M1
JAN
2007

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1. 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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5. A particle is projected vertically upwards with speed 22·05 ms^{-1}.

    (a) Calculate the time that elapses before the particle returns to the point of projection and the speed of the particle at that time. [4]

    (b) Find the greatest height of the particle above the point of projection. [3]

    (c) Determine the speed and direction of motion of the particle 3 s after projection. [4]

(980-01)

2. At time $t = 0$ s, a ball P is dropped from the top of a tall building 40 m high. At time $t = T$ s, another ball Q is dropped from a point on the same building 16·9 m above the ground. The balls reach the ground at the same time.

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    (a) Calculate the speed of P when it reaches the ground. [2]

    (b) Find the time when P reaches the ground. [2]

    (c) Calculate the value of T. [3]

    (d) State one assumption that you have made in your solution. [1]

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3. In order to estimate the depth of a well, a man drops a pebble from the top of the well and measures the time interval between the dropping of the pebble and hearing the pebble hit the water as 2·9 seconds.

Neglecting the time taken for the sound to reach the man, find estimates for the depth of the well and the speed of the pebble when it hits the water. [5]