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Presenting Centre No.	Candidate No.	Subject No.	Level	Paper No.	Group No.	Marker's No.		
		3220						
							Total Marks	

[3220/285] 1992

SCOTTISH CERTIFICATE OF EDUCATION

PHYSICS

Standard Grade—GENERAL LEVEL

Thursday, 14th May—9.30 a.m. to 11.00 a.m.

Fill in these boxes and read what is printed below.

Full Name of school or college

Town

Christian Name/First Name, Initial(s) (of other/middle name(s))

Surname

Date of Birth

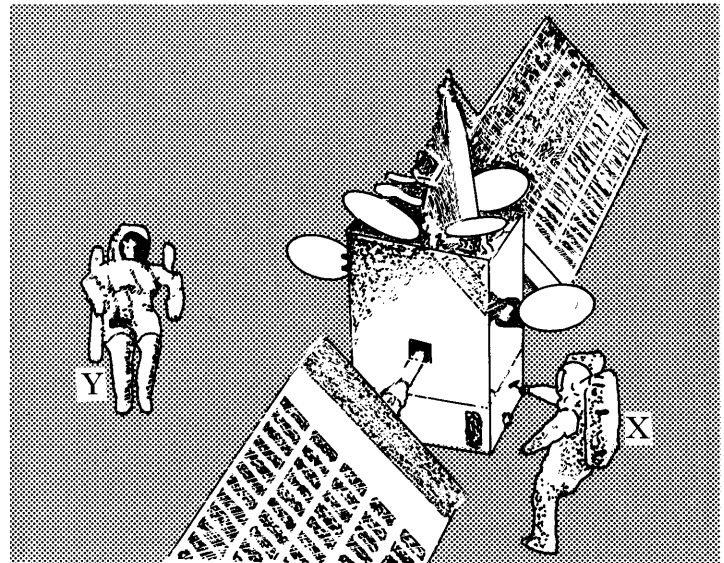
Day Month Year

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Number of seat occupied at examination

- 1. All questions should be answered.**
- 2. The questions may be answered in any order but all answers must be written clearly and legibly in this booklet.**
- 3. For questions 1–8, write down, in the space provided, the letter corresponding to the answer you think is correct. There is only ONE correct answer.**
- 4. For questions 9–23, write your answer where indicated by the question or in the space provided after the question.**
- 5. You may score out your original answer and replace it in the space provided at the end of the answer booklet.**
- 6. Before leaving the examination room you must give this book to the Invigilator. Failure to do so may result in you losing all marks.**

5. Astronaut X is tapping the side of a satellite which is orbiting the moon.



Astronaut Y, at the other side of the satellite, will not hear the tapping because the sound will

- A be at too low a frequency
- B be at too high a frequency
- C not travel through space
- D be refracted away from Y
- E reflect back from the satellite.

Answer

1

6. Which of the following does **not** contain an amplifier?

- A Tape recorder
- B Video recorder
- C Transformer
- D Hearing aid
- E Compact disc player

Answer

1

7. The voltage gain of an amplifier may be calculated from the expression

- A $\frac{\text{output voltage}}{\text{input voltage}}$
- B $\frac{\text{input voltage}}{\text{output voltage}}$
- C $\text{output voltage} - \text{input voltage}$
- D $\frac{\text{output voltage} - \text{input voltage}}{\text{input voltage}}$
- E $\frac{\text{input voltage}}{\text{output voltage} - \text{input voltage}}$

Answer

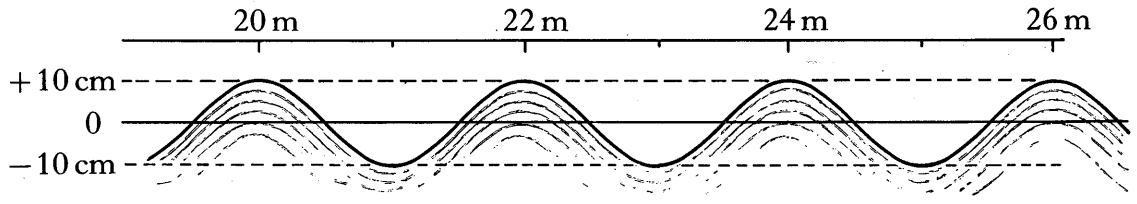
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8. Far out in space, a space capsule has its rocket engine fired. When the engine is switched off, the capsule will
- A gradually slow down and stop
 - B continue to speed up
 - C move at a steady speed
 - D immediately stop
 - E move in the opposite direction.

