S.2 PHYSICS

TOPICAL REVISION QUESTIONS.

CHAPTER ONE: MEASUREMENTS

1. Which of the following is a fundamental quantity?

   A. Time B. Density C. Volume D. Area

2. What does a beam balance measure?

   A. Area B. Mass C. Length D. Density

3. Which one of the following is not a method of science?

   A. Measurement B. Observation

   C. Experimentation D. Presentation

4. Which one of the following are not matter?

   I. Steam II. Pencil III. Light IV. Space

   A. I and II B. II and III C. III and IV D. I and IV.

5. How many cubic centimeters are there in a litre?

   A. 500 B. 100 C. 2000 D. 1000

6. The sides of a black board are 2m and 5m, What is the surface area in m^2 ?

   A. 0.1 B. 10 C. 1 D. 7

7. How many mm^2 are in 0.032 dm^2.

   A. 3.2 B. 320 C. 32 D. 0.0032

8. Find the correct expression.

   A. Litre is a unit of length.

   B. 1 A is equal to 1 ten-thousandth of a micron.

   C. A day is equal to one complete rotation of the earth.

   D. A graduated cylinder is used to measure volume.

9. What is equivalent to 5 minutes?

   A. 30s B. 60s C. 120s D. 300s

10. How many minutes are there between 05: 30 and 21:15?

    A. 715 B. 945 C. 1595 D. 900

11. The width of a meter rule is accurately measured by a

A. micrometer screw gauge B. vernier caliper

C. tape measure D. meter rule

12. A set of apparatus that is suitable for measurement of the volume of an irregular object includes;

A. Over flow can, measuring cylinder, irregular object and a string.

B. Measuring cylinder, irregular object, over flow cans, flask

C. Overflow can,. Irregular objects, string, retort sand and burette

D. Burette, overflows can, irregular object, a string, measuring cylinder, and retort stand.

13. Convert $25cm^3$ into m^3

A. 2.5×10^5 B. 2.5×10^2 C. 2.5×10^{-1} D. 2.5×10^{-5}

14. Three of the fundamental physical quantities are:

A. Density, mass and time B. Length, time and mass

C. Length, time and weight D. Volume, density and mass

CHAPTER TWO: DENSITY

1. To calculate the density of an object, which one of the following must be known?

i. Height ii. Volume iii. Area iv. Mass v. Weight

A. i and ii B. ii and v. C. iii and iv D. ii and iv

2. A block of wood 10m x 5m x 4m has a mass of 80,000 kg. What is the density of this wood?

A. $2000 kgm^{-2}$ B. $4000\ kgm^{-2}$ C. $200\ kgm^{-2}$ D. $400\ kgm^{-2}$

3. The density of gold is $19.3\ gcm^{-2}$. What is the mass of $10cm^3$ gold?

A. 19.3 g B. 0.193g C. 1.93g D. 193g

4. What is the mass of the copper cube having each side 2cm? (take $d_{copper} = 9\ gcm^{-3}$)

A. 0.18g B. 72g C. 180g D. 36g

5. What is the volume of 60g wood? ($density_{wood} = 0.6\ gcm^{-3}$)

A. $10cm^3$ B. $36cm^3$ C. $100cm^3$ D. $360cm^3$

6. Study the table below and use it to spot the correct answer.

Material	Density (gcm^{-3})	Mass (g)
K	3	60
L	9	180
M	6	360
N	5	200

From the values shown in the table which material has the biggest volume?

A. K B. L C. M D. N

7. What is the volume and mass of the block which measures by 2m, by 3m by 5m if its density is 1500 kgm^{-3}?

A. $50m^3$; 75 000 kg B. $100\ m^3$; 75 000 kg

C. $30m^3$; 75 000 kg D. $30\ m^3$; 75 000 kg

8. Two litres of corn oil has a mass of 1. 85kg. What is the density of the oil?

A. 1850 kgm^{-3} B. 925 kgm^{-3} C. 185 kgm^{-3} D. 92.5 kgm^{-3}

9. If an object of volume $0.02m^3$ weighs 500 N in a liquid of density 2000 kgm^{-3}, what is the weight in air?

A. 900 N B. 1000 N C. 400 N D. 600 N

10. Which one of the following is the SI unit of density?

A. kgm^3 B. kgm^{-3} C. gcm^{-3} D. kgm^{-3}

11. If 10g water and $10cm^3$ alcohol are mixed what will be the mass of the mixture?

(density of $_{alcohol}$ = 0.80 gcm^{-3})

A. 18g B. 20g C. 16g D. 19g

12. A tin containing 5 litres of paint has a mass of 8.5kg. The mass of the empty tin is 2.0kg, the density of the paint is

A. 1.3kg m^{-3} B. $1.3x10^3$kg m^{-3} C. $1.7x10^3$kg m^{-3} D. $2.1x10^3$kg m^{-3}

13. A rectangular block of tin is 0.5m long and 0.01m thick. Find the width of the block if its mass and density are 0.45kg and 9000 kg m^{-3} respectively.

