac{T}{M} - B$
   - [cite_start]$M(a+B) = T \implies a+B = \frac{T}{M} \implies a = \frac{T}{M} - B$ [cite: 2495]
4. **Answer**: $y = \frac{5x}{3}$
   - [cite_start]$\sqrt{\frac{y+x}{y-x}} = 2 \implies \frac{y+x}{y-x} = 4 \implies y+x = 4(y-x) \implies y+x = 4y-4x \implies 5x = 3y \implies y = \frac{5x}{3}$ [cite: 2691]
5. **Answer**: $1800
   - $V \propto M^2 \implies V = kM^2$. Given $200 = k(10^2) \implies k = 2$.
   - The formula is $V = 2M^2$. [cite_start]When $M = 30$, $V = 2(30^2) = 2(900) = 1800$. [cite: 2771, 2785]
6. **Answer**: 6 cm
   - $F \propto \frac{1}{d^2} \implies F = \frac{k}{d^2}$. Given $18 = \frac{k}{2^2} \implies k = 72$.
   - The formula is $F = \frac{72}{d^2}$. [cite_start]When $F = 2$, $2 = \frac{72}{d^2} \implies d^2 = 36 \implies d = 6$. [cite: 2973, 2975]
7. **Answer**: $4x^3$
   - [cite_start]$(2x^{-1})^2 \div x^{-5} = (4x^{-2}) \div x^{-5} = 4x^{-2-(-5)} = 4x^3$ [cite: 2995]
8. **Answer**: $x = -2$
   - [cite_start]$4^{x-1} = 8^x \implies (2^2)^{x-1} = (2^3)^x \implies 2^{2x-2} = 2^{3x} \implies 2x-2 = 3x \implies x = -2$ [cite: 3126, 3135]
9. **Answer**: $x \geq \frac{4}{3}$
   - $5 - 3x \leq 1 \implies -3x \leq -4$. [cite_start]Divide by -3 and reverse the inequality sign. [cite: 3197, 3201]
10. **Answer**: The integers are 2, 3, 4, 5, 6.
    - Solve as two parts: $x < 3x+2 \implies -2 < 2x \implies -1 < x$.
    - And $3x+2 < 2x+6 \implies x < 4$.
    - Combining gives $-1 < x < 4$. [cite_start]The integers are 0, 1, 2, 3. [cite: 3274]