Imaginary & Complex #'s Review

* All answers can be found on my website.*

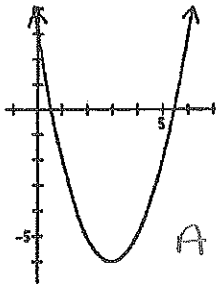
Part I: Matching

Looking at the graph of the following equations determine whether the solutions are

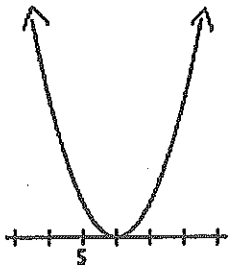
A) real and two of them

B) real and one solution

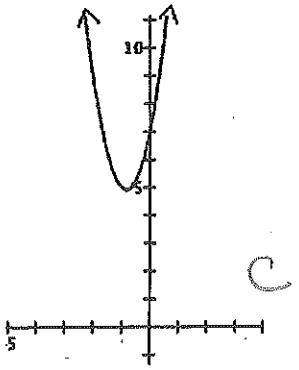
C) two imaginary



A



B



C

Part 2: Simplify. Write all answers in Standard form

1. $i^0 =$ **1**

2. $i^{203} = (i^2)^{101} \cdot i$ **$-1i$**

3. $i^{24} = (i^2)^{12}$ $(-1)^{12}$ **1**

4. $i^{86} = (i^2)^{43}$ $(-1)^{43}$ **-1**

5. $i^{53} = (i^2)^{26} \cdot i$ **$1i$**

6. $\sqrt{-121} =$ **$-11i$**

7. $\sqrt{-200} =$ $\sqrt{-1 \cdot 100 \cdot 2}$ **$10i\sqrt{2}$**

8. $6\sqrt{-36} =$ $6 \cdot 6i$ **$36i$**

9. $\sqrt{-60} =$ $\sqrt{-1 \cdot 4 \cdot 15}$ **$2i\sqrt{15}$**

10. $-5\sqrt{-384} =$ $-5\sqrt{-1 \cdot 64 \cdot 6}$ $-5 \cdot 8i\sqrt{6}$ **$-40i\sqrt{6}$**

