P6 Complex Numbers

Obj: 1. Perform operations w/ complex #s.
2. Use complex conjugates and division.

Complex #: any # that can be written $a + bi$

a: real part; bi: imaginary part

$0 + 2i$ $\quad 3 + 0i$

Aug 30-8:55 AM

$i = \sqrt{-1} = i$

$i^2 = \sqrt{-1} \cdot \sqrt{-1} = -1$

$i^3 = i^2 \cdot i = -i$

$i^4 = i^2 \cdot i^2 = 1$

$i^5 = i^4 \cdot i = i$

$i^6 = -1$

$i^7 = -i$

$i^8 = 1$ . . .

"I won, I won"

* middle are negative

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Operations

Simplify: $(7-3i)+(4+5i)$

$7-3i+4+5i$

$11+2i$

$(7+3i)+(6-i)$

$13+2i$

$(2-i)-(8+3i)$

$2-i-8-3i$

$-6-4i$

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

$10-2i+15i-3i^2$ (-1)

$10+13i+3$

$13+13i$

$(2+3i)(2-i)$

$4-2i+6i-3i^2$

$4+4i+3$

$7+4i$

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Simplify:

$\sqrt{-16} = \sqrt{-1 \cdot 16}$

$= 4i$

$\sqrt{-9} = 3i$

$\sqrt{-3} = i\sqrt{3}$ or $\sqrt{3}i$

$\sqrt{-32} = \sqrt{16 \cdot 2 \cdot -1} = 4i\sqrt{2}$

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If $z = 1 - i$, Find z^2.

$(1-i)^2$

$(1-i)(1-i)$

$1 - i - i + i^2$

$1 - 2i - 1$

$-2i$

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Complex Conjugate:

$a+bi$ conjugate: $a-bi$

$3-2i \rightarrow 3+2i$

$-4+6i \rightarrow -4-6i$

$8i \rightarrow -8i$

Find the ~~product~~ mult. of the complex # and its conjugate: $2-3i$

$(2-3i)(2+3i)$

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Division

Write the complex # in Standard form: $a+bi$

$$\frac{2}{3-i}\left(\frac{3+i}{3+i}\right)$$

$$\frac{6+2i}{9+3i-3i-i^2}$$

$$+1$$

$$= \frac{6+2i}{10}$$

$$= \frac{6}{10} + \frac{2i}{10}$$

$$= \frac{3}{5} + \frac{1}{5}i$$

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Write in standard form: $\frac{1}{2+i}\left(\frac{2-i}{2-i}\right)$

$\frac{2-i}{4-2i+2i-i^2}$ $+1$

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

$= \frac{2}{5} - \frac{i}{5}$

Aug 30-10:08 AM