

Solutions

Each answer shows the steps, then the **result**.

2.1

- $x_{cm} = \frac{1.0(0) + 4.0(10)}{5.0} = 8.0 \text{ m}$

2.2

- internal (it acts between two parts of the system)

2.3

- midpoint, $x = 5.0 \text{ m}$ — the masses are equal, so the centre of mass is exactly halfway between them

3.1 B

3.2 B

- by symmetry, $x_{cm} = 3.0 \text{ m}$

3.3

(a)

- $x_{cm} = \frac{60(0) + 40(5.0)}{100} = 2.0 \text{ m}$

(b)

- They meet at the centre of mass, 2.0 m from the 60 kg skater — with no external horizontal force, the centre of mass stays fixed