

Name _____

Honors Algebra 2 – Unit 1

WS-1: Imaginary Numbers

Simplify the following.

1. i^{24}

2. i^{230}

3. i^{357}

4. i^{179}

5. i^{312}

6. i^{94}

7. i^{45}

8. i^{91}

9. $\sqrt{-121}$

10. $\sqrt{-125}$

11. $\sqrt{-169}$

12. $3\sqrt{-27}$

13. $\sqrt{-125}$

14. $\sqrt{5} \cdot \sqrt{-15}$

15. $\sqrt{-24} \cdot \sqrt{27}$

16. $4\sqrt{-9} \cdot \sqrt{12}$

17. $-2\sqrt{-18} \cdot 3\sqrt{-3}$

Over...

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

19. $\sqrt{\frac{-16}{9}}$

20. $\sqrt{\frac{-36}{2}}$

21. $\sqrt{\frac{-56}{49}}$

22. $\sqrt{\frac{-27}{8}}$

WS-1: Imaginary Numbers

$$1. i^{24} = (i^2)^{12} = (-1)^{12} = \boxed{1}$$

6 r 0

$$4 \overline{)24}$$

$$2. i^{230} = (i^2)^{115} = (-1)^{115} = \boxed{-1}$$

57 r 2

$$4 \overline{)230}$$

$$3. i^{357} = i \cdot i^{356} = i \cdot (i^2)^{178} = i \cdot (-1)^{178} = \boxed{i}$$

89 r 1

$$4 \overline{)357}$$

$$4. i^{179} = i \cdot i^{178} = i \cdot (i^2)^{89} = i \cdot (-1)^{89} = \boxed{-i}$$

44 r 3

$$4 \overline{)179}$$

$$5. i^{312} = (i^2)^{156} = (-1)^{156} = \boxed{1}$$

78 r 0

$$4 \overline{)312}$$

$$6. i^{44} = (i^2)^{22} = (-1)^{22} = \boxed{-1}$$

23 r 2

$$4 \overline{)44}$$

$$7. i^{45} = i \cdot i^{44} = i \cdot (i^2)^{22} = i \cdot (-1)^{22} = \boxed{i}$$

11 r 1

$$4 \overline{)45}$$

$$8. i^{91} = i \cdot i^{90} = i \cdot (i^2)^{45} = i \cdot (-1)^{45} = \boxed{-i}$$

22 r 3 $\xrightarrow{\hspace{10em}}$

4 | 91

$$9. \sqrt{-121} = \boxed{11i}$$

$$10. \sqrt{-125} = \boxed{5i\sqrt{5}}$$

$$11. \sqrt{-169} = \boxed{13i}$$

$$12. 3\sqrt{-27} = \boxed{9i\sqrt{3}}$$

$$13. \sqrt{-125} = \boxed{5i\sqrt{5}}$$

$$14. \sqrt{5} \cdot \sqrt{-15} = i\sqrt{5 \cdot 5 \cdot 3} = \boxed{5i\sqrt{3}}$$

$$15. \sqrt{-24} \cdot \sqrt{27} = i\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3} = \boxed{18i\sqrt{2}}$$

$$16. 4\sqrt{-9} \cdot \sqrt{12} = 12i \cdot 2\sqrt{3} = \boxed{24i\sqrt{3}}$$

$$17. -2\sqrt{-18} \cdot 3\sqrt{-3} = -6i\sqrt{2} \cdot 3i\sqrt{3} = -18i^2\sqrt{6} = \boxed{18\sqrt{6}}$$

$$18. \sqrt{\frac{-9}{4}} = \frac{i\sqrt{6}}{2}$$

$$21. \sqrt{\frac{-56}{49}} = \frac{2i\sqrt{14}}{7}$$

$$19. \sqrt{\frac{-16}{9}} = \frac{4i}{3}$$

$$22. \sqrt{\frac{-27}{8}} = \frac{3i\sqrt{3}}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$20. \sqrt{\frac{-36}{2}} = \sqrt{-18} = \boxed{3i\sqrt{2}}$$

$$\frac{3i\sqrt{6}}{4}$$