

$$\text{Q. 8. (i) } \left. \begin{array}{l} W \text{ at } (6, 5) \\ 2W \text{ at } (7, -1) \\ 3W \text{ at } (2, 11) \\ 4W \text{ at } (6, 1) \end{array} \right\} = 10W \text{ at } (x, y)$$

$$W(6) + 2W(7) + 3W(2) + 4W(6) = 10W(x) \quad \dots \text{ divide by } W$$

$$\Rightarrow 10x = 50$$

$$\Rightarrow x = 5$$

$$W(5) + 2W(-1) + 3W(11) + 4W(1) = 10W(y) \quad \dots \text{ divide by } W$$

$$\Rightarrow 10y = 40$$

$$\Rightarrow y = 4$$

\Rightarrow The centre of gravity is at (5, 4)

$$\text{(ii) } \left. \begin{array}{l} W \text{ at } (6, 5) \\ 2W \text{ at } (7, -1) \\ 3W \text{ at } (2, 11) \\ kW \text{ at } (6, 1) \end{array} \right\} = (6 + k)W \text{ at } (11, y)$$

$$W(6) + 2W(7) + 3W(2) + kW(6) = (6 + k)W(11) \quad \dots \text{ divide by } W$$

$$\Rightarrow 66 + 11k = 26 + 6k$$

$$\Rightarrow 5k = -40$$

$$\Rightarrow k = -8$$

$$W(5) + 2W(-1) + 3W(11) - 8W(1) = -2W(y) \quad \dots \text{ divide by } W$$

$$\Rightarrow 2y = -28$$

$$\Rightarrow y = -14$$

$$\text{Q. 9. } \left. \begin{array}{l} 2N \text{ at } (x, 5) \\ 3N \text{ at } (11, y) \\ 5N \text{ at } (5, -6) \end{array} \right\} = 10N \text{ at } (6, -5)$$

$$2(x) + 3(11) + 5(5) = 10(6)$$

$$\Rightarrow 2x + 58 = 60$$

$$\Rightarrow x = 1$$

$$2(5) + 3(y) + 5(-6) = 10(-5)$$

$$\Rightarrow 3y - 20 = -50$$

$$\Rightarrow y = -10$$

$$\text{Q. 10. } \left. \begin{array}{l} 1N \text{ at } (7, 8) \\ 4N \text{ at } (1, y) \\ xN \text{ at } (5, 2) \\ 2N \text{ at } (6, -3) \end{array} \right\} = (7 + x)N \text{ at } (4, 2)$$

$$1(7) + 4(1) + x(5) + 2(6) = (7 + x)(4)$$

$$\Rightarrow 5x + 23 = 28 + 4x$$

$$\Rightarrow x = 5$$

$$1(8) + 4(y) + 5(2) + 2(-3) = 12(2)$$

$$\Rightarrow 4y + 12 = 24$$

$$\Rightarrow y = 3$$

$$\text{Q. 11. } \left. \begin{array}{l} 3W \text{ at } (30, 20) \\ 2W \text{ at } (20, 10) \\ 5W \text{ at } (50, 20) \end{array} \right\} = 10W \text{ at } (x, y)$$

$$3W(30) + 2W(20) + 5W(50) = 10W(x) \\ \dots \text{ divide by } 10W$$

$$\Rightarrow x = 38$$

$$3W(20) + 2W(10) + 5W(20) = 10W(y) \\ \dots \text{ divide by } 10W$$

$$\Rightarrow y = 18$$

\Rightarrow Centre of gravity is at (38, 18)