

Candidate's Name

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Signature:.....

Random No.						Personal No.		

535/1
PHYSICS
Paper 1
1st July 2019
2¼ hours



ST. HENRY'S COLLEGE, KITOVU

UCE Pre – Mock Examinations 2019

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

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.

Section B contains 10 structured questions. Answers are to be written in the spaces provided on the question paper.

Mathematics tables and silent non-programmable calculators may be used.

Acceleration due to gravity = 10ms^{-2}
Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$
Specific heat capacity of copper = $400\text{Jkg}^{-1}\text{K}^{-1}$

For Examiner's Use Only

Q 41	Q 42	Q 43	Q 44	Q 45	Q 46	Q 47	Q 48	Q 49	Q 50	Total

SECTION A: (40 MARKS)
*Answer **all** questions from this section.*

1. Which of the following best explains specific heat capacity of a body? Heat required to change
- A. 1kg of a body by 1°C
B. any mass of a body by 1°C
C. temperature of 1kg of a body by 1°C
D. 1kg of a body from one state to another without change in temperature.
2. The type of energy transformed to when a catapult is released to throw a stone is
- A. Electric potential energy B. Elastic potential energy
C. Kinetic energy D. Potential energy
3. Which of the following can replace a plane mirror to produce an image which is clearer with no lateral inversion?
- A. Convex mirror B. Pinhole camera
C. Concave mirror D. Glass prism
4. The acceleration of cathode rays in an x – rays tube depends on
- A. the amount of heat supplied to the filament.
B. the voltage across the anode and the cathode.
C. the amount of x – rays produced.
D. thermionic emission.
5. The movement of paraffin up a lamp wick is an effect of
- A. diffusion B. cohesive force
C. adhesive force D. capillarity
6. Which of the following is likely to have the lowest resistance in any given electric circuit?
- A. Bulb B. Voltmeter
C. Ammeter D. Rheostat

7.

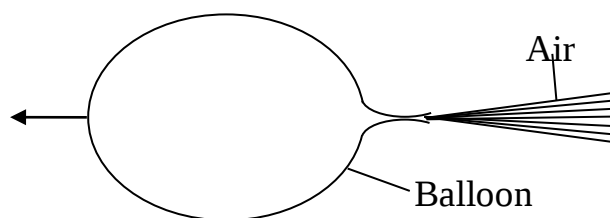


Figure 1

Figure 1 shows a balloon with its neck open and air escaping in the direction shown as the balloon also moves as indicated. Which principle is demonstrated in the experiment?

- A. Principal of moments.
- B. Archimedes' principle.
- C. Pascal's principle of transmitting pressure
- D. The principle of conservation of liner momentum

☐

8. Which of the following is more deflected by an electric field?

- | | |
|-------------------|----------------------|
| A. Gamma rays | B. Alpha particle |
| C. Beta particles | D. Neutron particles |

☐

9. Acceleration due to gravity can be measured in

- | | |
|----------------------|---------------------|
| B. Nkg^{-1} | B. Nm^{-2} |
| C. Ns^{-2} | D. ms^{-1} |

☐

10. A negatively charged pointed conductor mounted on an insulated stand loosed charge in air because

- A. negatively charged ions are atracted to it
- B. negatively charged ions are repelled by it
- C. positively charged ions are repelled by it
- D. positively charged ions are atracted to it

☐

11. A spherical ball falling through a viscous fluid reaches terminal velocity when

- (i) the total upward force on it is equal to the weight.
- (ii) the total upward force on it is greater than the weight.
- (iii) Its acceleration is zero
- (iv) the total upward force on it is less than the weight.

- | | |
|-----------------------|-----------------------|
| A. (i) only | B. (ii) only |
| C. (i) and (iii) only | D. (ii) and (iv) only |

☐

12. The element Polonium is represented as $^{210}_{84}\text{Po}$. How many neutrons does it contain?

A. 294
B. 126
C. 210
D. 84

13. Which of the following is true about brittle a material? It

A. can easily be hammered into thin a sheet.
B. break suddenly just beyond the elastic limit.
C. stays permanently stretched after the elastic limit.
D. go back to its original length even after the elastic limit.

