S.2 REVISION QUESTIONS.

Light

Reflection at Curved mirrors.

1. A concave mirror may be used as

(i) a magnifying mirror.
(ii) a torch reflector.
(iii) a driving mirror.

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

2. A concave mirror can be used as a shaving mirror because when an object is placed between the focus and the pole, the image formed is

A. magnified, virtual and erect.
B. magnified, real and inverted.
C. diminished, real and inverted.
D. diminished, virtual and erect.

3.. Which of the following information is true about concave and convex mirrors?

	Concave mirror	Convex mirror
A.	Converges light	Diverges light
B.	Diverges light	Converges light
C.	Refracts light	Reflects light
D.	Has a wide field of view.	Has a narrow field of view.

4. The bulb in a projector is placed.

A. at the focal point of the reflector.
B. at the centre of curvature of the reflector.
C. between the focal point and the centre of curvature of the reflector.
D. between the pole and the centre of curvature of the reflector.

5. An object is placed between the focal point and the centre of curvature of a concave mirror. Which of the following fully describes the image formed?
   A. Real, inverted, magnified
   B. Virtual, erect, magnified
   C. Real, inverted, diminished
   D. Real, erect, diminished.
6. A converging mirror produces a virtual, magnified and erect image when
   A. The object is between the pole and the principal focus
   B. The object is between the principal focus and the centre of curvature
   C. The object is beyond the centre of curvature
   D. The object is at infinity

Essay questions.

1. An object 3cm high is placed at right angles to the principle axis of a concave mirror of focal length 7.5cm. if the object is 30cm from the pole of the mirror, using a scale diagram, obtain the position and size of the image formed.
2. (i) By use of ray diagram, explain how a parabolic mirror is used as a solar concentrator.

   (ii) State any two applications of parabolic mirrors.

3. (a) Define the following terms as applied to a concave mirror;
   (i) Linear magnification
   (ii) Centre of curvature of a concave mirror
   (iii) principal focus
   (b) State **two** uses of a concave and **two** of convex mirrors.

4. Describe an experiment to determine the focal length of a concave mirror using an illuminated object.

(5) A concave mirror of focal length 15 cm forms a real image 6 cm high at a distance of 60 cm from the mirror. By graphical construction, find;
   (i) The position of the object.
   (ii) The height of the object.
   (iii) magnification of image.

(6) An object placed at a certain distance in front of a diverging mirror of radius of curvature 20cm forms an image 30cm away from the mirror. By scale drawing, determine the position of the object from the mirror.

Magnets

1. Which of the following statements is not true about magnets ?

A. Magnetic poles cannot be separated.

B. A paramagnetic material is a material from which strong magnet can be made.

C. The neutral point in a magnetic field is a point where there is no force experienced.

D. Heating a magnet can reduce its magnetism .

2.

The figure above shows magnetic field lines between two magnetic poles. The poles marked P, Q, X and Y are respectively;

A. north, south, south and north
B. south, north, north and south
C. north, north, south and north
D. south, south, north and south

3. Which of the following statements are correct ?

(i) The particles of magnetic materials are tiny magnets.
(ii) The particles in unmagnetised iron arrange themselves in closed chains.
(iii) The particles in a magnet are arranged in open chains with *N* pole of one particle against the *S* pole of its neighbouring particle.
(iv) Groups of atoms form a magnetic domain.

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

4. Which of the following shows a piece of material in a magnetized condition?

A. **B.** **C.** **D.**

5. A magnetic material can be magnetized by

(i) stroking with a permanent magnet.
(ii) using a direct current.
(iii) by induction.

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

6. Which of the following statements are true about magnets?

1. Magnets always have opposite polarities
2. A magnet can be used as a **compass**
3. Repulsion is the only sure test a magnet.
4. Magnets attract all metals.

A. *1, 2, 3 are correct*
B. *1, 3 only are correct*
C. *2 only are correct*
D. *4 only are correct.*

7..Figure 2 shows the superposition of the earth's magnetic field due to a magnet.

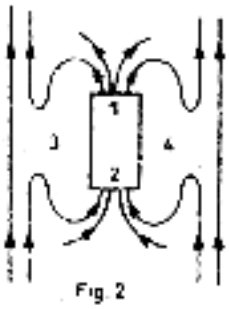


Fig. 2

Identify points marked 1, 2, 3 and 4.

	1	**2**	3	4
A.	South pole	North pole	Neutral point	Neutral point
B.	North pole	South pole	Neutral point	Neutral point
C.	Neutral point	Neutral point	North pole	South pole

D.	Neutral point	Neutral point	South pole	North pole

8. Permanent magnets are made from

A. diamagnetic materials
B. ferromagnetic materials
C. paramagnetic materials.
D. dielectric materials.

9. Which of the following statements is/are true a**bout** molecular theory of magnetism?

1. Breaking a magnet into two results to the formation of twomagnets.

2. Heating and rough treatment destroys magnetism.

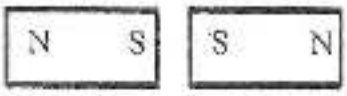
3. The poles of a magnet are of equal strength.

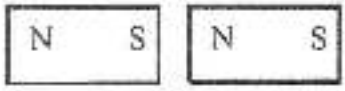
4. The lines of force travel from a north pole towards a south pole.

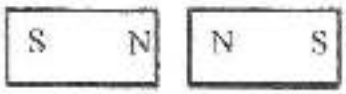
A. 1, 2, 3 only are correct.
B. 1, 3 only are correct.
C 2, 4 only are correct.
D 4 only is correct.

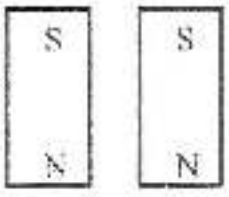
10. Which of the following is not a vector quantity
A. Magnetic flux
B. Momentum
C. Pressure
D. Weight

11. The diagrams show different arrangements of two strong magnets. Which pair of magnets V will pull each other.

A. 

B. 

C. 

D. 

12.Which of the following statements is correct about soft ferromagnetic materials

(i) they don't lose their magnetism easily

(ii) they are easily and strongly magnetized
(iii) they are used to make permanent magnets

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

13. To test whether a piece of metal is a magnet or not, one would see if it

A. attracts steel and iron fillings.

B. attracts a magnet.

C. repels a known magnet.

D . repels a metal bar.

14. The earth behaves as if it contains a short but a powerful bar magnet with;

A. it's north pole in the southern hemisphere.

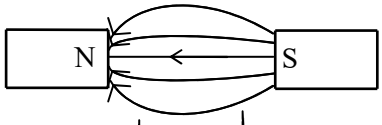
B. it's north pole in the northern hemisphere.

C. it's north pole in east — west direction.

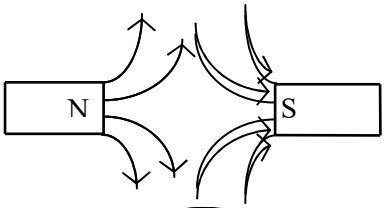
D. no poles.

15.Which one of the following diagrams represents the magnetic field pattern when two small magnets are placed close together?