Answer

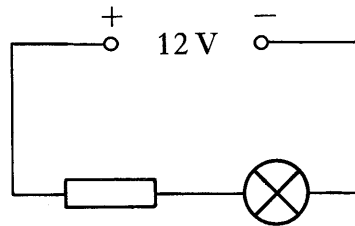
9. The diagram shows a water wave travelling along a tank. The tank is marked as shown.



What is the wavelength of the wave?

Answer

10. A lamp is connected in series with a resistor to a 12 volt supply as shown. The current in the lamp is 0.2 ampere and the voltage across it is 3.5 volts.



- (a) What is the current in the resistor?

Answer

- (b) What is the voltage across the resistor?

Space for working and answer

11. Complete the following statement by inserting the word *increase* or *decrease* in each space.

A car designer wishes to increase the maximum acceleration of a car. He should the engine force of the car and its mass.

12. Jack uses 3600 joules of energy running up a hill in 12 seconds.
What is the average power developed by Jack?

Space for working and answer

2

13. A miniature submarine is travelling horizontally through the water. The captain sees the following information on a monitor in front of him.

Mass of submarine = 500 kilograms
Speed of submarine = 2 metres per second
Acceleration of submarine = 0.1 metres per second per second

- (a) Calculate the horizontal force which is accelerating the submarine.

Space for working and answer

2

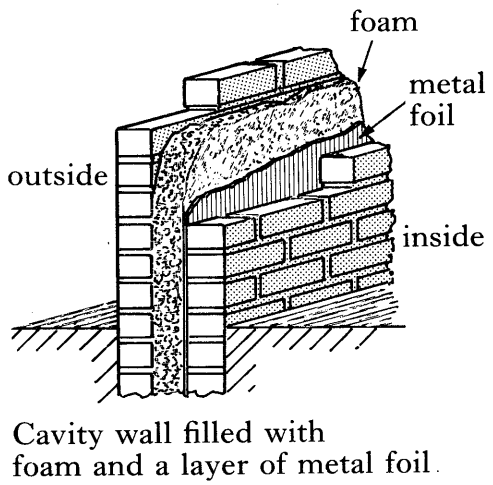
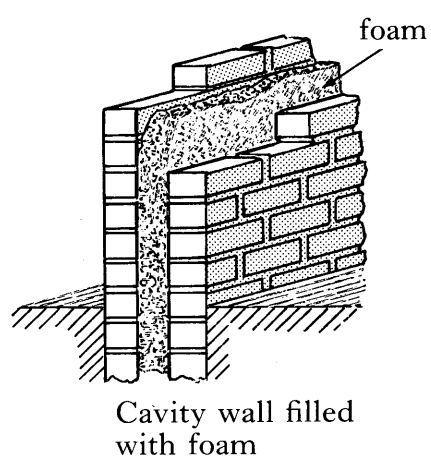
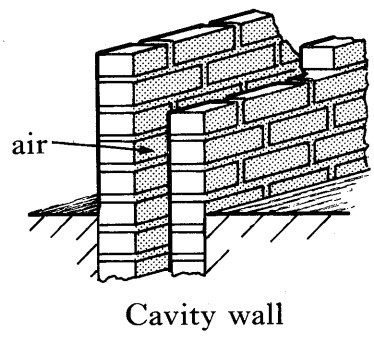
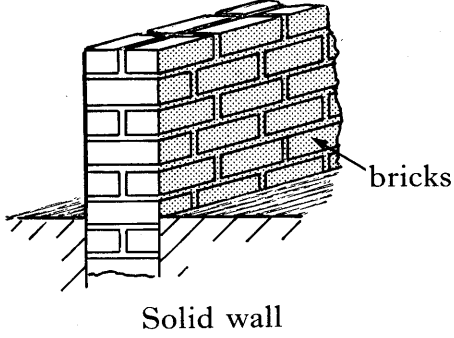
- (b) By how much will the speed of the submarine have increased 5 seconds after the captain looked at his monitor?

Space for working and answer

2

[Turn over

19. On a cold winter's day, heat is lost through the walls of a house. Houses can have different types of wall as shown below, depending on how they were built.



The table below shows the ways in which heat is lost by the different types of wall.

H—lots of heat loss **M**—medium heat loss **L**—little heat loss

Wall	Conduction	Convection	Radiation
A	H	L	M
B	L	L	M
C	L	L	L
D	L	M	M

(a) From all the information given above, match the type of wall with the walls labelled A, B and D. Enter your answers to complete the table below.

