

**Example** The reflection of the point  $(4, -13)$  about the line  $5x + y + 6 = 0$  is

- (A)  $(-1, -14)$       (B)  $(3, 4)$       (C)  $(0, 0)$       (D)  $(1, 2)$

**Solution** The correct choice is (A). Let  $(h, k)$  be the point of reflection of the given point  $(4, -13)$  about the line  $5x + y + 6 = 0$ . The mid-point of the line segment joining points  $(h, k)$  and  $(4, -13)$  is given by

$$\left( \frac{h+4}{2}, \frac{k-13}{2} \right) \quad (\text{Why?})$$

This point lies on the given line, so we have

$$5 \frac{h+4}{2} + \frac{k-13}{2} + 6 = 0$$

or  $5h + k + 19 = 0$       (1)

Again the slope of the line joining points  $(h, k)$  and  $(4, -13)$  is given by  $\frac{k+13}{h-4}$ . This line

is perpendicular to the given line and hence  $(-5) \frac{k+13}{h-4} = -1$       (Why?)

This gives  $5k + 65 = h - 4$

or  $h - 5k - 69 = 0$       (2)

On solving (1) and (2), we get  $h = -1$  and  $k = -14$ . Thus the point  $(-1, -14)$  is the reflection of the given point.