Vertical Projectile: Exam Revision Tracker

Attempt #1		Attempt #2		Attempt #3		Attempt #4		Attempt #5	
Total	Score	Total	Score	Total	Score	Total	Score	Total	Score
13		16		18		18		16	
Percentage =		Percentage =		Percentage =		Percentage =		Percentage =	

Vertical Projectiles: Attempt #1

Total = 13 Marks

Ball **A** is projected vertically upwards at a velocity of 16 $m \cdot s^{-1}$ from the ground. Ignore the effects of air resistance. **Use the ground as zero reference.**

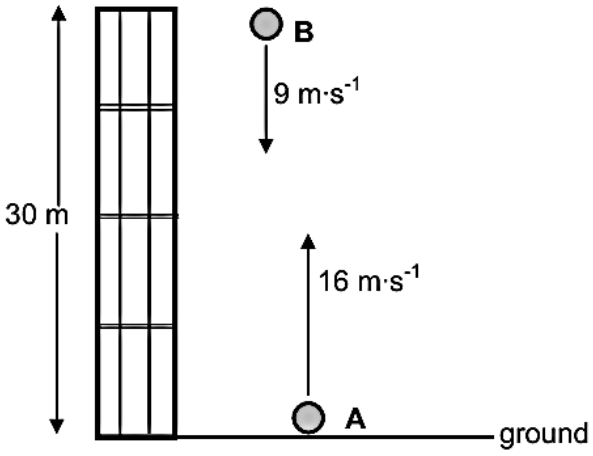
1. Calculate the time taken by ball **A** to return to the ground. (4)

2. Sketch a velocity-time graph for ball **A**.

Show the following on the graph:

(a) Initial velocity of ball **A**
(b) Time taken to reach the highest point of the motion
(c) Time taken to return to the ground (3)

ONE SECOND after ball **A** is projected upwards, a second ball, **B**, is thrown vertically downwards at a velocity of 9 $m \cdot s^{-1}$ from a balcony 30 m above the ground. Refer to the diagram below.



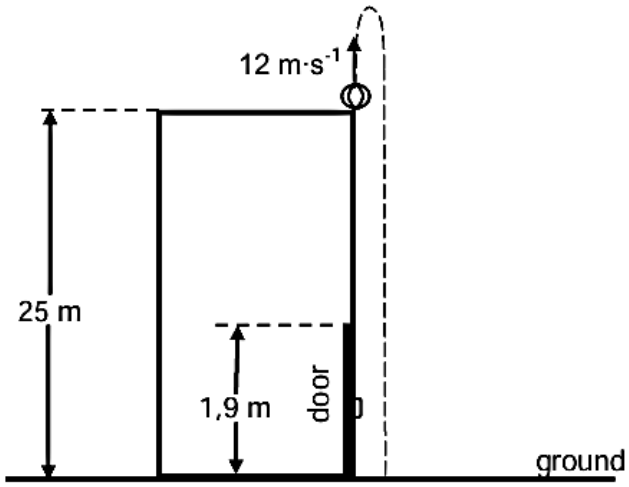
3. Calculate how high above the ground ball **A** will be at the instant the two balls pass each other. (6)

Vertical Projectiles: Attempt #2 ⚡

Total = 16 Marks

A ball is thrown vertically upwards from the top of a building of height 25 m with a velocity of 12 m·s^{-1}. On its way down, the ball passes a door which has a height of 1,9 m and then strikes the ground, as shown in the diagram below.

Ignore the effects of air friction.



1. Define the term *free fall*. (2)

2. Calculate the:

2.1 Time taken for the ball to reach its maximum height (3)

2.2 Velocity with which the ball strikes the ground (4)

2.3 Time it took the ball to move from the top of the door to the ground (4)

3. Draw a velocity versus time graph for the motion of the ball from the moment that the ball is thrown upwards until it strikes the ground. Use the ground as zero reference.

