Modulus

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. Find $|5-12i|$. [2 marks]

$|5-12i| = \sqrt{25+144} = \sqrt{169}$.

Answer: 13.

2. Find $|-3+2i|^2$. [2 marks]

Squared modulus is $9+4=13$.

Answer: 13.

3. Find the distance between $2-i$ and $-1+3i$. [3 marks]

The difference is $3-4i$.

Its modulus is $\sqrt{9+16}=5$.

Answer: 5.

4. Given $|z|=6$ and $|w|=2$, find $|zw|$ and $\left|\frac{z}{w}\right|$. [3 marks]

Use the product and quotient modulus identities.

Answer: 12 and 3.

5. Find all z such that $\text{Im}(z)=5$ and $|z|=13$. [3 marks]

Write $z=a+5i$.

$a^2+25=169$, so $a^2=144$ and $a=\pm 12$.

Answer: $z=12+5i$ or $z=-12+5i$.

6. Use $z=1$ and $w=-1$ to show that $|z+w|=|z|+|w|$ is not always true. [3 marks]

$z+w=0$, whereas each of 1 and -1 is one unit from the origin.

Oppositely directed vectors cancel.

Answer: Left side 0; right side 2.