

## Mathematics Questions by Topic

Motion and Force

Answer 22

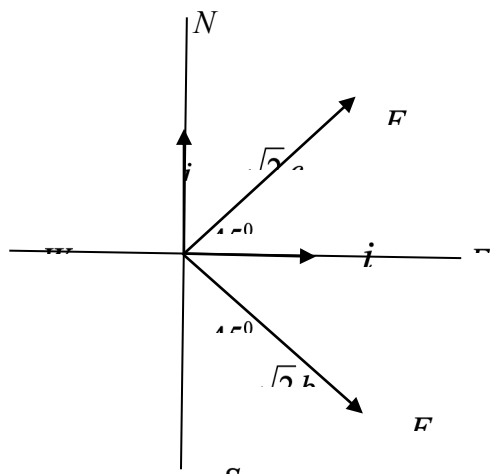
Source: K13SM2Q21

### Question 22

A particle is acted upon by two forces. One has a magnitude of  $\sqrt{2}b$  newtons and acts in the direction  $S 45^\circ E$ , the other has a magnitude of  $\sqrt{2}c$  newtons and acts in the direction  $N 45^\circ E$ , where  $b$  and  $c$  are non-zero real positive constants. The magnitude of the resultant force is equal to

- A.  $\sqrt{2}(b+c)$
- B.  $\frac{\sqrt{2}}{2}(b+c)$
- C.  $2\sqrt{2(b^2+c^2)}$
- D.  $\sqrt{2(b^2+c^2)}$
- E.  $2\sqrt{b^2+c^2}$

**ANSWER D**



1.1	MC Q11	
$[b \ -b] \rightarrow f1$	$[b \ -b]$	
$[c \ c] \rightarrow f2$	$[c \ c]$	
$\text{norm}(f1)$	$ b  \cdot \sqrt{2}$	
$\text{norm}(f2)$	$ c  \cdot \sqrt{2}$	
$f1+f2$	$[b+c \ c-b]$	
$\text{norm}(f1+f2)$	$\sqrt{2} \cdot (b^2+c^2)$	
	6/99	

$$\begin{aligned}
 F_1 &= \sqrt{2}b(\sin(45^\circ)\underline{i} - \cos(45^\circ)\underline{j}) = b(\underline{i} - \underline{j}) & |F_1| &= \sqrt{2}b \\
 F_2 &= \sqrt{2}c(\sin(45^\circ)\underline{i} + \cos(45^\circ)\underline{j}) = c(\underline{i} + \underline{j}) & |F_2| &= \sqrt{2}c \\
 F_1 + F_2 &= (b+c)\underline{i} + (c-b)\underline{j} \\
 |F_1 + F_2| &= \sqrt{(b+c)^2 + (c-b)^2} = \sqrt{b^2 + 2bc + c^2 + c^2 - 2bc + b^2} \\
 &= \sqrt{2(b^2 + c^2)}
 \end{aligned}$$