6.2 Operations on Complex Numbers

NOTES

Write your questions here!

ADD and SUBTRACT

$(4 - 3i) + (7 + 9i)$

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

$4i + (5 - 12i)$

MULTIPLY

$4(3 + 5i)$

$(3 - 2i)(3 + 7i)$

TRY IT!

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

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

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

DIVIDE

$$\frac{4-3i}{3}$$

$$(2x+1)^2 = -9$$

$$(3y-1)^2 + 1 = -26$$

CONJUGATES

$$\frac{4-3i}{2i}$$

$$\frac{4-3i}{3+2i}$$

TRY IT!

$$(5x+2)^2 = -17$$

$$(3y-4)^2 + 48 = 3$$

$$\frac{2+5i}{3i}$$

SUMMARY:

Now, summarize your notes here!

Perform the indicated operation. Express in standard form.

1. $(4-3i)+(12-9i)$	2. $(15+7i)-(4-3i)$	3. $5i+(6-8i)$
4. $4i(5-3i)$	5. $(3-4i)(5+6i)$	6. $(8-4i)(5-3i)$
7. $\frac{9-5i}{3}$	8. $\frac{5+7i}{2}$	9. $4(3-2i)+(2+3i)^2$
10. $\frac{2-4i}{3i}$	11. $\frac{3+5i}{6-2i}$	12. $\frac{2-7i}{4+5i}$

Solve. Express your radical solutions in the simplest form.

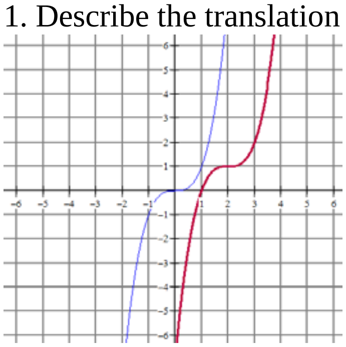
13. $(4m+3)^2+33=3$	14. $(3y)^2=-18$	15. $77=5-2(2h-4)^2$
16. $(2x-4)^2=-20$	17. $(5p-2)^2-48=0$	18. $12=100+(7d-14)^2$

Algebra Skillz

GRAPH

Below, the graph of $f(x)=(x-2)^3+1$ is sketched in bold. Its parent function $f(x)=x^3$ is represented by the thin curve.

1. Describe the translation of the parent graph.



2. How does the translation relate to the equation?

SIMPLIFY

3. $\sqrt{40}-4\sqrt{20}$

4. $\sqrt{2}(5+\sqrt{7})$

SOLVE

5. Solve:
$(x-5)(2x+5)=0$

6. Factor and solve.
$x^2-11x-60=0$

6.2 Operation on Complex Numbers

APPLICATION

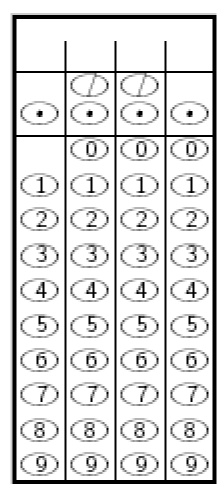
Perform the indicated operation. Express your answer in standard form.	
1. $(3 - 4i)(-2 + 3i)$	2. $\frac{3-5i}{2-i}$

3. If $(4 + 2i) - (a + 5i) = 9 - 3i$, find the value of a.

4. If $(3 + bi) + (7 - 2i) = 10 + 6i$, find the value of b.

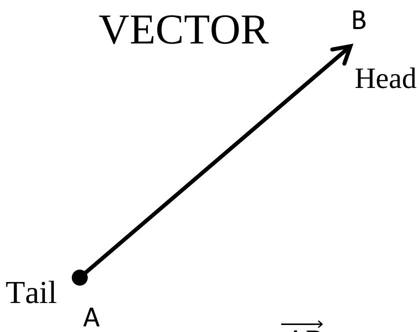
5. Sully has 3 real friends and 4 imaginary friends. He sets up a play date with Bean who has 1 real friend and 6 imaginary friends. If everyone shows to the play date, how many people both real and non-real will be there?

6. **SAT PREP** Complex numbers are NOT on the SAT. For this Unit we will look at "Mr. Kelly Problems". They are called Kelly Problems because they look weird and are confusing. Don't freak out about these, once you get the hang of them they are pretty easy.

MULITPLE CHOICE	**GRID IN**
If $\ddagger\, h \ddagger = 10 - h^2$, then find $\ddagger\, 2 \ddagger$. (A) 14 (B) 12 (C) 10 (D) 8 (E) 6	$x \boxtimes y = 3x + y$. If $4 \boxtimes -3 = k \boxtimes 8$, find the value of k. 

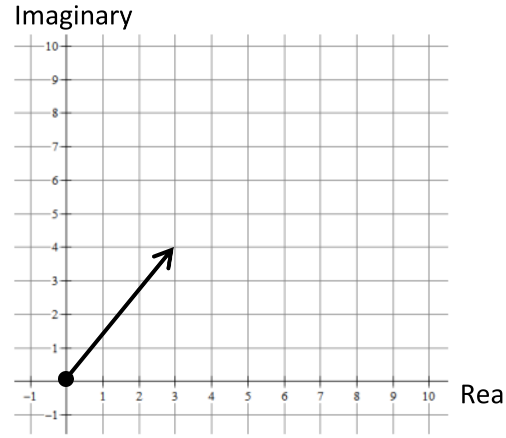
7. **GRAPHICALLY** You can add complex numbers graphically. It helps to use vectors. Vectors show magnitude and direction. Vectors start at the tail and end with the head (see picture below). The point $3 + 4i$ is shown on the graph below with a vector whose tail is the origin.

   a. Draw a vector with tail at the origin and head at the point $5 + 2i$.
   b. Now add the two vectors together by placing the tail of one vector on the head of the other vector.
   c. What point does the resultant vector end at? Draw this vector from origin to new point.



$v = \overrightarrow{AB}$

$(3 + 4i) + (5 + 2i) =$



ACDC is one of the best rock and roll bands of all time. ACDC stands for the two types of electrical currents. DC is direct current and AC is Alternating Current. Complex numbers are used when working with Alternating Currents because the quantities alternate in direction and amplitude which means we need multi-dimensional quantites to represent them. Electricians do not use *i* because it is used for current, so they use *j* instead. Electricians also change the standard form slightly so Mathematicians use $a + bi$ while Electricians use $a + jb$. So, $4 + 3i$ to a mathematican is the same as $4 + j3$ to an electrician. We will use the formula:

$$E = I \cdot Z$$

where *E* is voltage (volts), *I* is current (amps), and *Z* is impedance (ohms)

8. The current in a circuit is $9 + j3$ amps and the impedance is $5 - j$ ohms. What is the voltage?

9. The voltage in a circuit is $55 + j10$ volts and the impedance is $3 + j4$ ohms. What is the current?

10. The impedance in one part of a series circuit is $5 + j8$ ohms, and the imedance in another part of the circuit is $5 - j6$ ohms. Find the total imedance in the circuit.