ANSWERS TO IGCSE EXAMS

In

PHYSICS

for

PAPER 2

Of

MAY/JUNE SESSION 2001

By
Ramadan K. Abu-Msameh
http:// ramadan.50megs.com

Answers of PAPER 2 of MAY/JUNE SESSION 2001
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Ramadan K. Abu-Msameh
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Candidate Name	Center Number	Candidate Number

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

0625/2
1 hour

PHYSICS
PAPER 2
MAY/JUNE SESSION 2001
Candidates answer on the question paper.
No additional materials required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES
Write your name, Center number and candidate number in the spaces at the top of this page.
Answer all questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1kg to be 10N (i.e. acceleration of free fall = 10 m/s^2).

This question paper consists of 13 printed pages and 3 blank pages.

SB *(SC/CG) QF*10309/4
 [Turn over

1. A machine operator is making metal cylinders. The factory inspector wants to check whether the machine operator is working fast enough.

(a) He tells the operator to start working when the clock on the wall of the factory shows the time in Fig. 1.1.

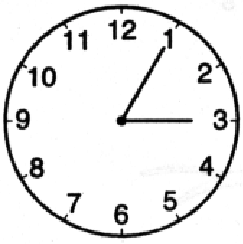


Fig. 1.1

What time is this? Tick one box.

3.01 ☐
1.03 ☐
3.05 ☑
5.03 ☐

[1]

(b) The operator is told to stop when the clock shows the time in Fig. 1.2.

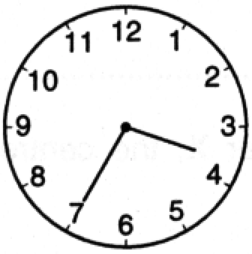


Fig. 1.2

What time is this? Tick one box.

3.07 ☐
7.03 ☐
3.35 ☑
4.35 ☐

[2]

(c) How long did the test take?

3:05-3:35=30 minutes

length of test = **30** minutes [1]

(d) During this time, the operator makes 5 cylinders. What is the average time to make one cylinder?

average time= total time/No Cylinders = 30/5 =6 minutes

time to make one cylinder **6** minutes [2]

2 (a) What is meant by the term *moment of a force?[2]*

Moment of a force is a measure of the turning effect of the force about a particular point and is defined as: moment=force x perpendicular distance from the point.

(a) The sawn-off branch of a tree is laid across a log.

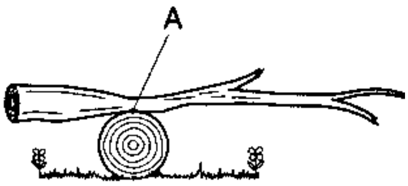


Fig. 2.1

The branch balances when point A is in contact with the log.

(i) How does the moment of the part of the branch to the left of A compare with the moment of the part to the right of A?

The anticlockwise moment of left side of "A" is equal to clockwise of right side of "A" because the branch is balanced at "A"

(ii) On Fig. 2.1. mark clearly, using the letter X, the center of mass of the whole branch.

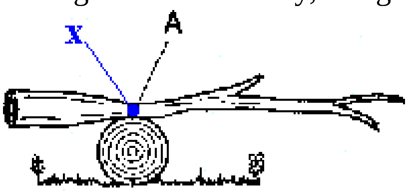


Fig. 2.1

[2]

3 A rubber balloon is filled with air

(a) Describe how the pressure in the balloon is caused by the air molecules.

Gas molecules are in a state of continuous motion in all directions, and they are constantly bombarding the walls of the container. When the molecules bounce off the walls, they produce an outward force on the walls which causes the outward pressure of the gas on the walls of the container.

(b) The temperature of the air in the balloon increases.

(i) What happens to the air molecules?

When the temperature rises, the gas molecules gain kinetic energy and move faster and thus strike the container wall more frequently and with greater force. Therefore, the total force exerted per unit area of the walls is greater and the pressure increases.

[3]

(II) What happens to the pressure in the balloon, and why?

what happens

the pressure increases

why

Because the gas molecules strike the container wall more frequently and with greater force. Therefore, the total force exerted per unit area of the walls is greater.

