SuperNovaSchool
LEARN TO BE DISTINCT

Entry Test
Academic Session 2019-20

PHYSICS

Write in block letters:

Candidate Name

Date

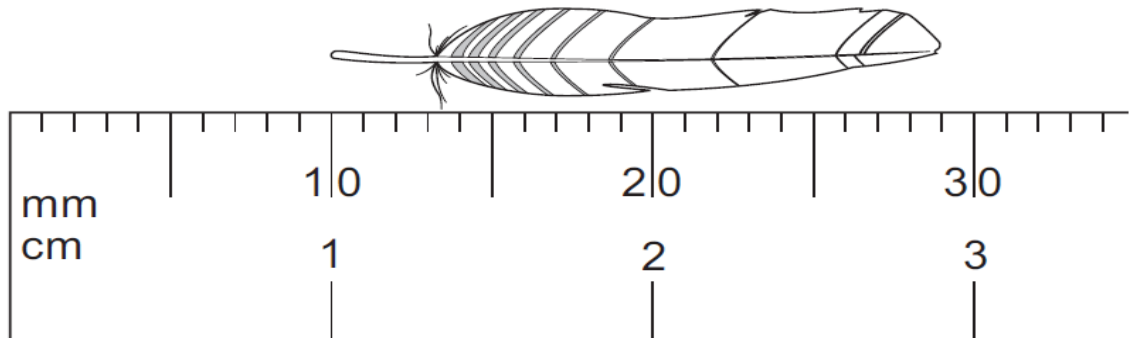**Kindly read the instructions carefully;**

1   **Answers must be written in ink.**

2   **Write the number of question distinctly before each answer.**

FOR OFFICIAL USE ONLY

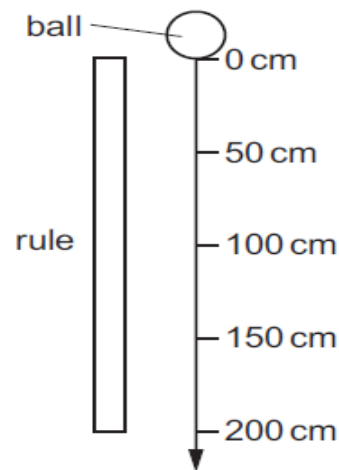| Total Marks		Marks Obtained		Percentage	

MCQS

1   The diagram shows an enlarged drawing of the end of a metre rule. It is being used to measure the length of a small feather.



What is the length of the feather?

A   19 mm   **B**   29 mm   **C**   19 cm   **D**   29 cm

2   In a laboratory, a ball is dropped in a vacuum and falls 200 cm.

Which statement describes the acceleration of the ball?

A   It is greater at 10 cm than at 200 cm.

B   It is greatest at 200 cm.

C   It is smaller at 50 cm than at 100 cm.

D   It is the same value at 50 cm as at 150 cm.

3

Which statement about the masses and weights of objects on the Earth is correct?

A   A balance can only be used to compare weights, not masses.

B   Heavy objects always have more mass than light ones.

C   Large objects always have more mass than small ones.

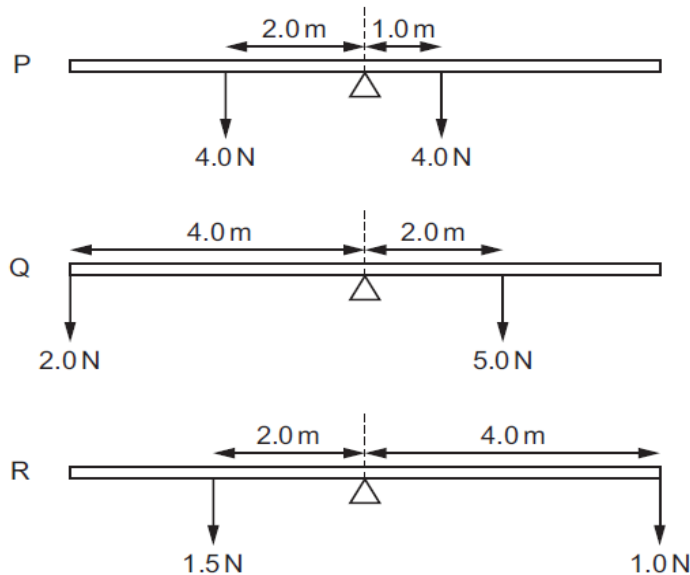**D**   Mass is a force but weight is not.

