

This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found [here](#).

If you have a suggestion to make the keys better, please fill out the short survey [here](#).

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

1. **General Comment:** None

2. **General Comment:** None

3. **General Comment:** None

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

$$\frac{-45 - 11i}{-4 - 6i}$$

The solution is $[4.730769230769231, -4.346153846153846]$, which is option C.

- A. $a \in [1.5, 3.5]$ and $b \in [4.5, 6.5]$ $2.19 + 6.04i$, which corresponds to forgetting to multiply the conjugate by the numerator and not computing the conjugate correctly.
- B. $a \in [245, 247]$ and $b \in [-4.5, -4]$ $246.00 - 4.35i$, which corresponds to forgetting to multiply the conjugate by the numerator and using a plus instead of a minus in the denominator.
- C. $a \in [3.5, 5]$ and $b \in [-4.5, -4]^*$ $4.73 - 4.35i$, which is the correct option.
- D. $a \in [10, 11.5]$ and $b \in [1, 3]$ $11.25 + 1.83i$, which corresponds to just dividing the first term by the first term and the second by the second.
- E. $a \in [3.5, 5]$ and $b \in [-226.5, -225.5]$ $4.73 - 226.00i$, which corresponds to forgetting to multiply the conjugate by the numerator.

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 $2-3i$.

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

$$(10 - 6i)(3 + 4i)$$

The solution is $54 + 22i$, which is option E.

- A. $a \in [-1, 7]$ and $b \in [-61.2, -57.5]$ $6 - 58i$, which corresponds to adding a minus sign in the second term.
- B. $a \in [30, 32]$ and $b \in [-24.2, -22.6]$ $30 - 24i$, which 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.
- C. $a \in [52, 59]$ and $b \in [-23.2, -20.1]$ $54 - 22i$, which corresponds to adding a minus sign in both terms.
- D. $a \in [-1, 7]$ and $b \in [55.7, 60.7]$ $6 + 58i$, which corresponds to adding a minus sign in the first term.
- E. $a \in [52, 59]$ and $b \in [19.1, 22.2]^*$ $54 + 22i$, which is the correct option.

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