11. $(2+6i)+(10-4i)$

$2+6i+10-4i$

$\boxed{12+2i}$

12. $-2i-(6-i)$

$-2i-6+i$

$\boxed{-6-i}$

13. $(1+2i)-(-3-2i)$

$1+2i+3+2i$

$\boxed{4+4i}$

14. $3\sqrt{-4}+\sqrt{-121}$

$3\cdot 2i+11i$

$6i+11i$

$\boxed{17i}$

15. $\sqrt{-45}+3\sqrt{64}-2\sqrt{-20}$

$\sqrt{-1\cdot 9\cdot 5}+3\cdot 8-2\sqrt{-1\cdot 4\cdot 5}$

$3i\sqrt{5}+24-2\cdot 2i\sqrt{5}$

$3i\sqrt{5}+24-4i\sqrt{5}$

$\boxed{24-i\sqrt{5}}$

16. $\sqrt{-36}+2\sqrt{-63}+4\sqrt{-28}+\sqrt{169}$

$6i+2\sqrt{-1\cdot 9\cdot 7}+4\sqrt{-1\cdot 4\cdot 7}+13$

$6i+2\cdot 3i\sqrt{7}+4\cdot 2i\sqrt{7}+13$

$6i+6i\sqrt{7}+8i\sqrt{7}+13$ → $\boxed{13+6i+14i\sqrt{7}}$

17. $(\sqrt{5}-i)(\sqrt{5}+i)$

$\sqrt{25}+i\sqrt{5}-i\sqrt{5}-i^2$

$5-1(-1)$

$5+1$ $\boxed{6}$

18. $(9-4i)^2$

$(9-4i)(9-4i)$

$81-36i-36i+16i^2$

$81-72i-16$

$\boxed{65-72i}$

19. $(3+5i)(-4+i)$

$-12+3i-20i+5i^2$

$-12-17i-5$

$\boxed{-17-17i}$

20. $(7-\sqrt{-36})(-4+\sqrt{-25})$

$(7-6i)(-4+5i)$

$-28+35i+24i-30i^2$

$-28+59i+30$

$\boxed{2+59i}$

21. $(-4-2\sqrt{-12})(5+3\sqrt{-27})$

$2i\sqrt{3}$ $\quad$ $3i\sqrt{3}$

$(-4-4i\sqrt{3})(5+9i\sqrt{3})$

$-20-36i\sqrt{3}-20i\sqrt{3}-36i^2\sqrt{9}$

$-20-36i\sqrt{3}-20i\sqrt{3}-36(-1)(3)$

$-20-36i\sqrt{3}-20i\sqrt{3}+108$

$\boxed{88-56i\sqrt{3}}$

22. $\frac{10}{3i}\cdot\frac{3i}{3i}$

$\frac{30i}{9i^2}=\frac{30i}{-9}=\boxed{\frac{10i}{-3}}$

23. $\frac{(7-4i)}{6i}\cdot\frac{6i}{6i}$

$\frac{42i-24i^2}{36i^2}\Rightarrow\frac{42i+24}{-36}$

$\frac{42i}{36}+\frac{24}{-36}$

$\boxed{\frac{7i}{6}-\frac{2}{3}}$

24. $\frac{(2+3i)(3-2i)}{(3+2i)(3-2i)}$

$\frac{6-4i+9i-6i^2}{9-6i+6i-4i^2}$

$\frac{6+5i+6}{9+4}\Rightarrow\boxed{\frac{12+5i}{13}}$

25. $\frac{1}{(5-2i)}\cdot\frac{(5+2i)}{(5+2i)}$

$\frac{5+2i}{25+10i-10i-4i^2}=\boxed{\frac{5+2i}{29}}$

26. $\frac{3+6i}{-5i^{28}+2i^{87}}$

27. $6i^{39}+7i^{55}$

$6(i^2)^{19}\cdot i+7(i^2)^{27}\cdot i$

$6(-1)^{19}\cdot i+7(-1)^{27}\cdot i$

$-6i-7i$

$\boxed{-13i}$

28. $(-8-i)(2+6i)+(3+4i)$

$-16-48i-2i-6i^2+3+4i$

$-16-50i+6+3+4i$

$\boxed{-7-46i}$

29. $(-8+2i)(1-4i)+2i^{21}$

$-8+32i+2i-8i^2+2i^{21}$

$-8+34i+8+2(i^2)^{10}\cdot i$

$-8+34i+8+2(-1)^{10}\cdot i$

$-8+34i+8+2i$ $\boxed{36i}$

30. $(3-2i)(5+4i)-(3-4i)^2$

$15+12i-10i-8i^2-(3-4i)(3-4i)$

$15+2i-8(-1)-(9-12i-12i+16i^2)$

$15+2i+8-(9-24i-16)$

$15+2i+8-9+24i+16$

$\boxed{30+26i}$

31. $-i+(7-5i)-3(2-3i)$

$-i+7-5i-6+9i$

$\boxed{1+3i}$

32. $\sqrt{-72}+\sqrt{-32}+3\sqrt{-8}$

$\sqrt{-1\cdot36\cdot2}$ $\sqrt{-1\cdot16\cdot2}$ $3\sqrt{-1\cdot4\cdot2}$

$6i\sqrt{2}+4i\sqrt{2}+3\cdot2i\sqrt{2}$

$6i\sqrt{2}+4i\sqrt{2}+6i\sqrt{2}$

$\boxed{16i\sqrt{2}}$

33. $(3i)(7i^4)(-4i^9)$

$\boxed{-84i^{14}}$

Part 3: Solve. Write the answer in standard form

34. $6x^2 + 1 = -5$

$-1 \quad -1$

$\frac{6x^2}{6} = \frac{-6}{6}$

$x^2 = -1$

$\sqrt{x^2} = \sqrt{-1}$

$\boxed{x = \pm i}$

35. $\frac{3(x+4)^2}{3} = \frac{-75}{3}$

$(x+4)^2 = -25$

$\sqrt{(x+4)^2} = \sqrt{-25}$

$x + 4 = \pm 5i$

$-4 \quad -4$

$\boxed{x = -4 \pm 5i}$

36. $2(3x+1)^2 - 5 = -77$

$+5 \quad +5$

$\frac{2(3x+1)^2}{2} = \frac{-72}{2}$

$(3x+1)^2 = -36$

$\sqrt{(3x+1)^2} = \sqrt{-36}$

$3x + 1 = \pm 6$

$-1 \quad -1$

$\frac{3x}{3} = \frac{-1 \pm 6i}{3}$

$\boxed{x = -\frac{1}{3} \pm 2i}$

37. $x^2 + 4x = -20$

$+20 \quad +20$

$x^2 + 4x + 20 = 0$

$a = 1$, $b = 4$, $c = 20$

38. $8x^2 = -4x - 5$

$+4x + 5 \quad +4x + 5$

$8x^2 + 4x + 5 = 0$

$a = 8$, $b = 4$, $c = 5$

37 + 38 use Quadratic Formula

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

$\frac{-4 \pm \sqrt{(4)^2 - 4(1)(20)}}{2(1)}$

$\frac{-4 \pm \sqrt{16 - 80}}{2}$

$\frac{-4 \pm \sqrt{-64}}{2}$

$\frac{-4 \pm 8i}{2}$

Answer $\boxed{-2 \pm 4i}$

$\frac{-4 \pm \sqrt{(4)^2 - 4(8)(5)}}{2(8)}$

$\frac{-4 \pm \sqrt{16 - 160}}{16}$

$\frac{-4 \pm \sqrt{-144}}{16}$

$\frac{-4 \pm 12i}{16}$

Answer $\boxed{-\frac{1}{4} \pm \frac{3i}{4}}$

39. $(6 + 2yi) + 4i = 6(x+4) + 8i$

$6 + 2yi + 4i = 6x + 24 + 8i$

real equation

$6 = 6x + 24$

$-24 \quad -24$

$\frac{-18}{6} = \frac{6x}{6}$

$\boxed{x = -3}$

imaginary equation

$2yi + 4i = 8i$

$-4i \quad -4i$

$\frac{2yi}{2i} = \frac{4i}{2i}$

$y = 2$

$\boxed{y = 2}$

40. $(2+i)^2 + 8yi = (2x - 3i)^2$

SORRY CAN'T DO !!

$x =$ $y =$