14. Which of the following is true about straight waves incident on an opening in a barrier?

(i) If the opening is wide compared to the wavelength of the wave, they will pass through as parallel straight waves with slight bending at the edges.
(ii) If the opening is of same size as the wavelength of the wave, they will undergo constructive interference.
(iii) All the waves will be reflected back.

A. (i) only
B. (ii) only
C. (i) and (iii) only
D. (ii) and (iii) only

15. The process by which electrons are ejected from a clean metal surface when electromagnetic radiation of high frequency falls on it is

A. thermionic emission.
B. photoelectric emission.
C. nuclear fission
D. radioactivity

16. Which of the following is true about boiling?

A. Boiling occurs at any temperature.
B. Boiling occurs throughout the volume of the liquid.
C. At the boiling point, the heat energy supplied is latent heat of fusion.
D. At the boiling point, all the heat energy supplied is used to overcome adhesive force.

17.

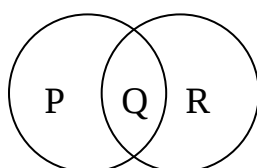
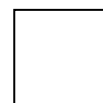


Figure 2

Figure 2 shows a mixture of coloured lights. Name the colours P, Q and R.

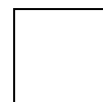
- | | P | Q | R |
|----|-------|---------|-------|
| A. | Red | Yellow | Blue |
| B. | Green | Cyan | Red |
| C. | Blue | Magenta | Green |
| D. | Green | Yellow | Red |



18. In a cloud chamber

- (i) tracks of beta particles are fainter than those of alpha particles.
- (ii) tracks of alpha particles are wavy and irregular
- (iii) tracks of gamma rays are short and wavy.

- | | | | |
|----|----------------------|----|--------------------|
| A. | (i) only | B. | (ii) only |
| C. | (ii) and (iii) only. | D. | (i) and (iii) only |



19.

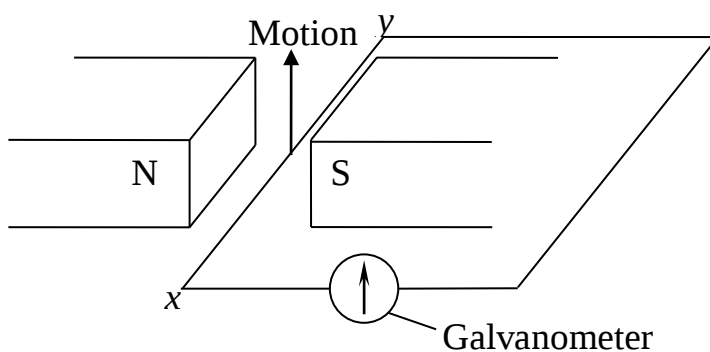
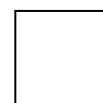


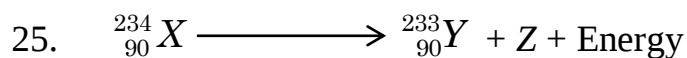
Figure 3

Figure 3 shows a wire xy connected to a galvanometer and moved between two poles of a magnet in the direction shown. Which of the following will be observed?

