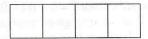# Exercise Set 4: Complex Numbers (No Calculator)

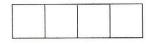**1**

If $a + bi = (1 + 2i)(3 - 4i)$, where $a$ and $b$ are constants and $i = \sqrt{-1}$, what is the value of $a + b$?
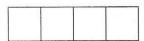
**2**

If $a + bi = \dfrac{4 + i}{2 - i}$, where $a$ and $b$ are constants and $i = \sqrt{-1}$, what is the value of $a$?
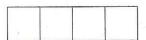
**3**

For what value of $b$ does $(b + i)^2 = 80 + 18i$?

**4**

The solutions of the equation $x^2 - 2x + 15 = 0$ are $x = a + i\sqrt{b}$ and $x = a - i\sqrt{b}$, where $a$ and $b$ are positive numbers. What is the value of $a + b$?

**5**

Given that $i = \sqrt{-1}$, which of the following is equal to $\dfrac{1}{(1 + i)^2}$?

A) $\dfrac{1}{2} - \dfrac{1}{2}i$

B) $-\dfrac{1}{2}i$

C) $\dfrac{1}{2}i$

D) $\dfrac{1}{2} + \dfrac{1}{2}i$

**6**

Which of the following expressions is equal to $(2 + 2i)^2$?

A) 0

B) $4i$

C) $8i$

D) $4 - 4i$

**7**

If $B(3 + i) = 3 - i$, what is the value of $B$?

A) $\dfrac{3}{5} + \dfrac{4}{5}i$

B) $\dfrac{4}{5} + \dfrac{3}{5}i$

C) $\dfrac{3}{5} - \dfrac{4}{5}i$

D) $\dfrac{4}{5} - \dfrac{3}{5}i$

**8**

$$x^2 + kx = -6$$

If one of the solutions to the equation above is $x = 1 - i\sqrt{5}$, what is the value of $k$?

A) $-4$

B) $-2$

C) 2

D) 4

**9**

If $i^m = -i$, which of the following CANNOT be the value of $m$?

A) 15

B) 18

C) 19

D) 27