Name …………………………………………………….…..   Class/Number.………………

GHS   **END OF TERM I EXAMIANTIONS**   **S.3**
                              PHYSICS PAPER ONE   **April 2019**
                                  2hrs: 15min
Instructions:
- Attempt *all* questions.
-         Answers to questions in Section A should be written in the table provided on page One.
- Answers to questions in Section B should be written in the space provided against each question.
- Assume where necessary; Acceleration due to gravity, $g = 10\text{ms}^{-2}$

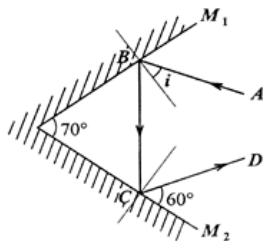| 1.		6.		11.		16.		21.		26.		31.		36.	
2.		7.		12.		17.		22.		27.		32.		37.	
3.		8.		13.		18.		23.		28.		33.		38.	
4.		9.		14.		19.		24.		29.		34.		39.	
5.		10.		15.		20.		25.		30.		35.		40.	

SECTION A
1.   When a mass is hanged from a spring balance and removed, the pointer on the spring balance does not
        return to the initial position because the
        A.   spring was too short.
        B.   extension of the spring was proportional to the mass.
        C.   spring stretched to proportional limit.
        D.   spring extended beyond the elastic limit.

2.   A wheel barrow that is used to carry a load across a soft ground should have a
        A.   narrow wheel because it exerts greater pressure on the ground.
        B.   narrow wheel because it exerts less pressure on the ground.
        C.   wide wheel because it exerts greater pressure on the ground.
        D.   wide wheel because it exerts less pressure on the ground.

3.   A car engine exerts a force of 500 N in moving 1000 m in 200 s. Calculate the power
        developed by the engine.
        A.   200 W   B.   500 W   C.   1000 W   D.   2500 W

4.   When a body is raised above the ground its gravitational potential energy
        A.   is raised.   B.   is lowered.
        C.   remains constant.   D.   changes to kinetic energy.

5.   Which of the following statements is true?
        A.   The temperature at which water freezes is - 273°C.
        B.   The boiling point of water is 373K.
        C.   The value of the absolute zero is 0°C.
        D.   Evaporation is possible at a temperature of 0K.

6.   A mass of 500 g produces an extension of 10 cm in a spring. Find the force that will produce an
        extension of 25 cm.
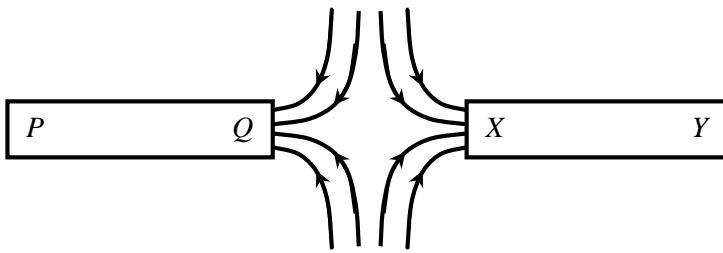   A.   0.5N.   B.   12.5 N.   C.   50.0 N.   D.   200.0 N.

1

7.	Two plane mirrors M_1 and M_2 are inclined to each other at an angle of 70°.

If the ray AB incident on M_1 is reflected as shown in figure above, find the angle of incidence, i.
A.	40°.	B.	50°.	C.	60°.	D.	70°.

8.	When a steel rod is stroked using a bar magnet, the
(i)	rod attracts small steel pins.
(ii)	rod will be charged.
(iii)	magnetic dipoles will be aligned.
A.	(i) only.	B.	(i) and (ii) only
C.	(ii) and (iii) only.	D.	(i) and (iii) only.

9.	A razor blade floating on water sinks when a few drops of paraffin are added to the water because
A.	paraffin is denser than water.	B.	surface tension of water increases.
C.	surface tension of water reduces.	D.	cohesion of water molecules increases.

10.	Which one of the following is true about a periscope? It
A.	gives a laterally inverted image.	B.	is used to observe an obscured object.
C.	is used for viewing distant objects.	D.	gives a magnified image of the object.

11.	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.

12.	Gas leaking from a cylinder, at one corner of a room reaches another comer by way of
A.	diffusion.	B.	evaporation.	C.	Brownian motion.	D.	osmosis.

13.	When oil of volume $6 \times 10^{-3} cm^3$ is dropped on a clean water surface, it forms a circular patch of one molecule of diameter 2 cm. Find the thickness of oil.
A.	$4.77 \times 10^{-4} cm$.	B.	$14.32 \times 10^{-4} cm$
C.	$1.91 \times 10^{-3} cm$.	D.	$5.24 \times 10^{-4} cm$

14.	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 into another.

