

Name .....centre/index No...../.....

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535/1  
Physics  
Paper 1  
July 2011  
2 ¼ Hours

**PHYSICS  
PAPER 1  
2 HOURS 15 MINUTES**

***Instructions to Candidates***

- Write your name, signature, centre and index number clearly in the space above
- Section A contains 40 objective type questions. You are required to write the correct answer A,B,C or D against each question in the box on the right hand side.
- Mathematical tables and silent non-programmable calculators may be used.
- Acceleration due to gravity =  $10\text{ms}^{-2}$
- specific heat capacity of water =  $4200\text{Jkg}^{-1}\text{K}^{-1}$

MCQ	Q41	Q42	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q50	Total

**SECTION A (40 MARKS)**

1. Which one of the following is not a property of the image of an object placed 10cm in front of a plane mirror?  
 A: it's behind the mirror                      B: it's 10cm from the mirror  
 C: it's laterally inverted                      D: it's real
2. 1000 joules of heat energy raise the temperature of 0.4kg of aluminium from 20°C to 36°C. The specific heat capacity of aluminium in  $\text{Jkg}^{-1} \text{K}^{-1}$  is given by  
 A:  $\frac{1000}{0.4 \times 16}$                       B:  $1000 \times 0.4 \times 16$                       C:  $\frac{1000 \times 16}{0.4}$                       D:  $\frac{1000 \times 0.4}{16}$
3. In capital shoppers a student notices that a loaded trolley is difficult to start and difficult to stop. The property of the loaded trolley which accounts for both of these observations is  
 A: friction                      B: density                      C: inertia                      D: energy
4. Sound waves are different from light waves because  
 A: sound waves need no medium                      B: light waves need a medium  
 C: sound waves need a medium                      D: light waves travel through glass
5. Which of the following does your skin detect on heat radiation?  
 A: violet light                      B: infra-red waves  
 C: microwaves                      D: ultra-violet waves
6. A  $12\Omega$  resistor is connected in parallel with a  $6\Omega$  resistor. What is the combined resistance of the two resistors?  
 A:  $18\Omega$                       B:  $72\Omega$                       C:  $5\Omega$                       D:  $4\Omega$
7. Energy can be defined on  
 A: producing power                      B: causing motion  
 C: ability to do work                      D: ability to exert a force
8. A pulley system of velocity ratio 6 is used to lift a load of 250N through a distance of 3m. If the effort applied is 50N how much energy is wasted?  
 A: 125J                      B: 150J                      C: 250J                      D: 750J
9. Which **one** of the following will take place as water waves travel from shallow end to the deep end of a ripple tank?
- | Speed        | Frequency        | Wave length      |
|--------------|------------------|------------------|
| A: increases | Remains the same | Remains the same |
| B: decreases | Remains the same | Decreases        |
| C: increases | Remains the same | Increases        |
| D: increases | Increases        | Increases        |
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10. A car increases its speed steadily from  $8.0\text{ms}^{-1}$  to  $30\text{ms}^{-1}$  in 10seconds. How far does it travel in this time?  
 A.80m                      B.190m                      C. 110m                      D.220m
11. When a ray of light from a denser to dense medium it is  
 A. always transmitted without being reflected.

- B. reflected towards the normal.
- C. refracted away from normal.
- D. always reflected back to the same medium.
12. Which of the following are primary colours.
- A. Red, green, yellow
- B. Blue, magenta, yellow
- C. Red, blue, green
- D. Yellow, blue magenta
13. Which of the following radiations causes the body temperature to rise
- A. U.V light      B. Infra- red      C. Gamma rays.      D. X-rays
14. The S.I unit of specific heat latent heat of fusion is
- A.  $\text{Jk}^{-1}$       B.  $\text{Jkg}^{-1}\text{k}^{-1}$       C. J      D.  $\text{Jkg}^{-1}$
15. A spring extends 3cm for every 2N of force that is applied. What is the weight of a stone which extends the spring by 18cm within the elastic limit.
- A: 12N      B: 27N      C: 108N      D: 3N
16. Which of the following uses an alternating current in its operation
- A: An electromagnet      B: A transformer
- C: A galvanometer      D: An electric lamp
17. A particle with a mass of 1 atomic unit and a charge of +1 is called
- A: an electron      B: a gamma particle
- C: a proton      D: an alpha particle

18.