- A. The galvanometer will deflect to the left.
- B. The galvanometer will oscillate about zero.
- C. The wire will experience a force pulling it downwards.
- D. The magnets will attract each other and they will move closer



20. The purpose of an earth wire in electric wiring is to
- A. Prevent electric appliances from overheating.
 - B. Break the circuit in case current exceeds a certain value
 - C. Reduce the power loss by preventing current going to earth
 - D. Prevent electric shock should an electric appliance develop a fault.
21. P is a mode of heat transfer in glass but not in vacuum and R is a mode of heat transfer in vacuum. Identify P and R.
- | | P | R |
|----|------------|------------|
| A. | Convection | Conduction |
| B. | Conduction | Radiation |
| C. | Radiation | Convection |
| D. | Convection | Radiation |
22. Which of the following is true about reverberation?
- (i) It occurs when many echos merge into a prolonged sound.
 - (ii) Too much reverbration makes sounds to become confused and indistinct.
 - (iii) Too little reverbration makes a hall sound acoustically dead and makes sound appear weak.
- A. (i) only
 - B. (i) and (ii) only
 - C. (ii) and (iii) only.
 - D. (i), (ii) and (iii)
23. Which of the following will give the efficiency of a machine?
- A. $\frac{\text{Work input}}{\text{Work output}} \times 100\%$
 - B. $\frac{\text{Velocity ratio}}{\text{Mechanical advantage}} \times 100\%$
 - C. $\frac{\text{Load}}{\text{Effort}} \times 100\%$
 - D. $\frac{\text{Power output}}{\text{Power input}} \times 100\%$
24. To overcome hysteresis loses in transformers,
- A. the iron core should be laminated.
 - B. low resistance copper wire should be used.
 - C. core should be made of soft magnetic material
 - D. good design of transformer core should be used



The equation above represent decay of a radioisotope by emission of Z. Z is

- A. beta particle B. neutron
B. alpha particle D. gamma ray

☐

26. Which of the following will **NOT** bring about mutual induction?

- A. Reversing current in the primary coil.
B. Increasing current in the primary coil.
C. Increasing the number of turns in the primary coil.
D. Passing an alternating current in the primary coil.

☐

27. Sound from an aeroplane high in the sky takes 5s to be heard by a person on the earth surface. Find the distance of the person from the aeroplane.
(Speed of sound in air = 330ms^{-1})

- A. 66m B. 825m
C. 1650m D. 3300m

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28. Figure 4 shows two forces of 2.5N and 6.0N acting on a body X. The resultant force on X will be

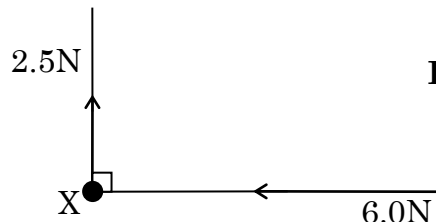


Figure 4

- A. 3.50N B. 4.25N
C. 6.50N D. 15.00N

☐

29. Which of the following effects can be brought about by a force?

- (i) It can accelerate a moving body.
(ii) It can decelerate a moving body.
(iii) It can change the direction of a moving body.

- A. (i) only B. (ii) only
C. (i) and (ii) only D. (i), (ii) and (iii)

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30. A heating element of resistance 40Ω produces 360kJ of heat in 5 minutes. Find the current flowing through the element.

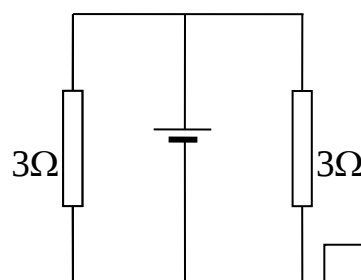
A. 5.5A B. 27.4A
C. 30.0A D. 42.4A

31. An electric motor in a washing machine has a power rated 1.5kW . Calculate the work it does in 1 hour.

A. $1.5 \times 10^9\text{J}$ B. $9.0 \times 10^1\text{J}$
C. $9.0 \times 10^4\text{J}$ D. $5.4 \times 10^6\text{J}$

32. Figure 5 shows two resistors, each 3Ω connected to a battery. The effective resistance is

Figure 5



A. 0.67Ω
B. 1.5Ω
C. 3.0Ω
D. 6.0Ω

33. A liquid, X, of mass 70g and volume 15cm^3 is mixed with liquid, Y, of mass 40g and density 8gcm^{-3} . Find the density of the mixture.