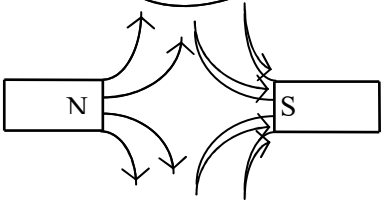
A.



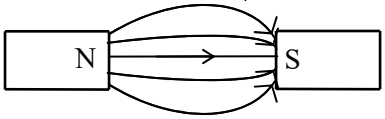
B.



C.



D.



16.Which one of the following substances would be strongly attracted by a magnet?

A. Aluminium B. Magnesium
C. Copper D. Nickel

17. Which of the following is not a property of magnetic field lines?

A. They start from North Pole to South Pole.

B. They don't cross each other.
C. They start from South Pole to North Pole.
D. They attract each other if they are of opposite poles.

18. Soft magnetic materials are materials which;
A. Can be magnified easily.
B. Can retain their magnetism for a long time
C. Can break easily
D. Cannot be attracted by a magnet.

ESSAY

1. Define the terms*;*

(i) ***magnetic saturation***

(ii) ***magnetic field***

(iii) ***neutral point***

2. (a) Define **magnetic induction**.

(b) Draw a diagram to show how a steal bar can be magnetized by single stroke method.

3. (a) Explain in terms of the domain theory how a steel bar gets magnetised by stroking.

(b) Describe how a magnet is demagnetized by electrical method. *(*

4. What is meant by the following;
(i) Hard magnetic material.

(ii) Soft magnetic material

5. (a) Explain how a piece of iron can be magnetised by the single touch method. Illustrate your answer with a diagram.

(b) How can you determine the polarity of a magnet?

PRESSURE

1. What is 730 mm Hg in Nm^{-2} ?

A. $\frac{13600 \times 1000 \times 10}{730}$

B. $\frac{13600 \times 730 \times 10}{1000}$

C. $\frac{13600 \times 730}{1000 \times 10}$

D. $\frac{13600 \times 10}{1000 \times 730}$

2. In a hydraulic machine

A. an object displaces its own weight of fluid.

B. the press transmitted in a fluid is the same in all directions.

C. the volume of fluid compressed is proportional to the applied force

D. an object experiences an upthrust equal to the weight of fluid displaced.

3. A rectangular block of metal weighs 3 N and measures (2 x 3 x 4) cm^3.Who is the greatest pressure it can exert on a horizontal surface?

A. $5.0 \times 10^3\ Nm^{-2}$

B. $3.75 \times 10^3\ Nm^{-2}$

C. $2.5 \times 10^3\ Nm^{-2}$

D. $7.5 \times 10^{-1} Nm^{-2}$

4. In a liquid, pressure is

A. transmitted in a specific direction.

B. transmitted in all directions.

C. decreased with depth.

D. decreased with density.

5.A solid, Q, sinks deeper in liquid, N, than in liquid, M because the

A. upthrust on the solid is greater in liquid N than in M.

B. density of liquid M is greater than that of N.

C. density of liquid N is greater than that of M.

D. surface tension of liquid N is less than that of M.

6.Which one of the following statements is false? The pressure in a liquid

A. at any one point in a liquid would not change even when more liquid is added.

B. at anyone point depends only on the depth and density.

C. at anyone point acts equally in all directions.

D. increases with depth.

7. Pressure in a liquid is independent of the;

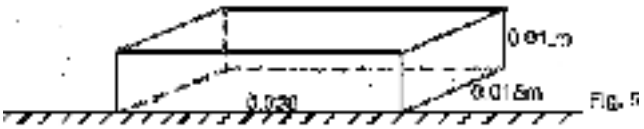
A. density of the liquid.

B. depth below the surface of the liquid.

C. pressure exerted on the surface of the liquid above.

D. cross sectional area and the shape of the vessel containing the liquid.

8. A box is placed on top of a table as shown in Figure 5, with the dimensions indicated.



If its mass is 40 kg, find the pressure it exerts on the table.

A. $\frac{40}{0.020 \times 0.015}$

B. $\frac{40}{0.015 \times 0.010}$

C. $\frac{40 \times 10}{0.020 \times 0.015}$

D. $\frac{40 \times 10}{0.020 \times 0.010}$

9. A rectangular block of dimension 4 cm × 2 cm × 1 cm exerts a maximum pressure of 200 N m^{-2} when resting on a table. Calculate the mass of the block.

A. 4 g.

C. 40 g.

B. 16 g.

D. 400 g.

10. A tight bottle top becomes easier to unscrew when hot water f1ows over it because the

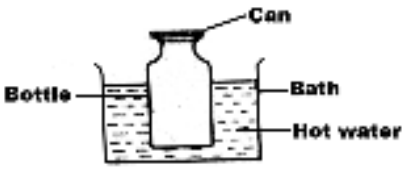
A. cap expands more than the glass.

B. glass in the neck of the bottle contracts.

C. hot water acts like oil between the glass and bottle.

D. increased pressure of the air in the bottle causes the cap to expand.

11.An empty bottle is immersed in a hot bath and then closed with a coin as shown below.



The bottle is then immersed in a cold water bath and turned upside down. The coin .....

A. does not fall off because the pressure inside the bottle is greater than that outside the bottle.

B. does not fall off because the pressure outside the bottle is greater than that inside the bottle.

C. will fall off because the pressure inside the bottle is equal to that outside the bottle.

D. will fall off because the pressure inside the bottle is greater than that outside the bottle.

12. Calculate the increase in pressure which a diver experiences when he descends in sea water of density 1.2×10^3 kg m^{-3}.

1. 3.0×10^2 N m^{-2}.

3. 3.6×10^4 N m^{-2}.

2. 1.2×10^4 N m^{-2}.

4. 3.6×10^5 N m^{-2}.

13.The diagram in figure 3 shows a mercury barometer.

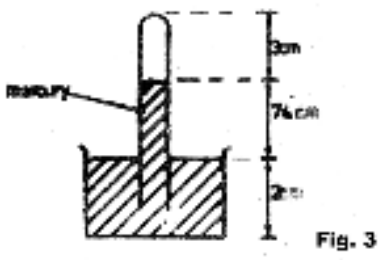


Fig. 3

What is the value of the atmospheric pressure?

A. 74 cm C. 77 cm

B. 76 cm **D.** 79 cm

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

A. facilitate the movement of the piston downwards.

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

C. transmit pressure equally throughout the liquid.

D. obtain a pressure as large as possible.

15.A force of 50 N moves an object through a distance of 200 m in 40 s. Find the power expended.

A. 100 W C. 200 W

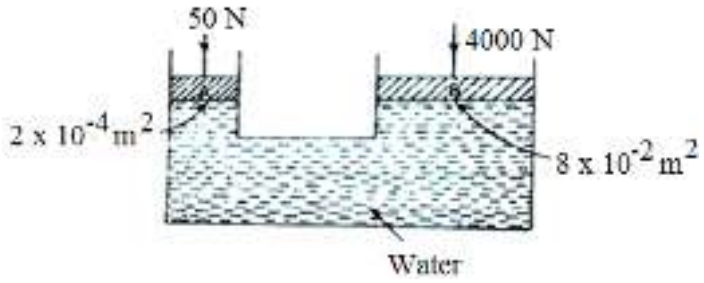
B. 160 W D. 250 W

16.A cork held under water rises to the surface when released because the upthrust on it is

A. greater than the weight. **C.** equal to the weight.

B. less than the weight. **D.** equal to the weight of water displaced.

17. Forces of 50N and 400N are applied to pistons A and B respectively as shown below.



The areas of cross-section of A and B are $2 \times 10^{-4}\ m^2$ and

$8 \times 10^{-2} m^2$ respectively. Which of the following is not true?