Clearly indicate the following on your graph:

- The velocity with which the ball was thrown upwards
- Time taken by the ball to reach its maximum height
- The velocity with which the ball strikes the ground (3)

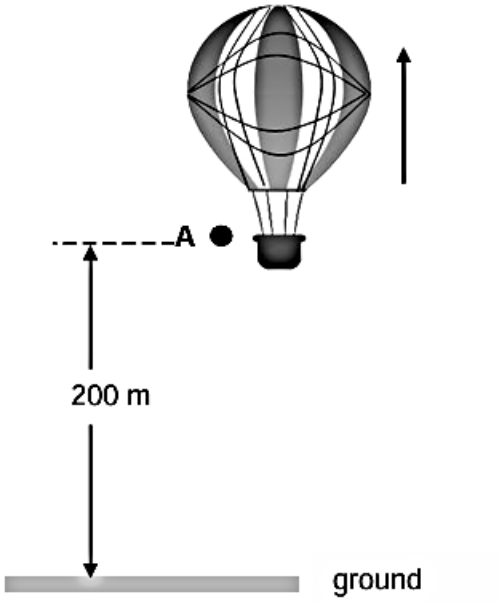
Vertical Projectiles: Attempt #3 ⚡

Total = 18 Marks

A hot-air balloon is moving upwards at a CONSTANT UNKNOWN speed.

1. Is the hot air balloon in free fall? Choose from YES or NO.

Give a reason for the answer. (2)



When the balloon is 200 m above the ground, a small stone **A** is dropped from the balloon. See the diagram above. Another small stone **B** is dropped 5 s later from the balloon while the balloon is still moving upwards at constant velocity.

Stone **A** strikes the ground at a speed of 62,68 $m \cdot s^{-1}$.

Ignore air resistance.

2. Calculate the:

2.1 Speed of the hot air balloon (3)

2.2 Time it takes stone **A** to strike the ground (3)

2.3 Distance between the hot-air balloon and stone **B** at the instant when stone **A** strikes the ground (6)

3. On the same set of axes, draw position-time graphs for both the hot-air balloon and stone **A** from the moment the stone is dropped until it strikes the ground.

Use the ground as zero reference.

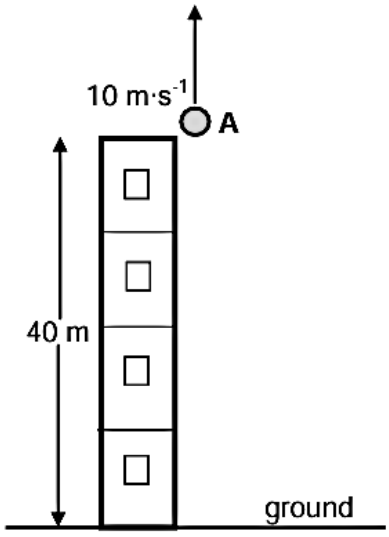
Label your graphs **BALLOON** and **A**. (4)

Vertical Projectiles: Attempt #4

Total = 18 Marks

Stone **A** is thrown vertically upwards with a speed of 10 $m \cdot s^{-1}$ from the edge of the roof of a 40 m high building, as shown in the diagram below.

Ignore the effects of air friction. Take the ground as reference.



1. Define the term *free fall*. (2)

2. Calculate the maximum HEIGHT ABOVE THE GROUND reached by stone **A**. (4)

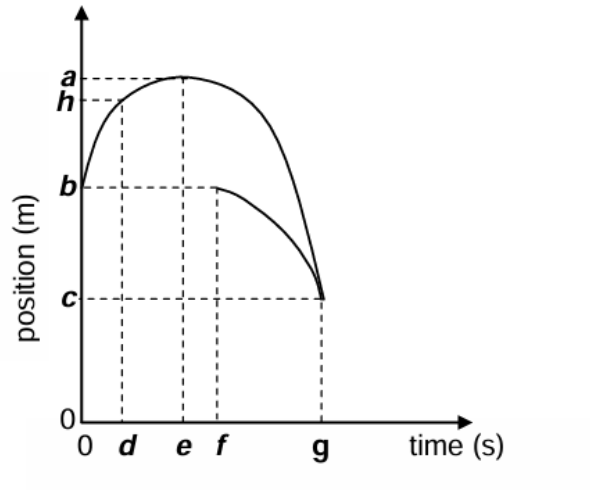
3. Write down the magnitude and direction of the acceleration of stone **A** at this maximum height. (2)

Stone **B** is dropped from rest from the edge of the roof, x seconds after stone **A** was thrown upwards.