A. 5.5gcm^{-3} B. 6.3gcm^{-3}
C. 8.0gcm^{-3} D. 12.67gcm^{-3}

34. A car of mass $1,200\text{kg}$ travelling at 20ms^{-1} is brought to rest in 4s. Find the average braking force.

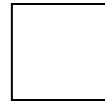
A. $6,000\text{N}$ B. $80,000\text{N}$
C. $120,000\text{N}$ D. $240,000\text{N}$

35. An object 2cm tall is placed 6cm from a converging lens. If the height of the image formed is 5cm , find the distance of the image from the lens.

A. 2.4cm B. 2.5cm
C. 15.0cm D. 18.0cm

36. In electric wiring circuits, devices are connected in parallel with each other in order to

- A. avoid short circuit
- B. receive the same mains p.d
- C. reduce energy loss in form of heat.
- D. have the same current flowing through them



37. A bottle contains air of volume 250cm^3 at a temperature of 27°C and a pressure of $99,000\text{Pa}$ is sealed and placed in a refrigerator and is cooled to 3°C . What is the new pressure?

- A. $3,300\text{Pa}$
- B. $11,000\text{Pa}$
- B. $91,080\text{Pa}$
- D. $107,609\text{Pa}$



38. A body starts from rest and accelerates through a distance of 100m in 5s . What is the acceleration?

- A. 0.05ms^{-2}
- B. 0.32ms^{-2}
- C. 8.00ms^{-2}
- D. 26.00ms^{-2}



39. A ray of light falls on a plane mirror such that the angle between the incident ray and the reflected ray is 20° . The value of the angle of incidence will be

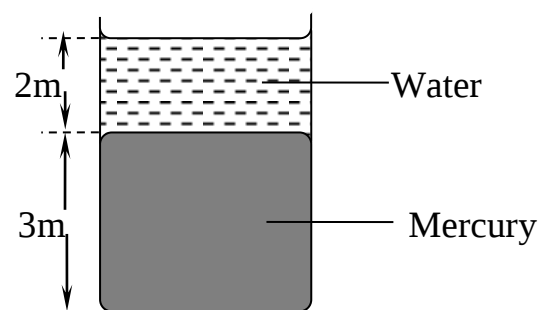
- A. 10°
- B. 20°
- C. 40°
- D. 70°



40. Figure 6 shows a tank containing mercury and water. Find the pressure exerted by the two liquids on the bottom of the tank.

(Density of water
 $= 1.0 \times 10^3\text{kgm}^{-3}$,
 Density of mercury
 $= 1.36 \times 10^4\text{kgm}^{-3}$)

Figure 6



- A. $2.00 \times 10^4\text{Pa}$
- B. $3.88 \times 10^5\text{Pa}$
- C. $4.08 \times 10^5\text{Pa}$
- D. $4.28 \times 10^5\text{Pa}$



SECTION B: (40 MARKS)

Answer **all** questions from this section. All working must be shown clearly in the spaces provided.

41. (a) What are x – rays? (01 mark)

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- (b) State what is done to produce hard and also soft x - rays.

- (i) Hard x – rays. (01 mark)

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- (ii) Soft x – rays. (01 mark)

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- (c) State one industrial application of x – rays. (01 mark)

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42. (a) What is meant by **mechanical advantage** of a machine? (01 mark)

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- (b) State the advantage of using a machine of mechanical advantage greater than 1. (01 mark)

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(c)

