

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

Circle T or F, whichever is correct. 1 pts. each for 1 – 25. 5 pts. each for 26 – 37. 38 is 13 pts. 39 is 2 pts.

1. T F The opposite of $-\frac{3}{4}$ is $-\frac{4}{3}$.
2. T F $\mathbf{N} \subset \mathbf{R}$.
3. T F $\{x | x \in \mathbf{R} \text{ and } 1 < x < 5\} = \{2, 3, 4\}$
4. T F The graph of $3x + 2 = 0$ is a line.
5. T F $\{3, b, x, 5\}$ is an example of the roster method for specifying a set.
6. T F If both sides of an equation are multiplied by $x - 2$, the resulting equation is equivalent to the original equation.
7. T F Every real number is a rational number.
8. T F Division by 0 is undefined.
9. T F If x is a real number, then $-x$ is negative.
10. T F If Q is the set of rational numbers and F is the set of irrational numbers, then $Q \cup F = \mathbf{R}$.

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

11. A _____ is a collection of objects.
12. The _____ is the set with no elements.
13. The set A is a subset of the set B if every element of set _____ is an element of set _____.
14. The process to solve a linear equation in one variable is to generate a sequence of equations each _____ to the previous equation until a _____ equation is obtained.
15. A number (or numbers) that makes an equation true when substituted for the variable (or variables) is called a _____ of the equation.
16. A linear equation in one variable is an equation that can be written in the form _____ where a and b are real numbers with a not zero.
17. The formula for the volume of a cone is _____.
18. A real number which is not rational is _____.

19. A prime number is a natural number greater than _____ which has only _____ and _____ as factors.
20. A quadratic equation in one variable x is an equation which may be written in the form _____ where a , b , and c are real numbers and a is not zero
21. The Pythagorean Theorem states that if a and b are the lengths of the legs of a right triangle with hypotenuse of length c , then _____.
22. If a and b are real numbers and $ab = 0$, then _____ or _____.
23. Use the roster method to describe $\{x \mid x \in \mathbb{Z} \text{ and } |x| < 3\}$ _____.
24. What is the solution set for $|3x - 7| = -5$? _____ (HINT: Think)
25. Insert the correct symbol ($<$, $=$, or $>$) in the blank.
If x and y are real numbers and $x < y$, then $-3x$ _____ $-3y$
26. 42 is 14% of what number?
27. List all of the possible subsets of $\{1, 2, 3\}$ ---There are eight subsets including the set $\{1, 2, 3\}$ itself and the empty set. So you need to list six other subsets. Use the roster method of specifying the sets.
a. _____ b. _____ c. _____ d. _____ e. _____ f. _____
28. Find the exact area of the circle with center $(-4, 5)$ and radius 3
29. Show that 1 is a solution of the equation $x^5 + 3x^4 - 2x^3 + 6x^2 - 12x + 4 = 0$.
30. A can manufacturer has a contract to make cylindrical cans with a radius of 4 inches and a volume of 48π cubic inches. What should be the height of the cans?
31. A particular equation in one variable x has $\{-2, 1, 4\}$ as its solution set. Sketch its graph.

32. Find the solution set for $2x^2 + x - 1 = 0$. Hint: Factoring works.

33. Solve the equation $K = \frac{6}{7}\left(R - \frac{7}{9}\right)$ for R.

34. Solve the equation $(x - 1)(x + 3)(x - 4) = 0$.

35. Use the Quadratic formula to solve the equation $x^2 + x - 1 = 0$.

36. A rectangular garden is 25 ft. wide. If its area is 1125 sq. ft., what is its length?

37. Solve the equation $3x - \frac{5}{7} = \frac{2}{3}x + \sqrt{3}$ (I want an exact solution—not a decimal approximation.)

38. On this question I will lead you through a proper way of writing a solution to a question. You are to supply the details by filling in each blank. **No computations are required or even desired.**

Problem: What quantity of a 60% acid solution must be mixed with a 30% acid solution to produce 300 mL of a 50% acid solution ?

(*) and () should not be the same.**

Analysis:

Let x be the amount (measured in milliliters) of _____ to be added.

The volume of the final mixture will be _____ mL.

The amount of acid in the final solution is _____. (*)

The amount of acid contributed by the 60% solution is _____.

The amount of the 30% solution will be _____ mL.

The amount of _____ contributed by the 30% solution is $(0.3)(300 - x)$.

The amount of acid in the final solution is _____. (**)

We now have the amount of _____ in the _____ solution written in two ways.

Therefore the mathematical model for this concentration problem is the linear equation in one variable
(Insert the Model/equation here) _____

Solution: (I have solved the equation so you don't need to)

Ordinary methods now may be used to solve this equation to obtain $x = 200$.

Conclusion: (Must be based on the correct solution as stated above.)

200 milliliters of _____ must be added to 100 milliliters of _____
_____ to obtain 300 milliliters of _____.

39. A grocer mixes peanuts that cost \$2.49 per pound and walnuts that cost \$3.89 per pound to make 100 pounds of a mixture that costs \$3.19 per pound. How much of each kind of nut is put into the mixture?

Solution:

Let x be the amount of peanuts to be put into the mixture.

Then $100 - x$ is the amount of walnuts put into the mixture.

The cost of the peanuts in the mixture is $2.49x$

The cost of the walnuts in the mixture is $3.89(100 - x)$

The total cost contributed by the peanuts and walnuts is $2.49x + 3.89(100 - x)$.

However, the total cost of the final mixture is required to be $(3.19)(100)$ or 319.

This completes the analysis of the problem and we are now in a position to model the mixture problem with an equation

Write that equation. Do not solve the equation.