

Republic of



Somaliland

SLNECB

Physics Examinations
With simplified answers

First edition 2013

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Compiled by: Mohamed Osman Saed (Mohamed Somali)

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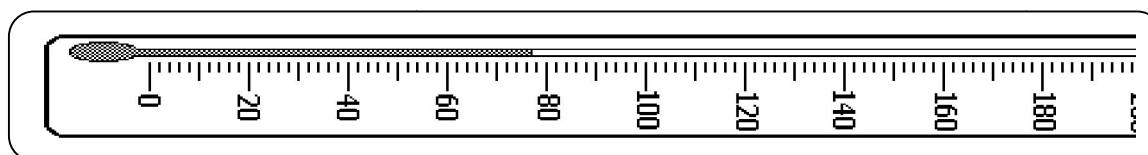
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Unit 1:- Measurement and Units

1.1. Multiple choice Questions

- 1) Which of the following is measured in Newton? (2001)
 - a. Density
 - b. Mass
 - c. Volume
 - d. Weight
- 2) A metal of 360 kg is 20 cm long, 40 cm wide and 30 cm thick. What is its density? (2003)
 - a. 30 grams/cm³
 - b. 15 grams/cm³
 - c. 20 grams/cm³
 - d. 5 grams/cm³
- 3) 0.2m is equal to:- (2004)
 - a. 2 cm
 - b. 20 cm
 - c. 40 cm
 - d. 20 mm
- 4) An object sinks in a liquid if it has:- (2005)
 - a. A large mass.
 - b. Less density than the liquid.
 - c. Greater density than the liquid.
 - d. Smaller volume than the liquid.
- 5) when using a measuring cylinder one precaution to take is to:- (2006)
 - a. check for zero error
 - b. look at the meniscus from below the level of the water surface
 - c. obtain more readings by looking for more than one direction
 - d. position the eye in the line
- 6) the number of grams in 0.002 kg are:- (2007)
 - a. 20 g
 - b. 200 g
 - c. 2 g
 - d. 2000 g
- 7) What temperature does the Celsius thermometer read in C°? (2007)



- a. 81.5
- b. 77
- c. 76
- d. 68.5

8) The SI unit of length is:- (2009)

- a. Mm
- b. Km
- c. M
- d. Cm

9) The mass of the body is:- (2009)

- a. The amount in matter in the body
- b. The volume the body occupies
- c. The product of its volume and density
- d. Its weigh at sea level

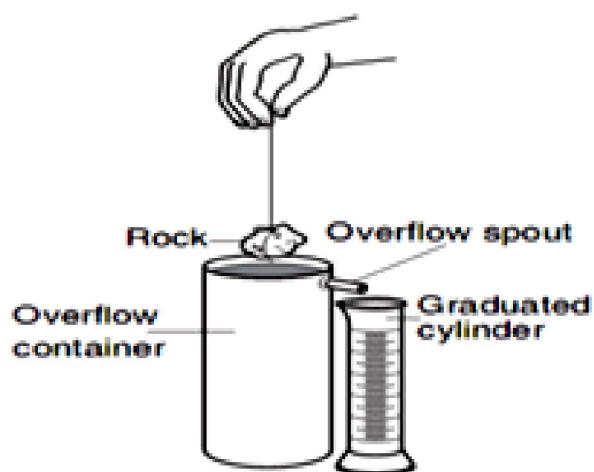
10) $1 \text{ km/h} = \underline{\hspace{1cm}} \text{ m/s}$ (2010)

- a. $5/18$
- b. $18/5$
- c. $50/3$
- d. $3/50$

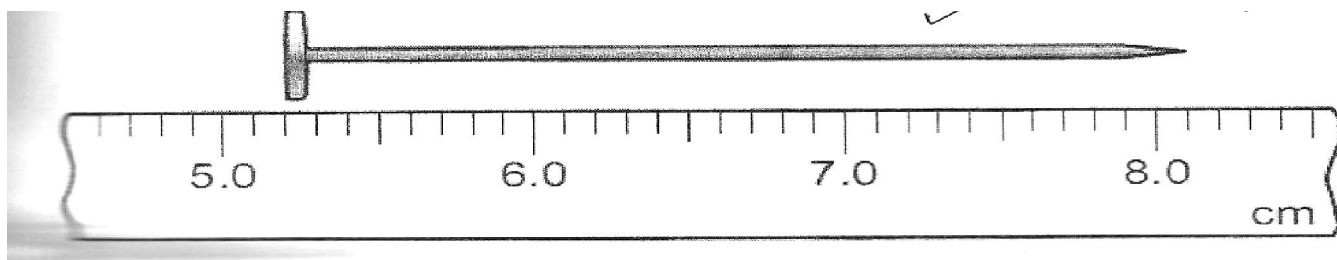
11) The diagram below shows a rock suspended above an overflow container filled with water up to overflow spout. A graduated cylinder is positioned next to the container to collect water that comes out of the overflow spout. (2010)

Which property of the rock can be directly determined when the rock is placed in the overflow container?

- a. Mass
- b. Density
- c. Volume
- d. Hardness

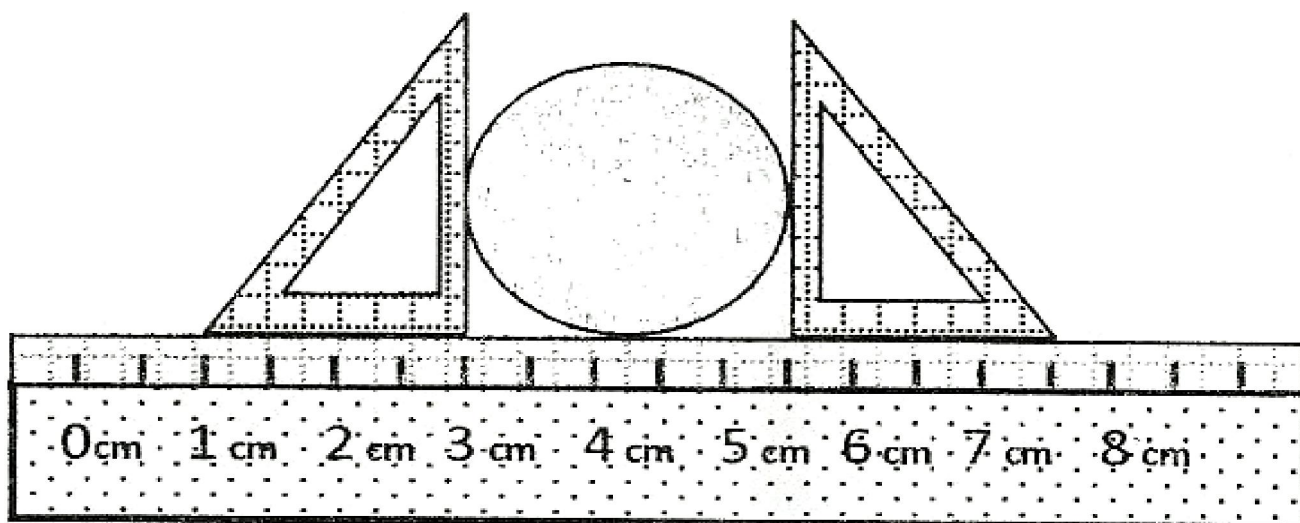


12) A ruler is used to measure the length of a nail. (2011)



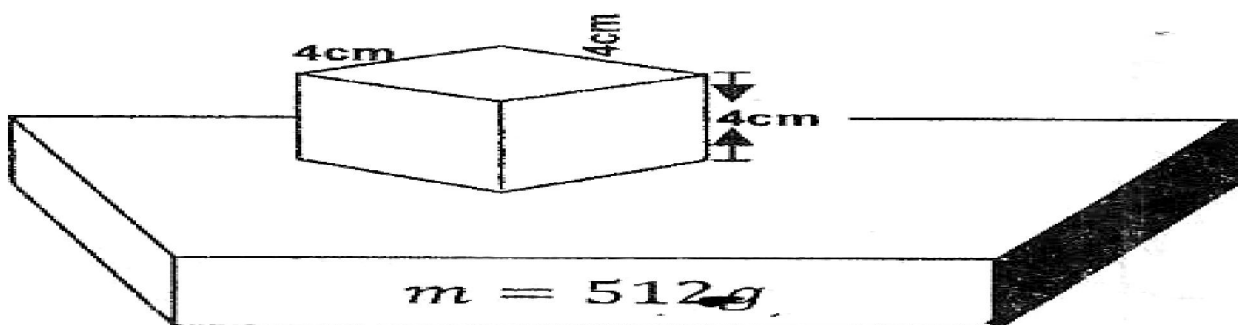
- | | |
|-----------|--------|
| a. 1.3 cm | c. 5.2 |
| b. 2.9 cm | d. 8.1 |

- 13) Which of the following is a vector quantity? (2011)
- Distance
 - Energy
 - Speed
 - Velocity
- 14) The number 0.087 in standard or scientific form is:- (2011)
- 87×10^{-2}
 - 8.7×10^{-2}
 - 8.7×10^2
 - 8.7×10^{-6}
- 15) The density of a substance is defined as:- (2011)
- Mass per unit area
 - Volume per unit mass
 - Mass per unit volume
 - Force per unit area
- 16) Speed of 90 km/h is equal to:- (2011)
- 35 m/s
 - 45 m/s
 - 25 m/s
 - 15 m/s
- 17) The student measured the diameter of a circular disc with a ruler, as shown in the diagram (2012)

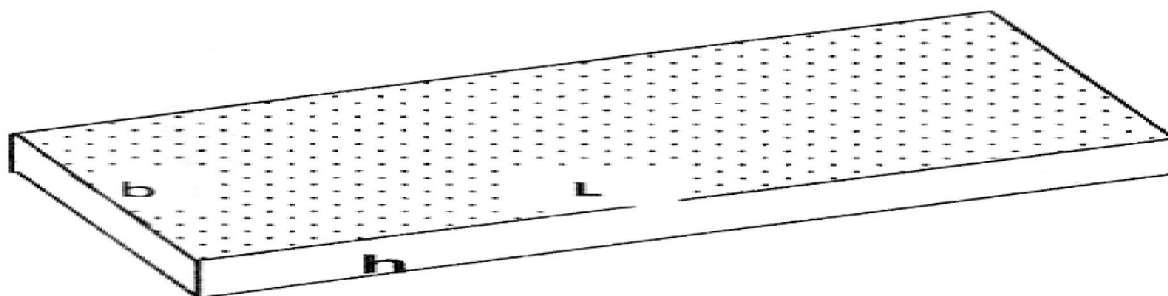


- ✓ The diameter of the disc is:-
- 5 cm
 - 3 cm
 - 2.5 cm
 - 3.5 cm

- 18) The diagram below shows a metal cube on the balance (2012)
using the information on the diagram. what is the density of the cube?



- a. 4 g/cm^3
 - b. 8 g/cm^3
 - c. 12 g/cm^3
 - d. 64 g/cm^3
- 19) The diagram below shows a rectangular block:- (2012)



The shaded area is

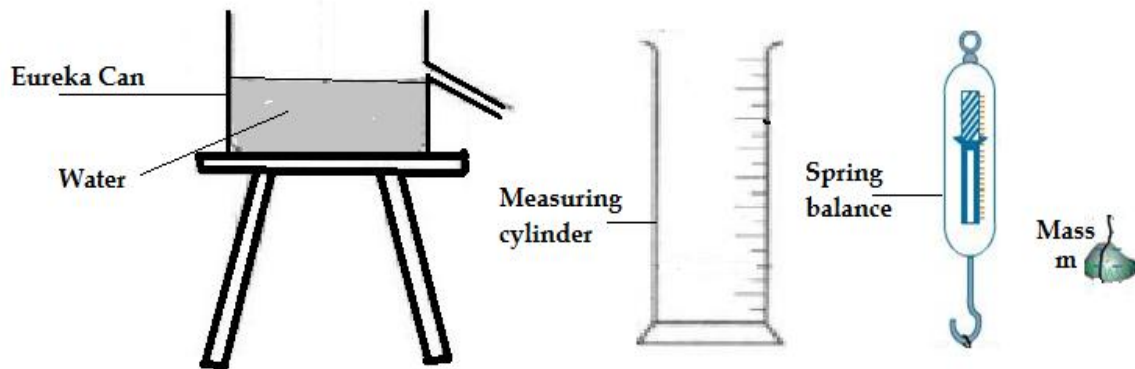
- a. bh
 - b. Lh
 - c. bL
 - d. L^2
- 20) Speed of 90 km/h when expressed in m/s is:- (2013)
- a. 2.5
 - b. 25
 - c. 250
 - d. 90000

- 21) The mass of a body is:- (2013) & (2007)
- a. The amount in matter in the body
 - b. The volume the body occupies
 - c. The product of its volume and density
 - d. Its weight at sea level

1.2. Structural Questions

1) The following equipments is provided

(2001)



You are going to find the density of the mass. Using the above equipment write down four (4) steps in performing the experiment to find the density of the mass.

i. Step1

.....

.....

ii. Step2:

.....

.....

iii. Step3:

.....

.....

iv. Step4

.....

.....

2) Convert 36km/h to m/s

(2003)

.....

.....

3) (i) Write down the formula that connects **density**, **mass** and **volume**.

(2005)

.....

- (ii) Using the formula show why 1kg of water in a bottle has a greater volume than 1kg of a cube of iron

4) Complete the table below

(2006)

Quantity	S.I Unit	Symbol
Length	Meter	
	Kilogram	Kg
Electric current		A
Force		
Charge		C
	Kelvin	K

5)

Estimate and write down the values shown by the arrows on each on each of the scales:

(2007)

a. 0.2 0.3

Ans.....

b. 0 500

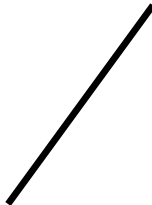
Ans.....

c. 1200 1203

Ans.....

d. Estimate or measure the length of the line below in **mm**

Ans.....mm



Unit 2:- Force

2.1 Multiple choice Questions

- 1) When a force is applied to an object. Several effects are possible. Which of the following effects CANNOT occur? (2006)
 - a. The pressure of the object increases
 - b. The object rotates
 - c. The mass of the object decreases
 - d. The object speed up
- 2) What unit is weight measured in? (2010)
 - a. g
 - b. Kg
 - c. K/g
 - d. N
- 3) A Newton is a unit of force. Which quantity is measured in Newton?
 - a. Acceleration
 - b. Density
 - c. Mass
 - d. weight

Unit 3. Motion

3.1- Structured questions

1. a) Change 360km/h to meters per second (m/s). (2001)

.....
.....

- b) A bullet travels at 100m/s. How far does it travel in 6.25 seconds?

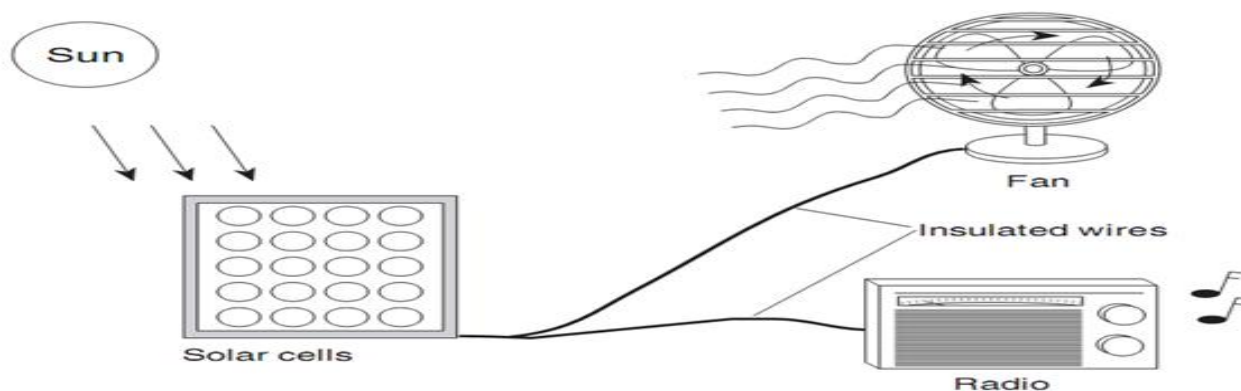
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Unit 4. Energy

4.1- Multiple choice questions

- 1) A moving object of mass 20kg has a velocity of 5m/s. what is its kinetic energy (2003)
 - A. 250 joules
 - B. 4 joules
 - C. 100 joules
 - D. 2000 joules
- 2) The energy of an object due to its position (2006)
 - A. Potential energy
 - B. Audio energy
 - C. Electric energy
 - D. Kinetic energy
- 3) Which of the following is a renewable energy source? (2007)
 - A. Wood
 - B. Natural gas
 - C. Sugar cane
 - D. Wind
- 4) Energy may be defined as:- (2008)
 - A. Producing power
 - B. Causing motion
 - C. Ability to do work
 - D. Ability to exert force
- 5) The illustration below show an example of energy changing forms. (2010)



Which changes in energy are illustrated in the diagram?

- A. Electrical → sound → light and mechanical
- B. Sound → mechanical → light and electrical
- C. Mechanical → light → sound and electrical
- D. Light → electrical → mechanical and sound

- 6) Which of the following is **NOT** an example of fossil fuels (2012)
- A. Crude oil
 - B. Uranium
 - C. Natural gas
 - D. Coal

4.2- Structured questions

- 1) Fill in blanks in the following paragraphs using the following words: (2006)

Sound , Internal , potential (some words may be used many times)

When the hammer knocks a nail into a wooden block with a hammer, stored energy in his body is used to do work in lifting up the hammer which, in its raised position, possesses energy. When the hammer falls, the Energy is converted into energy of the moving hammer. This Energy is then used to do work in driving the nail into wood with the dissipation of energy into the air and production of energy in the block, nail and hammer.

- 2) Here are some statements about energy. (2007)
Complete the statements using words from the following list

Chemical, electrical, geothermal, heat, hydroelectric, light, movement (kinetic), position (potential), strain, tidal, wave

- a. A coal fire converts..... energy into energy and energy.
 - b. When a ball falls from rest, its energy increase and its.....energy decreases.
 - c. The source of energy, in which hot rocks under the earth's surface heat water to produce steam, is referred to as energy
- 3) When a car collides on a wall what kind of energy could we use for restoring the car's original shape? (2013)
-

Unit 5. Properties of matter

5.1- Multiple choice questions

1. The molecules in solid are: (2002)
 - a) Moving closer together
 - b) Moving fast in all directions, hitting each other and sides of the solid
 - c) Not moving, vibrate and have strong attractive forces
 - d) Vibrating and passing each other

2. Water drops from a dripping tap are round. this is because:- (2009)
 - a) The molecules of water are round
 - b) Water crystals are round
 - c) Molecular attraction causes the round shape
 - d) Atmospheric pressure causes the drop to be round

3. Which of the following statements does NOT fit the kinetic theory of matter? (2009)
 - a) Matter is made up of small particles called molecules
 - b) The molecules are in constant motion or vibration
 - c) The molecules of a solid expand when heated
 - d) The higher the temperature, the faster the molecules move or vibrate

4. Paraffin moves up the wick of a candle by a process:- (2011)
 - a) Osmosis
 - b) Surface tension
 - c) Capillarity
 - d) Transpiration

5. When water spreads on a glass plate, the forces between its molecules and glass molecules are due to: (2011)
 - a) Surface tension
 - b) Cohesion
 - c) Adhesion
 - d) Capillarity attraction

6. An orange fruit is cut open from one corner of a class room. In about 10 minutes the orange smell covers the whole room. The smell covers the whole room by a process known as (2013)
 - a) Osmosis.
 - b) Transpiration
 - c) Diffusion
 - d) Fission

Unit 6:- Heat and temperature

6.1 Multiple choice Questions

- 1) The lowest point of the Kelvin scale is known as: (2003)
 - a. Absolute zero
 - b. Freezing point
 - c. The ice point
 - d. The boiling point
- 2) Which is the best conductor of heat? (2003)
 - a. Aluminum
 - b. Copper
 - c. Iron
 - d. Brass
- 3) Absolute zero temperature is same as (2004)
 - a. -273°C
 - b. 273°C
 - c. 373°C
 - d. 173°C
- 4) A heating stove is next to a wall in a closed room. (2005)
The whole room is eventually heated:
 - a. By conduction
 - b. By radiation only
 - c. By convection
 - d. By evaporation
- 5) In the vacuum flask, the vacuum prevents heat transfer by (2006)
 - a. Radiation only
 - b. Conduction only
 - c. Convection only
 - d. Convection & conduction
- 6) A clinical thermometer has a narrow capillary tube so that it (2007)
 - a. Is quick to respond to temperature changes
 - b. Can record the maximum temperature
 - c. Shows a large change for a given temperature rise
 - d. Can measure a range of temperatures
- 7) Water is NOT used as a thermometric liquid mainly because:- (2008)
 - a. Is colourless
 - b. Is bad conductor of heat
 - c. Does not expand linearly
 - d. Has a low boiling point of 100°C
- 8) A vacuum flask has double walls of glass or steel with a vacuum between them. Which (2008)
kinds of heat transfer are reduced by the vacuum?
 - a. Radiation & Convection
 - b. Conduction & convection
 - c. Conduction & radiation
 - d. Convection, Conduction & radiation
 - e.

- 9) Normally healthy body temperature is (2009)
- 27°C
 - 98.4°C
 - 37°C
 - 68°C
- 10) The inner surface of vacuum flask is silvered to make it a (2009)
- Bad absorber and bad conductor of heat
 - Bad absorber and good radiator of heat
 - Bad absorber and bad radiator of radiant heat
 - Good absorber and bad radiator of heat
- 11) The windows of modern building have double glasses separated by air. this reduces loss of heat by : (2012)
- Conduction
 - Convection
 - Radiation
 - Evaporation
- 12) Water has its maximum density at the following temperature (2013)
- 20°C
 - 4°C
 - 10°C
 - 15°C
- 13) Asha puts a cube of ice on a table and ice started melting gradually until completely melted, where does it get latent heat? (2013)
- Surroundings
 - Sun
 - Fire
 - Asha's hands

6.2. Structural Questions

- 1) a) State any two ways in which heat can be transferred from one body to another (2004)

.....
.....

- b) Compare evaporation and boiling by filling the following table:

Boiling	Evaporation
i.	i.
ii.	ii.
iii.	iii.

- c) An aluminum rod 5m long is heated from 20°C to 100°C . Find the increase in length if the linear expansivity of aluminum is $0.00003/^{\circ}\text{C}$

.....

.....

- 2) a) Explain how heat gets to the top of heated water in a beaker (2008)

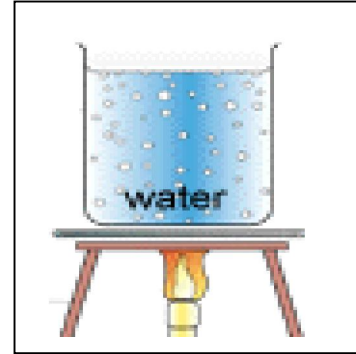
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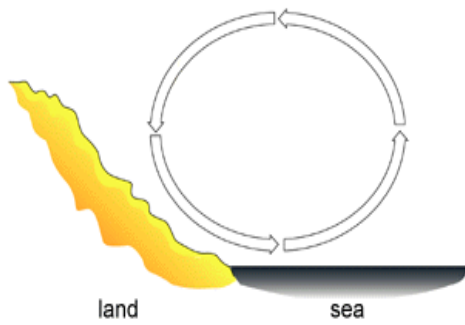
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- b) (i) The diagram shows a breeze that occurs along the coastal town of Berbera.



- i. What is the name given to this breeze?

.....

- ii. Does the breeze occur during the day or night?

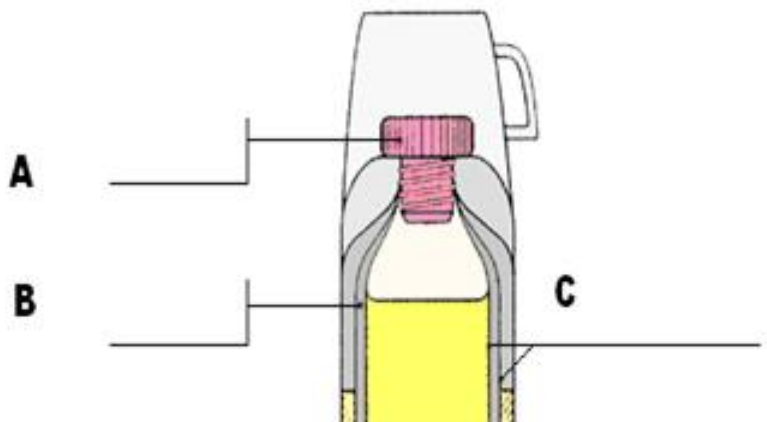
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(ii) What causes the breeze?

.....

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- c) The diagram shows parts of vacuum flask.



- (i) Label A, B & C

A=.....

B=.....

C=.....

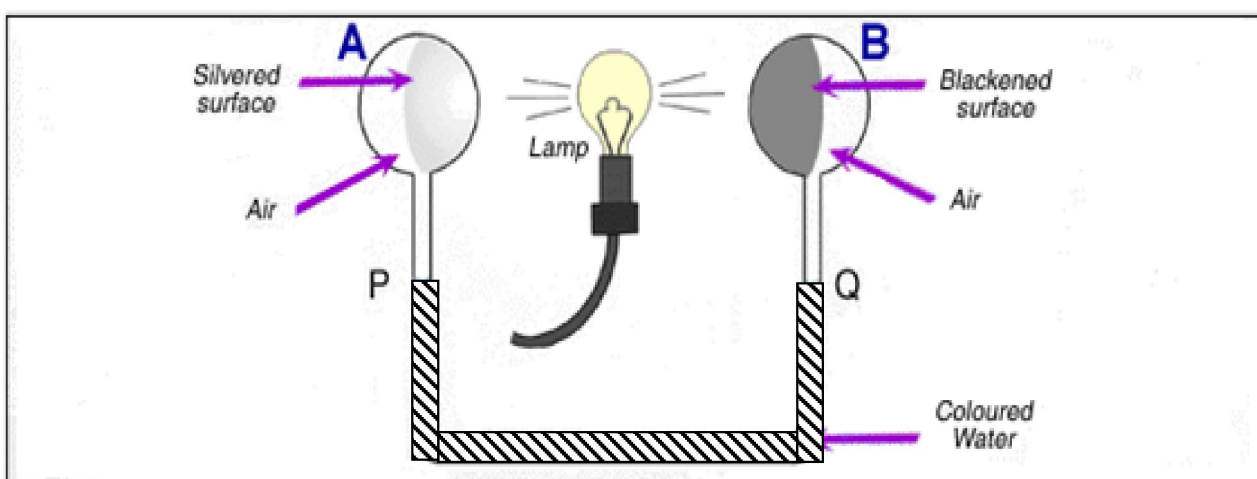
(ii) Explain how using A, B and C in the vacuum flask helps to ensure minimal heat losses so as to keep drinks hot.

A).....

B).....

C).....

3. A lighted electric lamp is placed between two glass flasks containing air. One flask is painted silver, the other is black. There is colored water in the tube and the levels of water are same or identical before heating commences. (2009)



- a) Name the process by which heat
 - i. Passes through the glass of the lamp
.....
 - ii. Passes from the outer surface of the lamp to the flask
.....
- b) After a time it is noticed that the liquid level falls in the left hand and rises in the right hand tube
 - i. Which surface is better absorber of heat?
.....
 - ii. What has happened to the pressure of the air in the black bulb?
.....
 - iii. What has happened to the pressure of the air in the silvered bulb?
.....
 - iv. What can you say about the speed of movement of the molecules in the two bubs?
.....
.....

6.3- Extended questions:- CHOOSE EITHER 1 OR 2

(2013)

1. Compare by giving examples:-
 - a) Conduction of heat.
 - b) Convection of heat.
2. Compare:-
 - a) Green house effect.
 - b) Global warming.

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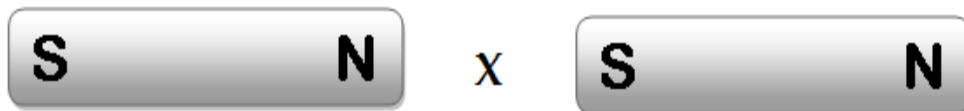
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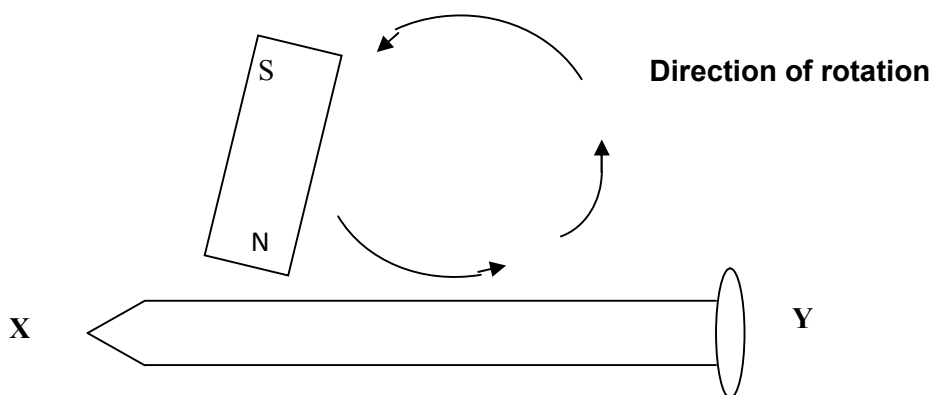
Unit 7:- Magnetism

7.1- Multiple choices questions

1. Which of the following makes use of the electromagnetic effect of an electric current? (2001)
 - a) Electric bell
 - b) Electric fire
 - c) Fuse
 - d) Lamp
2. A bar magnet attracts:- (2005)
 - a) All metals
 - b) Aluminium, copper and steel
 - c) Iron and steel
 - d) Aluminium, cobalt and iron
3. The diagram shows a neutral point X between two poles of magnets

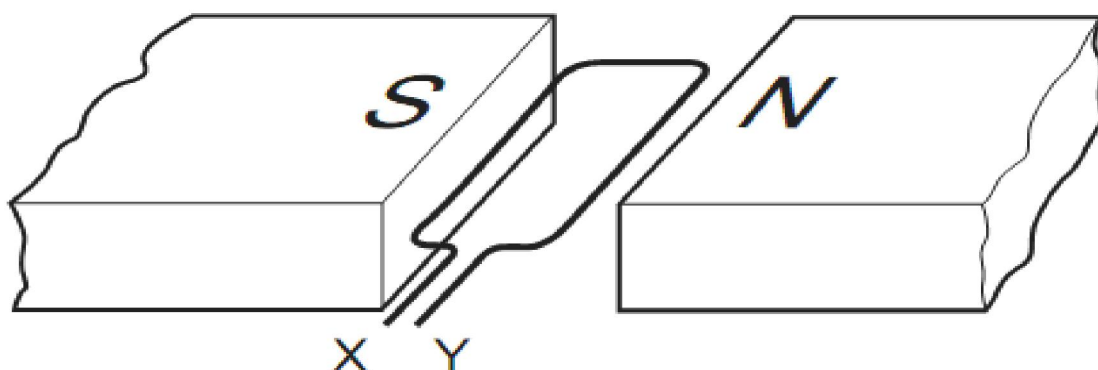


- A neutral point is where there are no: - (2006)
- a) Electrical charges
 - b) magnetic poles
 - c) magnetic material
 - d) magnetic forces
4. A bar magnet with poles as marked is used to stroke a nail in the direction shown in diagram (2007)



- When the nail is freely suspended and the north pole of magnet is near to the end X, the end X will
- a) be attracted to magnet
 - b) move away from the magnet
 - c) remain stationary
 - d) move to point in the north direction

5. Heating a magnet will (2008)
- a) weaken its magnetic field
 - b) strengthen in its magnetic field
 - c) reverse its polarity
 - d) have no effect
6. Carbon brushes in an electric motor are used to (2009)
- a) increase efficiency
 - b) brush the commutator
 - c) reverse the current
 - d) decrease resistance
7. The diagram shows a coil in magnetic field. (2010)

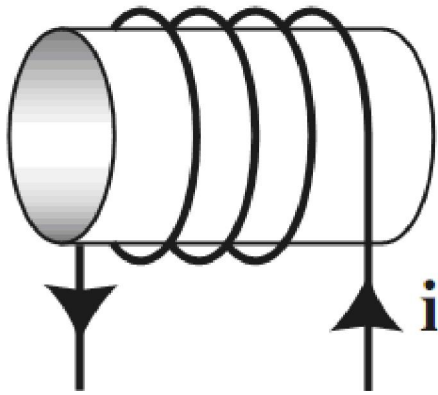


When the coil is part of a d.c motor, what must be connected directly to X and Y?

- a) d.c supply
 - b) slip rings
 - c) soft-iron core
 - d) split –ring commutator
8. Which of the following properties does NOT belong to bar magnets in terms of magnetic field: (2012)
- a) magnetic field lines run from south to north
 - b) lines of force are closer together at the poles
 - c) magnetic field is strongest at the poles
 - d) magnetic lines of force never cross each other

9. A coil with a current is shown below.

(2010)

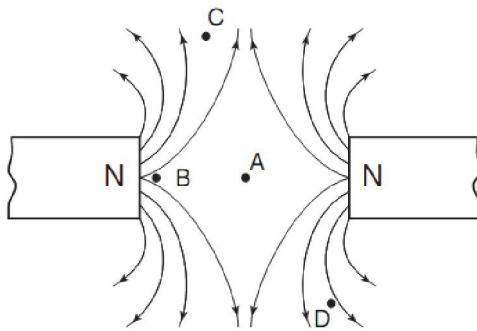


In the centre of the coil, a magnetic field points

- A) to the right
- B) to the left
- C) upward
- D) downward

10. The diagram below shows the lines of magnetic force between two north magnetic poles.

(2010)

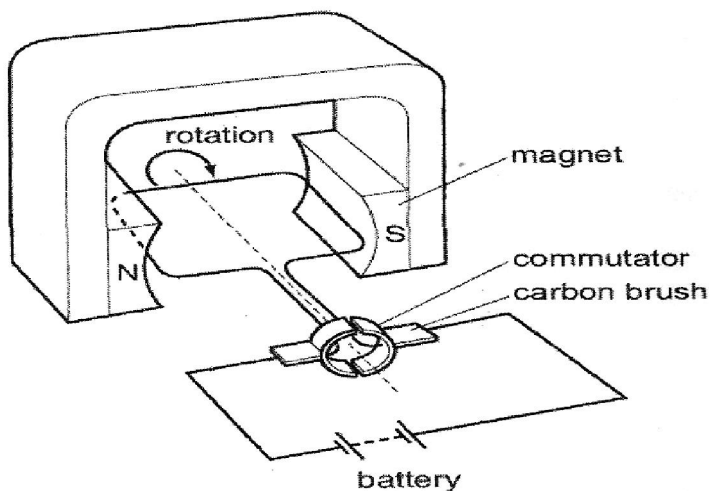


At which point is the magnetic field strength greatest?

- A
- B
- C
- D

11. the diagram shows an electrical device

(2011)

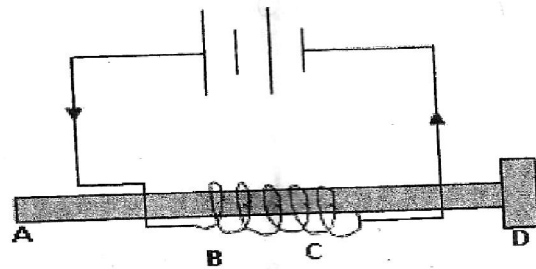


What is this electrical device?

- a. A d.c motor
- b. An a.c generator
- c. A magnetizing coil
- d. A transformer

12. the figure shows an iron nail copper wire wound round it, and two dry cells connected in series make an electromagnet then N pole is represented by:- (2013)

- a) C
- b) D
- c) A
- d) B



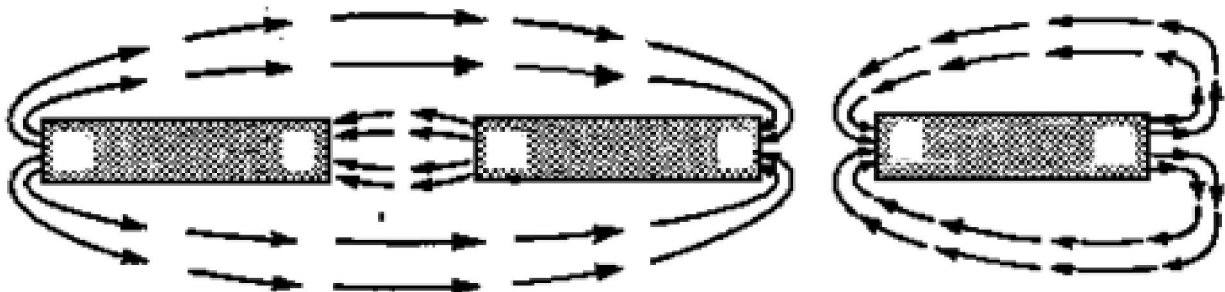
7.2- Structured questions

1. a) Give two reasons why soft iron is in electromagnets instead of hard iron (2001)

REASON 1

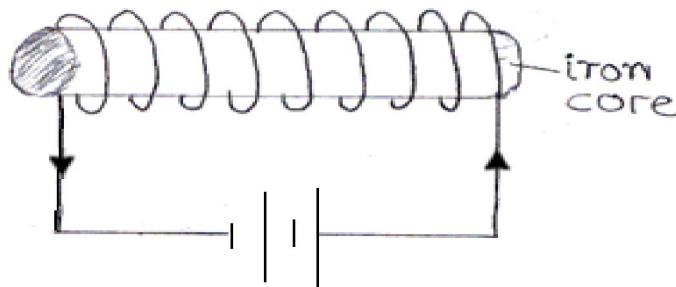
REASON 2

b) The diagram shows the lines magnetic flux between and around three bar magnets. Label the poles of the bar magnets North (N) or south (S) in the diagram:



2. A current flows in the direction, as shown, through the wire coiled round a soft iron core.

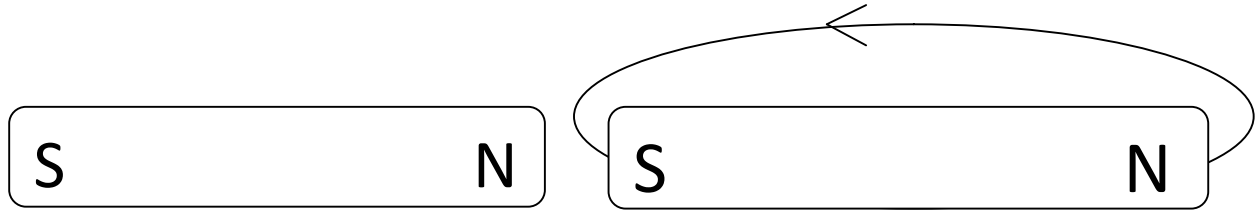
a) Label correctly the pole N (north) and the pole S (south) at each end of the core. (2005)



COMPLETE

- b) When the current flows the soft iron core will become
- c) This apparatus could be called
- d) If we switch off the circuit, after a while the core will lose its

3. a) One loop of line of force is drawn for you. Draw in three other loops to show the field lines (or lines of forces) between two magnets. (2005)



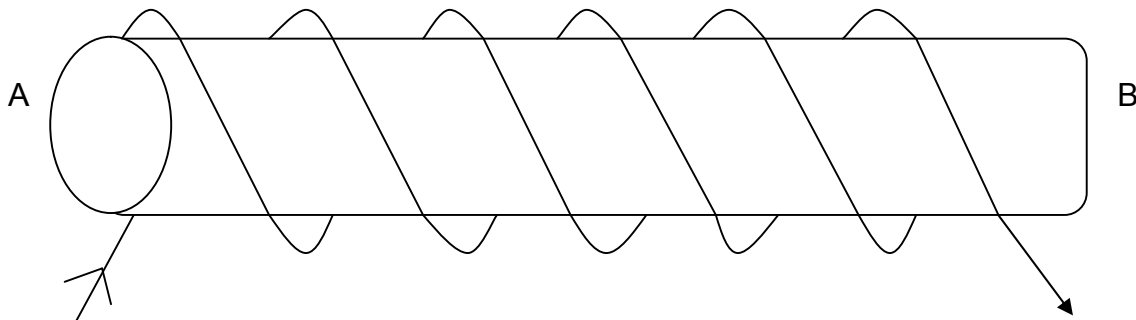
- b) State any 2 practical application of an electromagnet.

1

2

QUESTION FOUR:-

(2006)



AB is a soft iron bar wrapped in a coil of insulated wire, when a direct current is switched on in the wire the bar AB becomes magnetized.

- a) With the direction of the current shown in the wire, which end is the North Pole?

.....

- b) When the current is switched off what happens to the magnetism of the bar

.....

- c) In what would the result be different if a steel bar was used instead of a soft iron bar?

.....

- d) State two ways of increasing the strength of an electromagnet.

i.

ii.

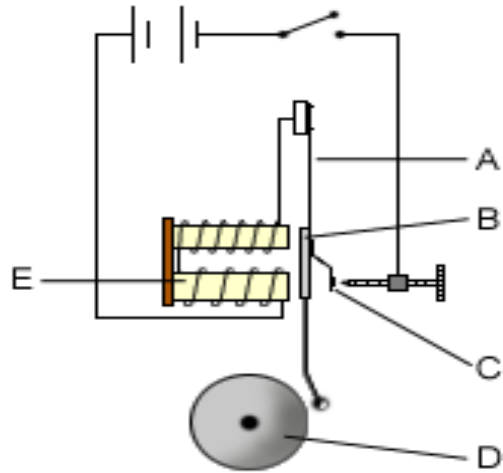
e) State any two uses of electromagnets.

i.

ii.

5. The diagram below represents an electric bell.

(2009)



a) Name the parts;

i. C.....

ii. D.....

iii. E.....

b) (i) identify a material suitable for E

(ii) Explain why the material is suitable for the electric bell

.....

c) i. Explain how the bell works

.....

.....

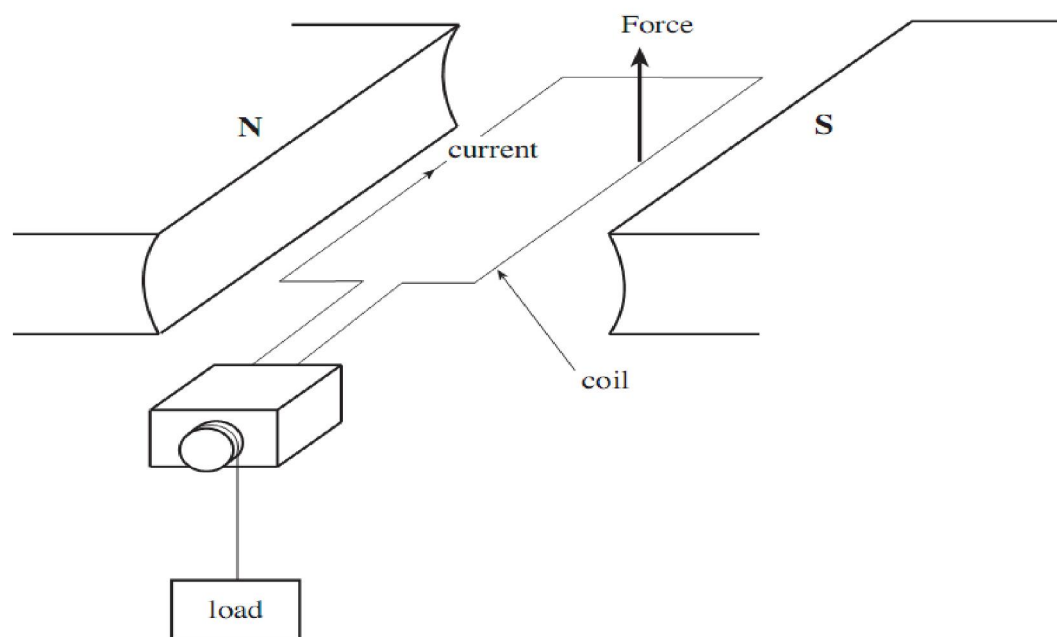
ii. State two changes which can be made to E to increase its magnetism.

.....

.....

6. The diagram shows an electric motor used to lift a load.

(2010)



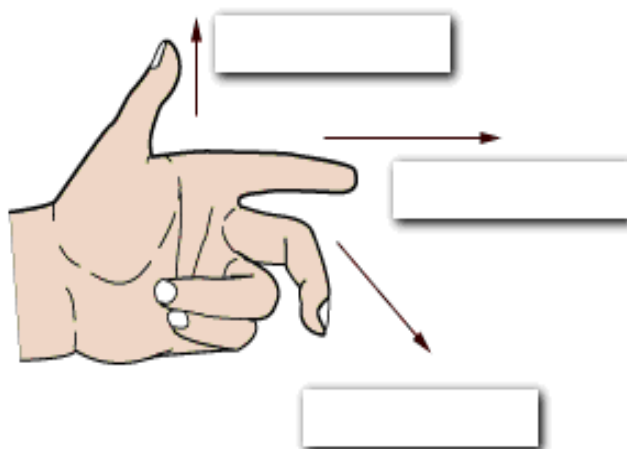
State THREE ways you can increase the force on the coil so that it spins faster

.....

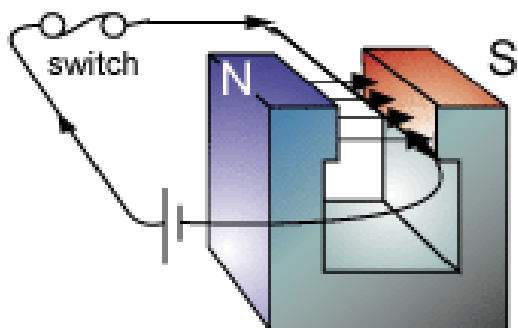
.....

7. a) The figure below illustrates Fleming's left hand rule. Indicate what the fingers and thumb represent.

(2008)



b) There is a force on the wire in the diagram below.



i) Using Fleming's left hand rule, draw an arrow to show the direction of the force.

ii) Give two ways in which the force could be increased.

1

2

iii) Give one way in the direction of the force could be reversed.

