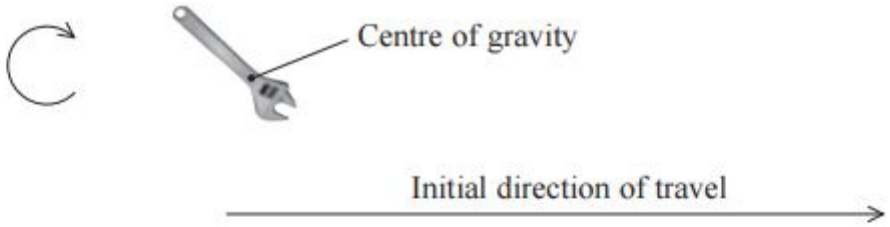
1 A spanner is thrown horizontally. As it moves it spins in a clockwise direction in a vertical plane.



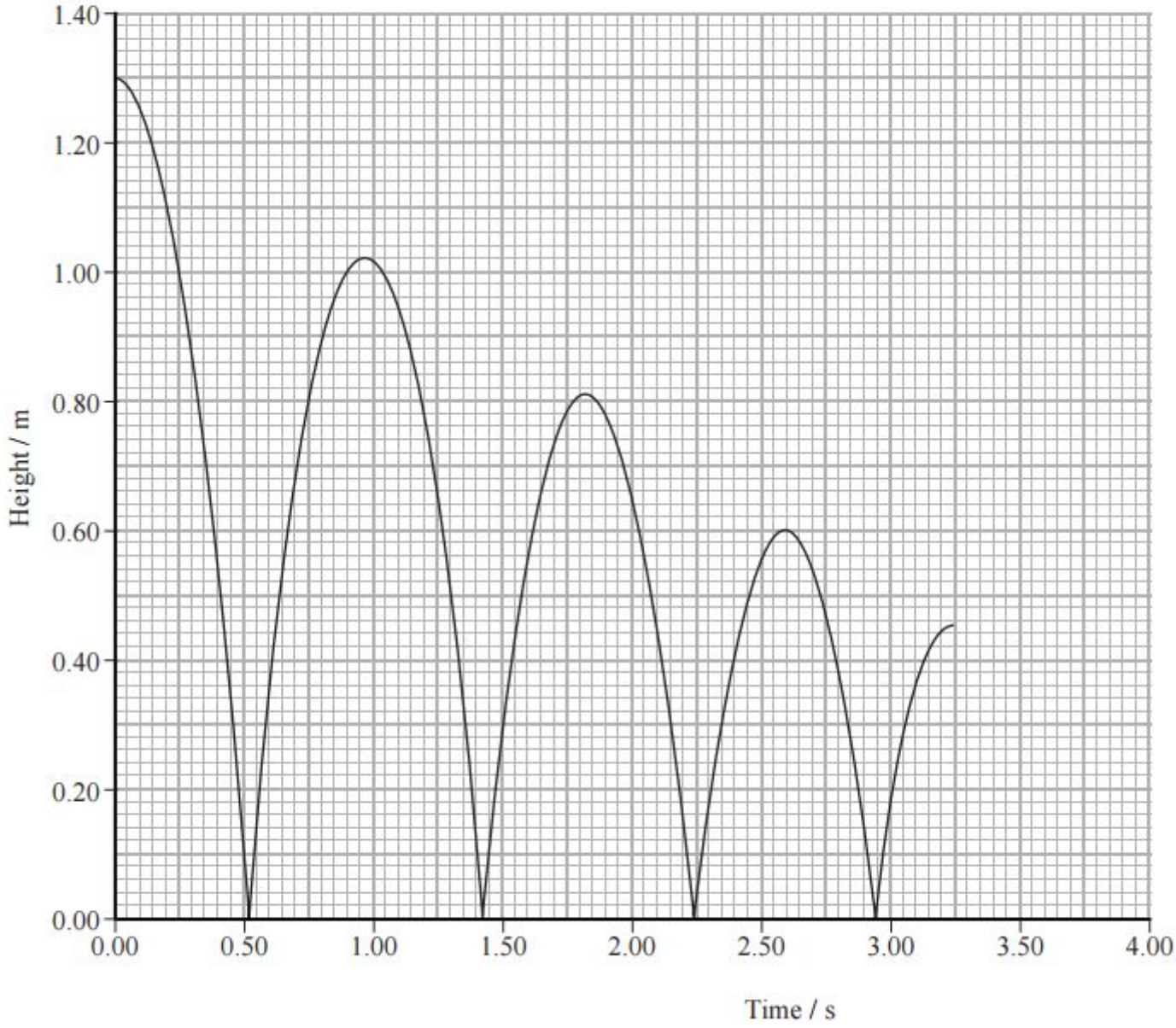
Which row of the table could **not** show the relative positions of the spanner when released and during motion?