4   The speed-time graph shown is for a car moving in a straight line.
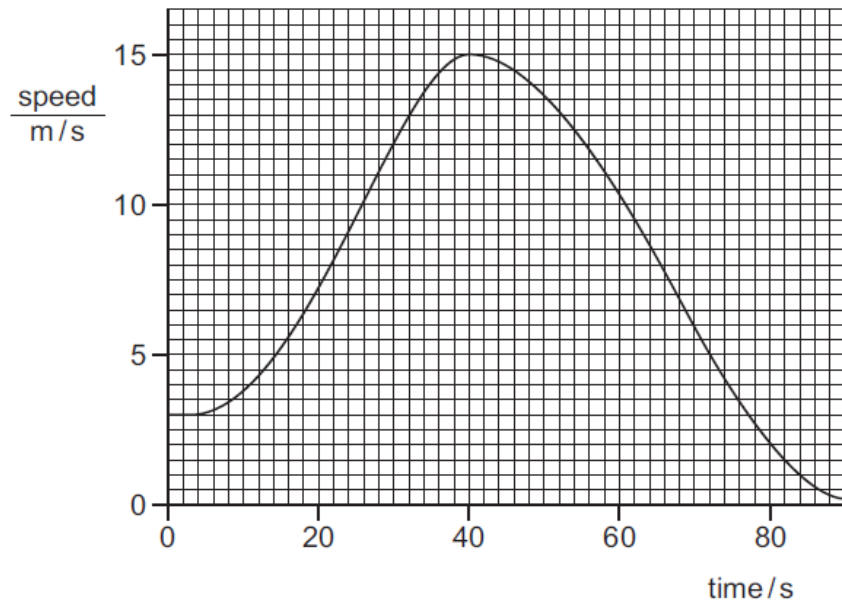
What is the acceleration of the car when the time is 40 s?

A $0\,\text{m/s}^2$ **B** $\dfrac{15-3}{40}\,\text{m/s}^2$ **C** $\dfrac{15}{40}\,\text{m/s}^2$ **D** $(15-3)\,\text{m/s}^2$

5   The diagrams show three uniform beams P, Q and R, each pivoted at its centre.

The two forces acting on each beam are also shown.

Which beams rotate clockwise?

A   P and Q only

B   P and R only

C   Q and R only

D   P, Q and R

6   A cup contains hot liquid.

Some of the liquid evaporates.

What happens to the mass and what happens to the weight of the liquid in the cup?

	mass	weight
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

7   Energy is released in some nuclear reactions.

Which nuclear reaction takes place in a nuclear power station, and which nuclear reaction takes place in the Sun?

	nuclear power station	the Sun
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion

8   A lorry of mass 4000 kg is travelling at a speed of 4.0 m/s.

A car has a mass of 1000 kg. The kinetic energy of the car is equal to the kinetic energy of the lorry.

What is the speed of the car?

A   2.0 m/s   **B**   4.0 m/s   **C**   8.0 m/s   **D**   16.0 m/s

9   A force acts on an object and causes the object to move a certain distance, in the same direction as the force.

Which row represents a situation in which the largest amount of work is done on the object by the force?

	force / N	distance moved / m
A	2.0	40.0
B	10.0	2.0
C	20.0	6.0
D	100.0	1.0

10   The diagram shows a simple mercury barometer.
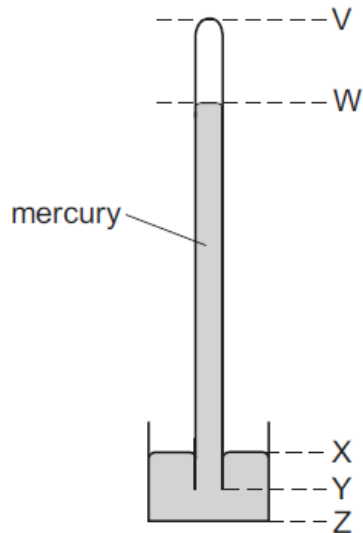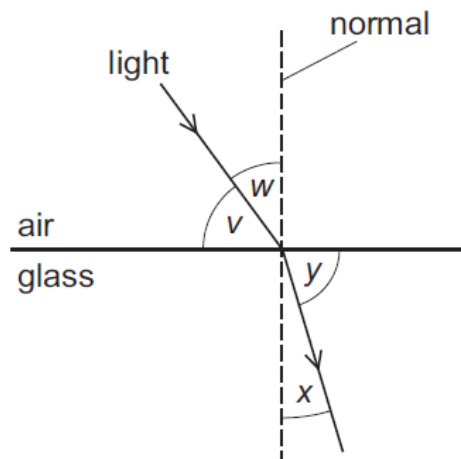

The atmospheric pressure increases.

