Absolute Value of Complex Numbers

Algebra 2 Worksheet · Grade 10-12

Name: _____ Date: _____ Score: / 10

Learning Objectives

- Graph complex numbers in the complex plane
- Compute the absolute value (modulus) of a complex number using |a+bi| = sqrt(a^2 + b^2)
- Compare distances of complex numbers from the origin

For each complex number, find its absolute value (modulus) and simplify, leaving radicals in exact form unless a decimal is requested.

1. Find the absolute value of the complex number.

$|3 - 2i|$

Answer: _____

2. Find the absolute value of the complex number.

$|-2 + 5i|$

Answer: _____

3. Find the absolute value of the complex number.

$|-6i|$

Answer: _____

4. Find the absolute value of the complex number.

$|2 + 3i|$

Answer: _____

5. Find the absolute value of the complex number.

$|-4 + 2i|$

Answer: _____

6. Find the absolute value of the complex number.

$|7 - 24i|$

Answer: _____

7. Find the absolute value of the complex number.

$|-8 - 6i|$

Answer: _____

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8. Which complex number is closer to the origin? Justify with absolute values.

$|1 + 4i|$ vs. $|3 + 2i|$

Answer: _____

9. Find the absolute value of the complex number.

$|5 + 12i|$

Answer: _____

10. Find the absolute value of the complex number.

$$\left|\frac{1}{2} - \frac{\sqrt{3}}{2}i\right|$$

Answer: _____

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ANSWER KEY & SOLUTIONS

Emphasize that |a+bi| represents the distance from the origin to the point (a, b) in the complex plane; encourage students to sketch each number before computing.

Solutions

1. Find the absolute value of the complex number.

$|3 - 2i|$

→ *Identify a = 3 and b = -2.*
→ *Apply the formula: square root of a squared plus b squared.*
→ *Compute 9 + 4 = 13.*
→ *The absolute value is the square root of 13.*

Answer: $\sqrt{13}$

2. Find the absolute value of the complex number.

$|-2 + 5i|$

→ *Identify a = -2 and b = 5.*
→ *Square each: (-2)^2 = 4 and 5^2 = 25.*
→ *Add to get 29.*
→ *The modulus is the square root of 29, approximately 5.39.*

Answer: $\sqrt{29}$

3. Find the absolute value of the complex number.

$|-6i|$

→ *Rewrite as 0 + (-6)i, so a = 0 and b = -6.*
→ *Compute 0^2 + (-6)^2 = 36.*
→ *Take the square root of 36 to get 6.*

Answer: 6

4. Find the absolute value of the complex number.

$|2 + 3i|$

→ *Identify a = 2 and b = 3.*
→ *Square each: 4 and 9.*
→ *Add to get 13.*
→ *The absolute value is the square root of 13.*

Answer: $\sqrt{13}$

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5. Find the absolute value of the complex number.

$|-4+2i|$

→ *Identify a = -4 and b = 2.*
→ *Square each: 16 and 4.*
→ *Add to get 20.*
→ *Simplify the square root of 20 as 2 times the square root of 5.*

Answer: $2\sqrt{5}$

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6. Find the absolute value of the complex number.

$|7-24i|$

→ *Identify a = 7 and b = -24.*
→ *Square each: 49 and 576.*
→ *Add to get 625.*
→ *The square root of 625 is 25.*

Answer: 25

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7. Find the absolute value of the complex number.

$|-8-6i|$

→ *Identify a = -8 and b = -6.*
→ *Square each: 64 and 36.*
→ *Add to get 100.*
→ *The square root of 100 is 10.*

Answer: 10

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8. Which complex number is closer to the origin? Justify with absolute values.

$|1+4i|$ vs. $|3+2i|$

→ *Compute the first modulus: square root of 1 + 16 = square root of 17.*
→ *Compute the second modulus: square root of 9 + 4 = square root of 13.*
→ *Compare: square root of 13 is less than square root of 17.*
→ *Therefore 3 + 2i is closer to the origin.*

Answer: $|3+2i| = \sqrt{13} < \sqrt{17} = |1+4i|$

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9. Find the absolute value of the complex number.

$|5+12i|$

→ *Identify a = 5 and b = 12.*
→ *Square each: 25 and 144.*
→ *Add to get 169.*
→ *The square root of 169 is 13.*

Answer: 13

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10. Find the absolute value of the complex number.

$$\left|\frac{1}{2}-\frac{\sqrt{3}}{2}i\right|$$

→ *Identify a = 1/2 and b = -sqrt(3)/2.*
→ *Square each: 1/4 and 3/4.*
→ *Add to get 1.*
→ *The square root of 1 is 1.*

Answer: 1

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