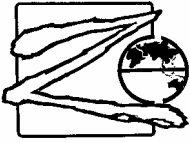


Candidate
Name

Index
Number

Class

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ZHENGHUA SECONDARY SCHOOL
Secondary 4 Express
Preliminary Examinations 2007
SCIENCE (Physics)
Paper 2

5152/2

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Sep 2007

TIME : 1 hour 15 mins

Additional Materials : Writing Paper

INSTRUCTIONS TO CANDIDATES

Write your name, index number and class in the spaces at the top of this page and on any separate answer paper used.

Section A

Answer **all** questions. Write your answers in the spaces provided on the question paper.

Section B

Answer any **two** questions. Write your answers on the writing paper provided.

- At the end of the examination,
1. fasten any separate answer paper used securely to the question paper;
 2. enter the numbers of the **Section B** questions you have answered in the grid below.

INFORMATION FOR CANDIDATES

The number of marks given in brackets [] at the end of each question or part question.

<i>For Examiner's Use</i>	
Section A	/ 45
Section B	
Total	/ 65

Section A : (45 marks)

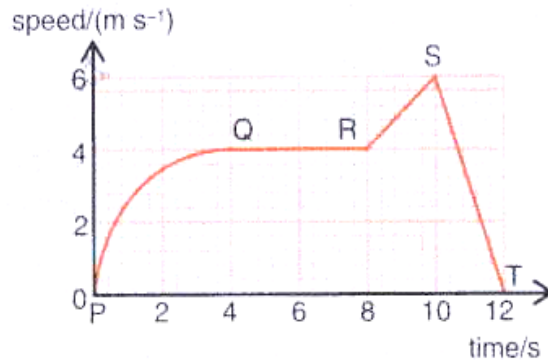
Answer **all** the questions in the spaces provided on the question paper.

1. Three instruments used in an experiment are vernier calipers , spring balance and voltmeter . Complete the following table to show the property measured by each of the instruments. State the correct unit used. The first row has been completed.

Instrument	Property measured	Unit
Vernier calipers	Length	millimetre
Spring balance		
Voltmeter		

[2]

2. The speed-time graph below refers to a trolley moving along a straight track.



- (a) In which section of the graph is the acceleration constant and negative ?

_____ [1]

- (b) Calculate the acceleration in part (a) above. [2]

- (c) What is the highest speed of the trolley ? [1]

- (d) What distance has the trolley travelled at uniform speed ? [2]

3. A wooden block with a mass of 1.2 kg being pulled with a force of 5 N on a rough surface as shown in Fig 1. The wooden block does not move because of friction.

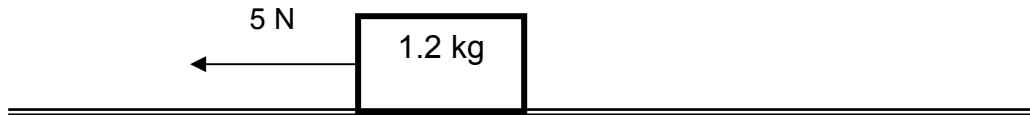


Fig 3.1

- (a) What is the frictional force exerted on the wooden block in this instance ? [1]

- (b) When the wooden block is pulled with a force of 9 N, the block moves with a constant speed.

- (i) What is the resultant force acting on the wooden block ? [1]

- (ii) What is the frictional force exerted on the wooden block now ? [1]

- (c) The pull is then increased to 12 N. Calculate the acceleration of the block. [2]

4. (a) What is meant by moment of a force about a point ? [1]

- (b) A uniform beam has a weight of 4N and its centre of mass is at 50 cm mark. Fig. 4.1 shows the beam pivoted at the 60 cm mark, balanced by a mass of weight, W hanging from the 80 cm mark. (Take the value of $g = 10 \text{ N/kg}$).

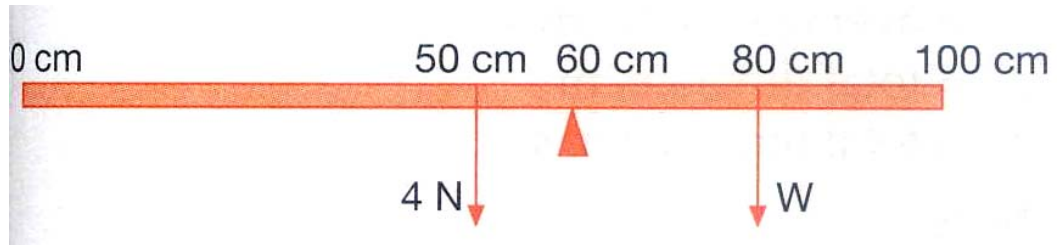
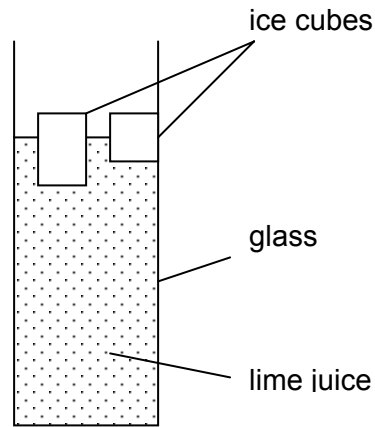