Which distance increases?

A   VW   B   WY   C   XY   D   XZ

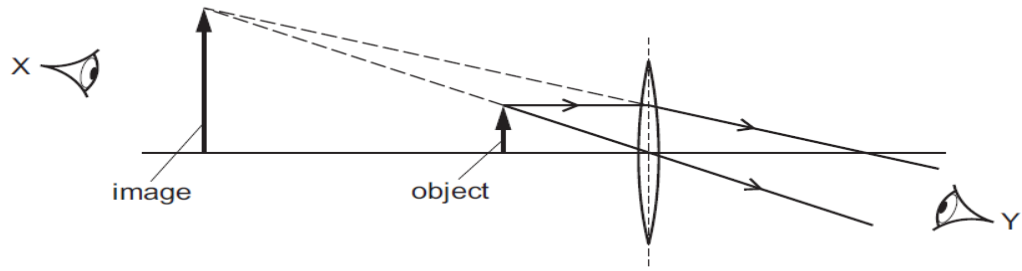11   The diagram shows light travelling from air into glass.

Four angles *v*, *w*, *x* and *y* are shown.

Which formula is used to calculate the refractive index *n* of the glass?

A $n = \dfrac{\sin v}{\sin y}$ B $n = \dfrac{\sin v}{\sin x}$ C $n = \dfrac{\sin w}{\sin y}$ D $n = \dfrac{\sin w}{\sin x}$

12   The diagram shows a converging lens forming an image of an object.

Which statement about the image is correct?

A   It is real and can be seen by an eye at X.

B   It is real and can be seen by an eye at Y.

C   It is virtual and can be seen by an eye at X.

D   It is virtual and can be seen by an eye at Y.

13   The diagram shows four solid objects resting on a horizontal surface. The objects all have the **same** weight, and are drawn to the same scale.

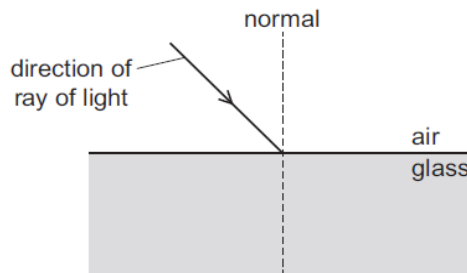Which object exerts the least pressure on the surface?
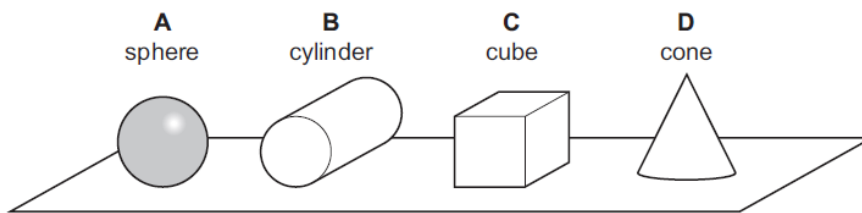
14   The points labelled F are the principal foci of a lens. A beam of parallel light is incident on the lens.

Which diagram shows the path of the light after it passes through the lens?

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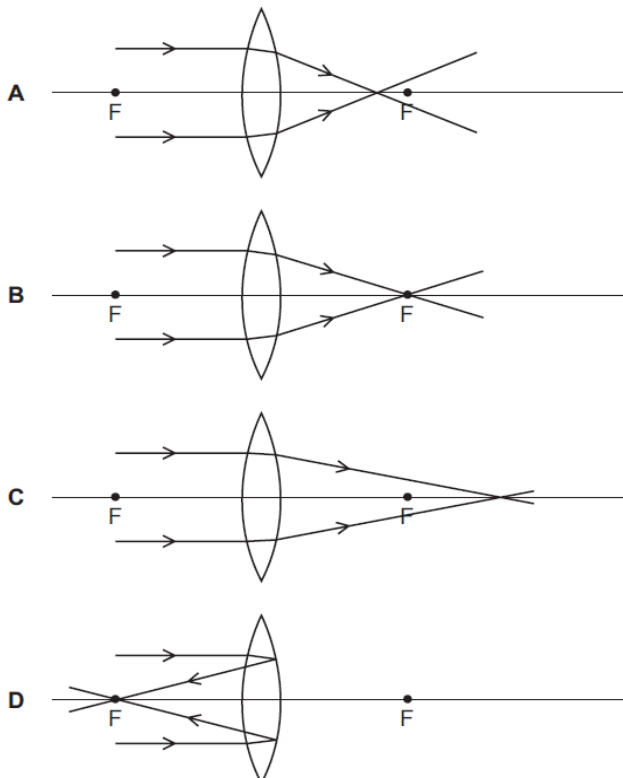
15 A ray of light is incident on the surface of a glass block.