[3]

4 Fig. 4.1 shows the view from above of a triangular object on one side of a vertical mirror.

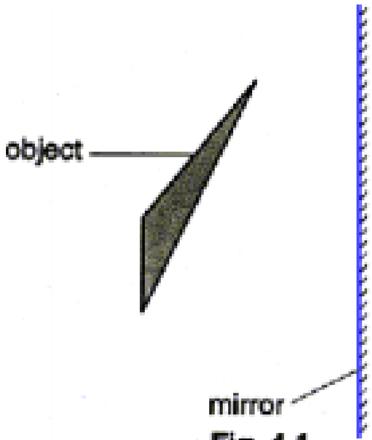
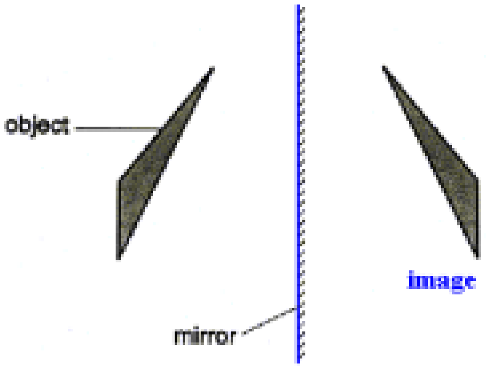


Fig. 4.1

On Fig. 4.1,carefully draw the image formed by the mirror [3]

the object image is shown on the same graph to the right below



5 Fig. 5.1 represents a wave.

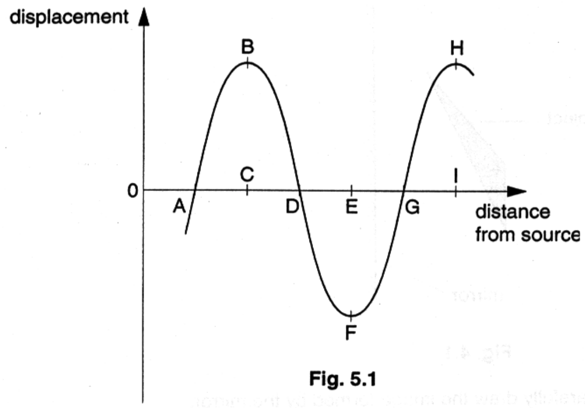


Fig. 5.1

(a) Making use of the letters on Fig. 5.1, state which distances you would measure to find

(I) the wavelength of the wave: measure between **BH** and **AG**

(ii) the amplitude of the wave: measure between **CB** and **HI (or EF)**

[2]

(b) What is meant by the *frequency* of the wave?

The number of vibrations or waves per second is called frequency and is measured in hertz (Hz).

[2]

(c) One complete wave takes 0.2s to generate.

Calculate the frequency of the wave. **f=1/T=1/0.2= 5 Hz**

frequency of wave = **5** Hz [2]

6 A charged ebonite rod has negative charges all over its surface. It is held above three small pieces of aluminum foil, one positively charged, one negatively charged and one uncharged. This is shown in Fig. 6.1.

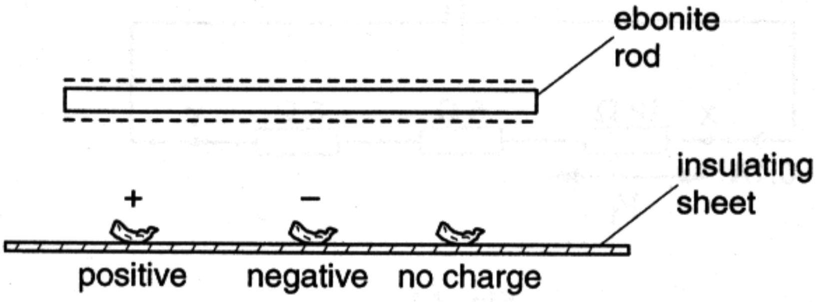
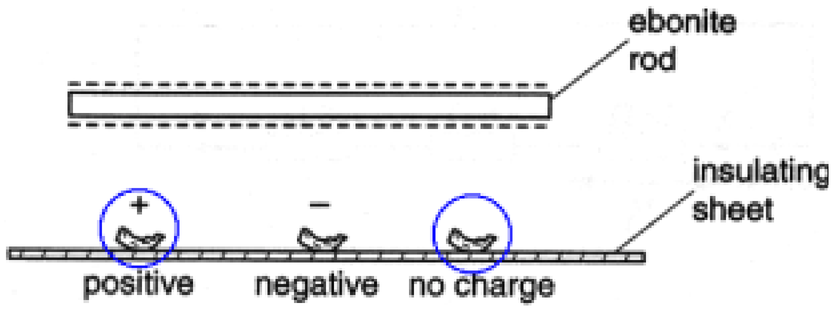


