



Hong Kong Certificate of Education Mock Examination 2008

PHYSICS PAPER 1

Question-Answer Book

By C.W. Sham

Time Allowed : 1 hour 45 minutes

This paper must be answered in English

- Write your Candidate Number, Centre Number and Seat Number in the spaces provided on this cover.
- This paper consists of TWO sections, Section A and Section B. Section A carries 54 marks and Section B carries 36 marks.
- Answer ALL questions in each section. Write your answers in the spaces provided in this Question-Answer Book. Supplementary answer sheets will be supplied on request. Write your Candidate Number on each sheet and fasten them with string inside this book.
- Some questions contain parts marked with an asterisk (*). In answering these parts, candidates are required to give paragraph-length answers. In each of these parts, one mark is allocated to assess candidates' ability in effective communication.
- Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
- Take $g = 10 \text{ m s}^{-2}$.
- Unless otherwise specified, all the cells are assumed to have negligible internal resistance.

Please stick the barcode label here.

Candidate Number

	Marker's Use only	Examiner's Use only
	Marker	Examiner No.
Section A Question No.	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
Section B Question No.		
10		
11		
12		
Script Total		

Checker's Use only	Section B		
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Checker

Useful Formulae in Physics

- (a) Relationships between initial velocity u , uniform acceleration a , final velocity v and displacement s after time t :

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

- (b) *Potential energy* gained by a body of mass m when raised through a height h is mgh .

- (c) *Kinetic energy* of a body of mass m moving with speed v is $\frac{1}{2}mv^2$.

- (d) *Power* = *force* \times *velocity*

- (e) Equivalent resistance of two resistors R_1 and R_2 :

(i) *in series* = $R_1 + R_2$

(ii) *in parallel* = $\frac{R_1 R_2}{R_1 + R_2}$

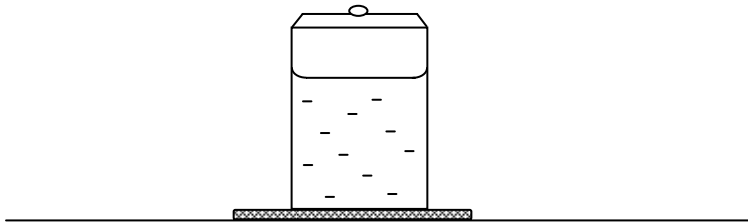
- (f) *Power* = *voltage* \times *current*

Section A (54 marks)

Answer ALL questions in this section and write your answers in the spaces provided in this Question-Answer Book.

Question	1	2	3	4	5	6	7	8	9
Mark	6	5	5	8	7	6	6	4	7

1.



Billy prepares a cup of hot coffee with mass 0.35 kg at 95°C. He chooses a white cup to contain the coffee. He then covered it with a lid and places the cup on a cushion above the table surface as shown in the above figure. (Specific heat capacity of coffee = 4200 J kg⁻¹ °C⁻¹)

(a) State THREE ways of reducing heat lost to the surroundings by the cup, and explain briefly. (3 marks)

(b) If the hot coffee loses heat at a constant rate of 60 J s⁻¹ to the surroundings, and the optimum temperature of drinking the coffee is 55°C, how long does it take so that Billy should drink the coffee ? State ONE assumption in your calculation. (3 marks)

2.

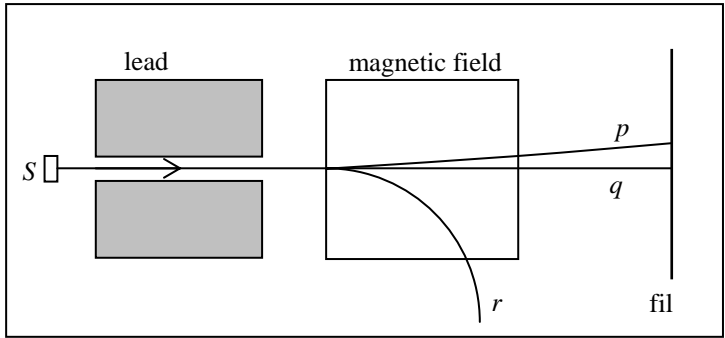
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
City A	5°C	8°C	15°C	20°C	25°C	28°C	30°C	37°C	30°C	24°C	13°C	2°C
City B	19°C	21°C	23°C	24°C	25°C	27°C	28°C	28°C	25°C	23°C	21°C	18°C

The above table shows the average monthly temperature of two cities A and B. The two cities have similar latitudes and altitudes. One of them is Hong Kong and the other is inside the mid-land of America.