A. $0.005x0.45x9000m$ B. $\frac{0.45}{9000x0.005}m$

C. $\frac{0.005}{0.45x9000}m$ D. $\frac{0.45x0.005}{9000}m$

14. A box of dimensions 0.2m by 0.3m by 0.5m is full of a gas of density 200kgm^{-3}. The mass of the gas is

A. $3x10^{-2}$kg B. $6.0x10^0$kg C. $2x10^2$kg D. $6.7x10^3$kg

15. A piece of material of mass 200g has a density of 25kgm^{-3}. Calculate its volume in m^3.

A. $\frac{200}{25}$ B. $\frac{200}{1000x25}$ C. $\frac{1000x25}{200}$ D. $\frac{1000x200}{25}$

16. Two solid cubes have the same mass but their edges are in the ratio 4:1. What is the ratio of their densities?

A. 1:4 B. 1:8 C. 1:16 D. 1: 64

17. A tin containing $6x10^{-3}$ m^3 of paint has a mass of 8kg. If the mass of the empty tin with the lid is 0.5kg, calculate the density of the paint in kgm^{-3}

A. $\frac{8x0.5}{6x10^{=3}}$ B. $\frac{7.5}{6x10^{-3}}$ C. $\frac{8x10^6}{6x10^{-3}}$ D. $\frac{8.5x10^6}{6x10^{-3}}$

18 A tank 2 m tall base area of 2.5 m^2 is filled to the brim with a liquid which exerts a force of 40000N at the bottom. Calculate the density of the liquid.

A. $\frac{4000}{25x2x10}kgm^{-3}$ B. $\frac{40000}{2.5x2x10}kgm^{-3}$ C. $\frac{40000}{25x2x10}kgm^{-3}$ D. $\frac{40000}{2.5x2}kgm^{-3}$

19. The following reading were recorded when measuring the density of a stone; Mass of the stone = 25g, volume of water = 25 cm^3, volume of water and

stone = 35cm^3 .What is the density of the stone?

A. $\frac{25}{10}$ gcm^{-3} B. $\frac{35}{30}$ gcm^{-3} C. 10 gcm^{-3} D. $\frac{25}{35}$ gcm^{-3}

20. Liquid Y of a volume 0.40m^3 and density 900 kgm^{-3} is mixed with liquid Z of volume 0.35 m^3 and density 800 kgm^{-3}. Calculate the density of the mixture.

A. 800 kgm^{-3} B. 840 kgm^{-3} C. 850 kgm^{-3} D. 900 kgm^{-3}

CHAPTER THREE: FORCES.

1. What is the mass of a man on the earth if his mass on the moon is 60kg.

A. 6kg B. 10kg C. 60kg D. 360kg

2. Assume that you are taking measurements with a spring balance (dynamometer), where can you get the greatest reading for the same object?

A. At the centre of the earth B. On the moon

C. At the equator D. At the poles.

3. What is the name of any push or pull exerted?

A. Mass B. Force C. Friction D. Tension

4. What do we call the pull of gravity on an object?

A. Mass B. Weight C. Moment D. Tension

5. Which one of the following is **not** a measuring tool?

A. Equal-arm balance B. Dynamometer C. Lever D. Ruler

6. Which one of the following is the unit of weight?

A. Newton B. Kilogram C. Meter D. Ton

7. A mass of 60kg weighs 600N on the earth and 100N on the moon. What is the mass and weight of an object on the earth if it weighs 50N on the moon?

A. 60kg mass, 600N weight B. 10kg mass, 60N weight

C. 30kg mass, 300N weight D. 5 kg, mass, 100N weight

8. Which one of the following is a force?

A. Energy B. Mass C. Weight D. Speed

9. Which one of the following statements is **not** correct?

A. Force can change the speed of an object.

B. Force can change the shape of an object.

C. Force can change the direction of motion.

D. Force can change the mass of an object.

10. Which one of the following are SI units of mass and weight?

A. g and n respectively B. N and kg respectively

C. kg and g respectively D. kg and N respectively

CHAPTER FOUR: LIGHT.

Exercise 1.

1. When a pin-hole camera is moved nearer an object, the size of the image

A. remains the same B. becomes smaller

C. becomes larger D. becomes diminished

2. In a pin-hole camera, sharper and taller images are obtained by

A. widening the hole and moving the object farther

B. narrowing the hole and moving the object nearer

C. using a longer camera with a wider hole

D. using a shorter camera with a narrower hole

3. (a) Describe an experiment to show that light travels in a straight line.

(b) With the aid of a diagram, illustrate how the shadows are formed when an opaque object is placed between an extended source of light and a screen.

4. (a) An object of height 4 cm is placed 5 cm away from a pin-hole camera. The screen is 7 cm from the pinhole.

(i) Draw a scale a ray diagram to show the formation of an image by a pinhole camera.

(ii) What's the nature of the image?

(iii) Find the magnification.

(iv) Explain what happens to the image if the pinhole is made larger.

(b) Draw a diagram to show the formation of a partial and total solar eclipse.

EXERCISE 2.