Fig. 6.1

(a) Put a circle around any of the pieces of aluminum which are attracted by the ebonite rod. [2]



(b) Ebonite is an insulator. What is meant by the term *insulator?[2]*

Insulator is a material which does not conduct a charge.

(c) Write down the name of another insulating material. [1]

Wood, air, plastic, gases, oil …etc.

7 Three resistors are connected in series between X and V. When a cell is connected across **XV,** the current at X is 0.1 A, as shown in Fig. 7.1.

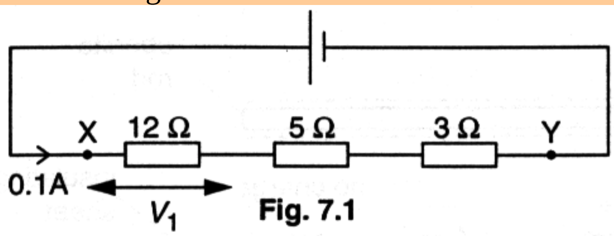


Fig. 7.1

(a) What is the value of the current at Y? **0.1** A [1]

(b) Calculate V_1, the pd. across the 120 resistor.

V_1=I R_1 =0.1 x 12 =1.2 volts

pd. across the 12Ω resistor =**1.2** V [2]

(c) What instrument would you use to measure the pd. V_1?[1] **Voltmeter**

(d) How does the e.m.f. of the cell compare with your answer to part (b)? Tick one box.

e.m.f. of cell is larger than V_1 ☑

e.m.f. of cell is smaller than V_1 ☐

e.m.f. of cell is same as V_1 ☐

[1]

(e) Calculate the combined resistance of the three resistors.

$R_{eq}=R_1+R_2+R_3$ =12+5+3=20 ohms

combined resistance =**20** Ω [2]

8 (a) Fig. 8.1 shows a simple transformer.

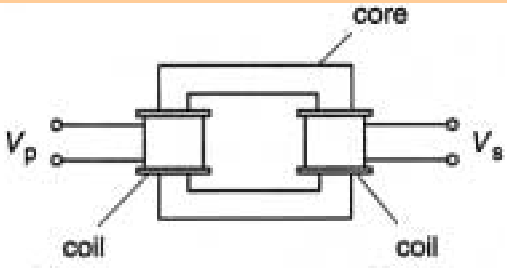


Fig. 8.1

Vs= **Vp Ns/Np** V

Complete the following sentences about the transformer

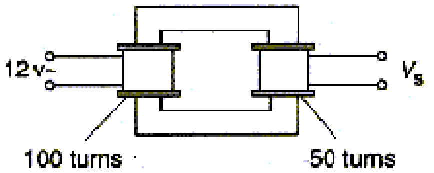
'The transformer only works using **alternating (A.C.)** current.

It steps the potential difference up or down according to the equation **Vp/Vs=Np/Ns**

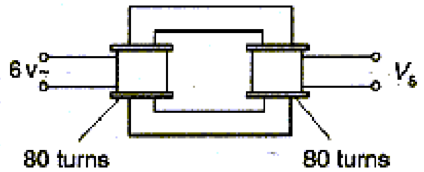
The core of the transformer is made of **a soft magnetic material** [3]

(b) In each of the following examples, state the potential difference V_s.

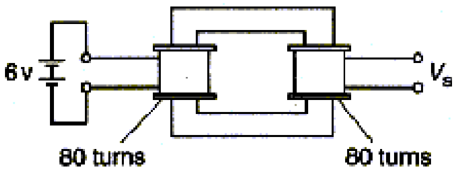
i. **Vp/Vs=Np/Ns, Vs=Vp Ns/Np= 12 x 50/100= 6 V A.C.**



ii. **Vp/Vs=Np/Ns, Vs=Vp Ns/Np= 6x 80/80= 6 V A.C.**



iii. **Transformers do not operate by D.C. so Vs=0.**



9 The table below gives some data about an accelerating car

time/s	0	1	2	3	4	6	8	10
speed m/s	0	5	10	15	19	24	25	25

(a) On Fig. 9.1, plot the speed/time graph for the motion.

