

QQQ – Mechanics Year 1 – Chapter 9 – SUVAT Equations (Version 1)

Total Marks: 23

(23 = Platinum, 21 = Gold, 18 = Silver, 16 = Bronze)

1. A ball moves in a straight line and passes through two fixed points, A and B , which are 0.5 m apart.

The ball is moving with a constant acceleration of 0.39 m s^{-2} in the direction AB .

The speed of the ball at A is 1.9 m s^{-1}

Find the speed of the ball at B .

Circle your answer.

[1 mark]

- 2 m s^{-1}
- 3.2 m s^{-1}
- 3.8 m s^{-1}
- 4 m s^{-1}

(Total 1 marks)

AQA June 2019 Paper 1 Q11

2. An unmanned craft lands on the planet Mars. A small bolt falls from the craft onto the surface of the planet. It falls 1.5 m from rest in 0.9 s.

Calculate the acceleration due to gravity on Mars.

[2]

(Total 2 marks)

OCR MEI October 2021 Paper 1 Q2

3. In this question use $g = 9.8 \text{ m s}^{-2}$

A ball is launched vertically upwards from the Earth's surface with velocity $u \text{ m s}^{-1}$

The ball reaches a maximum height of 15 metres.

You may assume that air resistance can be ignored.

Find the value of u

[3 marks]

(Total 3 marks)

AQA June 2024 Paper 1 Q16

4. A man throws a tennis ball into the air so that, at the instant when the ball leaves his hand, the ball is 2 m above the ground and is moving vertically upwards with speed 9 m s^{-1}

The motion of the ball is modelled as that of a particle moving freely under gravity and the acceleration due to gravity is modelled as being of constant magnitude 10 m s^{-2}

The ball hits the ground T seconds after leaving the man's hand.

Using the model, find the value of T .

(4)

(Total 4 marks)

Edexcel June 2018 Mechanics Q6

5. Jermaine and his friend Meena are walking in the same direction along a straight path.

Meena is walking at a constant speed of $u \text{ m s}^{-1}$

Jermaine is walking 0.2 m s^{-1} more slowly than Meena.

When Jermaine is d metres behind Meena he starts to run with a constant acceleration of 2 m s^{-2} , for a time of t seconds, until he reaches her.

(a) Show that

$$d = t^2 - 0.2t$$

[4 marks]

(b) When Jermaine's speed is 7.8 m s^{-1} , he reaches Meena.

Given that $u = 1.4$ find the value of d .

[2 marks]

(Total 6 marks)

AQA June 2022 Paper 1 Q16

6. A small stone is projected vertically upwards with speed 39.2 m s^{-1} from a point O .

The stone is modelled as a particle moving freely under gravity from when it is projected until it hits the ground 10 s later.

Using the model, find

- (a)** the height of O above the ground, **(3)**
- (b)** the total length of time for which the speed of the stone is less than or equal to 24.5 m s^{-1} **(3)**
- (c)** State one refinement that could be made to the model that would make your answer to part (a) more accurate. **(1)**

(Total 7 marks)