Unit 3 · Kinematics

WORKSHEET

Full marks 33

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 33

1 Key words [4]

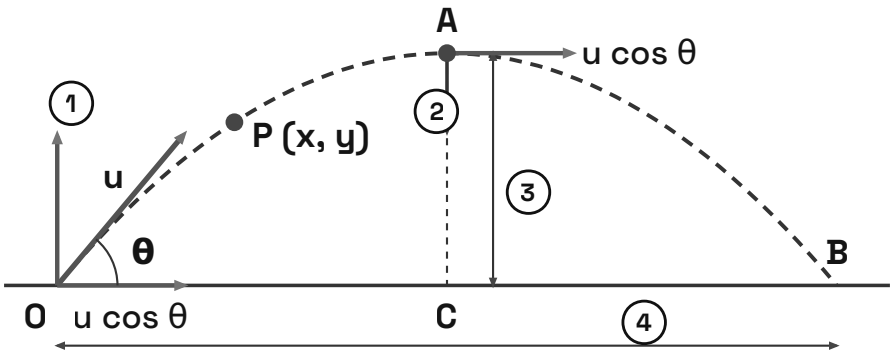
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

45°	**90°**	**acceleration**	**area**	**displacement**	**distance**	**parabola**	**projectile**	**slope**	**velocity**

The change in position of a body in a given direction is its _____, and its rate of change is the _____. The rate of change of velocity is the _____. On a position–time graph, the _____ gives the velocity; on a velocity–time graph, the _____ under the line gives the displacement. A body thrown into the air that moves under gravity alone is a _____. Its path is a _____, and on level ground it goes farthest when it is launched at _____.

2 Label the diagram [2]

The diagram shows the path of a projectile launched at an angle θ. Write the quantity that belongs in place of 1 to 4. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. The slope of a velocity–time graph gives the: [1]

a. displacement **b.** speed

c. acceleration **d.** distance

ii. A car goes round a roundabout at a steady 20 km/h. Its acceleration is: [1]

a. zero, because its speed is steady

b. not zero, because the direction of its velocity changes

c. not zero, because its speed changes

d. zero, because it comes back to the same place

iii. A car moving at 72 km/h stops in 4 s with uniform retardation. The retardation is: [1]

a. 18 m/s^2 **b.** 5 m/s^2

c. 4 m/s^2 **d.** 0.2 m/s^2

iv. A ball thrown at 30° above the horizontal lands 20 m away on level ground. At what other angle, with the same speed, would it land at the same place? [1]

a. 15° **b.** 45°

c. 60° **d.** 75°

v. At the highest point of a projectile's path: [1]

a. its velocity and acceleration are both zero

b. its velocity is zero and its acceleration is g

c. its velocity is horizontal and its acceleration is g, downward

d. its velocity is horizontal and its acceleration is zero

4 Short answers [7]

Write short answers to the following questions.

a. Can a body have zero velocity and still be accelerating? Give an example. [2]

b. When rain falls straight down, why does a person walking quickly hold the umbrella tilted forward? [2]

c. Two buses, each 12 m long, travel the same way on the Araniko Highway, one at 60 km/h and the other at 45 km/h. How long does the faster bus take to overtake the slower one completely? **[3]**

5 Long answer **[4]**

Write a long answer to the following question.

A body has initial velocity u and uniform acceleration a. Draw its velocity–time graph, and use the area under it to show that $s = ut + \frac{1}{2}at^2$.

6 Numerical problems **[8]**

Solve the following problems. Show your working. Take $g = 9.8\ m/s^2$.

a. Kushal is riding a motorcycle at 15 m/s when he sees a cow standing on the road 40 m ahead. He takes 0.6 s to react, then brakes with a retardation of 5 m/s^2. Does he stop before reaching the cow? By how much? **[4]**

Answer:

b. A stone is kicked horizontally at 8 m/s off the edge of a cliff 45 m high. Find i. the time it takes to land, ii. how far from the foot of the cliff it lands, and iii. its speed as it lands. **[4]**

Answer: _____

7 Think [3]

Swastika sits in a bus moving at a steady velocity on a straight, level road, and tosses a ball straight up. Does it land in her hand, behind her or in front of her? What would someone standing beside the road see?

8 Activity: How fast do you react? (not marked)

A friend holds a 30 cm ruler hanging vertically, its zero between your open finger and thumb. Without warning they let go; catch it as fast as you can. The distance it falls, d, gives your reaction time, $t = \sqrt{2d/g}$.

Try	Distance fallen d (cm)	Reaction time t (s)
1		
2		
3		
4		
5		
Average		

How far would a motorcycle at 15 m/s travel during your average reaction time?