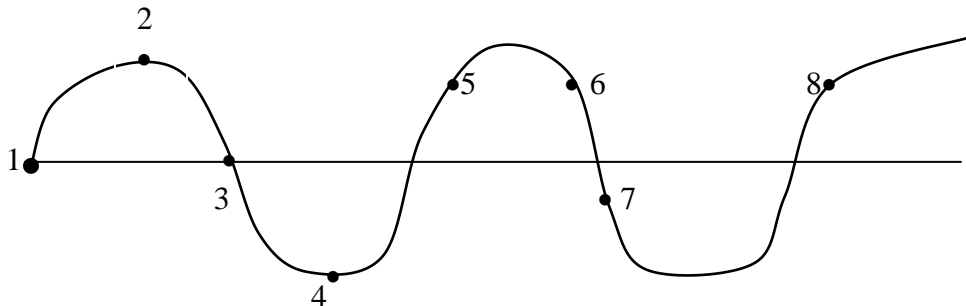
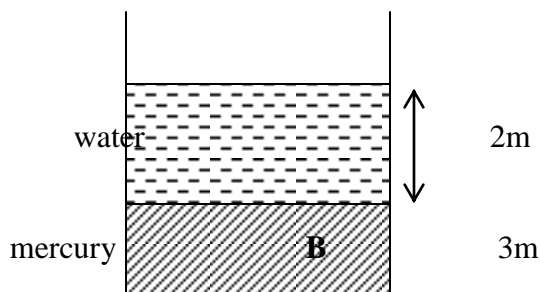


Fig 2 shows a transverse wave. Which two points are in phase?

- A: 1 and 3      B: 2 and 4      C: 5 and 6      D: 5 and 8
19. A piece of aluminium leaf is placed near the palm of your hand. Immediately the hand feels warmer because
- A: the leaf reflects the heat radiated by your hand.
- B: the leaf absorbs heat radiated from the surroundings
- C: the leaf radiates well
- D: the leaf keeps cooling air away.

20.





- Fig 3 shows a tank containing mercury and water. The density of mercury is  $13600 \text{ kgm}^{-3}$  and the density of water is  $1000 \text{ kgm}^{-3}$ . Find the pressure at the bottom B in  $\text{Nm}^{-2}$
- A:  $2.1 \times 10^5$                       B:  $2.92 \times 10^5$                       C:  $2.91 \times 10^4$                       D:  $2.84 \times 10^4$
21. The mass of a moving body multiplied by its velocity is measuring the body's  
 A: inertia                              B: weight                              C: force                              D: momentum
22. A pin is placed in front of convex lens at a distance less than the focal length of the lens. The image formed is  
 A: real, inverted, diminished                              B: virtual, erect, magnified  
 C: real, erect, diminished                              D: virtual, inverted, magnified
23. When you step forward from rest, one foot pushes backwards on the ground. The ground as a result will push that foot  
 A: forwards with an equal force                              B: backwards with an equal force  
 C: backwards with less force                              D: forwards with greater force
24. How much heat energy is required to convert 0.8kg of water into steam?  
 Specific latent heat of vaporizations of water is  $2.26 \times 10^6 \text{ Jkg}^{-1}$   
 A: 1.42 J                      B: 2.81 J                      C: 1.81 J                      D: 1.9 J
25. To produce a clear magnified image of an object using a magnifying glass the observer must place the object  
 A: at infinity  
 B: at the principal axis  
 C: between the optical centre and the principal focus  
 D: at the optical centre of the lens
26. The pressure of a given mass of a gas increases when its volume is  
 A: kept constant and temperature lowered  
 B: increased and temperature kept constant  
 C: decrease and temperature kept constant  
 D: increased and temperature lowered
27. The mass of an aluminium cube in air is 20g. When suspended in oil its apparent mass is 15g and when suspended in water its apparent mass is 13g. The relative density of oil is  
 A: 0.75                              B: 1.15                              C: 0.87                              D: 0.71

28.