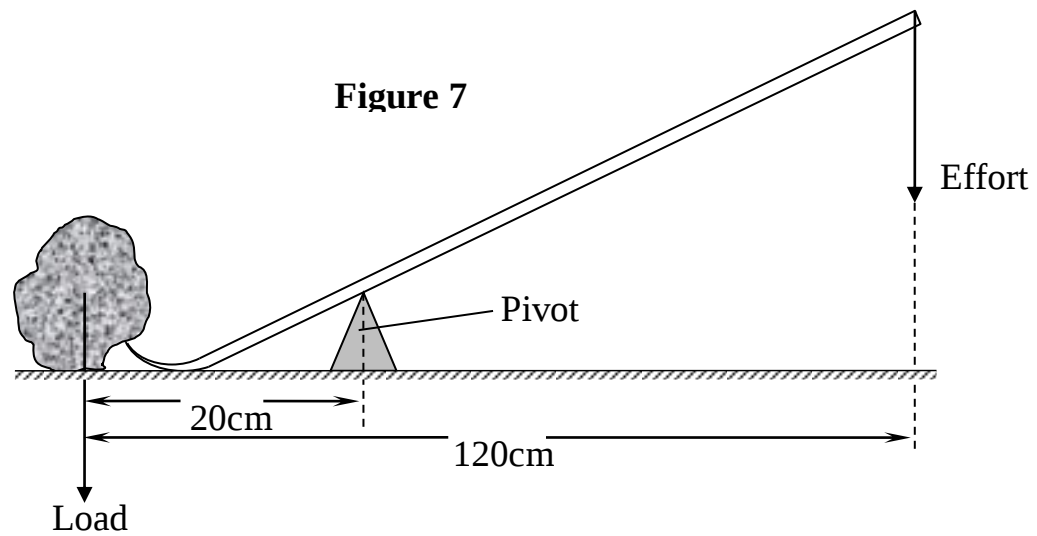


Figure 7 shows a crow bar used to lift a load. Calculate the velocity ratio of the crow bar
(02 marks)

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43. (a) What is a beam as a construction material? (01 mark)

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(b)

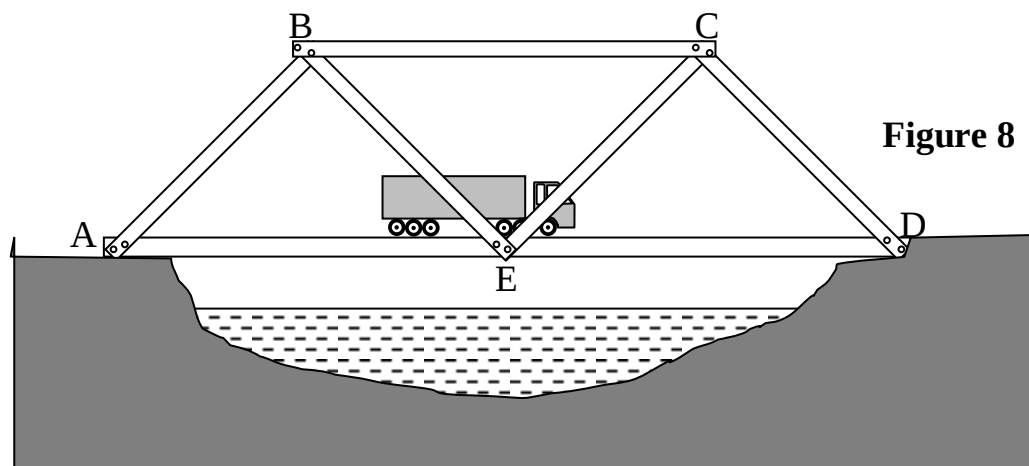


Figure 8 shows a bridge made of several girders. Name any two struts and two ties. (02 marks)

Struts.....

Ties.....

- (c) State one way of reducing notch effect on concrete. (01mark)

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44. (a) State the domain theory of magnetism. (02 marks)

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- (b) Explain briefly why a freely suspended magnet comes to rest with its north pole pointing to the North Pole and the south pointing to the South Pole. (02 marks)

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45. A block and tackle pulley system is used to raise a load of 400N steadily through a height of 15m. If the work done against friction is 100N, calculate

- (a) the work input (02 marks)

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- (b) the efficiency of the system. (02 marks)

