#16 – 18: Simplify (some of these may already be simplified)

$$\text{(18)} \quad \frac{4+\sqrt{28}}{2}$$

$$\frac{4+\sqrt{4}\cdot\sqrt{7}}{2}$$

$$\frac{4+2\sqrt{7}}{2}$$

$$\frac{4}{2} + \frac{2\sqrt{7}}{2}$$

$$2 + 1\cdot\sqrt{7}$$

P
E
M
D
A
S

Warm-Up: Finish these problems on page 18

Simplify the expression:

$$\text{(4)} \quad \frac{5+8\sqrt{20}}{10} \qquad \text{(6)} \quad \frac{14+7\sqrt{100}}{2}$$

$$\frac{5+8\cdot\sqrt{4}\cdot\sqrt{5}}{10} \qquad \frac{14+7\cdot10}{2}$$

$$\frac{5+8\cdot2\cdot\sqrt{5}}{10} \qquad \frac{14+70}{2}$$

$$\frac{5+16\sqrt{5}}{10} \qquad \frac{84}{2} = \boxed{42}$$

$$\frac{5}{10} + \frac{16\sqrt{5}}{10}$$

$$\frac{1}{2} + \frac{8\sqrt{5}}{5}$$

In order to solve some of the equations you will come upon throughout the rest of your math career, the number system needs to be expanded from the **REAL number system** to the **COMPLEX number system** which includes **imaginary numbers.**

An imaginary number, when squared, gives a positive result.

$$i = \sqrt{-1}$$

It helps us answer the question: $x^2 = -1$

$$x^2 = -1$$
$$\sqrt{x^2} = \sqrt{-1}$$
$$|x| = \sqrt{-1}$$
$$x = \sqrt{-1} \quad \text{or} \quad x = -\sqrt{-1}$$
$$\boxed{x = i} \quad \text{or} \quad \boxed{x = -i}$$

Substitute the solutions in the original equation:

check the solution $x = i$

$$x^2 = -1$$
$$(i)^2 = -1$$
$$i^2 = -1$$

$$\boxed{i^2 = -1}$$

check the solution $x = -i$

$$x^2 = -1$$
$$(-i)^2 = -1$$
$$(-i)(-i) = -1$$
$$(-1)(i)(-1)(i) = -1$$
$$(1)(i)(i) = -1$$
$$i^2 = -1$$

$i \rightarrow$ imaginary

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

$$\sqrt{-1 \cdot b} = \sqrt{-1} \cdot \sqrt{b}$$
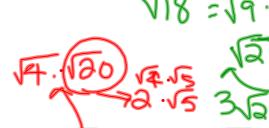
$$= i \sqrt{b}$$

Remember that $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$. We can use this property with i to simplify square roots of negative numbers.

9) Simplify $\sqrt{-49}$?

$$\sqrt{-1} \cdot \sqrt{49}$$
$$i \cdot 7$$
$$7 \cdot i$$

$$\sqrt{18} = \sqrt{9} \cdot \sqrt{2}$$

$$\sqrt{4} \cdot \sqrt{20}$$
$$\sqrt{4} \cdot \sqrt{5}$$
$$2 \cdot \sqrt{5}$$

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

10) Simplify the following:

a) $\sqrt{-4}$ **b)** $\sqrt{-90}$ **c)** $5\sqrt{-80}$ **d)** $-3\sqrt{-225}$

$$\sqrt{-1} \cdot \sqrt{4}$$
$$= 2i$$

$$\sqrt{-1} \cdot \sqrt{90}$$
$$\sqrt{-1} \cdot \sqrt{9} \cdot \sqrt{10}$$
$$= i \cdot 3 \cdot \sqrt{10}$$
$$= 3i\sqrt{10}$$

$$5 \cdot \sqrt{-1} \cdot \sqrt{80}$$
$$5\sqrt{-1} \cdot \sqrt{16} \cdot \sqrt{5}$$
$$5 \cdot i \cdot 4\sqrt{5}$$
$$20i\sqrt{5}$$

$$-3\sqrt{-1} \cdot \sqrt{225}$$
$$-3\sqrt{-1} \cdot \sqrt{25} \cdot \sqrt{9}$$
$$-3i \cdot 5 \cdot 3$$
$$-45i$$

Simplify the expression.

#14

d) $\dfrac{8i}{2}$

e) $\dfrac{9 - \sqrt{-36}}{3}$

f) $\dfrac{14 + 21i}{7}$

$4i$

$\dfrac{9 - 6i}{3}$

$\dfrac{14}{7} + \dfrac{21i}{7}$

Note:

$\sqrt{-36} = \sqrt{-1} \cdot \sqrt{36}$

$\dfrac{9}{3} - \dfrac{6i}{3}$

$2 + 3i$

$= 6i$

$\boxed{3 - 2i}$

-Go over the first test

-Homework assignment on Syllabus

->Homework that will be checked tomorrow:

5.3B, 5.3AB Worksheet, 5.2D Worksheet 5.2G

-Check homework on the board/Check off homework with Ms. Vang or Mrs. Witchger. Make sure you use a different color pen/marker to show us that you have checked your work and write the number wrong up on the top of the assignment.