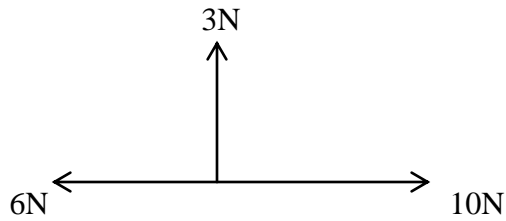


Fig 4

Fig 4 shows two forces of 6N and 10N acting horizontally on body P and a force of 3N acting vertically. What is the magnitude the resultant force?

A: 4N

B: 5N

C: 7N

D: 6N

29. Which of the following radiations has the longest wavelength?

A: gamma rays

B: radio waves

C: light

D: x-rays

30. In a hydraulic press, the area of the piston on which the effort is applied is made smaller in order to

A: facilitate the movement of the piston downward

B: transmit a force as large as possible to the load

C: transmit pressure equally throughout the liquid

D: obtain pressure as large as possible

31.

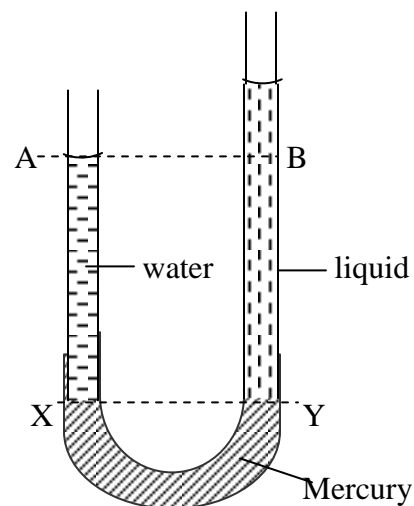


Fig 5

Fig 5 shows a U-tube containing a liquid and water separated by mercury. Which of the following statements concerning the arrangement is correct.

A: The pressure at Y is greater than that at X

B: Pressure at A is the same as at B

C: The density of water is greater than that of the liquid

D: The pressure of the water column is greater than the pressure of the liquid column.

32. The frequency of the third harmonic in an open pipe is 660 Hz. Find the length of the air column if the speed of sound in air is  $330\text{ms}^{-1}$

- A: 0.49m                      B: 0.35m                      C: 0.25m                      D: 0.75m

33. A force of 10N gives a mass of 5kg an acceleration of  $2\text{ms}^{-2}$ . The same force would produce an acceleration of

- A:  $4\text{ms}^{-2}$  when acting on a mass of 10kg  
 B:  $4\text{ms}^{-2}$  when acting on a mass of 2.5kg  
 C:  $10\text{ms}^{-2}$  when acting on a mass of 2 kg  
 D:  $5\text{ms}^{-2}$  when acting on a mass of 10kg

33. When water spreads on a glass plate, the forces between its molecules and glass molecules are due to

- A: surface tension                      B: adhesion                      C: cohesion                      D: viscosity

34. An image 5cm high is formed by a converging lens. If the magnification is 0.4, find the height of the object.

- A: 2.0cm                      B: 4.6cm                      C: 5.4cm                      D: 12.5cm

35. Which of the following are brittle substances?

- A: dry clay, steel, chalk and wood                      B: chalk, steel, plastic and glass  
 C: glass, chalk, concrete and steel                      D: dry clay, glass, chalice and concrete.

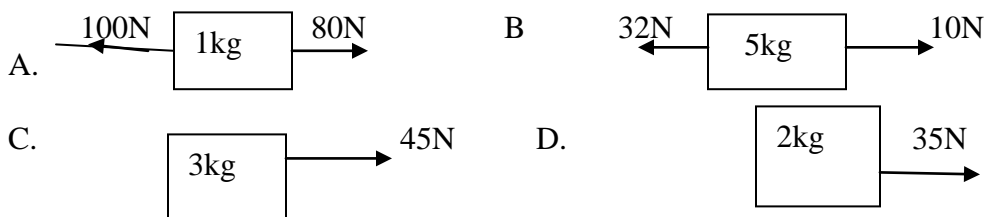
36. The rate at which distance covered by a body changes with time is known as

- A. speed                      B. velocity                      C. acceleration                      D. displacement

37. The S.I unit of charge is called

- A. Current                      B. Coulomb                      C. ampere                      D. Tesla

38. In which of the following is acceleration greatest




39. One of the following is a list of only vector quantities

- A. charge, velocity and mass  
 B. velocity, acceleration and force  
 C. Displacement, mass and acceleration  
 D. mass, charge and time.