Type of wall	Wall
Solid wall	
Cavity wall	
Cavity wall filled with foam	
Cavity wall filled with foam and a layer of metal foil	C

(b) Wall C is the only one which has a low heat loss by radiation. Explain.

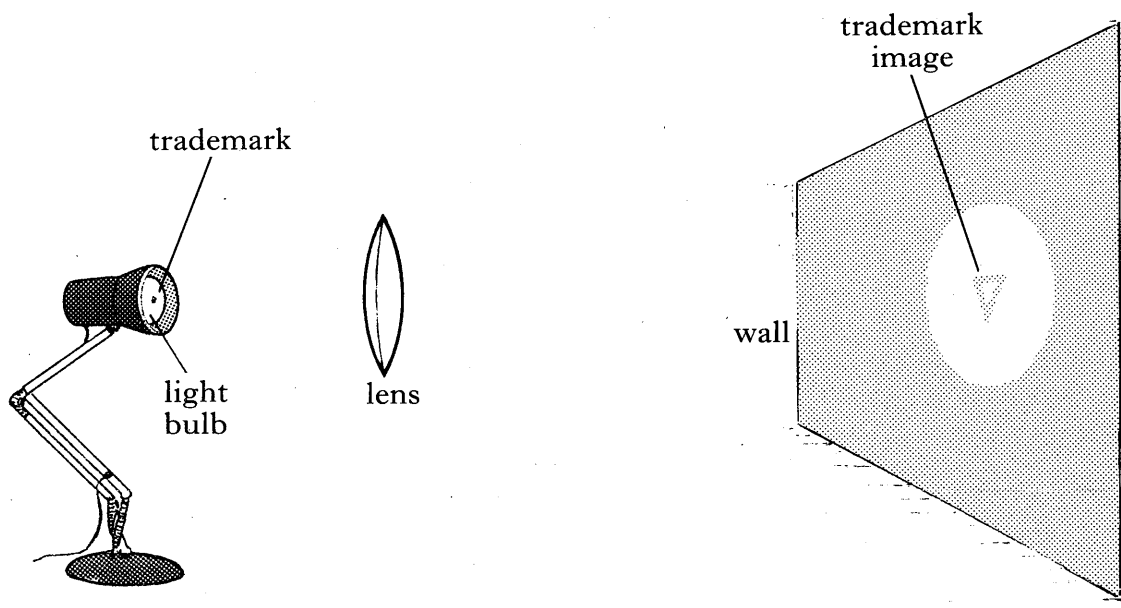
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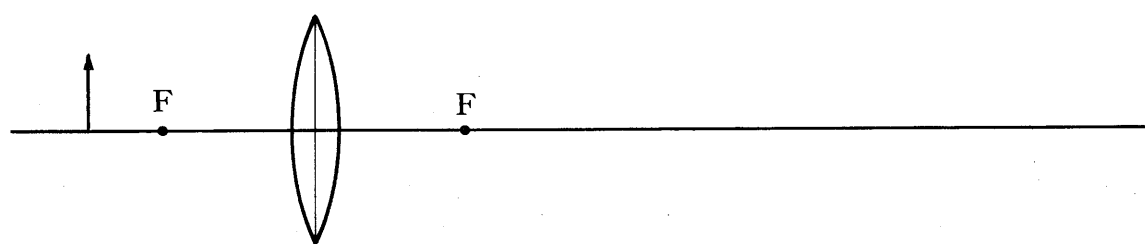
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21. While investigating a convex lens, Michael notices that he can project an enlarged image of a light bulb on the wall. The image shows the manufacturer's trademark which is stamped on the light bulb.



(a) Complete the ray diagram below to show how an enlarged image can be formed with a convex lens. The points marked F are one focal length from the centre of the lens.



(b) Michael compares the trademark on the bulb with the image formed on the wall. What difference, other than the trademark being smaller than the image, would be seen?

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(c) What would happen to the appearance of the image if the lens was moved closer to the light bulb?

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[Turn over

YOU MAY USE THE SPACE ON THIS PAGE TO REPLACE ANY ANSWERS YOU HAVE DECIDED TO CHANGE IN THE MAIN PART OF THE ANSWER BOOKLET. TAKE CARE TO WRITE IN CAREFULLY THE APPROPRIATE QUESTION NUMBER.

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