VERTICAL MOTION UNDER GRAVITY 2

1. A boy throws a pebble from the top of a cliff 70·2 m high with an initial velocity of 14·7 ms^{-1} vertically upwards.

(a) Calculate the speed of the pebble 2 s after it has been thrown. [3]

(b) Calculate the speed of the pebble when it hits the ground at the foot of the cliff. [3]

(c) For how long is the pebble at least 3·969 m above the top of the cliff? [4]

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2. A pebble is projected vertically upwards with speed 10·5 ms^{-1} from a point *A* at the top of a cliff.

(a) Find the greatest height above *A* reached by the pebble. [3]

(b) The pebble reached the bottom of the cliff 5 s after being projected. Calculate the height of the cliff. [3]

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3. A pebble is projected vertically downwards with speed 2·1 ms^{-1} from the top of a well, which is 15·4 m deep.

(a) Calculate the speed of the pebble when it hits the bottom of the well. [3]

(b) Find the time taken by the pebble to reach the bottom of the well. [3]

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4. A stone is thrown vertically upwards with a speed of 14·7 ms^{-1} from a point *A* which is 49 m above the ground.

(a) Find the time taken for the stone to reach the ground. [3]

(b) Calculate the speed of the stone when it hits the ground. [3]

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5. A stone is projected vertically upwards from a point *A* at the top of a tower 70 m high. It reaches the highest point of its path after 2·5 s.

(a) Show that the speed of projection of the stone is 24·5 ms^{-1}. [2]

(b) Find the height of the stone above *A* 4 s after projection. [3]

(c) Calculate the speed of the stone when it reaches the ground. [3]

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6. A stone is thrown vertically **downwards** from the top of a cliff with an initial velocity of 1 ms^{-1} and hits the sea 2·5 seconds later.

(a) Find the speed with which the stone hits the sea. [3]

(b) Calculate the height of the cliff. [3]