

9-5

Practice

Simplifying Complex Numbers

Simplify.

1. i^{38}

-1

2. i^{-17}

$-i$

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

$7 + 7i$

4. $(-6 - 2i) - (-8 - 3i)$

$2 + i$

5. $(8 - i) - (4 - i)$

4

6. $(1 + i)(3 - 2i)$

$5 + i$

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

$13 - 13i$

8. $(4 + 5i)(4 - 5i)$

41

9. $(3 + 4i)^2$

$-7 + 24i$

10. $(4 + 3i) \div (1 - 2i)$

$-\frac{2}{5} + \frac{11}{5}i$

11. $(2 + i) \div (2 - i)$

$\frac{3}{5} + \frac{4}{5}i$

12. $\frac{8 - 7i}{1 - 2i}$

$\frac{22}{5} + \frac{9}{5}i$

13. **Physics** A fence post wrapped in two wires has two forces acting on it. One force exerts 5.3 newtons due north and 4.1 newtons due east. The second force exerts 6.2 newtons due north and 2.8 newtons due east. Find the resultant force on the fence post. Write your answer as a complex number. (*Hint:* A vector with a horizontal component of magnitude a and a vertical component of magnitude b can be represented by the complex number $a + bi$.)

$(4.1 + 5.3i) + (2.8 + 6.2i) = 6.9 + 11.5i \text{ N}$

9-5

NAME _____

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Cycle Quadr

Four nonnegative integers that sum to 23 to make a “cyclic quadruple” is 23, 8, 1, 1.

The next cyclic quadruple is 18, 1, 1, 1. The values of the four digits are 1, 8, 1, 1.

$|23 - 8| = 15 \quad |8 - 1| = 7$

By continuing in this pattern, the next four equal integers are 13, 1, 1, 1. The next four equal integers are 8, 1, 1, 1.

appear in three steps.

Solve each problem.

- Start with the quadruple 23, 8, 1, 1. How many steps do the equal integers disappear? **1 step**
- Some interesting quadruples of original numbers are 23, 8, 1, 1; 18, 1, 1, 1; 13, 1, 1, 1; 8, 1, 1, 1. Predict how many steps it will take for 4 equal integers to disappear. Complete the table below. **3 steps; a**
- Start with four integers that sum to 23. How many steps does it take for opposite one another to disappear? **1 step**
- Start with two equal integers that sum to 23. How many steps does it take for them to disappear? **2 steps**
- Start with two nonnegative integers that sum to 23. How many steps does it take for one to disappear? **4 steps**
- Start with three equal integers that sum to 23. How many steps does it take for them to disappear? **3 steps**
- Describe the remaining quadruples. **(1) all integers equal; (2) opposite one another; (3) two adjacent integers; (4) two adjacent integers and one opposite one another; (5) two adjacent integers and one opposite one another; (6) two adjacent integers and one opposite one another; (7) two adjacent integers and one opposite one another.**