Which row describes how the speed and the direction of the ray of light change when it enters the glass?

	speed in glass	direction in glass
A	decreases	closer to the normal
B	decreases	further from the normal
C	increases	closer to the normal
D	increases	further from the normal

16 A pendulum is set in motion and timed. The time measured for 20 complete swings is 30s.

What is the time for one complete swing of the pendulum?

A   0.67 s   B   0.75s   C   1.5s   D   3.0s

17 Two runners take part in a race.

The graph shows how the speed of each runner changes with time.
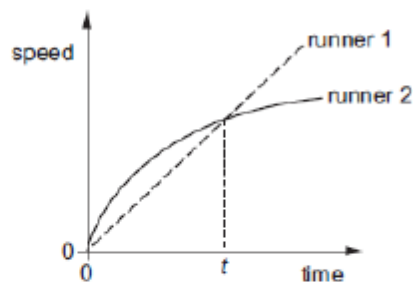
What does the graph show about the runners at time *t*?

A   Both runners are moving at the same speed.

B   Runner 1 has zero acceleration.

C   Runner 1 is overtaking runner 2.

D   Runner 2 is slowing down.

18 An object moves initially with constant speed and then with constant acceleration.

Which graph shows this motion?

A

speed

time

B

speed
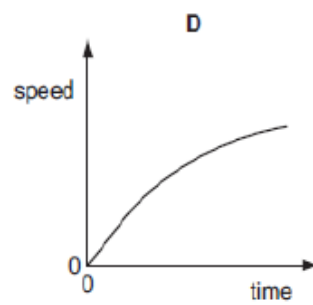
time

C

speed

time

D

speed

time
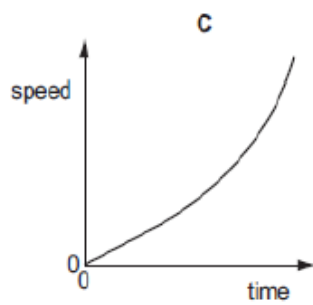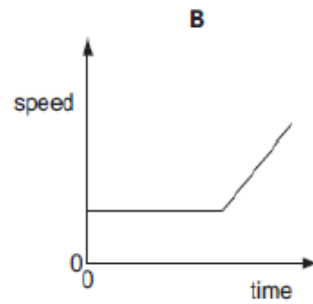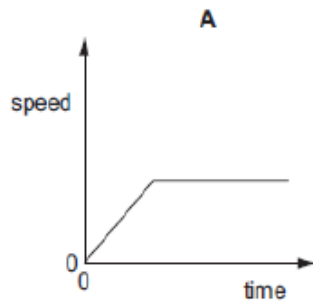
19 The weights of four objects, 1 to 4, are compared using a balance.

Which object is the lightest?

A object 1   B object 2   C object 3   D object 4

20 The mass of a full bottle of cooking oil is 1.30 kg.

When exactly half of the oil has been used, the mass of the bottle plus the remaining oil is 0.90 kg.
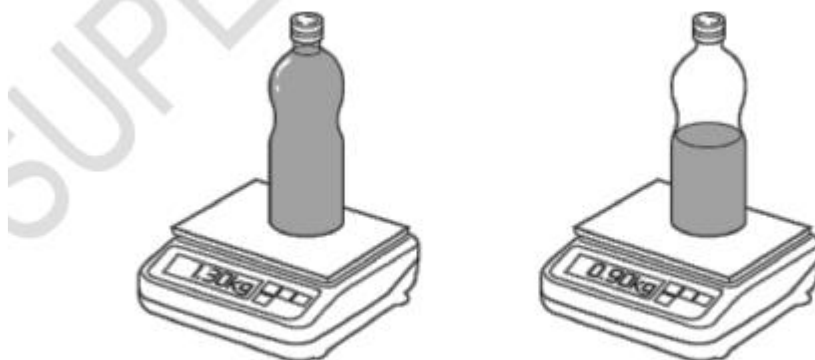
What is the mass of the empty bottle?

