Surname	Centre Number	Candidate Number
Other Names		2

GCE A LEVEL – NEW

1420U50-1A

S17-1420U50-1A

PHYSICS – A2 unit 5
Practical Examination

Experimental Task
TEST 1

TUESDAY, 21 MARCH 2017

1 hour 30 minutes

For Teacher's use only Award a mark of 0 or 1 for each of the following	
Height determined correctly – *(e)*(i)	
$\sin\theta$ determined correctly – *(e)*(i)	

For Examiner's use only	
Mark awarded	
Total	

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ADDITIONAL MATERIALS

In addition to this examination paper, you will require a calculator and a **Data Booklet**.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Pencil may be used to draw tables and graphs.
Write your name, centre number and candidate number in the spaces at the top of this page.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The total number of marks available for this task is 25.
Your teacher will directly assess your practical skills in part ***(e)*(i)**.
The number of marks is given in brackets at the end of each question or part-question.
You are reminded of the necessity for orderly presentation in your answers.

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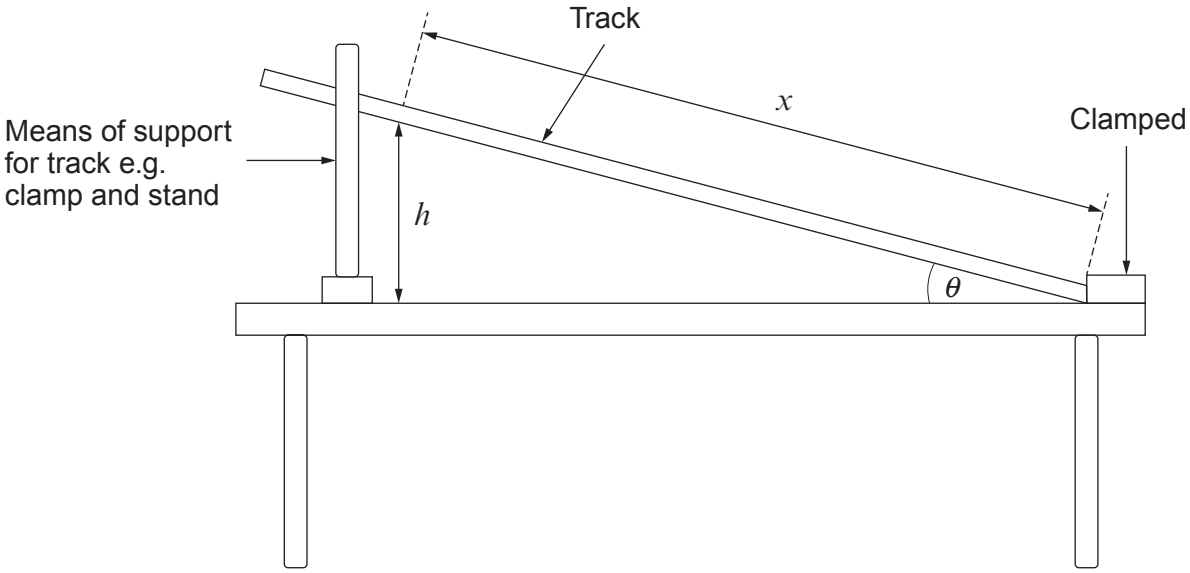
Examiner only

Answer **all** *questions.*

You are going to investigate how the time taken for a marble to roll down a slope depends on the distance travelled, x, and hence find its acceleration, a.
The height of the track above the bench, h, has been set for you and should not be adjusted.



If the marble starts from rest it can be shown from theory that:

$$x = \frac{at^2}{2}$$

where t is the time taken for the marble to roll a distance, x and a its acceleration.

Your task is to design, and carry out an experiment to investigate this relationship.

(a) Write a plan of how you will carry out an investigation to do this.
Include a risk assessment with your plan *(space provided on next page)*. [5]

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Risk assessment

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(b) Using the apparatus take sufficient measurements to complete this task. Draw a table to show your results clearly, including estimated uncertainties. State the resolutions of all instruments used. [5]

Do not dismantle the apparatus after use as you will need it to make further measurements later on in the investigation.