A. Both pistons A and B remain at the same level

B. The upthrust on piston B is equal to 20000N

C . The pressure exerted on the water by piston B is $5x10^4 Nm^{-2}$

D. Piston B is going to move upwards

18. A mass of 2.4 kg rests on the floor. If the area of contact with the floor is 6 cm^2, what pressure does the mass exert on the floor?

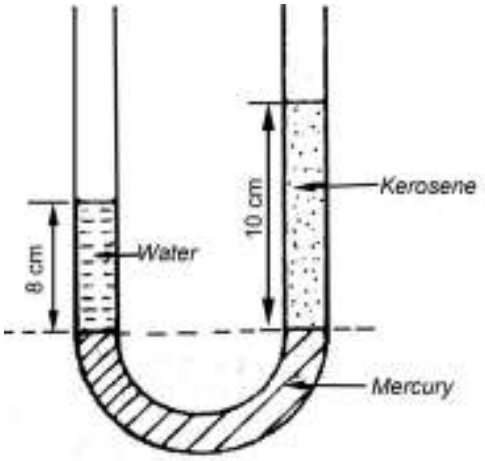
A. $0.4\ N\ m^{-2}$

B. $4.0\ N\ m^{-2}$.

C. $4.0 \times 10^3\ N\ m^{-2}$

D. $4.0 \times 10^4\ N\ m^{-2}$

19. An open U-tube contains columns of water and kerosene over mercury as shown in figure 1.



Calculate the density of kerosene

(b) State two factors on which the pressure of a liquid depends.

Explain why cooking at a high altitude takes a longer time than at a lower altitude.

(c) With the aid of a labelled diagram, describe how a force pump works

20. A hippopotamus can easily walk on mud without sinking while a goat will sink because

A. a hippopotamus has more weight than a goat

B. the centre of gravity of a hippopotamus is lower than that of a goat

C. a hippopotamus exerts more pressure on the ground than a goat

D. a hippopotamus exerts less pressure on the ground than a goat

21. The following are factors affecting pressure in fluids except;

A. depth below the surface of the fluid.

B. density of the liquid.

C. pressure exerted on the liquid surface.

D. surface area of the liquid.

22. When the handle, H, of the force pump shown in figure 6 is moved upwards, the valves at

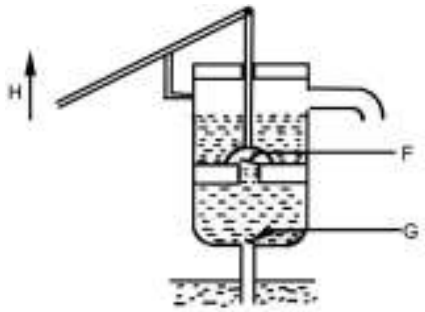


Fig. 6

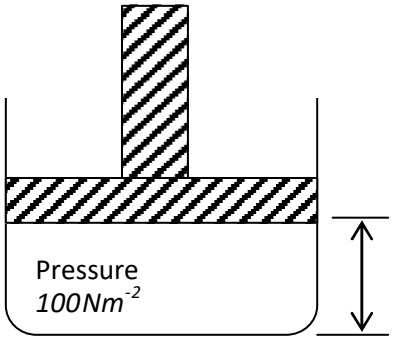
A. F and G will both close

B. F an

C. F will close and G will open.

D. F will open and G will close.

23.



If the piston in Figure above is moved down by 8cm, what is the new pressure?

A. (100-8)Pa

B. 100Pa

C. $(\frac{100x20}{12})$ Pa

D. $(\frac{12x100}{20})$Pa

24. A boy of mass 40kg balances evenly on two stilts each having an area of $8cm^2$ in contact with the ground. The pressure exerted by one stilt is;

A. 50 Ncm^{-2}
B. 40 Ncm^{-2}
C. 25 Ncm^{-2}
D. 5 Ncm^{-2}

25. A hot air balloon rises in air because;

A. weight of balloon equals to weight of displaced air.
B. weight of balloon is less than weight of displaced air.
C. weight of balloon is greater than weight of displaced air.
D. weight of balloon is zero.

26. A school nurse applies a force of 30N to a syringe .Given that the cross sectional area of the tip of the needle is $1.0 \times 10^{-7} m^2$. Calculate the pressure produced at the tip of the needle.

A. 3.0×10^7 Pa
B. 3.0×10^8 Pa
C. 4.0×10^7 Pa
D. 2.5×10^8 Pa

27. Which of the following statements is NOT true about pressure in liquids?

A. It increases with depth
B. It is lowest at the surface
C. It is the same throughout the liquid
D. It acts equally in all directions.

27.

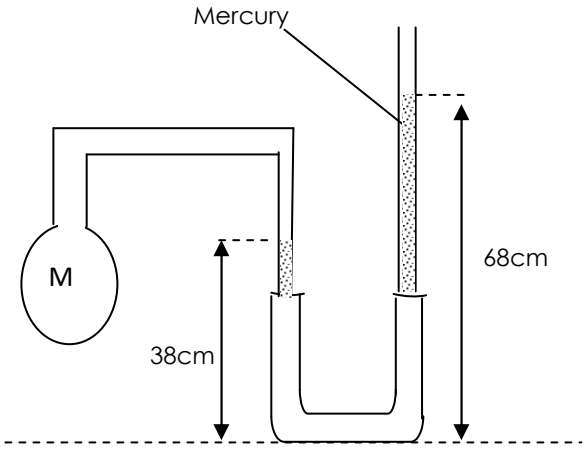


Fig. 3

In the figure 3 above, a fixed mass of dry gas is trapped in bulb M. Determine the total pressure of the gas in M, given that the atmospheric pressure is 760mm of mercury.

A) 114cm Hg B) 106cm Hg

C) 30cm Hg D) 46cm Hg

28. In the crushing can experiment, the can collapses because

A. It is weakened by the hot water

B. Pressure outside is greater than pressure inside

C. Pressure inside is greater than pressure outside

D. Pressure inside is atmospheric.

29.An air craft is able to experience a lift in air because,

(i) It can adjust the shape of the wings to create less pressure above the wings.
(ii) It can adjust the shape of the wings to create less pressure below the wings.
(iii) It can adjust the shape of its wings to reduce its apparent weight in air.

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

ESSAY

1. (a) State Archimedes principle. (1 mark)

(b) A body weighs 100N in air, appears to weigh 50N in a liquid and 70N in water. What is the density of the liquid. (3 marks)2

2. (a)State two factors affecting pressure of a liquid. (1 mark)

(b) (i) Name the instrument used to measure atmospheric pressure. (1 mark)

(ii) The value of atmospheric pressure of a certain place was recorded as 76 cmHg. Express this value in S.I units.
(density of mercury $= 1.36 \times 10^4 kgm^{-3}$) (2 marks)

3. (a) Explain each of the following observations:

(i) An inflated bicycle tube may burst when left in a hot piece.
(ii) Large water reservoirs are much wider at the base than at the top.