Fig. 4.1

- (i) Calculate the mass of the beam. [2]

- (ii) Calculate the value of the weight, W . [2]

5. Ice cubes are added to lower the temperature of lime juice.



(a) Explain how the lime juice just next to the ice cubes cools. [2]

(b) Explain how the lime juice at the bottom of the glass cools. [2]

(c) Explain why the outside of the glass is wet minutes later. [1]

6. (a) During a thunderstorm, an observer sees a lightning flash. 6 s later he hears the thunder. The speed of sound is 330 ms^{-1} . Approximately how far away is the observer from the lightning? [2]

- (b) The speed of sound in air is 330 ms^{-1} . What is the wavelength of a note of frequency of 550 Hz? [2]

7. In Figure 7.1, a sound wave is emitted downwards from a ship. The sound wave is reflected from the seabed and is detected as it arrives back at the ship.

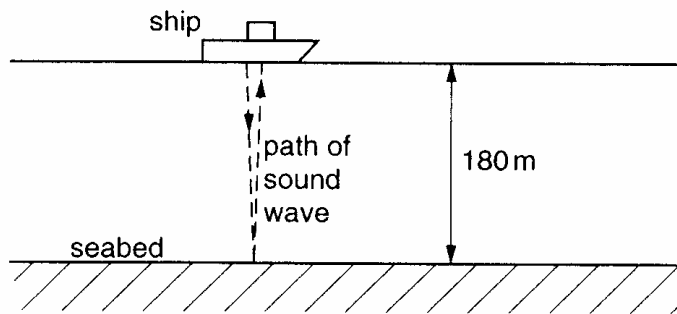


Figure 7.1

The time between emitting the sound wave and detecting it back at the ship is 0.25 s. The seabed is 180 m below the ship.

- (a) Calculate the speed of sound in seawater. [2]

- (b) Suggest why sound waves cannot move from the Earth to the Moon. [2]

8. Fig. 8.1 shows the path of a ray of light passing into a glass block. The refractive index of the glass block is 1.5.

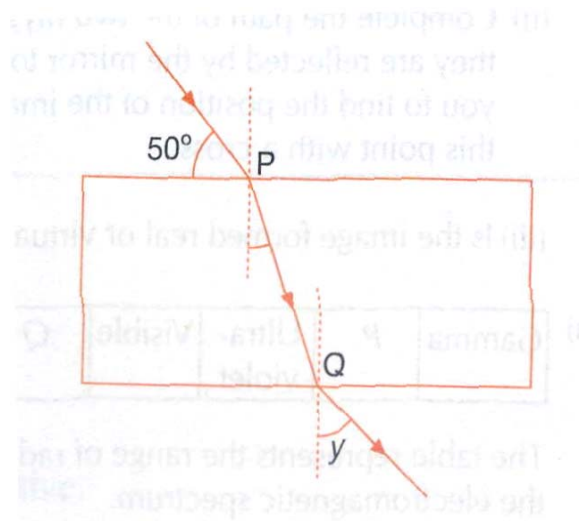


Fig. 8.1

- (a) What is the angle of incidence at point P ? [1]

- (b) Calculate the angle of refraction at point P. [2]

- (c) Write down the value of angle y. [1]

9. Figure 9.1 shows a $4.0\ \Omega$ resistor X and a $6.0\ \Omega$ resistor Y connected to a $3.0\ \text{V}$ battery.

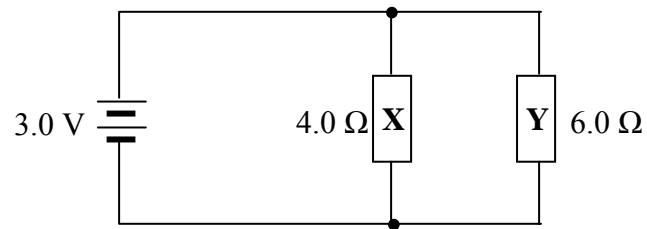


Fig 9.1

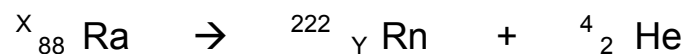
- (a) What is the potential difference across resistor X, [1]
- (b) Calculate
- (i) the current in resistor Y, [1]
- (ii) the total resistance of the circuit, [2]
- (iii) the current through the battery, [1]
- (iv) the power supplied by the battery. [1]

10. The half-life of a radioactive isotope is 20 minutes. The initial mass of the isotope in a sample is 64 g.

(a) What is the mass of the isotope in the sample after 1 hour ? [1]

(b) After how long would the mass of the isotope in the sample be 2 g ? [1]

(c) In the following nuclear reaction , what are the values of X and Y ? [2]



X is _____

Y is _____

SECTION B: (20 marks)

Answer any **two** questions from this Section on the writing paper provided.

