

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

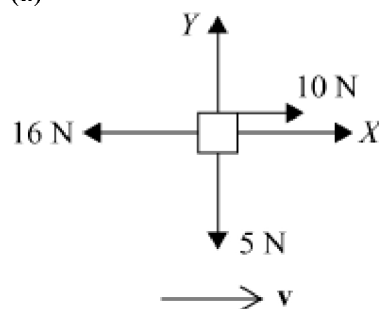
5 Newton's laws of motion

Exercise A, Question 1

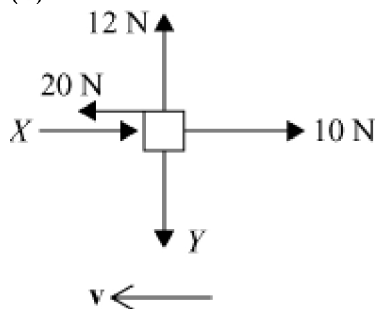
Question:

The following situations show a body moving with constant velocity in the direction shown, subject to unknown forces of magnitude X and Y . Find X and Y .

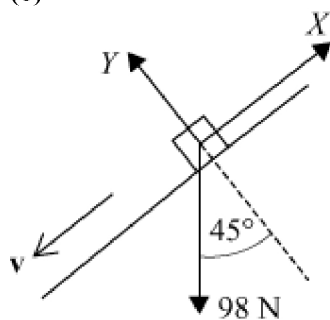
(a)



(b)



(c)



Solution:

$$\text{Newton's 1st Law horizontally } X + 10 - 16 = 0$$

$$\therefore X = 6\text{ N}$$

$$(a) \text{ Newton's 1st Law vertically } Y - 5 = 0$$

$$\therefore Y = 5\text{ N}$$

Newton's 1st Law horizontally $X + 10 - 20 = 0$

$$\therefore X = 10 \text{ N}$$

(b) Newton's 1st Law vertically $Y - 12 = 0$

$$\therefore Y = 12 \text{ N}$$

Newton's 1st Law along plane $X - 98 \sin 45^\circ = 0$

$$\therefore X = 98 \sin 45^\circ$$

$$X = 69.296\dots$$

$$X = 69.3 \text{ N (3 s.f.)}$$

(c) Newton's 1st Law perpendicular to plane $Y - 98 \cos 45^\circ = 0$

$$\therefore Y = 98 \cos 45^\circ$$

$$Y = 69.296$$

$$Y = 69.3 \text{ N (3 s.f.)}$$