Five persons A, B, C, D and E are pulling a cart of mass 100 kg on a smooth surface and cart is moving with acceleration 3 m/s^2 in east direction. When person 'A' stops pulling, it moving with accelerating 1 m/s^2 in the west direction. When only person 'B' stops pulling, it moves with acceleration 24 m/s^2 in the north direction. The magnitude of acceleration of the cart when only A and B pull the cart keeping their directions same as the old direction, is

A $26\ m/s^2$

B $3\sqrt{71}\ m/s^2$

C $25\ m/s^2$

D $30\ m/s^2$

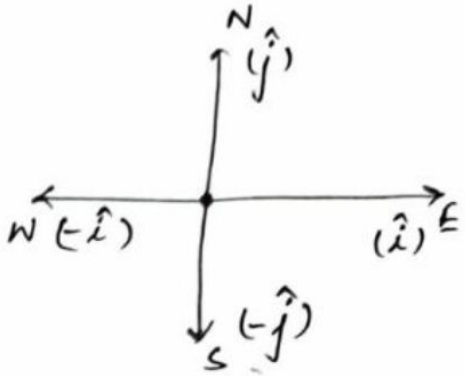
Given:

5 peoples are pulling cart: A, B, C, D & E.

Mass of cart, $m = 100\,kg$

Acceleration of cart, $a = 3\,m/sec^2$

Let total force be $\vec{F}_t$



According to question

$\vec{F}_t = 100kg \times 3\hat{i}$ — ①

When A stops, pulling, then,

$\vec{F}_t - \vec{F}_A = 100kg \times \{1(-\hat{i})\}$ — ②

When B stops pulling, then;

$\vec{F}_t - \vec{F}_B = 100\,kg \times (24\hat{j})$ — ③

Using eqⁿ ② and eqⁿ ③

$\vec{F}_A + \vec{F}_B = 100(7\hat{i} - 24\hat{j})N$

Therefore, acceleration of the cart, $\vec{a}$ is

$\vec{a} = \frac{\vec{F}_A + \vec{F}_B}{m} = \frac{100(7\hat{i} - 24\hat{j})}{100}\ m/sec^2$

$\vec{a} = (7\hat{i} - 24\hat{j})\ m/sec^2$

$|\vec{a}| = \sqrt{(7)^2 + (24)^2} = \sqrt{49 + 576} = 25\,m/sec^2$

Hence, acceleration's magnitude is $25\,m/sec^2$

Correct Option (C.)