Glenalmond College | inspiring learning

SCHOLARSHIP EXAMINATION

PHYSICS

2015

Time: 30 minutes

Name: …….

School: …….

Candidates will need a pen, pencil and ruler

A calculator can be used for this paper

1

a) The moon follows a circular orbit around the earth at a distance of 400 000 km and it takes 28 days to complete each one.

What keeps the moon in this orbit**?** ----------(1)

b) Assuming that the orbit is a circle (circumference = 2 x π x radius).

Calculate how many kilometres the moon travels in each orbit. (3)

If your calculator does not have π on it then use the number 3.142 as its value.

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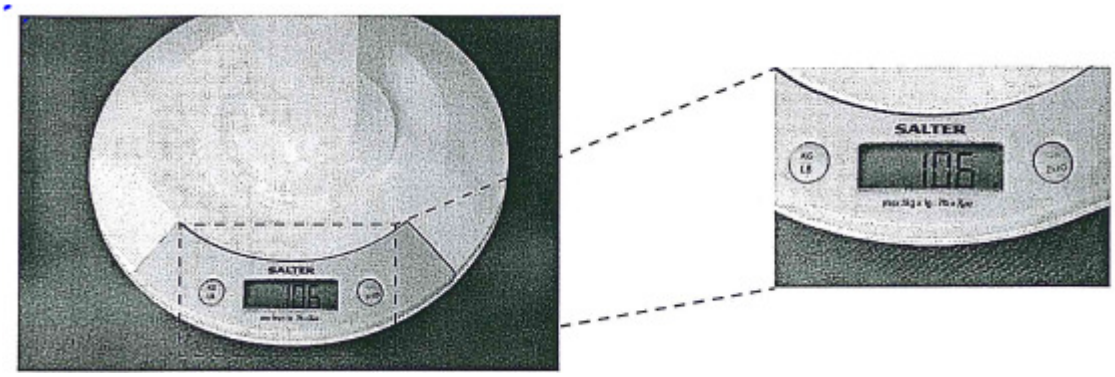
c) Show that its speed is about 1.0 km/s (3)

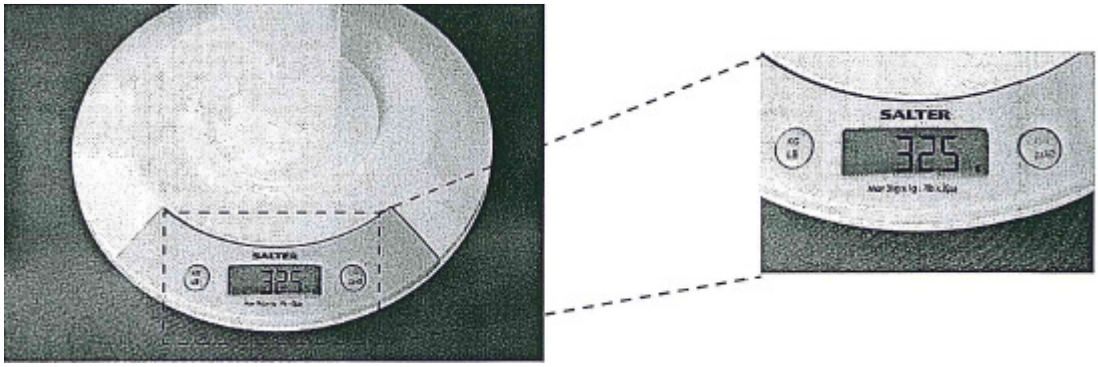
2(a)

Annabelle is investigating the density of a liquid. She uses scales which display **mass to the nearest gram** and a measuring cylinder that is marked with **volume in cm^3**.

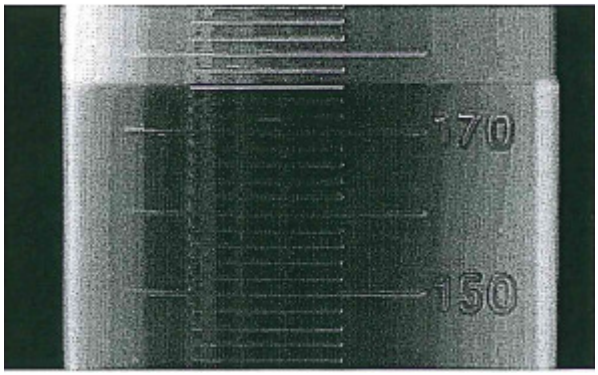
First she puts the empty measuring cylinder on the scales.



Then she puts some liquid into the cylinder on the scales



Finally Annabelle looks at the level of liquid in the cylinder.



