Answer on Question #83828 - physics - Relativity

1. If the 1 kg standard body has an acceleration of $2\ m/s^2$ at $20°$ to the positive direction of an x axis, what are

(a) the x component and

(b) the y component of the net force acting on the body, and

(c) what is the net force in unit-vector notation?

Solution.

a. Calculate the components of force in X-direction by the relation as follows:

X-component of force = $F_X = macos\theta$

Here, m is the mass of body , a is the acceleration of the body and θ is the angle.

Substitute 1 kg for m and $2\ m/s^2$ for a and $20°$ for θ.

$$F_X = (1\ kg)(2\ m/s^2\ )(\cos(20°)$$

$$F_X = 1.879\ m/s^2$$

b. Calculate the components of force in Y-direction by the relation as follows:

Y-component of force = $F_Y = masin\theta$

Here, m is the mass of body , a is the acceleration of the body and θ is the angle.

Substitute 1 kg for m and $2\ m/s^2$ for a and $20°$ for θ.

$$F_Y = (1\ kg)(2m/s^2\ )(\sin(20°))$$

$$F_Y = 0.684\ m/s^2$$

c. Calculate the net force in vector form by the relation as follows:

$$F_{NET} = F_X\hat{\imath} + F_Y\hat{\jmath}$$

$$F_{NET} = (1.879\hat{\imath} + 0.684\hat{\jmath})$$

$$F_{NET} = (1.879\hat{\imath} + 0.684\hat{\jmath})\ m/s^2$$

Answer:

$$F_X = 1.879\ m/s^2$$

$$F_Y = 0.684\ m/s^2$$

$$F_{NET} = (1.879\hat{\imath} + 0.684\hat{\jmath})\ \ m/s^2$$

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