A 0.40 kg   B 0.50 kg   C 0.65 kg   D 0.80 kg

Q1 Fig. 3.1 shows a beam on a pivot. The beam is balanced at its centre of mass.
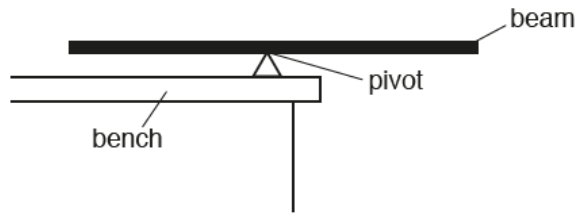
Fig. 3.1

(a) Explain the meaning of *centre of mass*.

....

....[1]

(b) Fig. 3.2 shows a load of 2.5 N on one side of the beam. The beam is balanced by a load of 1.5 N suspended by a thin string.

Fig. 3.2 (not to scale)

(i) Calculate the distance *x* from the pivot to the string.

distance from pivot = ...cm [3]

Q2 The bucket at the front of a tractor is used to push fence posts down into the ground, as shown in Fig. 5.1.
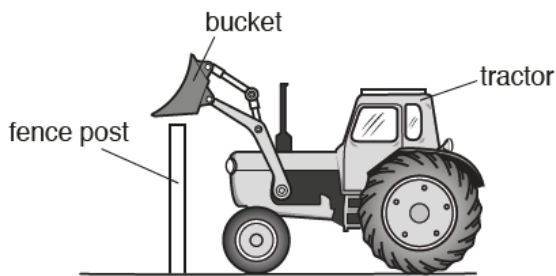
Fig. 5.1

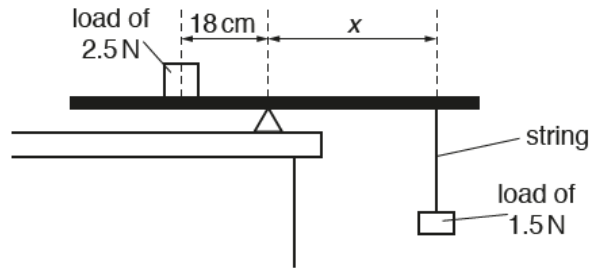The area of each post in contact with the ground is $100 \, cm^2$. When the bucket pushes a post, the downward force from the post on the ground is 6500 N.

(a) Calculate the pressure that the post exerts on the ground.

pressure = ...N/cm^2 [3]

(b) A farmer cuts the bottom of one of the posts to make it more pointed. The bucket applies the same force as before.

Explain the effect this has on the pressure exerted by the post on the ground.

....

....

....

....

....[2]

Q3   Fig. 1.1 shows how the speed of a car varies over a short time.

Fig. 1.1

(a) Different parts of the journey are labelled A, B, C, D and E.

   (i) State a part of the graph that shows the car at rest.
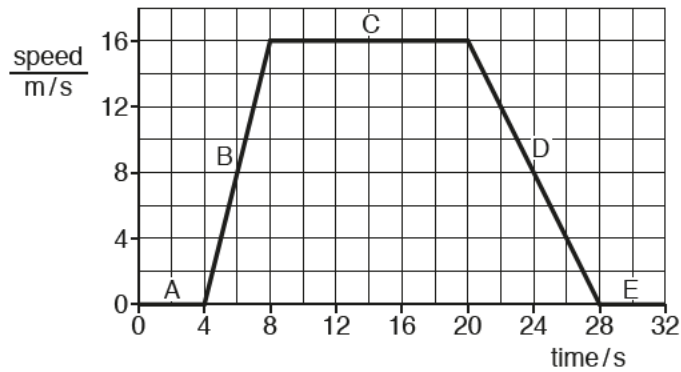
   ....[1]

   (ii) State a part of the graph that shows the car moving with constant speed.

   ....[1]

   (iii) During part of the journey the car decelerates.

   Calculate the distance travelled by the car when it is decelerating.

   distance travelled = ...m [3]

(b) Another car accelerates, from rest, starting at time 0 s. This car has a constant acceleration. Its speed at 20 s is 10 m/s.

   On Fig. 1.1, draw a line to show this motion.   [2]

(c) Describe, using Fig. 1.1, how you can decide which car has the greater acceleration.

   ....

