

Test 3
Dusty Wilson
Math 097

Name: _____

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11 min.

*In questions of science, the authority of a thousand is not
worth the humble reasoning of a single individual.*

Galileo Galilei (1564 - 1642)
Italian astronomer

No work = no credit

Warm-ups (1 pt each):

$$0^0 = \text{und}$$

$$-3^2 = -9$$

$$\frac{3}{0} = \text{und}$$

1.) (4 pts) Solve $x^2 - 14 = -5x$ using any method

$$x^2 + 5x - 14 = 0$$

$$(x+7)(x-2) = 0$$

$$x = -7 \text{ OR } x = 2$$

Solution: $x = -7 \text{ OR } x = 2$

2.) (4 pts) Solve $5(w+6)^2 - 100 = 0$ using any method

$$5(w+6)^2 = 100$$

$$(w+6)^2 = 20$$

$$w+6 = \pm \sqrt{20}$$

$$w = -6 \pm 2\sqrt{5}$$

Solution: $w = -6 \pm 2\sqrt{5}$

3.) (4 pts) Solve $m^2 - 10 + 4m = 6m$ using any method

$$m^2 - 2m - 10 = 0$$

$$m = \frac{2 \pm \sqrt{4 - 4(-1)(-10)}}{2}$$

$$= \frac{2 \pm \sqrt{44}}{2}$$

$$= \frac{2 \pm 2\sqrt{11}}{2}$$

Solution: $m = 1 \pm \sqrt{11}$

4.) (4 pts) Solve $x^2 + 2x = -5$ using any method

$$x^2 + 2x + 5 = 0$$

$$x = \frac{-2 \pm \sqrt{4 - 4(1)(5)}}{2(1)}$$

$$\Rightarrow x = \frac{-2 \pm \sqrt{-16}}{2}$$

$$\text{Solution: } x = \frac{-2 \pm 4i}{2}$$

5.) (2 pts) Solve: $\frac{3x}{4} - \frac{1}{3} = 1 - \frac{2}{3}\left(x - \frac{1}{6}\right)$

$$\frac{3x}{4} - \frac{1}{3} = 1 - \frac{2}{3}x + \frac{2}{18}$$

$$\Rightarrow 27x - 12 = 36 - 24x + 4$$

$$\Rightarrow 51x = 52$$

$$\text{Solution: } x = \frac{52}{51}$$

6.) (2 pts) State the quadratic formula used for solving $ax^2 + bx + c = 0, a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

7.) (2 pts) Solve: $-4 + 5|2x - 4| < 36$.

$$\Rightarrow 5|2x - 4| < 40$$

$$\Rightarrow |2x - 4| < 8$$

$$\Rightarrow -8 < 2x - 4 < 8$$

$$\Rightarrow -4 < 2x < 12$$

$$\Rightarrow -2 < x < 6$$

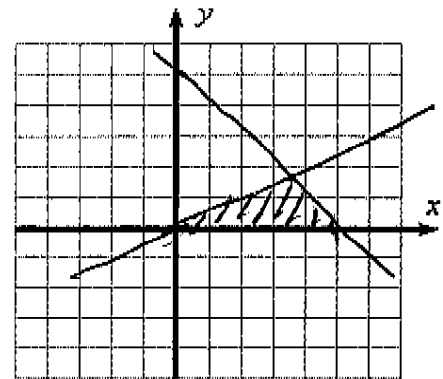
$$\text{Solution: } -2 < x < 6$$

8.) (4 pts) Simplify $8 + 3\sqrt{2}$

$$\text{Solution: } 8 + 3\sqrt{2}$$

9.) (2 pts) Carefully graph the system of inequalities and clearly shade the solution set.

$$\begin{cases} x \geq 2y \\ x + y \leq 5 \\ x \geq 0 \\ y \geq 0 \end{cases}$$



10.) (4 pts) Solve $5x^2 + 70x - 30 = 0$ by completing the square

$$x^2 + 14x = 6$$

$$x^2 + 14x + 49 = 6 + 49$$

$$(x + 7)^2 = 55$$

$$x + 7 = \pm \sqrt{55}$$

$$\Rightarrow x = -7 \pm \sqrt{55}$$

Solution: $x = -7 \pm \sqrt{55}$

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11.) (4 pts) Solve $10 - 5x^2 = 6x$ using the quadratic formula

(don't simplify)

$$0 = 5x^2 + 6x - 10$$

$$x = \frac{-6 \pm \sqrt{36 - 4(5)(-10)}}{2(5)}$$

$$\Rightarrow x = \frac{-6 \pm \sqrt{236}}{10}$$

$$x = \frac{-6 \pm 2\sqrt{59}}{10}$$

Solution: $x = \frac{-3 \pm \sqrt{59}}{5}$

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12.) (4 pts) Simplify $\sqrt{-9} \cdot \sqrt{-16}$

$$3i \cdot 4i$$

$$-12$$

Solution: _____

13.) (4 pts) Find $(6+12i)-(15-3i)$ Express your answer in the standard form $a+bi$

Solution: $-9 + 15i$

14.) (2 pts) Simplify $\frac{9}{2+\sqrt{6}} \cdot \frac{2-\sqrt{6}}{2-\sqrt{6}}$

$$\frac{18 - 9\sqrt{6}}{4 - 6}$$

$$\frac{18 - 9\sqrt{6}}{-2}$$

Solution: $-\frac{18 - 9\sqrt{6}}{2}$

15.) (4 pts) Find $(7-4i)(10+5i)$ Express your answer in the standard form $a+bi$

$$70 + 35i - 40i - 20i^2$$

+20

Solution: $90 - 5i$

16.) (4 pts) Simplify i^{82}

Solution: -1

17.) (4 pts) Find $\frac{6-4i}{5+3i}$ Express your answer in the standard form $a+bi$

$$\frac{6-4i}{5+3i} \cdot \frac{5-3i}{5-3i} = \frac{30 - 18i - 20i + 12i^2}{25 - 9i^2}$$

$$= \frac{18 - 38i}{34}$$

Solution: $\frac{18}{34} - \frac{38i}{34} = \frac{9}{17} - \frac{19i}{17}$