*(a) Which city do you think represents Hong Kong ? Explain briefly. (4 marks)

(b) In Hong Kong, all the power plants for generating electricity are located along the seaside. State one important reason behind this choice of the location. (1 mark)

3. A radioactive S emits three different types of radiation. The figure below shows the three types of radiation entering a region of uniform magnetic field.



(a) Which path represents the alpha radiation ? Explain briefly. (2 marks)

(b) What is the direction of the magnetic field ? (1 mark)

(c) State and explain one necessary precaution in this experiment. (2 marks)

4. Explain the following phenomena :

(a) In autumn, some 'click' sounds may be heard when you put off your sweater. (1 mark)

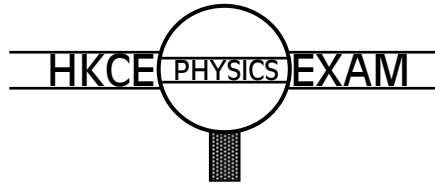
(b) The voice of your form teacher can be heard and identified before he enters the classroom. (2 marks)

(c) The road surface seems shiny in hot summer at day time. (1 mark)

(d) Mist appears above a cup of hot water. (2 mark)

(e) The sea waves slow down when they move towards the beach. (2 marks)

5.



Mary uses a lens to look at some print on a paper. The image of the word “PHYSICS” is shown above.

- (a) State the nature of the image formed. (2 marks)

- (b) What kind of lens is held by Mary ? (1 mark)

- (c) Sketch a ray diagram to show how the image of the word is formed by the lens. (3 marks)

- (d) If Mary moves the lens slightly away from the paper, would the image become greater or smaller ? (1 mark)

6. Read the following passage about electrostatics and answer the questions that follow :

Electrostatics was the first branch of electricity to be investigated and for a long time was regarded as a subject of no practical value. In recent years this has changed and it now has important industrial applications.

The electrostatic precipitation of flue-ash that would otherwise be discharged into the atmosphere from modern coal-fired power stations is a vital factor in the reduction of pollution. An average power station produces about 30 000 kg of flue-ash per hour. Precipitators are built to remove 99% of the ash from the flue gases before they reach the power station chimney. A precipitator is made up of a number of wires and plates. The wires are negatively charged and give a similar charge to particles of ash which are then attracted to the positive plates. These are mechanically shaken to remove the ash which is collected and used as a by-product. Electrostatic precipitation is also important in the steel, cement and chemical industries where flue-gas outputs are high.

Electric charges can build up due to friction on aircraft in flight and on plastic sheeting in industry, creating a potential explosion hazard unless preventive steps are taken. In the case of aircraft the rubber tyres are made slightly conducting so that the charge leaks away harmlessly at touch-down. The crackling that occurs when someone steps from a car with plastic seat covers is also due to static charges causing the insulating of the surrounding air to break down. A flash of lightning is nature's most spectacular electrostatic event. .

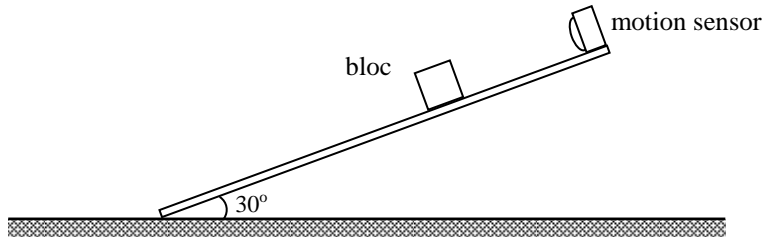
(a) Other than power stations, state one type of industry that would also produce large amount of flue-gas. (1 mark)

(b) In Hong Kong, the China Light and Power Company has built a coal-fired power station near Tuen Mun. Calculate the amount of flue-ash that can be collected by the precipitator in one day. (2 marks)