40. The quantity of heat required to raise the temperature of 2kg of a metal of specific heat capacity of  $840\text{Jkg}^{-1}\text{k}^{-1}$  from  $24^\circ\text{c}$  to  $54^\circ\text{c}$

A 0.0714J

B. 56J

C.12600J

D. 50400J



**SECTION B (40 MARKS)**

Attempt all questions in this section

41 (a) Define Mechanical advantage . (1 mark)

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(b) (i) A machine uses 8000J of energy to lift a mass of 120kg through a vertical distance of 4m. Calculate the efficiency of the machine (03 marks)

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42 (a) Define the following terms  
(i) Resistance (01 mark)

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(ii) Electromotive force (01 mark)

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(b)

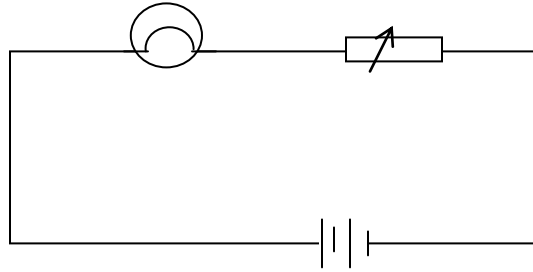


Fig 7

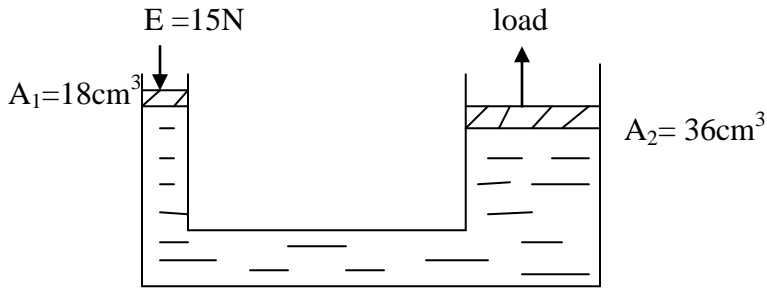
Fig 7 shows an incomplete circuit for an experiment to investigate how the resistance of a torch bulb varies with the current flowing through it. Complete the diagram such that it can be used to measure the current and the p.d across the bulb

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(02 marks)

43(a) Define pressure and state its S.I unit.

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The figure shows a hydraulic machine. Calculate the load on the big piston which can be lifted by a force of 15N.....

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44(a) Define the term force and state its S1 unit

(1 1/2 mark)