(b) Figure 3 shows the structure of a force pump.

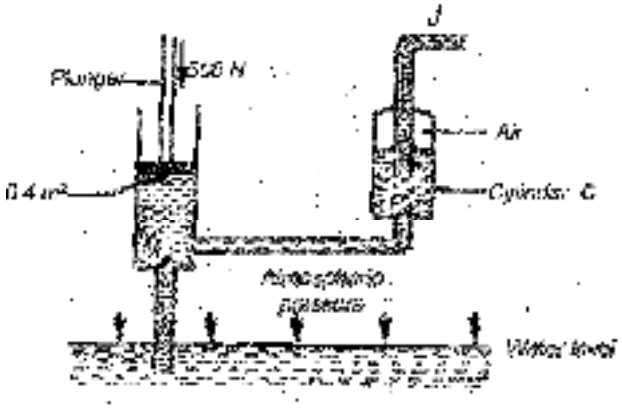


Fig. 3

(i) Describe the action of the pump.

(ii) If a downward force of 500 N is exerted on the plunger whose surf area is 0.4 m^2, calculate the pressure which forces water into cylinder.

4.The difference between the atmospheric pressure at the top and bottom of a mountain is 1×10^4 N ms^{-2}. If the density of air is 1.25 kg^{-3}, calculate the height of the mountain.

5. In figure one, piston A has diameter of 14 cm while B has diameter 280 cm. If a force of 77N is exerted on piston A, calculate the force exerted by piston B.

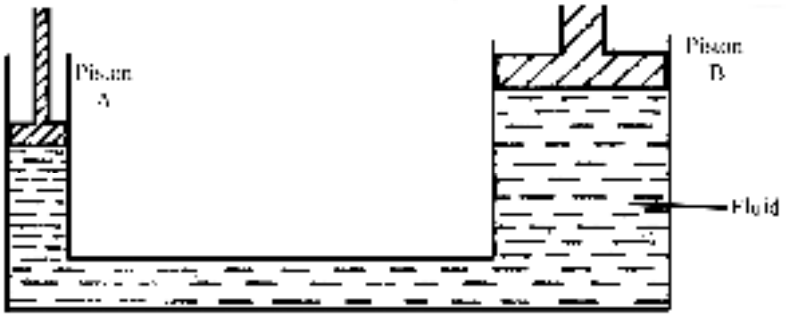


Fig. 1

MECHANICAL PROPERTIES

1. A material that can be rolled into sheets or drawn into wires without breaking is said to be

A. strong. **C.** ductile.

B. elastic. **D.** brittle.

2. Reinforced concrete is stronger than ordinary concrete because concrete and steel are

A. both brittle materials.
C. strong in tension and compression respectively.

B. both ductile materials.
D. strong in compression and tension respectively.

3.Which of the following are brittle substances '?

A. Dry clay, steel, chalk and wood.
C. Glass, chalk, concrete and steel.

B. Chalk, steel, plastic and glass.
D. Dry clay, glass, chalk and concrete .

4.A load of 4 N stretches a spring by 0.5cm. Calculate the extension when a load of 8 N is applied.

A. 0.25 cm
C. 2.0 cm

B. 1.0 cm
D. 4.0 cm

5. A beam may be designed with much of its central part removed in order to improve on its

A. brittleness.
C. ductility.

B. stiffness.
D. stability.

6. Which of the following are all brittle materials ?

A. Leather, rubber, thread.
C. Glass, cast iron, stone.

B. Clay, glass, wood.
D. Rubber, polyster, copper wire.

7. The beam in figure 2 is being acted on by a weight W.

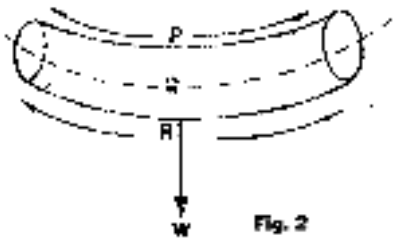


Fig. 2

The regions P, Q, and R are respectively

A. tension, compression, neutral axis.

B. neutral axis, compression, tension.

C. compression, neutral axis, tension.

D. tension, neutral axis, compression.

8. A mass of 0.5 kg causes a spiral spring to extend by 4 cm. The force that would cause an extension of 6cm is

A. 2.0 N
C. 4.8 N
B. 3.3 N
D. 7.5N

9. A rod of cross-sectional area 40 cm^2 needs a tensile force of 2 N to break it. What is its breaking stress ?

A. 0.005 N m^{-2}
C. 5 N m^{-2}
B. 0.05 N m^{-2}
D. 500 N m^{-2}

10. An object is said to behave elastically when

A. its elastic limit is exceeded
B. its breaking point is reached.
C. equal increases in the force applied to it produce equal changes in length.
D. the potential energy stored in it is used to permanently deform the object.

11. The diagram in figure 7 shows a structure of wooden beams P, Q, R, S and T supporting a heavy rod L.

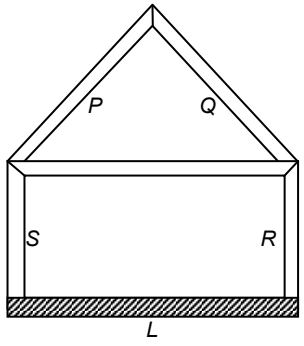


Fig. 7

Which of the beams can be replaced by strong ropes if the shape is to be maintained?

A. P, R, S, and T
C. Q, R, S and T
B. P, Q, S and T
D. P, Q, R and S

12. In a wire supporting a load, stress is given by

A. $\frac{\text{Stress}}{\text{Area}}$
C. $\frac{\text{Area}}{\text{Stress}}$

B. Force × Area **D.** $\frac{\text{Force}}{\text{Area}}$

13. A load of 500 N is placed at 2 m from a pivot of a sea saw. At what distance from the pivot should a weight of 250 N be placed to balance the sea-saw?

A. 0.5 m **C.** 2.0 m

B. 1.0 m **D.** 4.0 m

14. A mass of 0.2 kg produces an extension of 8 cm in d spring. The force required to produce an extension of 6 cm is

A. 0.75 N. **C.** 2.70 N.

B. 1.50 N **D.** 24.00 N.

15. Figure 1 below shows a graph of extension against load for an elastic material.

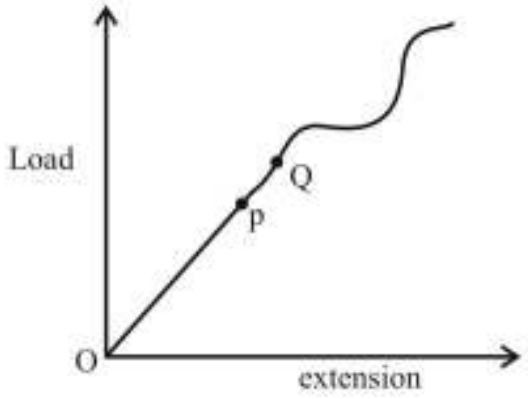


Fig.