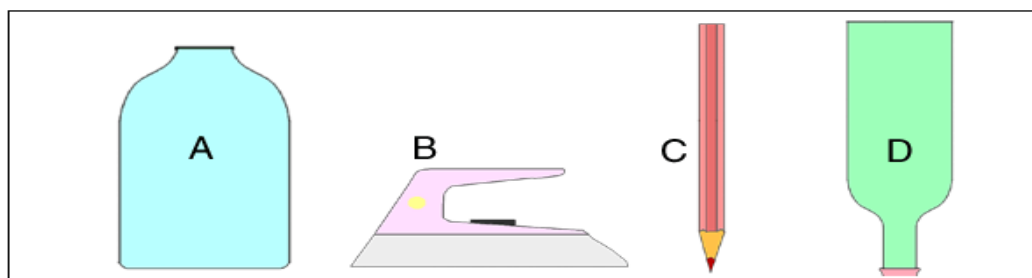
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Unit 8- Force, moment & pressure

8.1- Multiple choice questions

1. Which of the following illustrates stable equilibrium?

(2008)



2. a body floating in oil displaces its own:-

(2009)

- A) Volume.
- B) Weight of oil.
- C) Surface area of oil
- D) depth of oil

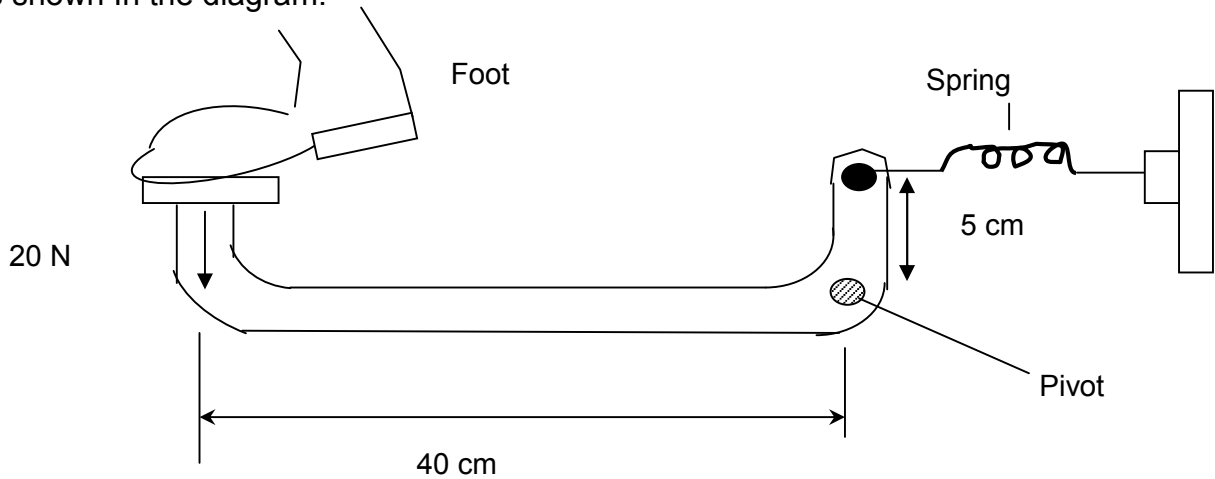
3. The centre of gravity of the body is the:-

(2007)

- A) Midpoint of the body
- B) point of balance of the body
- C) Point through which the resultant force of gravity acts .
- D) Point at which the body is supported

4. a driver's foot pressure on the a pedal in a car with a force of 20N as shown In the diagram.

(2007)

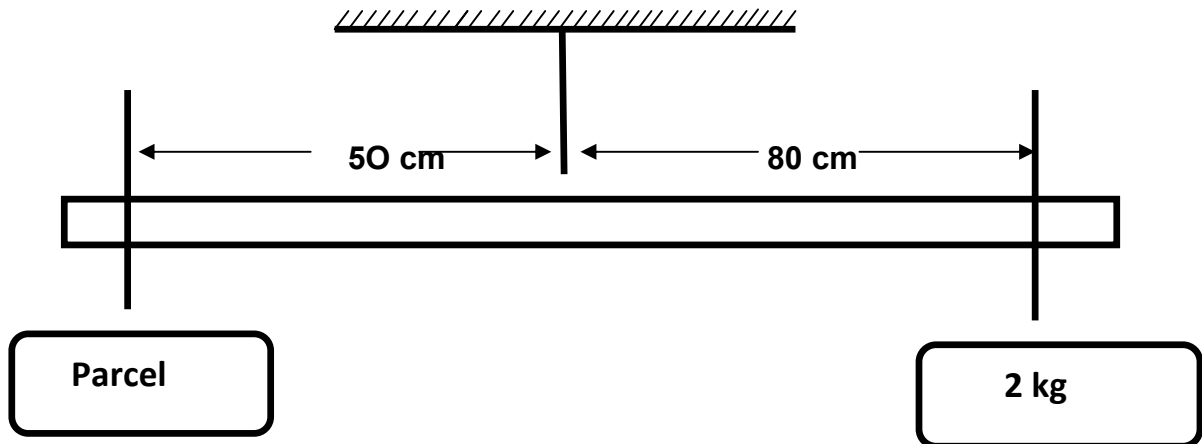


with what force is the spring pullec

- A) 2.5
- B) 10 N
- C) 100 N
- D) 160 N

5.

(2011)

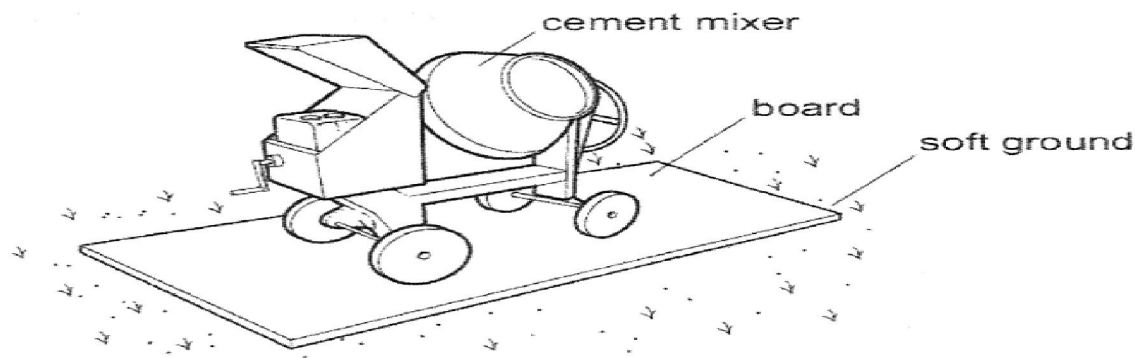


A man balanced a parcel with a 2.0 kg bag of flour using a horizontally suspended uniform broom handle as shown above. Calculate the mass of the parcel

- A) 12.5 kg
- B) 10 kg
- C) 40 kg
- D) 3.2 kg

6. .to prevent a cement mixer sinking into soft ground,
the mixer is placed on a large flat board.

(2011)



Why

does this prevent the mixer sinking?

- a. The large area decreases the pressure on the ground
- b.the large area increases the pressure on the grounf
- c. the large area decreases the weigh on the ground
- d. the large are aincreases the weigth on the ground

8.2- structural questions of force, pressure and moment

1. a) i) Define pressure

(2009)

.....

.....

ii) State the S I unit of pressure

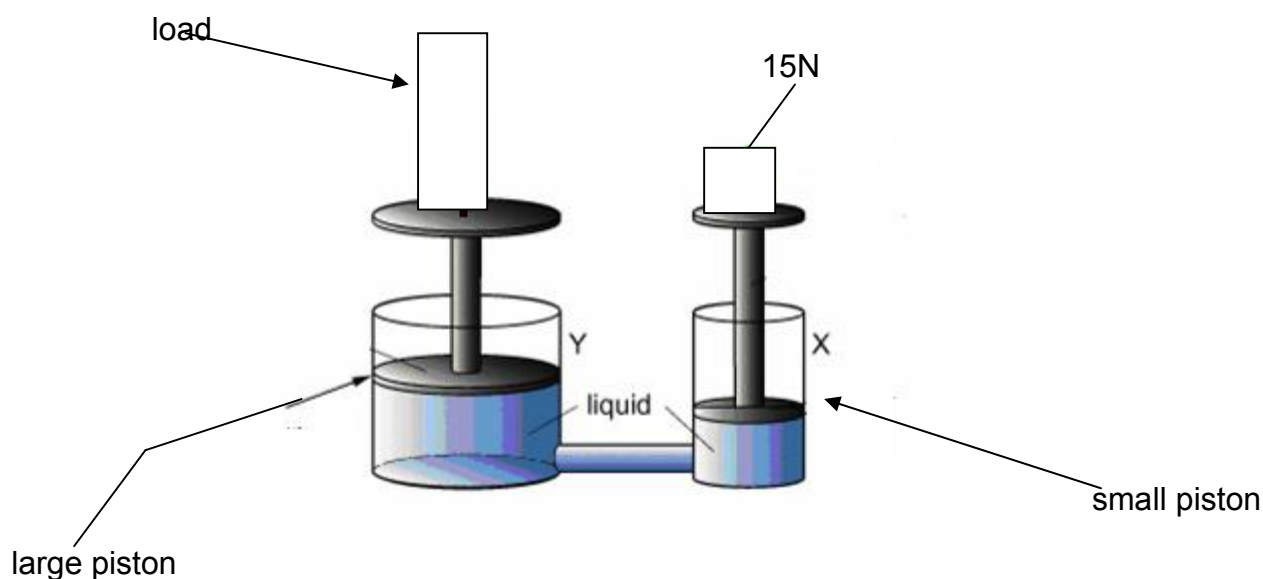
.....

iii) Explain why it is easier to cut meat with a sharp knife than with a blunt one

.....

.....

b) The diagram below shows a simplified form of a hydraulic press. a force of 15N is exerted on the small piston of area 0.025m^2 . the large piston has an area of 0.5m^2 .



i) What liquid is used by the hydraulic press?

.....

ii) State one property of the liquid that makes it suitable as the hydraulic fluid.

.....

c) Calculate

i) Pressure exerted on the liquid by the small piston

.....

.....

ii) Pressure on the large piston

.....

.....

iii) Force exerted by the large piston on the load

.....

.....

2. a) Define pressure and state the SI unit

(2007)

i) Definition

.....

.....

ii) SI unit of pressure

.....

.....

b) State two applications of atmospheric pressure at home

i).....

ii).....

c) Find the pressure acting on a diver when he is at 10m in water.(density of
water= 1000kg/m^3 , $g=10\text{m/s}^2$)

.....

.....

.....

3. The mass of Aisha on the earth is 55 kg.(g on earth= 9.8m/s^2 , g on Jupiter= 26m/s^2)

(2005)

i) Find her weight on earth

.....

ii) What would be her weight on Jupiter.

.....

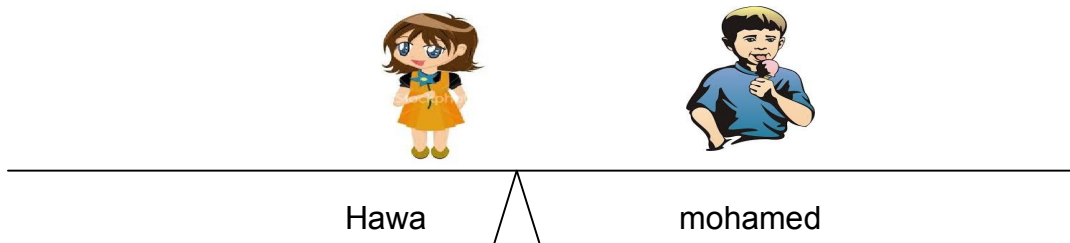
.....

iii) What would be her mass on Jupiter?

.....

4.a. Hawa and Mohamed sit on either sides of a beam, both the same distance from the midpoint of the beam. Mohamed has a greater mass than Hawa and his side of the beam goes down. Mark H on the beam where approximately Hawa should sit as to balance the beam

(2005)



5. a) Define frictional force

(2004) AND (2008)

.....

b) In a car, friction is the essential in some parts, but needs to be reduced in others. Give two examples of where friction is

i) Essential

❖

❖

ii) Needs to be reduced

❖

❖

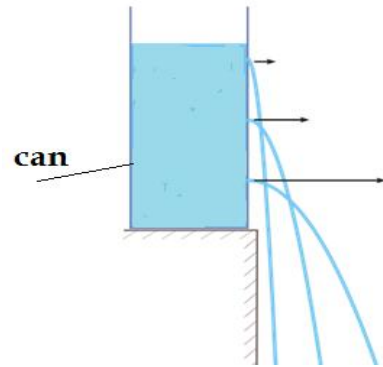
- c) A truck is travelling at 30m/s. suddenly the driver sees a danger ahead and decides to do an emergency stop. If the driver's reaction time is 0.6 sec. Calculate how far the car travels before the driver starts pressing the brake pedal

.....
.....

6. Why is the pressure greatest at the bottom of the can?

(2003)

.....
.....
.....



7. Explain in terms of $p = F/A$.

(2003)

Why pressure on the floor of a ladies high heel shoes is the greater than that of a man's large boots (the ladies mass is 40kg and the man's mass is 80kg)

.....
.....

8. Using the words **pressure** and **area** explain why a camel has a large feet.

(2001)

.....
.....

9. a) we use lubricants or ball bearings in the moving parts of a machine because:-

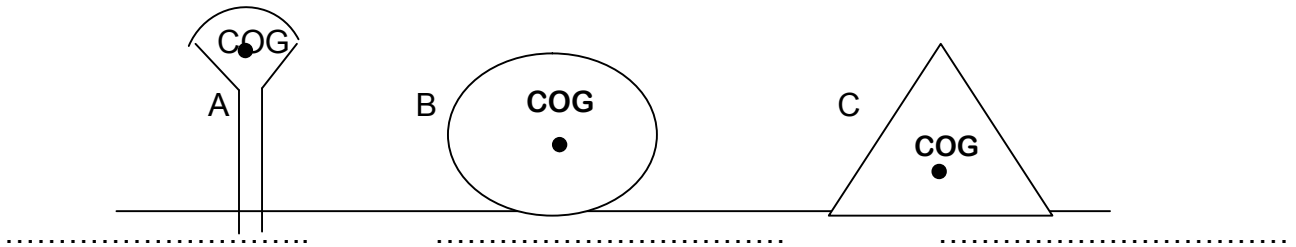
(2002)

.....
.....

- b) If you could walk on Jupiter, which is much larger than Earth, your Mass compared with the Earth would be.....

c) Under each diagram write down one word using the words: -

STABLE, UNSTABLE and NEUTRAL.



10. The figure below shows two different shoes. one has a pointed heel while the other is a flat. (2012)



a) i. Explain briefly the expression $p \propto \frac{1}{A}$

.....

.....

ii. Which of the shoes exerts more pressure on the ground than the other? Explain your answer

.....

.....

.....

b) State two applications where area is increased to reduce the pressure

❖

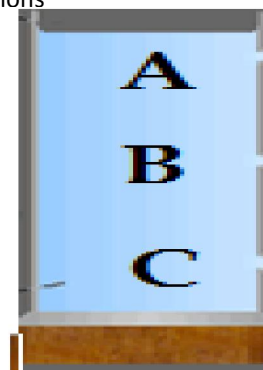
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- c) The figure shows a container full of water. Which of the points is the pressure greatest? Explain your answer

.....

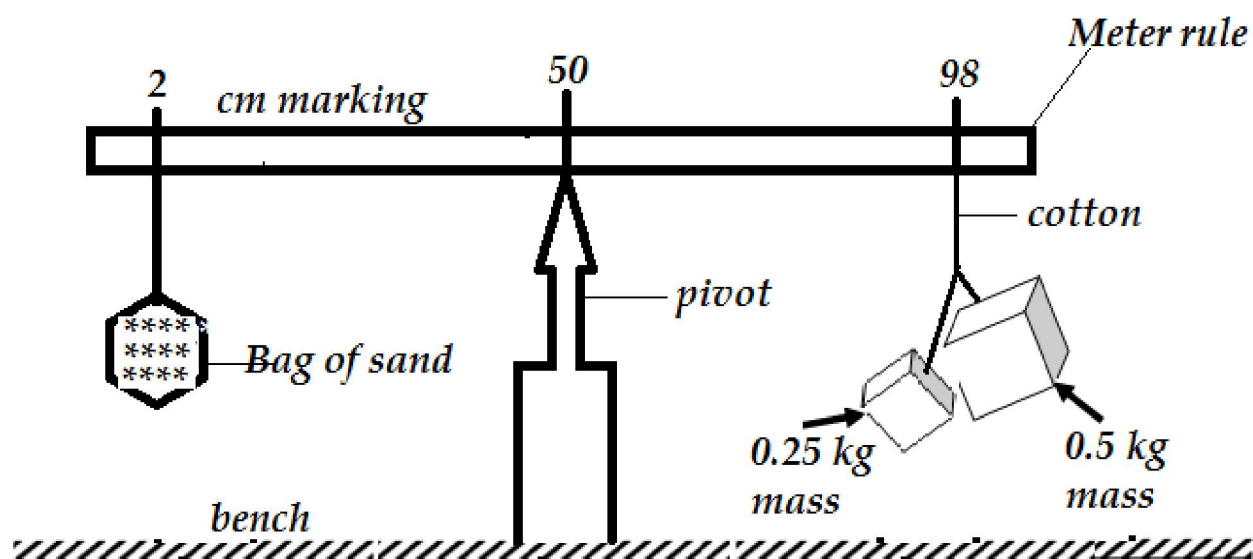
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8.3 Extended Questions

1. The figure shows a simple beam balance made from a pivot and a meter rule (2007)



- a) Find

- i) The mass of the bag of sand

.....

.....

- ii) The weight of the bag of sand ($g = 10 \text{ m/s}^2$)

.....

.....

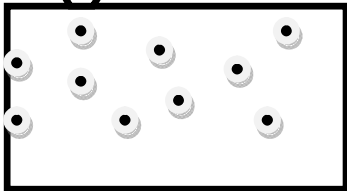
- b) Explain, in terms of moments of forces, why the beam balances

.....

.....

Unit 9:- Quantity of heat

9.1 Multiple choice Questions

- 1) If the temperature of a gas increases, and its volume is constant. (2001)
Its pressure will:
a. Increase
b. Decrease
c. Remain the same
d. Accelerate
- 2) When the sun shines on sand and water, the sand heats up quickly, than the water this is (2002)
because the sand has lower:
a. Specific heat
b. Latent heat
c. Temperature
d. Expansion
- 3) The quantity of heat energy that can raise the temperature of 3 kg of water from 10°C to 50°C is : (2002)
a. $3 \times 10 \times 50\text{kJ}$
b. $3 \times 40\text{kJ}$
c. $3 \times 50\text{kJ}$
d. 504kJ
- 4) Evaporating and melting is called (2002)
a. Change of heat
b. Change of state
c. Change of temperature
d. Specific heat
- 5) Air is in a bottle with a tight screw-top. When the bottle becomes cooler, the pressure inside decreases because the molecules of air? (2007)
a. Move faster
b. Become smaller
c. Move slower
d. Become bigger
- 
- 6) The pressure of air inside a car tyre increases if the car stands for some time in full sun light. According to kinetic theory this is due to an increase inside the tyre of the (2008)
a. Size of the molecules
b. Number of air molecules
c. Speed of the air molecules
d. Total mass of the air molecule
- 7) Water can boil at 101°C if (2009)
a. It is heated quickly
b. It is purified
c. Salt is added
d. Sand is added

- 8) Cooling always accompanies evaporation because (2009)
- The air molecules cool the liquid surface
 - The more energetic molecules leave the liquid
 - There are fewer liquid molecules left in the liquid
 - The escaped molecules return to the liquid
- 9) Specific latent heat is defined as (2009)
- Heat required to change water into steam
 - Heat required to melt ice
 - Heat exchange when the state of a unit mass of a substance changes without a temperature change
 - Heat taken in or given out when the state of a substance changes.
- 10) A gas cylinder is left outside on a sunny day. The sun heats the gas inside the cylinder. What happens to the gas molecule? (2011)
- They collide less often
 - They expand
 - They move closer together
 - They move more rapidly
- 11) Latent heat is defined as (2012)
- Heat raise temperature of unit mass by 1°C
 - Heat released when substance is cooled
 - Heat absorbed or released when the state of a substance changes
 - Heat to reach the boiling point of water
- 12) Asha heats up in turn the same masses of water and copper. She observed that copper heats up quickly than the water, this is because the water has higher (2012)
- Density
 - Heat capacity
 - Boiling point
 - Latent heat of vaporization
- 13) A gas is heated in a closed container so that its volume cannot change, which of the following will NOT happen? (2012)
- Molecules will move in all direction at higher speed
 - Number of molecules are increase
 - Temperature will increase
 - Molecules will hit the walls of the container more than ten

9.2 Structural Questions

- 1) a. Using the word **molecules, speed, collisions and random**. Explain why the air inside a tyre, which has full air pressure, puts pressure on the inside of the tyre wall. (2001)

.....

.....

b. A cycle pump contains 290cm^3 and the temperature rises to 27°

(i) Change the temperature to $^\circ\text{Kelvin}$

.....

.....

(ii) Find the new pressure atmospheres

.....

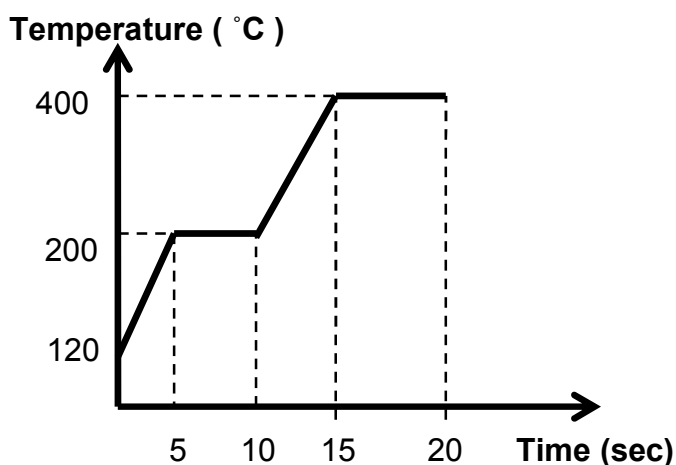
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2) (a) Why the specific heat of water ($4200\text{ joule/kg}^\circ\text{C}$) much greater than aluminum ($900\text{ joules/ kg}^\circ\text{C}$) **(2001)**

.....

.....

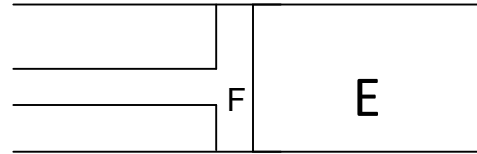
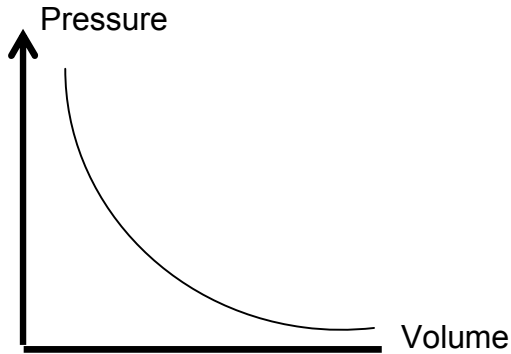
(b). the graph shows how the temperature in degrees Celsius($^\circ\text{C}$) changes over 20 seconds when a solid changes to a liquid and liquid to a gas.



On the graph:-

- i. circle and label the melting point (M) and the boiling point (B)
- ii. write the word LIQUID to show when the substance is in the liquid state

- 3) Look at the graph and the pump and explain what happens to the air in **E** when the pump **F** is pushed inwards. (2002)
You must use the word VOLUME and PRESSURE in the answer



- 4) a. For the formula $Q=mc\Delta T$ (2003)

i. Write down what the letter C represents

.....

ii. Using your answer to (i) Explain simply why a mass of the metal aluminum, heats up quickly than the same mass of water when heated from a temperature of 20°C up to 100°C.

.....
.....
.....

b. when ice melts in a glass of water the quantity of heat needed to change the ice to water is called:-

.....

- 5) If 35cm³ of air is at a pressure of 200 pa at 7°C, what is the final pressure when the air is compressed in 20cm³ at 27°C. use the gas laws formula. (Hint:- change °C to °K firstly) (2003)

.....
.....
.....

- 6) a. In the equation $Q = mL_f$. What does the letter L_f stand for? (2004)

.....

- b. Calculate the quantity of heat needed to melt 5kg of ice in 0°C ($L_f = 340,000 \text{ J/kg}$)

.....
.....
.....

- 7) a. Use the word **evaporation**, **hot molecules** and **cold molecules** to explain why, when a man sweats, it helps him cool down. (2005)

.....
.....

- b. Explain why water boils at 75°C at the top of a high mountain but boils at 100°C at Berbera?

.....
.....
.....

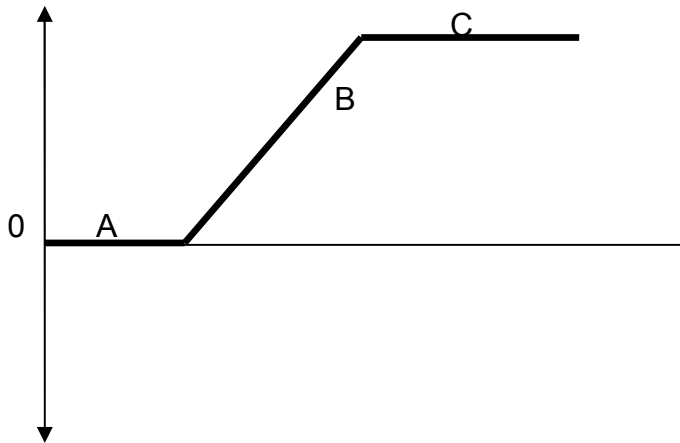
- c. Calculate the thermal energy required to boil 5kg of pure water at 100°C ($L_v = 2.3 \times 10^6 \text{ J/kg}$)

.....
.....
.....

- d. A lady put a glass bottle (with a tight top) full of 'subag' in a fridge. The 'subag' froze and the bottle broke. Explain why this happened

.....
.....
.....

- 8) a. The figure shows variation of temperature with time when frozen water is heated for some time. Use the figure to answer question (i) and (ii) **(2006)**
Temperature



- i) Explain what happens to the ice and water at the parts labeled A, B and C
A=.....
B=.....
C=.....
- ii) It is observed that when the temperature of ice starts to raise the volume initially decreases and then increases. Explain why

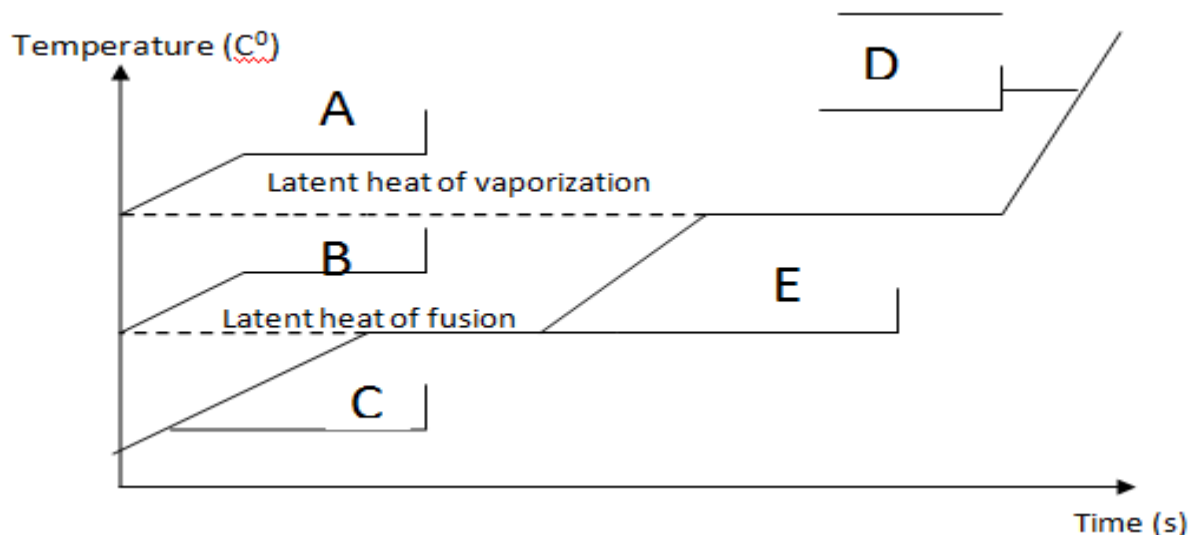
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- b. Determine the quantity of the heat required to change 3kg of ice at 0° to water at 5°C . {specific heat capacity of water= 4300 J/kg , specific latent heat of fusion= $3.36 \times 10^5\text{ J/kg}$ }

.....
.....
.....

9) Figure below represents a typical heating (cooling) curve (2008)

a) Watch the letters A, B, C, D, and E with the words LIQUID, SOLID, MELTING POINT, BOILING POINT, and GAS.



Letter	State (LIQUID, SOLID, GAS, MELTING AND BOILLING POINTS)
A	
B	
C	
D	
E	

b) Calculate the mass of cold water at 10°C which must be added to 60kg of hot water at 80°C to lower the temperature to 50°C (Take specific heat capacity of water= $4200\text{J/kg } 0^{\circ}\text{C}$)

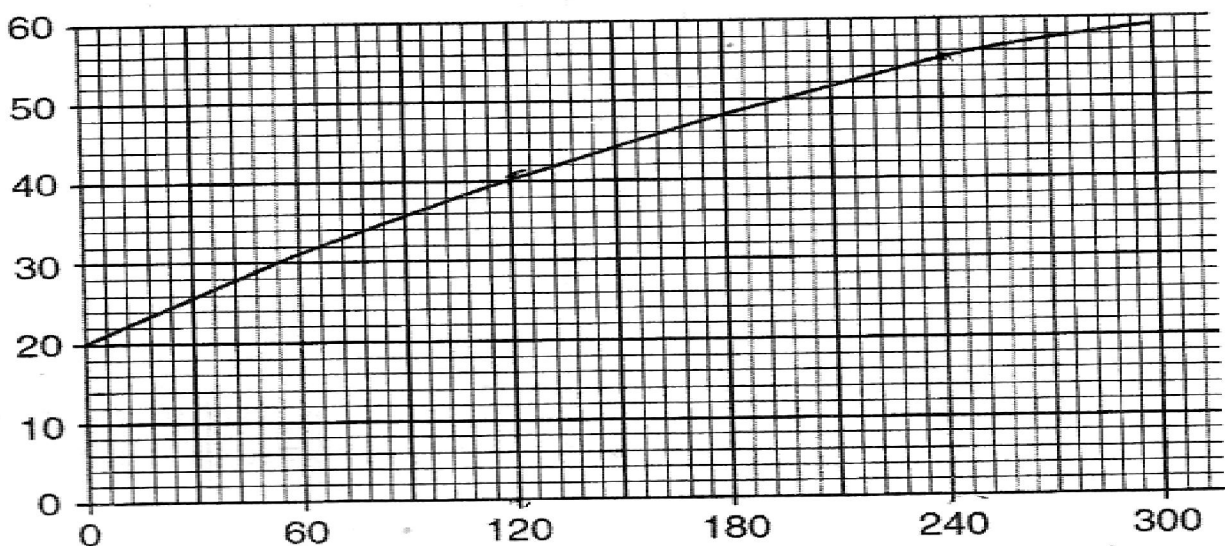
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- 10) . Some water is heated electrically in a glass beaker in an experiment to find the specific heat capacity of water. The temperature of the water is taken at regular intervals. The temperature- time graph for this heating is shown in the figure. **(2011)**



a) i. Use the graph to find

1. The temperature rise in the first 120s

.....

2. The temperature rise in the second 120s interval

.....

i. Explain why these values are different

.....

- ii. The experiment is repeated in an insulated beaker. This time, the temperature of the water increases from 20°C to 60°C in 210s. The beaker contains 75g of water. The power of the heater is 60W. Calculate the specific heat capacity of water.

.....

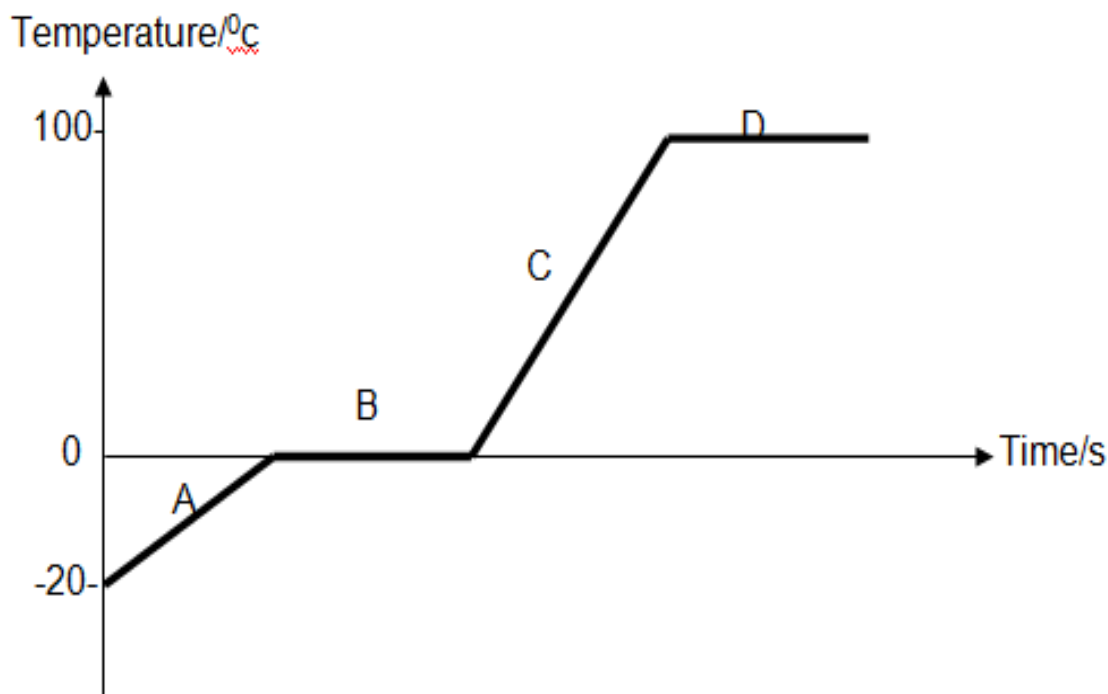
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- 11) The figure below shows the graph of temperature against time of block of ice at -20°C to steam at 100°C .

(2012)



- a) Use the letter A, B, C, or D to complete the following
- The substance is pure water is.....
 - The melting point is represents by.....
 - The substance is pure ice at
 - Water turns to steam at.....

b)

- In the equation $Q = mL_f$, write down what the letter L_f represents
.....
.....
.....
- Work out the quantity of heat needed to change 50g of ice at 0°C to water at 30°C
.....
.....
.....

iii.

12) Owrara heated 1 liter of water at 20°C to 90°C ($C_w=4200\text{J/Kg}^{\circ}\text{C}$)

(2013)

a. What is the quantity of heat, in joules, needed to heat?

.....

.....

.....

.....

.....

.

b. Sketch the graph of this change



c. How do impurities like, salt added to water, affect the boiling process of water?

.....

.....

d. How does increase in pressure affect the boiling point of water?

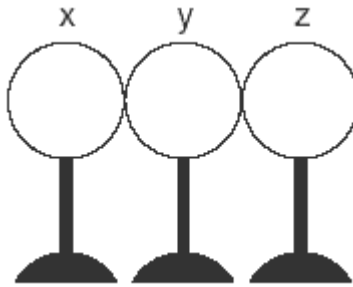
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Unit 10:- Electrostatics

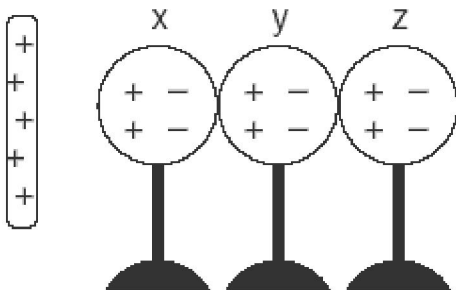
10.1- Multiple choice questions

- 1) The diagram below shows three neutral metals spheres x, y and z. in contact and on insulting stands. (2008)

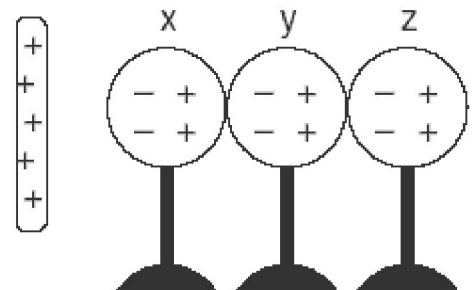


Which diagram best represents the charge distribution on the spheres when a positively charge rod is brought near sphere x, but does not touch it?

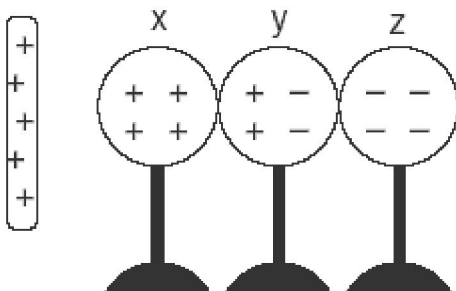
A



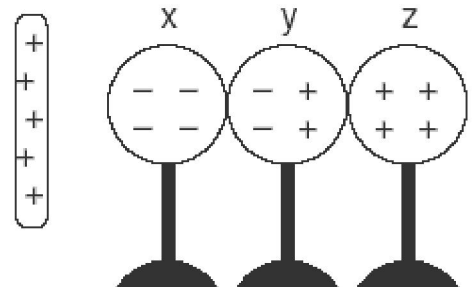
B



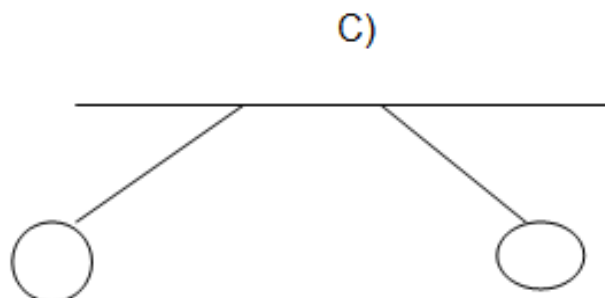
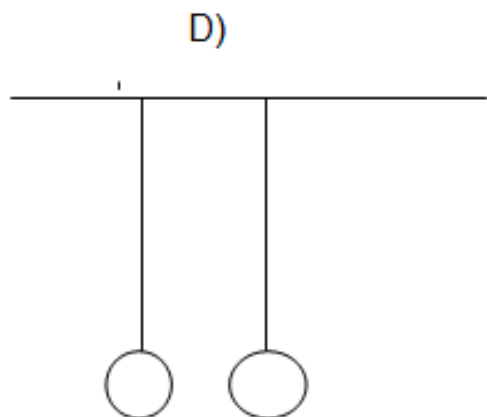
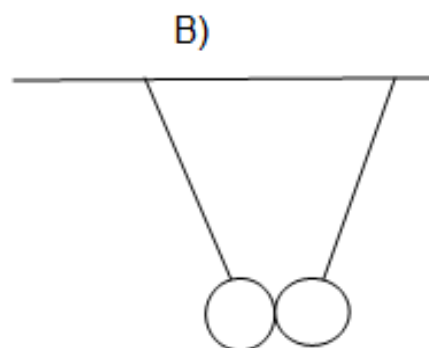
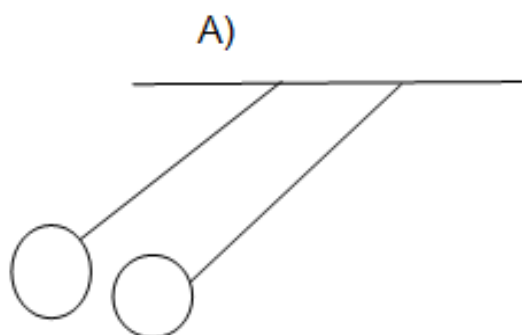
C



D

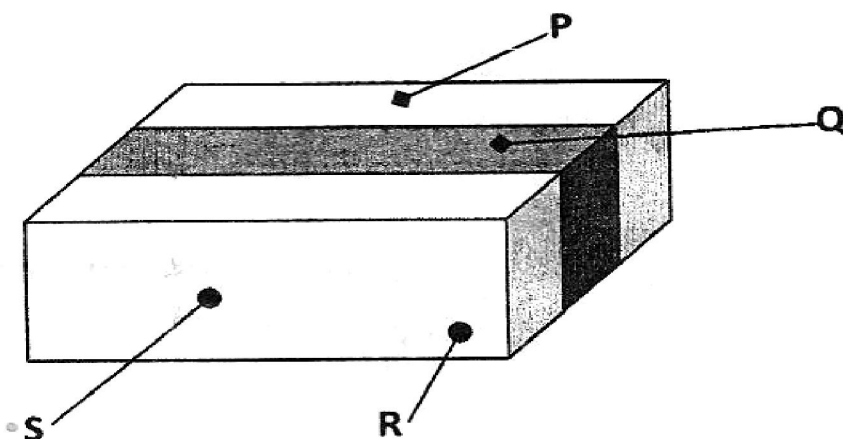


- 2) A glass rod becomes positively charged when rubbed with silk. The glass rod becomes charged because it (2007)
- A) Gains protons
 - B) Gains electrons
 - C) Loses electrons
 - D) Gains protons and loses electrons
3. A rod is rubbed with cloth and the rod becomes positively charged. the charge left on the cloth is therefore: (2003)
- A) Positive
 - B) Neutral
 - C) a south pole
 - D) Negative
4. The instrument used to detect electric charge is called:- (2003)
- A) resistor
 - B) capacitor
 - C) electroscope
 - D) Tester
5. Two identical spheres are positively charged and hang next to each other from a stand. Which of the following describe their position? (2001)



6. The figure shows a model of a capacitor. It consists of two metal and an insulator called **dielectric**. Which of the components P to S stands for the dielectric? (2012)

- a) P
- b) Q
- c) R
- d) S



10.2- structural questions of electrostatics

- 1) a. using the concept of the electrons, distinguish between an electrical insulator and an electrical conductor. (2006)

i. An electrical insulator

.....

.....

ii. An electrical conductor

.....

.....

- b. Sketch the electrical field lines due to a positive and negative charge placed close to each other



c. State any two applications of electrostatics

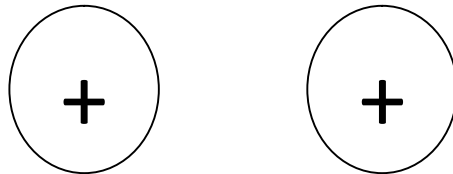
- i.
- ii.

d. State any two hazards of electrostatics.

- i.
- ii.

2) (a) Draw the field (lines of force) around and between the two charges, show the direction using Arrows.

(2002)



(b) Define the field strength?

.....
.....

(c) Complete:-

The field strength as you move away from the charge.

(d) Write down ONE daily use of electrostatics.

.....

3) (a) fill in the spaces:-

(2001)

A capacitor stores and the more charge it stores the
.....is its capacitance. Capacitance is measured
in.....A capacitor consists of.....

.....

b) Find the charge in micro-coulombs on a capacitor if is charged by a 3v cell and its
capacitance is $12\mu\text{F}$ (micro-farad)

.....
.....

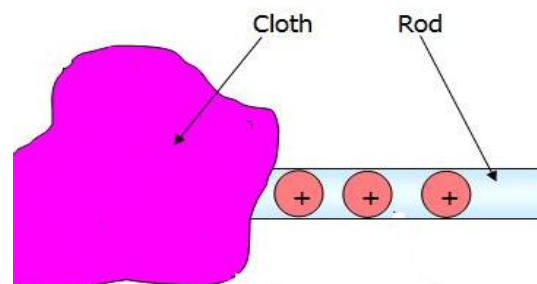
4. (a) a plastic rod is rubbed with a dry cloth and it becomes positively charged (2012)
(i) Explain this statement in terms of electron transfer

.....

.....

- (ii) What kind of charge is left on the cloth.

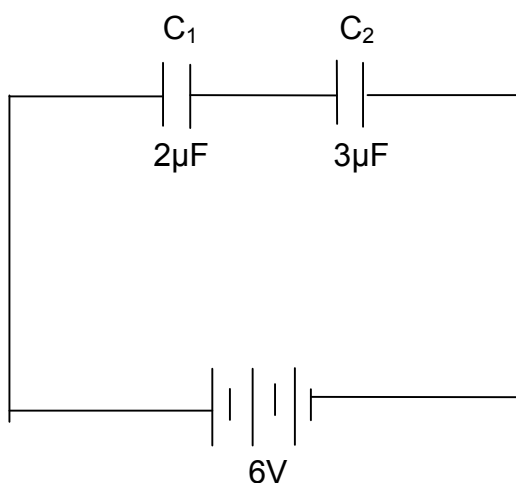
.....



- (b) COMPLETE: The device used to detect presence of charge on an object is called

.....

- (c) The figure below shows an arrangement of capacitors connected across 6V power supply.



- i) Suggest ONE practical application for a capacitor?

.....
.....

- ii) Workout the equivalent (total) capacitance of combination.

.....
.....
.....

- iii) Calculate the charge stored in the system (the capacitors).

.....
.....
.....

5. (a) state two applications of electrostatics in everyday life

(2009)

-
-

(b) Explain why a glass window when wiped with a dry cloth on a dry day soon becomes dusty

.....

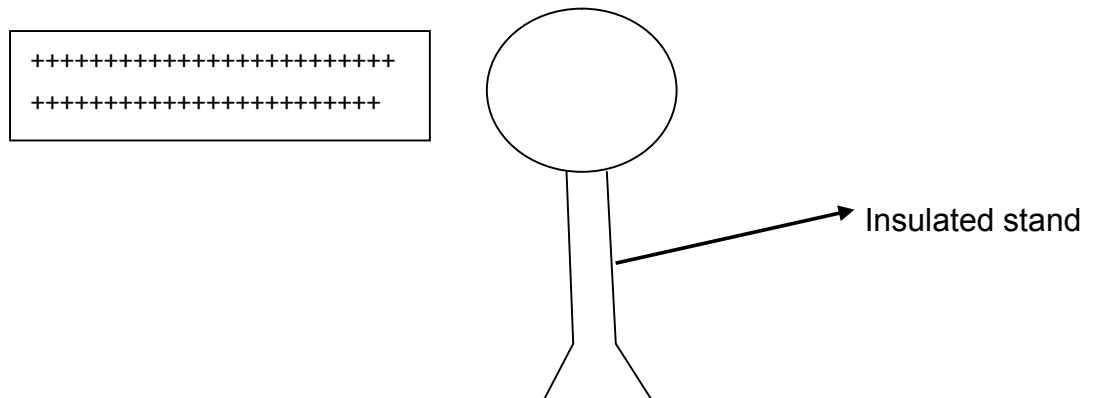
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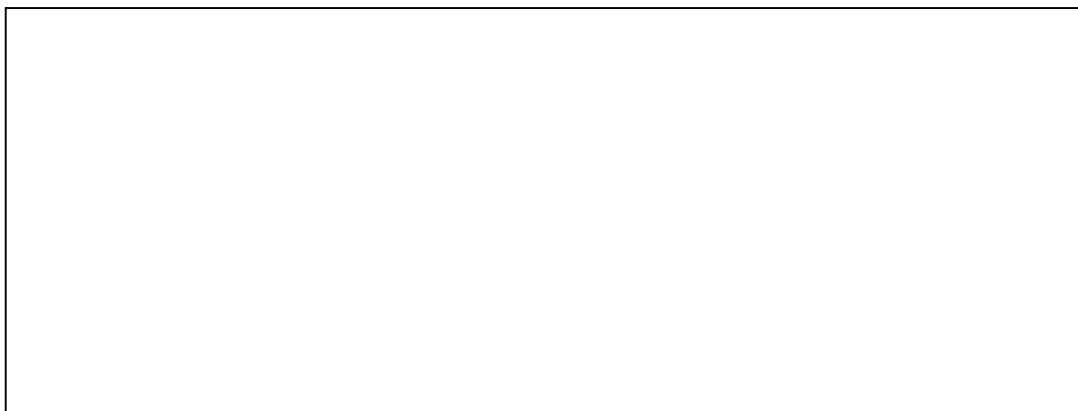
6. (a) A positively charged rod is held near an uncharged metal sphere on an insulated Stand as shown in the figure.

(2004)

i) Show clearly the induced distribution of charge on the sphere. Use diagram shown below



ii) If you touch the sphere with your fingers what will happen to the sphere? Use diagram



iii) What type of charge is left on the sphere after touching and removing the rod?

.....

.

iv) Name the method of charging the above sphere

.....
(b).COMPLETE: Earthing is process of sharing charge with the.....

(c) State two practical applications of electrostatics

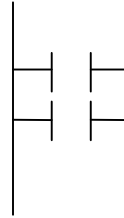
➤

➤

(d) Define a capacitor

.....
.....
.....

