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The graph of a line in the xy -plane has slope 2 and contains the point $(1, 8)$. The graph of a second line passes through the points $(1, 2)$ and $(2, 1)$. If the two lines intersect at the point (a, b) , what is the value of $a + b$?

- A) 4
- B) 3
- C) -1
- D) -4

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Which of the following complex numbers is

equivalent to $\frac{3-5i}{8+2i}$? (Note: $i = \sqrt{-1}$)

- A) $\frac{3}{8} - \frac{5i}{2}$
- B) $\frac{3}{8} + \frac{5i}{2}$
- C) $\frac{7}{34} - \frac{23i}{34}$
- D) $\frac{7}{34} + \frac{23i}{34}$

Solution to Q9:

If a line has slope 2 and contains the point $(1, 8)$ then the equation of the line can be found as follows:

$$y = mx + b$$

slope of the line $\leftarrow$ m
the y-intercept $\leftarrow$ b

$$y = 2x + b$$

Substitute the point $(1, 8)$

$$8 = 2(1) + b \Rightarrow b = 8 - 2 = 6$$

$$\rightarrow y = 2x + 6 \quad \dots \textcircled{1}$$

The second line passes through two points and its slope is calculated as

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{where } (1, 2) = (x_1, y_1) \\ (2, 1) = (x_2, y_2)$$

$$m = \frac{1 - 2}{2 - 1} = \frac{-1}{1} = -1$$

$$y = -x + b$$

Substitute the point $(1, 2)$

$$2 = -1 + b \Rightarrow b = 2 + 1 = 3$$

$$\rightarrow y = -x + 3 \quad \dots \textcircled{2}$$

The two lines $\textcircled{1}$ and $\textcircled{2}$ intersect when

$$y \textcircled{1} = y \textcircled{2} \Rightarrow$$

$$2x + 6 = -x + 3 \Rightarrow 2x + x = 3 - 6 \Rightarrow$$

$$3x = -3 \Rightarrow x = -1$$

Substitute $x = -1$ in eq. $\textcircled{2}$

$$y = -(-1) + 3$$

$$y = 1 + 3$$

$$y = 4$$

Therefore, the intersection point is $(a, b) = (-1, 4)$

$$\text{and the sum } a + b = 4 - 1 = 3$$

The answer is **B**