1. Light energy is reflected when

   A. angle of incidence is greater than angle of reflection

   B. angle of incidence is equal to angle of refraction

   C. angle of incidence is equal to angle of reflection

   D. the normal at the point of incidence makes the same angle as the incident ray.

2. When reflection occurs in a plane mirror

   (i) the image is real, erect and magnified

   (ii) the angle of reflection is equal to the angle of incidence

   (iii) the incident ray and reflected ray lie in different planes

   (iv) the object and the image are at the same distance from the mirror

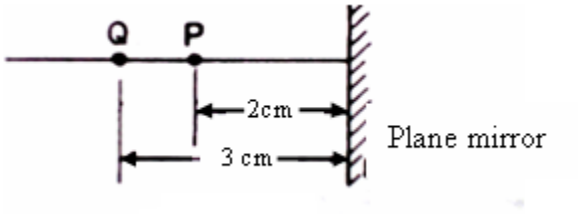
   A. (i), (ii) and (iii) only B. (ii) and (iv) only

   C. (i), (ii) and (iv) only D. (iv) only

3. An object is placed 30 cm in front of a plane mirror. If the mirror is moved a distance of 6 cm towards the object, find the distance between the object and its image.

   A. 24 c m B. 36 cm C. 48 cm D. 60 cm

4. Objects P and Q are placed at distances of 2 m and 3 m respectively from a plane mirror as shown in figure 14.1. Find how far the image of P is from Q.



   A. 1m.
   B. 4m.
   C. 5m.
   D. 7m.

5. A person observes the image of a pin placed in front of a plane mirror as shown in the figure 14.2 below. The reflected beam from the pin reaching the observer is a

A. virtual beam
B. divergent beam
C. parallel beam
D. convergent beam

SECTION B

6. a) With the aid of diagrams, distinguish between diffuse and regular reflection.

   b) (i) State the laws of reflection.

   (ii) Describe an experiment to verify the laws of reflection of light.

7. (a) State the applications of reflection in plane mirrors.

   (b) Describe the structure and the mechanism of the periscope.

CHAPTER FIVE: HEAT AND THERMOMETRY.

1. The distance between the fixed points on mercury in glass thermometer is 25cm. What is the temperature in degrees Celsius if the mercury thread is 8cm long?

   A. $\frac{100 \text{ x } 25}{8}$ B. $\frac{100 \text{ x } 8}{25}$ C. $\frac{25 \text{x } 8}{100}$ D. $\frac{100 \text{ x } 25}{10}$

2. Which one of the following fluids is the best conductor of heat?

   A. Air B. alcohol C. water D. mercury

3. The graph in the figure shows water being heated from -10^0c to 100^0c.

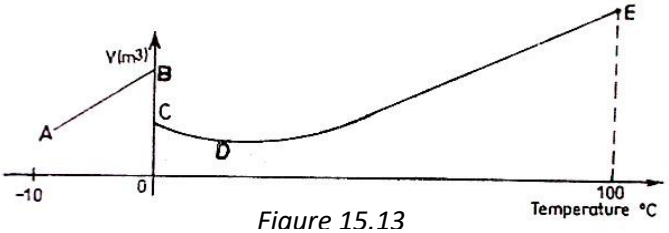


Figure 15.13

At what point does the substance have maximum density?

A. E

B. C

C. D

D. B

4. A bimetallic strip operates on the principle that metals

   A. are heat controllers. B. are good heat conductors.

   C. have different rates of expansion. D. have the same rates of expansion.

5. In order to make a mercury thermometer more sensitive, the

A. degree markings must be further a part.

B. diameter of capillary tube must be reduced.

C. volume of the mercury bulb must be reduced.

D. capillary tube must be open to air.

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

A. cap expands more than the glass

B. glass in the neck of the bottle contracts

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

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

7. Which of the following changes occur when a metal block is heated?

	Volume	Mass	Density
A	increases	remains the same	decreases
B	increases	Increases	increases
C	remains the same	remains the same	decreases
D	increases	remains the same	increases

8. The distance between the lower and the upper fixed points on the Celsius scale in unmarked mercury-in- glass thermometer is 25cm. If the mercury level is 5cm below the upper fixed point, then the temperature is

A. 5^0C B. 20^0C C. 80^0C D. 95^0C

9. The unusual expansion of water when it is cooled between 4^0C and 0^0C is due to

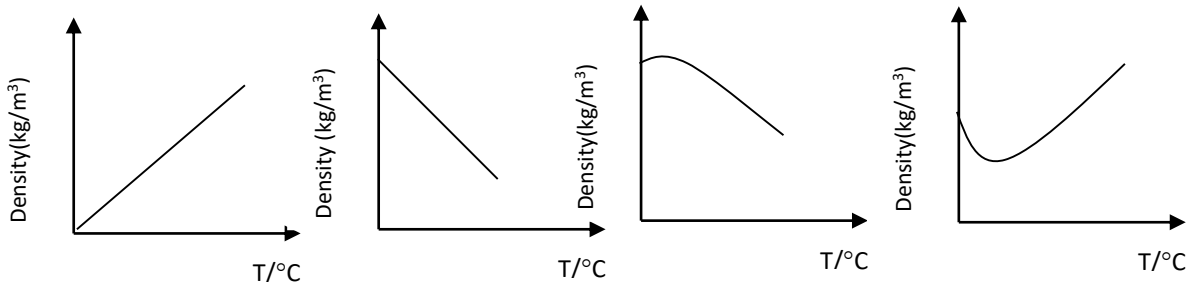
A. water molecules coming closer together to form a compact structure

B. formation of a new arrangement of molecules which requires a large volume

C. the increased repulsive forces between the water molecules

D. differences in the sizes of water and ice molecules

10. Which one of the following graphs shows how the density of water varies with temperature between 0^0C and 100^0C?



SECTION B

1. (a) State: (i) Any two thermometric liquids you know.