(e) Two capacitors of $2\mu\text{f}$ and $3\mu\text{f}$ are connected in parallel as shown in the figure. Calculate the total capacitance



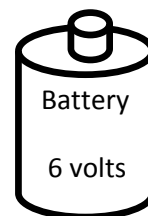
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Unit 11:- Electricity

11.1 Multiple choice questions of electricity

- 1) In a circuit two lamps are connected in series and both are bright, if one goes out what will happen to the other lamp? The other lamp will **(2001)**
 - a. Remain bright
 - b. Go out
 - c. Blow up
 - d. Go dimmer
- 2) The energy difference between one point and another in a flow of electrons is called **(2002)**
 - a. Potential difference
 - b. Resistor
 - c. Power
 - d. Current
- 3) In an electric conductor the resistance to an electric current increase. If you increase the **(2002)**
 - a. Cross sectional area
 - b. Gravity
 - c. Current
 - d. Length
- 4) In an electrical circuit when measuring the voltage across a light bulb we connect the voltmeter to the bulb in : **(2003)**
 - a. Series
 - b. Series and parallel
 - c. Parallel
 - d. Next to the battery
- 5) Which of the following electrical components is used for safety purposes? **(2004)**
 - a. Bulb
 - b. Transformer
 - c. Resistor
 - d. Fuse
- 6) The potential difference (voltage) across a 6Ω (ohm) resistor is 12 volts. **(2005)**
What current is flowing?
 - a. 6amp
 - b. 0.5 amp
 - c. 72 amp
 - d. 2 amp
- 7) A fuse in an electrical circuit is used to **(2006)**
 - a. Prevents excessive current flow
 - b. Prevents electrical shocks
 - c. Protect the appliance from fluctuating voltages
 - d. Save electrical

- 8) A battery is labeled '6 volts'
Which information does the label give about the battery?



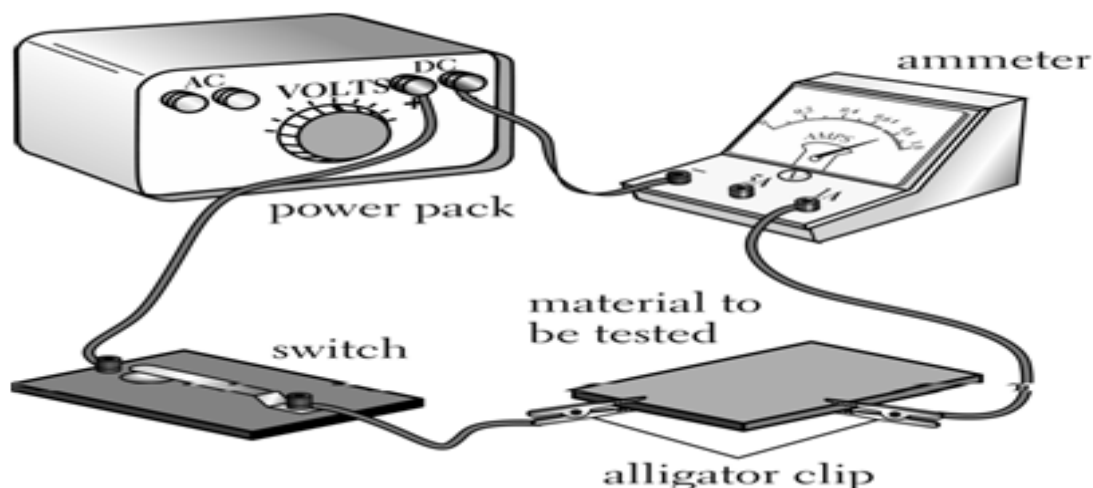
(2007)

- a. The power it can supply
b. The current it can supply
c. The electromotive force (e.m.f)
d. Its resistance
- 9) The earth wire is used to
- a. Prevents excessive resistance
b. Prevent electrical shocks
c. Prevent the appliance from exploding
d. Prevent the appliance from fluctuating voltages

(2007)

- 10) The apparatus below was set up to test _____ of the material

(2007)

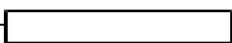
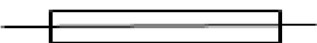
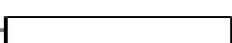
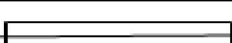


- a. voltage
b. Current
c. Electrical conductivity
d. Energy
- 11) Three resistors $R_1=2\Omega$, $R_2=4\Omega$ & $R_3=8\Omega$ are connected in parallel. What is their total resistance?
- a. $8/7$
b. $8/5$
c. $8/3$
d. $8/9$
- 12) A direct current flow from A to B, how is the current carried?
- a. Electrons move from A to B
b. Electrons move from B to A
c. Atoms move from A to B
d. Atoms move from B to A

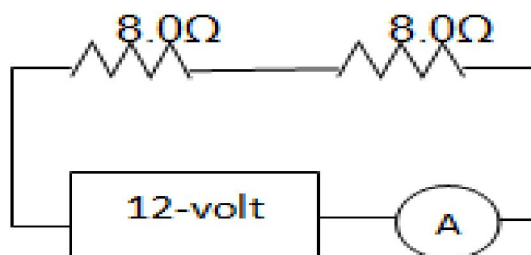
(2007)

(2009)

- 13) If an electrical appliance becomes live, the appliance (2009)
- Stops working and is safe to touch
 - Continues working and is safe to touch
 - Continues working and is dangerous to touch
 - Is safe to touch because of the fuse
- 14) Charges arise because (2009)
- Protons move from one article to the other
 - Electrons move from one article to the other
 - neutrons move from one article to the other
 - both neutrons and protons move together
- 15) When the main switch of the house is put off, it disconnects? (2010)
- Live wire
 - Neutral wire
 - Earth wire
 - Live and neutral wire
- 16) Which row in the table shows the symbols for a resistor and a variable resistor (2010)

	Resistor	variable resistor
A		
B		
C		
D		

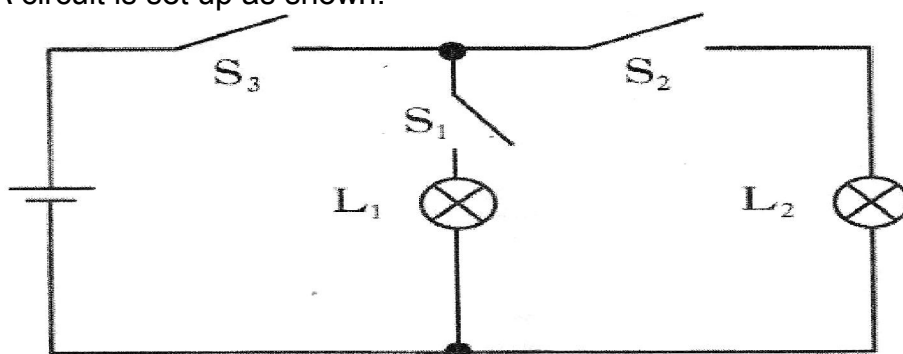
- 17) The diagram below shows a circuit with two resistors (2010)
- What is the reading on ammeter A?
- 1.3 A
 - 1.5 A
 - 3.0 A
 - 0.75 A



- 18) When a fuse is rated 8A, it means it (2010)
- Will not work if current is less than 8A
 - Has a resistance of 8A
 - Will work only if current is 8A
 - Will melt if current exceeds 8A

19) A circuit is set up as shown.

(2011)

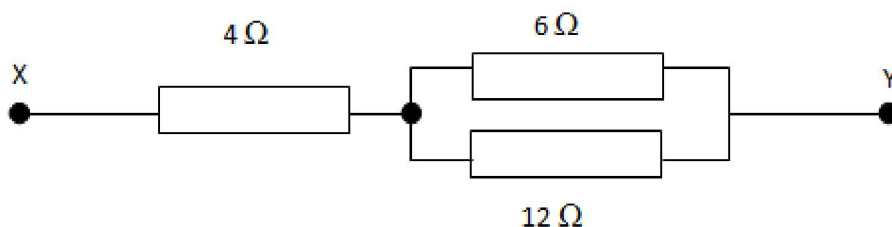


Which switch or switches must be closed to light lamp L_1 only

- a. S_1 only
- b. S_1 and S_2 only
- c. S_2 only
- d. S_1 and S_3 only

20) Three resistors are connected as shown.

(2011)



The total resistance between X and Y is

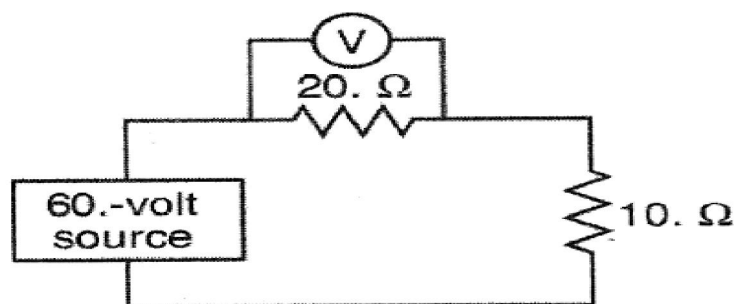
- a. $2\ \Omega$
- b. $4\ \Omega$
- c. $8\ \Omega$
- d. $13\ \Omega$

21) In the circuit represents by the diagram below.

What Is the reading of voltmeter V?

(2011)

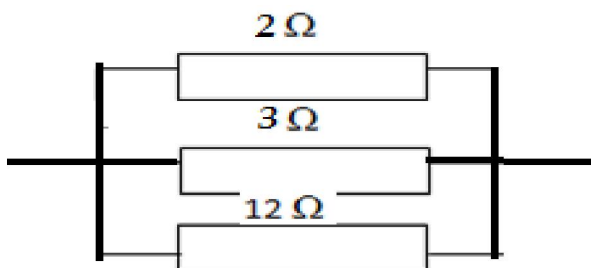
- a. 20v
- b. 2.0v
- c. 30v
- d. 40v



- 22) The figure shows three resistors arranged as shown below. The equivalent (total) resistance of the system is

(2012)

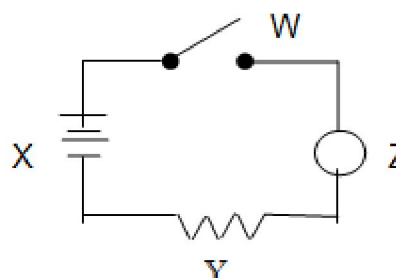
- a. 0.83Ω
- b. 1Ω
- c. 1.2Ω
- d. 17Ω



- 23) A circuit diagram is shown below. Which component in the diagram converts chemical energy into electric energy?

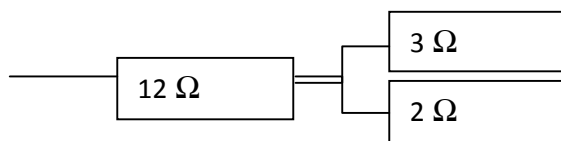
(2013)

- a. Compound W
- b. Compound X
- c. Compound Y
- d. Compound Z



- 24) The figure below shows three resistors connected in series and parallel. The total resistance is?

(2013)



- a. 13Ω
- b. 13.2Ω
- c. 13.4Ω
- d. 13.5Ω

11.2 Structured questions of electricity

1)

(2001)

- a) Why do electrons lose energy when they start to flow in a circuit?

.....

- b) Where do they renew the energy in a circuit?

.....

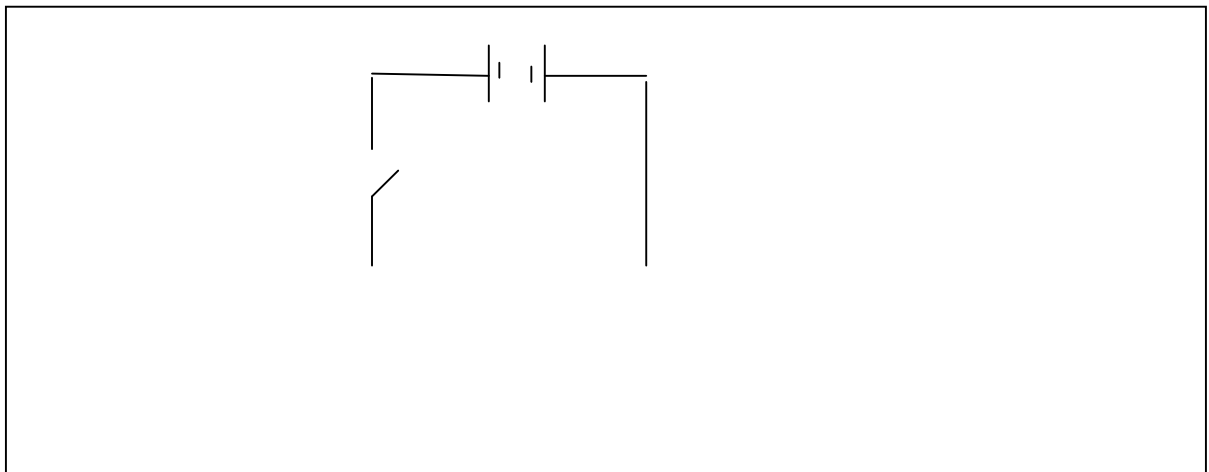
- c) Fill the space:

A length of wire is replaced by wire of the same length but twice the radius.

Therefore the thickness of the wire..... and the resistance in the wire.....

- d) Complete the circuit by drawing on the diagram two resistors

$R_1=3\text{ ohm}$ and $R_2= 2\text{ ohm}$ connected in parallel across a battery of 12 V



- e) Find the total resistance in the circuit

.....

- f) Find the total current in the circuit

.....

- g) Write down 2 reasons why we connect lamps in our houses parallel

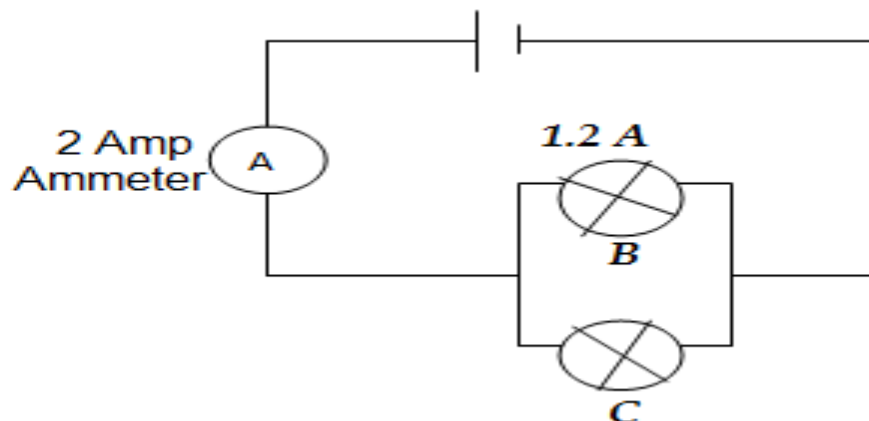
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.....

2) Complete

(2003)

A student sets up a circuit as shown where B and C are lamps. The meter readings at C is amp. The voltage across Band C is same. True or false? Ans..... the resistance of C is ohm.



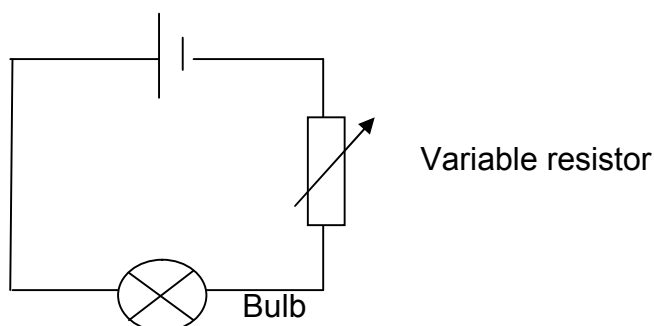
3. a) Write down 3 energy transformations that take place as the current flows through a light bulb in an electrical circuit (2003)

.....
.....
.....

- b) Which meter in an electrical circuit measures the speed of the electric charge round a circuit?

.....
.....

- c) At the circuit below what happens to the brightness of the bulb when only the resistance of the variable resistor is increased?



The Brightness.....

- d) If you add more and more lamps in parallel to some lamps already connected in parallel then the

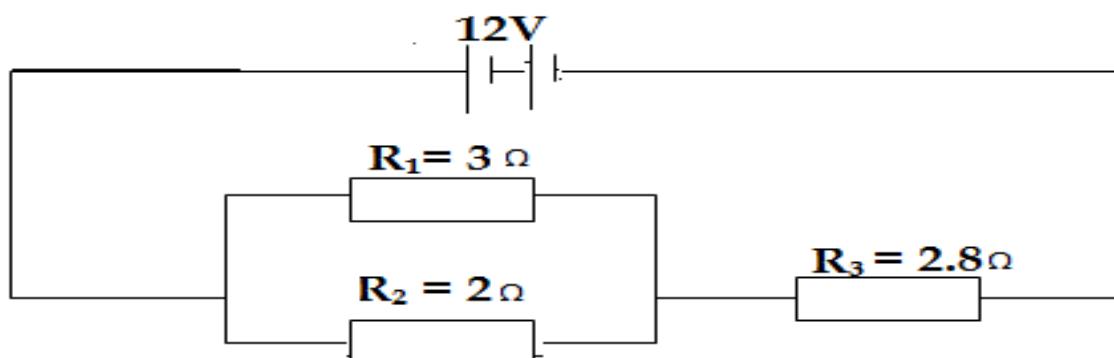
- A) Total resistance increases
- B) Total resistance decreases
- C) Total voltage increases

4)

(2004)

- a) Sketch a simple circuit diagram consisting of a cell, lamp, voltmeter and ammeter connected properly

- b) Complete: the unit of electric current is and its measured by a device called
- c) The circuit below has three resistors arranged as shown



Find out:

- i. The combined resistors R_1 and R_2

.....

.....

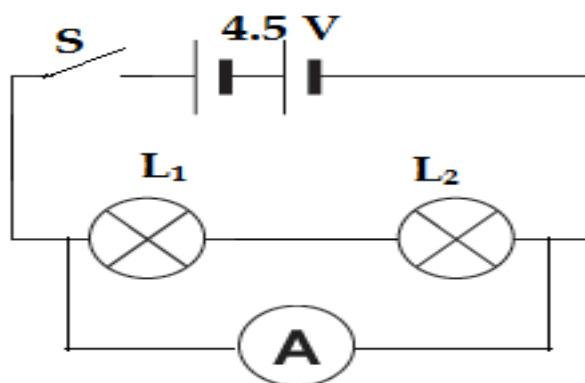
- ii. The total resistance of the system

.....

-
- iii. The total current flowing in the main circuit
-
-

- 5) Below is student's drawing of an electric circuit. It may not be correct. It is used to set up apparatus to measure the current through two torch bulbs (lamps) of the same power.

(2005)



- a) In each answer fill in the spaces using one or more of the words once or twice

Parallel, Series, Resistance

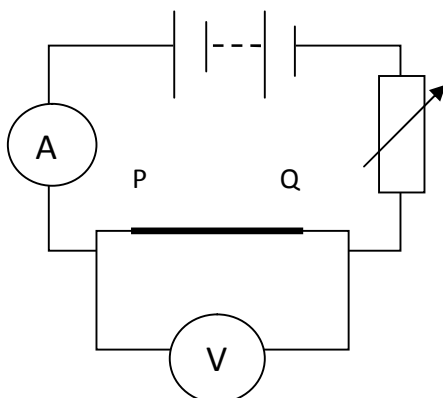
- The lamps are connected in.....
- The ammeter should be connected in with the lamps
- The lamps L1 and L2 do not light up when switch S is switched on because

- b) With the removal of the ammeter the current through the lamps is found to be 0.9amps.what is the resistance of lamp?

- c) Write down the formula connecting **power, current and resistance**, which is used for electricity calculation

6) The diagram shows a circuit used to investigate the resistance of a carbon rod PQ

(2006)



a) Write down two ways of changing the current in the circuit

.....

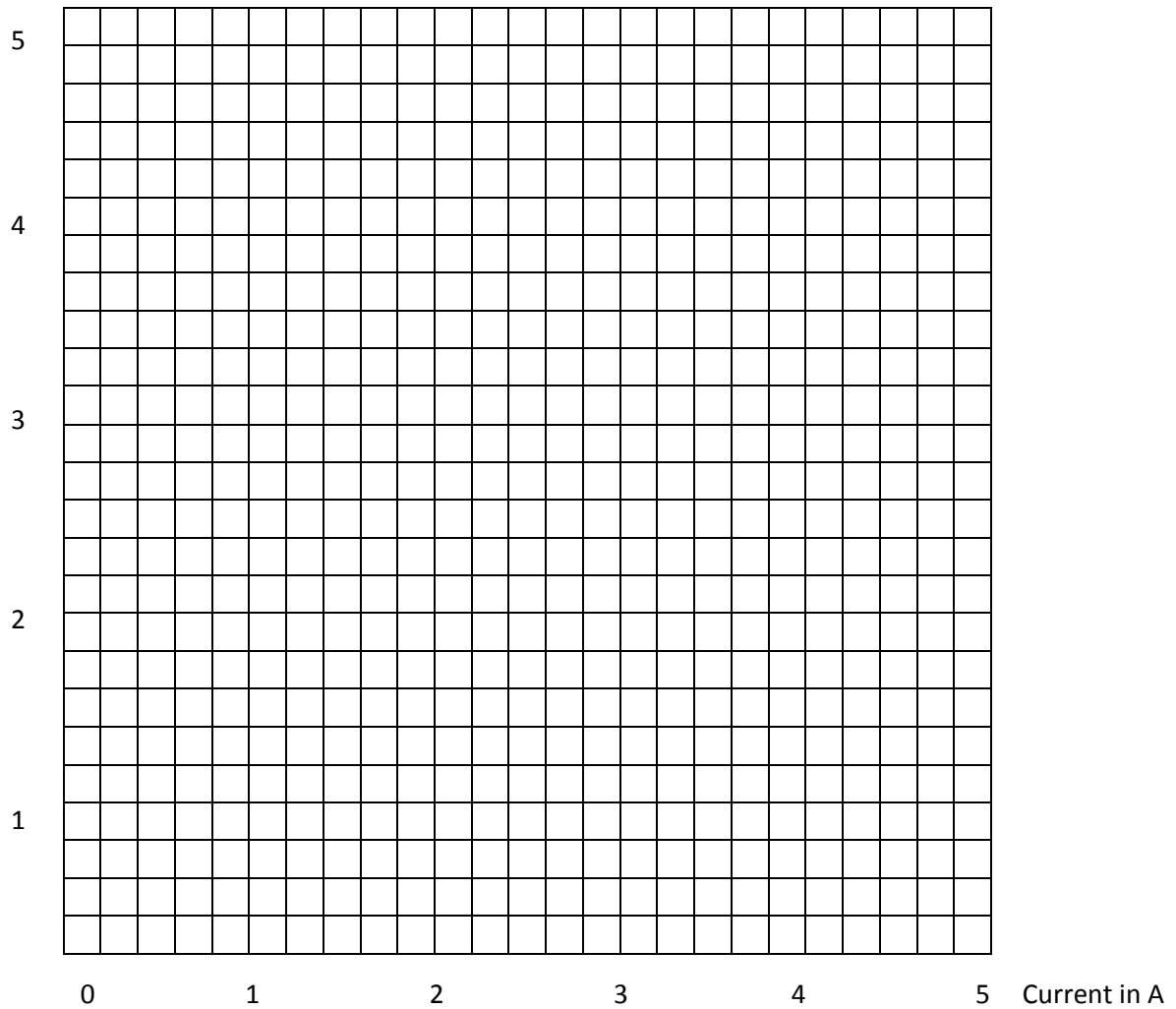
.....

b) The table shows the ammeter and voltmeter reading for a range of current passing in the rod

Voltage in V	Ammeter in A
0.8	0.4
1.9	1.1
3.1	2.1
4.1	3.2
4.7	4.1

i. Use the grid to plot a graph of voltage against current

Velocity in V



i. Read form your graph the value of the voltage when the current in the carbon rod is 1.5 A

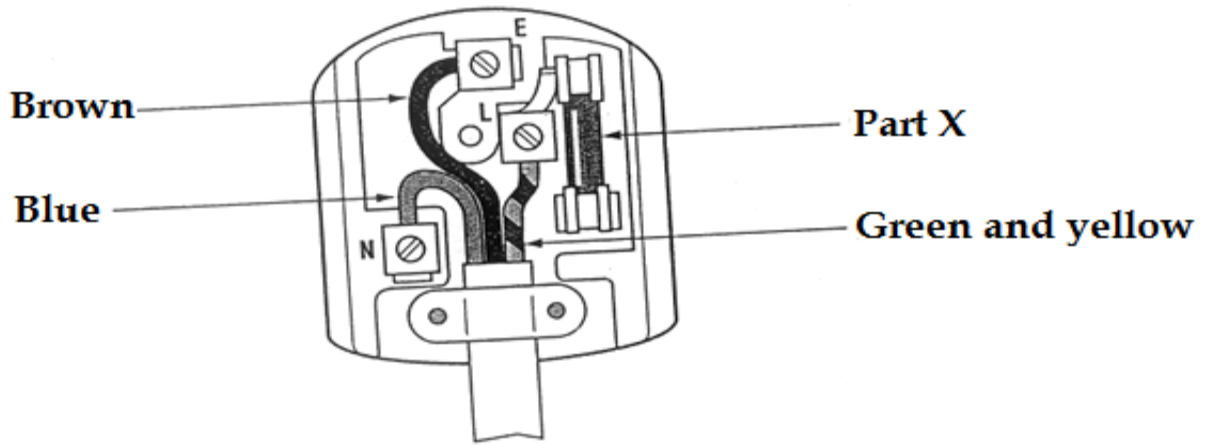
.....
.....

ii. Calculate the resistance of the carbon rod when the current in it is 1.5 A

.....
.....
.....

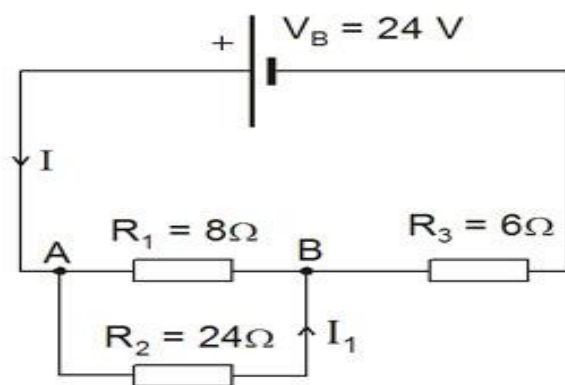
7) The 13 amp pug shows is connected to a hairdryer

(2007)



- b) What is the purpose of part X?
.....
- c) What two mistakes were made when this plug was wired up?
.....
.....
- d) The plug which connects a hairdryer to the main electricity supply sometimes has only two wires. Which TWO wires are used and why is it still safe?
.....
.....
why is it still safe
.....
- e) Use these equations to answer the following questions:
Unit of electricity= power x time
Cost of electricity supplied= energy transferred x price per unit
 The hairdryer has a power rating of 0.5 kilowatts. During the one month it used 5 hours. The price of electricity is \$2.5 per kilowatt-hour. Calculate the cost of the electricity used by the hairdryer during the month

- 8) Dayib guray secondary school students set up the electric circuit below **(2008)**



- a) Calculate the total resistance of the circuit

.....

.....

.....

- b) Calculate the current I

.....

.....

- c) Calculate the voltage across the point A and B

.....

.....

- d) Calculate the current I_1

.....

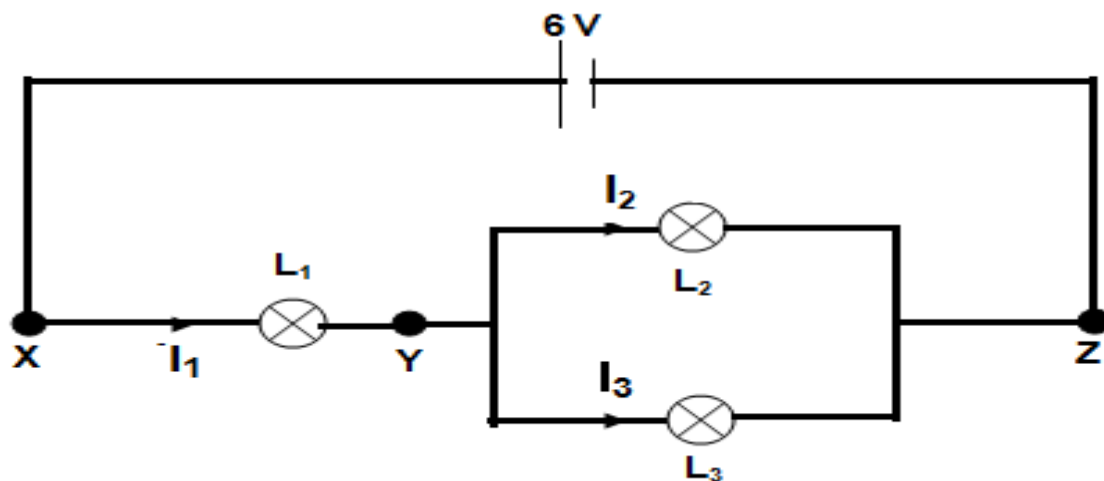
.....

- e) How much charge will pass through the cell in 20s?

.....

.....

- 9) Three identical lamps L_1 , L_2 and L_3 of the resistance $10\ \Omega$ are connected to a $6V$ cell of negligible resistance as shown in the figure below **(2009)**



Calculate the:

- a) Combined resistance of lamps L_2 and L_3

.....
.....

- b) Total resistance of the circuit

.....
.....

- c) Current I_1

.....
.....

- d) Potential difference across XY

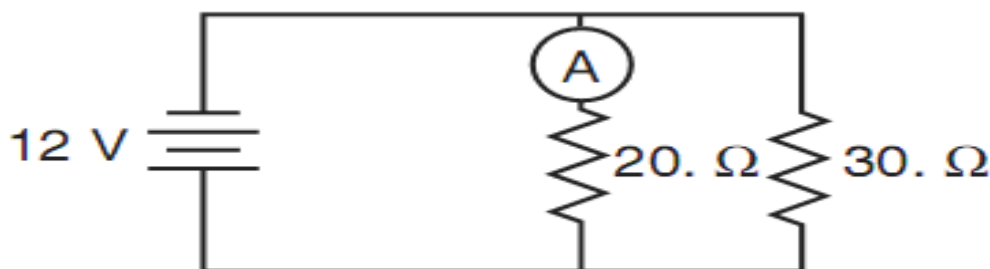
.....
.....

- e) Current I_3

.....
.....

10) A 20 ohm resistor and 30 ohm resistor are connected in parallel to a 12 volt battery as shown

(2010)



a) What is the total resistance of the circuit?

.....

.....

b) What is the current reading of the ammeter?

.....

.....

c) What is the power of the 30 Ohm resistor?

.....

.....

d) Explain what is meant by the term E.M.F of the battery?

.....

.....

e) The current from the battery is DIRECT CURRENT. The current from the mains supply is ALTERNATING CURRENT. Explain the difference between direct current and alternating current?

.....

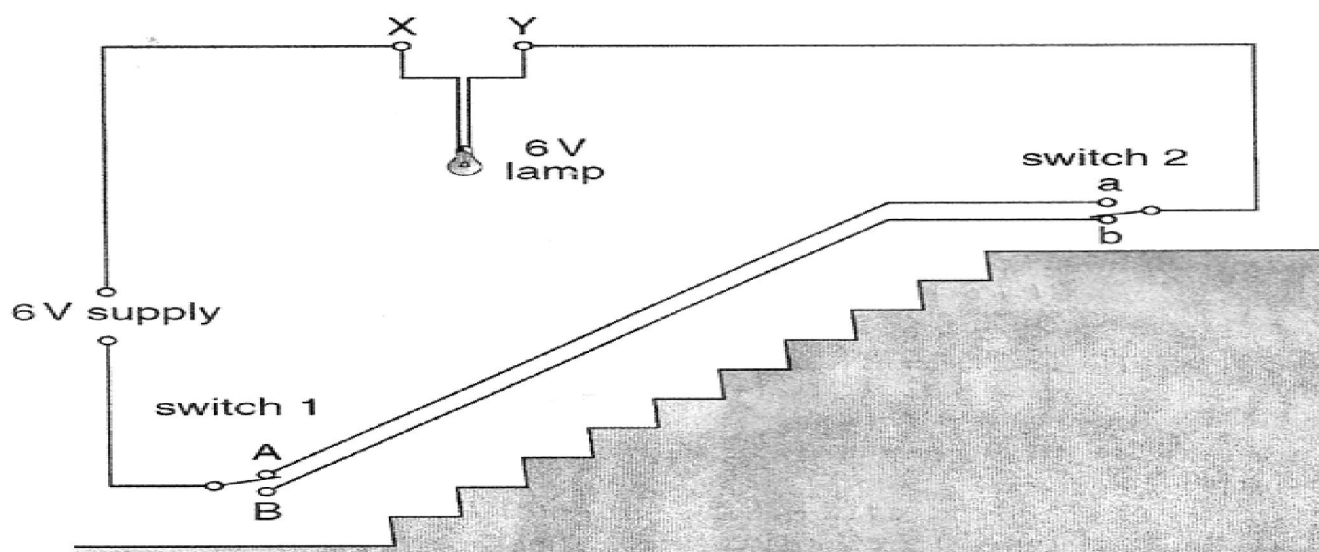
.....

f) Calculate the potential difference across the 30 ohm resistor?

.....

.....

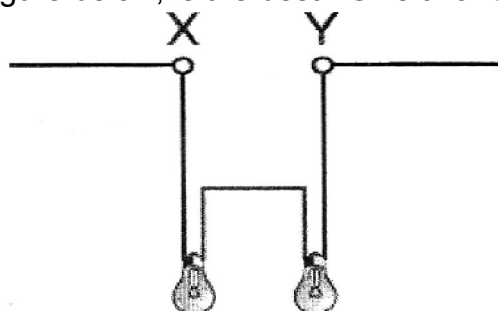
- 11) A toy maker wires a circuit in a toy house, so that a 6V lamp can be switched on using either switch 1 at the stairs or switch 2 at the top of the stairs. The circuit is shown in the figure below.



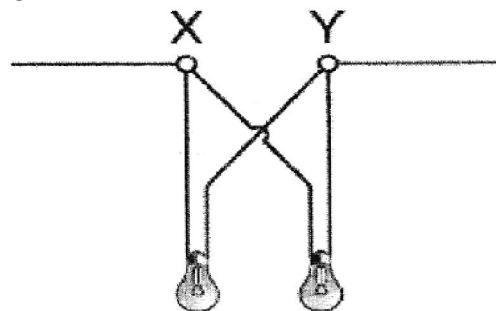
Use letter A, B, a, and b to answer the questions below

(2011)

- When switch 1 is in position A, what is the position of switch 2 so that the lamp is it?
.....
- When switch 2 is in position b, what is the position of switch 1 so that the lamp is it?
.....
- The lamp has a resistance of 4.0Ω . Calculate the current in the circuit.
.....
.....
.....
- The toymaker decided he wants to have two 6V amps in the circuit with the 6V supply. Which of the following means of connecting the lamps between X and Y, shown in the figure below, is the best? Give two reasons for your answer



connection 1



connection 2

Which is the best ?

Reason1

Reason2.....

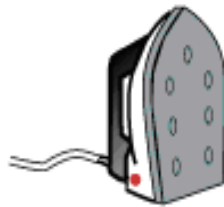
- 12) The table shows the electricity meter reading for examinations center between 1st January and 1st October 2012 (2013)

Date	1 st January	1 st April	1 st July	1 st October
Meter reading (KWh)	6005	6840	7340	7685

- a) Calculate the number of KWh of electricity used between 1 April and 1 July
.....
.....
- b) The electricity bill for the period 1 April to 1 July was \$450. Find the cost of 1KWh of electricity
.....
.....

11.3 Extended Questions

- 1) An electric iron has a heating element of resistance 60Ω . If the operating current through it is 4 A. calculate the (2008)



- a) Supply voltage
.....
.....
- b) Electrical power produced and
.....
.....

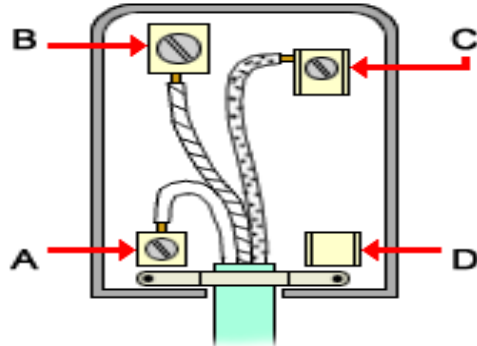
c) The heat energy produced in 5 minutes

.....

.....

2)

(2008)



a) Name the wires A,B and C

.....

b) What are the colour codes for

A.....

B.....

C.....

c) An electrical device fits between C and D

i. What is the name of the device?

ii. What is purpose of the device?

.....

iii. Describe how it works

.....

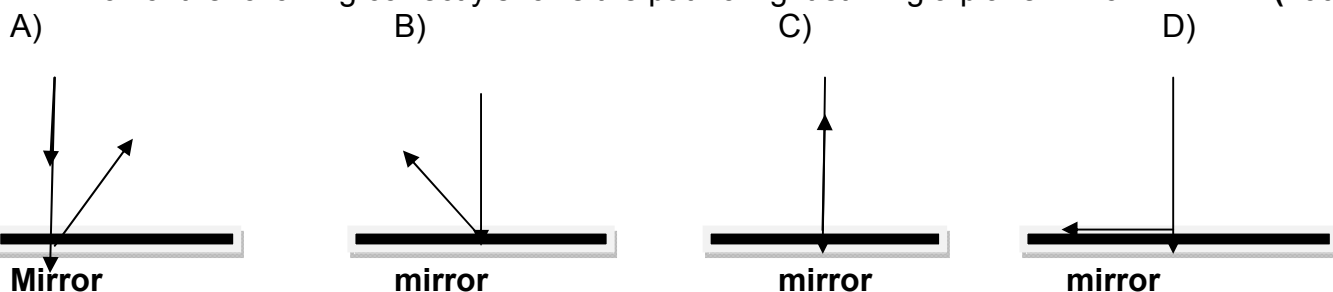
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Unit 12:- Light

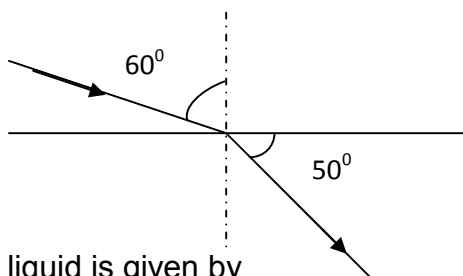
12.1- Multiple choice questions

1. Correction of short sight is the eye is by (2009)
 - A) A converging lens placed in front of the eye
 - B) A diverging lens placed in front of the eye
 - C) Moving away from near objects
 - D) Using binoculars
2. The image formed on the film of simple camera is (2009)
 - A) Real, inverted and diminished
 - B) Virtual, upright and diminished
 - C) Virtual, upright and magnified
 - D) Real, inverted and magnified
3. A mirage is formed due to (2009)
 - A) Refraction
 - B) Dispersion
 - C) Reflection
 - D) Scattering

4. Which of the following correctly shows the path of light striking a plane mirror? (2008)



5. The diagram shows a ray of light incident on the surface of a liquid and its subsequent path. (2007)



the refractive index of the liquid is given by

- A) $\frac{\sin 60^\circ}{\sin 50^\circ}$ B) $\frac{\sin 30^\circ}{\sin 50^\circ}$ C) $\frac{\sin 60^\circ}{\sin 40^\circ}$ D) $\frac{\sin 40^\circ}{\sin 60^\circ}$

6. The formation of shadows is due to light travelling (2006)

- A) Fast
- B) In straight lines
- C) Through non-blocking objects
- D) Through vacuum

7. If a ray of light strikes a plane mirror normalcy the angle of incidence is **(2004)**

- A) 60°
- B) 30°
- C) 0°
- D) 90°

8. If we paint a disc RED, GREEN & BLUE equally and then rotate it very fast what colour will you see on the disk? **(2003)**

- A) BROWN
- B) BLUE
- C) BLACK
- D) WHITE

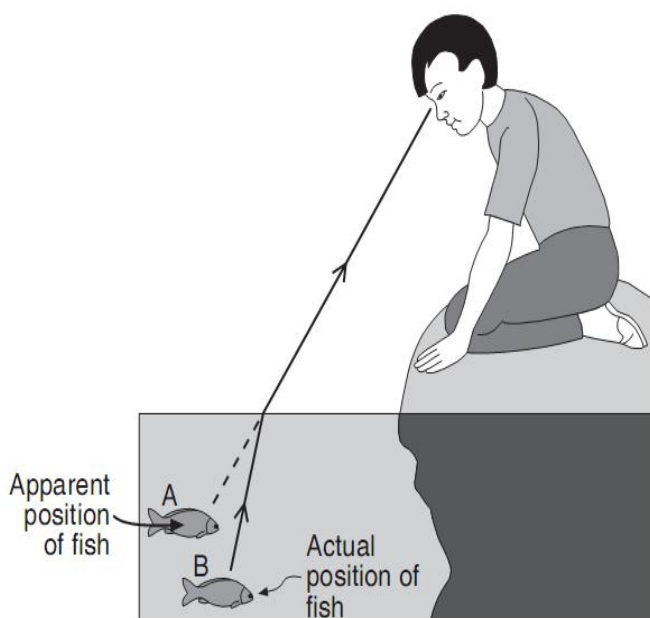
9. We see images in a plane mirror because the light rays are: **(2003)**

- A) Diffracted
- B) Reflected
- C) refracted
- D) Dispersed

10. Which of the following is NON-luminous object **(2012)**

- A) The sun
- B) A candle
- C) The moon
- D) A lamp

11. The diagram below shows a boy observing a fish located at position B below the surface of the water. The boy sees the fish at position A **(2010)**

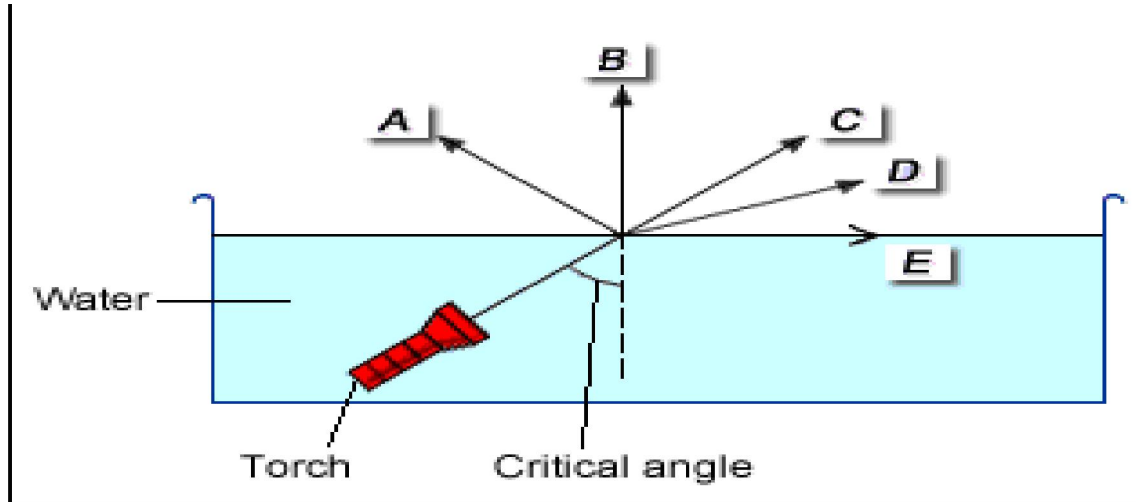


The apparent position of the fish is different from the actual position of the fish. what happened to the light passing through the water to cause this difference

- A. Reflection
- B. Absorption
- C. Compression
- D. Refraction

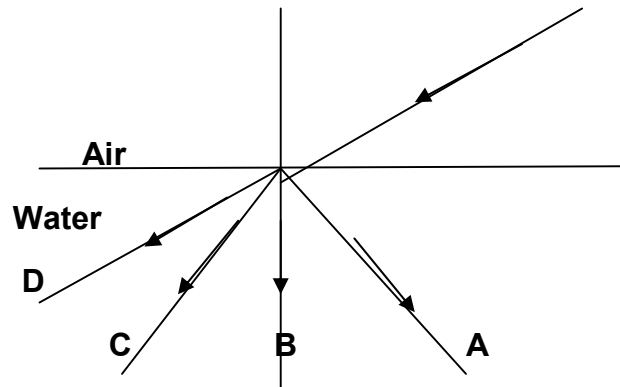
12. Which of the following choices illustrate the correct light path?

(2008)



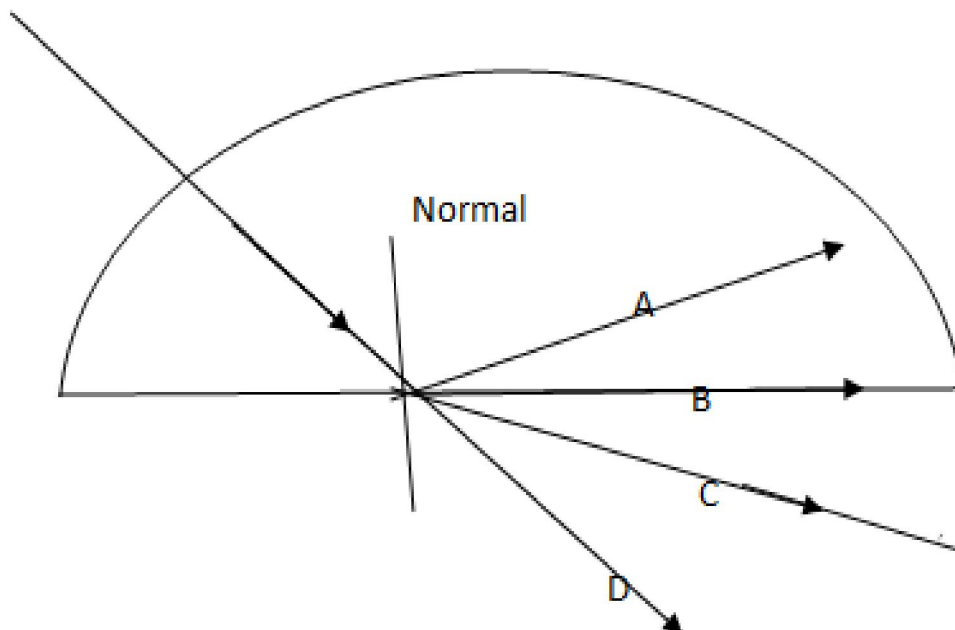
13. A ray of light in air strikes a water surface. The correct path through the water is.

(2005)



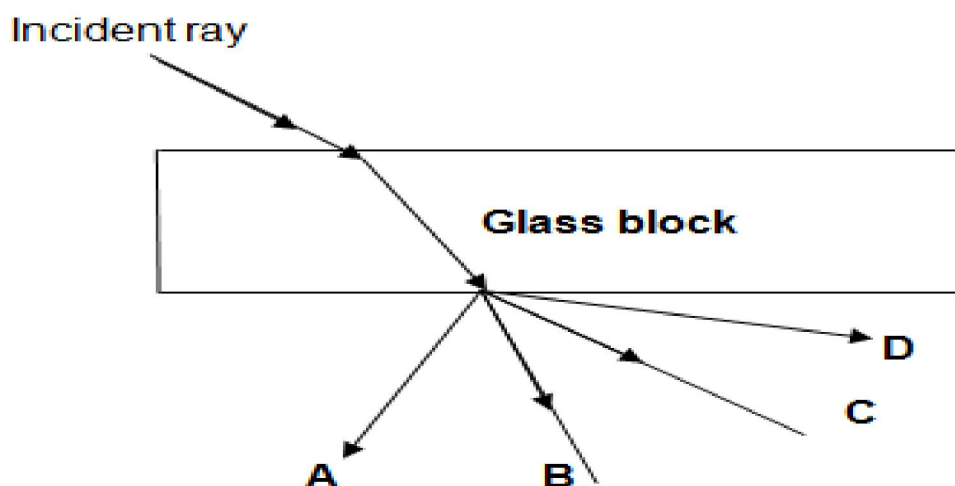
14. A ray of light enters semi-conductor glass block as shown in the figure. at O the ray changes its direction .which of the ray A to D represents the correct path of the refracted ray A or B or C or D.