	Position when released	**Position during motion**
☒ **A**		
☒ **B**		
☒ **C**		
☒ **D**		

(Total for Question = 1 mark)

Questions 2 and 3 refer to the graph below.

A ball is dropped from a height of 1.3 m. The graph shows how the height above the ground varies with time for several bounces.



2 At 2.6 s the magnitude of the displacement from the starting position is

- ☒ **A** 0.20 m
- ☒ **B** 0.60 m
- ☒ **C** 0.70 m
- ☒ **D** 1.30 m

(Total for Question = 1 mark)

3 How can the velocity of the ball at time $t = 2.5$ s be determined from the graph?

☒ **A** Calculate the area between the graph and the time axis up to $t = 2.5$ s.

☒ **B** Divide the displacement at $t = 2.5$ s by 2.5 s.

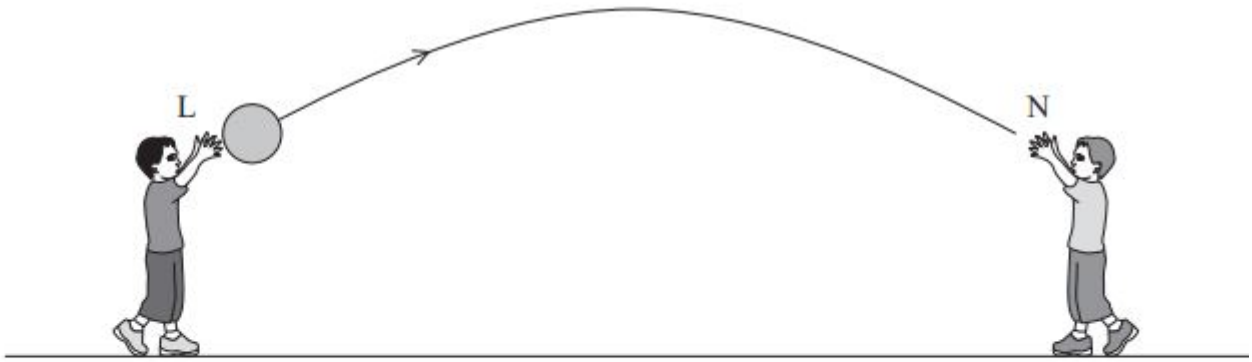
☒ **C** Divide the height at $t = 2.5$ s by 2.5 s.

☒ **D** Draw a tangent to the graph at $t = 2.5$ s and calculate its gradient.

(Total for Question = 1 mark)

4 A ball is thrown from position L and caught at position N.

L and N are the same height above the ground. The trajectory of the ball is shown.



If vectors directed upwards are taken as positive, and air resistance is neglected then the acceleration of the ball at L is $-g$ and its speed is v.

Select the row of the table that correctly gives the acceleration and speed of the ball as it reaches N.

	Acceleration	**Speed**
☒ **A**	$-g$	v
☒ **B**	$-g$	$-v$
☒ **C**	g	v
☒ **D**	g	$-v$

(Total for Question = 1 mark)

5 A box is dropped from a plane flying at a constant velocity and height.

Assuming that air resistance is negligible, as the box falls to the ground its horizontal position will

☒ **A** remain unchanged.

☒ **B** lag behind the plane.

