Answer on Question #64346-Physics-Other

By resolving the forces horizontally and vertically, find the magnitude and direction of the resultant of the 4 forces shown below:

1. F1 : 10N 90 degrees from X-axis (In other words y/ direction-north)

2. F2 : 30N 30 degrees from X-axis (direction-NE)

3. F3 : 20N 10 degrees from X-axis (direction-NE)

4. F4 : 10N 30 degrees below X-axis (direction-SW)

Solution

$$F_{1x} = 0, F_{1y} = 10$$

$$F_{2x} = 30 \cos 30 = 25.98\,, F_{2y} = 30 \sin 30 = 15$$

$$F_{3x} = 20 \cos 10 = 19.70\,, F_{3y} = 20 \sin 10 = 3.47$$

$$F_{4x} = -10 \cos 30 = -8.66\,, F_{4y} = -10 \sin 30 = -5$$

We need to add horizontal and vertical components:

$$F_x = 0 + 25.98 + 19.70 - 8.66 = 37.02$$

$$F_y = 10 + 15 + 3.47 - 5 = 23.47$$

The magnitude of the resultant of the 4 forces is

$$F = \sqrt{37.02^2 + 23.47^2} = 43.8\ N.$$

The direction is

$$\theta = \tan^{-1} \frac{23.47}{37.02} = 32.4° \ from\ X - axis\ (direction - NE).$$