(2012)



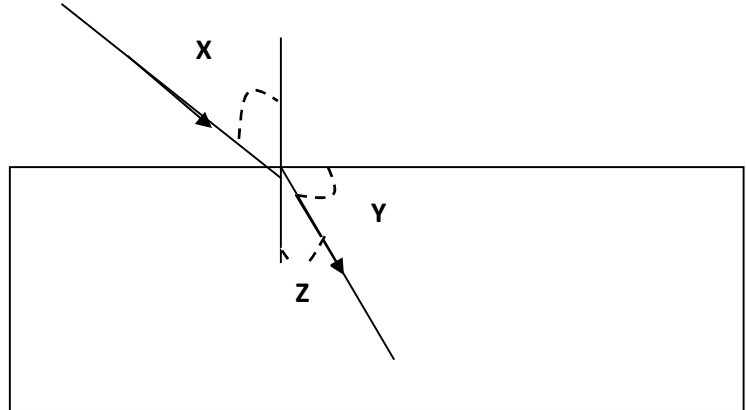
15. Circle A,B,C or D to show which is the correct ray when incident ray is refracted through the glass block .

(2006)



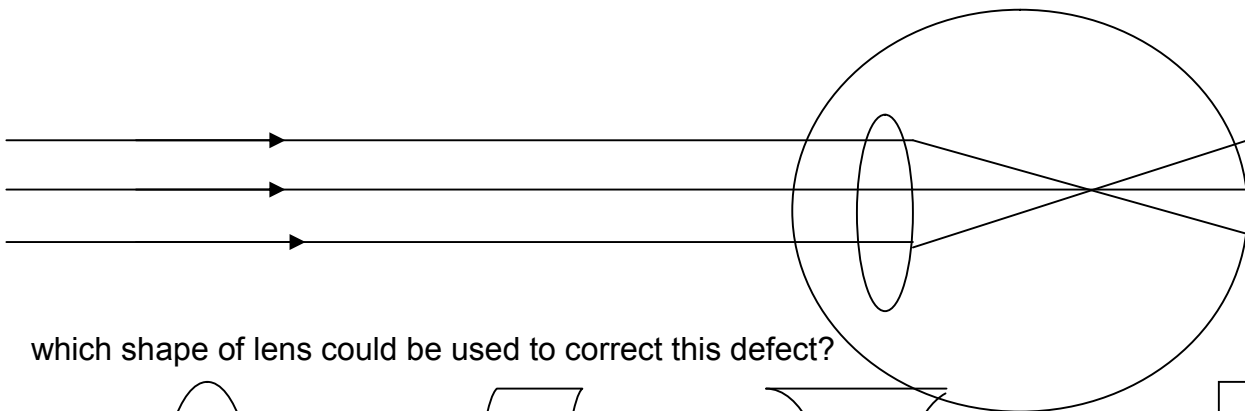
16. A ray of light passes from air into a glass block as shown (2011)

Which row in the table shows the angle of incidence and the angle of refraction?

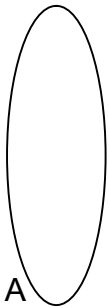


	Angle of incidence	Angle of refraction
A	W	Z
B	W	Y
C	X	Z
D	X	Y

17. The diagram shows rays of light in an eye that has a defect. (2011)



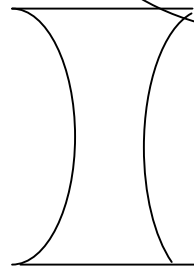
which shape of lens could be used to correct this defect?



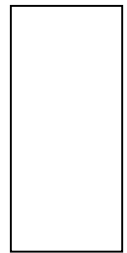
A



B



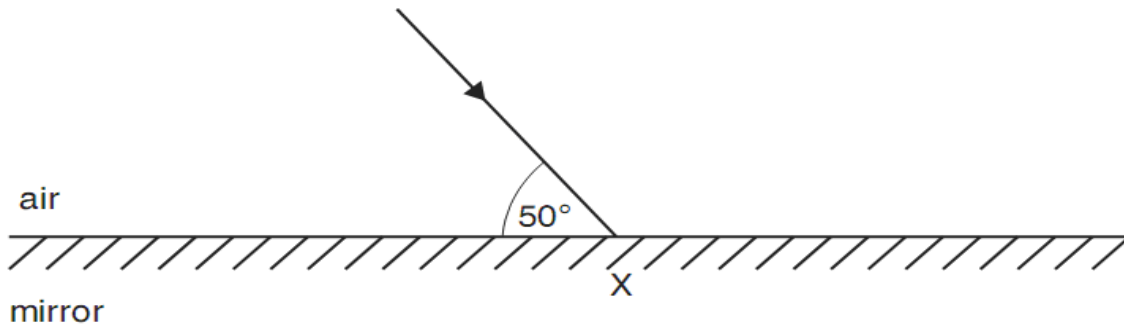
C



D

12.2- structural questions of light

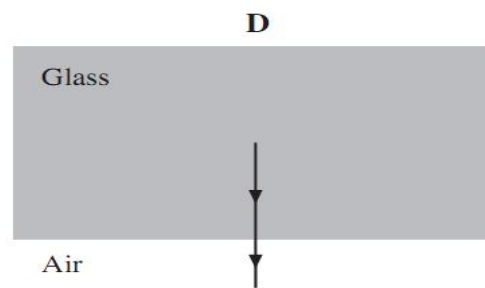
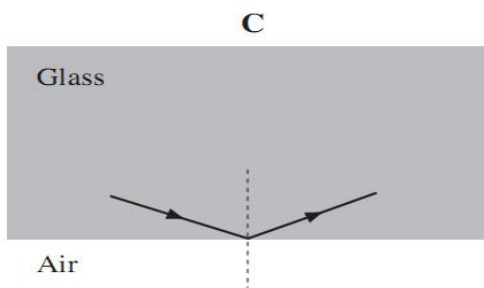
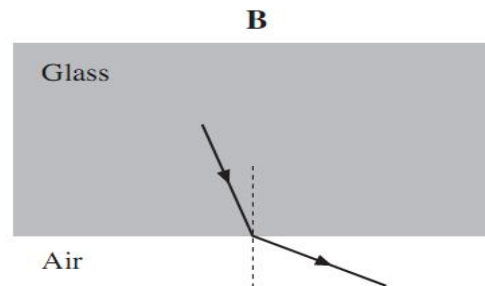
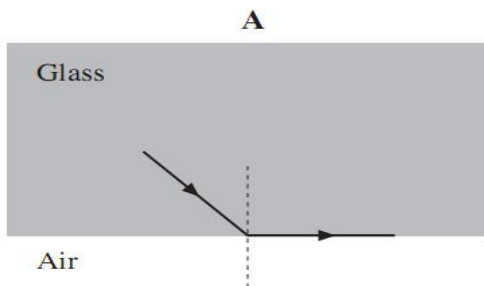
- 1) The figure below shows a ray of light incident on mirror at X. the incident ray makes an angle of 50° with the surface of the mirror. (2010)



- complete the figure to show the normal line and the reflected ray at X.
- State the values of the

- Angle of incidence.....
- Angle of incidence.....

- b) The diagram show a ray of light hitting a surface between glass and air



- Which diagram A,B,C or D shows a ray of light that is not refracted?.....
- Which diagram shows total internal reflection
- Which diagram shows a ray of light that is refracted at the critical angle?.....

iv) State one practical use of total internal reflection

.....

.....

2) a. States the laws of reflection

(2009)

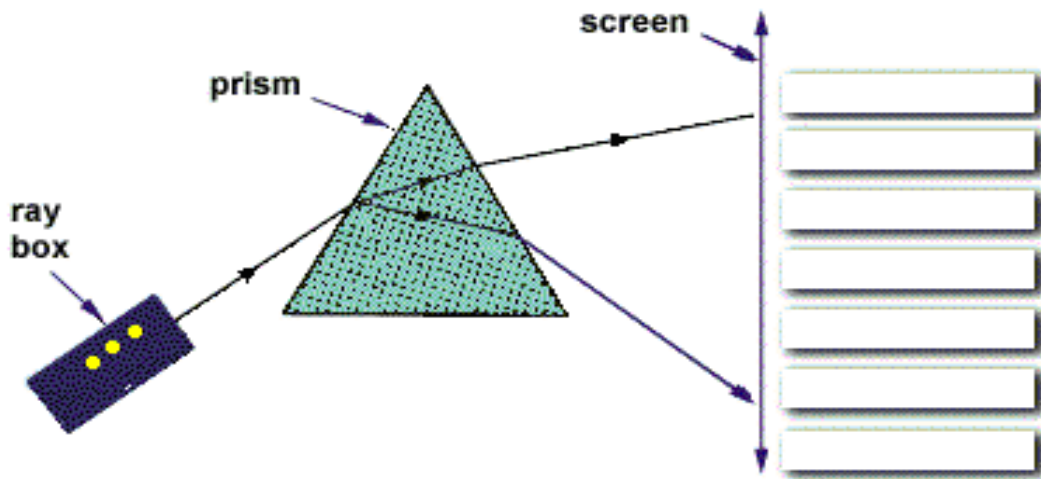
1)

.....

2)

.....

b. a beam of light white light passes through a triangular prism onto a white screen as shown below. The following colors are seen on the screen: yellow, red, green, orange, blue, indigo and violet. Write down the colors as they appear on the screen from top to bottom on the diagram.



C) Explain what would happen if a red filter is placed in the path of the white light.

.....

.....

.....

- d) Calculate the position and nature of the image formed by a convex mirror lens of focal length 15cm, of an object placed 20cm from the lens.

.....

.....

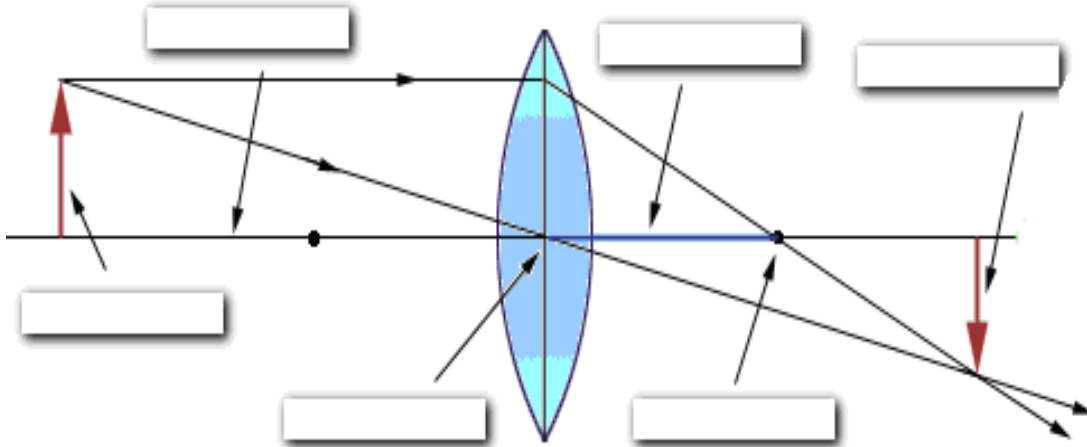
.....

.....

3. Noradin secondary school students were investigating images formed by lenses. (2008)

- a) Complete labeling the diagram below using the following words

Focal length (A),	principal axis (B),	optical centre (C),	Image (D),
Focal length (E),	object (F)		



- c) Give the name of this lens

- d) Calculate the position of the image formed by a convex lens of the focal length 15cm, of the object 20cm from lens

- e) Is the image formed real or virtual?

.....

.....

.....

.....

4. a) write the help of a diagram, state the laws of Refraction.

(2007)

Diagram

b.

i) First law

.....

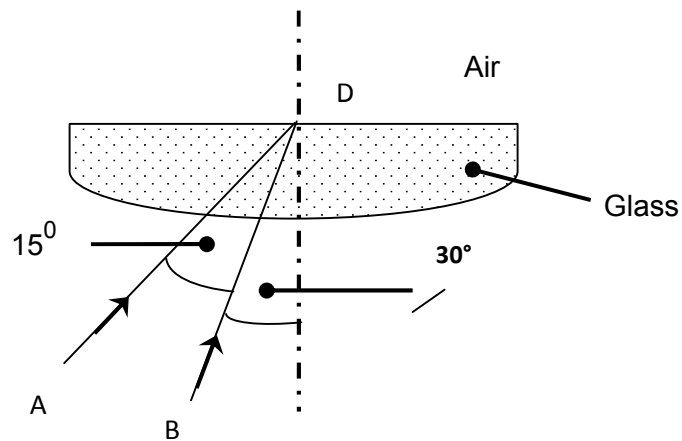
.....

ii) Second law

.....

.....

c) The figure below shows the ray A and B entering a semi-conductor glass block (which has a critical angle of 42°). The rays are incident at a glass-air boundary at point D and has refractive index is $n=2/3$



i) Draw straight lines to complete the paths of the rays A and B from the point D.

Label the resulting rays A and B.

ii) What is the angle of the reflecting ray? State why this is so

.....

.....

d) Find the sin of the angle of the reflected ray using one of these values

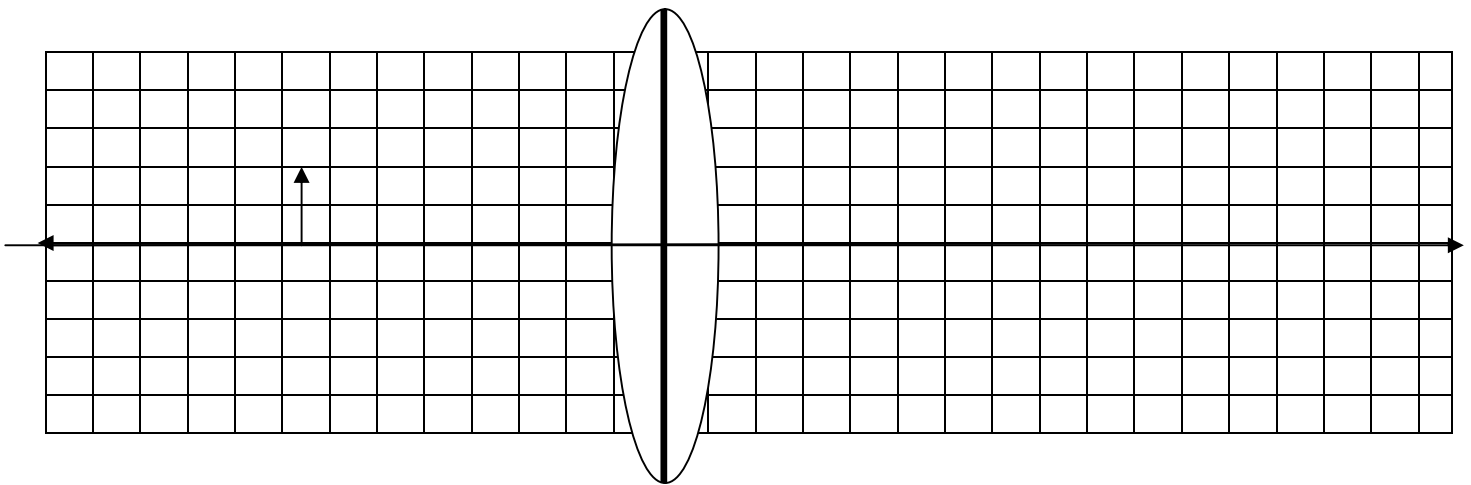
(Sin 15=0.3, sin 45=0.7 or sin=0.5)

.....

.....

.....

5. An object height of 2cm is placed 7.5cm from a converging lens. the focal length of the lens is 5cm. find by scale drawing the position of the image using a scale of 1 square representing 1cm on both axes
(2006)



a. give any two characteristics of the image

i.....

ii.....

b. i) find the image distance.....

ii) Calculate the magnification of the given lens

.....

.....

.....

c) Name one application of the given lens

.....

6. (a) the incident ray is drawn for you on the diagram of a concave mirror. `

(2005)

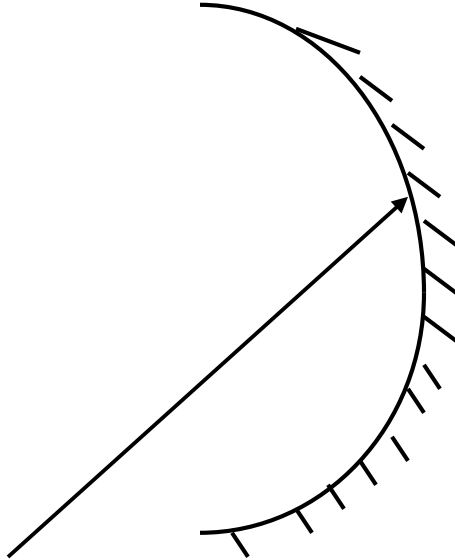
Draw on the diagram

i) The normal

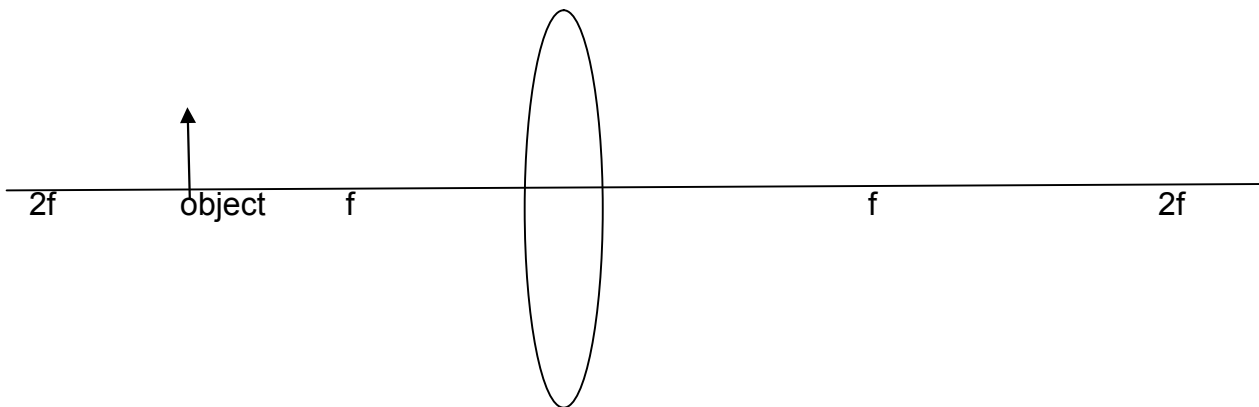
ii) i° , angle of incident and

ii) the reflected ray and label

ii) r° , angle of reflection



b. draw 2 rays of light from the object through the lens to locate the image. the image is where the two lines converge.



c) A beam of red light and a beam of green light of equal intensity are focused on the same area of a white screen. What colour will be seen on the screen?

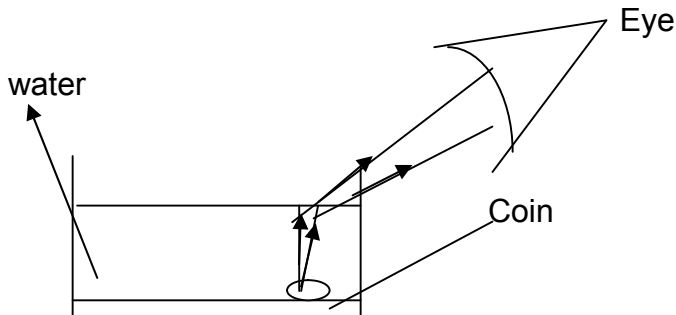
.....
.....

d) Choose the correct word from absorbs, reflects ,refracts to complete the following

Black..... all colours

White.....all colours

7. (a) the beaker below is full of water and coin inside it appears to be closer to the eye. **(2004)**
locate the apparent position of the coin as seen by the observe.

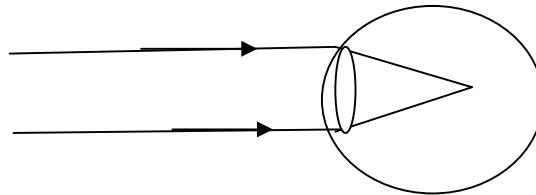


- b. A swimming pool is 8m deep when empty. What is its apparent depth when full of water.

.....

.....

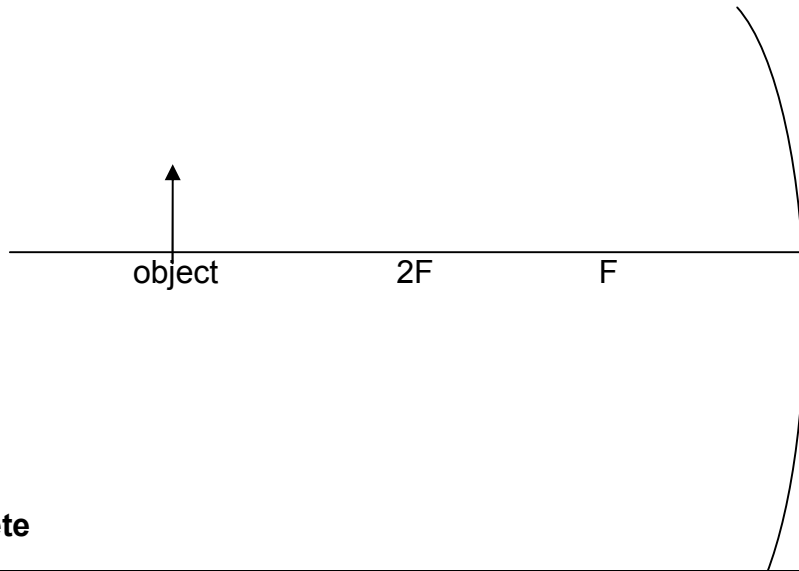
- c. Farsightedness is an eye defect as shown below



Draw the correction of this eye defect using appropriate lens.



- d. using two rays through the object to the mirror, locate the image formed by this mirror in the correct position.



8. a. Complete

(2003)

dispersion	spectrum	least	absorbs	reflects	most	prism
------------	----------	-------	---------	----------	------	-------

Use the above words to complete the following.

If a narrow beam of light is passed through a It splits into a range of colours called the visible.....

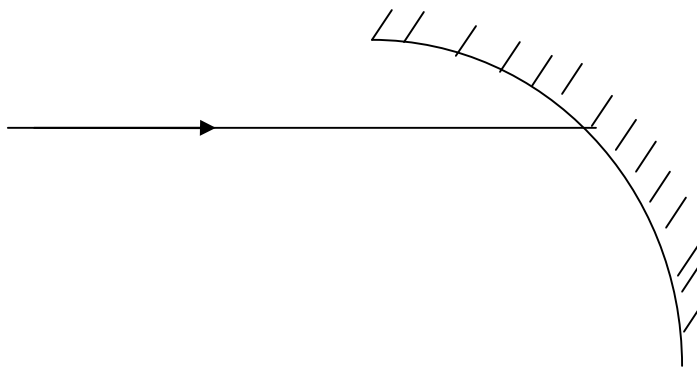
This effect is called

Red light is refracted and violet is refracted

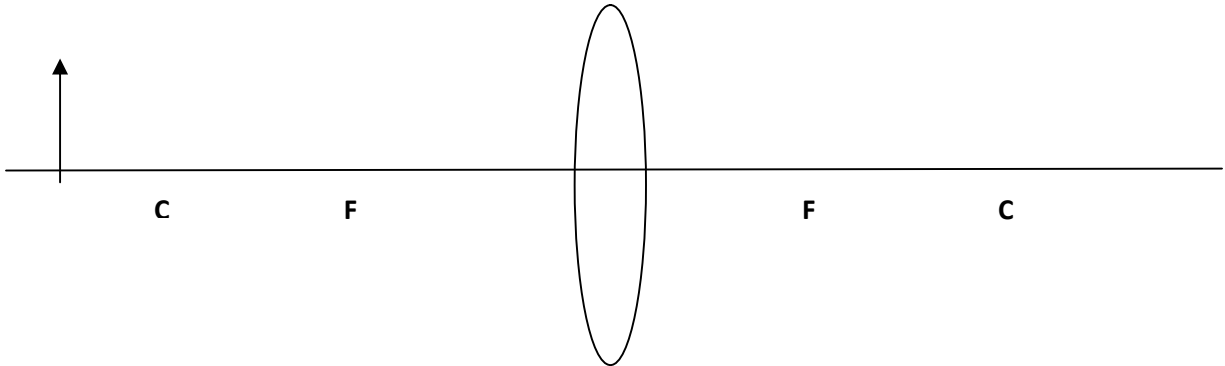
.....

Black all colours. White all colours

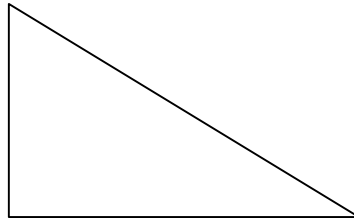
- b) Draw in the resulting ray of light, the normal and shows the angle of incidence i° and the angle of reflection r° .



c) Draw a 2 rays of light through the lens and draw the image of the object;

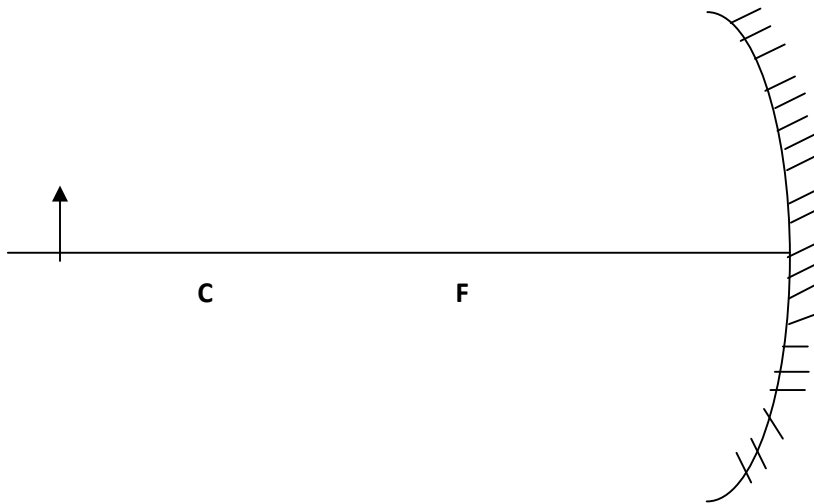


d) Draw one ray of light through the prism and one leaving the prism so that a light ray can be turned through 90°

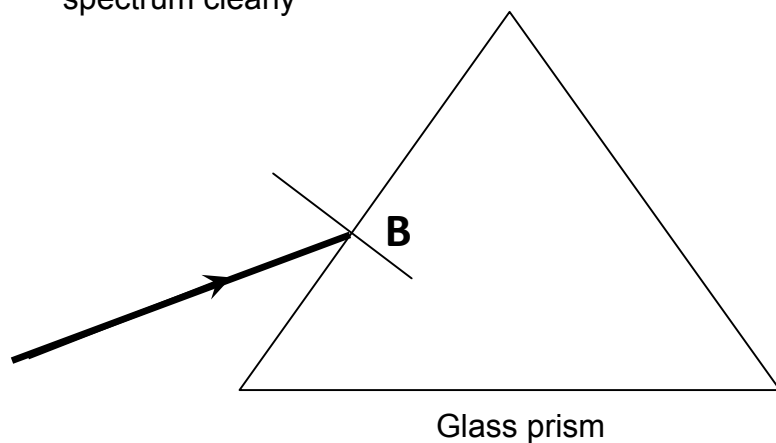


9. complete the diagram of an object and a concave mirror. Draw 2 rays of light and an image.
(2002)

a)

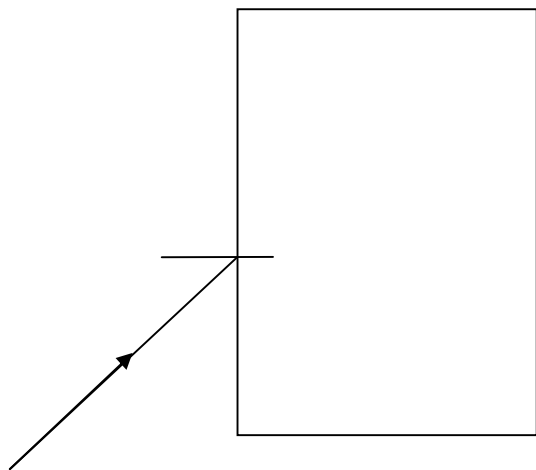


10. a) A ray of light enters at B. by drawing straight lines show the path of the ray as it reflects twice and then dispersed into colours of the visible spectrum. Label the colours of the spectrum clearly **(2001)**



11. A ray of light strikes a parallel sided glass block as shown below **(2012)**

a)



- i. what property of light does the ray suffers as it enters the block

.....

- ii. Complete the path of the ray through the block and out of the others side

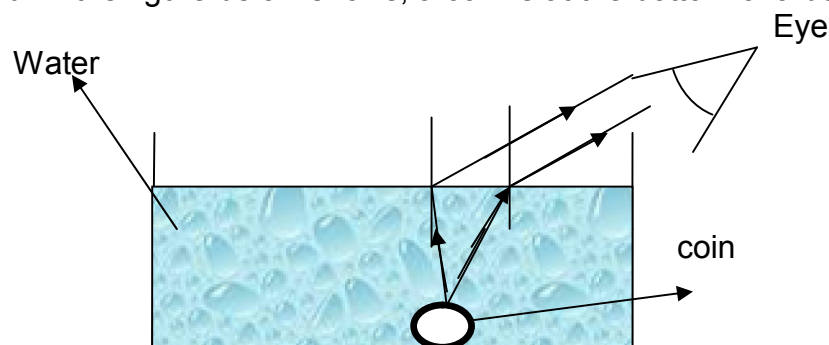
- iii. If the refractive index of the glass is 1.5 and light travels at $3 \times 10^8 \text{ ms}^{-1}$ in air, work out the speed of light in the glass ($n=c/v$)

.....

.....

.....

b. in the figure below shows, a coin is at the bottom of a beaker full of water.

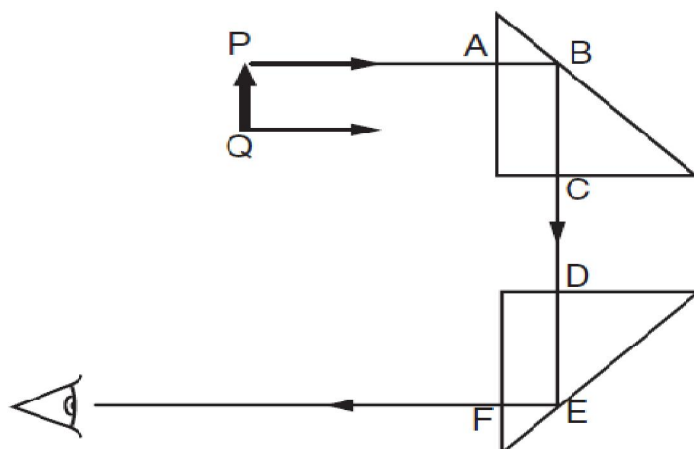


i. complete the path of the rays as they get out and draw in the image of the coin

ii. Is the image of the coin real or virtual? Justify your answer.

12. The figure shows a ray of light, from the top of an object PQ, passing through two glass prisms.

(2011)



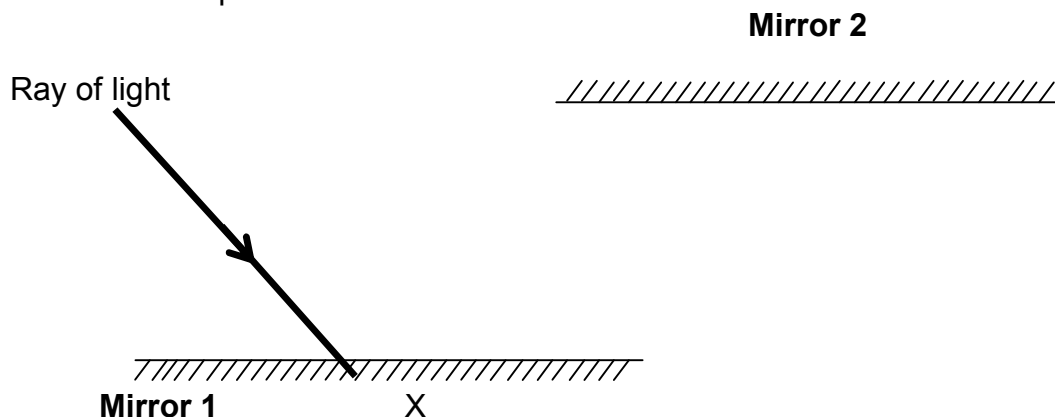
(a) Complete the path through the two prisms of the ray shown leaving Q.

(b) A person looking into the lower prism, at the position indicated by the eye symbol, sees an image of PQ. State two properties of this image?

(c) Explain why there is no change in direction of the ray from P at points A,C,D and F.

.....
.....

(d) In this question, drawing should be done carefully. The figure shows a ray of light striking mirror 1 at point X.



(a) On the figure,

(i) Draw the normal at X.

(ii) Draw the ray reflected from mirror 1.

(iii) Mark the angle of incidence using the letter i and the angle of reflection using the letter r

(b) Mirror 2 is parallel to mirror 1. The reflected ray from mirror 1 strikes mirror 2.

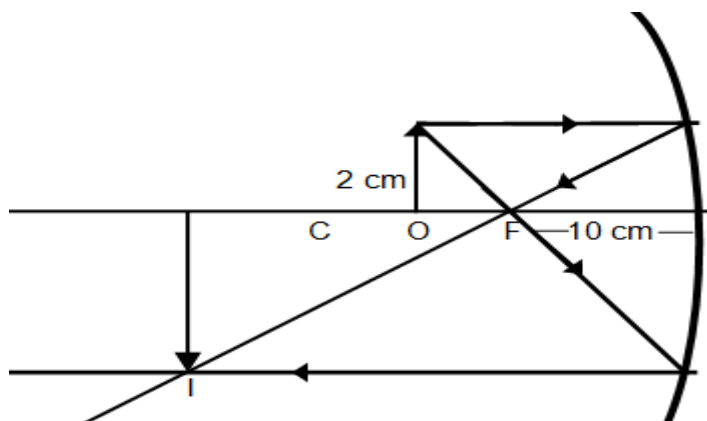
Compare the direction of the ray reflected from mirror 2 with the incident ray at X. you may do further construction if you wish. Complete the sentence below.

The reflected ray from mirror 2 is.....

.....

13. In the figure below of a concave mirror $f = 10$ cm, $S_o = 15$ cm

(2013)



a) Find S_i

.....

.....

.....

b) Find the magnification of the mirror

.....

.....

.....

c) Find the size of the image

.....

.....

.....

Unit 13:- Sound

13.1. Multiple choice Questions

1) Which of the following is true statement?

(2001)

- a. Sound can travel through a vacuum
- b. Sound travels faster in iron than air
- c. Sound cannot travel through a glass
- d. Sound travels faster than light

2) A student is standing 170 m in front of a wall. He claps his hands once. He hears the echo of his handclap. How many second was this **after** his handclap (speed of sound=340m/s

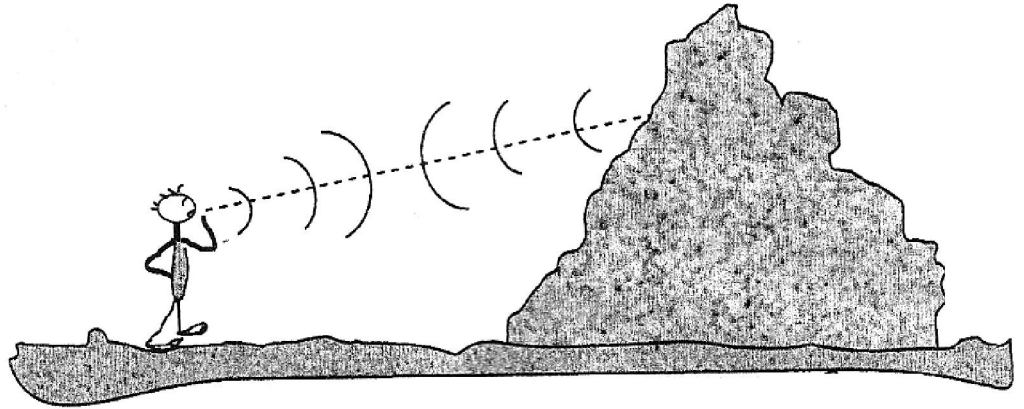
- a. 0.5s
- b. 2s
- c. 1s
- d. 170s

(2001)

3) A gun is fired at a point 3400m away from a cliff. The echo from the cliff reaches him in

- a. 20s
- b. 50s
- c. 10s
- d. 40s

(2004)



4) Which one of the following statements best describes how sound travels from one place to another? (2006)

- a. Sound waves are transverse waves propagated by the vibration of particles
- b. Sound waves are transverse waves whose movements are invisible to our eyes
- c. Sound waves are longitudinal waves propagated by the vibration of particles
- d. Sound waves are longitudinal waves which move outwards in circles of increasing radii

5) Sound waves cannot carry energy through

(2010)

- a. Water
- b. Air
- c. A mirror
- d. A Vacuum

6) Ahmed shouted near a cliff and he hears the echo reflected from the cliff 3 sec later. If the speed of sound in air is 340 m, how far is he from the cliff?

(2012)

- a. 0 m
- b. 340 m
- c. 510 m
- d. 1020 m

7) An echo is produced when sound waves are: (2013)

- a. Bent around corners of object
- b. Transmitted by an object
- c. Reflected back by an object
- d. Absorbed by an object

13.2- Structural Questions

1) (2003)

- a) Which of the following waves is part of the electromagnetic spectrum?
- a. Sound
 - b. Water
 - c. Radio
 - d. Those formed by a slinky spring
- b) Complete: the sound waves in a solid travel faster than in air because the solid particles are

2) (2005)

- a) Choose the correct word from the words below and fill in the empty spaces;

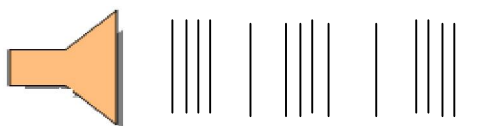
Chemical energy, energy, E.M wave, vibrating, vacuum, medium

Sound is form of

Which is produced by..... objects

It travels through a.....

- b) Label C (for compression) and R for (rarefaction) on the diagram of a loud speaker producing sound waves below



- c) Choose the correct word from the words below and fill in the empty spaces;

Frequency, amplitude, long, short, beat

On a guitar (or any stringed instrument) a higher note is produced by a
String and has a higher..... we increase the loudness..... by striking
the string harder.

- 3) Sound is transmitted as a **longitudinal wave motion** and it sets up **rarefactions** and
compressions in the medium

(2007)

Explain briefly the meaning of

- a) Longitudinal wave motion

.....
.....

- b) Rarefactions

.....
.....

- c) You are watching a firework display. As the firework explodes it produces light and
sound at the same time..

- a. Explain why you see the flash from the firework before hearing the 'bang'.

.....
.....

- b. The time between seeing the flash and hearing the bang is 0.4 seconds. If the
velocity of sound is 340m/s, how far are you from the firework?

.....
.....

Ultra sound scanning is used to monitor the development of unborn babies.

- a) Why cannot hear ultrasound?

.....
.....

- b) What happens to the ultrasound waves when they strike the baby's body?

.....
.....

c) Why is ultrasound used instead of X-rays for monitoring unborn babies?

.....
.....

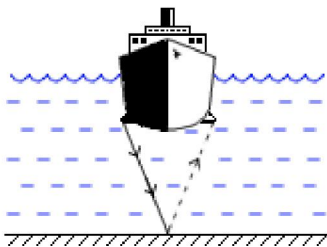
4) a) The figure shows an ultrasound probe used by doctors in Borama to obtain an image of unborn baby. **(2008)**



Give two reasons why ultra sound and not X-rays are used for this investigation.

- i).....
ii).....

b)



A ship sends a signal in the red sea near Berbera and an echo is heard after 16 seconds. Determine the depth of the ocean if the speed of sound in water is 1440 m/s

.....
.....

c) Explain why sound cannot travel through a vacuum.

.....

.....

5)

(2009)

a)



i) During thunderstorm, Halima sees the flash of lightning followed by the thunder.
Explain why

.....

.....



ii) Halima standing 1.0 km from the storm hears a sound of thunder 3 seconds after she sees a flash of lightning. Calculate the speed of sound in air.

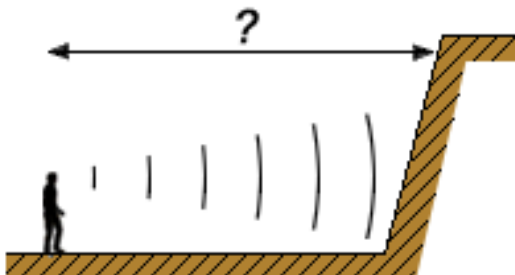
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.....

b) i) Daud stands some distance away from a cliff in Gabiley. He gives a shout and hears his echo 4 seconds later. How far is he from the cliff?



.....

.....

.....

.....

.....

- ii) Write down any two uses of echoes.

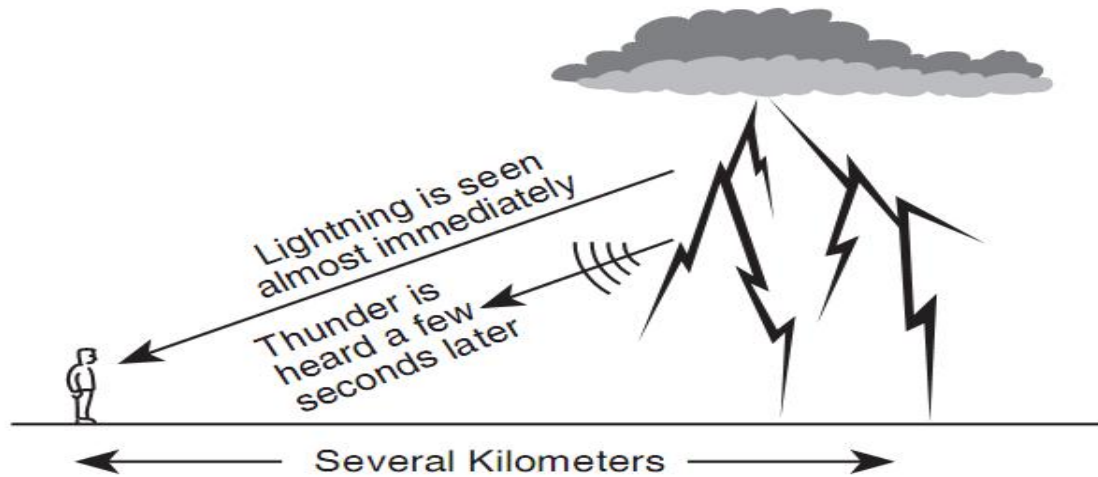
.....

.....

6.

(2010)

- a. The diagram shows a person observing a thunderstorm located several kilometers away. The person hears the thunder several seconds after seeing the lightning.



- i) Explain why the sound waves always reach the observer after the light waves.

.....

.....

- ii) Identify a form of energy, other than light and sound that is often present during a thunderstorm.

.....

- iii) Explain how sound travels through the air to the observer.

.....

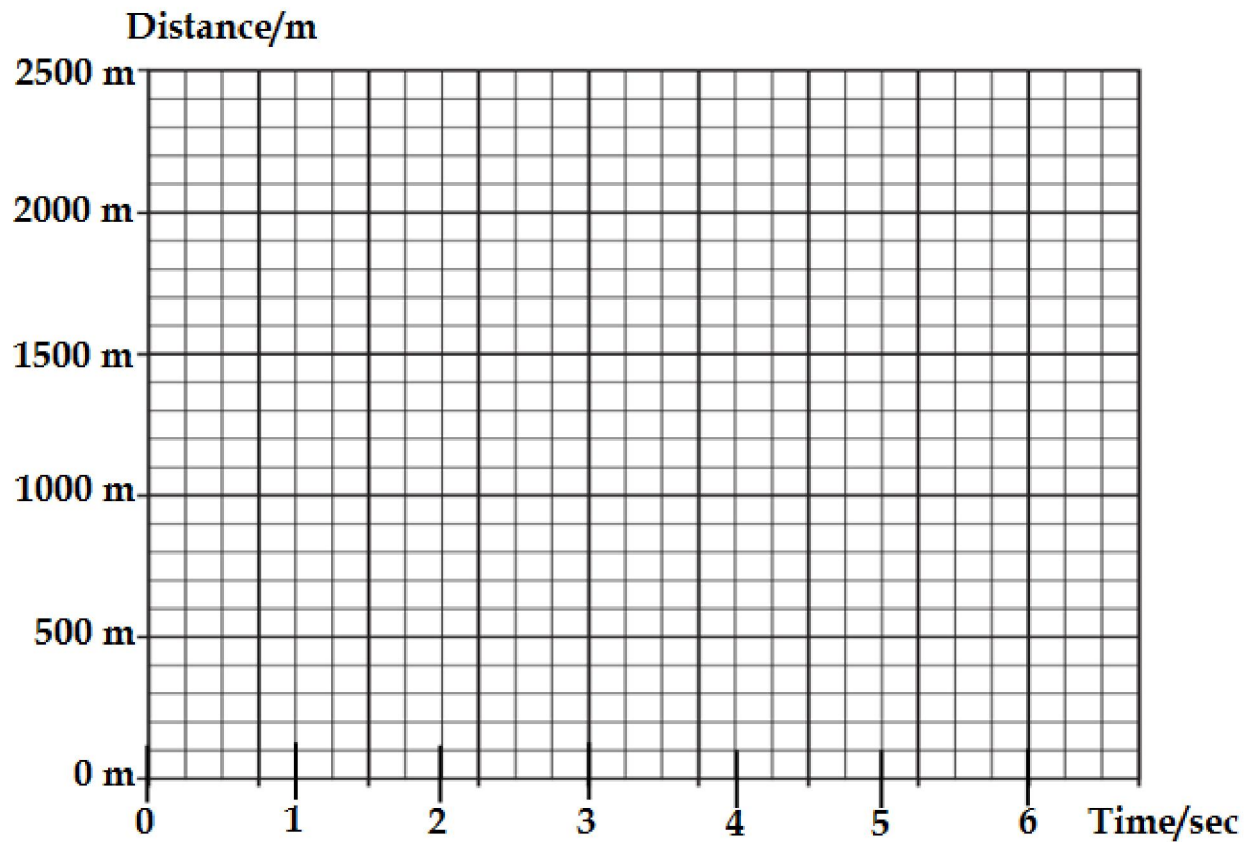
.....

.....

- b. The speed of sound in air is 340 m/s. Complete the table below to show how far a sound wave has traveled 2, 3, 4 and 5 seconds after the sound was made.

Time elapsed in seconds	0	1	2	3	4	5
Distance traveled in metres	0	340				

- i) Draw the graph of distance traveled against time for the sound wave.



- c) A ship is sinking near Berbera as shown below.



The sailors on the ship fire a distress flare into the air. It explodes with a bang and a bright flash of light. The Somaliland coast guard boat crew sees the flash and hears the bang. The time interval between hearing the bang and seeing the flash is 4.25 seconds. Use your graph to find how far the life boat is from the flare. Show clearly on your graph how you got your answer.

.....

.....

7) A man is using an axe to chop down a tree. (2011)

- a. A short time after the axe hits the tree: the man hears a clear echo. He estimates that the echo is heard 3 seconds after the axe hits the tree.

i. Suggest what type of obstacle might have

.....