   ....[1]

Q4   Fig. 10.1 shows two mirrors placed at right angles to each other. A ray of light is incident on mirror A, which is then reflected towards mirror B.
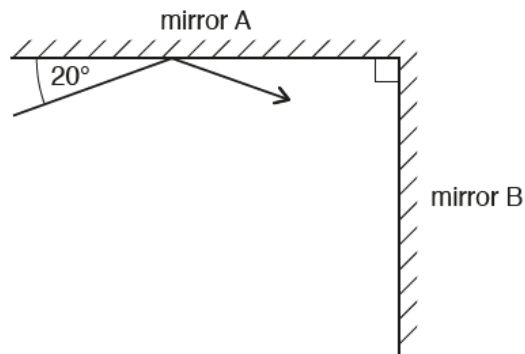

Fig. 10.1

(a)   Determine the angle of incidence of the ray on mirror A.

angle of incidence = ...[1]

(b)   (i)   The ray is also reflected from mirror B.

On Fig. 10.1, continue the path of the ray of light. Show the position of the reflected ray and the normal to mirror B.   [2]

Q1   The IGCSE class is investigating the period of oscillation of a simple pendulum.
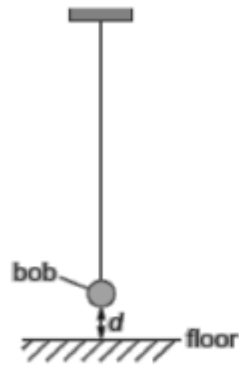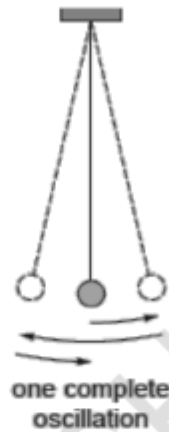
Fig. 1.1 shows the set-up.

Fig. 1.1   Fig. 1.2

(a) (i)   On Fig. 1.1, measure the vertical distance d from the floor to the bottom of the pendulum bob.

$d =$ ....

   (ii)   Fig. 1.1 is drawn one twentieth actual size. Calculate the actual distance x from the floor to the bottom of the pendulum bob. Enter this value in the top row of Table 1.1.

The students displace the pendulum bob slightly and release it so that it swings. They measure and record in Table 1.1 the time t for 20 complete oscillations of the pendulum (see Fig. 1.2).

Table 1.1

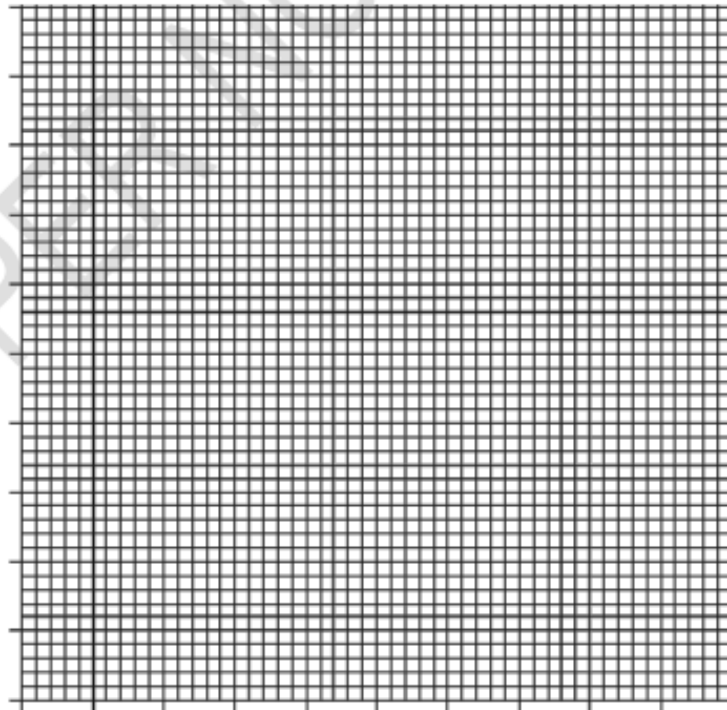| x/cm	t/s	T/s	T^2/s^2
	20.0		
20.0	19.0		
30.0	17.9		
40.0	16.8		
50.0	15.5		

[4]

(b) (i) Calculate the period T of the pendulum for each set of readings. The period is the time for one complete oscillation. Enter the values in Table 1.1.

(ii) Calculate the values of T^2. Enter the T^2 values in Table 1.1.

(c) Use your values from Table 1.1 to plot a graph of T^2/s^2 (y-axis) against x/cm (x-axis). Draw the best-fit line.

[5]

(d) State whether or not your graph shows that T^2 is directly proportional to x. Justify your statement by reference to the graph.

statement ....

justification ....

.... [1]