11 A thin horizontal plate of area $0.036\,\mathrm{m}^2$ is beneath the surface of a liquid of density $930\,\mathrm{kg\,m}^{-3}$. The force on one side of the plate due to the pressure of the liquid is $290\,\mathrm{N}$.

What is the depth of the plate beneath the surface of the liquid?

**A** 0.88 m      **B** 1.1 m      **C** 1.8 m      **D** 8.7 m

12 Spheres X and Y form an isolated system. The mass of Y is greater than the mass of X.
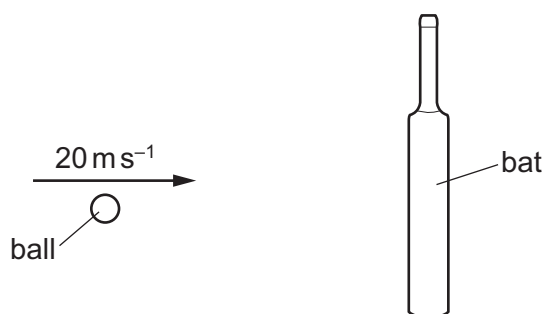
Sphere Y is initially stationary.

Sphere X collides elastically with sphere Y.

The speed of sphere X before the collision is $u$.

Which statement **must** be correct?

**A** Sphere X rebounds with a speed that is greater than $u$, and sphere Y moves off with a speed that is less than $u$.

**B** Sphere X rebounds with a speed that is less than $u$, and sphere Y moves off with a speed that is also less than $u$.

**C** Sphere X rebounds with speed $u$, and sphere Y remains stationary.

**D** Sphere X remains stationary, and sphere Y moves off with a speed that is less than $u$.

13 A ball of mass $0.10\,\mathrm{kg}$ is thrown towards a stationary vertical bat. The ball hits the bat with a horizontal velocity of $20\,\mathrm{m\,s}^{-1}$.



The ball rebounds and leaves the bat with a horizontal velocity of $15\,\mathrm{m\,s}^{-1}$.

What is the change in momentum of the ball?

**A** 0.20 N s      **B** 0.50 N s      **C** 1.5 N s      **D** 3.5 N s