Plot is shown below in Fig. 9.1

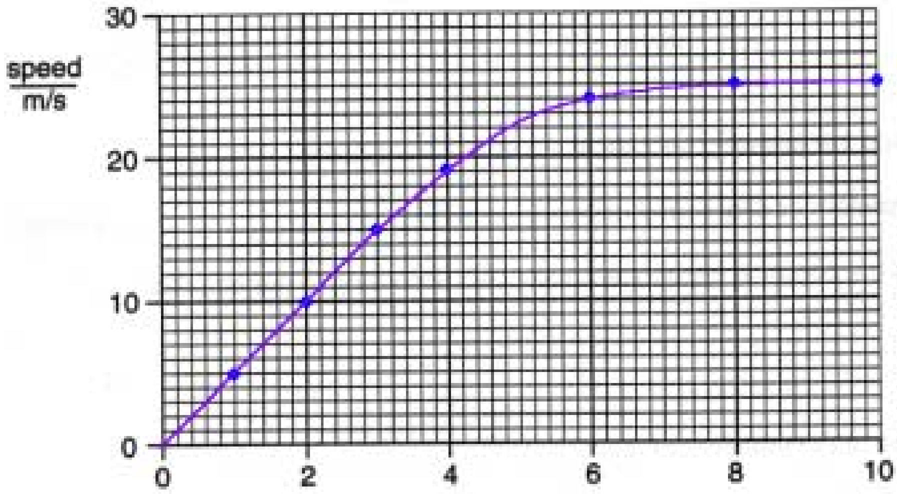


Fig. 9.1

(b) How far did the car travel during the first 3 s?

distance=area= ½ base height = ½ 3 15=22.5 m

distance traveled =**22.5** m [3]

(c) What was the top speed of the car? **25** m/s [1]

(d) How far would the car travel in 3s if traveling at its top speed?

Distance=speed x time= 25 m/s 3 s=75m

distance traveled =**75** m [3]

10 Two workers, A and 8, are lifting boxes of food in a store-room. The boxes all weigh the

same and are lifted from the floor on to the same shelf.

A is able to lift 10 boxes in 2 minutes.

B takes longer than 2 minutes to lift 10 boxes.

(a) How does the total work done by A compare with the total work done by B?

The total work done by "A" is more than that of "B" because it took him less time to lift the same "10" boxes than "B".

[1]

(b) How does the power of A compare with the power of B?

The power of 'A' is more than that of "B"

f

(c) (i) Which form of energy in their bodies do the workers transform in order to do the work lifting the boxes? **Chemical energy**

(ii) From what did they obtain this supply of energy? **from food** [2]

(d) The boxes have more energy when they are on the shelf than when they were on the floor. Which form of energy has increased? **Gravitational Potential Energy** [1]

(e) One of the boxes falls off the shelf and crashes to the ground. Describe the energy changes as the box falls and hits the ground.

As the object falls its gravitational potential energy changes into ⇒ Kinetic energy. When the object hits the ground its kinetic energy changes into ⇒ heat energy + sound + work done to penetrate the ground surface.

(potential energy⇒ Kinetic energy⇒ heat energy + sound + work)

[4]

11 (a) A builder is building a brick wall. He has 500 bricks delivered, all neatly stacked together. Each brick measures 0.2 m x 0.1 m x 0.06 m and is a solid block, as shown in Fig. 11.1.

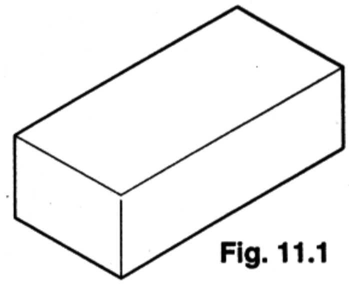


Fig. 11.1

(I) Calculate the volume of one brick.