In the region OP, the material is;

A. elastic and obeys Hooke's law.

B. elastic but does not obey Hooke's law.

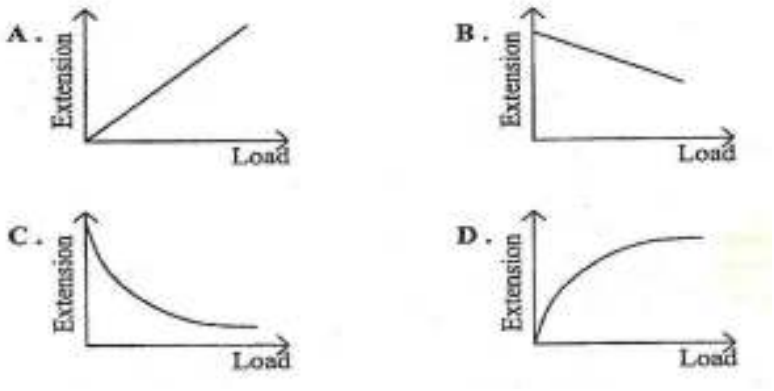
C. plastic but obeys Hooke's law.

D. plastic but does not obey Hooke's law.

16.A Material which undergoes a large amount of extension before it breaks is called

A. ductile
B. brittle
C. plastic
D. elastic

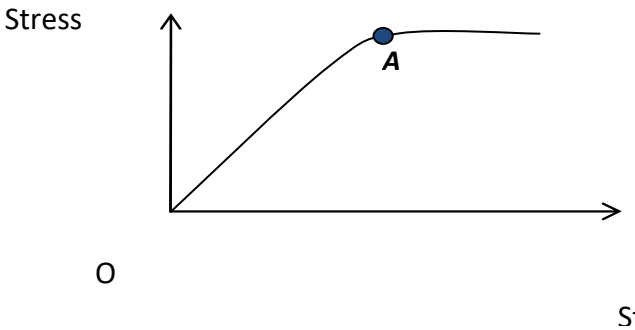
17.Which one of the following graphs represents the variation of extension of a spring with load.



18.A force of 2 N produces an extension on a spring of 3cm. Find the weight of a stone that produces an extension of 18cm.

A. 3 N
B. 6 N
C. 12 N
D. 108 N

19. Which one of the following statements is correct about the stress ─ strain graph of a wire?



A. The wire only obeys Hooke's law between O and A it becomes much more difficult to stretch it.

B. The wire does not obey Hooke's law between O and A and after A, it becomes much more difficult to stretch it.

C. The wire only obeys Hooke's between O and A and after A, it becomes much easier to stretch it.

D. The wire does not obey Hooke's law between O and A and after A, it becomes much easier to stretch it.

20. A mass of 600g produces an extension of 15cm in a spring. Find the extension produced by a force of 12.0N.

A. 4.8cm B. 7.5 cm C. 10.8cm D. 30.0cm

21. A notch on a material spreads more rapidly when the material is;

A) reinforced B) in tension

C) pre stressed D) in compression

22. A girder under compression is called

A. strut B. tie
C. beam D. pillar

ESSAY.

1. (a) Name any two constituents of a concrete material.

(b) State any two characteristics which make concrete a desirable building material.

(c) State any two ways in which concrete may be reinforced.

2. (a)(i) What is a notch?

(ii) State two ways of reducing notch effect?
(b)What is the difference between a tie and a strut?

3. (a) (i) State Hooke's law. (1 marks)
(ii) Differentiate between a tie and a strut. (2 marks)
(iii) State any two ways in which concrete can be reinforced. (2 marks)
(b) Describe an experiment to verify Hooke's law. (4 marks)

(c) An elastic spring of natural length 30cm is stretched by a force of 50N to a length of 80cm. Calculate its extension if a force of 40N is applied to it. (2 marks)

4. (a) Define the terms *strain* and *stress*.

(b) Figure 2 shows a diagram of a bicycle.

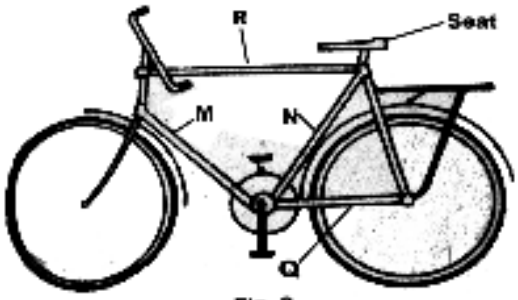


Fig. 2

Which ofthe parts, labelled *M, N*, *Q* and *R*, would be

(i) in tension.

(ii) in compression when a heavy person sits on the seat?

(c) Give four reasons why bicycle frames are made of hollow cylindrical

ELECTROSTATICS

1. The laws of electrostatic induction state that

A. like poles repel and unlike poles attract.

B. like poles attract and unlike poles repel.

C. like charges repel and unlike charges attract.

D. like charges attract and unlike charges repel.

2.When polythene and wool are rubbed against each other and then separated, they acquire

A. no charge.

B. equal amount of same type of charge.

C. equal and opposite charges.

D. both acquire positive and negative charges.

3. A metal rod gains a positive charge when rubbed with fabric. The fabric acquire.

A. no charge.

B. a negative charge equal to that on the rod.

C. a positive charge equal t9 that on the rod.

D. a positive charge greater than that on the rod.

4. A brass rod is rubbed with silk and then brought near a positively charged gold leaf electroscope. The divergence of the leaf will

A. increase.

B. decrease.

C. not change.

D. increase slightly and fall back.

5. The result of rubbing a glass rod with silk and separating them is

A. a negative charge on the rod and an equal positive charge on the silk.

B. equal amounts of negative charge on both.

C. a positive charge on the rod and an equal negative charge on the silk.

D. no charge on both the rod and the silk.

6. When a negatively charged body is brought near the cap of a positively charged electroscope, the gold leaf

A. remains unchanged.

B. decreases in divergence.

C. increases in divergence.

D. gains a positive charge.

7. It is easier to charge insulators than conductors because

A. the insulators don't allow the charge to flow away but the conductors allow it to flow away.

B. the conductors retain the charge by conduction but the insulators release it to the atmosphere.

C. it is impossible to charge conductors under any condition.

D. insulators just receive the charge from the atmosphere without being rubbed.

8. When a rod is brought close to the cap of a negatively charged gold leaf electroscope and its leaf diverges, it shows that the rod is

A. negatively charged. **C.** neutral.

B. positively charged. **D.** partially charged.

9. When a charged body is brought near a cap of a negatively charged gold leaf electroscope, the

A. divergence of the leaf does not change

B. leaf falls ifthe body is negatively charged.

C. leaf diverges if the body is positively charged.

D. leaf diverges if the body is negatively charged.

10. Which one of the following materials can be electrified by friction?

A. Plastic pen. **C.** Copper rod.

B. Silver rod. **D.** Wet wood.

11. The leaf of a charged electroscope gradually collapses with time due to

A. leakage to the surroundings C. pressure variation in the surroundings

B. surrounding magnetic field D. similar charges from the surroundings

12. When a plastic rod is brought near a charged electroscope, the gold leaf is seen to diverge more. The possible charge on the rod and the electroscope are.