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(c) Plot your data on a suitable graph to determine acceleration. Remember, where possible, to **include** error bars on the graph. Draw a line of maximum gradient and a line of minimum gradient. [5]

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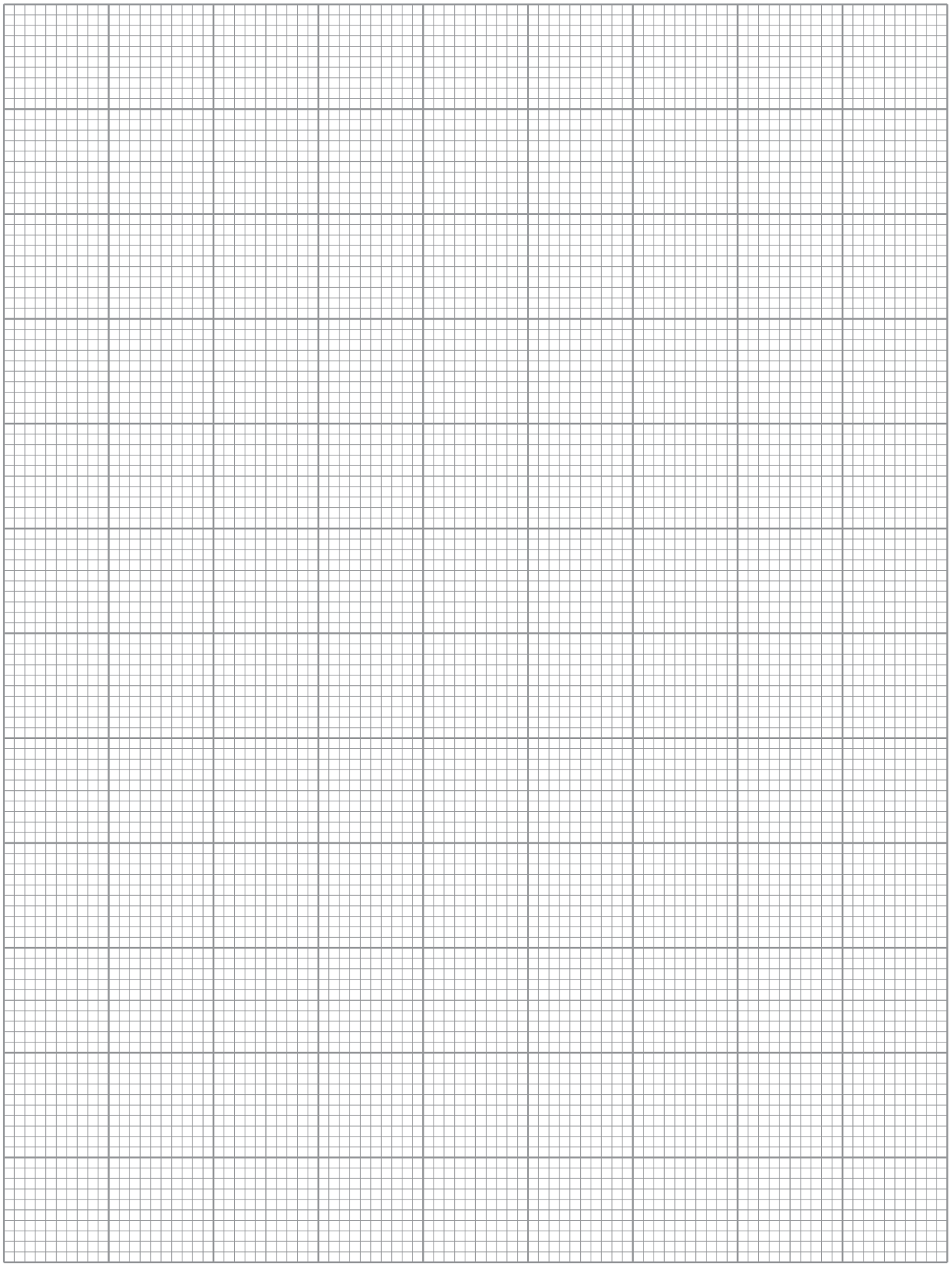

Examiner only

(d) (i) Determine the mean gradient of your graph and its **percentage** uncertainty. [3]

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(ii) Calculate a value for the acceleration along with its **absolute** uncertainty. [2]

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(e) It is suggested that:

$$\text{acceleration, } a = g \sin\theta$$

where g is the acceleration due to gravity, $9.81\,\text{m s}^{-2}$.

(i) By measuring and recording the height, h, and one additional length determine $\sin\theta$. [2]

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(ii) Theory suggests that the acceleration, a, calculated in part *(d)*(ii) should be lower than the acceleration calculated from $g \sin\theta$. Are your results in agreement with this theory? [1]

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(iii) Suggest why this difference is to be expected. [2]

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END OF PAPER

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