Volume= height x width x length= 0.2 x 0.1 x 0.06=0.0012 m^3

volume of one brick =**0.0012 m^3**

(ii) The brick has a density of 2400 kg/m^3. Show that the mass of one brick is 2.88 kg.

mass= density x volume= 2400 x 0.0012=2.88 kg

(iii) What is the mass of the stack of bricks?

total mass= Bricks No. x mass of each = 500 x 2.88=1440 kg

mass of stack =**1440** kg [6]

(b) Some other bricks have the same size and are made of the same material, but they have a hollow in one face, as shown in Fig. 11.2.

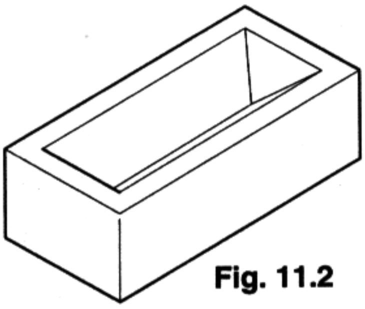


Fig. 11.2

(I) How does the mass of one of these bricks compare with the mass of one of the bricks in (a)(ii)?

The mass of one brick with hollow is less than a one without hollow

(II) The hollow of one brick is filled level with wet cement, as shown in Fig. 11.3. wet cement

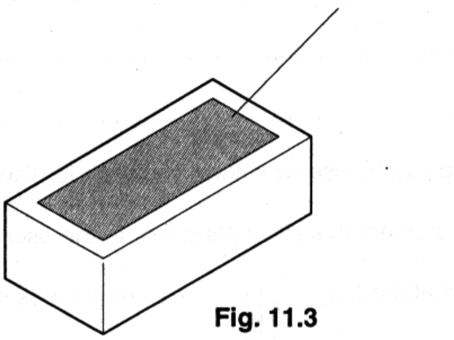


Fig. 11.3

The brick now has a mass of 2.91 kg.

Compare this with the mass given in (a)(ii). What does it tell you about the density of the wet cement?

The mass difference is 2.91-2.88=0.03 kg. This indicates that the density of wet cement is more than dry cement. [3]

12 Fig 12.1 shows a simplified diagram of the front of a cathode-ray oscilloscope (c.r.o).

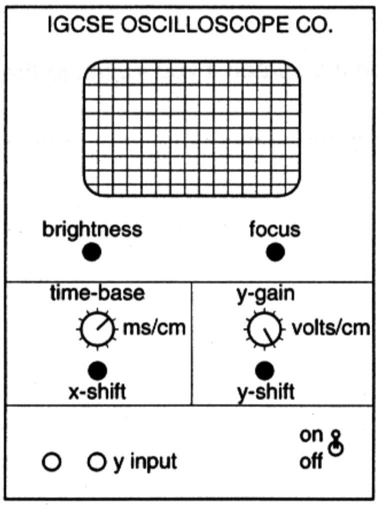


Fig. 12.1

When the oscilloscope is switched on, a bright line is seen across the center of the screen.

(I) What causes the bright line?

The bright line is caused by the deflection of the electrons beam by x-plates due to the potential difference across on them generated by the time-base circuit.

(II) When the brightness control is turned up, the line gets brighter. What happens inside the oscilloscope to cause this increase in brightness? [4]

When the brightness control is turned up, the grid becomes less negative than before causing more electrons to pass through it to be accelerated to hit the screen.

(b) You have an alternating pd. whose waveform you wish to display on the screen.

(i) Where would you connect this alternating pd. to the oscilloscope?

To the y-input terminals

(ii) Fig. 12.2 shows what the trace on the screen might look like.

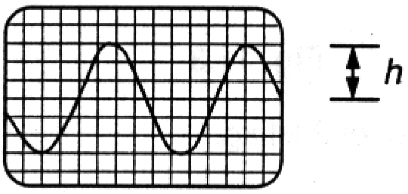


Fig. 12.2

1. Which oscilloscope control would you adjust to vary the amplitude, *h*, of the trace on the screen? **The y-gain control**

2. Which control would you adjust to vary the number of waves visible on the screen? **The time-base control**

3. What would you see on the screen if you switched the time-base setting to zero? **A vertical line in the center of the screen would be seen if the a.c. p.d. is applied to y-input, otherwise a small spot of light would be seen in the center of the screen if no p.d is applied to y-input.**

[4]

End of exam