(ii) The properties of a thermometric liquid.

(iii) Advantages of mercury over alcohol as used a thermometer.

(b) Define the following terms.

(i) Lower fixed point.

(ii) Upper fixed points.

(a) Describe how the fixed points of a thermometer are determined in the laboratory.

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

3. The distance between the lower and upper fixed points on the Celsius scale in unmarked mercury-in-glass thermometer is 25 cm. If the mercury level is 5 cm below the upper fixed, calculate the temperature value.

4. Convert the following temperature readings to Celsius scale.

(a) 750 K (b) 400 K (c) 973 K

5. Convert the following temperature readings to Kelvin scale.

(a) 340 ℃ (b) 130 ℃ (c) 20 ℃

CHAPTER SIX: PARTICULATE NATURE OF MATTER.

1. When a crystal of potassium permanganate is carefully placed at the bottom of a beaker containing water, it spreads uniformly in the water after some days. This is due to:

A. diffusion B. capillarity

C. surface tension D. Brownian motion

2. Soap is used to wash clothes because it

A. increases capillarity in the clothes

B. reduces capillarity in the clothes

C. increases surface tension allowing water to penetrate the dirt easily.

D. reduces surface tension allowing water to penetrate the dirt easily.

3. Brownian motion experiment shows that molecules of gasses are

A. Stationary B. in motion in one direction only

C. In constant random motion D. More closely packed than molecules in liquid.

4. When mercury is spilt on glass it forms small spherical droplets because its

A. Density is high. B. Surface tension makes its surface elastic.

C. Molecules are small D. Cohesive force is greater than adhesive force with the glass.

5. A needle may float on a clean water but sinks when some detergent is added to water because the detergent

A. reduces the density of water.

B. increases adhesive force between the needle and water molecules.

C. lowers the surface tension of water.

D. makes water surface slippery.

6. The particles in a solid at room temperature are

A. Close together and vibrating. B. Close together and stationary.

C. Far apart and moving at random. D. Close together and moving at random.

7. Mercury forms spherical drops when spilt on a wooden bench because it

A. is very viscous B. has a high density

C. has a high cohesive force D. has a low surface tension

8. Water wets glass because

A. adhesive forces between water and glass molecules are greater than cohesive forces

B. adhesive forces between water and glass molecules are more than cohesive forces

C. surface tension forces between water and glass molecules are more than adhesive forces.

D. Surface tension forces are less than cohesive forces.

9. The forces which hold the molecules in water drop together are called…

A. Surface tension B. Adhesive

C. Cohesive D. Electrostatic forces

10. When water spreads on a glass plate, the forces between it's molecules and glass molecules are due to

A. Surface tension B. Adhesion C. Cohesion D. Viscosity.

11. In a Brownian motion experiment, the

A. smoke particles are seen moving about with uniform velocity.

B. motion observed is caused by the air molecules colliding with the smoke particles.

C. Size of particles are found to increase the motion.

D. smoke cell has a vacuum within it.

12. When smoke is introduced in a smoke cell and observed under a microscope, it is observed as particles moving at random. This is mainly because the particles

A. are hot B. collide with one another

C. collide with air molecules D. collide with the walls of the smoke cell

13. Which of the following statements is incorrect when a tin containing air tightly sealed is heated?

A. the average speed of molecules increases

B. the molecules of air hit the walls of the tin harder

C. The molecules of the air strike the walls of the tin less often.

D. The pressure inside the tin increases.

14. When a room is filled with smoke, the smoke tends to concentrate

A. around the walls B. close to the walls

C. close to the roof D. midway between the roof and the floor

15. Capillary rise in a tube dipped in water is due to

A. Surface tension B. adhesive force being greater than cohesive force
C. high vapour pressure D. Atmospheric pressure acting on the surface of the water

16. Which of the following statements about states of matter is/are true?

(i) a liquid has a definite volume but no a definite shape.

(ii) a vapour has no definite volume and no definite shape.

(iii) a solid has a definite volume and shape.

(iv) a gas has a definite volume and shape.

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

17. When viewing Brownian motion in a smoke cell the observer sees:

A. Air molecules moving in a random motion
B. air molecules vibrating regularly
C. air molecules colliding with each other

D. Smoke particles in a random motion.

18. Which one of the following below is a matter?

A. Heat B. Sound C. Air D. Light

19. Which of the following statements below is *wrong*?

A. Matter is made up of atoms. B. Solid, liquid and gas are states of matter.

C. Solids and liquids have definite shape and volume. D. Gas molecules move freely.

20. The diagrams in figure show two capillary tubes standing in a trough of mercury and two capillary tubes standing in a trough of water. The correct order of arrangement of the tubes in order of increasing height of the liquid column is;

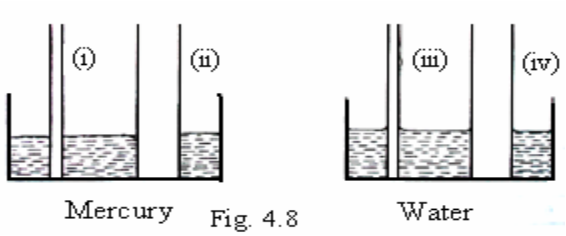


Fig. 4.8

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

SECTION B

21. Describe the relationship between molecules of liquids, gases and solids in terms of:

(a) the arrangement of the molecules throughout the bulk of the material,

(b) the separation of the molecules,

(c) the motion of the molecules and

(d) The forces of attraction between the molecules.

