This is the Answer Key for Module 1 Version C.

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

$$\sqrt{\frac{24}{0}}$$

The solution is Not a Real Number

A. Not a Real number

B. Rational

C. Integer

D. Irrational

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.

$$19 - 12 \div 13 * 6 - (5 * 2)$$

The solution is 3.462

A. $[-1, 6]$

* Correct option.

B. $[36, 44]$

This is just an arbitrary distractor.

C. $[7, 12]$

Messed up their order of operations.

D. $[15, 21]$

Did not distribute negative correctly.

E. $[23, 36]$

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.

$$\frac{23\pi}{0} + 7i^2$$

The solution is Not a Complex Number

A. Irrational

B. Not a Complex Number

C. Nonreal Complex

D. Pure Imaginary

E. Rational

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.

$$(-8 + 2i)(-4 + 6i)$$

The solution is $20.0 - 56.0i$

A. $a \in [28, 34]$ and $b \in [10, 15]$

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.

B. $a \in [17, 21]$ and $b \in [54, 60]$

Corresponds to adding a minus sign in both terms.

C. $a \in [39, 49]$ and $b \in [38, 42]$

Corresponds to adding a minus sign in the second term.

D. $a \in [39, 49]$ and $b \in [-44, -39]$

Corresponds to adding a minus sign in the first term.

E. $a \in [17, 21]$ and $b \in [-60, -53]$

* Correct option.

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.

$$\frac{45 + 22i}{3 + 4i}$$

The solution is $8.92 - 4.56i$

A. $a \in [218, 226]$ and $b \in [-7, 1]$

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

B. $a \in [-1, 3]$ and $b \in [7, 15]$

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

C. $a \in [11, 20]$ and $b \in [3, 9]$

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

D. $a \in [8, 12]$ and $b \in [-119, -106]$

Forgot to multiply the conjugate by the numerator.

E. $a \in [8, 12]$ and $b \in [-7, 1]$

* Correct option.

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 $2 - 3i$.
