

NAME: _____ Score _____ /100
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SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

3 pts. each for Questions 1 – 20.

1. T **F** An expression of the form a^n is called an algebraic expression.
2. T **F** $\frac{2}{3} + \frac{3}{4} = \frac{5}{7}$
3. T **F** $(a + b)^2 = a^2 + b^2$
4. **T** F $(ab)^2 = a^2b^2$
5. **T** F If \sqrt{x} and \sqrt{y} are real numbers, then $\sqrt{xy} = \sqrt{x}\sqrt{y}$
6. **T** F $\sqrt{x} = x^{\frac{1}{2}}$ if \sqrt{x} is a real number.
7. T **F** If \sqrt{x} and \sqrt{y} are real numbers, then $\sqrt{x+y} = \sqrt{x} + \sqrt{y}$
8. T **F** If both sides of an equation involving rational expressions are multiplied by the LCD, the resulting equation is equivalent to the original equation.
9. T **F** $\frac{3x + \cancel{5}}{y + \cancel{5}} = \frac{3x}{y}$
10. **T** F Simplifying a complex fraction is a division problem.

Fill in each of the blanks to make the statements true.

11. A rational expression is an expression which can be written as a quotient of two **polynomials**.
12. If $\frac{a}{b}$ and $\frac{c}{d}$ are fractions, then their product is defined by $\left(\frac{a}{b}\right)\left(\frac{c}{d}\right) = \frac{ac}{bd}$
13. If $\frac{a}{b}$ and $\frac{c}{d}$ are fractions, then their quotient is defined by $\left(\frac{a}{b}\right) \div \left(\frac{c}{d}\right) = \left(\frac{a}{b}\right)\left(\frac{d}{c}\right) = \frac{ad}{bc}$
14. If $\frac{a}{b}$ and $\frac{c}{b}$ are fractions, then their sum is defined by $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$
15. Use three signs of a fraction to write the opposite of $\frac{8}{5}$ in four ways.
$$-\frac{8}{5} = \frac{-8}{5} = \frac{8}{-5} = -\frac{-8}{-5}$$
16. When both sides of an equation are multiplied by an expression containing a variable the solution set of the resulting equation **contains** the solution set of the original equation.
17. To subtract one fraction or rational expression from another, change the problem to an **addition** problem and proceed according to the rules for addition.
18. When both sides of an equation are squared the solution set of the resulting equation **contains** the solution set of the original equation.
19. This symbol $\sqrt{\quad}$ is called a **radical**.
20. When both sides of an equation are multiplied by a **non zero real number**, the solution set of the resulting equation is equal to the solution set of the original equation.

Problems 21 – 28 are each worth 5 points.

21. Multiply (do not simplify) $\left(\frac{3x-1}{2x}\right)\left(\frac{x+1}{x-2}\right) = \frac{(3x-1)(x+1)}{2x(x-2)} = \frac{3x^2 + 2x - 1}{2x^2 - 4x}$

22. Add (do not simplify) $\frac{3x-1}{2x} + \frac{x+1}{x-2} = \frac{(3x-1)(x-2)}{2x(x-2)} + \frac{2x(x+1)}{2x(x-2)} = \frac{(3x^2 - 7x + 4) + (2x^2 + 2x)}{2x(x-2)} = \frac{5x^2 - 5x + 4}{2x(x-2)}$

23. Simplify $\frac{\frac{5x}{x+2}}{\frac{10}{x+2}} = \left(\frac{\cancel{5x}}{\cancel{x+2}}\right)\left(\frac{\cancel{x+2}}{\cancel{10}}\right) = \frac{x}{2}$

24. Simplify completely $\sqrt{\frac{8}{49}} = \frac{\sqrt{(4)(2)}}{\sqrt{49}} = \frac{\sqrt{4}\sqrt{2}}{7} = \frac{2\sqrt{2}}{7}$

25. Simplify completely $\sqrt{25x^4y^3} = \sqrt{25}\sqrt{x^4}\sqrt{y^3} = 5x^2\sqrt{y^2}\sqrt{y} = 5x^2y\sqrt{y}$

26. Write $(3x^5)^{\frac{1}{2}}$ in radical form. $(3x^5)^{\frac{1}{2}} = \sqrt{3x^5}$

27. Solve the equation $\frac{2x}{2x-1} + \frac{1}{x} = \frac{1}{2x-1}$

$$\frac{2x}{2x-1} + \frac{1}{x} = \frac{1}{2x-1}$$

$$2x^2 + 2x - 1 = x$$

$$2x^2 + x - 1 = 0$$

$$(2x-1)(x+1) = 0$$

By the Zero Factor Property

$$2x-1 = 0 \text{ OR } x+1 = 0$$

$$x = \frac{1}{2} \text{ OR } x = -1$$

$\frac{1}{2}$ causes a denominator to be 0, so $\frac{1}{2}$ is not a solution.

However, -1 does not make a denominator 0, so it is a solution.

The solution set is $\{-1\}$.

28. Solve the equation $\sqrt{4-x} = x-2$

$$\sqrt{4-x} = x-2$$

$$4-x = x^2 - 4x + 4$$

$$x^2 - 3x = 0$$

$$x(x-3) = 0$$

By the Zero Factor Property

$$x = 0 \text{ OR } x = 3$$

TEST 0: $\sqrt{4-0} = 0-2$ is FALSE so 0 is not a solution.

TEST 3: $\sqrt{4-3} = 3-2$ is TRUE so 3 is a solution.

The solution set is $\{3\}$