

GCSE Physics A (Gateway)

J249/03 Physics A P1-P4 and P9 (Higher Tier)

Question Set 8

1

A student wants to find out the depth of a well.

She thinks that she can calculate this by dropping a stone into the well and timing how long it takes to hear the stone splash at the bottom.

(a) (i) Explain how she could use this measurement to find the depth of the well.

She can use the constant acceleration formulae " $v = u + at$ " and " $v^2 = u^2 + 2as$ " as she knows $u = 0$, $g = 10$ and t . Using $v = 0 + 10$ she can find v then $v^2 = 2(10)s$

[3]
to find s , which is the depth of the well

(ii) It takes 2.2 seconds for the stone to drop from rest and splash into the water at the bottom.

What is the speed of the stone when it hits the water?

$$v = u + at$$

$$v = 0 + 10(2.2)$$

$$v = 22$$

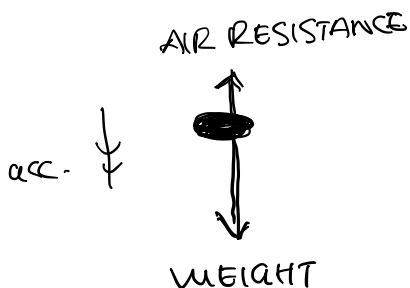
Answer =22..... m/s

[2]

(b) Describe the motion of the stone as it falls.

Assume it does not reach terminal velocity.

Use a free body diagram to help you.



* As the resultant force of the stone is downwards the stone falls with acceleration

[4]

Total Marks for Question Set 8: 9

Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

Higher tier only –

$$\text{force on a conductor (at right angles to a magnetic field) carrying a current} = \text{magnetic flux density} \times \text{current} \times \text{length}$$

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