4. Stone **A** passes stone **B** when the two stones are 29,74 m *above the ground*.

Calculate the value of x. (6)

5. The graphs of position versus time for part of the motion of both stones are shown below.



Which of labels ***a*** to ***h*** on the graphs above represents EACH of the following?

5.1 The time at which stone **A** has a positive velocity (1)

5.2 The maximum height reached by stone **A** (1)

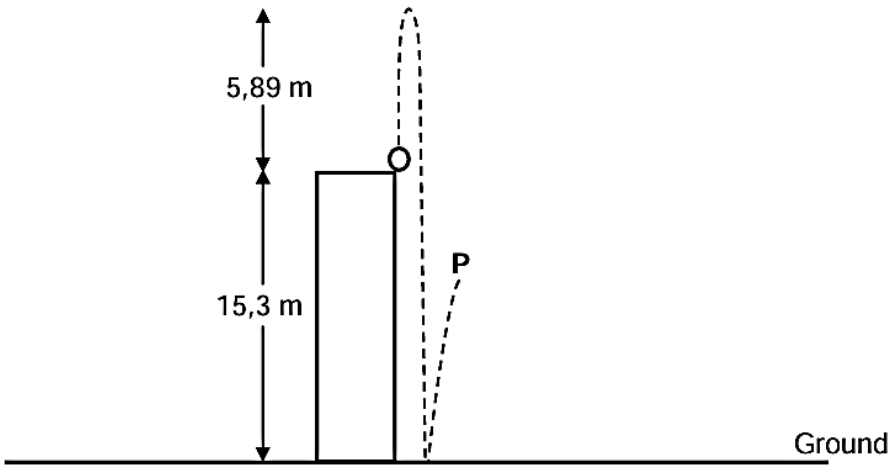
5.3 The time when stone **B** was dropped (1)

5.4 The height at which the stones pass each other (1)

Vertical Projectiles: Attempt #5 ⚡

Total = 16 Marks

A ball of mass 0,5 kg is thrown vertically upwards from the top edge of a building which is 15,3 m high. The ball reaches a maximum height of 5,89 m above the top of the building. The ball strikes the ground and bounces vertically upwards, reaching a maximum height at point **P**, as shown in the diagram below.



Ignore the effects of air friction.

1. Define the term *free fall*. (2)

2. Using only EQUATIONS OF MOTION, calculate the speed at which the ball was projected upwards. (3)

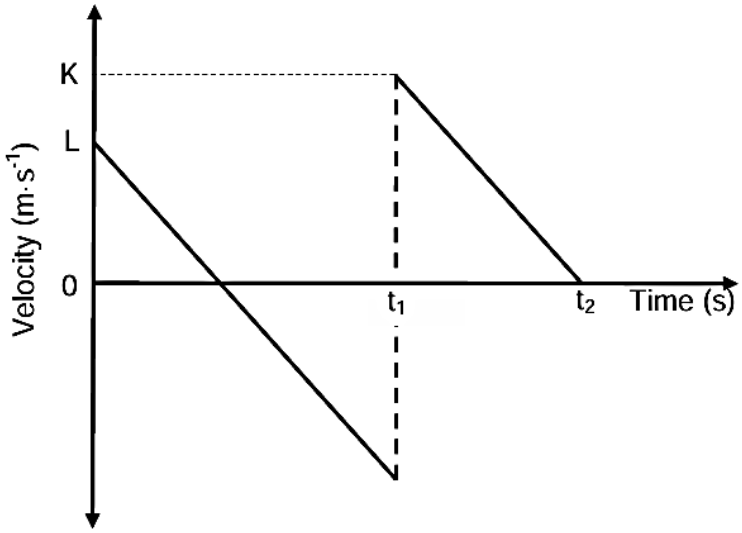
3. After the collision with the ground, the ball leaves the ground with a speed of 11,92 $m \cdot s^{-1}$.

Calculate the:

3.1 Amount of kinetic energy lost by the ball during the collision with the ground (5)

3.2 Time taken for the ball to reach point **P** after leaving the ground (3)

4. The velocity-time graph for the motion of the ball from the instant it is projected upwards from the top edge of the building until the time it reaches point **P** is shown below.



Write down the numerical values indicated by EACH of the following:

4.1 K (1)

4.2 L (1)

4.3 $t_2 - t_1$ (1)