Topic: Imaginary and complex numbers

Question: Simplify the expression.

$$3ii - 2i + 8i^3$$

Answer choices:

A $-3 - 10i$

B $3 - 10i$

C $-3 + 10i$

D $3 + 10i$

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Solution: A

Remember that

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

and

$$i^2 = -1$$

We can rewrite the given expression.

$$3ii - 2i + 8i^3$$

$$8i^3 + 3i^2 - 2i$$

$$8i^2 i + 3i^2 - 2i$$

Replacing each i^2 with -1, we get

$$8(-1)i + 3(-1) - 2i$$

$$-8i - 3 - 2i$$

$$-3 - 10i$$

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Topic: Imaginary and complex numbers

Question: Simplify the expression.

$$-\sqrt{-16}+4i^3+3i-\sqrt{-9}\sqrt{9}+3\sqrt{-4}$$

Answer choices:

A $-8i$

B $-9i$

C $8i$

D $9i$

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Solution: A

Remember that

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

and

$$i^2 = -1$$

We can rewrite the given expression.

$$-\sqrt{-16} + 4i^3 + 3i - \sqrt{-9}\sqrt{9} + 3\sqrt{-4}$$

$$-\sqrt{16(-1)} + 4i^2 i + 3i - \sqrt{9(-1)}\sqrt{9} + 3\sqrt{4(-1)}$$

$$-\sqrt{16}\sqrt{-1} + 4i^2 i + 3i - \sqrt{9}\sqrt{-1}\sqrt{9} + 3\sqrt{4}\sqrt{-1}$$

$$-4i + 4i^2 i + 3i - 3i(3) + 3(2)i$$

$$-4i + 4i^2 i + 3i - 9i + 6i$$

$$-4i + 4i^2 i$$

Replacing i^2 with -1, we get

$$-4i + 4(-1)i$$

$$-4i - 4i$$

$$-8i$$

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Topic: Imaginary and complex numbers

Question: Simplify the expression.

$$3i^6 + 4i^5 - 3i^4 - 7i^3 + 5i^2 - \sqrt{-16}$$

Answer choices:

A $11 + 7i$

B $-5 + 7i$

C $-11 + 15i$

D $-11 + 7i$

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Solution: D

In the given expression

$$3i^6 + 4i^5 - 3i^4 - 7i^3 + 5i^2 - \sqrt{-16}$$

we'll start by rewriting the radical.

$$3i^6 + 4i^5 - 3i^4 - 7i^3 + 5i^2 - \sqrt{16}\sqrt{-1}$$

$$3i^6 + 4i^5 - 3i^4 - 7i^3 + 5i^2 - \sqrt{16(-1)}$$

Then we'll factor each expression of the form i^n with $n > 2$, using i and/or i^2 as factors.

$$3i^2i^2i^2 + 4i^2i^2i - 3i^2i^2 - 7i^2i + 5i^2 - 4i$$

Replace each i^2 with -1.

$$3(-1)(-1)(-1) + 4(-1)(-1)i - 3(-1)(-1) - 7(-1)i + 5(-1) - 4i$$

$$-3 + 4i - 3 + 7i - 5 - 4i$$

$$-3 - 3 - 5 + 4i + 7i - 4i$$

$$-11 + 7i$$

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