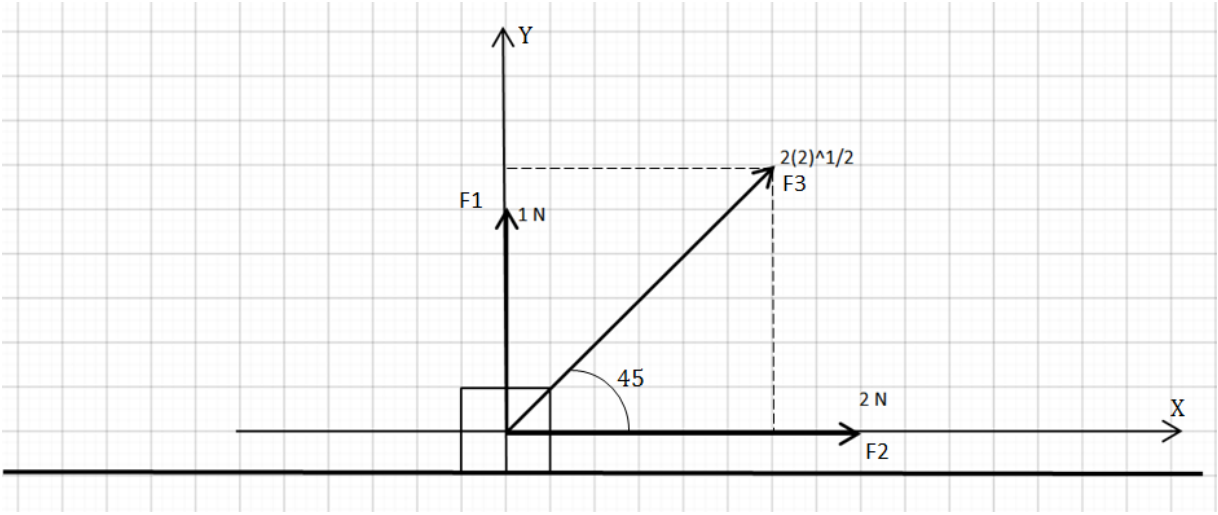
A particle is acted upon by 3 forces in one plane equal to 2, 2(2)^1/2, 1 N respectively. First is horizontal, second acts at 45 degree to the horizontal and 3rd is vertical. What is the magnitude of resultant force?

Solution:



To find resultant force we should add all forces, which are acting on the body.

Firstly, we should add $F_2\ and\ F_3$. To do that we need to project F_3 on the axis X:

$$F_x = F_3 \cdot \cos 45^\circ = 2\sqrt{2} \cdot \frac{1}{\sqrt{2}} = 2\ N$$

So the sum is:

$$F_{2,3} = F_2 + F_3 = 2 + 2 = 4\ N$$

Secondly, we should add $F_1\ and\ F_3$. Now we project F_3on the axis Y:

$$F_y = F_3 \cdot \sin 45^\circ = 2\sqrt{2} \cdot \frac{1}{\sqrt{2}} = 2\ N$$

So the sun is:

$$F_{1,3} = F_1 + F_3 = 1 + 2 = 3\ N$$

To find the magnitude of resultant force we should add $F_{2,3}\ and\ F_{1,3}$. To do that just use Pythagoras' theorem:

$$F_{resultant} = \sqrt{{F_{1,3}}^2 + {F_{2,3}}^2} = \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5\ N$$

Answer: $F_{res} = 5$