22. (a) (i) What is meant by the term *diffusion*?

(ii) State factors on which diffusion depends.

(b) Describe an experiment to show diffusion in liquids.

(c) A porous pot containing air is connected to a water manometer. Explain what happens if hydrogen is let in the space surrounding the as shown in the figure.

(d) (i) Describe a simple experiment to show surface tension in water.

(ii) State two factors, which affect surface tension.

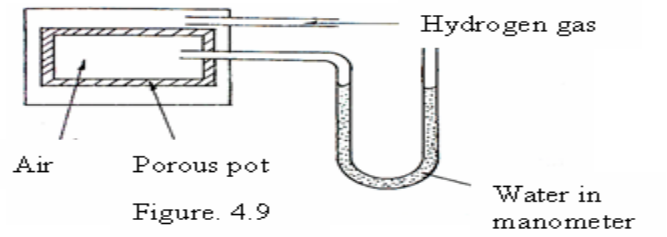
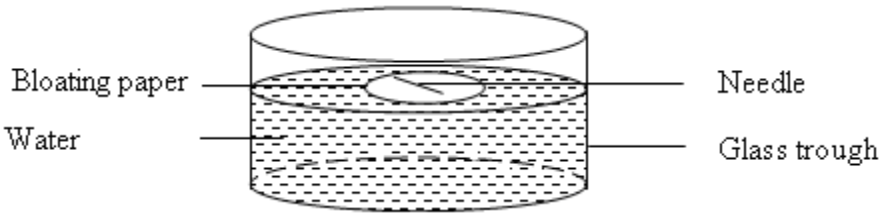


Figure. 4.9

23. A pin is placed on a bloating paper, which is on the surface of water as shown in figure 4.10 below



(a) Explain what happens after some time.

(b) Explain what happens when some soap solution is carefully added to the water.

24. Draw a well labelled diagram you would use to describe Brownian motion.

(a) How is the motion of the smoke particles best described?
(b) What accounts for the motion of the smoke particles?
(c) The motion is viewed using bigger smoke particles.
What difference in the motion would this lead to.

Give reason for the difference.

25. The diagram in figure 4.11 shows an arrangement for observing Brownian motion.

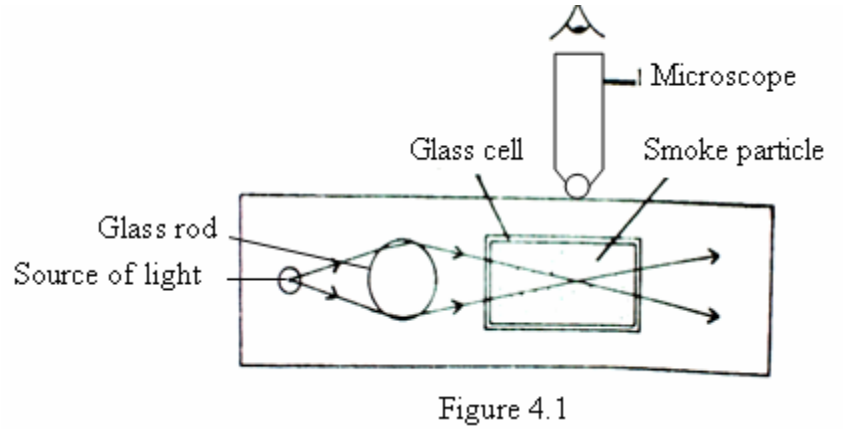


Figure 4.1

(a) Explain:

(i) The observation made.

(ii) What will be observed when the glass cell temperature is raised.

(b) State one factor which determines the rate of diffusion of a gas.

26. (a) Distinguish between cohesion and adhesion.

(b) Sketch diagrams to show the level of liquid in a capillary tube that is immersed in a liquid which has greater;

i) Cohesion than adhesion

ii) Adhesion than cohesion

27. (a) Define surface tension.

(b) Describe a simple experiment to show the existence of surface tension in water.

(c) Explain the following observations as fully as you can.

(i) A small needle can be floated on the surface of water, but if a drop of detergent is added to the water the needle sinks.

(ii) Damp courses are used in modern houses.

(iii) Gases can easily be compressed but liquids cannot.

(iv) Diffusion occurs more easily in a gas than in a liquid.

28. (a) State the kinetic theory of matter.

(b) Describe experiments, in each case, to show:

(i) Diffusion in liquids

(ii) Diffusion in gases.

(c) Use kinetic theory to explain the result of your experiment demonstrating the diffusion in gases.

CHAPTER SEVEN: WORK, ENERGY AND POWER.