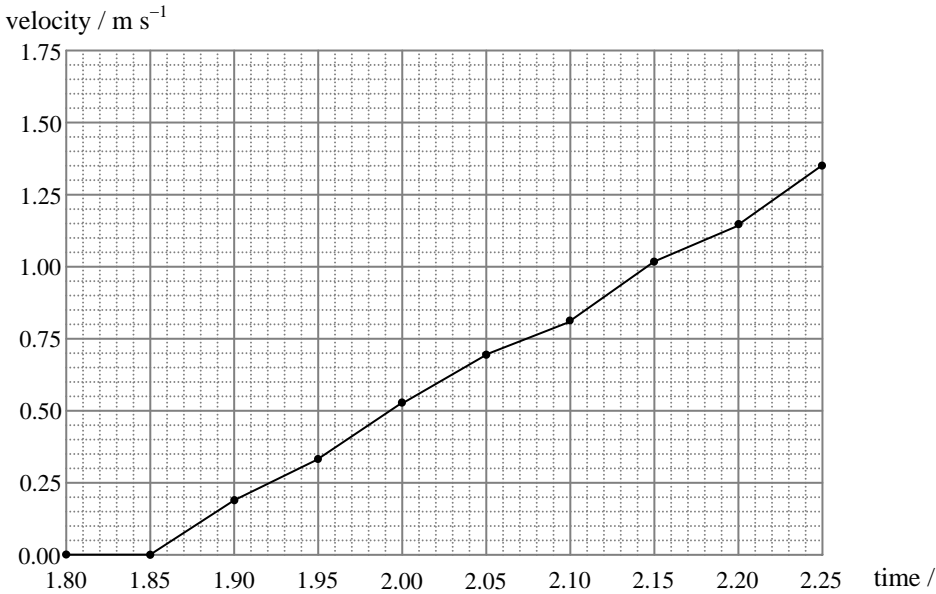
(c) The electrostatic charges built up in an aircraft in flight may lead to explosion. How can this be avoided ? (2 marks)

(d) State ONE application of electrostatics that has not been mentioned in the above passage. (1 mark)

7.



A student releases a block of mass 0.256 kg from rest along an inclined plane as shown in the above figure. A motion sensor records the velocity-time graph in the figure below.

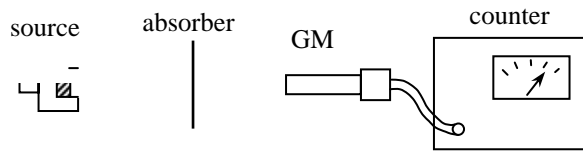


(a) Find the above graph, find the distance travelled by the block. (2 marks)

(b) Find the acceleration of the block. (2 marks)

(c) Hence determine the friction acting on the block by the inclined plane. (2 marks)

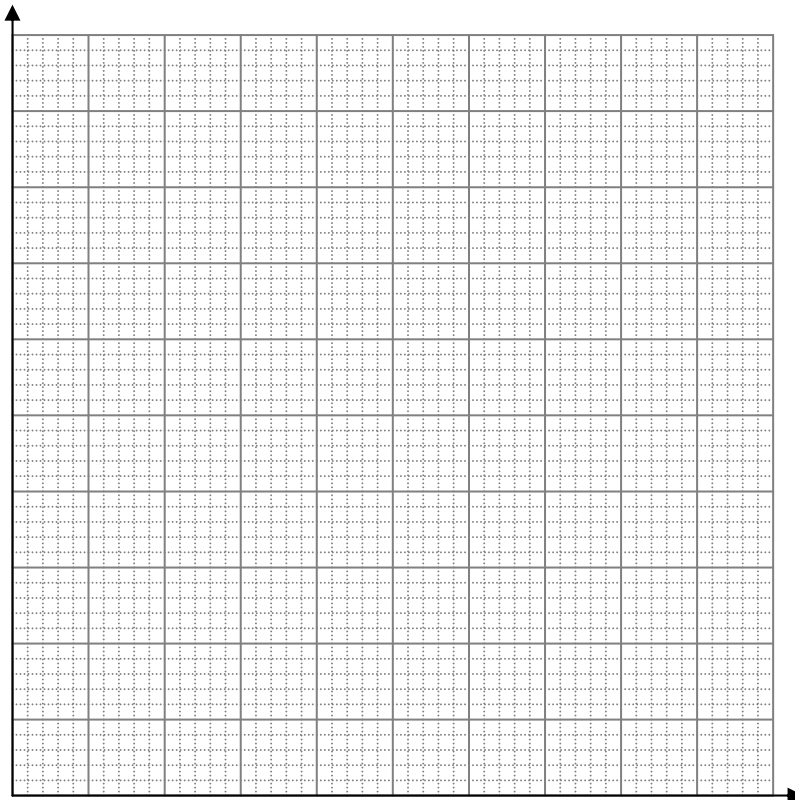
9. In an experiment to investigate the absorption of radiations by absorbers, a source emitting β and γ radiation is placed at a distance of 20 cm from a GM tube as shown.



