Algebra Basics Problems

1. Compute the value of $5 + 3 \cdot (4^2 - 2) \div 7 \cdot 2$.

2. In a math class, the ratio of boys to girls is $3 : 2$. If there are 25 students in total, how many girls are in the class?

3. Solve the equation

$$5(3x - 7) + 1 = 4x - 1.$$

4. Find the values of x and y that satisfy the following system of equations:

$$\begin{cases} 3x + y = 6 \\ -2x + 3y = -15 \end{cases}$$

5. Explain why there are no solutions to the following system of equations:

$$\begin{cases} 8x + 4y = 9 \\ 2x + y = 13 \end{cases}$$

6. Find all possible values of x that satisfy $x^4 - 13x^2 + 36 = 0$. (Hint: Factor the trinomial the same way you would factor $x^2 - 13x + 36$.)

7. Solve the equation

$$4(2^{x+2}) = \frac{3(2^{3x-5})}{6}.$$

8. Solve for x:

$$\frac{3x - 5}{2x + 7} = \frac{5}{3}.$$

9. Expand $(3x + 5)(2x + 7)$.

10. A rectangle with side lengths x and $x - 1$ has the same area as a right triangle with legs 5 and 8. Find x.

11. Solve for x:

    (a) $\dfrac{x+1}{y} = 5$

    (b) $xy = x + 1$

    (c) $\dfrac{2}{3x-y} = \dfrac{4}{5x}$

12. Find all values of x that satisfy the equation $(x+1)^2(x-6) + 10x + 10 = 0$ (Hint: Expand the expression and then factor.)

13. Ana spent \$12.60 on bananas and apples. The number of bananas she bought is twice the number of apples she bought. If apples and bananas cost 20 cents each, how many bananas did she buy?

For questions 14-15, determine whether the statement is true or false. If true, explain why. If false, give a counter-example or explain why not.

14. $2^x \cdot 4^2 = 2^{x+4}$

15. If that $A : B = 4 : 5$ and that $B : C = 1 : 2$, then $A : C = 2 : 1$.