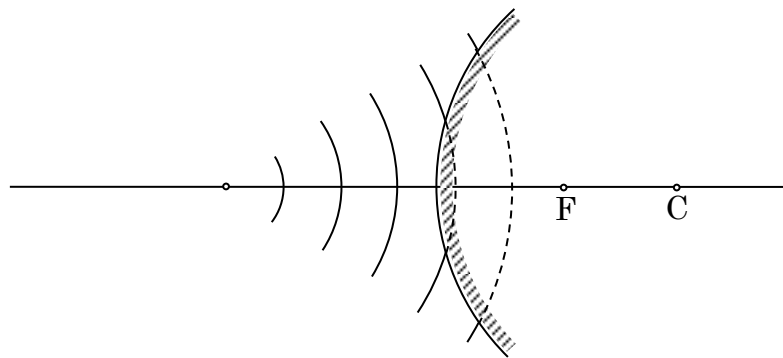
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46. (a)



Figure

Figure 9 shows circular waves incident on a convex barrier. Complete the diagram to show how the wave is reflected

- (b) (i) What is meant by wavelength of a wave? (01 mark)

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- (ii) A vibrator sends eight ripples per second across a water tank. The ripples are observed to be 4cm apart. Calculate the speed of the ripple. (03 marks)

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47. (a) What is meant by heat capacity of a body? (01 mark)

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(b) A brass cylinder of mass 100g was heated to 100°C and transferred to a thin aluminium can of negligible heat capacity containing 168g of paraffin at 11°C. If the final temperature after stirring was 20°C, calculate the specific heat capacity of paraffin.
(Specific heat capacity of brass = $380\text{Jkg}^{-1}\text{K}^{-1}$). (03 marks)

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48. (a) What is meant by atmospheric pressure? (02 mark)

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(b) (i) State one application of atmospheric pressure. (01 mark)

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(ii) Briefly explain how the application in (b)(i) works.

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49. (a) State Snell's law. (01 mark)

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(b) (i) The refractive index of a ray travelling from water to air is 0.75. If the angle of refraction is 35° , calculate the angle of incidence. (02 marks)

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(ii) Calculate the refractive index of water. (01 mark)

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50. A 3kW immersion heater is used for 8 hours each week and a 200W filament lamp used for 5 hours daily in a week. Find the
(a) Total energy consumed each week. (02 marks)

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(b) total cost of using the appliances each week if one unit of electricity cost Shs. 650. (02 marks)

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END

PRE – MOCK EXAMS 2019
535/1 Physics Paper 1 Marking Guide

Section A

1.	C	11.	C	21.	B	31.	D
2.	C	12.	B	22.	D	32.	B
3.	C	13.	B	23.	D	33.	A
4.	B	14.	A	24.	C	34.	A
5.	D	15.	B	25.	B	35.	C
6.	C	16.	B	26.	C	36.	B
7.	D	17.	D	27.	C	37.	B
8.	C	18.	D	28.	C	38.	C
9.	A	19.	A	29.	D	39.	A
10.	D	20.	D	30.	A	40.	D

Section B

41. (a) X-rays are electromagnetic radiations of short wave length produced when fast moving electrons strike a metal target. ✓
- (b) (i) Hard X-rays are produced when a high accelerating E.H.T p.d is applied across the anode and cathode. ✓
- (ii) Soft X-rays are produced when a low E.H.T p.d is applied across the anode and cathode. ✓
- (c) Used to detect cracks in car engines and pipes. ✓
(Any other use)
42. (a) Mechanical advantage is the ratio of load to effort. ✓
- (b) A small effort is applied to the machine to lift a big load. ✓
- (c)
$$\text{V.R} = \frac{\text{Distance moved by effort}}{\text{Distance moved by load}} = \frac{100}{20}$$
 ✓
$$\text{V.R} = 5$$
 ✓
43. (a) A beam is usually a straight piece of material used as a structural material in construction to resist tension or compression forces. ✓

(b) Struts: BC, AB, CD. Ties: BE, CE, AD

(c) The surface containing the notch is put under compression.

