

NAME: _____ Score _____ /100
Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

2 points each for questions 1 – 32. 5 points each for questions 33 – 39.

Circle T or F, whichever is correct.

1. T **F** $2 - 5 = 10$.
2. **T** F $Z \subset Q$.
3. T **F** $\{x | x \in R \text{ and } 1 \leq x \leq 5\} = (1, 5)$
4. **T** F $\sqrt{5}$ is a real number.
5. T **F** $3 - (4 - 5) = 3 + (-4 - 5)$.
6. T **F** The opposite of $\frac{11}{7}$ is $\frac{7}{11}$.
7. **T** F If x represents a negative number, then the absolute value of x is the opposite of x .
8. T **F** $\sqrt{5}$ is a rational number.
9. T **F** If x is a real number, then $-x$ is negative.
10. T **F** On the real number line the relation “less than” means “is to the right of”.

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

11. A **set** is a collection of objects.
12. The formula for the area of a triangle is **$A = \frac{1}{2}bh$** .
13. A linear equation in one variable is an equation which can be written in the form **$ax + b = 0$** .
14. $\frac{4}{0}$ is **undefined**.
15. $\frac{0}{4}$ is **0**.
16. The product of two real numbers with different signs is **negative**.
17. The transitive property of equality states that if $a = b$ and $b = c$, then **$a = c$** .
18. A real number which is not rational is **irrational**.

19. Two equations with the same solution set are **equivalent** equations.

20. The **graph** of an equation consists of all the points, and only those points, whose coordinates are solutions of the equation.

21. The solution set for the equation $x^2 + 5x + 6 = 0$ is $\{-3, -2\}$. Sketch the graph of $x^2 + 5x + 6 = 0$.



22. If 2 is a solution of a particular equation and $\sqrt{2}$ is not a solution of that equation, then the equation is a **conditional** equation.

23. Absolute value is defined by $|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

24. Complete the statement of the Law of Trichotomy.

If a and b are real numbers, then one and only one of the following is true:

i) **$a < b$**

ii) **$a = b$**

iii) **$a > b$**

25. If a and b are real numbers and $ab = 0$, then **$a = 0$** or **$b = 0$** .

26. The property of the real numbers which justifies $3(x + 2y) = 3x + 6y$ is the **Distributive** property.

27. Simplify $6x^2 + 2 - 4(x^2 + 1)$. Your work should be shown as a “chain” of equalities. I will start it and end it for you. You should fill in the missing steps.

$$6x^2 + 2 - 4(x^2 + 1) = 6x^2 + 2 - 4x^2 - 4 = 2x^2 - 2 = 2(x^2 - 1).$$

28. $-7^2 = -49$

29. $(5)^0 = 1$

30. $-8 - (-10) = -8 + 10 = 2$

31. $\{x \in W \mid x > 8\}$ is an example of **set builder** notation for a set.

32. $[3, 5)$ is an example of **interval** notation.

Show your work on exercises 33 – 39 inclusive (5 pts each). No work –No Credit Be neat!

33. $25 - [(3 - 5) + (14 - 18)]^2 = 25 - [(-2) + (-4)]^2 = 25 - [-6]^2 = 25 - 36 = -11$

34. Show that 2 is a solution of the equation $2x^4 - 4x^3 + 5x^2 - 11x + 2 = 0$ **Replace x with 2 to obtain**
 $2(2^4) - 4(2^3) + 5(2^2) - 11(2) + 2 = 2^5 - 2^5 + 20 - 22 + 2 = 0$ ---a TRUE statement

35. Simplify $-4 + 6 - 3 - (-14) = -1 - (-14) = -1 + 14 = 13$

36. A second number is six less than a first number. A third number is twice the first number. The sum of the three numbers is 306. What are the three numbers? Neatly show the steps. Use words. No guessing. Your solution MUST demonstrate a valid algebraic method.

Let x be the first number. Then $x - 6$ is the second number and $2x$ is the third number.

The sum of the numbers is $x + (x - 6) + 2x$.

The sum of the numbers is 306

We have two expressions representing the same quantity.

Therefore they are equal.

This yields the equation $x + (x - 6) + 2x = 306$.

Which may be solved as any other linear equation in one variable.

$$x + (x - 6) + 2x = 306$$

$$4x - 6 = 306$$

$$4x = 312$$

$$x = 78 \text{ from which it follows that } x - 6 = 72, \text{ and } 2x = 156.$$

Conclusion: The three desired numbers are 72, 78, and 156.

37. Solve the equation $\sqrt{3}x + \pi = 5$. Show each step. NO DECIMALS!!!!

$$\sqrt{3}x + \pi = 5$$

$$\sqrt{3}x = 5 - \pi$$

$$x = \frac{5 - \pi}{\sqrt{3}}$$

38. Complete the following diagram to convert the subtraction problem to an equivalent addition problem.

$$\begin{array}{ccc} -3 & - & (-5) \\ \downarrow & \downarrow & \downarrow \\ -3 & + & 5 \end{array}$$

39. Complete the following diagram to convert the division problem to an equivalent multiplication problem.

$$\begin{array}{ccc} -\frac{4}{3} & \div & \left(-\frac{7}{5}\right) \\ \downarrow & \downarrow & \downarrow \\ -\frac{4}{3} & \cdot & \left(-\frac{5}{7}\right) \end{array}$$