# 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 $v^2 = 2(10)s$ to find $s$, which is the depth of the well

**[3]**

**(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?

$v = u + at$

$v = 0 + 10(2.2)$

$v = 22$

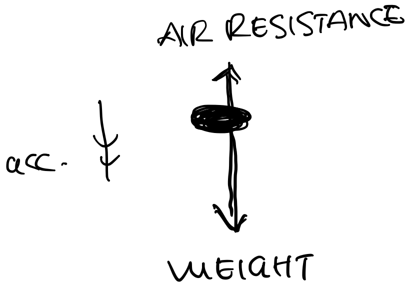
Answer = ....22.... m / s

**[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

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

change in thermal energy = mass × specific heat capacity × change in temperature

thermal energy for a change in state = mass × specific latent heat

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

potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil

## Higher tier only –

**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**