When different thicknesses, d , of aluminium plates are used as absorbers, the corrected count rate, C , in counts per minute are tabulated as follows :

d / mm	1	2	3	4	5	6	7	8
$C / \text{c.p.m.}$	3420	2790	2310	1950	1800	1710	1650	1630

- (a) Plot a graph of the corrected count rate, C , ranging from 1500 c.p.m. to 3500 c.p.m. against the thickness, d , on a graph paper. (3 marks)



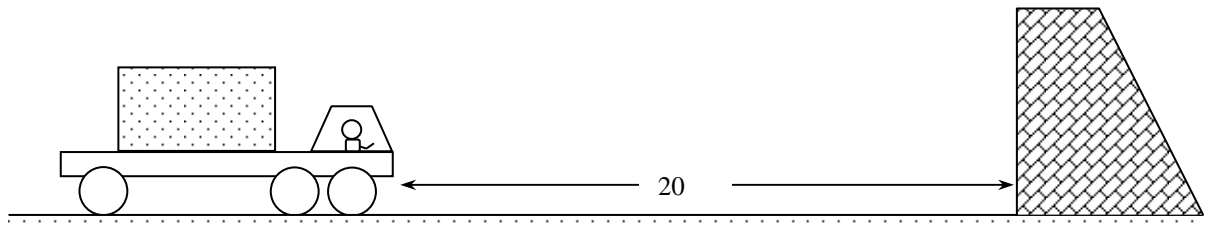
- * (b) A factory produces two different thicknesses of aluminium plates A and B . Thickness of plate A is 2 mm and that of plate B is 7 mm. If the source is used in a thickness gauge to monitor the thickness of the aluminium plates, which product, A or B , is more suitable to be monitored? Explain briefly. (4 marks)

Section B (36 marks)

Answer ALL questions in this section and write your answers in the spaces provided.

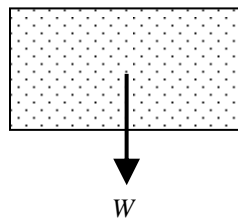
Question	10	11	12
Mark	12	12	12

10. A lorry carries a heavy load of mass 2500 kg on a horizontal straight road as shown in the figure below. The driver has a mass of 80 kg. The lorry is moving at a uniform velocity of 70 km h^{-1} .

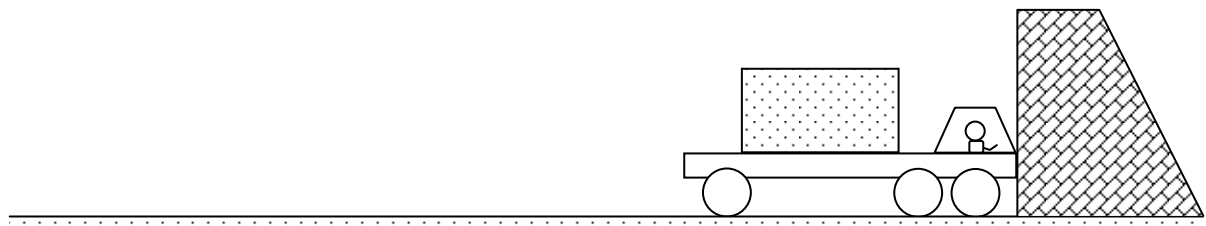


Suddenly, the driver observes that there is a rigid wall in front of him and he applies the brake hardily to decelerate the lorry.

- (a) The figure below shows the weight acting on the load. However, there are two other forces acting on the load when the lorry is decelerating.
- (i) In the figure below, draw and label the other two forces acting on the load. (2 marks)



- (ii) For these two action forces, there are two other forces which form action and reaction pair with them. Write down each of these two reaction forces and state their directions. (2 marks)
- (b) Suppose the maximum friction between the lorry and the ground is 0.64 times of the total weight of the lorry.
- (i) Determine the minimum braking distance that the lorry takes to come to rest. (2 marks)
- (ii) Hence determine the speed that the lorry collides with the wall. (2 marks)
- (c) Finally, the lorry collides with the wall and rebounds with a speed of 5 m s^{-1} . The collision takes a duration time of 0.28 s. The wall does not collapse after the collision.



- (i) Find the average force acting on the driver during the collision. (2 marks)
- (ii) Would the total momentum of the lorry and the wall be conserved during this collision? Explain briefly. (2 marks)

