

ELEMENTARY ALGEBRA

Part I:

1. If $4(x - 3) = 2x + 5$ then $x = ?$
2. If $a = 5$ and $b = -2$, what is the value of the expression $4a^2 - 3b + 5$?
3. Completely factor $ax + bx + 3a + 3b$.
4. For all x and y , $(3x + 2y)(x + 3y) = ?$
5. $(3\sqrt{2} - 4)(7\sqrt{2} - 5\sqrt{3}) = ?$
6. Factor completely and find solutions for: $3x^2 - 4x - 15 = 0$.
7. For all $x \neq -2$, $\frac{x^2 - 7x - 18}{x + 2} = ?$
8. $6\sqrt{3} + 7\sqrt{3} - \sqrt{9} - \sqrt{2} =$
9. Find the set of all x which satisfy the equation: $5 - 2x \leq 7$.
10. Write an equation for the following: The difference between four times a number and half the number is 7 more than 3 times the number.

ELEMENTARY ALGEBRA

Part II:

1. If $\frac{4x - 3}{2} = 3x$, then $x = ?$ a) $3/2$ b) $-3/2$ c) -3 d) 3
2. If $x = -2$ and $y = 3$, what is the value of the expression $x^2 - 7xy + 3$? a) -43 b) 49 c) 41 d) -35
3. Which is the completely factored form of $-6x^2 + 36x$?
a) $-6x(x + 6)$ b) $6x(x + 6)$ c) $-6x(x - 6)$
d) $x(-6x + 36)$

4. Find the product: $(2x + 5y)(3x - 3y)$. a) $6x^2 + 9xy - 15y^2$
 b) $5x^2 + 2xy + 2y^2$ c) $6x^2 - 15y^2$ d) $6x^2 + 21xy + 15y^2$
5. $(3\sqrt{3} - \sqrt{2})(5\sqrt{2} - \sqrt{3}) = ?$
 a) 85 b) $16\sqrt{6} - 47$ c) $16\sqrt{6} - 19$ d) $14\sqrt{6} - 19$
6. Which pair of answers include one factor and one solution of $x^2 + 8x + 12 = 0$? a) $(x+6)$, $x = 2$ b) $(x+12)$, $x = -8$
 c) $(x+3)$, $x = -4$ d) $(x+2)$, $x = -6$
7. If $x \neq 0$ or 2, $\frac{x^2 - 4}{x^2 - 2x} = ?$ a) $\frac{2}{x}$ b) 2 c) $\frac{x+2}{x}$ d) 3
8. $3\sqrt{4} - 2\sqrt{5} + 3\sqrt{5} - 4 = ?$
 a) $2 + \sqrt{5}$ b) $3\sqrt{4} + \sqrt{5} - 4$ c) -23 d) 5
9. Find the set of all y which satisfy: $3y - 7 > -11y$.
 a) $y > 2$ b) $y < 2$ c) $y > \frac{1}{2}$ d) $y < -\frac{1}{2}$
10. Which equation represents the statement: Four times a number less six is equal to five more than twice the number.
 a) $4(x-6) = 5 + 2x$ b) $4x - 6 = 5 + 2x$ c) $6 - 4x = 2(5+x)$

Note: There is only one answer, but there may be several ways to obtain the answer. Only one method is suggested.

Solutions to Elementary Algebra Part I:

1. First distribute the 4 across the parenthesis. $4x - 12 = 2x + 5$
 Then collect x 's on one side, constants on the other side. $2x = 17$
 Finally, isolate x by dividing both sides by 2. $x = \frac{17}{2}$.
2. Replace letters with the numbers assigned them. $4(5)^2 - 3(-2) + 5$
 $= 4 \cdot 25 + 6 + 5 = 100 + 6 + 5 = 111$ remembering the product of two negative numbers is positive " $+(-3)(-2) = +6$."
3. Factor by grouping. From the first two terms factor out the common factor " x ". From the second two terms factor out the common factor " 3 ". $x(a + b) + 3(a + b)$
 Then factor out the resulting common factor " $a + b$ "
 $(a + b)(x + 3)$.
4. FOIL. Multiply the first two terms in each parenthesis, then the outer two, then the inner two and finally the last two terms

4. FOIL. Multiply the first two terms in each parenthesis, then the outer two, then the inner two and finally the last two terms.
 $(3x)(x) + (3x)(3y) + (2y)(x) + (2y)(3y) = 3x^2 + 9xy + 2xy + 6y^2$
 Finish by collecting like terms: $3x^2 + 11xy + 6y^2$.
5. FOIL to get:
 $(3\sqrt{2})(7\sqrt{2}) + (3\sqrt{2})(-5\sqrt{3}) + (-4)(7\sqrt{2}) + (-4)(-5\sqrt{3})$
 Multiply the numbers in front of the radical together and the numbers inside the radical together for each product:
 $21\sqrt{4} - 15\sqrt{6} - 28\sqrt{2} + 20\sqrt{3} = 21(2) - 15\sqrt{6} - 28\sqrt{2} + 20\sqrt{3} =$
 $42 - 15\sqrt{6} - 28\sqrt{2} + 20\sqrt{3}$. There are NO like terms so this is as simple as it gets.
6. This is a quadratic so the goal is to find two binomials which when multiplied together will produce the expression given.
 $(3x + 5)(x - 3) = 0$. Set each factor equal to zero and solve for x.
 $3x + 5 = 0$ so $x = \frac{-5}{3}$ and $x - 3 = 0$ so $x = 3$.
7. Factor the numerator: $\frac{(x-9)(x+2)}{(x+2)}$ and cancel the common factor of $(x+2)$ that appears in both the numerator and denominator. Answer: $(x-9)$.
8. Add coefficients of like radicals: $(6+7)\sqrt{3} - \sqrt{9} - \sqrt{2}$
 Note that 9 is a perfect square: $13\sqrt{3} - 3 - \sqrt{2}$.
9. Get all the constants to one side: $-2x \leq 2$
 Divide by -2 remembering to switch the direction of the inequality sign if multiplying or dividing by a negative number: $x \geq \frac{2}{-2}$ so the solution set is $x \geq -1$.
10. "Difference" means subtract. "Times" means multiply. "Is" means equals. "More than" translates to plus. Therefore:
 $4x - \frac{1}{2}x = 7 + 3x$.

Solutions to Elementary Algebra Part II:

- 1) b 2) b 3) c 4) a 5) c 6) d 7) c 8) a
 9) c 10) b