Algebra 2 w/ Trig

1.6 Perform Operations with Complex Numbers

Warm-Up:

 

 

**------------------------------------------------------------NOTES------------------------------------------------------------------------------**

**What is a complex number?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**The i wheel!**

1. $i^{8}$ b. $i^{39}$ c. $i^{111}$

Example 1: Solve a Quadratic Equation

**Solve** 2*x*2 + 11 = –37.

YOU TRY: 1. *x*2 = –13 2. *x*2 = –38 3. *x*2 + 11= 3

*4. x*2 – 8 = –36 5. 3*x*2 – 7 = –31 6. 5*x*2 + 33 = 3

Example 2: Add and Subtract Complex Numbers

**Write the expression as a complex number in standard form.**

**a**. (8 – *i*) + (5 + 4*i*) **b**. (7 – 6*i*) – (3 – 6*i*) **c**.10 – (6 + 7*i*) + 4*i*

YOU TRY:

**Write the expression as a complex number in standard form.**

**7**.(9 – *i*) + (– 6 + 7*i*) **8**. (3 + 7*i*) – (8 – 2*i*) **9**. – 4 – (1 + *i*) – (5 + 9*i)*

Example 3: Using Addition of Complex Numbers in Real Life

**Circuit components such as resistors, inductors, and capacitors all oppose the flow of current. This opposition is called *resistance* for resistors and *reactance* for inductors and capacitors. A circuit’s total opposition to current flow is *impedance*. All of these quantities are measured in ohms ( ).**

Ω



**The table shows the relationship between a component’s resistance or reactance and its contribution to impedance. A *series circuit* is also shown with the resistance or reactance of each component labeled.**

**The impedance for a series circuit is the sum of the impedances for the individual components. Find the impedance of the circuit shown above.**

Example 4: Multiply Complex Numbers

**Write the expression as a complex number in standard form.**

**a**. 4*i*(–6 + *i*) **b**. (9 – 2*i*)(–4 + 7*i*)

Example 5: Divide Complex Numbers

**Write the quotient in standard form.**



YOU TRY:

**10. WHAT IF? In Example 3, what is the impedance of the circuit if the given capacitor is replaced with one having a reactance of 7 ohms?**



11. *i*(9 – *i*) 12. (3 + *i*) (5 – *i*)



Example 6: Plot Complex Numbers



Example 7: Find the Absolute Value of Complex Numbers

**a**. |– 4 + 3*i* | **b**. |– 3*i* |

YOU TRY:

Plot the complex numbers in the same complex plane and find the absolute value.

 

 

KEEP GOING:



**Evaluate each expression if** *X* = 5 – 8*i* **and** *Y* = –9 + 3*i***. Write your answer as a complex number in standard form.**

**2.** *X* – *Y* **4.** *X* + *Y*



***5.***$X∙Y$***6.*** *6Y*