.....

- ii. The speed of the sound in the air is 320m/s. calculate the distance of the obstacle from the tree.

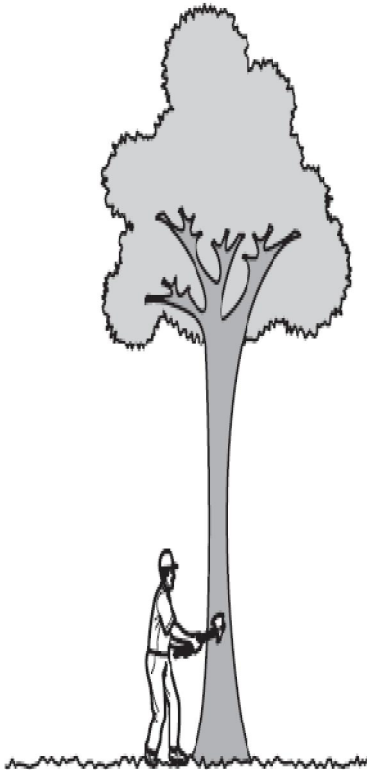
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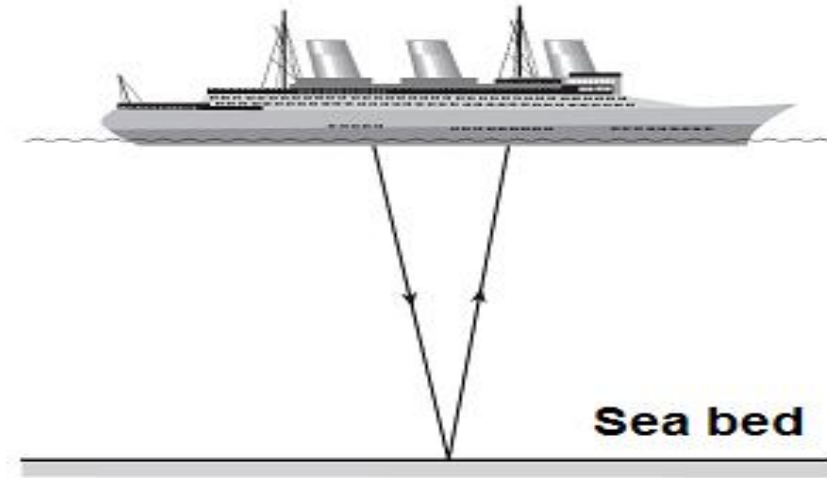
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.....

.....



- b. Ultrasound is used in sonar instruments to measure the depth of the sea. These instruments operate at a frequency of 50,000 Hz. The waves travel at a speed of 1500 m/s in water.



A wave is sent out from the boat to the sea bed and it received back 3 seconds later.

- i. State why ultrasound cannot be heard by humans

.....
.....

- ii. Use the equation: **distance = speed x time**, to calculate the depth of the sea

.....
.....
.....

- iii. State one other uses of ultrasound

.....
.....

Unit14:- Kinematics

14.1- Multiple choice questions

1. Which of the following is a vector quantity (2006)

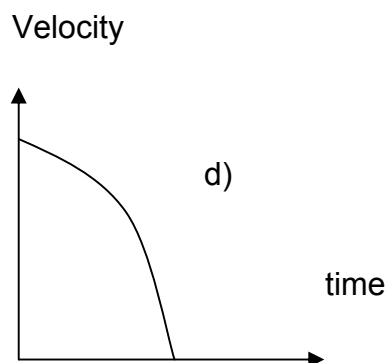
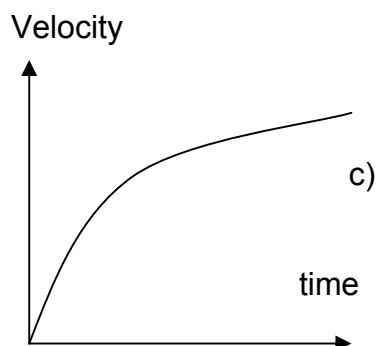
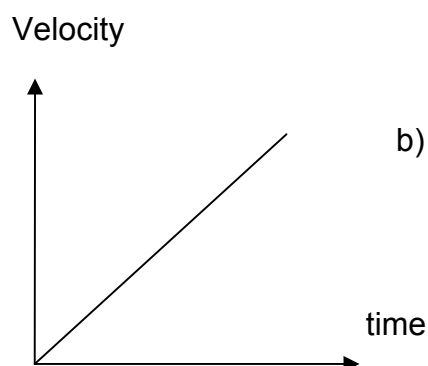
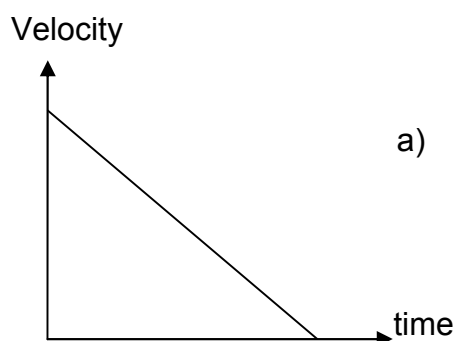
- a) Time
- b) Energy
- c) Velocity
- d) Temperature

2. Which one of the following is **NOT** vector quantity? (2007)

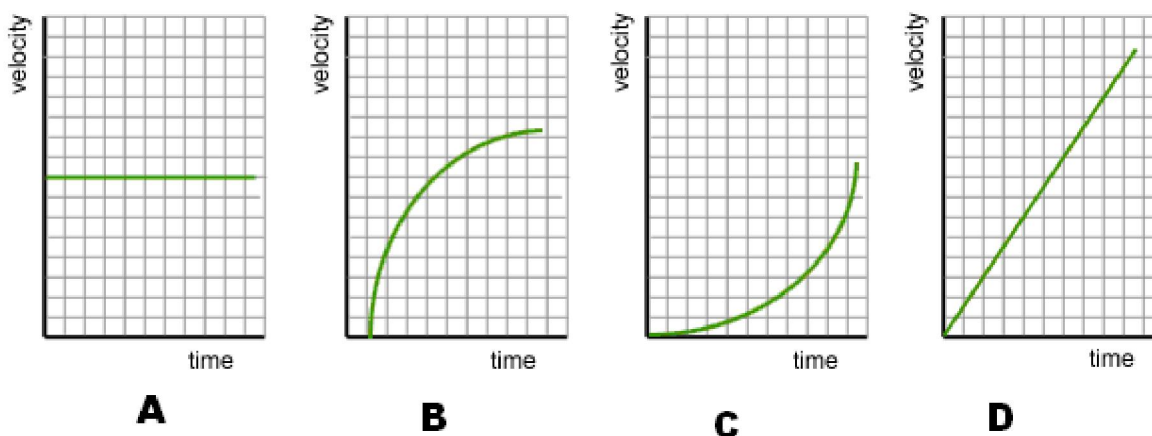
- a) Area
- b) Velocity
- c) Acceleration
- d) Force

3. Which of the following velocity-time graph shows an object slowing down with a variable (non-uniform) acceleration?

(2007)



4. Which of the velocity-time graphs below represents an object falling freely in a vacuum? (2008)



5. Which of the following is **NOT** a vector quantity? (2009)

- A) Force
- B) Energy
- C) Acceleration
- D) Momentum

6. Which is a scalar quantity? (2010)

- A) Weight
- B) Speed
- C) Displacement
- D) Momentum

7. Which of the following is a vector quantity? (2011)

- A) Distance
- B) Energy
- C) Speed
- D) velocity

14.2- Structured questions

1. A) Define

(2007)

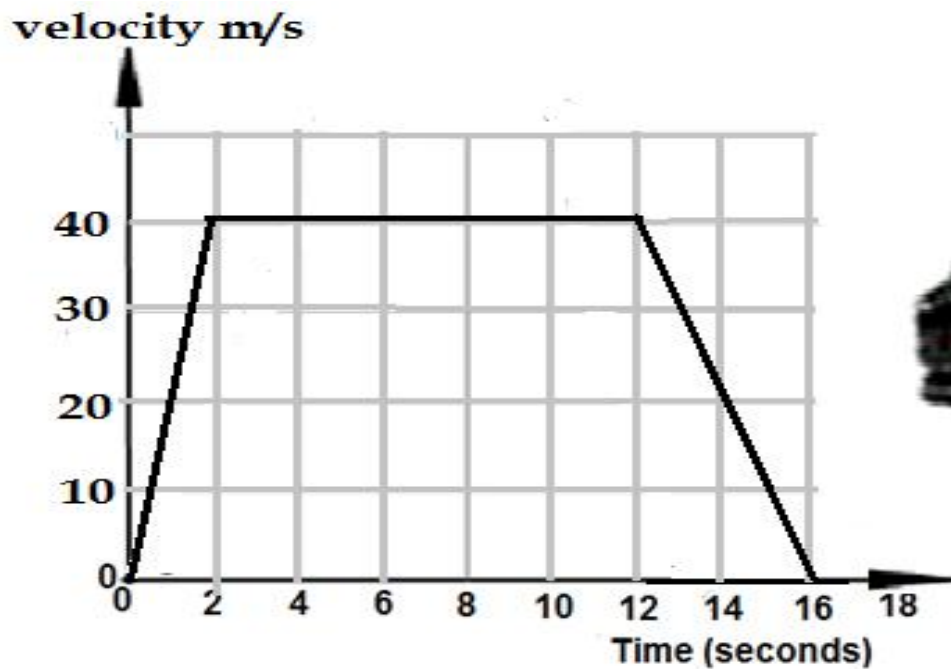
a) Velocity

.....

b) Acceleration

.....

- B) A train travels in a straight line from one station to another.
The graph below shows how the velocity of the bus varies with
the time over the whole journey



Using the graph, determine

a) The acceleration of the bus in the first two seconds of the journey

.....
.....
.....

b) The maximum velocity attained by the train

.....

c) The time which the train is retarding

.....

.....

d) The total distance between the two stations

.....

.....

.....

.....

.....

e) The average velocity of the train

.....

.....

2. A) **COMPLETE:**

(2003)

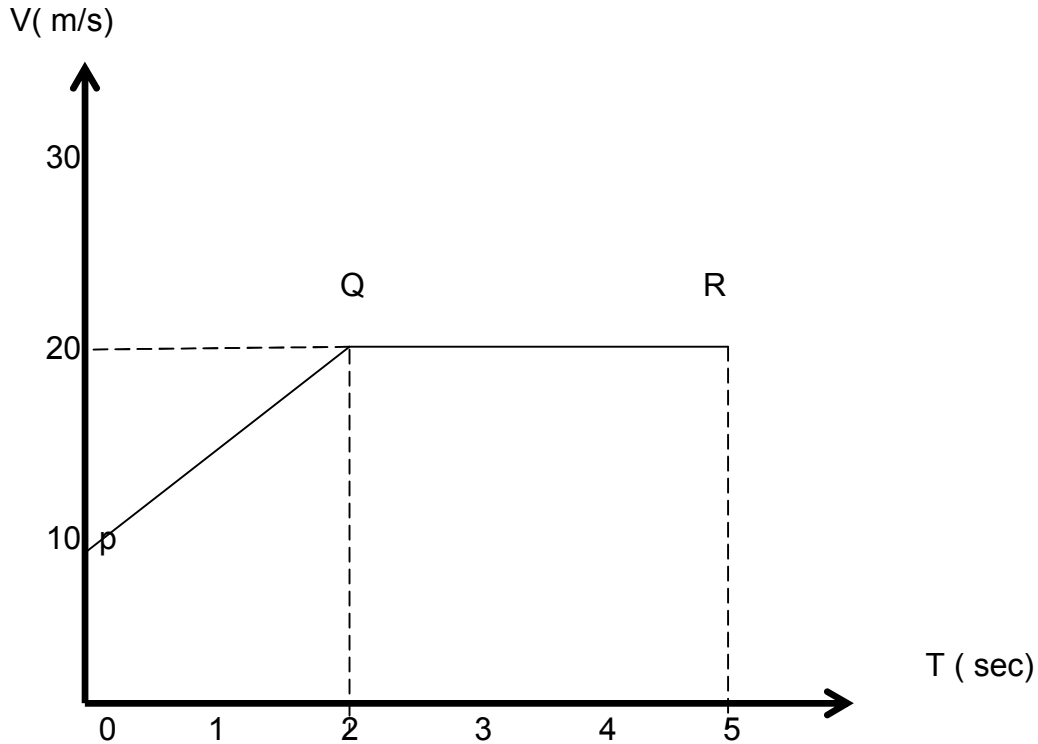
Velocity is a vector and speed is a which has only size or magnitude where as a vector has and

Speed is distance divided by the time taken, where as velocity is the change of divided by the time taken

When an object moves at a constant speed and constant acceleration in a circle it continuously changes its

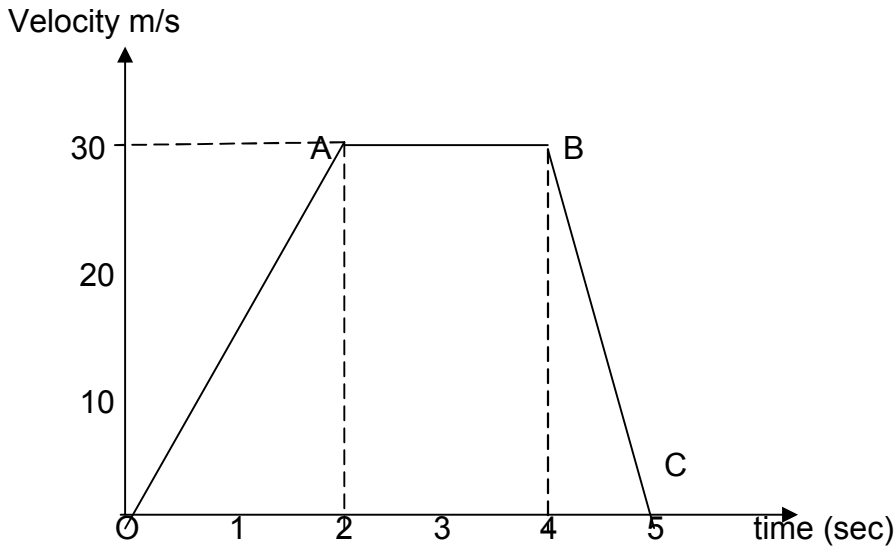
The object's acceleration is always direct towards the

B) Below is a velocity-time graph where P (0,10), Q (2,20) R (5,20)



- The velocity at the beginning $t=0$ is m/s
- The acceleration from P to Q is m/s^2
- The acceleration from Q to R is m/s^2
- The section of constant velocity is
- The distance covered from Q to R is m

3. (a) A car travels from O to C and the resulting journey is shown on a speed--time graph.
(2005)



- (i) Choose the correct word from the words below and fill in the empty spaces:

Retardation, speed, constant velocity, constant acceleration, distance,
Time, variable acceleration, uphill, downhill

The straight line part of the journey OA shows

Straight line AB shows.....

Straight line BC shows

- (ii) Calculate the total distance travelled from O to C.

.....

.....

.....

- (iii) Calculate the acceleration and retardation:

.....

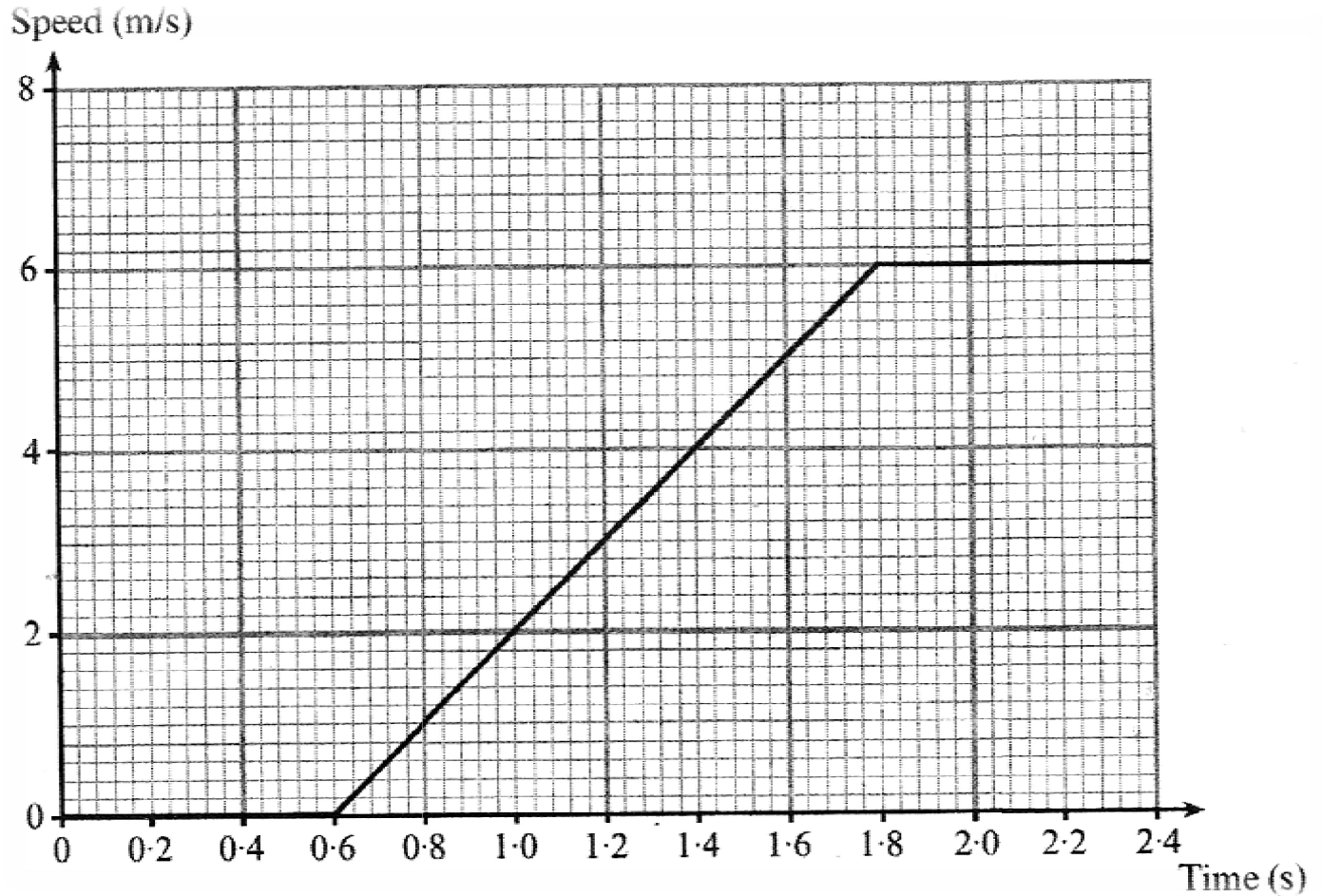
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4. A car is stopped at traffic lights, at time 0 second, the lights change to green. After the car speeds up it travels around a bend (2011)



a) How long does it take the driver to react when the lights change to green?

.....

b) At what time did the speed reach 6.0 m/s?

.....

c) Use the equation $a = \frac{v-u}{t}$ to calculate the acceleration of the car.

.....

.....

.....

5) (i) Define the following terms:-

(2013)

(a) Speed

.....

.....

(b) Velocity

.....

.....

(c) Acceleration

.....

.....

(ii) A body starting with a velocity of 60 ms^{-1} moves with an acceleration of 5 ms^{-2} .

(a) What will be the velocity of the body after 10 seconds?

.....

.....

.....

(b) Calculate the distance travelled during 10 s.

.....

.....

.....

14.3- Extended Questions

a) Define:-

(2009)

i) velocity

.....

.....

ii) Acceleration

.....

.....

b) A car runs at a constant speed of 15 m/s for 300 seconds and then accelerates uniformly to a speed of 25 m/s for 300 seconds. This speed is maintained for 300 seconds before the car is brought to rest with uniform deceleration in 30 seconds.

i) Draw a velocity-time graph to represent the journey described above.



From the graph find:

i) the acceleration while the velocity changes from 15 m/s to 25m/s

.....

.....

ii) the total distance traveled in the time described

.....

.....

iii) The average speed over the time described.

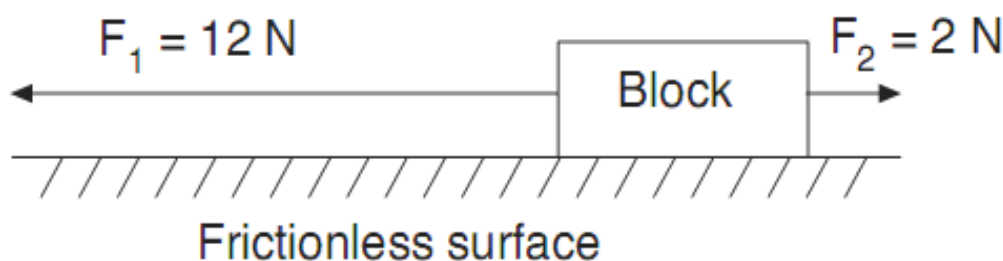
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Unit 15:- Dynamics

15.1- Multiple choice questions

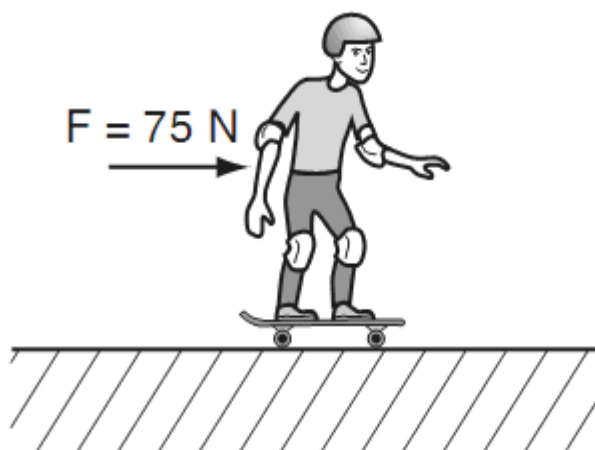
1. Two forces F_1 and F_2 are applied to a block on a frictionless, horizontal surface as below shown (2010)



If the magnitude of the block's acceleration is 2.0 m/s^2 . what is the mass of the block?

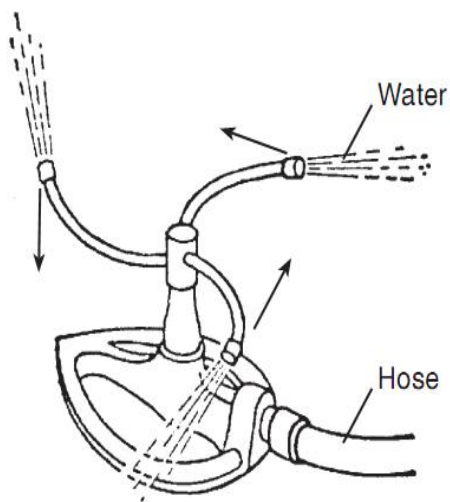
- A) 1 kg B) 5 Kg c) 6 kg 4) 7 kg
- 2) a train of 10,000kg mass is hauled by an engine of 40,000 N. what is the acceleration of the train? (2009)
- A) 4m/s^2
B) 2m/s^2
C) 0.4m/s^2
D) 0.5m/s^2
3. a net force of 10 Newton acceleration an object at $5.0 \text{ meter per second}^2$. what net force would be required to accelerate the same object at $1.0 \text{ meter per second}^2$? (2008)
- A) 1.0N
B) 2.0N
C) 5.0N
D) 50.0N
4. The product of two mass and velocity is called (2008)
- A) Acceleration B) Momentum Arm
C) Negative acceleration D) Momentum

5. When a resultant force of 6.0N is applied to a mass of 3.0kg, the acceleration of the mass will be
A) 0.5m/s^2 (2007)
B) 2.0m/s^2
C) 3.0m/s^2
D) 18.0m/s^2
6. A force of 12N acts on a body and produces an acceleration of 15m/s^2 . if a force of 4N acted on the body the acceleration would be
A) 6m/s^2 (2008)
B) 5m/s^2
C) 3m/s^2
D) 10m/s^2
7. You are sitting in a car, it stops immediately, and you fall forward. This is due to your (2002)
A) Weight
B) Inertia
C) Gravity
D) Height
8. You are sitting in a car, It stops immediately and you fall forward this is due to your: (2005)
A) Weight
B) Inertia
C) Gravity
D) Density
9. A bullet is fired from a gun. The momentum of the bullet is 8kgm/s .if the gun recoils back with a velocity of 2m/s , what is the mass of the gun?
A) 8Kg
B) 4kg (2012)
C) 16kg
D) 20kg
10. A 50kg child on skateboard experience a 75N force as shown .what is the experience acceleration of the child? (2010)



- A) 0.67 m / s^2
B) 1.50 m / s^2
C) 6.70 m / s^2
D) 25.00 m / s^2

11. The diagram below shows a spinning water sprinkler. Water comes through a hose and is sprayed by the sprinkler. (2010)



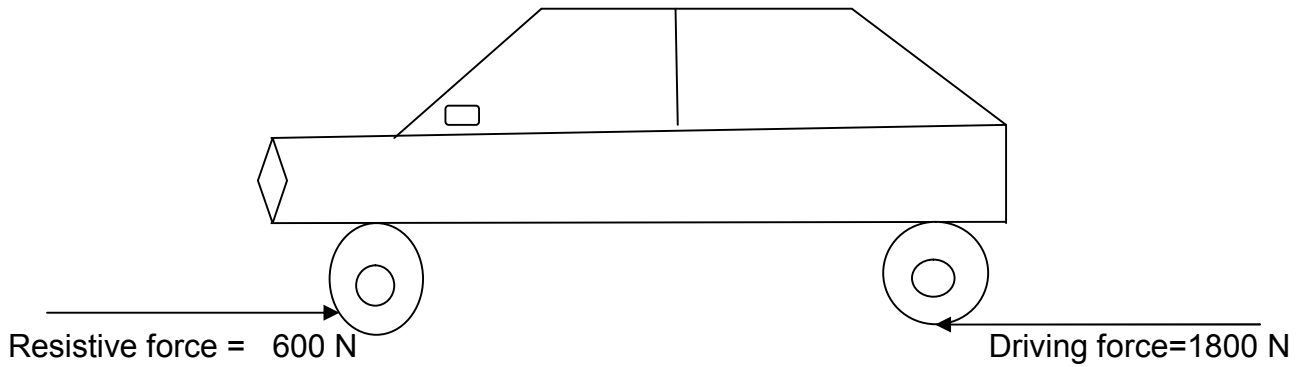
Which principle best explains why the sprinkler spins?

- A) Every action has an equal and opposite reaction
- B) Solid substances are usually denser than the liquid substances.
- C) Energy is released when water condenses
- D) Most substances expand when heated and contract when cooled.

15.2- Structure of dynamics

1. the diagram shows the forces acting on a car

(2006)



a. How can you tell from the diagram that the car is accelerating in the forwards directions?

.....

.....

.....

.

b. calculate the size of the unbalanced force on the car and state its direction

.....

.....

c. the total mass of the car and its driver is 900kg. Calculate the acceleration of the car.

.....

.....

d. state two ways of reducing friction between moving parts in machines

-
-

2. using the idea of Newton's third Law, explain YOUR OWN WORDS, why if Ali hits his head against the wall he will get a headache. (2003)

.....

.....

3. A pick up truck crashes into the back of a bus. Explain IN YOUR OWN WORDS using the idea of Newton First Law, why a goat in the front of the truck will crash through the truck's windscreen. (2003)

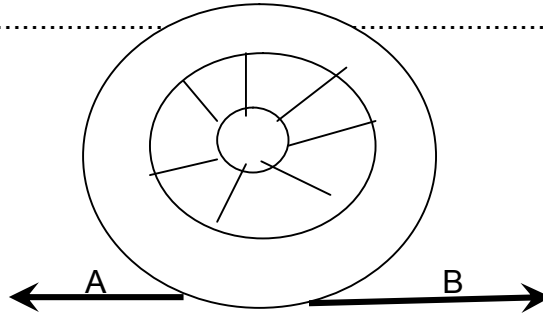
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4.

(2012)



- a. the diagram shows the forces between the wheel of a bicycle and the road when the bicycle is accelerating forwards (to the right).

- i) Force A is the backward push of the wheel on the road. write a similar description of force B

.....

.....

- ii) Which options describe the relative sizes of these forces correctly?

- a. force A is greater than force B
- b. force A is equal to force B
- c. force A is less than force B

Write down the letter of your choice.....

- iii) Suggest the source that provide force A

b. the total mass of the bicycle and cyclist is 80kg. The forward forces has a value of 100 N and the backward force is 60 N.

i) Calculate the size of the unbalanced (net) force acting on cyclist and state its direction.

.....

.....

ii) Calculate the acceleration of the cyclist ($f=ma$)

.....

.....

iii) Explain what will happen to the magnitude of the resistive force, as the cyclist drives faster.

.....

.....

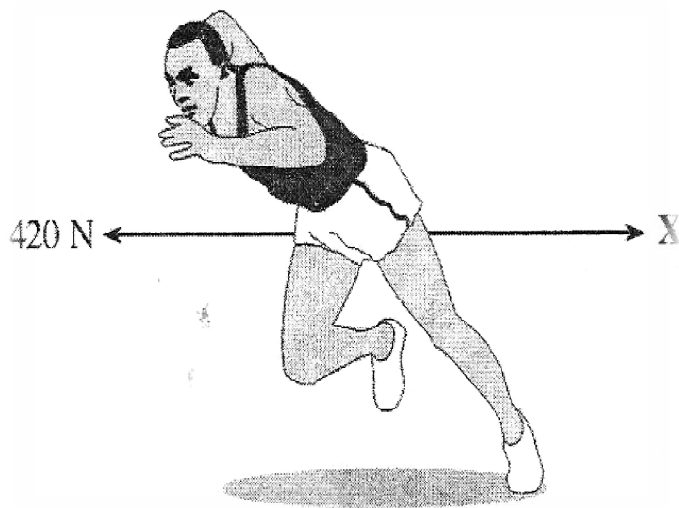
5) A sprinter accelerates of the start of a race. He has a forward force of 420N. The sprinter has a mass of 70kg.

Use the equation $F= ma$, to find his acceleration at the start of the race.

(2011)

.....

.....



b) The sprinter is also acted on by another force X.

(i) Name force X.

.....

.....

(ii) At the start of the race X is zero. State what happens to force X as the sprinter speeds up.

.....

(iii) Describe the motion of the sprinter when force X is 420 N

.....

6. Musa was driving a 1-tone car with a constant speed of 30m/s before collision with a concrete wall damaging the front part of the car **(2013)**

a) Find the momentum of the car with which it collided with the wall

.....

.....

b) A car of mass 100kg accelerates from 10m/s to 30m/s. Find the change in momentum

..... **(2002)**

.....

Unit 16:- Vectors

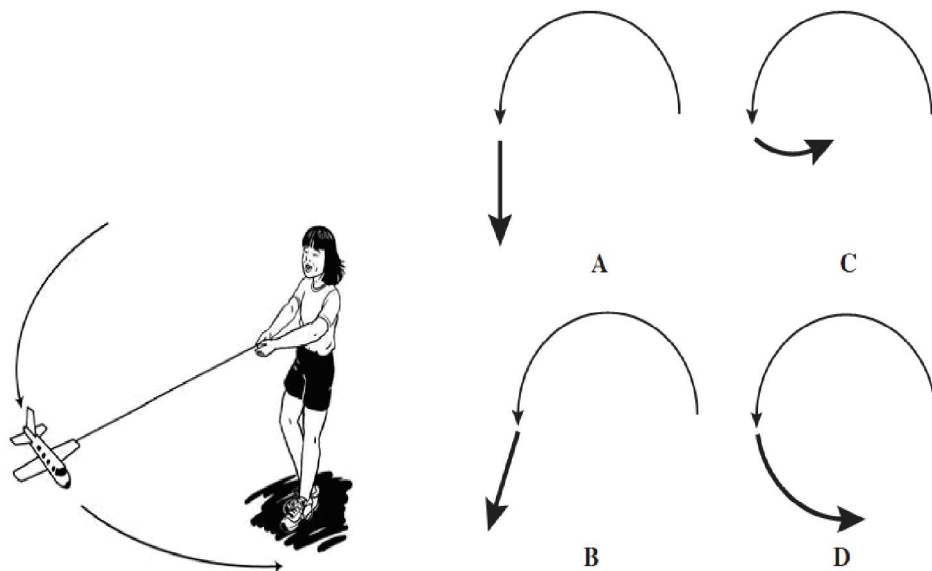
16.1 Multiple choice Questions

- 1) A very old car is pushed with a great force off a cliff of a high mountain and hits the ground. Immediately it begins to fall and has left the cliff it has: **(2003)**
 - a. Both horizontal velocity and vertical velocity
 - b. horizontal velocity only
 - c. horizontal force and downward force
 - d. vertical velocity only
- 2) A bullet is fired with initial velocity of 100ms^{-1} at an angle of 30° within the ground. The vertical component if the initial velocity in ms^{-1} is **(2004)**
 - a. 86.6
 - b. 100
 - c. 43.3
 - d. 50

Unit17- Circular motion

17.1- Multiple choice questions

1. The picture below shows the circular path of a toy plane being swung around on a string. What path would the toy take if the string broke? (2010)



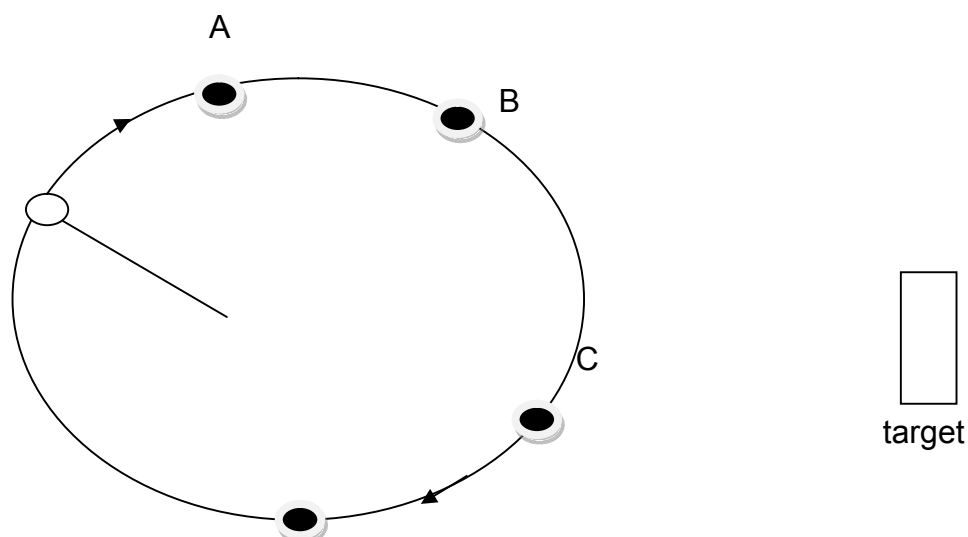
2. One ovulation is the same as:- (2004)
 A) 90° B) 360° C) 80° D) 270°
3. When a stone is attached to a rope and moves in a circle the acceleration is (2002)
 A) Away from the centre
 B) Round the circle
 C) Zero
 D) Toward the centre
4. The force of attraction between the moon and the earth is given by (2005)

$$F = \frac{G M_1 M_2}{R^2}$$

If the distance R between the moon and the earth is doubled then the force will be :

- A) Doubled B) Divided by 2 C) Squared D) Divided by 4

5. A ball attached to a string is moved at constant speed in a horizontal circular path. (2013)
a target is located near the path of the ball as shown in the diagram



at which point along the balls path should the string be released, if the ball is to hit the target?

- a. A b. B c. C d. D

17.2- structured questions of circular motion

1. a) Define angular velocity (2004)

.....

- b) A bus weighting $3 \times 10^4 \text{ N}$ is driven at a speed of 10 m/s around a horizontal bend that has a radius of 250 m .

- i) What is the centripetal force of the road on the bus? What is the direction of the centripetal force?

.....

.....

- c) Change 420 revolutions per minute(rpm) to rev.per second

.....

.....

- d) Derive the formula $F = m\omega^2 r$

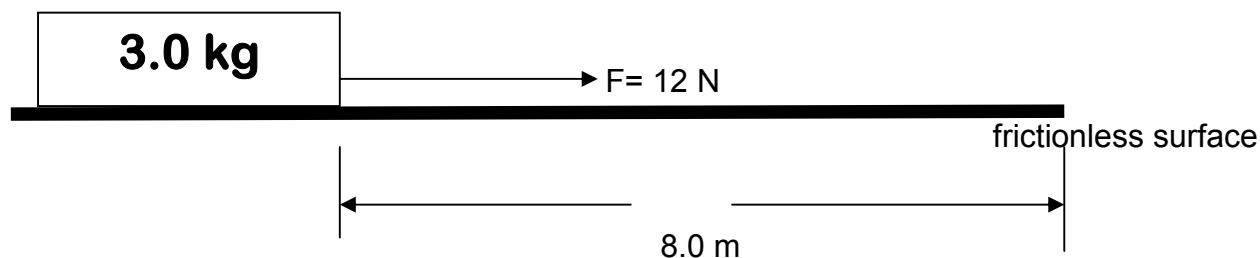
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Unit 18:- Work, energy and power,

18.1- Multiple choice questions

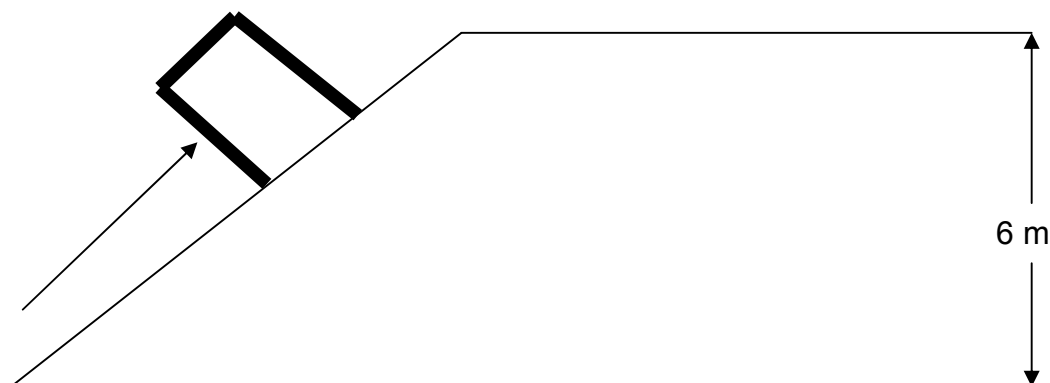
1. An object 4m above the ground has a mass of 5kg. Assuming $g = 10 \text{ ms}^{-2}$, what is its gravitational potential energy? (2004)
 - a) 200 J
 - b) 20 J
 - c) 2000 J
 - d) 2 J
2. A 3.0-kilogram block is initially at rest on a frictionless, horizontal force, as show in the diagram below. What is the average power developed while moving the block? (2009)



- a) 24 W
 - b) 32 W
 - c) 48 W
 - d) 96 W
3. An object weighing 15 Newton is lifted from the ground to a height of 0.22 meter. The increase in the object's gravitational potential energy is approximately:- (2008)
 - a) 310 J
 - b) 32 J
 - c) 3.3 J
 - d) 0.34 J
 4. A 2.0 kilogram mass is moving with a speed of 3.0 m/s. what is the kinetic energy of the mass? (2010)
 - a) 1.5 J
 - b) 6.0 J
 - c) 9.0 J

d) 12.0 J

5. An object of mass 4kg is pushed up a slope in the figure. What is the GPE of the mass when it is the top? ($g = 10 \text{ m/s}^2$) **(2012)**



- a) 60 J
b) 24 J
c) 40 J
d) 240 J

6. A man applies a force of 100 N to a rock for 60seconds, but the rock does not move. What is the amount of work done by the man on the rock? **(2013)**

- a) 0.0 J
b) 6.0 J
c) 100 J
d) 6000 J

7. A power station has an efficiency of 40 %. The input power to the station is 1600MW. What is the useful output power? **(2013)**

- a) 40 MW
b) 640 MW
c) 960 MW
d) 4000 MW

8. Which quantity is a measure of the rate at which work is done? **(2013)**

- a) Energy
b) Momentum
c) Power
d) Velocity

9. Ali raises 10Kg mass of books from the ground and puts them on a shelf 5m high. The potential energy stored in the books is ? **(2013)**
- a) 1000 J
 - b) 700J
 - c) 500J
 - d) 300 J

18.2- Structured questions

QUESTION ONE:-

(2003)

- a) Which of the following decreases if a body falls freely from a certain height?
- I. Kinetic energy
 - II. Acceleration due to gravity
 - III. Gravitational potential energy
- b) **COMPLETE:** A famous athlete of weight 600 N runs up a mountain of height 100m in 30 seconds. The work done against gravity is joules and the power of the athlete is..... Watts.

QUESTION TWO:-

(2007)

- a) Define work and state the SI unit:-

I. Definition

.....
.....

II. SI unit

.....

- b) Explain why a mother carrying a baby in her arms in a stationary position does not work

.....
.....

- c) (i) Define power

.....
.....

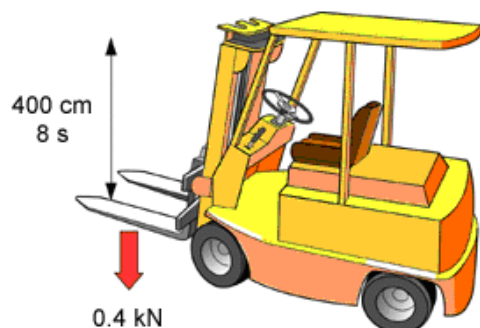
- (ii) A fat man and a thin man ran to the top of a hill in the same time. Who is more powerful? Why?

- Who is powerful?
- Why?

Question three:-

(2008)

3.



The figure illustrates a forklift used to lift 0.4 kN through a distance of 400 cm in 8 sec in a Burao water factory. Calculate the power developed in lifting the load?

.....

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Question Four:-

(2009)

a) Define and state the SI units of

i) work

.....

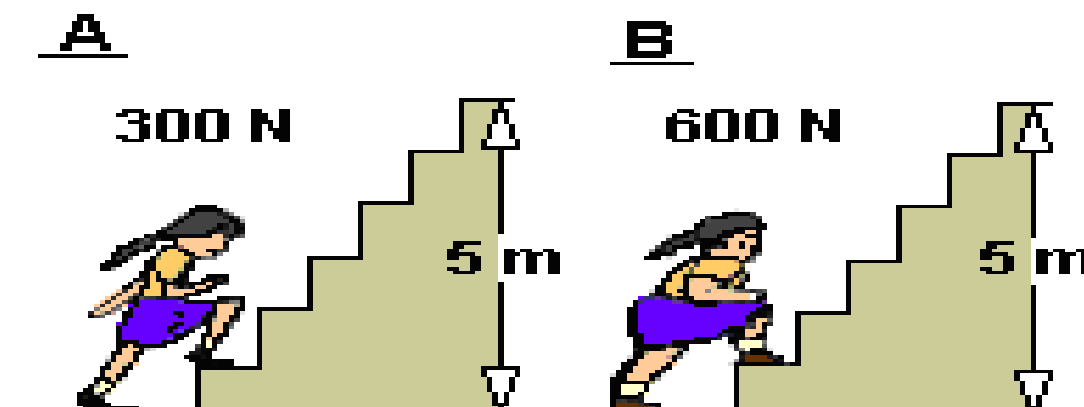
.....

ii) power

.....

.....

b) A thin girl (A) and a fat girl (B) ran up a flight of steps as shown.



(i) Calculate the work done by girl A and B.

Work by girl A

.....
.....

Work by girl B

.....
.....

c) If they both run up the steps in 5 seconds, Calculate the power developed by Girl A and B

Power by girl A

.....
.....
.....

Power by girl B

.....
.....
.....

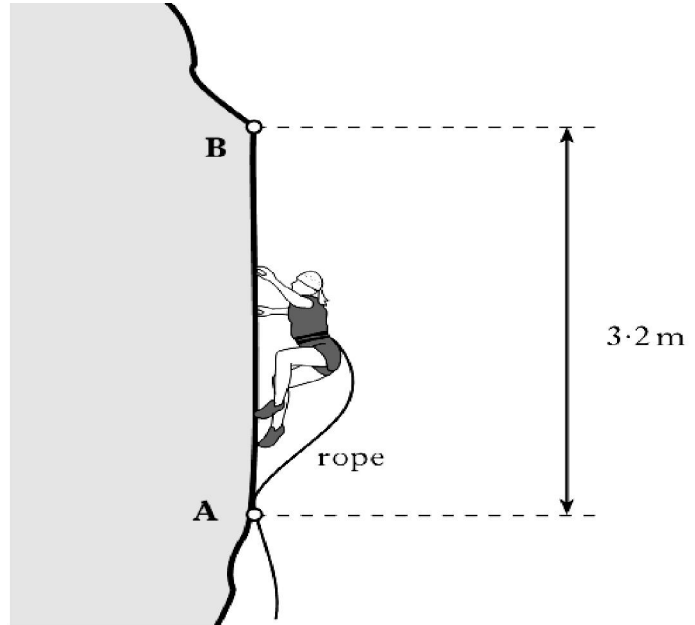
d) Who is more powerful? Why?

.....
.....
.....

Question Five:-

(2010)

A climber of mass 60 kg is attached by a rope to point A on a rock face. She climbs up to point B in 20 seconds. Point B is 3.2 m vertically above point A.



(a) (i) Calculate the average speed of the climber between A and B.

.....

.....

(ii) Calculate the weight of the climber.

.....

.....

(iii) Calculate her gain in potential energy.

.....

.....

(b) She then loses her footing and free falls from point B. After passing point A she is held safely by the rope. Calculate her speed as she passes point A.

.....

.....

6. The forward force of 420N does not change during the race. (2011)
❖ Use the equation: **work= force X distance**, to find the work done by the sprinter during the 100m race

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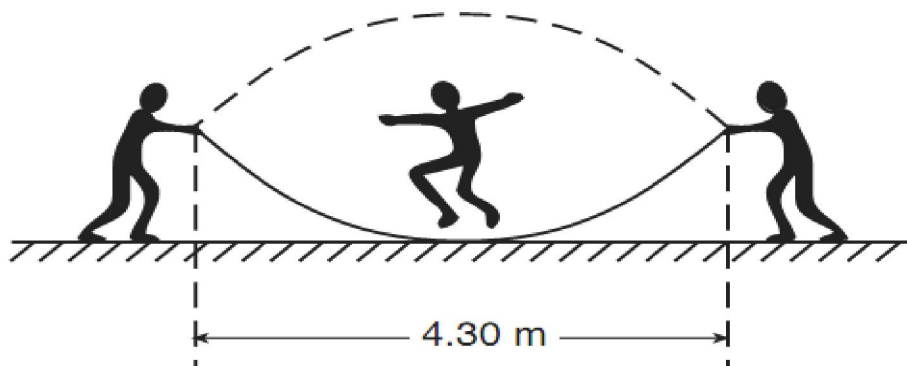
7. The car of mass 1 ton travelling 30m/s possessed K.E which becomes zero after the collision. calculate the initial kinetic energy of the car? (2013)

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19- Oscillations and waves

19.1- Multiple choice questions

1. While playing two children in Erigavo create a standing wave in a rope, as shown in the diagram below. A third child participates by jumping the rope. (2010)

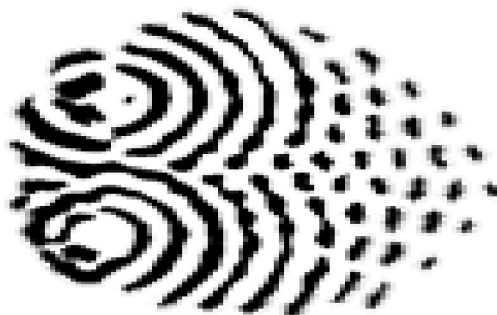


What is the wavelength of this standing wave?