1. A crane raises a mass of 500 kg vertically upwards at a speed of 10 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

2. A girl whose mass is 50 kg runs up a staircase 25 m high in 4 s. Find the power she develops.

A. $\frac{50 \times 4}{25} W$ B. $\frac{50 \times 10}{25 \times 4} W$ C. $\frac{50 \times 25}{4} W$ D. $\frac{50 \times 10 \times 25}{4} W$

3. A train traveling at a constant speed of 20 m/s overcomes a resistive force of 8 kN. The power of the train is

A. (8 x 20) W B. (8x10x20) WC. (8 x 100 x 20) W D. (8 x 1000 x 20) W

4. A pump is rated at 400W. How many kilograms of water can it raise in one hour through a height of 72m?

A. 0.8kg B. 5.6kg C. 33.3kg D. 2000kg

5. A boy carrying a load of 6 kg runs upstairs. If the work that the boy does is 300 J, find the height of the stairs.

A. 3m B. 5m C. 6m D. 10m

6. Tony can pull a box 2m in 5 sec. Ever (Tony's sister) can pull the same box in 10 sec. Assuming both apply the same force, what is the ratio of Tony's power to the sister's power = ?

A. 1 B. 2 C. ½ D. 4

7. An engine exerts a force of 2000N at a speed of 15ms^{-1}. Find the power developed by the engine in kW.

A. 30 000 B. 3 000 C. 300 D. 30

8. A constant force of 5N acts on a body and moves it through a distance of 20m in 10 seconds. Calculate its power.

A. 2.5W B. 10W C. 40W D. 100W

9. 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 x 2 x 4 x 10 B. $\frac{0.03 \text{ x } 4 x \ 2}{10}$ C. $\frac{0.03 \text{ x } 4 x \ 10}{2}$ D. $\frac{0.03 \text{ x } 10 \text{ x } 2}{4}$

10. A bullet of mass 0.02kg is fired with a speed of 40m s^{-1}. Calculate its kinetic energy.

A. 0.4 J. B. 0.8 J. C. 16 J. D. 32 J.

11. Which of the following statements is true about an electric motor? It changes

A. Kinetic energy to electric energy B. Electrical energy to light energy

C. Electrical energy to kinetic energy D. Chemical energy to electrical energy

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

A. $\frac{30 \text{ x } 300}{2}$ B. $\frac{30 \text{ x } 300}{2 \text{ x } 60}$ C. $\frac{30 \text{ x } 2 \text{ x } 300}{300}$ D. $\frac{300}{2 \text{ x } 60 \text{ x } 30}$

13. A ball of 1kg bounces off the ground to a height of 2m after falling from a height of 5m, find the energy lost.

A. 5 J B. 20 J C. 30 J D. 50 J

14. A man weighing 800N climbs a vertical distance of 15m in 30s. What is the average power out put?

A. 80/3 W **B**. 800/15 W **C**. 400 W **D**. 5 kW

15. In which action(s) below is there a work done?

I. Pushing a wall without moving it. II. Taking a book from a table to a higher shelf.

III. Walking on a bridge for 50 m

A. I only B. II only C. III only D. II and III only

16. A bullet of mass 5g is fired at a speed of 400ms^{-1}. How much energy does it have?

A. ½ x 5 x 10^2 x 400J B. ½ x 5 x 10^3 x 400J

C. ½ x 5 x 10^{-3} x 400 x 400J D. ½ x 5 x 10^2 x 400 x 400J

17. 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

18. An object, of mass 2kg, dropped from the top of a building hits the ground with kinetic energy of 900J. The height of the building is

A. 30m B. 45m C.90m D. 180m

19. A mass attached to the end of a string moves up and down to maximum and minimum points X and Y as shown in figure 7.1 below. When the mass is at X the

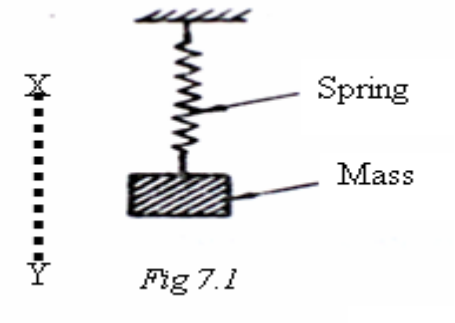


Fig 7.1

A. kinetic energy is maximum, potential energy is minimum

B. kinetic energy is zero, potential is maximum

C. kinetic energy is equal to potential energy

D. kinetic energy and potential energy are both zero

20. An electric motor of power 500 watts lifts an object of 100 kg. How high can the object be raised in 20 sec?

A. 40m **B**. 30m **C**. 20m **D**. 10m

21. A motor can pull a 400 kg box up to a height of 10m in 4 sec. What is the power of the motor in kW?

A. 10 **B**. 20 **C**. 30 **D**. 40

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

Highest level

Lowest level

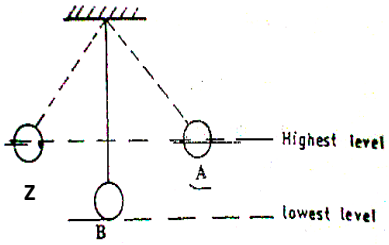


Figure 7.2

A. the K.E at B is equal to the K.E at A

B. the K.E at B is less than the P.E at A

C. the K.E at B is equal to the P.E at A.

D. the K.E at B is greater than the P.E at Z.

23. A toy car is pulled with a force of 10 N for 5m. If the friction force between the block and the surface is 5N, what is the net work done on the toy car?