- B1. (a) Fig. B1.1 shows a small car of mass 800 kg moving with a constant speed of 15ms^{-1} up the hill. (Take the acceleration due to gravity, g , to be 10ms^{-2})

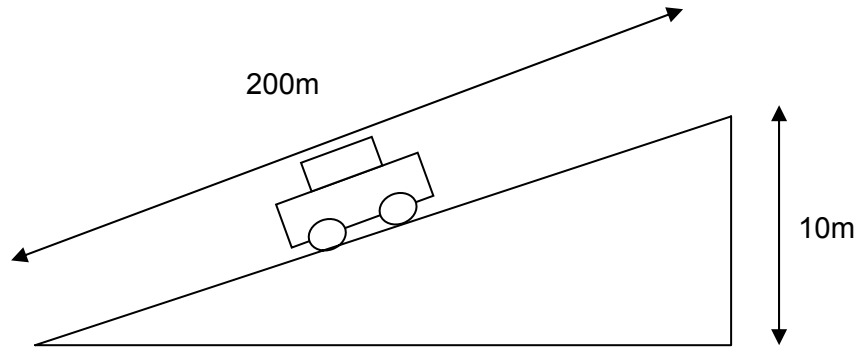


Fig. B1.1

- (i) Calculate the gain in gravitational potential energy of the car at the top of the hill. [2]
- (ii) Calculate the kinetic energy of the car when it is moving up the hill. [2]
- (iii) What is the resultant force acting on the car as it travels uphill? [1]
- (iv) Is the total workdone produced by the driving force of the car engine in moving the car up the hill smaller than, equal to, or greater than the gain in gravitational potential energy in part (i)? Explain your answer. [2]
- (b) If the car of mass 800 kg as shown above is moving on a straight horizontal road with a constant speed of 10ms^{-1} , find the average force that must be applied to bring the car to rest in 4 s. [3]
- B2. (a) An electric vacuum cleaner is designed to operate from a 240V supply has a power of 1500W.
- (i) Calculate the size of current which flows when the vacuum cleaner is being used. [2]
- (ii) Suggest a suitable fuse rating to be used with this vacuum cleaner. [1]
- (b) When the vacuum cleaner is operating normally. What would be the size of the current in
- (i) the earth wire, [1]
- (ii) the live wire [1]
- (iii) the neutral wire? [1]

- (c) An electric current of 0.5A passes through a 12V battery for two minutes in a completed circuit. Calculate
- the amount of electric charge that passes through the battery [2]
 - the amount of energy that is transferred by the battery during the two minutes. [2]

B3. (a) Figure B3.1 below shows high voltage cables used to transmit electrical energy.

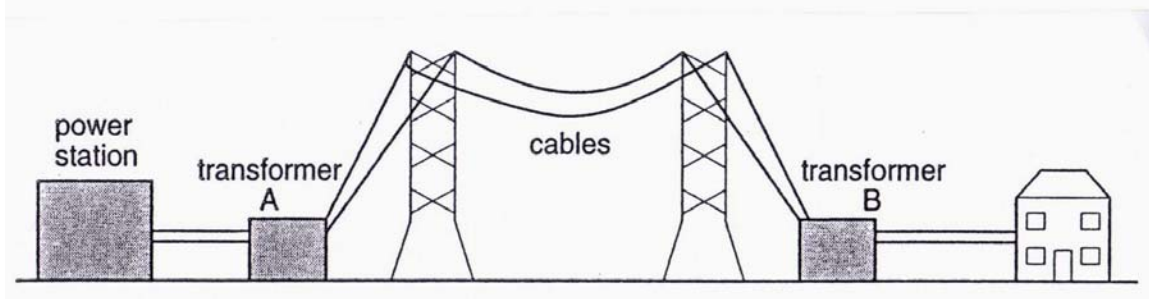


Fig. B3.1

- State the purpose of transformer B. [1]
 - The cables used are usually thick so that energy loss due to heat is reduced. Explain why this is so? [2]
 - The power station produces electricity at a voltage of 20 kV . Transformer A is ideal. It has 48000 turns in its secondary coil and produces an output voltage of 400 kV . Calculate the number of turns in the primary coil of transformer A. [2]
- (b) Sketch a diagram of a step-up transformer and label the following on your diagram :
- the primary coil
 - the secondary coil
 - the laminated core. [3]
 - If the input voltage in the primary coil is 12V and the output voltage in the secondary coil is 240V , what is the current flowing in the secondary coil if the current flowing in the primary coil is 0.8A ? (Assume 100% efficiency) [2]

***** End of Paper 2 *****