15.	The possible energy transfer in an electric bulb is
A.	light energy to heat energy.	B.	heat energy to electrical energy.
C.	electrical energy to light energy.	D.	light energy to electrical energy.

16.

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.

17.   The image formed in a plane mirror is
    (i)   the same distance behind as the object is infront.
    (ii)   laterally inverted.
    (iii)   magnified and virtual.
    A.   (i) and (ii) only.   B.   (i) and (iii) only.
    C.   (ii) and (iii) only.   D.   (i), (ii) and (iii).

18.   Radiation in a thermos flask is minimised by
    A.   cork.   B.   vacuum.   C.   felt pad.   D.   silvered glass walls.

19.   The most suitable instrument for measuring the outer diameter of a test tube is
    A.   a ruler.   B.   a tape measure.
    C.   vernier callipers.   D.   a micrometer screw gauge.

20.   A hydraulic brake works on the principle of
    A.   transmission of pressure in a liquid.   B.   distribution of force in a liquid.
    C.   existence of viscosity in a liquid.   D.   high density of a liquid.

21.   In the crushing can experiment, the can collapses because
    (i) the can contracts on cooling
    (ii) pressure outside is greater than pressure inside
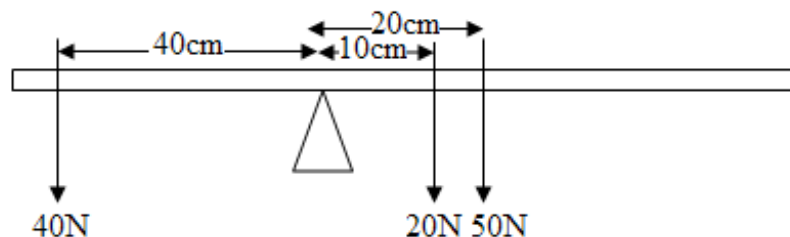   (iii) the steam condenses to produce water and water vapour at high pressure
    A.   (ii) only   B.   (iii) only
C.   C.   (ii) and (iii) only   D.   (i), (ii) and (iii)

22.   Blotting paper is used to dry ink split on a surface by a process called
    A.   osmosis   B.   diffusion.   C.   surface tension.   D.   capillarity.

23.   Forces of 40N, 20N and 50N are applied on a metre rule supported on a knife edge as shown in figure below.
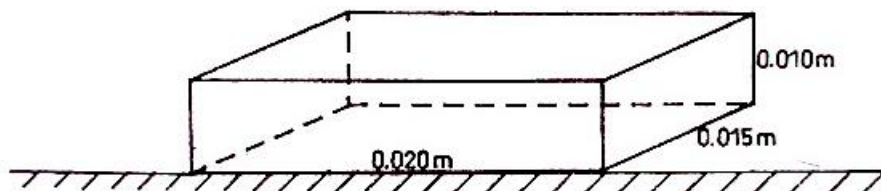

The metre rule will
    A.   balance.   B.   ascillate.
    C.   turn in a clockwise direction.   D.   turn in anti clockwise direction.

24. The three basic quantities of measurement are
    A.   mass, frequency and power.   B.   time, density and pressure.
    C.   area, electric current and volume.   D.   length, mass and time.

25. 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).

26. When potassium dichromate dissolves at the bottom of a water container, it spreads slowly throughout water by a process called
    A.   evaporation.   B.   diffusion.   C.   capillarity.   D.   convection.

27. A material that can be rolled into sheets or drawn into wires without breaking is said to be
    A.   strong.   B.   Elastic.   C.   ductile.   D.   brittle.

28. Radiation is the transfer of heat
    A.   in a liquid which involves the movement of the molecules.
    B.   from one place to another by means of electromagnetic waves.
    C.   through a material medium without the bulk movement of the medium.
    D.   through a fluid which involves the bulk movement of the fluid itself.

29. A piece of metal of mass 120 g is placed in a 100 ml measuring cylinder containing 20 ml of water. Find the density of the metal if the water level rises to the 50 ml mark.
    A. $12 \, g\mathrm{cm}^{-3}$.   B. $2.4 \, g\mathrm{cm}^{-3}$.   C. $4.0 \, g\mathrm{cm}^{-3}$.   D. $6.0 \, g\mathrm{cm}^{-3}$.

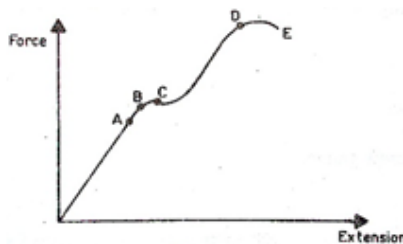30.