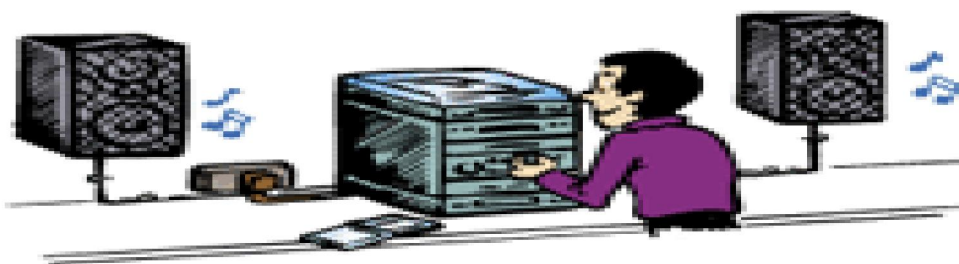
- A) 2.15m B) 4.30m C) 6.45m D) 8.60m

2. Which property of water waves is illustrated by the figure? (2008)

- A. diffraction
B. Interference
C. polarization
D. Reflection



3. A Hargeisa radio broadcasting on a wavelength 250m. The speed of the radio waves is 3×10^8 m/s. calculate the frequency. (2008)



- A. 120 Hz B. 120 KHz C. 1200 KHz D. 120000 Hz

4. In a swinging pendulum the period T is directly proportional to the (2007)

- A. mass of the bob
- B. length of string
- C. velocity of bob
- D. restoring force

5. A women tunes her radio to Hargeisa radio station broadcasting on 89 m. (2007)

what does the 89 m tell her about the radio wave?

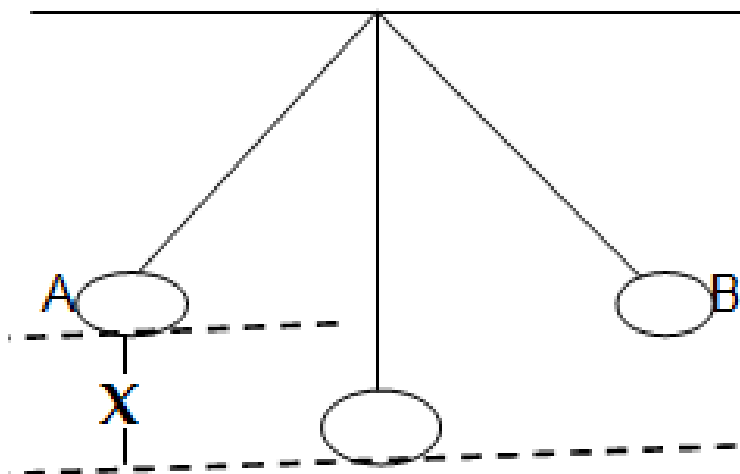
- A . its amplitude
- B. its frequency
- C. its speed
- D. its wavelength

6. Water waves are: (2004)

- A. electromagnetic
- B. Seismic
- C. longitudinal
- D. transverse

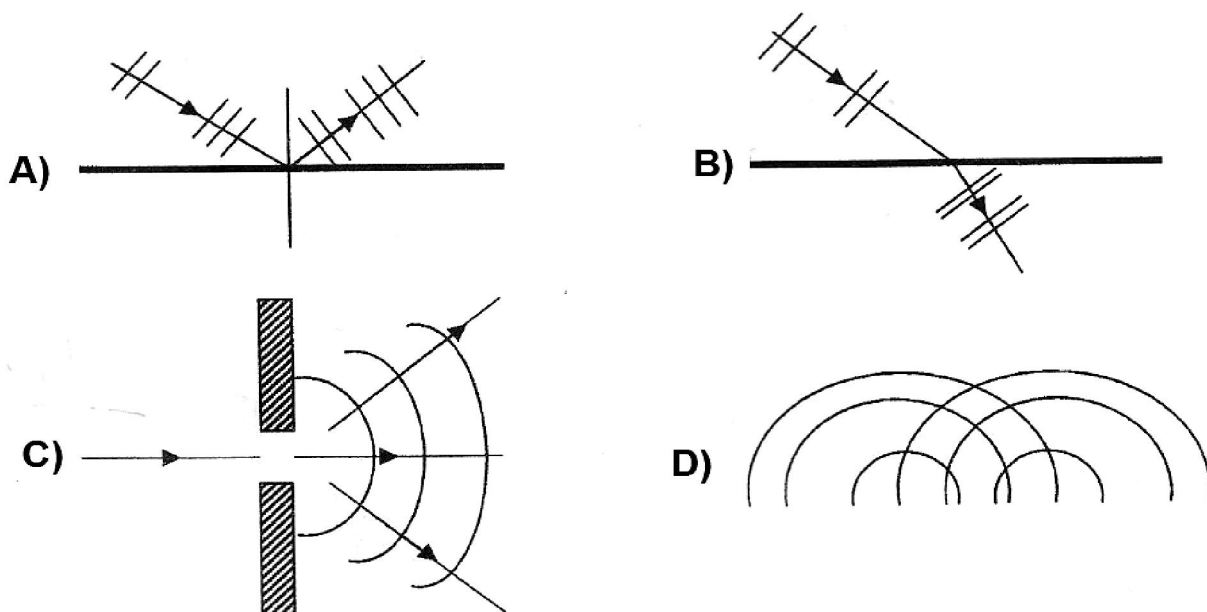
7. The figure shows a pendulum oscillating back and forth from A and B as shown. (2012)
The displacement labeled at X is known as :

- A. period
- B. frequency
- C. amplitude
- D. wavelength



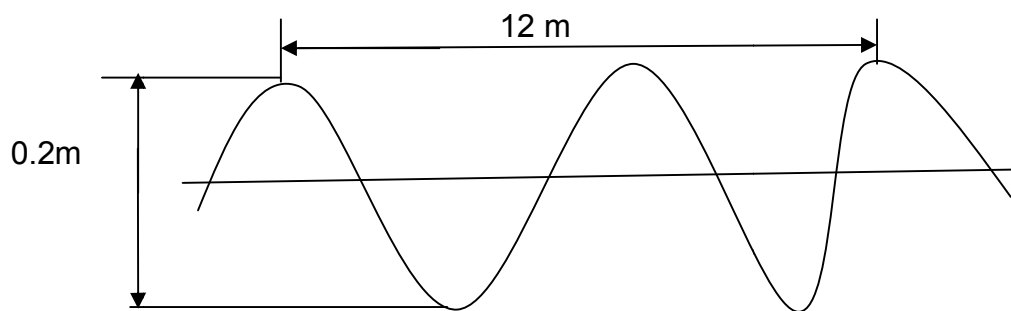
8. Which of the following diagrams illustrate the refraction property of waves.

(2012)



9. The following diagram shows a wave

(2011)



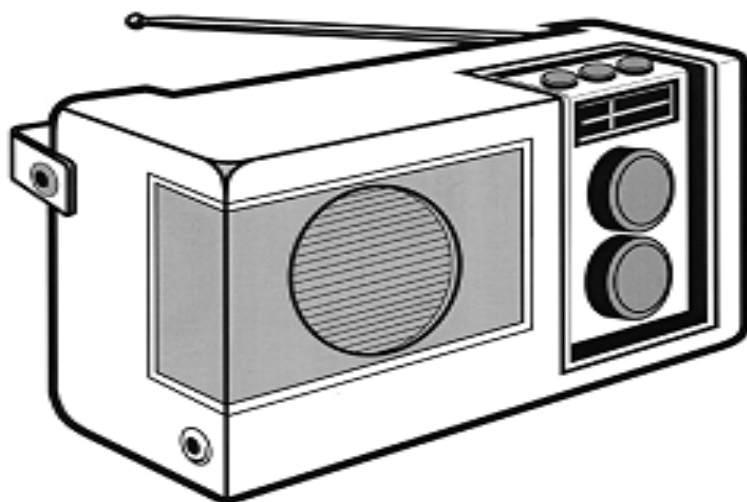
Which row in the table gives the wavelength and the amplitude of the wave

	Wavelength	Amplitude
A	4	0.2
B	6	0.1
C	6	0.2
D	12	0.1

19.2- structured questions

1. Ayan is listening to a radio

(2010)



a) Complete the passage below using words from the following list

Sound	Amplifier	Light
Microphone	Aerial	Battery
Tuner	Decoder	Electrical

The of a radio receives detect signals from many different stations and convert them into electrical signals.

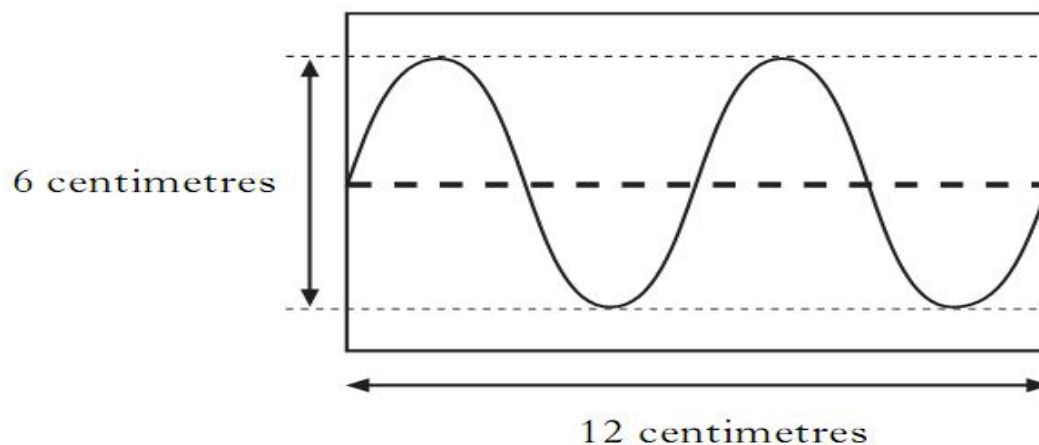
The selects one particular station from many.

The increase the amplitude of these electrical signals.

The energy required to do this is supplied by the

The loudspeaker in a radio receiver converts energy into.....energy.

b) Electrical signals are displayed as waves on an oscilloscope.



i. Calculate the wavelength of the wave

.....

.....

ii. Calculate the amplitude of the wave

.....

.....

2. a) The diagram below shows parts of the electromagnetic spectrum in order. Some parts have been named. (2009)

Radio waves	P	Visible light	Q	X-ray
-------------	---	---------------	---	-------

i. write down the name of part P.

.....

ii. Write down the name of part Q.

.....

iii. Look at the diagram. Which part of the spectrum has the shortest wavelength?

.....

b) Use the following words to complete the following sentences

Infra-red, microwaves, radio waves, ultra-violent, visible light.

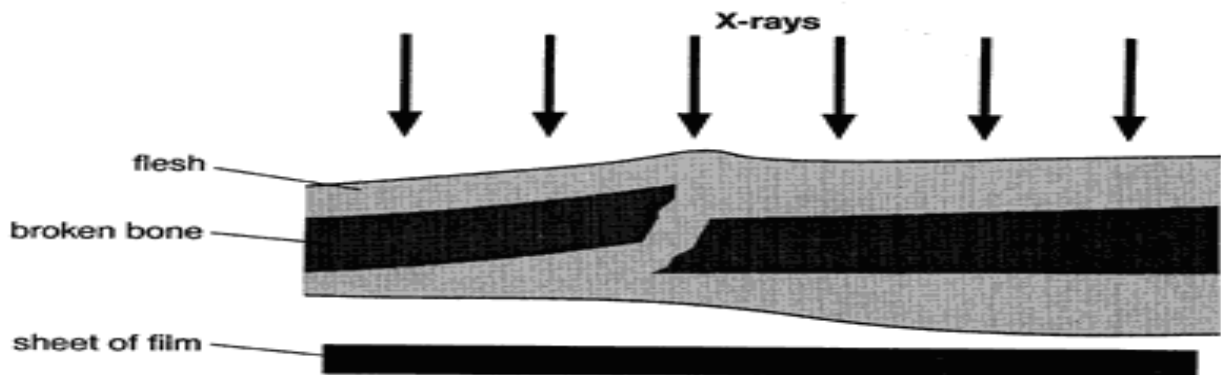
i. food can be cooked using.....

ii, thermometers can detect.....

iii. Photographs taken with ordinary camera use.....

iv. Skin cancer can be caused by.....

c) A Hargeisa hospital uses X-ray machines to take photographs of broken bones .A sheet of film is placed under the broken bone. the X-ray machine is turned on. An image of the broken bone is produced on the film.



a. X-rays are dangerous. How does the X- ray operator protect himself from them?

.....

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b. Explain how X-rays produce an Image of the bone on the film.

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3. Explain the difference between transverse and longitudinal waves

(2008)

.....

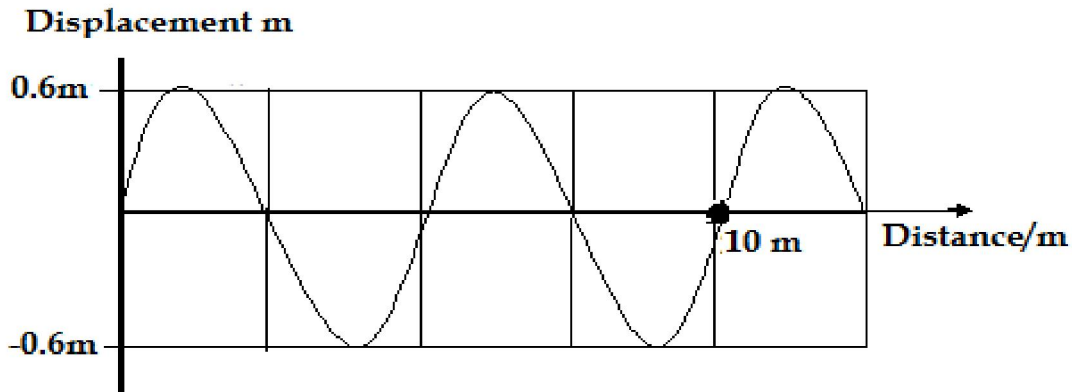
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4.a) The figure below shows the graph of the variation of the displacement of a wave with distance along the wave at a particular t

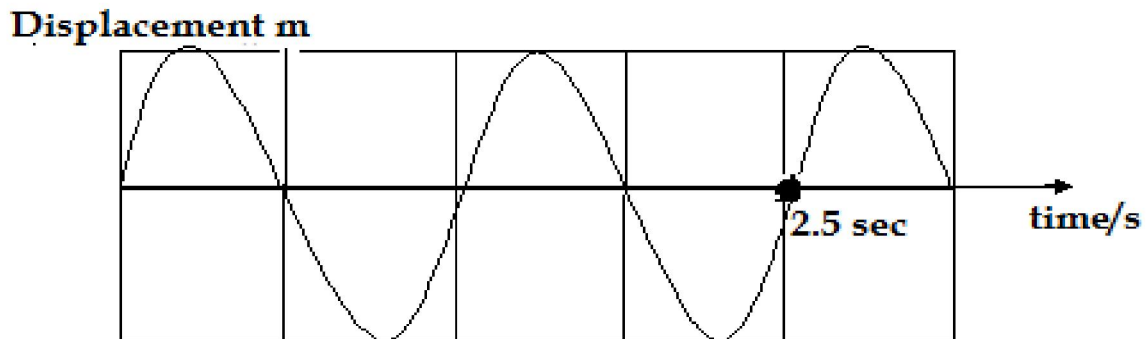
(2006)



State the value for the

- Amplitude of the wave.....
- Wavelength of the wave.....

b) the graph shows the graph of the variation of the displacement of the same wave with time at a particular point along the wave



State the value for the

i. time for one complete cycle

.....

.....

ii. Frequency of the wave

.....

.....

c. calculate the speed of the wave

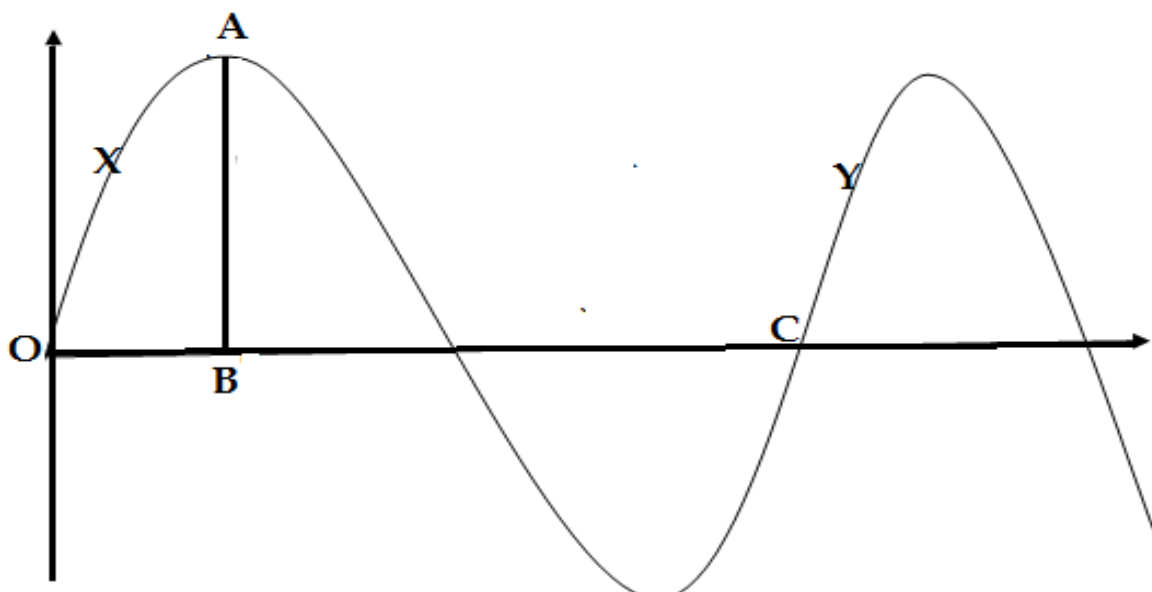
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5.

(2005)

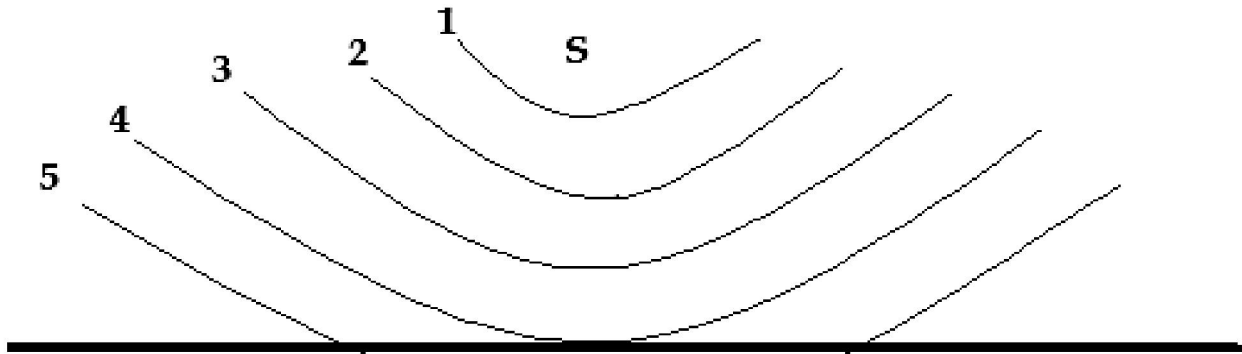


a) The graph of a transverse wave

Complete:

- i. AB represents of a wave.
- ii. X and Y are in
- iii. OC represents the of the wave.

- b. A vibrating source produces circular water waves and the waves meet a straight reflector. Complete the diagram below to show how the crest **4** and **5** are reflected.



6. a) With respect to waves, define

(2007)

- i. wavelength

.....

.....

- ii. Frequency

.....

.....

7. a) compare and contrast transverse and longitudinal waves and give one example of each

(2004)

.....

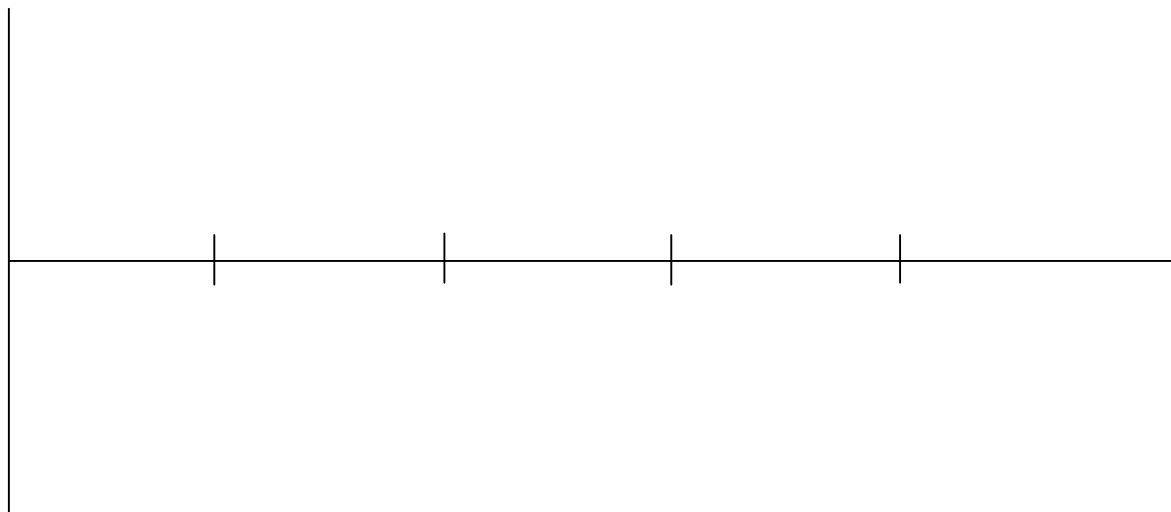
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b) (i) On the following diagram show the amplitude (A) and wavelength (λ)

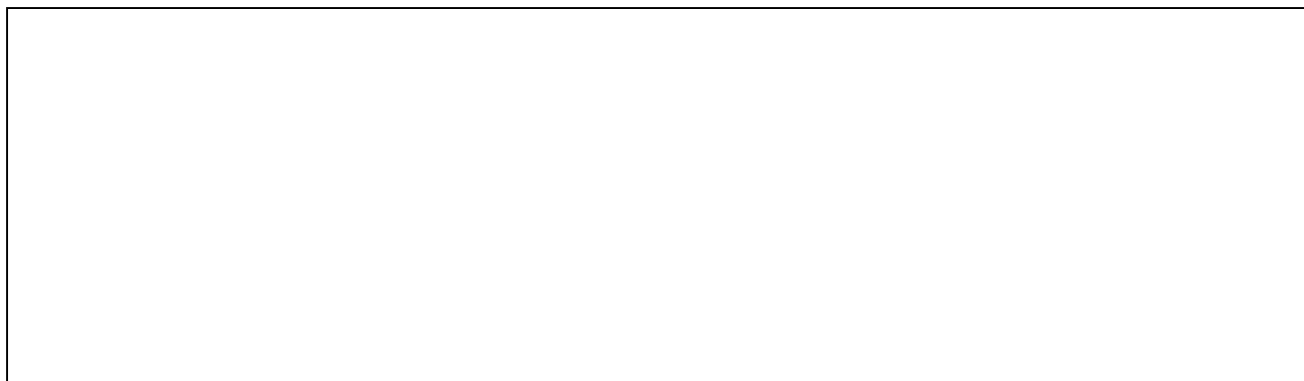


(ii) What increases the amplitude of wave?

.....

.....

c) Sketch a diagram showing a diffraction of a straight water waves.



d) With sketch show complete destructive interference



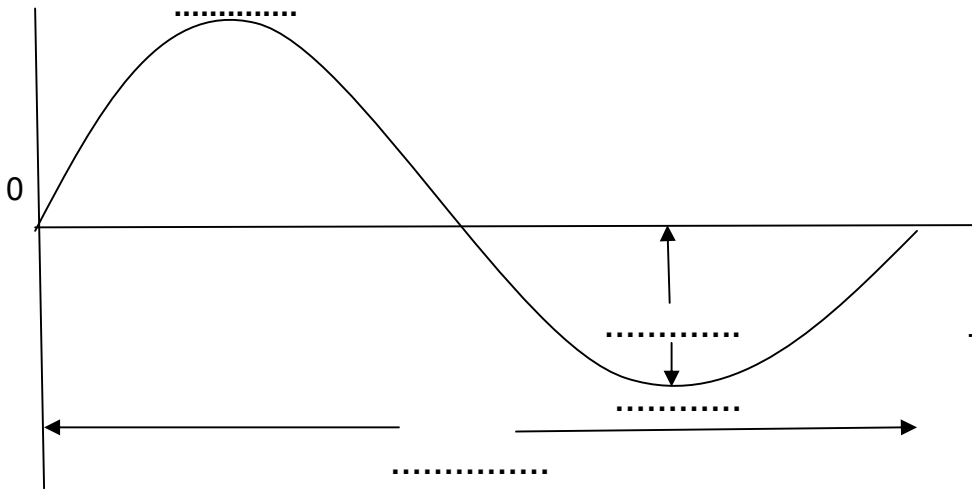
- e) What is the speed of a wave of frequency 800 Hz and wavelength 4m? What is the period of the wave?

.....

.....

.....

8. a) in the following diagram fill in the spaces clearly labeling **T (trough)**, **C (crest)**, **A (amplitude)** and the **W (wavelength)**. (2001)



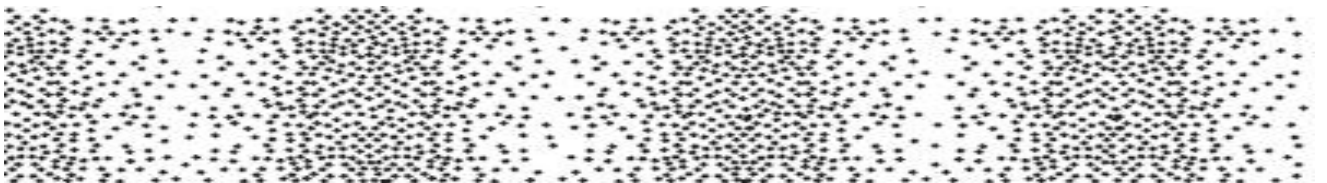
- b) What is the speed of a wave with frequency 200 Hz and a wavelength of 3m.

.....

.....

.....

- c) Label the diagram **C** for Compressions and **R** for Rarefactions.



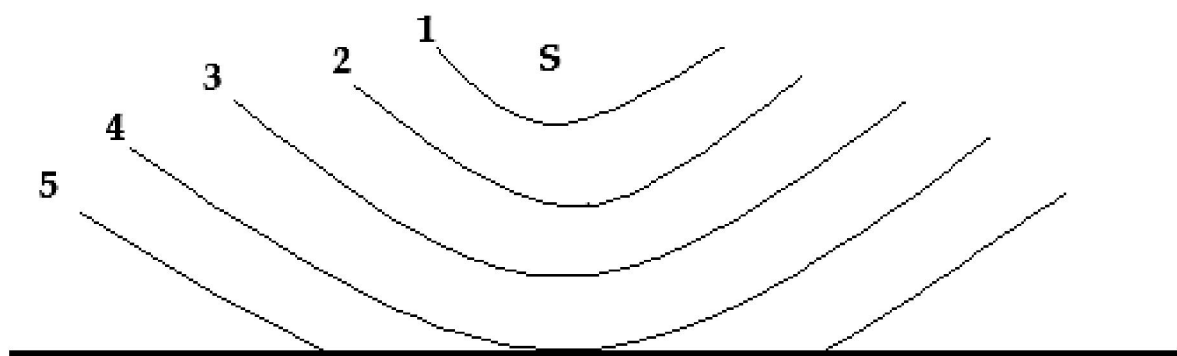
d) Why are gamma and X –rays dangerous to us

.....

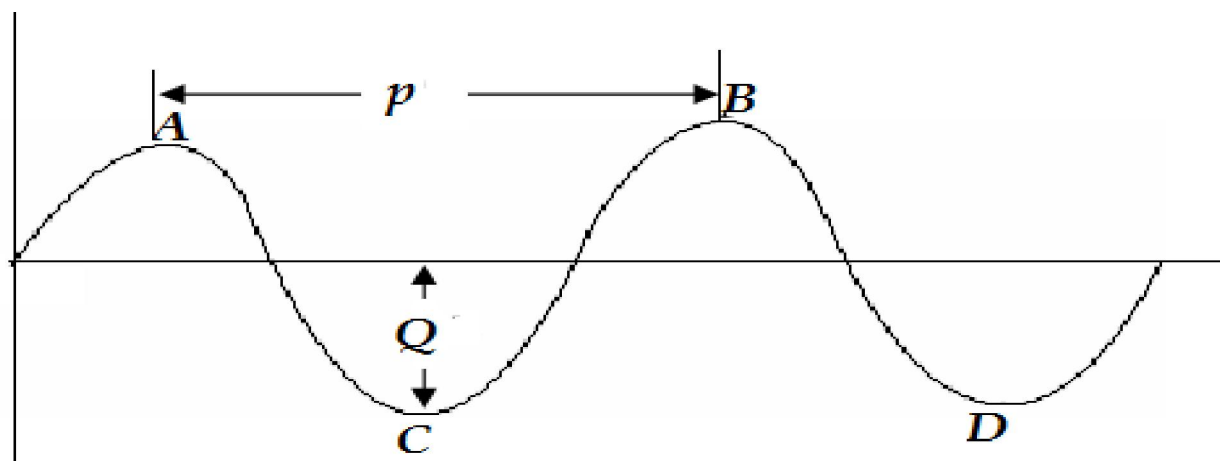
.....

.....

9. Circular wave forms hit a sea wall as shown. show clearly what happens when and after the sea wall. (2001)

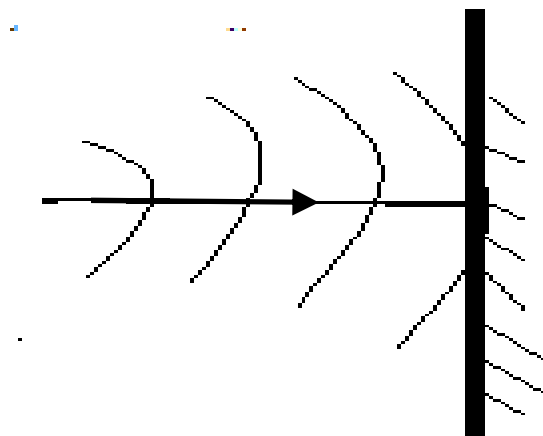


10. a) The figure shows a graph of wave motion of displacement against distance. (2012)
use the letters on the diagram to complete the statements below.



- The wave length is represented by the letter
 - The amplitude is given by the length shown by the letter.....
 - Points such as B and are exactly out of phase.
- b) The type of wave shown in the diagram is(Longitudinal, transverse)

- c) The figure below shows circular wave front that strikes on plane reflector on the diagram. Draw in the trace of the reflected wave fronts



- d) Circular wave forms are produced by hitting the tip of a water surface. 20 complete cycles are produced in 5 seconds and spread over distance of 50cm. work out
- the wavelength of the waves

.....

.....

- The frequency of the waves

.....

.....

- The spread of the waves ($v = \lambda f$).

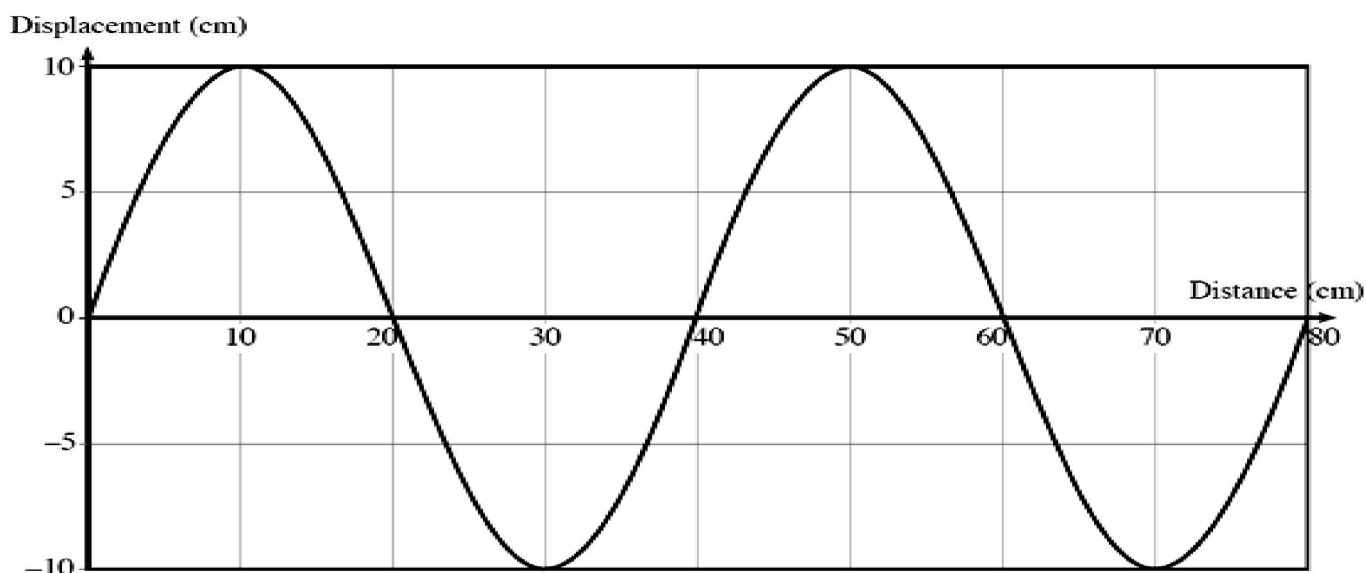
.....

.....

.....

11. The diagram below shows a wave.

(2011)



(i) How many complete waves are shown in the diagram?

.....

(ii) Write down the wavelength. Wavelength = ...

(iii) Write down the amplitude. Amplitude = ...cm

(b) The wave travels with a speed of 160 cm/s.

Use the equation: $frequency = \frac{wavespeed}{wavelength}$, to calculate the frequency of the wave

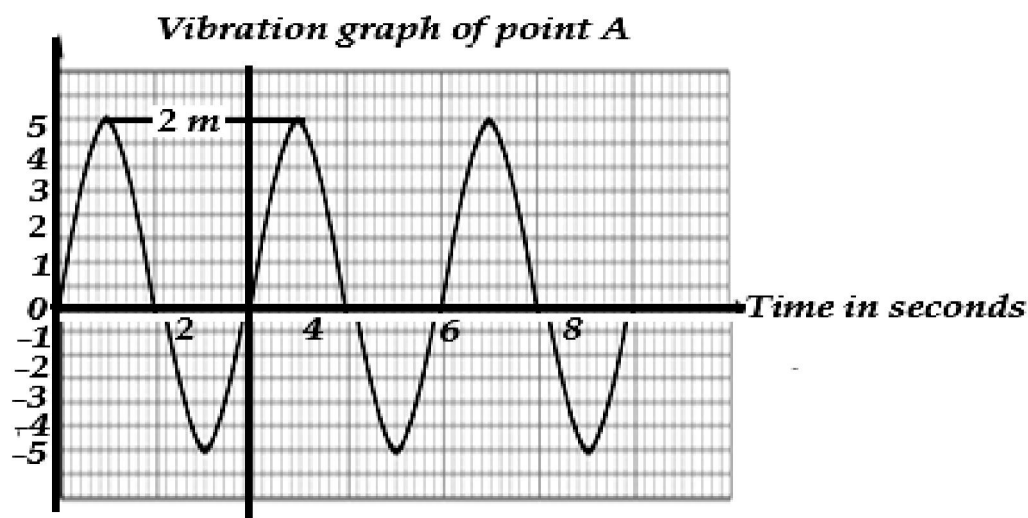
.....

(c) Water waves approaching a barrier have a wavelength of 1.2 cm and a frequency of 8.0 Hz.
Calculate the speed of the water waves.

.....

12. a) The diagram below shows a waveform

(2013)



i) What is the amplitude of this disturbance?

.....

ii) What is the period of this wave?

.....

.....

iii) Based on this information, what is the frequency of the source creating this disturbance?

.....

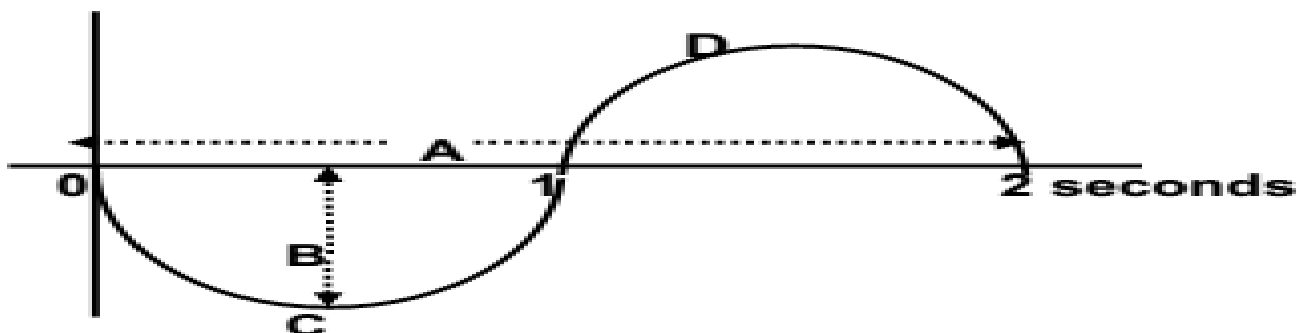
.....

iv) What is the wavelength of this wave

.....

13. Look at the graph of a wave below:

(2002)



i)

Write down the names of

- a) A
- b) B
- c) C.....
- d) D.....

ii) What is the frequency of the wave in Hz.....

iii) What is the period?

14. Think about the electromagnetic spectrum and complete the sentences:

(2002)

- a) are used to find a broken bone
- b) are used to carry messages over long distances
- c) cause suntan and are dangerous to skin
- d) has the highest frequency in the e-m spectrum
- e) are used in ovens for cooking.
- f) heat up the Earth

Unit 20:- Radio-activity

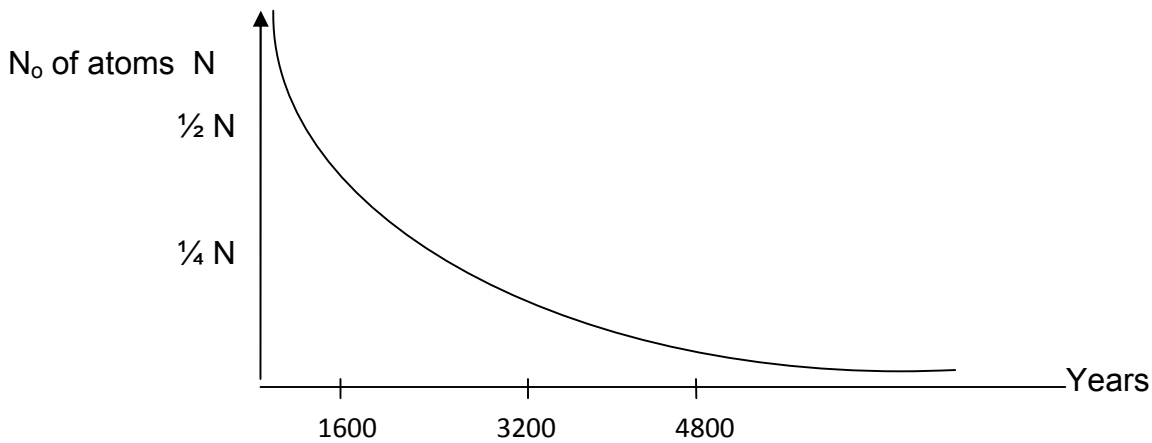
20.1 Multiple choice Questions

- 1) A radio-active element emits: (2001)
 - a. Alpha (α) radiation only
 - b. Alpha (α), beta (β) radiation only
 - c. Alpha (α), beta (β) and gamma (γ) rays
 - d. gamma (γ) rays only
- 2) alpha particle consists of (2002)
 - a. One proton, Three neutrons
 - b. One proton, Two neutrons
 - c. Two proton, One neutrons
 - d. Two proton, Two neutrons
- 3) The least penetration radiation from a radioactive source is : (2003)
 - a. Beta ray
 - b. Alpha ray
 - c. Gamma ray
 - d. X ray
- 4) The radiation from a radioactive nucleus which is most penetrating is (2004)
 - a. Gamma
 - b. Beta
 - c. Alpha
 - d. X- ray
- 5) The half-life of radon is 1 minute, what mass of radon is still present from a sample of 8g after 3 minutes? (2007)
 - a. 4g
 - b. 1g
 - c. 2g
 - d. 8g
- 6) A half life of a radioactive particle is 20 minutes. how long will it take 50g of the substance to decay to 6.25 (2011)
 - a. 60 min
 - b. 40 min
 - c. 20 min
 - d. 10 min
- 7) 40 grams of radioactive substance is compared with 10g of the same substance, what property is constant for both amounts (2012)
 - a. Mass
 - b. Half life
 - c. Activity
 - d. Volume

- 8) A nuclear engineer has 2,000,000 atoms radioactive a substance with half-life of 50 minutes. How many atoms will remain after 150 minutes? **(2013)**
- 100,000
 - 250,000
 - 500,000
 - 750,000

20.2 Structural Questions

- 1)
- a) COMPELETE **(2002)**
- An alpha ray is the same as an.....
 - The most penetrating ray is the
 - Two atoms which have same number of protons but different number of neutrons are called.....
 - An atom is represents ${}^9_4\text{Be}$ then its atomic number is..... its mass number is
- b) The graph shows the radioactive decay of RADIUM.
From the graph:



- How long is it before HALF the numbers of atoms have disintegrated?
.....
.....
- How long is it before THREE QUARTERS of the atoms have disintegrated?
.....
.....
- When will the most of the atoms have disintegrated?
.....

c) Write down 2 important uses of radioactivity

.....

.....

.....

2)

(2004)

a) Write down any two characteristics of radioactive substance

.....

.....

.....

b) A scientist has 2,000,000 atoms in I-131. How many atoms of I-131 remains after 16.1 days? After 32.2 days if the half-life of I-131 is 8.05 days?

.....

.....

.....

c) Write down any two uses of radioactivity

.....

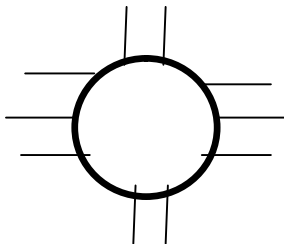
.....

.....

d) Radioactivity is measured in

.....

e) In the following arrangements trace the direction of **alpha(α)**, **beta(β)**, **gamma(γ)**



+++++

.....

.....

.....

3)

(2006)

a) Explain what is meant by a radioactive element?

.....

.....

b) Name the type of radiations which might be emitted by a radioactive element

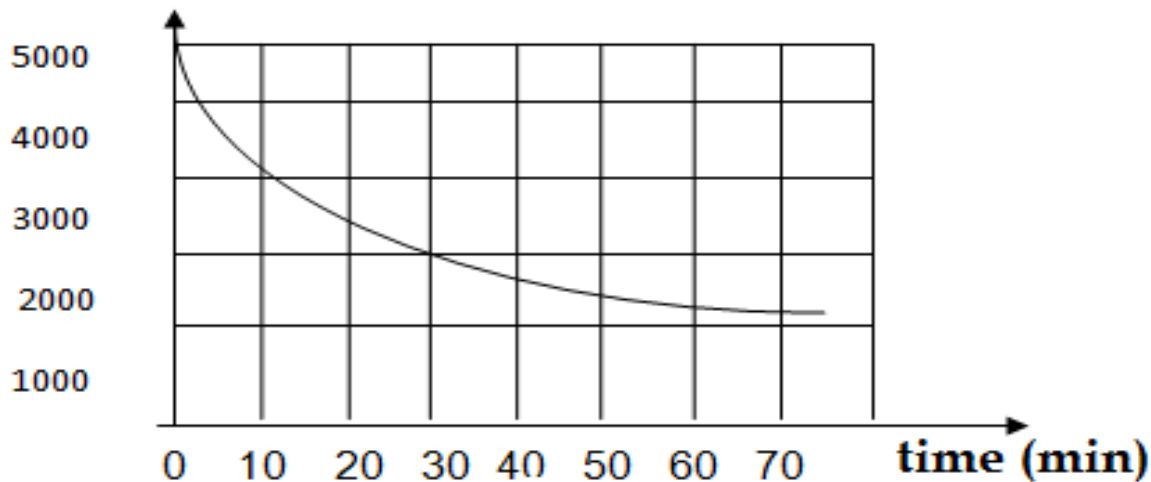
- i.
- ii.
- iii.

c) What is meant by 'half-life' of a radioactive substance?

.....

.....

d) The graph shows the count rate of a radioactive sample plotted against time



The half life of a radioactive sample, in minute is

e) State any two uses of radioactivity materials

.....

.....

4. (a) When the nucleus of a radioactive material disintegrates it is called (2005)

.....

(b) Complete the following table using the words high, low, medium and write in the associated Greek symbol

Radiation	Penetrating power	Ionisation	Greek symbol
Alpha			
Beta			
Gamma			

(c) Uranium 234 decays to Lead 214.

Write below the nuclear equation and find the number of alpha particles emitted.

.....

.....

.....

5.

