

NAME: \_\_\_\_\_ Score \_\_\_\_\_ /100

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SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

Circle T or F, whichever is correct. Questions 1 – 25 are each worth 2 points.

1. T F The x-intercepts of a graph are found by setting x equal to zero and solving for y.
2. T F The y-intercepts of a graph are found by setting x equal to zero and solving for y.
3. T F  $ax^2 + bx + c = 0$  is the quadratic formula.
4. T F The opposite of the complex number  $5 - 7i$  is  $5 + 7i$ .
5. T F The equation of the circle with center at the origin and radius r is  $x^2 + y^2 = r^2$
6. T F If the slope of a line is 4 and the slope of another line is  $-4$ , the lines are perpendicular.
7. T F The distance between  $(-4, 5)$  and  $(3, -1)$  is  $\sqrt{(3+4)^2 + (-1-5)^2}$
8. T F  $y - y_1 = m(x - x_1)$  is the equation of a line.
9. T F The graph of  $y - 3x^2 = 5x + 1$  is a parabola which opens down.
10. T F Two equations are equal if they have the same solution sets.
11. T F The sum of  $(3 + 2i)$  and  $(4 - 7i)$  is  $12 - 14i^2$
12. T F The conjugate of  $3i$  is  $-3i$
13. T F  $(x + y)^2 = x^2 + y^2$
14. T F If both sides of an equation are squared the resulting equation is equivalent to the original
15. T F If a, b, and x are real numbers such that  $a < x < b$ , then it must be true that  $a < b$ .
16. Note that solution is not the correct response. The graph of an equation consists of all the points, and only those points, which are solutions of the equation.
17. A linear equation in one variable is an equation which may be written as  $ax + b = 0$
18. A linear equation in two variables is an equation which may be written as  $y = ax + b$
19. A quadratic equation in one variable is an equation which may be written as  $ax^2 + bx + c = 0$
20. A quadratic equation in two variables is an equation which may be written as  $y = ax^2 + bx + c$
21. A simplest equation is an equation which has a single variable on one side of the equal sign and a single number on the other side of the equal sign.
22. If k is a positive real number then the principle square root of its opposite  $-k$  is defined by  $\sqrt{-k} = \sqrt{ki}$

23. Assume that  $a$ ,  $b$  and  $c$  are real numbers such that the solution to  $|ax - b| < c$  is  $(3, 7)$ . Then the solution to  $|ax - b| > c$  is  $(-\infty, 3) \cup (7, +\infty)$
24. Assume that  $a$ ,  $b$  and  $c$  are real numbers such that the solution to  $|ax - b| < c$  is  $(3, 7)$ . Then the solution to  $|ax - b| = c$  is **3 and 7**. Note the solution set for  $|ax - b| = c$  is  $\{3, 7\}$
25. The slope intercept form of the equation of a line is  $y = mx + b$

**Questions 26 – 42 are each worth three points.**

26. You are not expected to solve the equation. Show that  $-1$  is not a solution of  $x^4 - 5x^3 = 17$  **Show your work.**  
 $17 = (-1)^4 - 5(-1)^3 = 1 - 5(-1) = 6$  is FALSE.  
 Therefore  $-1$  is not a solution of  $x^4 - 5x^3 = 17$
27. Write the equation whose graph is the circle with center  $(t, p)$  and radius  $g$ .  
 $(x - t)^2 + (y - p)^2 = g^2$
28. Write the formula for the volume of a cylinder.  
 $V = \pi r^2 h$
29. Write the quadratic formula.  