	Electroscope	**Plastic rod**		**Electroscope**	**Plastic rod**
A.	positive.	negative.	**C.**	negative.	negative.
B.	negative.	positive.	**D.**	positive.	uncharged.

13. A body can only be confirmed to be electrically charged when

A. another charged body attracts it.

B. it does not affect the leaf of a charged electroscope.

C. it is repelled by another charged body.

D. it is found to have less protons than electrons.

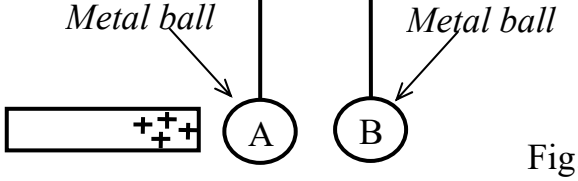
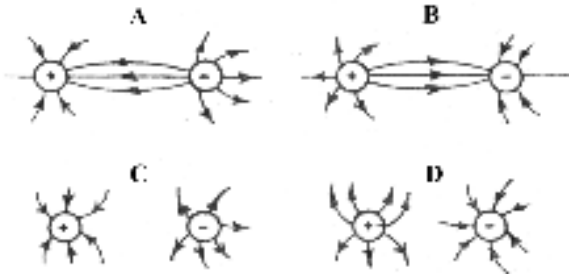


Fig. **2**

14. Which of the following shows a correct electric field pattern due to two charges?



15. If a body gains electrons, it becomes;

A. an atom
B. positively charged
C. an isotope
D. negatively charged

16. It is recommended that buildings should have earthed conductors in order to

A. reduce heat intensity on hot days.

B. remove excess electrons from the building.

C stabilise the current electricity to the building.

D provide more charges to electric appliances in the building.

17.

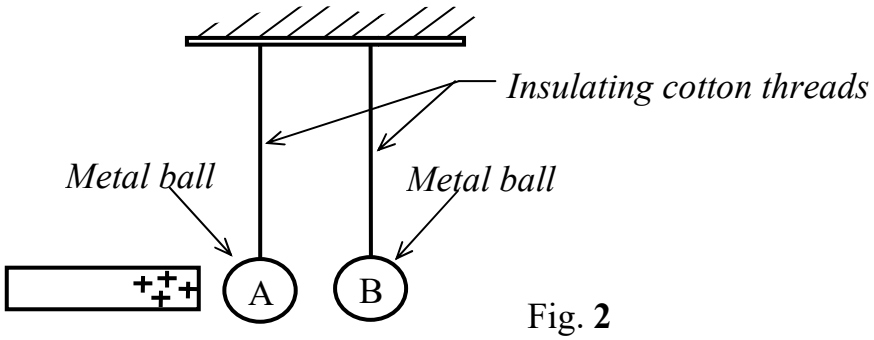


Fig. **2**

The diagram in figure **2** shows two metal balls A and B suspended an insulating cotton threads. State what is observed when a positively charged rod is brought close to A.

A. The metal balls A and B move towards each other.
B. A moves towards the rod which B moves away from the rod.
C. A moves towards the rod and B moves towards A.
D. A is attracted towards the rod but B is not affected.

18. When an uncharged conductor is brought near the cap of a positively charged electroscope, the gold leaf
A. gains a positive charge
B. increases the divergence
C. decreases in divergence
D. remains uncharged

19. Why does a changed electroscope lose its charge when a flame is brought near its cap?
A. Point action takes place at the cap
B. The flame blows the charges off the cap
C. Charges of the opposite sign from the flame are attracted to the cap.
D. The flame ionizes nearby air molecules and those of opposite sign are attracted on the cap.

ESSAY.

1. (i) state the law of electrostatics.

(ii) Explain how the nature of charge on a body may be determined using a gold leaf electroscope.

2. A gold leaf electroscope is positively charged. State what happens when each of the following is brought near the cap:

(a) a neutral metal,
(b) a positively charged body.

3. A negatively charged cloud passes over a building with a lightning conductor during a thunderstorm. Explain how the building is protected against lightning. (4 marks)

4. (a) Explain why a pen rubbed with a piece of cloth attracts pieces of paper.

(b) Describe how a gold leaf electroscope can be positively charged by electrostatic induction.

5 .(a) Explain how thunder is produced during a rainstorm.

(b) Explain why it is not advisable to touch the copper strip of a lightening conductor when it is raining.

TURNING FORCES

1. An object in unstable equilibrium continues to fall when slightly displaced because

A. centre of gravity is lowered
B. centre of gravity is raised
C. potential energy is reduced
D. potential energy is increased

2. It is easier to use a claw hammer to remove a nail from a piece of wood if the handle is longer because the;

A. effort applied becomes bigger
B. turning effect becomes bigger
C. anticlockwise moments will balance clockwise moments
D. fulcrum is between the effort

3. If the system in figure 3 is in equilibrium, find the value of X

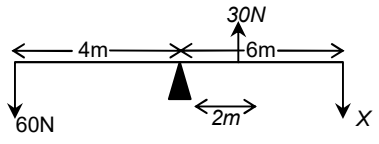
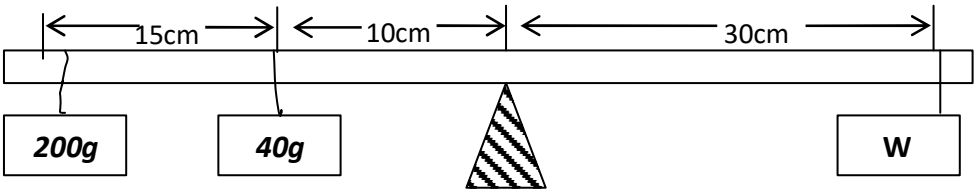


Fig.

A. 30 N.
C. 60 N
B. 50N
D. 90 N

4.



If the above system is in equilibrium, calculate **W.**

A. $\frac{(0.2 \times 0.15) + (0.04 \times 0.1)g}{0.3}$

B. $\frac{240 \times 25g}{30}$

C. $\frac{(200 \times 25) + (40 \times 10)g}{30}$

D. $\frac{(200 \times 15) + (40 \times 10)g}{30}$

5. It is easier to use a claw hammer to remove a nail from a piece of wood if the handle is longer because the

A effort applied becomes bigger.

B turning effect becomes bigger.

C anticlockwise moments will balance clockwise moments.

D fulcrum is between the effort and the load.

6. An object in unstable equilibrium continues to fall when slightly displaced because its

(i) Centre of gravity is lowered

(ii) Center of gravity is raised.

(iii) Potential energy is reduced

(iv) Potential energy is increased.

A. (i) , (ii) and (iii) only.

B. (i) and (iii) only

C. (ii) and (iii) only

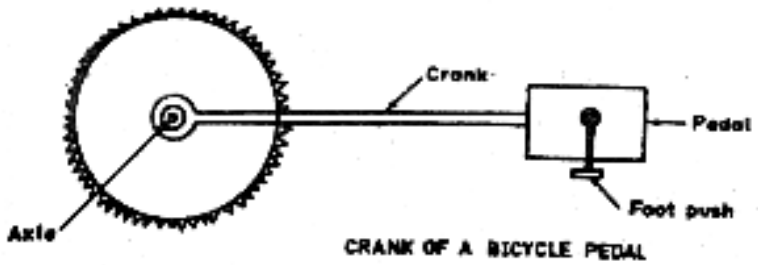
D. (iv) only

7. The interval between the ice and steam points on a thermometer is 192 mm. Find the temperature when the length or the mercury thread is 67.2 mm from the ice point.