Fill in the spaces using each of the following words once only: **(2001)**

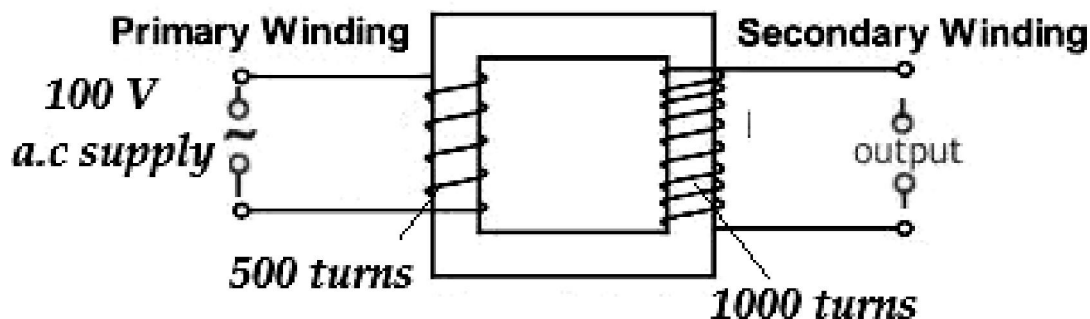
Half life, mass, atomic, protons, negatively, and positively,

- i) An isotope has the same number but a different number
- ii) The..... of a radio isotope is the time taken for half the atoms to decay
- iii) An alpha particle is..... charged
- iv) A beta particle is charged
- v) The number of is the atomic number

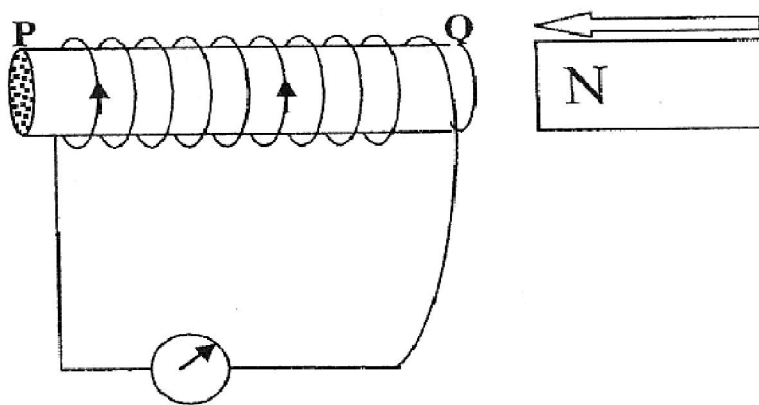
Unit 21:- Electromagnetic Induction

21.1- Multiple choices questions

1. The diagram shows a transformer with 100 V a.c. applied to the primary coil. What is the potential difference (voltage) across the secondary coil? **(2001)**



- a) 50 V
b) 100 V
c) 200 V
d) 800 V
2. The figure shows a bar magnet being pushed into a coil of wire. Which of the following



(2012)

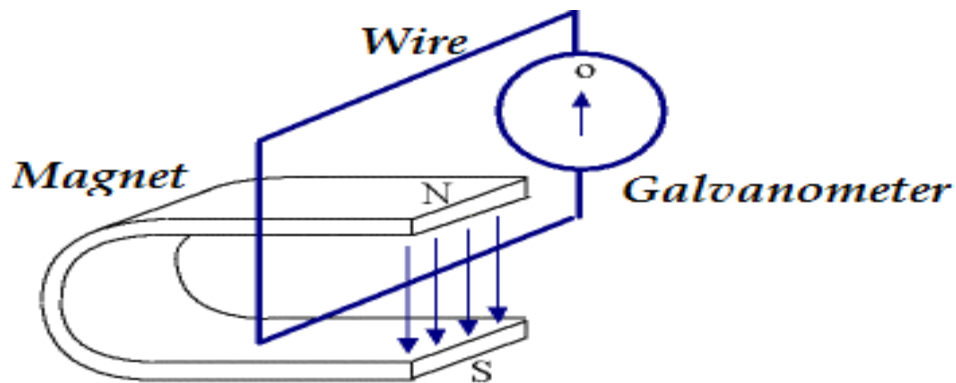
- a) End Q becomes N – pole
b) End P becomes S – pole
c) Current will follow in the direction show
d) The arrangement could be called generator

3. A transformer is used to change (2008)

- A) alternating current to alternating current of a different magnitude
- B) alternating current to constant direct current of the same magnitude
- C) constant direct current to constant direct current of a different magnitude
- D) constant direct current to alternating current of the same magnitude

21.2- Structured questions

- 1) A) write TWO sentences to explain how we could generate alternating current using the equipment shown below: (2001)

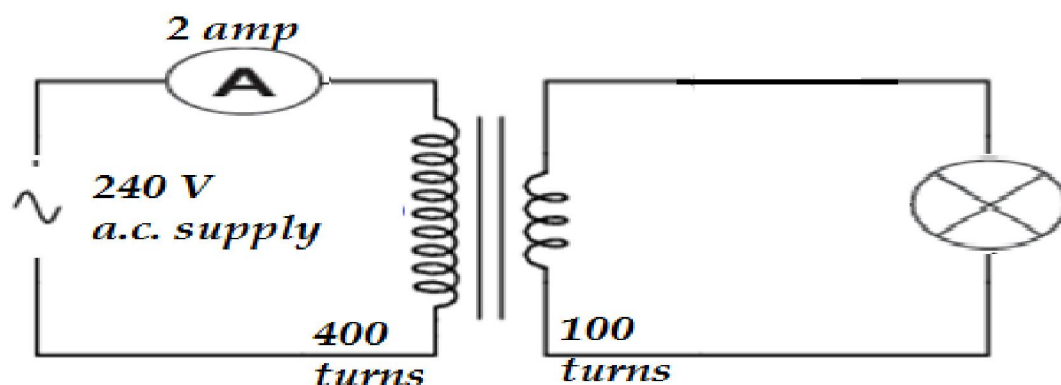


- B) When you generate electricity using this equipment what do you see when you look at the galvanometer needle?

Draw a diagram of the needle here

2) The circuit below is for a transformer

(2003)



i. Why is it a 'step down' transformer?

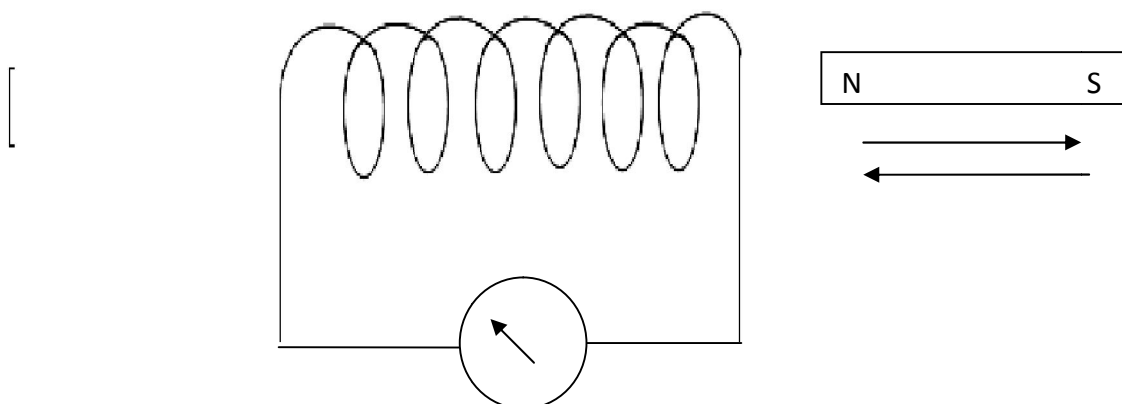
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.....

.....

- ii. The value of the current flowing through the lamp is amps
 iii. The voltage across the lamp is volts

3) The diagram below represents a magnet moving in and out of the coil which is connected to a galvanometer G. A movement is shown by the needle moving back and forth on the galvanometer when the magnet is moving. (2005)



(a) The movement generates electricity known as

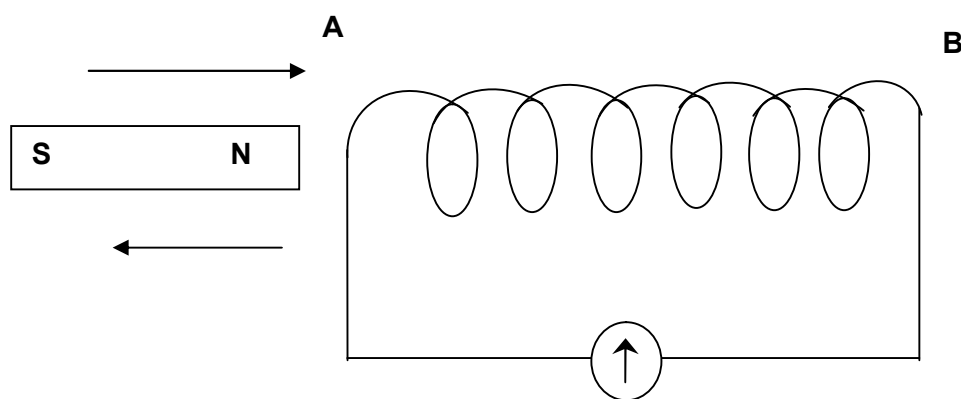
(b) The induced **emf** (voltage) in the circuit can be increased if:

- (i)
- (ii).....
- (iii).....

(c) Draw the graph below to show how **EMF** (Voltage) generated from the above apparatus varies with **time** if the magnet is pushed in and out of the coil **twice**.



4) A) In the figure below the bar magnet is pushed speedily *in* and *out* of the coil of about 40 turns which is connected to a galvanometer (2007)



Complete the sentences

- a) When the magnet is pushed in and pulled out of the coil, the pointer on the galvanometer will
- b) When the magnet is pushed into the coil, the induced magnetic field from the magnet will cause the end of the coil **A** to become a

- c) When the magnet is pulled out of the coil, the induced magnetic field from the magnet will cause the end of the coil A to become a:..... Pole
- d) To increase the electricity through the galvanometer we have to:
- i)
- ii)
- e) The name of the current induced is
- f) What will happen to the pointer on the galvanometer if the magnet remains Stationary inside the coil? The pointer on the galvanometer will

B). in a transformer,

- a). Why is soft iron used in the core of a transformer?

.....
.....

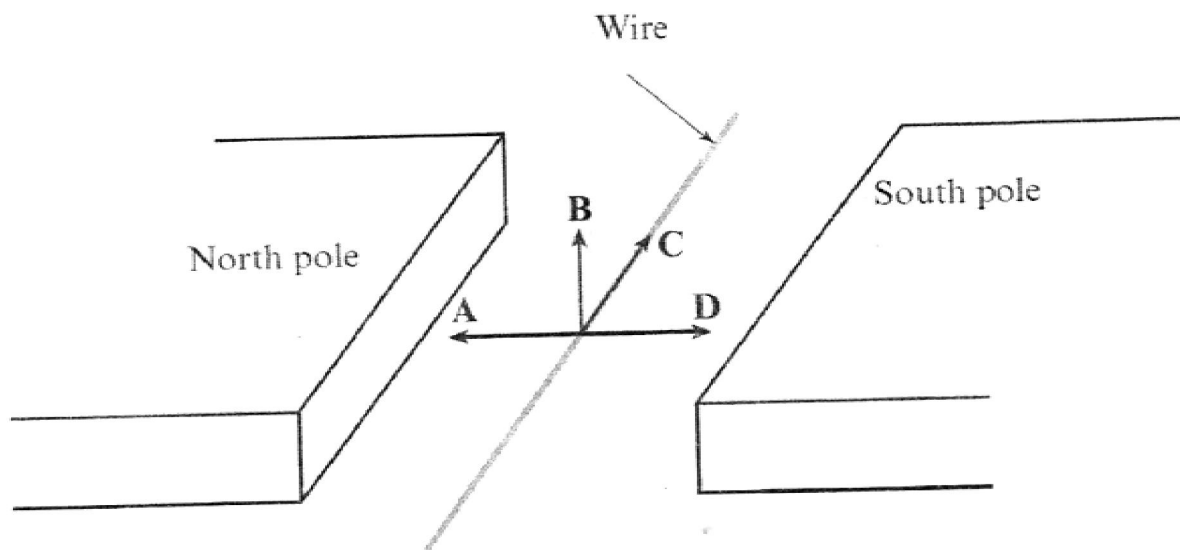
- b). Write down two uses of transformers.

- 1).....
2)

5) The strength of Emf and hence the size of induced current can be increased by: **(2004)**

- i)
- ii)
- iii)

- 6) The diagram shows a wire being moved between poles of a magnet (2011)



- a) Use the letters A, B, C or D to complete the follow

i. The direction of magnetic field is shown by the letter

.....

ii. To produce a current, the wire needs to be moved in direction

.....

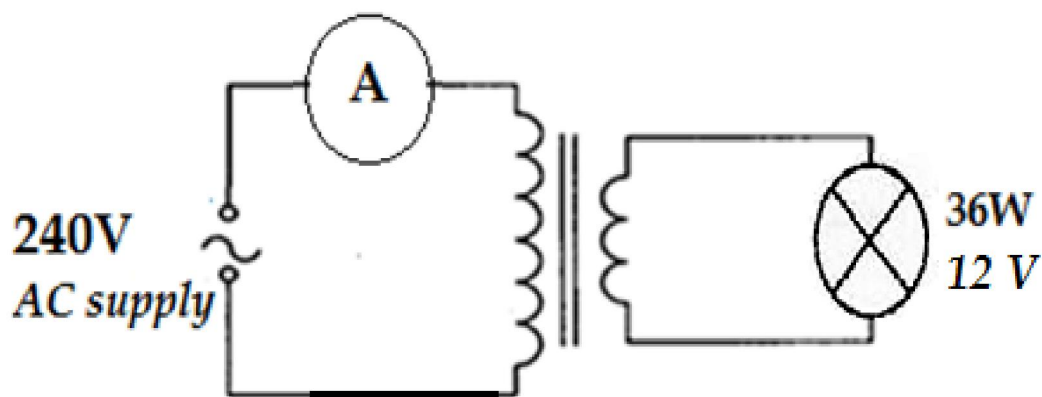
- b) State two ways that the current in the wire could be made bigger.

1.....

2.....

- 7) The figure shows a transformer being used to light up a lamp.

(2012)



a) Is the transformer step up or step down? Explain your answer

.....
.....

b) Work out the turn's ratio of the transformer windings

.....
.....

c) What the current does the lamp need to operate correctly?

.....
.....
.....

In electric power transmission, explain why it is preferable to transmit

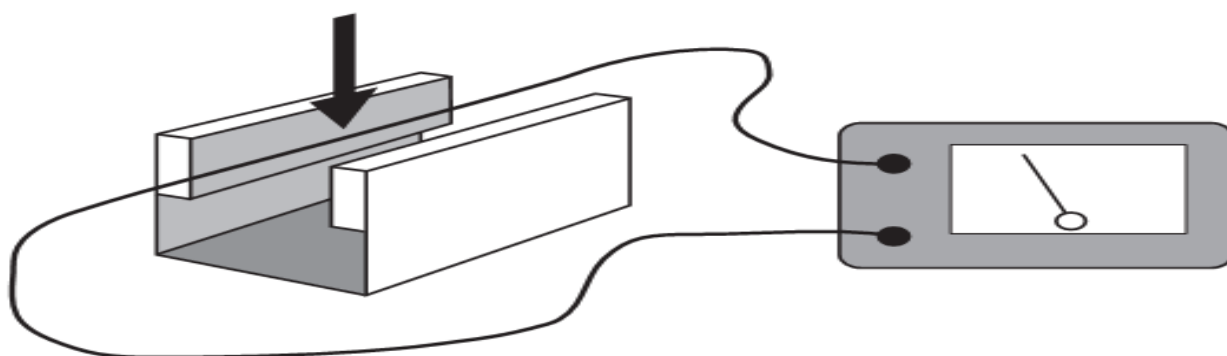
i. with high voltage and low current

.....
.....

ii. Using A.C rather than D.C

.....
.....

7. The diagram shows the apparatus used for investigating the current produced when a wire moves between the poles of a magnet. (2013)



When the wire moves down, the meter needle moves (deflects) to the left.

(a) Complete the sentences by underlining the correct choice in the brackets.

(i) The needle moves because a (**voltage** / current / resistance) flows through the wire.

(ii) The needle moves because as the wire moves down it cuts through **(the air / a magnetic field / an electric field)**.

(b) (i) State what happens to the meter needle if the wire moves down faster.

.....

(ii) State what happens to the meter needle when the wire moves up between the poles.

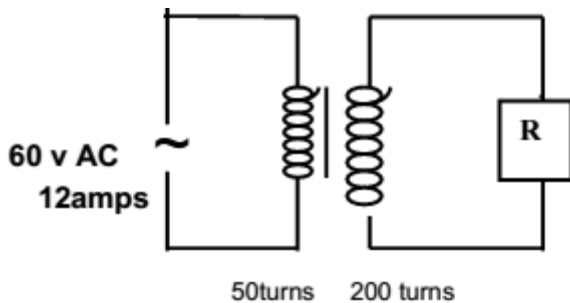
.....

(iii) State what happens to the meter needle if the wire is not moving between the poles.

.....

8. The circuit below represents a transformer and a resistance R

(2002)



Fill in the spaces

I. Is it a 'step down' or 'step up' transformer?

.....

II. The value of the current flowing through R is..... amps

III. The voltage across R is.....volts

IV. Give 2 examples where transformers are used.....

.....

.....

Unit 22:- Deforming solids

22.1 Multiple questions

1. Hook's law states that

(2009)

- a) Extension is directly proportional to applied force
- b) Clockwise moments equal to anticlockwise moments.
- c) For every action there is an equal and opposite reaction.
- d) Angle of incidence over the angle of refraction is a constant.

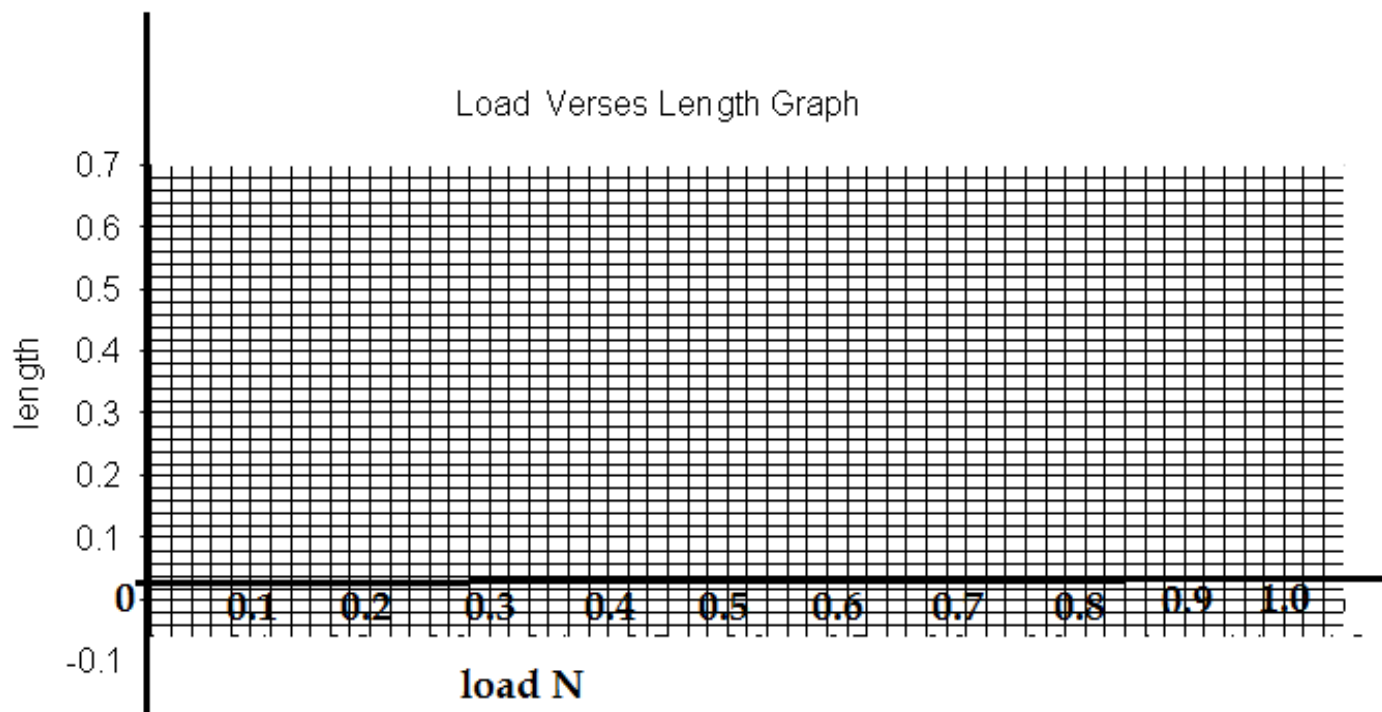
22.2- Structured of deforming solids

1. The following table gives you the resultant of an experiment to show how the length of a spring varies with the load attached at one end.

(2007)

Length in meters	0.28	0.35	0.42	0.54
Load in kilograms	0.25	0.46	0.73	1.04

a. plot a graph of the load length against load of the spring



b. what is the load on the spring when the length is 0.5m ?

.....

.....

c. what is the unloaded length of the spring

.....

2. a) Define stress (S)

(2002)

.....

.....

b) A mass hangs from a wire with radius R and stress S.

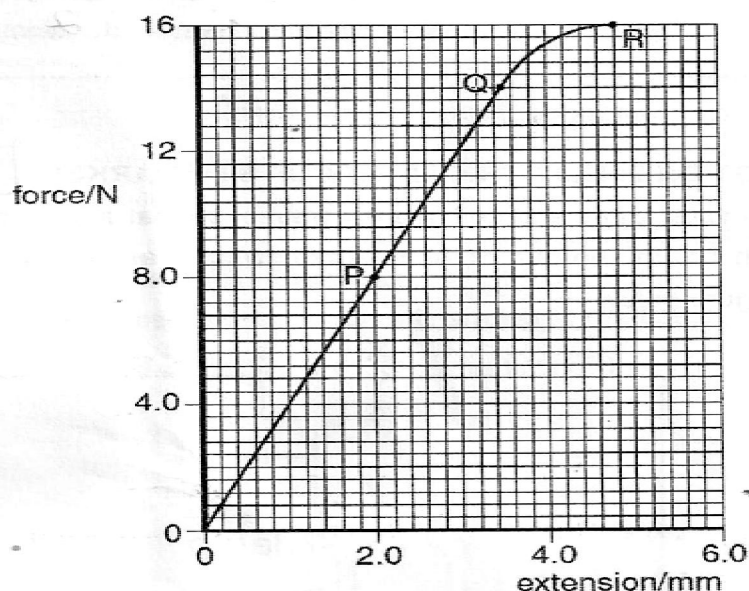
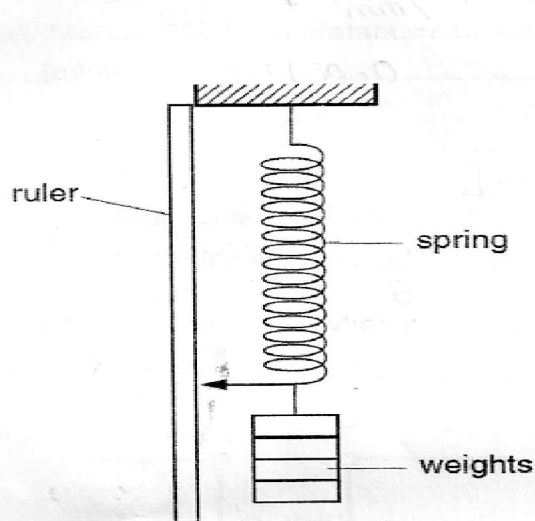
The same mass is hung from a wire of radius 2R but the same length. what is the value of the stress in the second wire in terms of S ?

.....

.....

.....

3. In an experiment, force are applied to a spring as shown in the figure. The result of this experiment are shown in the graph (2011)



- (a) what is the name given to the point marked Q on the graph?

.....

- (b) For the part OP of the graph, the spring obeys hook's law. State what this mean

.....

.....

.....

- (c) The spring is stretched until the force and extension are shown by the point R on the graph. Compare how the spring stretches, as shown by the part of the graph OQ, with that shown by QR

.....

.....

.....

- (d) The part of the graph shows the spring stretching according to the expression $F = Kx$. Use value from the graph to calculate the value of K

.....

.....

.....

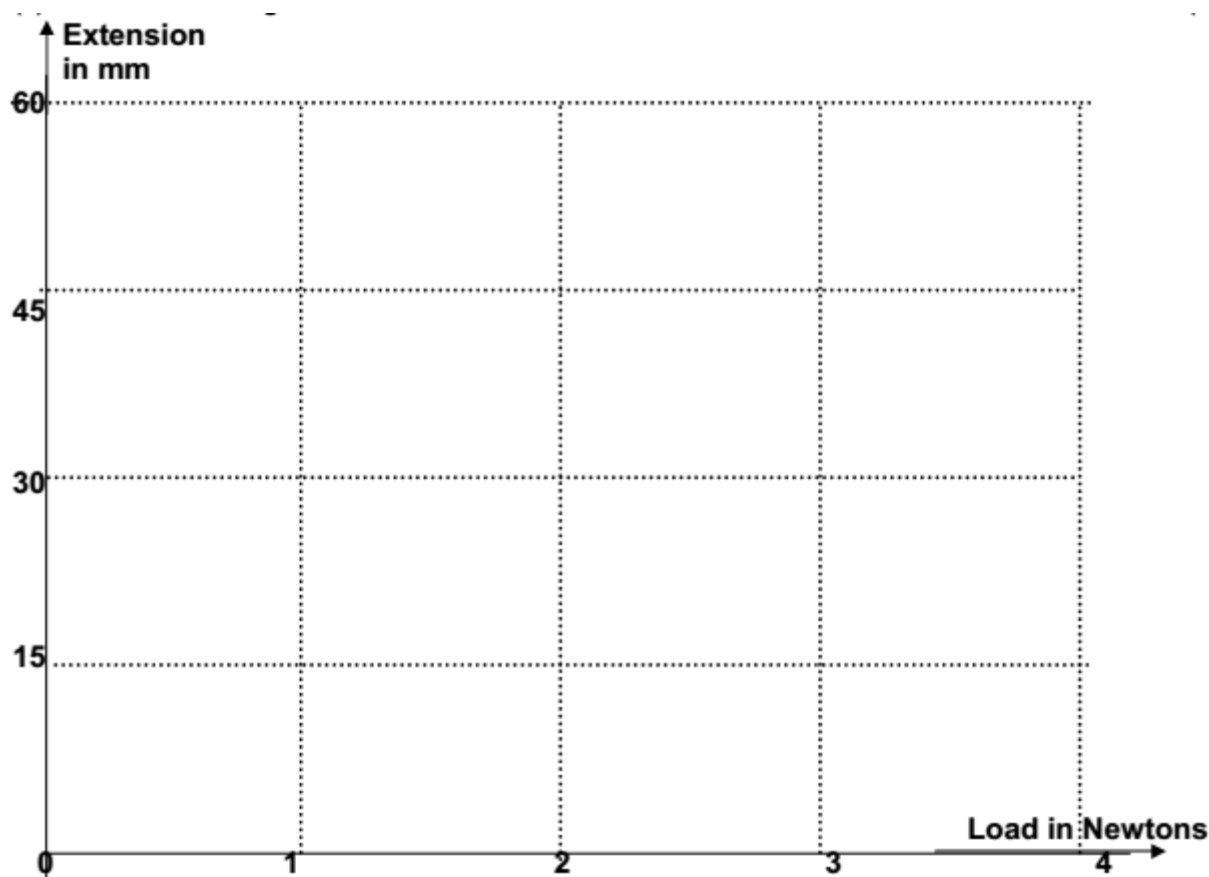
4. Weights of 1N each were attached to a spring hung from a clamp.

The results were recorded as follows.

(2003)

Extension mm	0	14	26	49	55
Load in Newtons	0	1	2	3	4

- Plot the points accurately on the graph below
- Draw a straight line of best fit.



(iii) Look at the graph, from it write down HOOKE's LAW (in your own words)

.....

.....

.....

Unit 23 Electronics

23.2- Structured questions

(2002)

1. A) Name one use of transistors
- B) Name one different use for semiconductors
-
- C) Explain why a transistor is placed in a circuit (your answer must be different from (A)) ?
.....
.....
.....

Unit 25. Answers

Unit 1: measurement and units.

1.1

1. D
2. B
3. B
4. C
5. D
6. C
7. B
8. C
9. A&C both are correct
10. A
11. C
12. B
13. D
14. B
15. C
16. C
17. C
18. B
19. C
20. B
21. A&C both are correct

1.2

1) **Step1**

Hang the mass on the spring balance and measure the mass in kilogram, you can find the mass **$M = \text{weight of mass}$**
10 N/Kg

Step2

Put the measuring cylinder under the opening of the Eureka can to collect overflow water (water displaced).

Step3

Put the mass inside the Eureka can; the mass displaces its volume of water in to the measuring cylinder. Then record the volume of displaced water from measuring cylinder to get the volume of stone.

Step4

Divide the mass of the mass in Kg to the volume of the mass (m^3).

Density = Mass (in kg) / Volume (in m^3).

2) $36 \text{ km/h} \times \frac{5}{18} = 10 \text{ m/s.}$

3)

i) $D = M/V$

ii) 1kg of water has less dense than 1kg of iron cube.

4)

Quantity	SI. Unit	Symbol
Length	Meter	M
	kilogram	Kg
Electric current	Ampere	A
Force	Newton	N
Charge	Coulomb	C
Temperature	Kelvin	K

5)

- a. 0.125
- b. 100
- c. 1201
- d. 38 mm

Unit 2: Force

2.1

- 1. C
- 2. B
- 3. D

Unit 3: Motion

3.2

- 1.
 - a) $360 \text{ km/h} \times \frac{5}{18} = 100 \text{ m/s}$
 - b) $S = vt = 100 \times 6.25 = 625 \text{ m}$

Unit 4: Energy

4.1

- 1. A
- 2. A
- 3. D
- 4. C
- 5. D
- 6. B

4.2

- 1.
 - internal....potential.....potential.....
 - kinetic.....kinetic.....sound.....heat
- 2.
 - a. chemical, light, heat.
 - b. kinetic, potential.
 - c. geothermal.

Unit 5: Properties of matter

5.1

- 1. C
- 2. C
- 3. C
- 4. C
- 5. C
- 6. C

Unit 6: Heat and Temperature

6.1

- 1. A
- 2. B
- 3. A
- 4. C
- 5. D
- 6. A
- 7. A&D both
- 8. B
- 9. C
- 10. C
- 11. A
- 12. B
- 13. A

6.2

- 1.
 - a. Conduction & Convection

b.

BOILING	EVAPORATION
i. <i>has a definite temperature</i>	i. <i>occurs at all temperature</i>
ii. <i>occurs with in the liquid</i>	ii. <i>occurs at the surface</i>
iii. <i>bubbles form in the liquid</i>	iii. <i>no bubbles form in the liquid</i>

c. $E = \infty L \Delta T = 0.00003 \times 5 \times 80 = 0.012 \text{ m}$

2.

- a. Firstly heat passes through the beaker by conduction.
Secondly heat passes through the water and reaches to the top by convection.

b.

- i. Land breeze
- ii. Night
- iii. Different pressure between two places. (air flowing from high pressure into a low pressure)

c.

(i).

A= stopper/cork/Lid

B= vacuum

C=double glass silvered walls

- (ii). **A**= prevents heat loss by convection & evaporation (it also prevents heat loss by conduction since it is made up a plastic)

B= prevents heat loss by both conduction & convection.

C= prevents heat loss by radiation.

3. a.

- i. conduction
- ii. Radiation

b.

- i. B
- ii. Increase

iii. Increase

iv. Molecules of air in bulb B are moving faster than air molecules in bulb A.

6.3 =

1.

a. Conduction

is the movement of heat through a material without carrying any of the particle with it. In a conduction heat is transferred by a vibrating particles; for example heat from fire travels through a metal spoon by conduction.

b. Convection

Is a movement of heat through the flowing particles..In convection heat is transferred by a moving particles. In this process heat travels through fluids only. for example heat from an electric radiator warm the air in the room by convection

2.

a. Green house effect

Greenhouse effect is the retention of the heat by the greenhouses gases on the surface of the Earth, allowing the planet's temperature to rise.

Causes

Increase of greenhouse gases, mining, combustion of fossil fuels, deforestation, population, global warming, etc.

b. Global warming

Global warming is when the average temperature of the Earth's atmosphere and the oceans rise..

Causes

Combustion of fossil fuels,
pollution, mining, deforestation,
population, etc

Unit 7: Magnetism

7.1

- 1) A
- 2) C
- 3) D
- 4) B
- 5) A
- 6) B
- 7) D
- 8) A
- 9) B
- 10) B
- 11) A
- 12) B

7.2

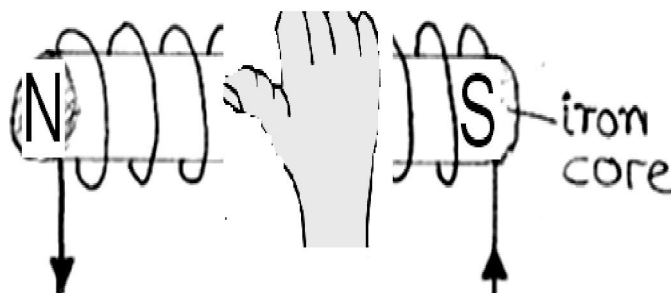
- 1) (a)

Reason 1:- Soft iron is a magnetically soft, it magnetizes and demagnetizes easily.

Reason 2:- iron increases the strength of electromagnet.

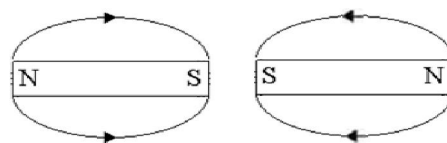
- (b) N-S-N-S-S-N

- 2) (a)



- (b) Magnetized
- (c) Electromagnet.
- (d) Magnetism.

- 3) (a)



- (b)

- 1- Circuit breaker.
- 2- Relay switch.

- 4)

- a) B
- b) Loses its magnetism.
- c) it will be harder to demagnetize or lose its magnetism easily.
- d) (i) increasing current.
(ii) Increasing number of turns of coil.
- e) (i) An electric bell.
(ii) Relay switch

5.

- a) (i) C= contact screw
(ii) D= gong/Bell
(iii) E= Electromagnet.

b)

- (i) iron
(ii) it magnetizes and demagnetizes easily as current is turned on and off.

c) (i) As switch **S** is closed current flows through the electromagnet, the electromagnet attracts the armature **B** and hammer hits the gong; the contact **C** open, circuit breaks and the armature springs back remaking the contact.

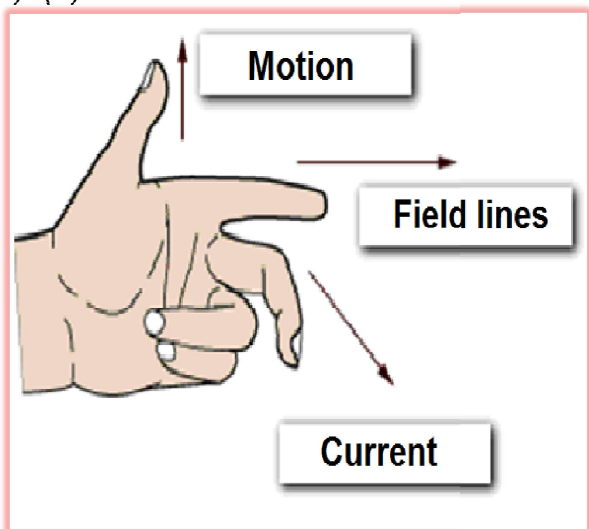
- (ii) 1. Increasing number of turns of coil.
2. Increasing the current

6). 1- increasing the current.

2- Increasing the number of turns of coil.

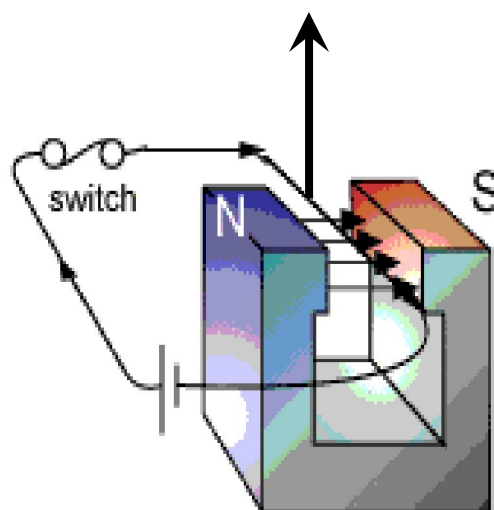
3- Using strong magnet.

7) (a)



(b)

i)



ii) 1- increasing current.

2- Increasing length of wire in a magnetic field.

iii) Reversing direction of current.

Unit 8: force, moment and pressure

8.1

1. B
2. B
3. C
4. D
5. D
6. A

8.2 -

1.

a.

- i. force per unit area
- ii. Pascal (pa) or N/m^2 .
- iii. sharpen knife has a smaller area of contact and produces greater pressure

b.

- i. oil
- ii. incompressible

c.

$$i. P_1 = \frac{F}{A} = \frac{15}{0.025} = 600 \text{ pa}$$

$$ii. P_1 = P_2 = 600 \text{ pa}$$

$$iii. F = P_2 A = 600 \times 0.5 = 300 \text{ N}$$

2.

a.

i. force per unit area

ii. pascal

b.

i. vacuum cleaner

ii. sucking a straw

$$c. P = \rho gh = 1000 \times 10 \times 10 = 100,000 \text{ pa}$$

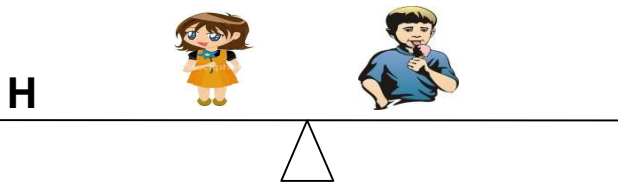
3.

$$i. W = mg = 55 \times 9.8 = 539 \text{ N}$$

$$ii. W = mg = 55 \times 26 = 1430 \text{ N}$$

$$iii. 55 \text{ kg}$$

4.



5.

a) is a force that opposes the motion of the object

b)

i. braking of cars
And walking

ii. Moving parts of machines,
Steering and wheels of cars

c) 18 m (motion)

6. Pressure increases with depth

7. Ladies high heel shoes has smaller area of contact with the floor, which produces greater pressure acting on floor

8. The large feet have a largest area of contact with the ground which reduces the pressure it acts on the ground.

9.

a) they reduce the frictional force

b) the same

c) a= unstable

b= neutral

c=stable

d) turning force lowers its center of gravity of shape A

10.

a) i. pressure is inversely proportional to the Area.

ii. B, it has a smaller area of contact with the ground

b) 1.Foundation base walls of the dam

2. Large tyres of a tractor

c) C, pressure increases with depth.

8.3

1.

$$a) i) m = \frac{48 \times (0.25 + 0.5) \text{ kg}}{48}$$

$$= 0.75 \text{ kg}$$

$$ii) w = mg = 0.75 \times 10 = 7.5 \text{ N}$$

b) The sum of clockwise moment equals the sum of anti clockwise moment.

Unit 9: Quantity of heat

9.1

1. A
2. A
3. D
4. B
5. C
6. C
7. C
8. B
9. C
10. B
11. C
12. B
13. B

9.2

1. a. The molecules/particles of air are constant randomly motion and move with a higher speed colliding the walls of the tyre continuously in all directions which exerts pressure on the tyre.

b. i. $17^{\circ}\text{C} + 273 = 290\text{k}$

$27^{\circ}\text{C} + 273 = 300\text{k}$

iii. $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$P_2 = \frac{P_1 V_1 T_2}{V_2 T_1}$$

$$= \frac{1\text{atm} \times 290 \times 300}{20 \times 290}$$

$= 15 \text{ atm}$

(a) Water absorbs heat better than aluminum. It has a greater rate of thermal absorption, which is due to **hydrogen bonding**, which increases intermolecular forces between molecules.

2.

(b) (i) 400 boiling point

200 Melting point

(ii) Between 5 sec to 10 sec

3. The volume of air in E decreases while the pressure of the air increases

4. a.

- i. specific heat capacity
- ii. water has the higher specific capacity than the aluminum

b. latent heat of fusion.

5. $V_1 = 35\text{cm}^3$

$P_1 = 200\text{PA}$

$T_1 = 7^{\circ}\text{C} + 273 = 280\text{K}$

$V_2 = 20\text{cm}^3$

$P_2 = ?$

$T_2 = 27^{\circ}\text{C} + 273 = 300\text{K}$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$P_2 = \frac{P_1 V_1 T_2}{V_2 T_1}$$

$$= \frac{200 \times 35 \times 300}{20 \times 280} = \frac{25 \times 15}{2} =$$

$$= 187.5 \text{ KPa}$$

6. a. L_f = Specific latent heat of fusion.

b. $Q = mL_f$

$= 5 \times 340,00 = 1700,000 \text{ J}$

7. a. The hot energetic molecules of sweat evaporates and takes latent heat away from his body

b. the air pressure is less on a top of mountain.

c. $Q = mL_v$

$$= 5 \times 23 \times 10^5$$

$$= 1.15 \times 10^7 \text{ J}$$

d. As subag freezes its volume increases, expands in a glass bottle which leads the bottle to break down.

8. a.

i. A= ice is melting

B= water is heating up their temperature rises

C= water is boiling or evaporating.

ii. When ice starts to melt, its volume decreases up to the temperature of 4°C ; where water has a minimum volume. As the temperature rises above 4°C water expands and volume increases

b. $Q = mc\Delta t + mL_f$

$$= 3(4200 \times 5 + 3.36 \times 10^5)$$

$$= 3(2100 + 336000)$$

$$= 3(338100)$$

$$= 1014300 \text{ J}$$

9.

a. A=Boiling point

B=Melting point

C=Solid

D=Gas

E=Liquid

b. $Q_G = Q_L$

$$m_1 (T_2 - T_1) = m_2 (T_1 - T_2)$$

$$m_1 = \frac{m_2 (T_1 - T_2)}{(T_2 - T_1)}$$

$$= \frac{60(80 - 50)}{50 - 10} = \frac{60 \times 30}{40} = 45 \text{ Kg}$$

10. a. (i)

1. 20°C

2. 15°C

(ii) More heat lost at higher temperature

$$\text{b. Heat in} = p t = 60 \times 210 = 12600 \text{ (J)}$$

$$\text{Heat in water} = mc\Delta t = 75 \times c \times 40$$

$$C = \frac{12600}{75 \times 40} = 4.2 \text{ J/g } ^\circ\text{C}$$

11. a.

i. C

ii. B

iii. A

iv. D

b. i. Specific latent heat of fusion

$$\text{ii. } Q = m (L_f + C\Delta T)$$

$$= 0.5(334000 + 2100 \times 30)$$

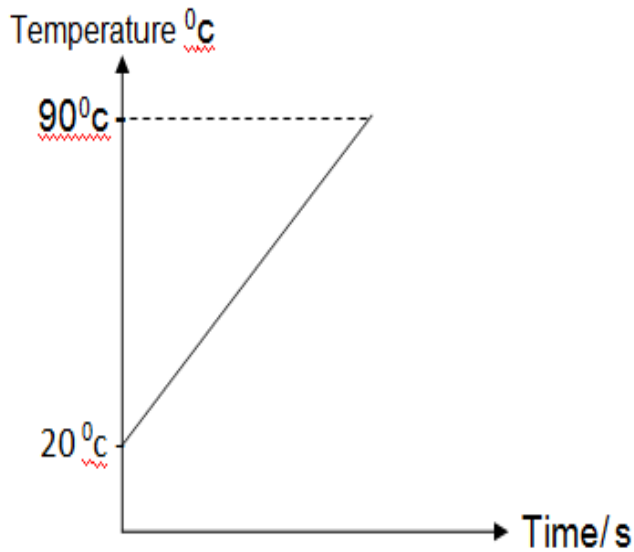
$$= 0.5(334000 + 63000)$$

$$= 0.5(397000) = 198500 \text{ J}$$

12.

$$\text{a. } Q = mc\Delta T = 1 \times 4200 \times 70 = 294000 \text{ J}$$

b.



- c. Salt increases the boiling point of the water
- d. Increases the boiling point of water.

Unit 10: Electrostatics

10.1

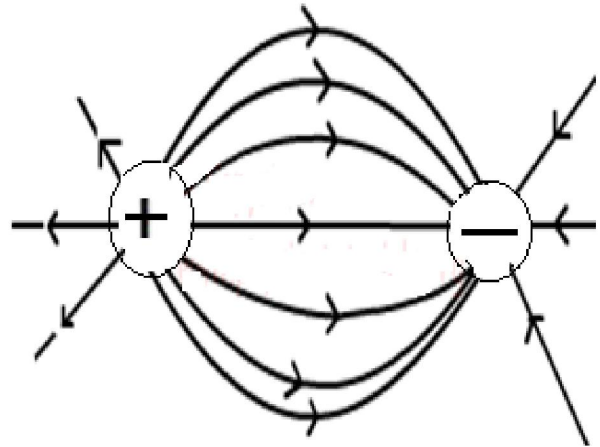
1. D
2. C
3. D
4. C
5. D
6. B

10.2

1. a)

- i. Is the substance that doesn't allow electric charge to pass through it.
- ii. Is Substance that allows electric charge to pass through it.

b)

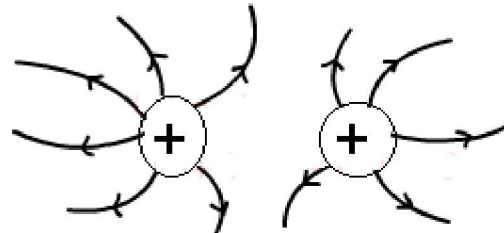


c.

- i. spraying paint for cars
- ii. Photocopying machines

- d) i. lightning
ii. Operating theaters

2. a)



- b) Is the force per unit charge
- c) decrease
- d) photocopy machines

3.

a) Charge.....greater.....faraday.....

Two parallel metal plates separated by an insulator called dielectric.

b) $Q = CV = 12\mu\text{F} \times 3\text{V} = 36\mu\text{C}$

4. a.

i) Plastic rod loses electrons while the cloth gains electrons

ii) Negative charge

b. Electroscope

c.

i. Radio/TV/CD players

ii. $1.2 \mu\text{F}$

iii. $7.2 \mu\text{C}$

5. (a)

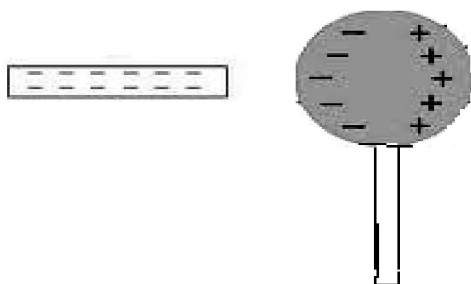
i. Painting cars

ii. photocopying machines

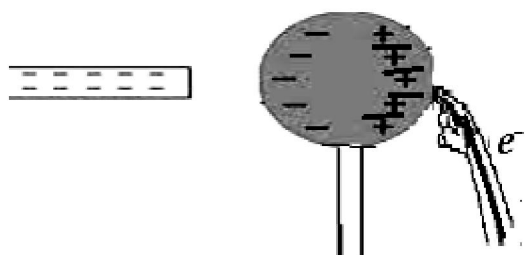
(b) The glass window become charged and attracts small dust particles after being rubbed with a cloth.

6. (a).

i.



ii.



Electrons enter sphere from ground, attracted to the +charge in the sphere

iii. Negative charge

iv. Induction

b. Earth

c. flue ash precipitation
And ink-jet printers

d. Device stores an electric charge and energy.

e. $C_T = C_1 + C_2 = 5 \mu\text{F}$

Unit 11: Electricity

11.1

1. B

2. A

3. D

4. C

5. D

6. D

7. A

8. C

9. B

10. C

11. A

12. B

13. C

14. B

15. A

16. C

17. D

18. D

19. D

20. C

21. A

22. C

23. B

24. B

11.2

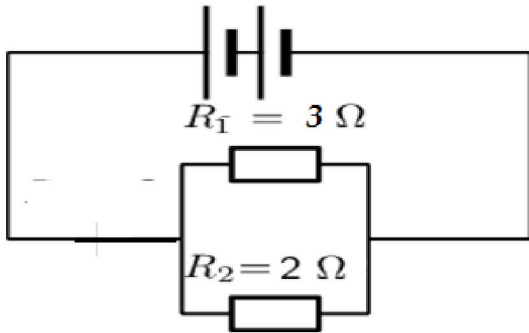
1.

a) Electrical resistance against their flow.

b) Batteries

c) Increases Decreases

d)



e)

$$R_T = \frac{R_1 R_2}{R_1 + R_2} = \frac{3 \times 2}{3 + 2} = \frac{6}{5} = 1.2 \Omega$$

f) $I = \frac{V_T}{R_T} = \frac{12V}{1.2} = 10 A$

g) To control independently.
To keep their working if one lamp was removed or blows

2. 0.8amp.....true..... 5Ω

3. a)

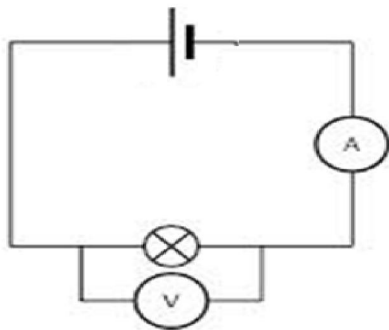
- Electrical energy
- Light energy
- Heat energy.

b) Ammeter.

c) Decrease.

d) **B** = Total resistance decrease.