A box is placed on top of a table as shown above, with dimensions indicated. If its mass is 40kg, find the pressure it exerts on the table.

A. $\dfrac{40}{0.020 \times 0.015}$ B. $\dfrac{40}{0.015 \times 0.10}$

C. $\dfrac{40 \times 10}{0.020 \times 0.015}$ D. $\dfrac{40 \times 10}{0.020 \times 0.010}$

31.

The above figure shows how the extension of a wire varies with the forces applied. Point B represents
    A.   proportional limit   B.   elastic limit   C.   breaking stress   D.   yield point

4

32. 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.

33. 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. Burrete, overflows can, irregular object, a string, measuring cylinder, and retort stand.

34. Which of the following is true about atmospheric pressure? As the height above the earth's surface increases
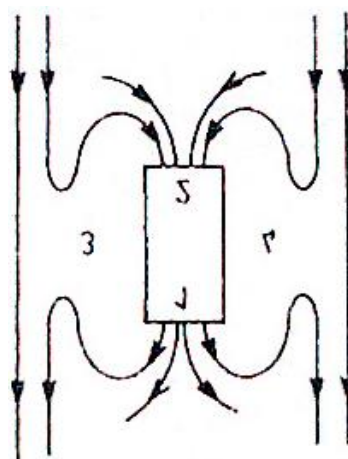
	Density of air	Pressure exerted by air
A.	increases	İncreases
B.	increases	Decreases
C.	decreases	Decreases
D.	decreases	İncreases

35. A glass block of mass 3.0kg rests on a horizontal flat surface. The pressure exerted by the glass block on its base of area $0.12m^2$ is
   A. 25.0Pa.   B. 250Pa.   C. 0.36Pa.   D. 3.60Pa.

36. Which one of the following does not make use of an electromagnet?
   A. Telephone receiver.
   B. Electric bell.
   C. Electric iron box.
   D. Loudspeaker.

37. The strength of an electromagnet depends upon, except
   A. the number of turns in the coil.
   B. the current through the coil.
   C. the polarities of the induced magnetism.
   D. the nature of the material used for the core.

38.

The figure above shows the super position of the earth's magnetic field and the field due to a magnet. Identify point marked 1,2,3 and 4.

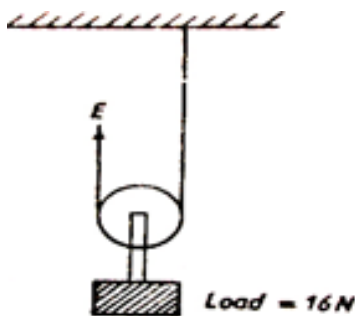|	1	2	3	4
A.	South pole	North pole	Neutral point	Neutral point
B	North pole	South pole	Neutral point	Neutral point
C.	Neutral point	Neutral point	North pole	South pole
D.	Neutral point	Neutral point	South pole	North pole

39.

When the handle, H, of the force pump shown in figure above is moved upwards, the valves at
A.   F and G will both close   B.   F and G will both open
C.   F will close, and G will open   D.   F will open and G will close

40.

The figure above shows a light, smooth pulley used to lift a load of 16N with an effort E. the mechanical advantage of the system is
A.   128   B.   2   C.   1   D. $\frac{1}{2}$

SECTION B

41.   (a)   State the kinetic theory of matter.   (01 mark)

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(b)   A potassium permanganate crystal is carefully placed at the bottom of a beaker containing clear water. Explain what is observed   (03 marks)

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\
\

6

42. (a) Define the joule. (01 marks)

_____

(b) The work done to move a body through a distance of 5m is 30J. Find the force that acts on the body. (03 marks)

_____

_____

_____

_____

43. (a) Define the term lateral inversion as applied to mirrors. (01 mark)

_____

_____

(b) State two properties of an image formed in a concave mirror when the object is placed between the focal point and the mirror. (01 mark)

_____

_____

(c) An object of height 3cm is placed at 20cm in front of a concave mirror. A real image formed is 10cm from the pole of the mirror. Calculate the height of the image formed. (02 marks)

_____

_____

_____

_____

_____

44. (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   (01 mark)

(ii) adhesion than cohesion   (01 mark)

45. (a) State any two factors which affect pressure in liquids.   (02 marks)

(b) The diagram in the figure below shows an instrument used for measuring gas pressure in a laboratory. Find the pressure in Nm^{-2} of the gas if atmospheric pressure is 76cmHg [density of mercury $= 13.6 \times 10^3 kgm^{-3}$]   (02 marks)

8

46. (a) Define the following terms
    (i) Strain   (01 mark)