A. 50 J B. 100 J C. 200 J D. 25 J

24. 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.

25. Ali and Veli move identical boxes equal distances in a horizontal direction. Since Ali is a weak child, the time needed for him to carry his box is two times longer than for Veli. Which of the following is true for Ali and Veli.

A. Ali does less work than Veli B. Veli does less work than Ali.

C. Each does the same work. D. Neither Ali nor Veli do any work

SECTION B

26. (a) Define the following terms.

(i) Work.

(ii) Power.

(b) State and define the SI units of the terms you have defined above.

(c) A crane lifts a load of 3500 N through a vertical height of 5 m in 5 second.

Calculate: (i) the work done.

(ii) the power developed by the crane.

27. (a) Define the term energy and state the SI unit for measuring it.

(b) Distinguish between potential energy and kinetic energy.

(c) A block of mass 2 kg falls freely from rest through a distance of 3m. Find the kinetic energy of the block.

28. (a) Define a joule.

(b) Describe briefly how you can measure your power.

(c) A boy of mass 45 kg runs up a flight of 60 steps in 5 seconds. If each step is 12 cm.

Calculate: (i) the work done against gravity by the boy.

(ii) the power developed by the boy.

29. (a) (i) State the types of heat engines you know.

(ii) Describe the mechanism of operation of a four stroke petrol engine.

(b) (i) What are the factors that affect the efficiency of an engine?

(ii) State how the factors you have stated in (c) above are minimized in a heat engine.

CHAPTER EIGHT: MACHINES.

1. Which one of the following are true for simple machines?

I. If there is a gain in force, there is a loss in distance.

II. The mechanical advantage is the ratio of the load to the effort.

III. There is a gain in work.

A. I-II B. II-III C. I-III D. I-II-III

2. Which one of the following below is an example of a 3rd class lever?

A. tweezers B. equal –arm balance

C. see- saw D. fixed pulley

3. The system that uses fixed and movable pulleys is called

A. windlass B. inclined plane C. block and tackle D. lever

4. Which one of the following describes the type of pulley, and the lever that the pulley epresents?

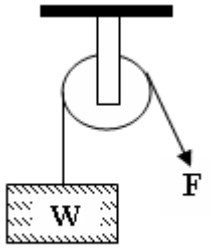


Fig. 8.20

A. Fixed pulley – Ist class

B. Fixed pulley – IIIrd class

C. Movable pulley – IInd class

D. Movable pulley – IIIrd class.

5. In a windlass, which changes decrease the force needed to pull up the load

I. increasing the radius of the wheel.

II. decreasing the radius of the wheel

III. decreasing the radius of the axle.

A. I-II B. I-III C. II only D. III only

6. A force F is acting on a block of mass 2 kg to push it on an inclined plane. If F = 5 N, what is the length of the plane?

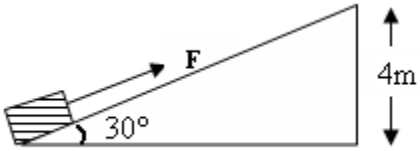


Figure 8.21

A. 4 m B. 8 m

C. 12 m D. 16 m

7. A screw of length 5 cm enters totally into a wooden block after 25 turns. What is the pitch of the screw?

A. 0.1 cm B. 0.2 cm C. 0.4 cm D. 0.5 cm

8. The maximum efficiency that can be obtained with four pulleys and a mechanical advantage of 3 is?

A. 100% **B. 75%** **C. 12%** **D. 1.33%**

9. Calculate the effort when a load of 72 N is raised using a block and tackle system of 5 pulleys and efficiency 80%.

A. 11.52N B. 18N C. 57.6N D. 288N

10. The bock and tackle system in the figure has an efficiency of 80%. The load, which can be lifted by an effort of 10N, is

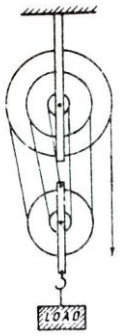


Figure 8.22

A. 4N

B. 8N

C. 40N

D. 50N

11. A machine which is 80% efficient is run by an engine with an out put of 40 watts. The time taken to raise a load of 1500 N through 0.15 m may be

A. 4.5s B. 5.6 s C. 7.0s D. 28.1s

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

A. Very small force is required to lift a big load. B. Work done is always so much.

C. Effort on the wedge is applied vertically. D. There is no frictional force.

13. Calculate the effort when a load of 72 N is raised using a block system of 5 pulleys and efficiency 80%.

A. 11.52N B. 18N C. 57.6N D. 288N

14. Figure 8.23 shows a light, smooth pulley used to lift a load of 16 N with an effort E. The mechanical advantage of the system is

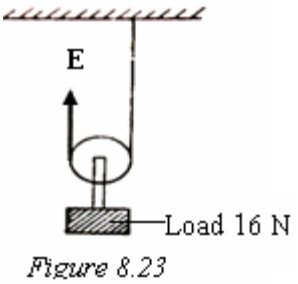


Figure 8.23

A. 128

B. 2

C. 1

D. $^1/_2$

15. Which one of the following is not a correct formula for calculating velocity ratio?

A. V.R $= \frac{l}{h}$ B. $V.R = \frac{Load\ distance}{Effort\ distance}$

C. V.R $= \frac{R}{r}$ D. V.R $= \frac{Number\ of\ teeth\ in\ driven\ wheel}{Number\ of\ teeth\ in\ the\ driving\ wheel}$

SECTION B

16. (a) What is meant by a first class lever?