A. 32.8°C **C.** 65.0°C

B. 35.0°C **D.** 67.2°C

8. Figure 2 shows a crank of a bicycle pedal. The force a cyclist exerts on a pedal varies from a minimum to a maximum.



CRANK OF A BICYCLE PEDAL

Fig. 2

When does the cyclist exert the maximum turning effect? When the

A. crank makes 90° with the foot push.

B. crank makes 0°with the foot push.

C. cyclist is climbing a hill.

D. cyclist is turning a corner.

9. The stability of a bus is reduced when a heavy load is placed on its roof rack because

A. the total weight is increased.
B. the pressure upon the tyres is increased.
C. the maximum speed is reduced.
D. the centre of gravity is raised.

10.. A box of mass 80kg is tied at one end of a uniform piece of timber resting on two supports 1 m from each end as shown below.

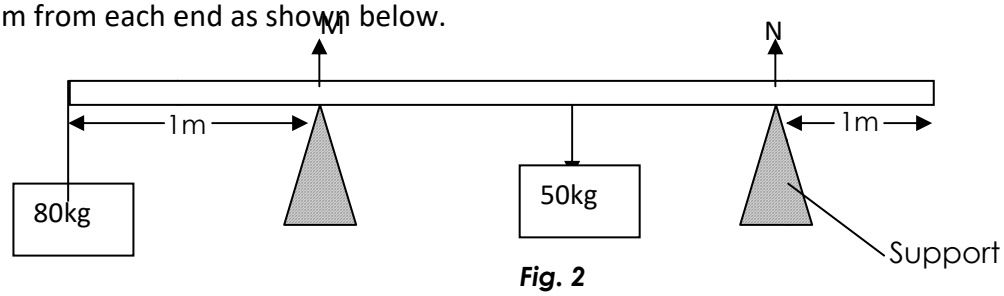


Fig. 2

If the piece of timber is 10m long and has a mass of 50kg. Find the force on each support.

	M	N
A	1150N	150N
B	800N	500N
C	150N	1150N
D	200N	1200N

ESSAY

. 1. (a) (i) State the principle of moments.

(ii) Figure 2 below shows a uniform metre rule, pivoted at the 10cm mark which balances when a mass of 400g is suspended at the 0 cm.

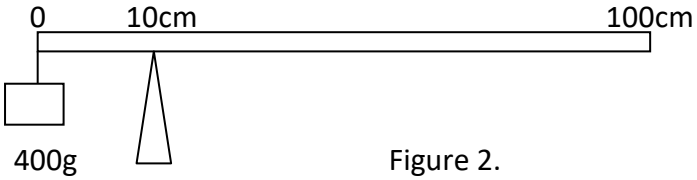


Figure 2.

Calculate the mass of the metre rule.

2. (a) (i) State the conditions for a body to be in equilibrium.

(ii) With the aid of a diagram, distinguish between stable and unstable equilibrium.

(iii) State any two ways in which stability of a body can be increased.

(b) Explain why luggage is always put at the bottom compartments of buses.

3.(a) A uniform rod of 1m long of mass 50g is supported horizontally on two knife edges, plated 10 cm from its ends. What will be the reaction at these supports when a 100g mass is suspended 10cm from the mid-point of the rod?

b) Explain how you would determine the mass of a closed umbrella if you were given a metre rule, a knife edge and a 50g mass.

4. (a) (i) Explain what is meant by **moment of a force**

(ii) State the principle of moments

(b)Describe an experiment to prove the principle of moments

5. (a) (i) What is meant by centre of gravity?

(ii) State two factors which affect the stability of a body.

(b) Explain how each of the factors mentioned in (b) (ii) above affect stability of the body.

MACHINES

1. A simple machine has a velocity ratio of eight and needs an effort 10N to lift a load of 50N.

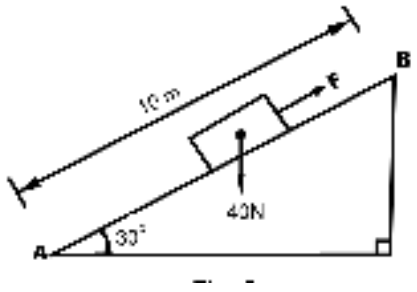
What is the efficiency of the machine?

A. 100% B. 62.5% C. 20% D.2.5%

2. Find the total energy input of an electric motor of efficiency 80% if it's useful energy output is 200J.

A. 400J B. 350J
C. 250J D. 200J

3. A load of 40 N is pulled steadily from *A* to*B* along an inclined plane by a force *F* as shown in figure 5.



Find the velocity ratio of the system

A. 1.0 C. 2.0

B. 1.2 **D.** 4.0

C. 2

D. 0.5

ESSAY

1. (a) Define the terms efficiency, mechanical advantage and velocity ratio as applied to machines.

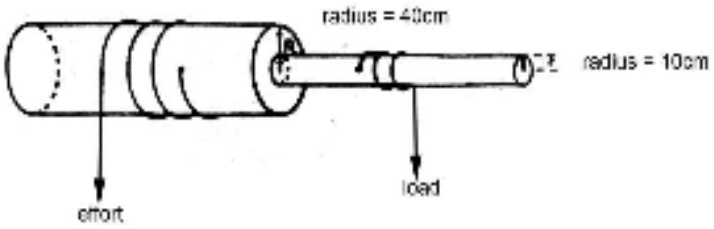
(b) Draw a pulley system of velocity ratio 5 with 3 blocks in the upper block.

(c) Find the efficiency of a pulley system above in (b) if it lifts a load of 1000N using an effort of 300N.

(d) (i) Explain why the efficiency of a pulley system is less than 100%.

(ii) Give **two** examples where pulleys are used.

2. Figure below shows a wheel and axle system.

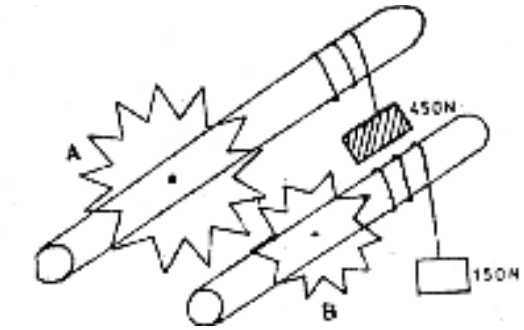


When an effort of 300N is applied, a load of 900 N is raised through a distance of 1.0 m. Calculate

(a) the velocity ratio

(b) the efficiency of the system.

3. Two gear wheels A and B with 80 and 20 teeth respectively lock into each other. They are fastened on riles of equal diameters such that a weight of 150 N attached to a string wound around one axle raises a load of 450 N attached to a string wound around the other axle as shown in Figure below.

