

**PROJECTILES MECHANICS PAST PAPERS QUESTIONS OCR**  
**A LEVEL YEAR 1**

1.

Fig. 2.1 shows the path of water from a hose pipe.

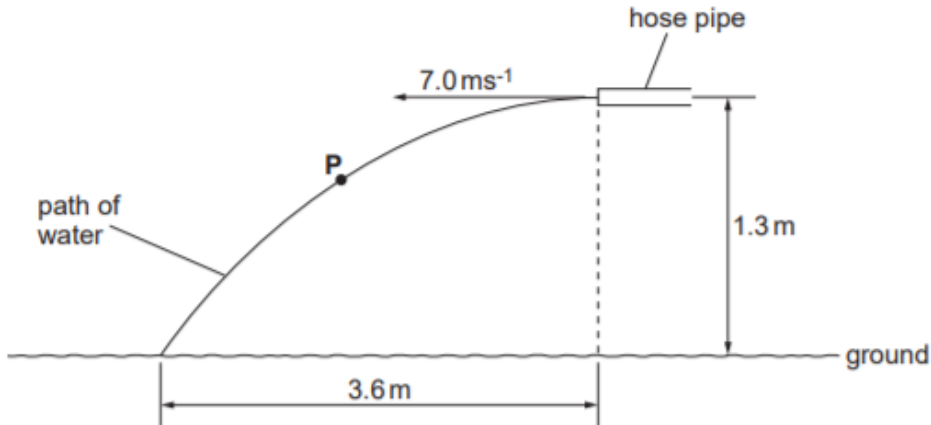


Fig. 2.1

The end of the horizontal hose pipe is at a height of 1.3 m from the ground. The initial horizontal velocity of the water is  $7.0 \text{ m s}^{-1}$ . The horizontal distance from the end of the hose pipe to the point where the water hits the ground is 3.6 m. You may assume that air resistance has negligible effect on the motion of the water jet.

- (a) On Fig. 2.1, draw an arrow to show the direction of the acceleration of the water at point P. (Mark this arrow **A**). [1]
- (b) Describe the energy conversion that takes place as the water travels from the end of the hose pipe to the ground.



*In your answer, you should use appropriate technical terms, spelled correctly.*

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.....

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..... [2]

- (c) Explain why the horizontal component of the velocity remains constant at  $7.0 \text{ m s}^{-1}$ .  
 .....  
 ..... [1]

(d) Show that the water takes about 0.5 s to travel from the end of the pipe to the ground.

[1]

(e) Show that the speed of the water when it hits the ground is  $8.6 \text{ m s}^{-1}$ .

[3]

[Total: 8]

2.

A small block of wood is held at a horizontal distance of 1.2 m from a metal ball. The metal ball is fired horizontally towards the block at a speed of  $8.0 \text{ m s}^{-1}$ . At the same instant the ball is fired, the block is released and it falls vertically under gravity.

Fig. 8.1 shows the paths of the metal ball and the block. The ball collides with the block. Air resistance is negligible.

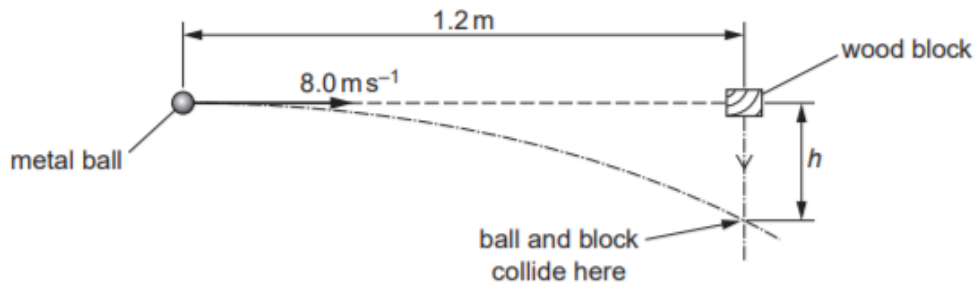


Fig. 8.1

(a) Show that the time between firing the ball and it colliding with the block is 0.15 s.

[1]

(b) Calculate the vertical distance  $h$  fallen by the wooden block when it collides with the metal ball.

$h = \dots\dots\dots \text{ m}$  [2]