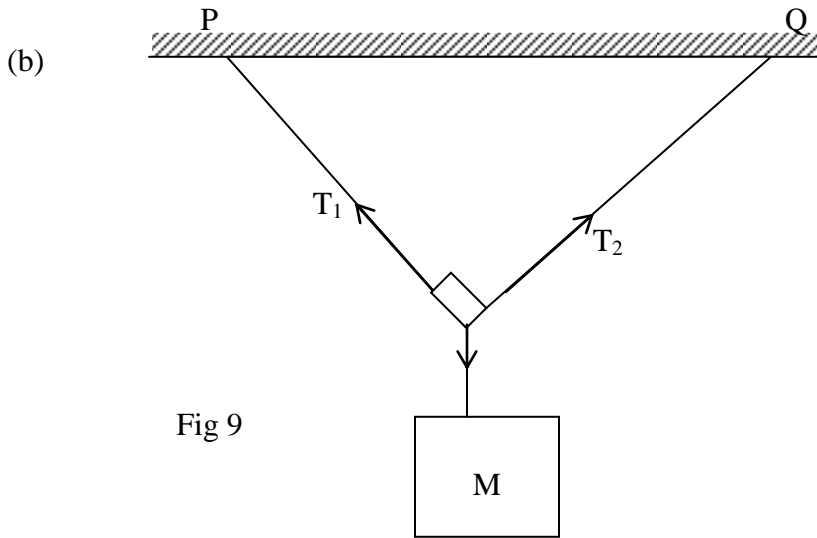


Fig 9 shows a block M suspended from point R of a string PQR such that angle PRQ is at right angle on as shown. If tensions  $T_1$  and  $T_2$  are 2.1N and 2.8N respectively, What is the weight of M?

45(a) State the laws of electrostatics

(01mk)

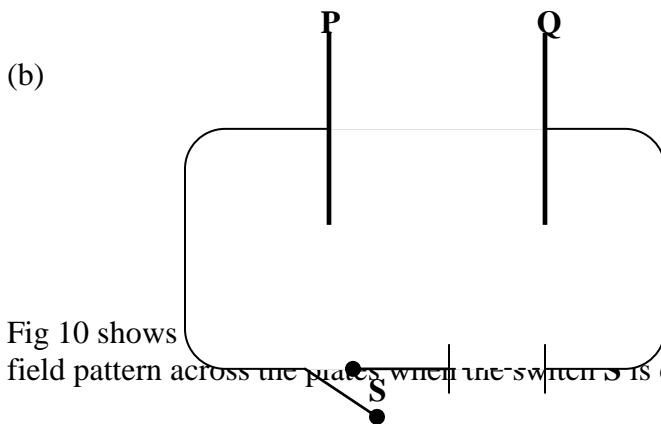


Fig 10 shows a parallel plate capacitor connected to a source of emf. Sketch the electric field pattern across the plates when the switch S is closed.

Fig 10

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(02 marks)

(c) Define the term conductor

(01 mark)

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46(a) Define the term specific latent heat of vaporization

(01 mark)

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(b) Calculate the amount heat needed to raise the temperature of 20kg of water from 0°C to 100°C given that the s.h.c of water is  $4200\text{Jkg}^{-1}\text{K}^{-1}$ .

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47(a) State what is meant by coherent sources.

(01 mark)

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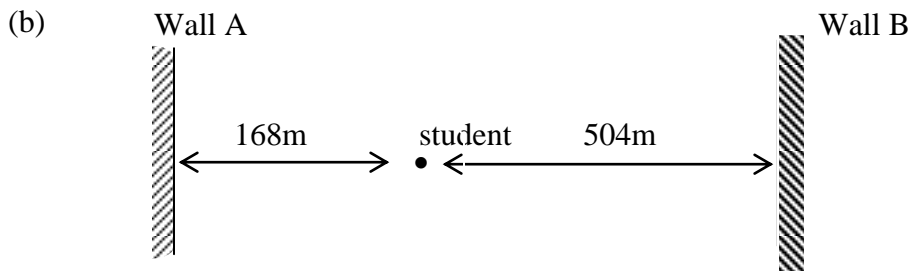


Fig 12

A student standing between two walls as shown in fig 12, shouts once. She noticed that the time interval between hearing the first and second echo is 2.0 seconds. What is the speed of sound in air? (03 marks)

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48(a) State the laws of reflections. (02 marks)

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(b) An object 10cm high, placed 50 cm from a concave mirror of focal length,  $f$ , forms an inverted image 25 cm away from the mirror on the same side as the object. Determine the height of the object. (02 marks)

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49(a) State Newton's third law of motion. (1 mark)

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(b) A ball of mass 0.75 kg rests on the surface of a level bench  
(i) Draw a sketch showing the forces acting on the ball. (1 ½ marks)

(ii) If the ball was raised 1.5m above the surface and then released, what would be its kinetic energy just before hitting the surface? (1 ½ marks)

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50 (a) Define the following terms

(i) Half life (1 mark)

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(ii) Radioactivity (01 mark)

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(b) The half-life of a sample of radioactive material is 60 days. What fraction of the sample will be left undecayed after 120 days? (02 marks)

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END