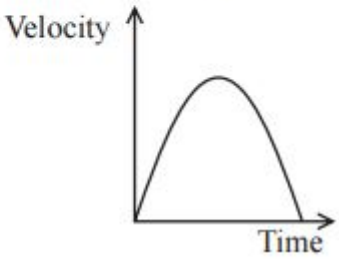
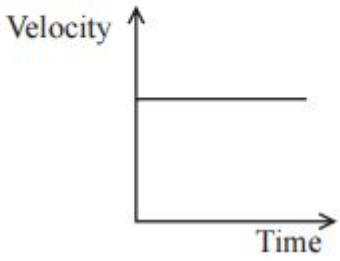
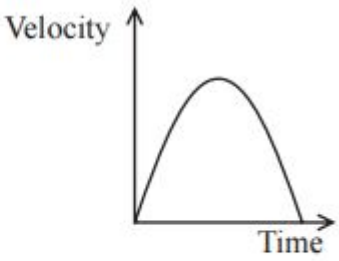
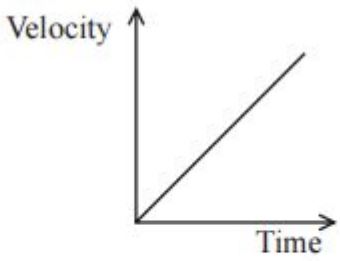
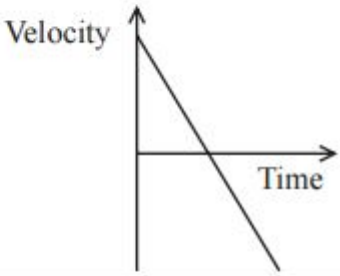
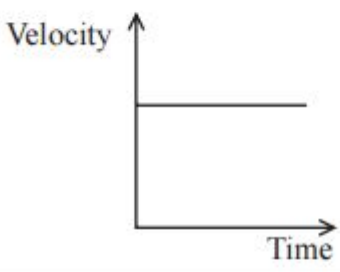
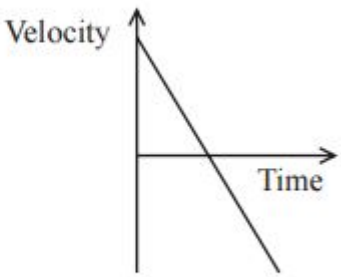
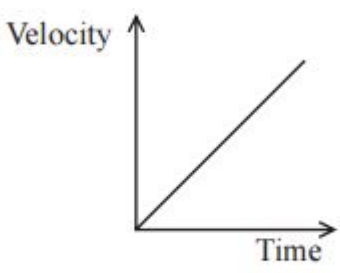
☒ **C** move ahead of the plane.

☒ **D** remain directly under the plane.

(Total for Question = 1 mark)

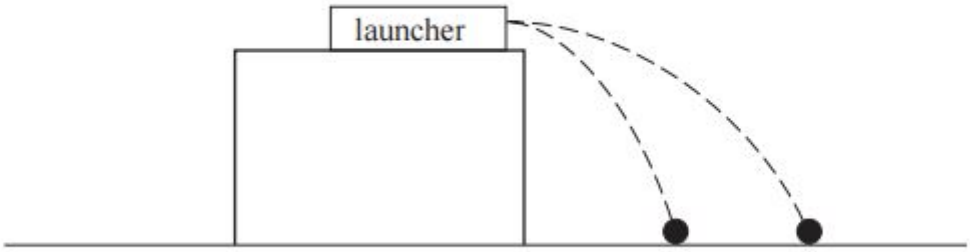
6 A projectile is launched at an angle of 45° to the horizontal.

Ignoring air resistance, which pair of graphs correctly shows how the vertical and horizontal components of velocity vary with time for the projectile until it lands?

	Vertical component	**Horizontal component**
☒ **A**		
☒ **B**		
☒ **C**		
☒ **D**		

(Total for Question = 1 mark)

7 A ball launcher fires a ball horizontally off the edge of a lab bench. The paths of the ball after two launches are shown below.



Which of the following quantities is different for the two launches?

☒ **A** gravitational acceleration

☒ **B** time of flight

☒ **C** launch angle

☒ **D** initial velocity

(Total for Question = 1 mark)

8 A football is kicked at a speed of 12 m s^{-1} at an angle of 35° to the horizontal. The horizontal component of its velocity, in m s^{-1}, is given by

☒ **A** 12 cos 35°

☒ **B** 12 sin 35°

☒ **C** $\frac{12}{\cos 35°}$

☒ **D** $\frac{12}{\sin 35°}$

(Total for Question = 1 mark)