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
30. Write the norm of  $7 - 3i$ . The norm of  $7 - 3i$  is  $7^2 + 3^2 = 49 + 9 = 58$
31. Write the complex number  $4 + \sqrt{-5}$  in standard form  $a + bi$ .  $4 + \sqrt{-5} = 4 + \sqrt{5}i$
32. Write the conjugate of  $-12 - 5i$ . The conjugate of  $-12 - 5i$  is  $-12 + 5i$
33. Write the multiplicative inverse of  $9 - 2i$ . The multiplicative inverse of  $9 - 2i$  is  $\frac{9 + 2i}{9^2 + 2^2} = \frac{9 + 2i}{85}$
34. What is the midpoint of the line segment joining  $(-1, 3)$  and  $(5, 5)$ ? **Show your work.**  
 $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$  to obtain  $\left(\frac{-1 + 5}{2}, \frac{3 + 5}{2}\right) = (2, 4)$
35. Write the equation of the line through  $(2, 3)$  with slope  $7$  in slope-intercept form. **Show your work.**  
 Use  $y - y_1 = m(x - x_1)$  to obtain  $y - 3 = 7(x - 2)$  so that  $y = 7x - 11$ .
36. Solve the inequality  $|4x - 3| < 11$ . Write the solution set in interval notation. **Show your work.**  
 $-11 < 4x - 3 < 11$   
 $-8 < 4x < 14$   
 $-2 < x < \frac{7}{2}$  The solution set in interval notation is  $(-2, \frac{7}{2})$

37. Solve  $6x + ax = 2x + 5$  for  $x$ . **Show your work.**

$$\begin{aligned}4x + ax &= 5 \\(4 + a)x &= 5 \\x &= \frac{5}{4 + a}\end{aligned}$$

38. Solve the equation  $x = \sqrt{-5x - 6}$  **Show your work.**

$$\begin{aligned}x^2 &= -5x - 6 && \text{Test -2: } -2 = \sqrt{-5(-2) - 6} = \sqrt{4} = 2 \text{ is FALSE} \\x^2 + 5x + 6 &= 0 && \text{Test -3: } -3 = \sqrt{-5(-3) - 6} = \sqrt{9} = 3 \text{ is FALSE} \\(x + 2)(x + 3) &= 0 && \text{The solution set for } x = \sqrt{-5x - 6} \text{ is the null set } \emptyset \\x &= -2 \text{ OR } x = -3\end{aligned}$$

39. A rectangular room is twice as long as it is wide, and its perimeter is 84 feet. What are its dimensions? **Show your work.**

Let  $x$  be the width. Then  $2x$  is the length and  $2x + 2x + x + x$  is the perimeter. The perimeter is also 84. This yields the equation  $6x = 84$ , from which it follows that  $x = 14$  and  $2x = 28$ . Therefore the room is 14 feet wide and 28 feet long.

40. If you don't have a calculator, write your answer as a fraction reduced to lowest terms. 52 is 14% of what number.

**Show your work.**  $52 = (.14)x$  so that  $x = \frac{52}{0.14}$

41. To solve the equation  $\sqrt{3x-4} = \sqrt{x^2+3}$  we square both sides to obtain  $3x-4 = x^2+3$ . What is the relation between the solution set for  $\sqrt{3x-4} = \sqrt{x^2+3}$  and the solution set for  $3x-4 = x^2+3$ ?

The solution set for  $3x-4 = x^2+3$  contains the solution set for  $\sqrt{3x-4} = \sqrt{x^2+3}$

42. What are the  $x$ -intercepts of the graph of the equation  $y = (x-4)(3x+5)$ ? **Show your work.**

To find the  $x$ -intercepts set  $y = 0$  and solve for  $x$ .

$$\begin{aligned}0 &= (x-4)(3x+5) \\x-4 &= 0 \text{ OR } 3x+5 = 0 \\x &= 4 \text{ OR } x = -\frac{5}{3}\end{aligned}$$

It is correct to say the  $x$ -intercepts for  $y = (x-4)(3x+5)$  are 4 and  $-\frac{5}{3}$

It is incorrect to say the  $x$ -intercepts for  $y = (x-4)(3x+5)$  are  $\left\{4, -\frac{5}{3}\right\}$