4. a)



b) Ampere..... Ammeter

c) i. $R_p = \frac{R_1 R_2}{R_1 + R_2} = \frac{3 \times 2}{3 + 2} = \frac{6}{5} = 1.2 \Omega$

ii. $R_T = R_p + R_3$
 $= 2.8 \Omega + 1.2 \Omega = 4 \Omega$

iii. $I = \frac{V}{R_T} = \frac{12V}{4} = 3A.$

5.

a)

i. Series

ii. Series

iii. The **resistance** of the lamps is increased by the ammeter connected parallel.

b) $R = \frac{V}{I} = \frac{4.5V}{0.9} = 5\Omega$

c) $P = I^2 R$

d) $P = I^2 R$

$= (0.9)^2 \times 5 = 0.81 \times 5 = 4.05 W$

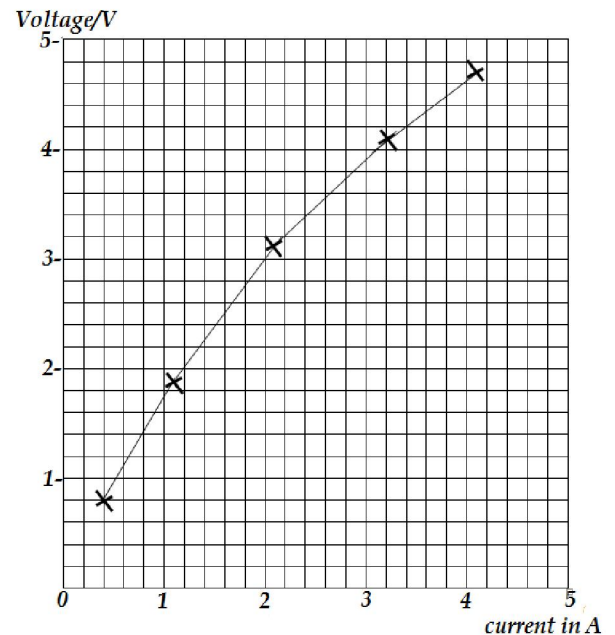
6.

a)

- i. Changing the resistance of variable resistor
- ii. Changing the length of carbon rod.

b)

i.



i. 2.4V

ii. $R = \frac{V}{I} = \frac{2.4V}{1.5} = 1.6 \Omega$

7.

a. Fuse.

b. To prevent excessive current.

c.

- i. Green and yellow wire is connected to the fuse
- ii. Brown wire is connected to the earth pin.

d.

- i. Live (brown)
- ii. Neutral (Blue).

- It is double insulated

e. Cost = $P(KW) \times t(h) \times \text{cost per unit}$

$$= 0.5 \times 5 \times 2.5$$

$$= \$6.25$$

8.

$$\begin{aligned} \text{a. } R_T &= R_p + R_3 \\ &= \frac{R_1 R_2}{R_1 + R_2} + R_3 \\ &= \frac{8 \times 24}{8 + 24} + 6 \\ &= 6 + 6 = 12 \Omega \end{aligned}$$

$$\text{b. } I = \frac{V}{R_T} = \frac{24V}{12} = 2 \text{ A}$$

$$\begin{aligned} \text{c. } V &= V_P - V_3 = 24 - (2 \times 6) \\ &= 24 - 12 = 12 \text{ V} \end{aligned}$$

$$\text{d. } I = \frac{V_{AB}}{R_2} = \frac{12V}{24} = 0.5 \text{ A}$$

$$\text{e. } Q = It = 2 \times 20 = 40 \text{ C}$$

9.

$$\text{a. } R_p = \frac{L_2 L_3}{L_2 + L_3} = \frac{10 \times 10}{10 + 10} = \frac{100}{20} = 5 \Omega$$

$$\begin{aligned} \text{b. } R_T &= R_p + L_1 \\ &= 5 \Omega + 10 \Omega \\ &= 15 \Omega \end{aligned}$$

$$\text{c. } I_1 = \frac{V}{R_T} = \frac{6V}{15} = 0.4 \text{ A}$$

d. Potential difference across XY

$$V = IR = 0.4 \times 10 = 4 \text{ V}$$

e. $V_p = 6 \text{ V} - 4 \text{ V} = 2 \text{ V}$; therefore

$$I_3 = \frac{V_p}{R_3} = \frac{2 \text{ V}}{10} = 0.2 \text{ A}$$

10.

$$\text{a. } R_T = \frac{R_1 R_2}{R_1 + R_2} = \frac{20 \times 30}{20 + 30} = \frac{600}{50} = 12 \Omega$$

$$\text{b. } I = \frac{V}{R_T} = \frac{12V}{20} = 0.6 \text{ A}$$

$$\text{c. } P = \frac{V^2}{R} = \frac{(12)^2}{30} = \frac{144}{30} = 4.8 \text{ W}$$

b. Energy given to each coulomb of charge by the battery

c. **Direct current** = current flows only one path

Alternating current = current that changes its direction continuously by a frequency of 50Hz

$$\text{d. } P.d = 12 \text{ V}$$

11.

a. A

b. B

c. $I = \frac{V}{R} = \frac{6}{4} = 1.5A$

d. Connection 2

Reason1: If one bulb blows up, the other bulb keep working

Reason 2: Each bulb may have its own switch, and can be controlled independently.

12.

a. $7340 - 6840 = 500 \text{ Kwh}$

b. $500 \text{ Kwh} \rightarrow 450$

$1 \text{ kwh} \rightarrow ?$

$\text{Cost} = \frac{450}{500} = 0.9 \$$

11.3

1.

a. $V = IR = 4 \times 60 = 240 \text{ V}$

b. $P = IV = 4 \times 240 = 960 \text{ W}$

c. $E = VIt = 960 \times 5 \times 60$
 $= 960 \times 300 = 288000 \text{ J}$

2.

a)

i. A = neutral wire

ii. B = earth wire

iii. C = live wire

b.

A = Blue

B = Green/Yellow

C = Brown

c.

i. Fuse

ii. To prevent excessive current flowing in the circuit.

iii. As the current flowing in the circuit rises to high the thin wire in the fuse melts before the other wires in the circuit heat up dangerously and breaks the circuit.

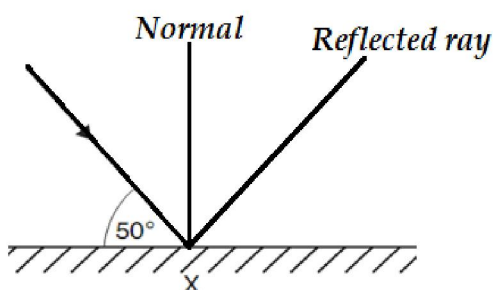
Unit12:Light

12.1

1. B
2. A
3. A
4. C
5. C
6. B
7. C
8. D
9. B
10. C
11. D
12. E
13. C
14. B
15. C
16. C
17. C

12.2

1. a. i.



ii.

- 1) 40°
- 2) 40°

b.

- i) D
- ii) C
- iii) A
- iv) optical fibers

2. a)

1. The incident ray, the reflected ray and the normal are all lie on same plane.
2. the angle of incidence i° equals the angle of reflection r°

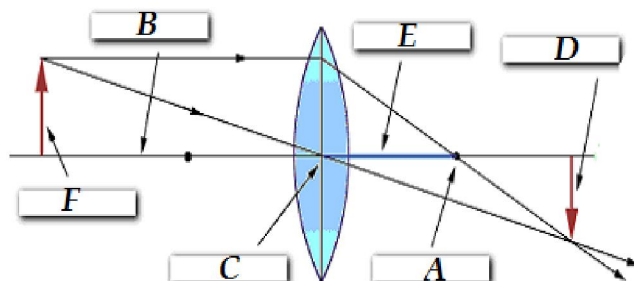
b)



c) Only red light is transmitted and all other colors are absorbed by the filter.

$$d) v = \frac{u F}{u - F} = \frac{20 \times 15}{20 - 15} = 60 \text{ cm.}$$

3. a)

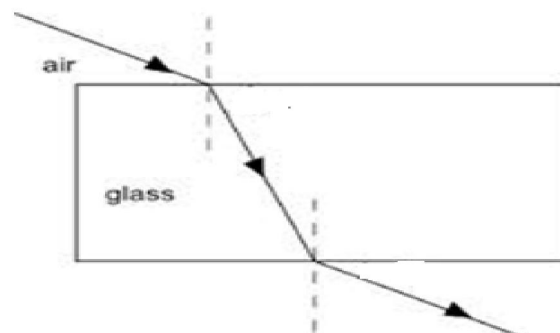


b) Convex

$$c) v = \frac{u F}{u - F} = \frac{20 \times 15}{20 - 15} = 60 \text{ cm.}$$

d) Real

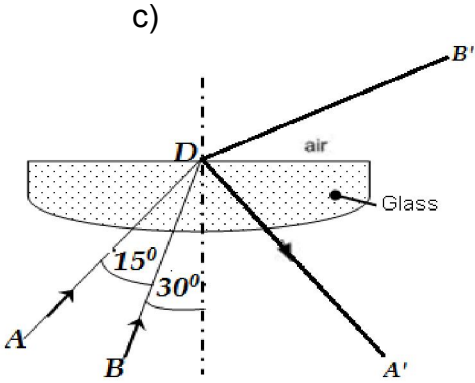
4. a)



b)

- i. The incident, refracted and normal all lie on same plane.
- ii. Snell's law: The ratio of sine of angle of incidence to the sine of angle of refraction is constant

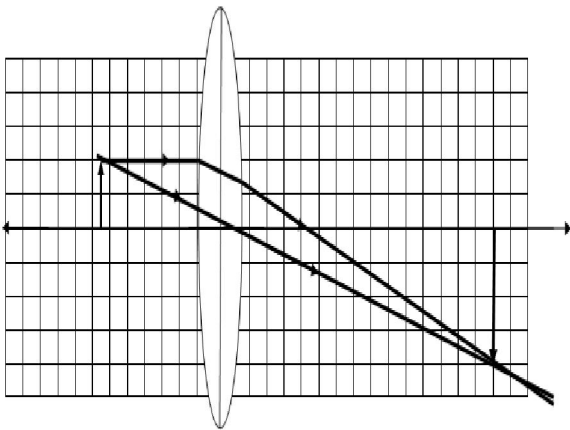
$$\sin i^\circ / \sin r^\circ = \text{constant}$$



- i. 45° total internal reflection occurs then $i^\circ = r^\circ$.

d) $r^\circ = \sin^{-1} 0.75$

5. a.



- i) real
ii) inverted

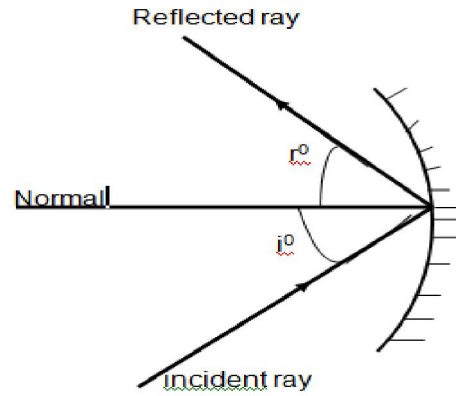
b.

- i. 15 cm

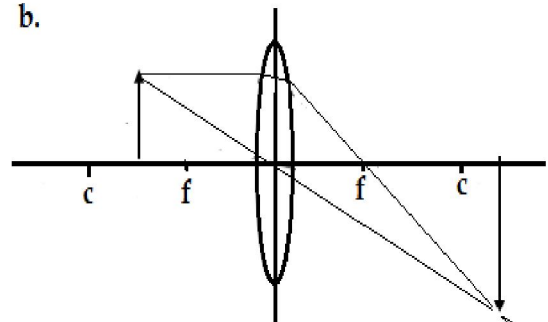
ii. $M = \frac{V}{u} = \frac{15}{7.5} = 2$

c. Projector

6. a)



b.

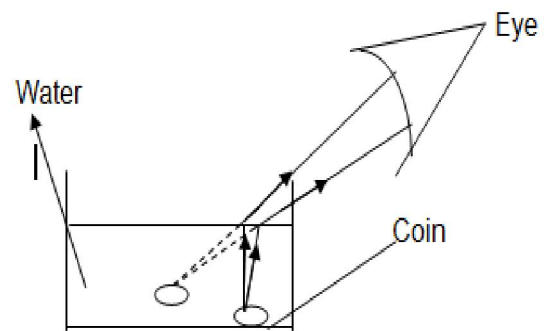


c)

Yellow

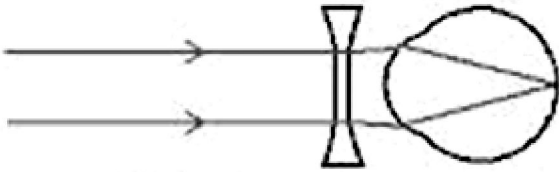
d) Absorbs.....reflects

7. a)

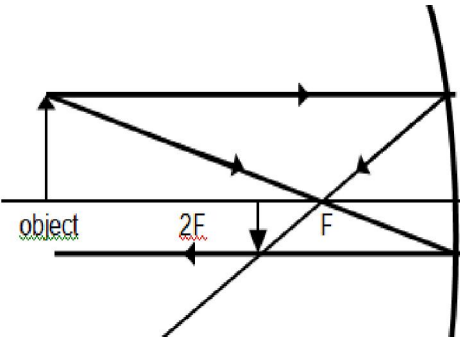


b) Apparent depth = $\frac{\text{Real depth}}{n}$
 $= \frac{8 \text{ m}}{1.33} = 6 \text{ m}$

c)

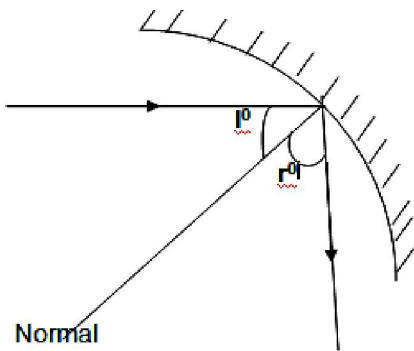


d)

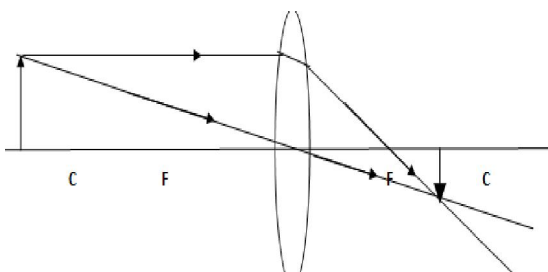


8. a) prism.....spectrum...dispersion,
least...most...absorbs.....reflects

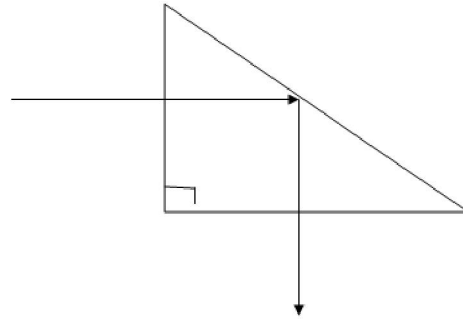
b)



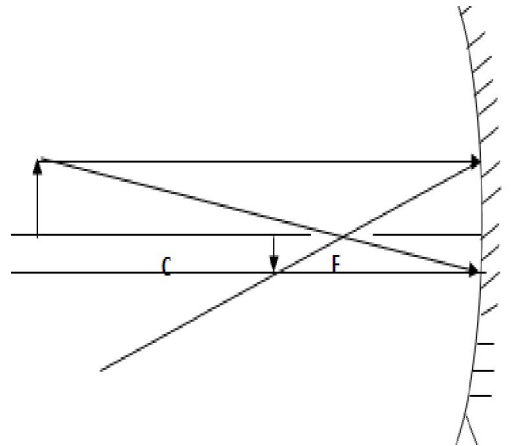
c)



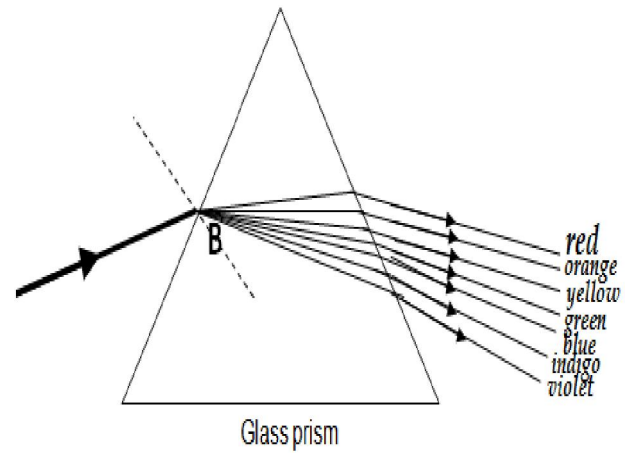
d)



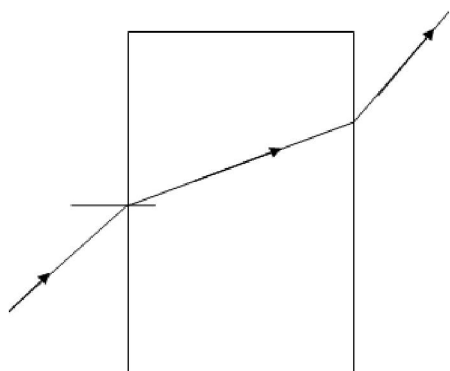
9. a)



10.



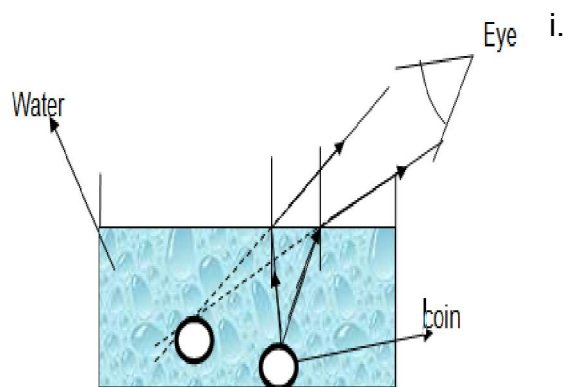
11. a)



i. refraction

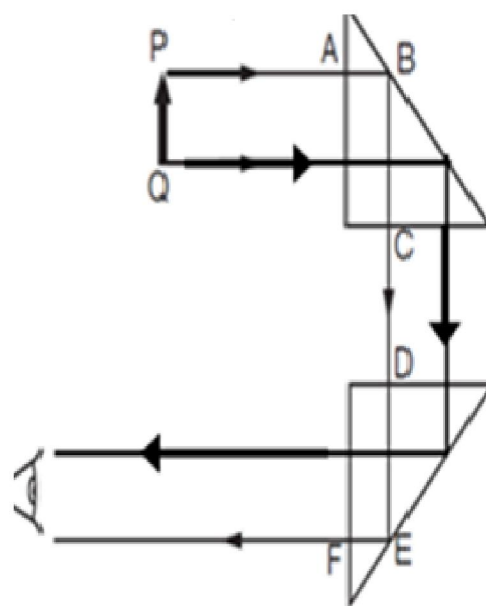
ii. $V = \frac{c}{n} = \frac{3 \times 10^8 \text{ m/s}}{1.5} = 2 \times 10^8 \text{ m/s}$

b)



ii. Virtual. it forms where virtual extended backward rays appear to come from.

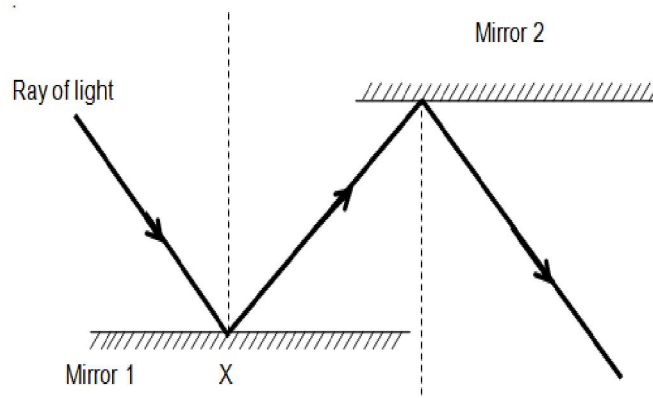
12. a)



b) Real and inverted

c) The ray enters perpendicularly/at right angle at the points A,C,D and F

(d)



(b) parallel to the incident ray of mirror 1

13.

$$\begin{aligned} \text{a) } S_i &= \frac{S_o \times F}{S_o - F} \\ &= \frac{15 \times 10}{15 - 10} = \frac{150}{5} = 30 \text{ cm} \end{aligned}$$

$$\text{b) } M = \frac{S_i}{S_o} = \frac{30 \text{ cm}}{15 \text{ cm}} = 2$$

$$\begin{aligned} \text{c) } h_i &= M \times H_o \\ &= 2 \times 2 \text{ cm} = 4 \text{ cm} \end{aligned}$$

Unit 13: Sound

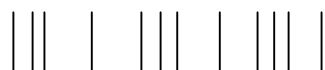
13.1

- 1) B
- 2) C
- 3) A
- 4) C
- 5) D
- 6) C
- 7) C

13.2.

- 1)
 - a) C
 - b) Close together

- 2)
 - a) Energy.....vibrating.....medium
 - b) C R C R C R



- c) Short...frequency.....amplitude

3)

- a) Is the motion that the particles of the medium vibrate parallel to the direction of wave motion
- b) Is a region where the particles of the air move further apart and have a lower pressure.
- c)
 - a. Light travels faster than sound
 - b. $S = v t = 340 \times 0.4 = 136 \text{ m}$
- d)
 - a. It is above audible range
 - b. They reflect back
 - c. 1. Ultrasound is harmless where X-rays is harmful and damages the growing cells of the babies
 2. X-rays ionizes the human cells but ultrasound does not

4)

- a)
 - (i) X-rays kills and destroys the human tissues where ultrasound is harmless.
 - (ii) X- rays are very penetrative and do not show the image of soft tissues.
 - (iii) The production of ultrasound is easier than the production of X-rays.

$$\text{b) } S = \frac{vt}{2} = \frac{1440 \times 16}{2} = 11520 \text{ m}$$

- c) It is a mechanical wave and needs a material to travel through.

5)

a)

- i. The speed of light is faster than the speed of sound

ii. $V = \frac{S}{T} = \frac{1000\text{m}}{3} = 333.3 \text{ m/s}$

b)

i. $S = \frac{vt}{2} = \frac{333.3 \times 4}{2} = 666.6\text{m}$

- ii. 1. Echo-sounder in ships,
2. Bats and dolphins.

6)

a)

- i. Sound travels slower than light
ii. Heat & electrical
iii. The particles of air vibrate parallel to the direction of sound motion forming series regions of compression and rarefaction in air.

c) 1400 m (From the graph)

7)

a)

- i. Mountain/ Cliff

ii. $S = \frac{vt}{2} = \frac{320 \times 3}{2} = 480 \text{ m}$

b)

- i. It has a frequency above audible range

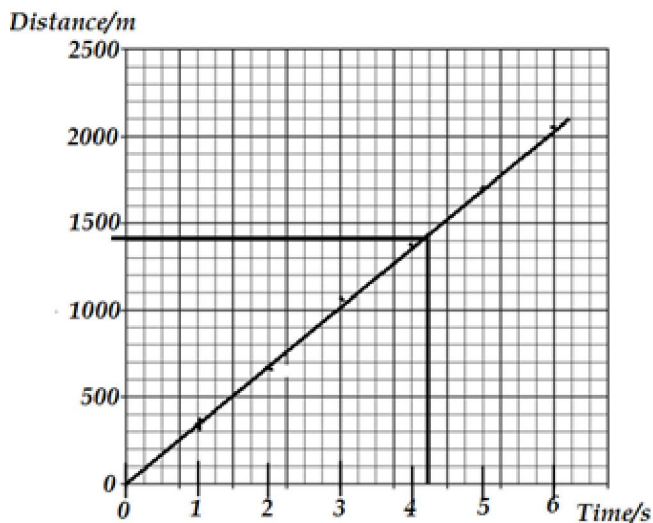
ii. $S = 1500 \times 1.5 = 2250 \text{ m}$

c) Cleaning.

b.

Time elapsed in seconds	0	1	2	3	4	5
Distance traveled in meters	0	340	680	1020	1360	1700

(i)



Unit 14: Kinematics

14.1

1. C
2. A
3. D
4. D
5. B
6. B
7. D

14.2

1)

(a) **Velocity**: - is the rate of change of displacement,

(b) **Acceleration**: - is the rate of change of velocity.

B)

(a) $a = \frac{\Delta V}{\Delta t} = \frac{40}{2} = 20 \text{ m/s}^2$

(b) 40 m/s

(c) 4 sec

(d) $S = \text{Area of trapezium}$

$$= \frac{1}{2} h (a+b)$$

$$= \frac{1}{2} 40(10+16)$$

$$= 20 \times 26$$

$$= 520 \text{ m.}$$

(e) Average velocity =

$$= \frac{\text{Total displacement}}{\text{Time taken}}$$

$$= \frac{520}{16} = 32.2 \text{ m/s}$$

2)

A) scalar.....magnitude and direction

displacement.....direction.....center

B) .

- i. 10m/s
- ii. $a = \frac{\Delta V}{\Delta t} = \frac{10}{2} = 5 \text{ m/s}^2$
- iii. 0 m/s^2
- iv. QR
- v. $S = lb = 3 \times 20 = 60 \text{ m}$

3) a)

- i. constant acceleration
constant velocity..
retardation.

(ii) $S_{oc} = \frac{1}{2} h (a + b)$

$$= \frac{1}{2} 30(2+5)$$

$$= 15 \times 7 = 105 \text{ m}$$

(iii) Acceleration = $\frac{\Delta V}{\Delta t} = \frac{30}{2} = 15 \text{ m/s}^2$

Retardation (or deceleration)

$$a = \frac{\Delta V}{\Delta t} = \frac{-30}{1} = -30 \text{ m/s}^2$$

4) .

a) 0.6 sec

b) 1.8 sec

c) $a = \frac{6-0}{1.8-0.6} = \frac{6}{1.2} = 5 \text{ m/s}^2$

5) (i)

(a) Speed is the change of distance per unit time

(b) Velocity is the change of displacement per unit time

(c) Acceleration is the change of velocity per unit time

(ii)

$$a) v = u + at = 60 + (5 \times 10) \\ = 60 + 50 = 110 \text{ m/s}$$

$$b) s = \left(\frac{u+v}{2}\right)t = \left(\frac{50+110}{2}\right)10 \\ = 850 \text{ m}$$

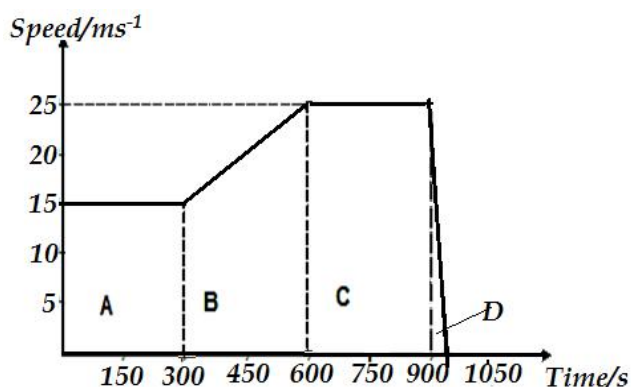
14.3

1. a) (i) velocity is the rate of change of displacement

(ii) Acceleration is the change of velocity per unit time.

b)

i)



$$ii) a = \frac{\Delta V}{\Delta t} = \frac{25-15}{600-300} = \frac{10}{300} \\ = 0.0033 \text{ m/s}^2$$

iii) Total distance = Area under the graph

$$= lb + \frac{a+b}{2}h + \frac{a+b}{2}h$$

$$= (15 \times 300) + \frac{15+25}{2} \times 300 +$$

$$\frac{300+330}{2} \times 25$$

$$= 4500 \text{ m} + 6000 \text{ m} + 7875 \text{ m}$$

$$= 18375 \text{ m}$$

$$iv) \text{ Average speed} = \frac{\text{total distance}}{\text{time taken}} = \frac{18375}{930} \\ = 19.8 \text{ m/s}$$

Unit 15: Dynamics

15.1

1. B
2. A
3. B
4. D
5. B
6. B
7. B
8. B
9. B
10. B
11. A

15.2

1. .

(a) Forward (driving) force > backward (resistive) force.

$$(b) F_R = 1800 \text{ N} - 600 \text{ N} = 1200 \text{ N}$$

$$(c) a = \frac{\text{Resultant force}}{\text{mass}} = \frac{1200 \text{ N}}{900} = 1.33 \text{ m/s}^2$$

(d)

i. Using lubrication (such as oil or grease).

ii. Using ball bearings.

2. The wall exerts same reaction force on his head which equals the force he exerts on the wall.

3. This is due to the inertia; the goat keeps on its state of motion while the pickup truck stops.

4. (a)

- i. Is a forward push of the ground on the wheel.
- ii. C
- iii. Friction of the road

(b)

- i. $F_R = 100 \text{ N} - 60 \text{ N} = 40 \text{ N}$
- ii. $a = \frac{\text{Resultant force}}{\text{mass}} = \frac{40}{80} = 0.5 \text{ m/s}^2$
- iii. Increases

5.

a) $a = \frac{F}{m} = \frac{420 \text{ N}}{70 \text{ kg}} = 6 \text{ m/s}^2$

b)

- i. Resistive force (air resistance)/ Drag force
- ii. increases
- iii. the sprinter moves with a constant speed

6. a) $1000 \times 30 = 30000 \text{ kg m/s}$

b) 2000 kgm/s

Unit 16: Vectors

16.1

1. C
2. D

Unit 17: CIRCULAR MOTION

17.1

1. A
2. B
3. D
4. D
5. B

17.2

1. a) Is the angular displacement per unit time.

b)

- i. 1200 N
- ii. Towards the centre

c) 7 rev per second

d) $F = mv^2/r$ $v = wr$
 $F = m(wr)^2/r = mw^2r^2/r$
 $F = mw^2r$

Unit 18: Work, Energy & Power

18.1

1. A
2. B
3. C
4. C
5. D
6. A
7. B
8. C
9. C

18.2-

1. a. iii. Gravitational potential energy
b) 60,000 J
. 2000 W

2. a.

- i. Work is the product of force and distance
 - ii. Joule
- b. No distance movement

c. .

- i. Power is the rate of doing work
- ii. Fat man
He has more weight

$$3. P = \frac{F \times S}{T}$$

$$= \frac{400 \times 4}{8}$$

$$= 200 \text{ W}$$

4. a)

- i. Work: is product of force and distance and its SI unit is Joule
- ii. Power: is the work done per unit time and its SI unit Watt.

b) **Girl A** $W = Fs = 300 \times 5 = 1500\text{J}$

Girl B $W = Fs = 600 \times 5 = 3000\text{J}$

c) **Girl A** $P = \frac{w}{t} = \frac{1500}{5} = 300 \text{ W}$

Girl B $P = \frac{w}{t} = \frac{3000}{5} = 600 \text{ W}$

d) Girl B she has more weight

5. a)

i) $V = \frac{S}{T}$

$$= \frac{3.2}{20}$$

$$= 0.16 \text{ m/s}$$

ii) $W = mg$

$$= 60 \times 10 = 600 \text{ N}$$

iii) $GPE = mgh$

$$= 60 \times 10 \times 3.2$$

$$= 1920 \text{ J}$$

6. $W = Fs$

$$= 420 \times 100$$

$$= 42000 \text{ J, or}$$

$$= 42 \text{ kJ}$$

7. $K.E = 450,000 \text{ J}$

Unit 19: Waves

19.1

1. D
2. B
3. C
4. B
5. D
6. D
7. C
8. B
9. D

19.2

1. a) Aerial....

. tuner.....

Amplifier....

Battery...

Electrical.....

sound

b. i) $\lambda = \frac{12}{2} = 6 \text{ cm}$

ii) $A = \frac{6}{2} = 3 \text{ cm}$

2.a) i. infra-red

ii. Ultraviolet

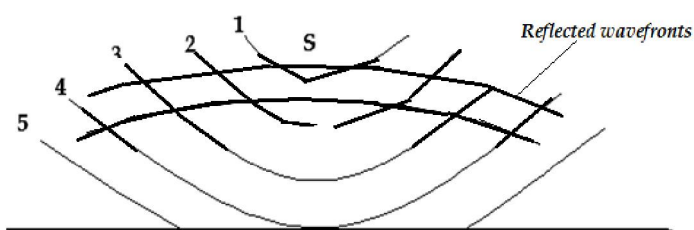
iii. X-ray

- b) i. micro waves
ii. infra-red
iii. Visible light
iv. Ultra violet
- c) a. shielding lead with the source or
Standing behind lead screen
- b. x-ray pass through all the flesh and appears dark gray on the film, but it does not pass through the bones and appears white on the X-ray film. At a break in a bone, the X-ray beam passes through the broken area and appears as a dark line in the white bone.
3. **Transverse waves:** Particles vibrate at right angle to the direction of wave motion
Longitudinal waves: Particles vibrate parallel to the direction of wave motion

4. a) i. 0.6m
ii. $\lambda = \frac{10 \text{ m}}{2} = 5 \text{ m}$
- b)
- i) $T = \frac{2.5 \text{ sec}}{2} = 1.25 \text{ sec}$
ii) $F = \frac{1}{T} = \frac{1}{1.25} = 0.8 \text{ Hz}$
- c) $V = F \lambda = 0.8 \times 5 = 4 \text{ m/s}$

- 5 .a)
- i. Amplitude
ii. Phase
iii. Wavelength

5. b)



6. a)

- i. **Wavelength** is the distance b/w two adjacent crests or troughs.
ii. **Frequency** is the number of waves produced per second.
7. a) **Transverse waves** are waves that the particles of the medium vibrate at right angle to the direction of wave motion

For example water waves and all electromagnetic waves are transverse waves.

Longitudinal waves are waves that the particles of the medium vibrate parallel to the direction of wave motion

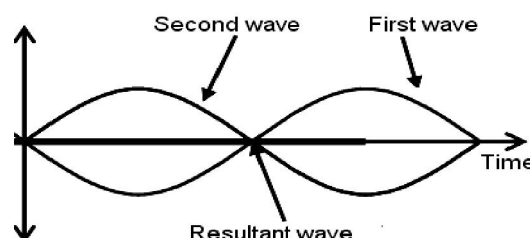
For example sound waves are longitudinal waves.

- b) Increasing the intensity of wave
Increasing the amount of energy that wave carries.

c)



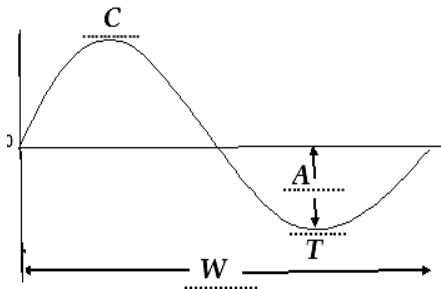
d)



e) $V = F \lambda = 800 \times 4 = 3200 \text{ m/s}$

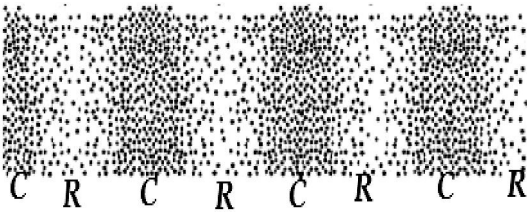
And $T = \frac{1}{F} = \frac{1}{800} = 0.00125 \text{ s}$

8. a)



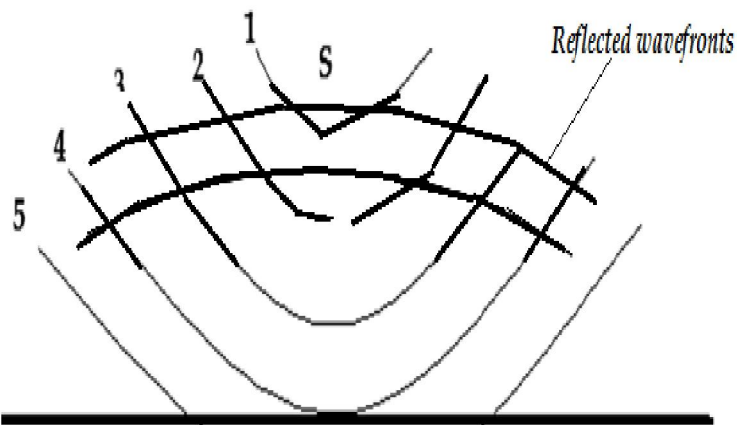
b) $V = F \lambda = 200 \times 3 = 600 \text{ m/s}$

c)



d) According to their very high penetrating power, they can penetrate deeply to our tissues, cells by damaging them.

9.

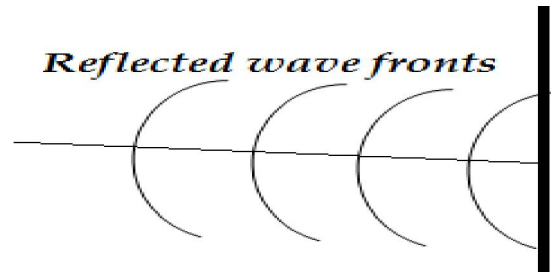


10. a)

- i. P
- ii. Q
- iii. C or D

b) Transverse wave

c)



d) .

- i. $\lambda = \frac{50}{20} = 2.5 \text{ cm}$
- ii. $F = \frac{20}{5} = 4 \text{ Hz}$
- iii. $V = F \lambda = 4 \times 2.5 = 10 \text{ cm/s}$

11.

- a) i) 2 cycles
- ii) $\lambda = 40 \text{ cm}$
- b) $F = \frac{160}{40} = 4 \text{ HZ}$
- c) $V = f \lambda$
 $= 1.2 \times 8$
 $= 9.6 \text{ cm/s}$

12.

- a) i) Amplitude = 5 m
- ii) $T = 3 \text{ sec} - 3.2 \text{ sec}$
- iii) $F = \frac{1}{T} = \frac{1}{3} = 0.33 \text{ HZ}$
- iv) $\lambda = 2 \text{ m}$

Unit 20: Radioactivity

13. i)

- a) A = wavelength
- b) B = Amplitude
- c) C = Crest
- d) D = Trough
- ii) $F = 0.5 \text{ Hz}$
- iii) $T = 2 \text{ seconds}$

14. a) X- rays

- b) Radio waves
- c) Ultraviolet
- d) Gama ray
- e) Microwaves
- f) Infrared

20.1

- 1. C
- 2. D
- 3. B
- 4. A
- 5. B
- 6. A
- 7. B
- 8. B

20.2

1.

a.

- Helium nucleus
- Gamma
- Isotope
- $A = 4 \dots\dots Z = 9$

b.

- i. 1600 yrs
- ii. 3200 yrs
- iii. 9600 yrs

c.

- i. Sterilization
- ii. Radioactive tracers.

2.

- a. 1. They have unstable nucleus and are continuously decaying into a more stable atoms
- 2. They produce radiations from the air nuclei which affects the photographic plate

b. After 8.05 days

$$\frac{1}{2} \times 2000,000 = 1000,000 \text{ atoms remain}$$

After 16.1 days

$$\frac{1}{4} \times 2000,000 = 500,000 \text{ atoms remain}$$

After 32.2 days

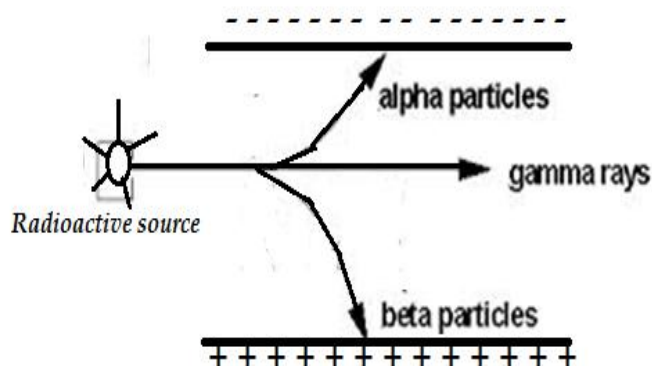
$$\frac{1}{16} \times 2000,000 = 125,000 \text{ atoms remain}$$

c.

1. Energy source,
2. Agricultural use.

d. Becquerel (Bq)

e.



3.

a) **Radioactive element** is the element that has unstable nucleus which emits radiations from its nucleus

b)

- i. Alpha
- ii. Beta
- iii. Gamma

c) **Half life** is the time taken for the activity of the radioactive sample falls halve of its original value.

d) 30 minutes

e)

- i. Industrial use (tracer)
- ii. Medical use

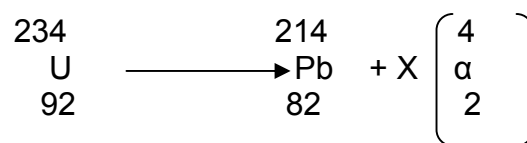
4 a) Radioactive decay

b)

Radiation	Penetrating power	Ionisation	Greek symbol
Alpha	<i>low</i>	<i>high</i>	α
Beta	<i>medium</i>	<i>medium</i>	β
Gamma	<i>high</i>	<i>low</i>	γ

c)

Let the number of alpha particles emitted be X



Therefore

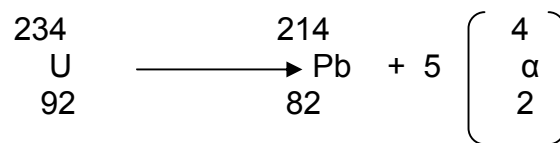
$$234 = 214 + 4X$$

$$4X = 234 - 214$$

$$4x = 20$$

$$X = 5$$

5 alpha particles are emitted



5.

- i. atomic mass
- ii. half life
- iii. positively
- iv. negatively
- v. protons

Unit 21: Electromagnetic Induction

21.1

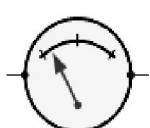
1. C
2. C
3. A

21.2

1. a)
 - Moving the wire to and fro across the field lines of the magnet continuously,
 - Or moving the magnet across the stationary wire.
- b) It deflects forward and backward



deflects right as wire is moved downwards across the field



deflects left when wire is moved upwards across the field

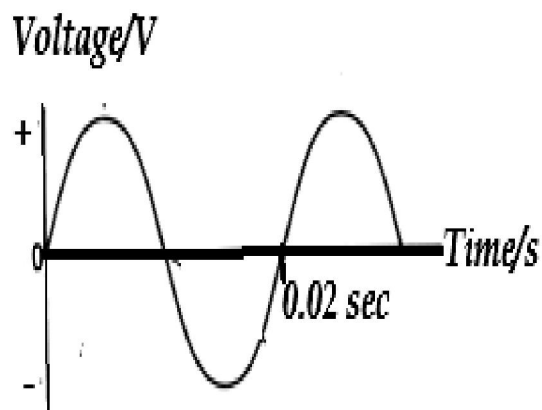
2.

- i. Primary turns are more than secondary turns.
- ii. 8 amps.
- iii. 6 volts.

.3.

- a. Generator effect
- b. i) The turns of the coil is increased
- ii) The strength of the magnet is increased
- iii) The magnet/or coil is moved faster

c.



4.

- a. Move to and fro
- b. North pole
- c. South
- d.
 - i. Move magnet faster
 - ii. Increase turns of the coil
- e. Alternating current
- f. The needle does not move

- B.
- a.
 - To increase the strength of magnetic flux that links between the two coils.
 - Acts as temporary ferromagnetic which allow magnetic flux to flow across.
 - b.
 - i. Radio
 - ii. TV screen
- 5.
- i. Increasing the number of turns of coil
 - ii. Using strong magnet
 - iii. Moving the magnet or coil faster
- 6.
- a.
 - (i) D
 - (ii) B
 - b.
 - (1) Moving the wire faster
 - (2) Using strong magnet
- 7.
- a. Primary turns are more than secondary turns
 - b. 20:1
 - c. 3 A
 - d.
 - i. To reduce power less
 - ii. AC voltage can be stepped up or down using a transformer
7. a.
- (i) **current**
 - (ii) **a magnetic field**
- b)
- (i) Deflects to the left more
 - (ii) Deflects to the right
 - (iii) It does not move
- 8.
- i. step up transformer
 - ii. 3 ampere
 - iii. 240 volt
- iv.
1. CD players
 2. At a power station to increase voltage for high levels needed

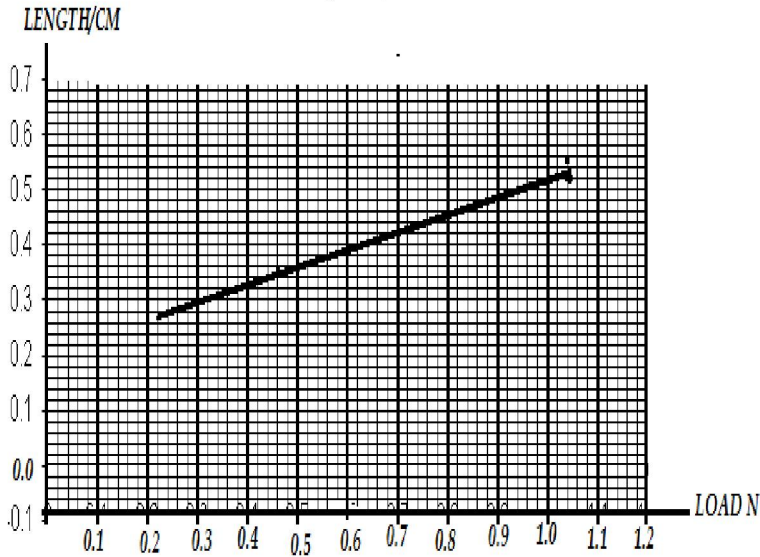
Unit22:Deforming solids

22.1

1. **A**

22.2.

1. a)



b) 0.37

c) 0.2

2.

a. force per unit cross-sectional area

b. $\frac{S}{4}$

3.

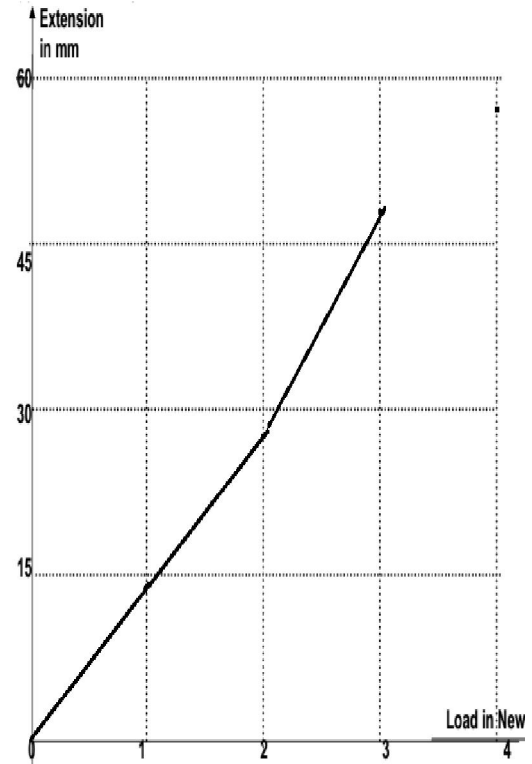
a. Elastic limit (limit of proportionality)

b. The extension is directly proportional to the load

c. Up to Q extension proportional to the load applied. Q to R extension per unit force is more.

d. $K = \frac{F}{X} = \frac{8}{4} = 4 \text{ N/mm}$
 $= 0.004 \text{ N/m}$

4.



iii. load is directly proportional to the extension before the elastic limit is not exceeded

Unit 23: Electronics

1. a) Radio, TV screens, CD players.
(one of that three uses)

b. Electronic computer chip

c. for amplifying the current/ or electronic switch