

# What is a Complex Number?

## Worksheet

A complex number  $z = a + bi$  has a real part  $a$  and an imaginary part  $b$ , with  $i = \sqrt{-1}$ . Its modulus (distance from the origin) is  $|z| = \sqrt{a^2 + b^2}$ .

$$z = a + bi$$

## Questions

1. What is  $i$ ?

- A) 1
- B) -1
- C)  $i$
- D) 0

2. What is the modulus of  $z = 6 + 8i$ ?

- A) 10
- B) 14
- C) 48
- D) 100

3. What is the conjugate of  $4 + 5i$ ?

- A)  $4 + 5i$
- B)  $-4 - 5i$
- C)  $-4 + 5i$
- D)  $5 - 4i$

4. Where is a complex number  $a + bi$  plotted?

- A) On the real number line
- B) On the Argand diagram (real vs imaginary axes)
- C) Nowhere, it has no location
- D) On a 3D graph

5. Find the modulus of  $z = 3 + 4i$ .

6. Add  $(2 + 3i)$  and  $(5 + i)$ .

7. Multiply  $(1 + 2i)(3 + i)$ .

8. Define: What is a complex number?

9. Define: What is  $i$ ?

10. Define: What is the modulus of a complex number?

## Answer Key

1. B) -1 - By definition,  $i = 1$ .
2. A)  $10 - (6+8) = 100 = 10$ .
3. A)  $4 + 5i$  - Flip only the sign of the imaginary part:  $4 + 5i$ .
4. B) On the Argand diagram (real vs imaginary axes) - Complex numbers are plotted as points on the 2D Argand diagram.
5.  $a=3, b=4$   $|z| = (3 + 4) = (9+16) |z| = 25 = 5$
6. Add real parts:  $2 + 5 = 7$  Add imaginary parts:  $3 + (1) = 2$  Result:  $7 + 2i$
7. Expand:  $13 + 1(i) + 2i3 + 2i(i) = 3i + 6i 2i$  Since  $i = 1$ :  $3 + 5i + 2 = 5 + 5i$
8. A number of the form  $z = a + bi$ , where  $a$  is the real part,  $b$  is the imaginary part, and  $i = 1$ .
9. The imaginary unit, defined so that  $i = 1$  ( $i = 1$ ).
10.  $|z| = (a + b)$ , the distance from the origin on the Argand diagram.

### **Bounlu**

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Promy turns exam dates into automatic reminders.