Adv. Alg. w/ Trig, Glawe

Name: Key

Complex Numbers and Properties of Exponents Review

Date: _____ Pd: _____

Simplify the complex number expression. Write your answer in standard form of a complex number.

1) $(3-5i)-(8-6i)$

$3-5i-8+6i=$

$\boxed{-5+i}$

2) $(4+2i)(7-5i)=$

$28+14i-20i-10i^2=$

$28-6i-10(-1)=$

$28-6i+10=$

$\boxed{38-6i}$

3) $\frac{2}{1+4i}\cdot\frac{1-4i}{1-4i}=$

$\frac{2(1-4i)}{(1+4i)(1-4i)}=\frac{2-8i}{1-4i+4i-16i^2}=$

$\frac{2-8i}{1-16(-1)}=\frac{2-8i}{1+16}=\frac{2-8i}{17}=$

$\boxed{\frac{2}{17}-\frac{8}{17}i}$

Solve by taking the square root. Simplify the radicals, if possible.

4) $3x^2-20=-56$

$+20\quad+20$

$\frac{3x^2}{3}=\frac{-36}{3}$

$\sqrt{x^2}=\sqrt{-12}$

$x=\pm\sqrt{-12}$

$\boxed{x=\pm 2i\sqrt{3}}$

$\sqrt{-12}$

$\sqrt{-1}\ \sqrt{12}$

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

$i\ 2\sqrt{3}$

5) $-4(x-3)^2+6=38$

$-6\quad-6$

$\frac{-4(x-3)^2}{-4}=\frac{32}{-4}$

$\sqrt{(x-3)^2}=\sqrt{-8}$

$x-3=\pm\sqrt{-8}$

$x-3=\pm 2i\sqrt{2}$

$+3\quad+3$

$\boxed{x=3\pm 2i\sqrt{2}}$

$\sqrt{-8}$

$\sqrt{-1}\ \sqrt{8}$

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

$i\ 2\ \sqrt{2}$

Solve by completing the square.

6) $x^2+8x+68=0$

$-68\quad-68$

$x^2+8x=-68$

$x^2+8x+\underline{16}=-68+\underline{16}$

$\sqrt{(x+4)^2}=\sqrt{-52}$

$x+4=\pm\sqrt{-52}$

$x+4=\pm 2i\sqrt{13}$

$-4\quad-4$

$\boxed{x=-4\pm 2i\sqrt{13}}$

$\left(\frac{8}{2}\right)^2=4^2=16$

$\sqrt{-52}$

$\sqrt{-1}\ \sqrt{52}$

$i\ \sqrt{4}\ \sqrt{13}$

$i\ 2\sqrt{13}$

7) $3x^2-12x+18=0$

$-18\quad-18$

$3x^2-12x=-18$

$3(x^2-4x)=-18$

$3(x^2-4x+\underline{4})=-18+3(\underline{4})$

$\frac{3(x-2)^2}{3}=\frac{-6}{3}$

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

$x-2=\pm\sqrt{-2}$

$x-2=\pm i\sqrt{2}$

$\left(\frac{-4}{2}\right)^2=(-2)^2=4$

$\sqrt{-2}$

$\sqrt{-1}\ \sqrt{2}$

$i\ \sqrt{2}$

$\boxed{x=2\pm i\sqrt{2}}$

Solve using the quadratic formula.

8) $x^2-2x+2=0$

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

$\frac{2\pm\sqrt{4-8}}{2}=$

$\frac{2\pm\sqrt{-4}}{2}=\frac{2\pm 2i}{2}=$

$\frac{2}{2}\pm\frac{2}{2}i=1\pm i$

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

$\sqrt{-4}$

$\sqrt{-1}\ \sqrt{4}$

$i\ 2$

$\boxed{x=1\pm i}$

9) $4x^2+2x+1=0$

$x=\frac{-2\pm\sqrt{2^2-4(4)(1)}}{2(4)}=\frac{-2\pm\sqrt{4-16}}{8}=$

$\frac{-2\pm\sqrt{-12}}{8}=\frac{-2\pm 2i\sqrt{3}}{8}=$

$\frac{-2}{8}\pm\frac{2\sqrt{3}}{8}i=-\frac{1}{4}\pm\frac{\sqrt{3}}{4}i$

$\boxed{x=-\frac{1}{4}\pm\frac{\sqrt{3}}{4}i}$

$y^{-6-4} = y^{-10} = \frac{1}{y^{10}}$

Simplify the expression.

10) $(x^{-2}y^3x)^{-5}$

$x^{10}y^{-15}x^{-5} =$

$\frac{x^{10}}{y^{15}x^5} = \boxed{\frac{x^5}{y^{15}}}$

11) $\frac{2x^5y^{-2}}{6x^2} \cdot \frac{(2xy^{-3})^2}{y^4}$

$\frac{2x^5}{6x^2y^2} \cdot \frac{2^2x^2y^{-6}}{y^4} =$

$\frac{1(x^3)}{3y^2} \cdot \frac{4x^2}{y^{10}} =$

$\boxed{\frac{4x^5}{3y^{12}}}$

Simplify the expression. Write you solution in scientific notation.

12) $(2.4\times10^8)(7\times10^{-5})$ $10^{8+(-5)} = 10^3$

16.8×10^3

$\boxed{1.68 \times 10^4}$

13) $\frac{(3.6\times10^2)(2\times10^{-3})}{8.9\times10^{-3}}$ $10^{2+(-3)} = 10^{-1}$

$\frac{7.2 \times 10^{-1}}{8.9\times10^{-3}} =$ $10^{-1-(-3)} = 10^{-1+3} = 10^2$

$.8089888764 \times 10^2$

$\boxed{8.089888764 \times 10^1}$

Simplify the expression. Must show all steps for any credit. No decimal solutions.

14) $64^{2/3}$

$(64^{1/3})^2 = ((4^3)^{1/3})^2 =$

$(4^{3/3})^2 = (4^1)^2 = 4^2 = \boxed{16}$

15) $4^{-3/2}$

$(4^{1/2})^{-3} = (\sqrt{4})^{-3} = 2^{-3} =$

$\frac{1}{2^3} = \boxed{\frac{1}{8}}$

16) $(\sqrt[3]{x})^9 \cdot \sqrt{x^4}$

$(x^{1/3})^9 \cdot (x^{1/2})^4 =$

$x^{9/3} \cdot x^{4/2} =$

$x^3 \cdot x^2 = \boxed{x^5}$

17) $8^{-1/3} \cdot 36^{1/2}$

$(2^3)^{-1/3} \cdot \sqrt{36} =$

$2^{-3/3} \cdot 6 = 2^{-1} \cdot 6 =$

$\frac{6}{2} = \boxed{3}$

*In calculator to take cube root on TI-83/84, hit MATH and option 4 is $3\sqrt{(}$ (insert number) ← close parenthese. For rational exponent form if you wanted to take the one-third power of 8, you type 8^(1/3). MAKE SURE YOU SHOW ALL WORK