Name_____

Warm-up 2

Date_____ Period____

Evaluate each expression.

1) $\left(-\frac{4}{5}\right)+\frac{1}{5}$ $= \frac{-3}{5}$

$\left(\frac{3}{3}\right)\left(-\frac{1}{4}\right)-\frac{2}{3}\left(\frac{4}{4}\right) = \frac{-3}{12}-\frac{8}{12} = \frac{-11}{12}$

$\left(\frac{3}{3}\right)\frac{(-2)}{1}-\frac{2}{3} = -\frac{6}{3}-\frac{2}{3}$

$= -\frac{8}{3}$

$\left(\frac{4}{4}\right)\left(-\frac{5}{3}\right)+\left(-\frac{1}{4}\right)\left(\frac{3}{3}\right) = \frac{-20}{12}-\frac{3}{12}$

$= \frac{-23}{12}$

Solve each equation.

5) $-4p+4=-20$

$-4p=-24$

$p=6$

6) $\cancel{2}\cdot\frac{v}{\cancel{2}}+5=1\cdot 2$

$v+10=2$

$v=-8$

$\frac{v}{2}+5=1$

$\cancel{2}\cdot\frac{v}{\cancel{2}}=-4\cdot 2$

$v=-8$

7) $-2(-4+p)=16$

$8-2p=16$

$-2p=8$

$p=-4$

8) $3+\frac{x}{4}=4$

$\cancel{4}\cdot\frac{x}{\cancel{4}}=1\cdot 4$

$x=4$

$\sqrt{12}$

$=\sqrt{2\cdot 3\cdot 2}$

$=2\sqrt{3}$

$\sqrt{72}$

$=\sqrt{8\cdot 9}$

$=\sqrt{2\cdot 2\cdot 2\cdot 3\cdot 3}$

$=6\sqrt{2}$

$=\sqrt{6\cdot 12}$

$=\sqrt{6\cdot 6\cdot 2}$

$=6\sqrt{2}$

Imaginary Numbers

To deal with the $\sqrt{-1}$, mathematicians came up with an abbreviation.

By definition

$$\boxed{\begin{aligned}\sqrt{-1} &= i \\ -1 &= i^2\end{aligned}}$$

- The i is referred to as the imaginary part of a complex number.

  complex number: **a + b*i***

- Imaginary do not mean "pretend" or "make-believe", imaginary refers to a reflected *image*.

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1. Express in terms of i

a) $\sqrt{-5}$

$= \sqrt{-1} \cdot \sqrt{5}$

$= i\sqrt{5}$

b) $\sqrt{-4}$

$2i$

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

$= i \cdot 2$

$= 2i$

c) $-\sqrt{-49}$

$= -i \cdot 7$

$= -7i$

d) $\sqrt{-12}$

$= i\sqrt{3 \cdot 2 \cdot 2}$

$= 2i\sqrt{3}$

Complex Numbers are numbers with an imaginary part: a + b*i*

2. Fully simplify the following:

a) $5+\sqrt{100}$

$5 + 10$

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b) $5+\sqrt{-100}$

$\boxed{5+10i}$

$\sqrt{-100}$

$= i\sqrt{100}$

$= 10i$

c) $\sqrt{-50}$

$= i\sqrt{5 \cdot 5 \cdot 2}$

$= 5i\sqrt{2}$

d) $-3+\sqrt{-24}$

$-3 + i\sqrt{6 \cdot 2 \cdot 2}$

$-3 + 2i\sqrt{6}$

$i^2 = -1$

3. Fully simplify each of these:

(Always *start first* by rewriting a negative under a square root symbol as $\boldsymbol{i}$)

a) $7\sqrt{-12}$

$= 7i\sqrt{2\cdot 2\cdot 3}$

$= 14i\sqrt{3}$

b) $-\sqrt{-3}\cdot\sqrt{-7}$

$= -i\sqrt{3}\cdot i\sqrt{7}$

$= -i\cdot i\sqrt{3}\cdot\sqrt{7}$

$= -i^2\sqrt{21}$

$= -(-1)\sqrt{21}$

$= \sqrt{21}$

c) $\sqrt{-5}\cdot 2i$

$= i\sqrt{5}\cdot 2i$

$= 2i^2\sqrt{5}$

$= 2(-1)\sqrt{5}$

$= -2\sqrt{5}$

4. You can add, subtract, multiply, and divide complex numbers. Try simplifying these:

a) $(3-4i)+(2+6i)$

$3-4i+2+6i$

$5+2i$

b) $5i-(-7+2i)$

$5i+7-2i$

$7+3i$

c) $2i\cdot 5i$

$= 10i^2$

$= 10(-1)$

$= -10$

d) $(-8i)^2$

$= -8i\cdot -8i$

$= 64i^2$

$= -64$

e) $(2-5i)(3+6i)$

$6+12i-15i-30i^2$

$6-3i+30$

$36-3i$

f) $(3+2i)(3-2i)$

$9-6i+6i-4i^2$

$9+4$

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Homework

Worksheet on Complex numbers