44. (a) Ferromagnetic materials consist of small atomic magnets called dipoles. The dipoles are grouped in a region called domain. In each domain, the dipoles face in the same direction.

(b) The north pole faces north because it is being attracted to the south pole of the earth's magnet whose south pole is in the northern hemisphere. The south pole faces south because it is attracted to the north pole of the earth's bar magnet which is in the southern hemisphere.

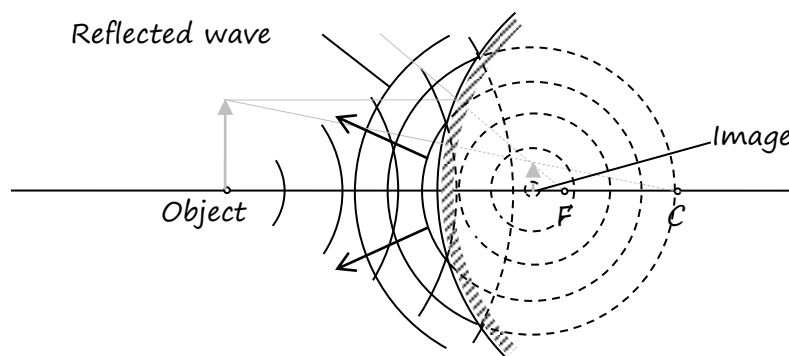
45. (a) Work input = Work done on load + work done against friction.

$$\text{Work input} = (400 \times 15) + 100$$

$$\text{Work input} = 6000 + 100 = \underline{6100\text{J}}$$

$$(b) \quad \eta = \frac{\text{Work output}}{\text{Work input}} \times 100\% = \frac{6000}{6100} \times 100\% = \underline{98.4\%}$$

46. (a)



(b) (i) Wavelength is the distance between two successive particles in phase. (Any other suitable ones)

$$(ii) \quad v = f\lambda$$

$$v = 8 \times 4 = \underline{32\text{cms}^{-1}}$$

47. (a) Heat capacity is the amount of heat required to raise the temperature of any mass of a body by 1K.

(b) Heat loss = Heat gain

$$M_b C_b \theta_b = M_p C_p \theta_p$$

$$100 \times 380 \times (100 - 20) = 168 \times C_p \times (20 - 11)$$

$$C_p = \frac{100 \times 380 \times 80}{168 \times 9}$$

$$C_p = \underline{2010.6 \text{ J kg}^{-1} \text{ K}^{-1}}$$

48. (a) Atmospheric pressure is the pressure exerted on the earth's surface or any other surface by air in the atmosphere.

(b) (i) Sucking a liquid using a straw, using a syringe, working of rubber suckers. (Any other)

(ii) Using a straw, the pressure in the mouth is reduced allowing atmospheric pressure to push the liquid through the straw to the mouth.

Note: Any example given by candidate works on reduction of pressure at one point so atmospheric pressure becoming greater at the other.

49. (a) The ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant for a given pair of media.

(b) (i) Using $n = \frac{\sin i}{\sin r}$

$$0.75 = \frac{\sin i}{\sin 35} \Rightarrow \sin i = 0.430$$

$$i = \underline{25.5^\circ}$$

(ii) $n_w = \frac{1}{n_a} = \frac{1}{0.75} = \underline{1.33}$

50. (a) Total energy = Heater energy + Filament lamp energy

$$\text{Total energy} = P_h t_h + P_f t_f$$

$$\text{Total energy} = (3 \times 8 \times 3600) + ((200 \times 5 \times 7 \times 3600) \div 1000)$$

$$\text{Total energy} = 86400 + 25200$$

$$\text{Total energy} = \underline{111600 \text{ kJ}}$$

(b) Total cost = $\frac{111600}{3600} = 31\text{kWh}$ ✓

Total cost = $31 \times 1000 = \underline{31,000/}$ ✓

END