This is the Answer Key for Module 1 Version MU.

1. Choose the **smallest** set of Real numbers that the number below belongs to.

$$-\sqrt{\frac{900}{10}}$$

The solution is Irrational

A. Integer

B. Rational

C. Irrational

D. Not a Real number

E. Whole

General Comments: The only ways to *not* be a Real number are: dividing by 0 or taking the square root of a negative number. Irrational numbers are more than just square root of 3: adding or subtracting values from square root of 3 is also irrational.

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2. Simplify the expression below and choose the interval the simplification is contained within.

$$2 - 11 \div 16 * 19 - (14 * 20)$$

The solution is -291.063

A. $[-503, -497]$

Did not distribute negative correctly.

B. $[17, 29]$

This is just an arbitrary distractor.

C. $[-293, -287]$

* Correct option.

D. $[-279, -271]$

Messed up their order of operations.

E. $[279, 286]$

Did not distribute addition and subtraction correctly.

General Comments: While you may remember (or were taught) PEMDAS is done in order, it is actually done as P/E/MD/AS. When we are at MD or AS, we read left to right.

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3. Choose the **smallest** set of Complex numbers that the number below belongs to.

$$\frac{13\pi}{0} + 10i^2$$

The solution is Not a Complex Number

A. Nonreal Complex

B. Irrational

C. Rational

D. Not a Complex Number

E. Pure Imaginary

General Comments: Be sure to simplify $i^2 = -1$. This may remove the imaginary portion for your number.

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4. Simplify the expression below into the form $a + bi$. Then, choose the intervals that a and b belong to.

$$(5 - 3i)(-8 + 7i)$$

The solution is $-19.0 + 59.0i$

A. $a \in [-27, -16]$ and $b \in [58, 63]$

   * Correct option.

B. $a \in [-65, -58]$ and $b \in [5, 13]$

   Corresponds to adding a minus sign in the first term.

C. $a \in [-65, -58]$ and $b \in [-15, -5]$

   Corresponds to adding a minus sign in the second term.

D. $a \in [-27, -16]$ and $b \in [-60, -56]$

   Corresponds to adding a minus sign in both terms.

E. $a \in [-44, -36]$ and $b \in [-23, -17]$

   Corresponds to just multiplying the real terms to get the real part of the solution and the coefficients in the complex terms to get the complex part.

General Comments: You can treat i as a variable and distribute. Just remember that $i^2 = -1$, so you can continue to reduce after you distribute.

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5. Simplify the expression below into the form $a + bi$. Then, choose the intervals that a and b belong to.

$$\frac{27 + 55i}{-6 - 2i}$$

The solution is $-6.8 - 6.9i$

A. $a \in [-5.2, -1.4]$ and $b \in [-32, -23]$

   Corresponds to just dividing the first term by the first term and the second by the second.

B. $a \in [-7.2, -6.6]$ and $b \in [-9, -2]$

   * Correct option.

C. $a \in [-273.5, -271.7]$ and $b \in [-9, -2]$

   Forgot to multiply the conjugate by the numerator and added a plus instead of a minus in the denominator.

D. $a \in [-7.2, -6.6]$ and $b \in [-278, -275]$

   Forgot to multiply the conjugate by the numerator.

E. $a \in [-2.2, -1.2]$ and $b \in [-14, -7]$

   Forgot to multiply the conjugate by the numerator and didn't compute the conjugate correctly

General Comment: Multiply the numerator and denominator by the *conjugate* of the denominator, then simplify. For example, if we have $2 + 3i$, the conjugate is $2 - 3i$.