(b) Give two examples of first class lever.

(c) By means of a lever, an effort of 50 N moves a load of 200 N through a distance of 3m. If the effort moves a distance of 16 m, calculate:

(i) the mechanical advantage

(ii) the efficiency of the system.

17. **(**a) What is meant by efficiency of a machine?

(b) Draw a single string pulley system of velocity ratio 3.

(c) State one reason why the efficiency of a machine is always less than 100%.

18. (a) Define efficiency of a machine.

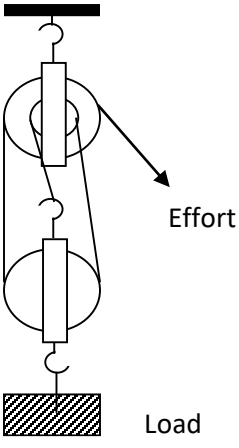


Figure 8.24

(b) The diagram in figure 8.24 above represents a pulley system in which an effort E is applied to raise the load L.

(i) Copy the diagram and indicate the forces acting on the string

(ii) What is the velocity ratio of the system?

(iii) How far will the load move if the effort moves by 2.4m.

(iv) What effort would just raise a load of 960 N, if the mechanical advantage is 2.4.

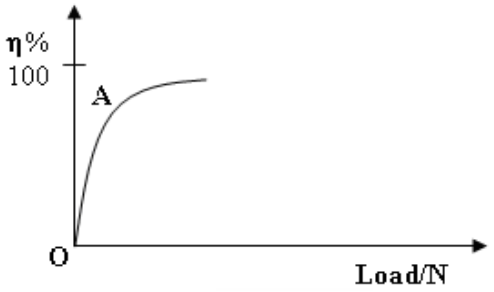
(v) Use your results above to calculate the efficiency of the pulley system.

(c) (i) Draw a sketch graph to show how the mechanical advantage of the pulley system in (b) varies with the load.

(ii) Explain the features of the sketch in (c) (i).

(d) Give two practical examples where pulley systems are used.

19. (a) Draw a labeled diagram to illustrate the lever principle as applied to a wheelbarrow.



(b) The graph in the figure shows the variation of the efficiency of a pulley system with load

Explain why:

(i) part OA of the graph is almost a straight line

(ii) from A, the graph curves and finally levels off before reaching 100%.

20. The figure 8.25 shows a wheel and axle system. When an effort of 300 N is applied, a load of 900 N is raised through a distance of 1.0 m.

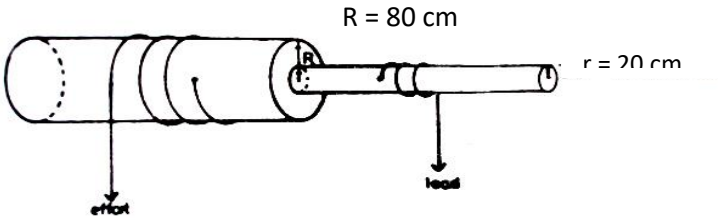


Figure 8.25

Calculate;

(a) the velocity ratio

(b) the efficiency of the system

21. (a) State what is meant by each of the following terms as applied to simple machines:

(i) Mechanical advantage

(ii) Efficiency

(b) (i) Give two reasons why the efficiency of any simple machine is always less than 100%.

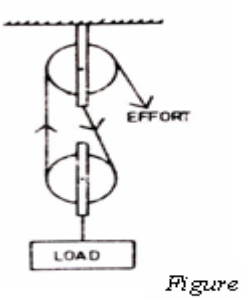


Figure 8.26

(ii) Give two ways in which the efficiency of a machine can be increased.

(c) The figure shows a load of 10 N raised slowly by a simple frictionless pulley system.

(i) What is the velocity ratio of the system?

(ii) Calculate the effort required to lift the load if the mass of the pulley is 0.2 kg.

(iii) If the load is raised through a distance of 5 m in 5 s, calculate the efficiency of the system.

22. Two gear wheels A and B with 80 and 20 teeth respectively lock into each other. They are fastened on axles 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.

Calculate: (a) (i) the velocity ratio.

(ii) the efficiency of the system, if the A drives B.

(b) (i) the velocity ratio.

(ii) the efficiency of the system, if the B drives A.

23. A smooth wooden board 3.6 m long is used to raise a box of 600 N to a height of 1.2 m.

Calculate: (a) The effort required

(b) The M.A of the system.

Failure will never overtake me if my determination to succeed is strong enough. GOOD LUCK

REMEMBER TO STAY HOME AND STAY SAFE.