Complete the results table on the next page by taking readings from the photographs above. (4)

mass of measuring cylinder and liquid	
mass of empty measuring cylinder	106 g
mass of liquid in cylinder	
volume of liquid	

(b) Show how Annabelle could use these results to calculate the density of the liquid. (3)

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unit of density

(c) Suggest how Annabelle could improve the experiment to give a more accurate value for the density. (1)

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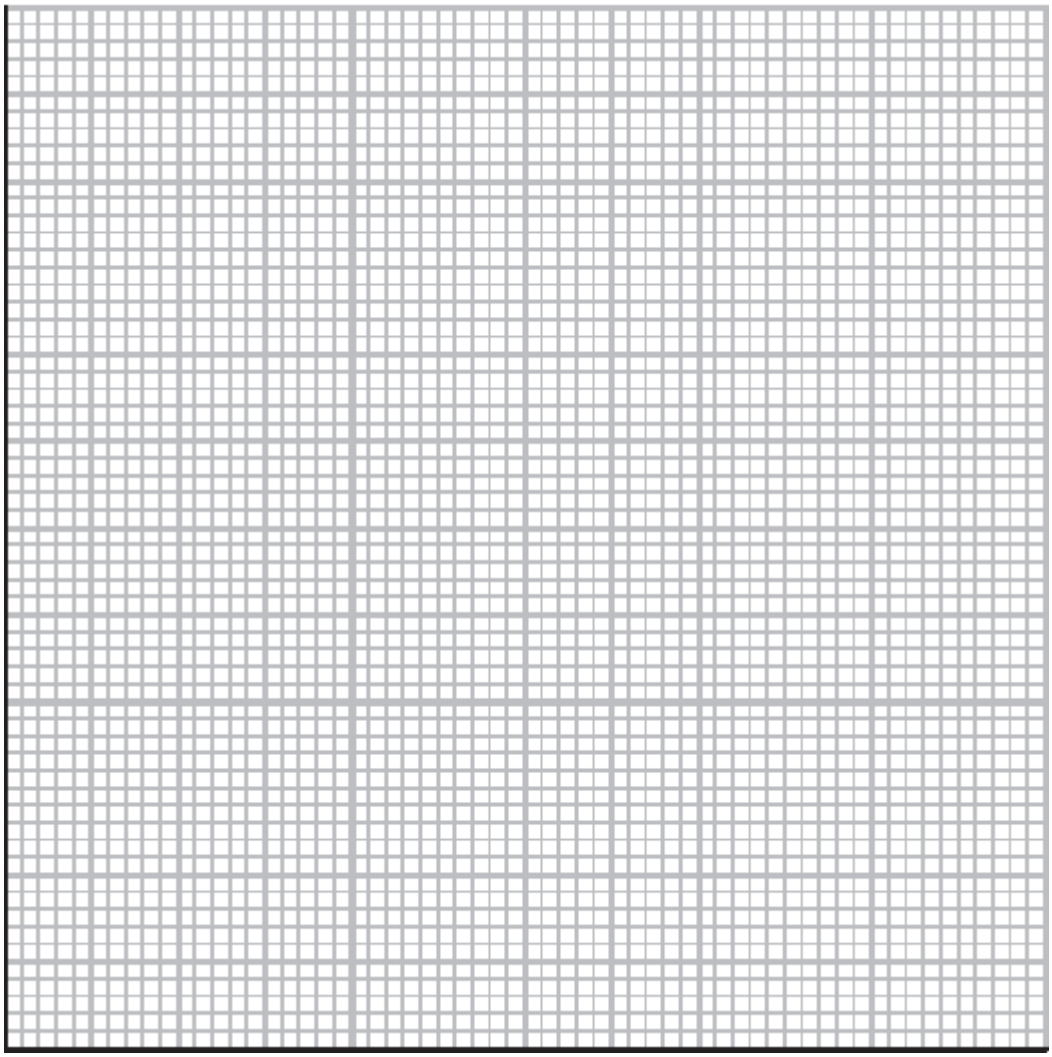
3 The circuit contains a bulb controlled by the variable resistor. Jack uses a voltmeter to measure the voltage applied to the bulb and an ammeter to measure the current flowing through it. He noticed that as he gradually increase the voltage the current also changed. The results are in the table on the next page.

voltage applied to the bulb/V	current flowing through the bulb/A
0.0	0.000
2.0	0.110
4.0	0.165
6.0	0.215
8.0	0.250
10.0	0.280
12.0	0.300

(d) On the graph paper below plot a graph of current on the vertical axes plotted against the voltage on the horizontal axis. (6)



(e) Add a best fit curved line to the plotted points (2)

(f) What current does your graph predict when the voltage across the bulb is 5.0 V? (2)

Show clearly how you got your answer

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4 Anuja is taking part in a freefall parachute jump. She jumps from an aeroplane at a height of 5000m and after 15 seconds is falling at a constant speed of 180 km/h. Including her parachute she weighs 560N.

(a) Draw her as a "stick person" and in a different colour carefully add labelled arrows showing the forces acting on her. (3)

She then pulls the rip-cord which deploys the parachute

(b) Draw her again one second later and again add labelled arrows showing the forces acting on her just after the parachute fully opens (2)

(c) Describe what would happen to her speed over the next 10 seconds. (2)