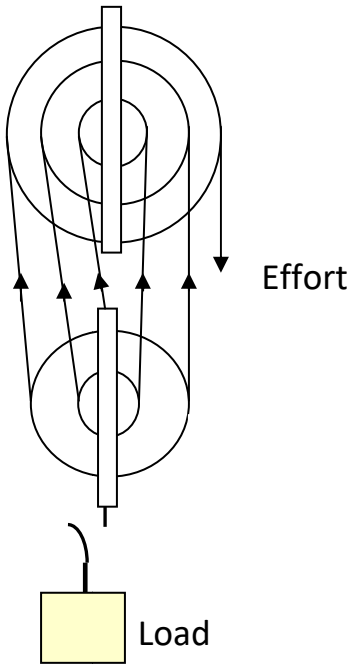


Calculate:

(i) the velocity ratio,

(ii) the efficiency, of the system.

4. Define the term efficiency of a machine.



The block and tackle pulley system above has an efficiency of 80%.
The load which it can lift by an effort of 10 N is?

5. (a) A machine is used to raise a load of 300N through a distance of 20m. if the work done against friction is 1500J, calculate;-

a) work in put: (02 mks)

b) efficiency of the system (02 mks)

ENERGY

1. A mouse of mass 0.03 kg climbs through a distance of 2 m up a wall in 4 s. The power expended in watts is

A. $0.03 \times 2 \times 4 \times 10$

B. $\frac{0.03 \times 4 \times 2}{10}$

C. $\frac{0.03 \times 4 \times 10}{2}$

D. $\frac{0.03 \times 2 \times 10}{4}$

2. Which of the following forms mechanical energy ?

A. Electrical energy and kinetic energy.

B. Potential energy and nuclear energy.

C. Nuclear energy and kinetic energy.

D. Potential energy and kinetic energy.

3. In which of the following devices is kinetic energy convened to electric energy?

A. An accumulator.

B. A dynamo.

C. An electric molar.

D. A combustion engine.

4. A car of mass 1.5×10^3 kg climbs a hill in 900 seconds. If the top of the hill is 50m above the starting point, find the average power output of the engine.

A. 1.38×10 W

B. 8.33×10^2 W

C. 5.00×10^3 W

D. 7.50×10^5 W

5. Which one of the following statements is true about energy transformation

A. A steam engine changes heat energy into mechanical energy. D

B. A thermopile changes electrical energy to heat energy.

C. A dynamo changes electrical energy to mechanical energy.

D. A microphone changes electrical energy to sound energy.

6. A crane raises a mass of 500 kg vertically upwards at a speed of 1 0 ms^{-1}. Find the power developed.

A. 5.0×10^0

B. 5.0×10^1

C. 5.0×10^2

D. 5.0×10^4

7. A stone is released from a height of 20m above the ground. Find its height above the ground when its speed is $10ms^{-1}$

A. 5m B. 10m C. 15m D. 20m

8. The energy changes that take place when a stone falls freely from rest to the ground can be orderly arranged as:

A. Kinetic energy ➔ Potential energy ➔ Sound energy ➔ Heat.

B. Sound energy ➔ Potential energy ➔ Kinetic energy ➔ Heat.

C. Potential energy ➔ Sound energy ➔ Kinetic energy ➔ Heat.

D. Potential energy ➔ Kinetic energy ➔ Heat energy ➔ Sound.

9. The principle of conservation of energy states that;

A. energy is the ability to do work
B. energy is composed of kinetic and potential energy
C. energy will always be converted from one form to another
D. energy cannot be created or destroyed but it can be changed from one form to another.

10.

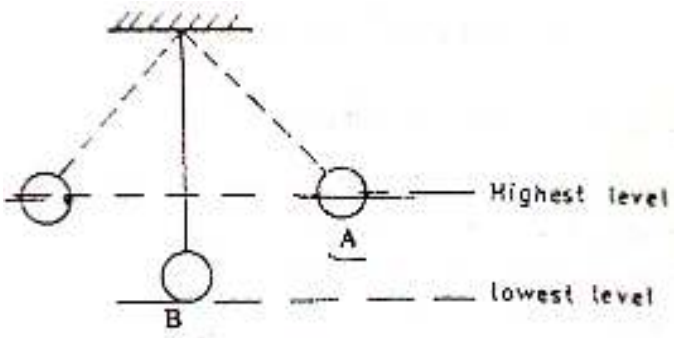


Fig.3

The diagram in the figure 3 shows an oscillation pendulum lob. Which of the following statements is true about its motion?

a) the kinetic energy at B is equal to the kinetic energy at A
b) the kinetic energy at B is less than the potential energy at A
c) the kinetic energy at B is equal to the potential energy at A.
d) the kinetic energy at B is greater than the potential energy at Z

11. A boy pulls a block of wood with a force of 30 N through a distance of 300 m in 2 minutes. Find the power he develops if he pulls the block at constant speed.

A. $\frac{30\times300}{2}$ C. $\frac{30\times2\times60}{300}$

B. $\frac{30\times300}{2\times60}$ **D.** $\frac{300}{2\times30\times60}$

12. A water pump raises 2000kg of water through a vertical height of 72m in one hour. Calculate the power of the pump.

A. 40000W
B. 4000W
C. 400W
D. 40W

13. Which one of the following statements is true of a wedge used as a simple machine?

A. A very small force is required to lift a big load.
B. Work done is always so much.
C. Effect on the wedge is applied vertically.
D. There is no frictional force.

14. In which of the following devices is kinetic energy converted into electrical energy?

A. An accumulator.
B. Dynamo.
C. An electric motor.
D. A combustion engine.

15. At what height above the ground must a mass of $5kg$ be to have a potential energy equal in value to the kinetic energy possessed by a mass of $15kg$ moving with a velocity of $10ms^{-1}$

A. $3\ m.$
B. $15\ m.$
C. $30\ m.$
D. $10\ m.$

16. Which one of the following is a device in which mechanical energy is converted to electrical energy?

A. An electrical cooker
B. An electric train
C. A generator
D. A motor

17. A grid of height 106m lifts a 20 litre jerrycan full of water from the ground to her head. Neglecting the mass of empty jerrycan. Find the work done.

A. 32J
B. 230J
C. 320J
D. 2300J

18. A boy of mass 20kg develops a power of 20W after climbing steps for 80s. If each step is 20cm high, how many steps did he climb?

A. 400 steps B. 100 steps C. 40 steps D. 4 steps

ESSAY

1. (a) Define a joule.

(b)A stone of mass 500g is thrown vertically upwards with a velocity of $15ms^{-1}$.

Calculate;

i) the potential energy at the greatest height.

ii) the kinetic energy on reaching the ground.

2. (a) (i) State the energy changes which take place when a dry cell is connected to a torch bulb using connecting wires.

(ii) A girl of mass 50 kg runs up a flight of 60 steps in 10seconds. Given that each step is 0.30m high, determine the power developed by the girl.

(b) A block and tackle pulley system has 3 pulley wheels in the upper fixed block and 2 pulley wheels in the lower movable block. Determine the load which can be lifted by an effort of 350 N if the efficiency of the system is 80%.

3. (a) Define the term gravitational potential energy.

(b) A body of mass 800 kg moves with a velocity of 72km h^{-1}, calculates its kinetic energy.