2022A7 IMAGINARY NUMBERS

ANSWERS

Level 1: Here are the answer in order with some explanations given:

a) $2 * 3i = 6i$
   a. We can separate the 3 from the i, so that the equation becomes $2 * 3 * i$. $2 * 3$ is 6, and $6 * i$ is $6i$.

b) $3 + 4i = 3 + 4i$
   a. This cannot be reduced any farther, so the given equation is the final answer!

c) $(6 + i) * 2 + 3i = (12 + 2i) + 3i = 12 + 5i$
   a. Imaginary numbers do not affect the order of operations, so we can multiply what's inside the parenthesis by two to start our solution.

d) $(6i)^2 = -36$
   a. We can distribute the square to the equation so that we get $6^2 * i^2$. Solving these, we get $36 * -1$, and then our answer: -36.

Imaginary numbers help a lot with calculations for AC power which is what our turbines deliver to industrial customers.

Level 2: Here are the answer in order with some explanations given:

a) $(4.5 + 6i) * 2i = -12 + 9i$
   a. Just like we mentioned in part c of the Level 1 questions, imaginary numbers do not affect the order of operations.

b) $3i * (99 + 4) = 309i$

c) $5.6i * 7.5i = -42$
   a. Decimals do not affect how we multiply imaginary numbers.

d) $12i - 8i = 4i$
   a. Subtraction works the same way too!

e) $i^3 = -i$
   a. Let's split up this problem. $i^3 = i * i * i = i^2 * i$. Great! We know $i^2 = -1$, so now we have $-1 * i$ or $-i$.

In future Wind Studies, we'll use these imaginary numbers to talk about impedance, phase angles in polar and exponential form, and power calculations with leading and lagging currents!