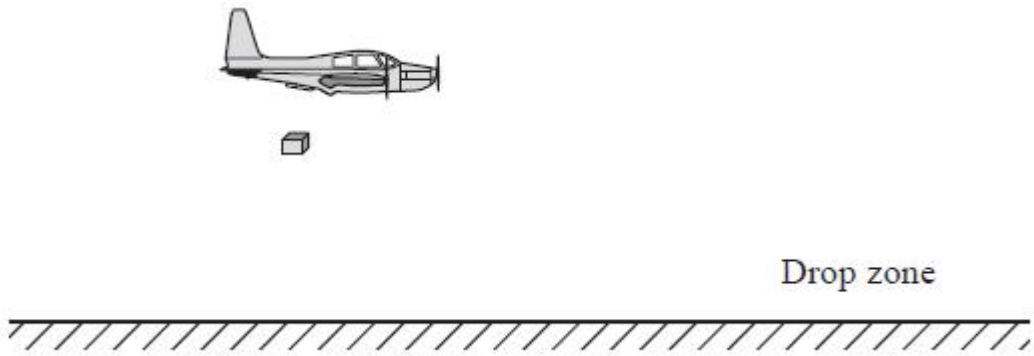
Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 2 (Mechanics)

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Q1.

In areas of the world where a plane is unable to land, free fall airdrops can be used to deliver supplies.



A plane travelling at a speed of 75 m s^{-1} and at a height of 63 m releases a package of supplies.

(a) (i) Draw the path of the falling package on the diagram above.

(1)

(ii) Show that the time taken for the supplies to reach the ground is about 4 s.

(2)

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(iii) Calculate the horizontal distance of the plane from the drop zone when releasing the package.

(2)

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Horizontal distance = ...

(b) (i) Show that the change in gravitational potential energy of the package during the fall is about 6 kJ.
mass of package = 10 kg

(2)

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(ii) Show that the kinetic energy of the package on release is about 28 kJ.

(2)

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(iii) Determine the kinetic energy of the package on impact.

(1)

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Kinetic energy = ...

(iv) State why in practice the actual value for the kinetic energy on impact with the ground is less than the value you calculated in part (b)(iii).

(1)

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(c) Most airdrops are not free fall and use parachutes.

State why using parachutes causes less damage to the package.

(1)

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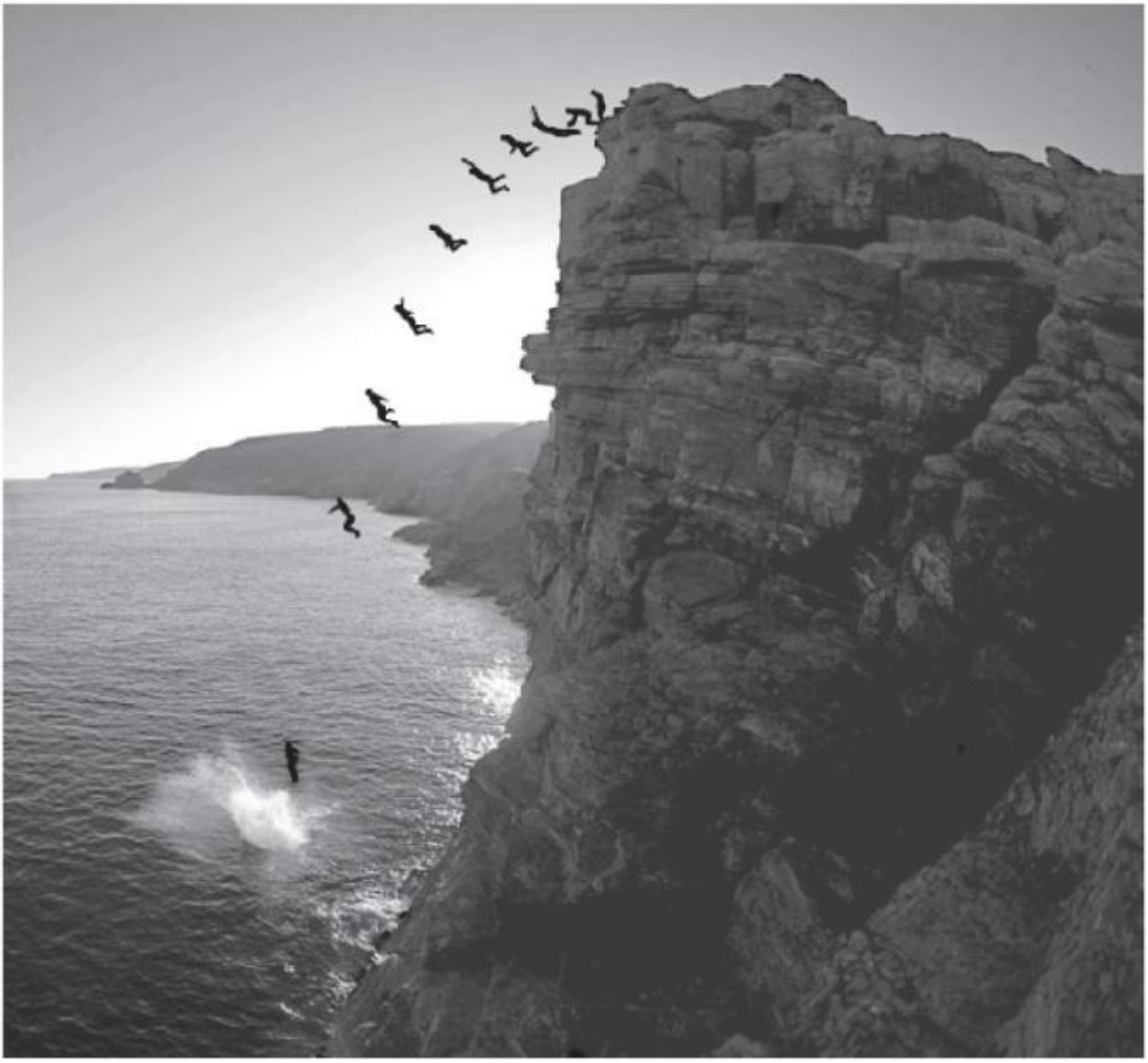
(Total for question = 12 marks)

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Q2.

The photograph shows a sequence of pictures of a man jumping 30 m from a cliff into the water below.

- Ignore the first picture and consider the second as representing the instant he jumps.
- Ignore the final picture (the splash), taking the tenth picture as showing the time at which he has fallen 30 m.



(a)



The diagram shows the tenth picture of the man.

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It is useful to mark the centre of gravity of the man for each picture before taking measurements to analyse the motion.

State what is meant by centre of gravity and mark its approximate position on the diagram.

(2)

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(b) The vertical distance between consecutive pictures increases, but the horizontal distance remains the same. Explain this observation.

(2)

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(c) By considering the vertical motion for pictures 2 to 10, show that the pictures are taken at a rate of about 3 per second.

vertical height fallen = 30 m

(3)

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(d) The vertical height between the second and tenth pictures is 30 m. Take measurements from the photograph and use them to show that the horizontal distance between these pictures is between 12 m and 15 m.

Record your measurements below.

(3)

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(e) Calculate the horizontal velocity and vertical velocity of the man for the tenth picture.

(4)

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Horizontal velocity = ...

Vertical velocity = ...

(Total for question = 14 marks)

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