    _____

    _____

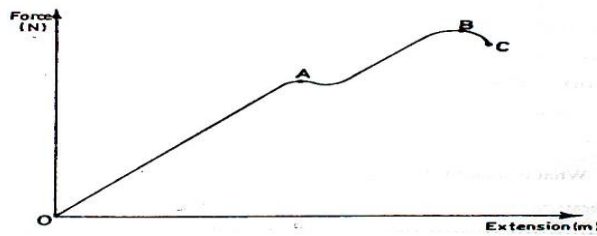   (ii) Stress   (01 mark)

    _____

    _____

    (b)

The curve in the figure shows the force versus extension graph for a copper wire. Describe what is happening between points A and B.   (01 mark)
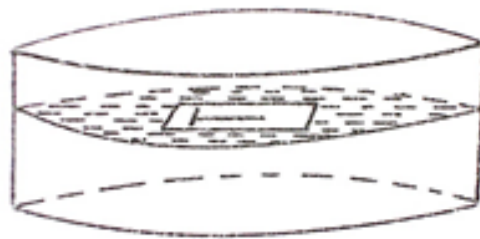
    _____

    _____

    _____

    _____

47.

A pin is placed on a bloating paper which is on the surface of water as shown in figure above.
(a) Explain what happens after some time.   (02 marks)

    _____

    _____

    _____

    _____

(b)   Explain what happens when some soap solution is carefully added to the water.   (02 marks)

_____

_____

_____

48.   _____

The diagram above shows an arrangement for observing Brownian motion.
(a)   Explain:
        (i)   the observation made.   (02 marks)

_____

_____

_____

        (ii)   What will be observed when the glass cell temperature is raised.   (01 mark)

_____

        (b)   State one factor which determines the rate of diffusion of a gas.   (01 mark)

_____

49.   (a)   state two factors which affect the strength of an electromagnet.   (02 marks)

_____

_____

(b)

The diagram above shows a small magnet placed near an electromagnet. Describe what happens to it when the key K is closed.   (02 marks)

_____

_____

_____

_____

50.   (a)   What is an electromagnet?   (01 mark)

_____

_____

(b)   Draw a well labeled diagram of an electric bell   (02 marks)

(c)   State two ways in which a bar-magnet can be demagnetized.   (01 mark)

_____

_____

END.

$$\frac{x}{80} \times 100\%$$

MARKING GUIDE

Name …………………………………………………….… Class/Number………………

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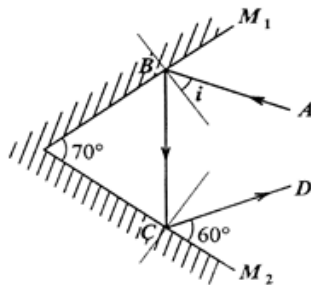| 1.	D	6.	B	11.	B	16.	A	21.	A	26.	B	31.	B	36.	C
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3.	D	8.	D	13.	C	18.	D	23.	D	28.	B	33.	A	38.	B
4.	A	9.	C	14.	D	19.	C	24.	D	29.	C	34.	C	39.	D
5.	B	10.	B	15.	C	20.	A	25.	B	30.	C	35.	B	40.	B

SECTION A

1. When a mass is hanged from a spring balance and removed, the pointer on the spring balance does not return to the initial position because the
    A. spring was too short.
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2. A wheel barrow that is used to carry a load across a soft ground should have a
    A. narrow wheel because it exerts greater pressure on the ground.
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3. A car engine exerts a force of 500 N in moving 1000 m in 200 s. Calculate the power developed by the engine.
    A. 200 W B. 500 W C. 1000 W D. 2500 W

4. When a body is raised above the ground its gravitational potential energy
    A. is raised. B. is lowered.
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5. Which of the following statements is true?
    A. The temperature at which water freezes is - 273°C.
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12

6. A mass of 500 g produces an extension of 10 cm in a spring. Find the force that will produce an extension of 25 cm.

    A.   0.5N.   B.   12.5 N.   C.   50.0 N.   D.   200.0 N.

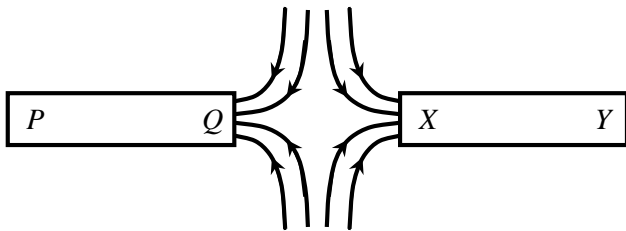7. Two plane mirrors M_1 and M_2 are inclined to each other at an angle of 70°.

If the ray AB incident on M_1 is reflected as shown in figure above, find the angle of incidence, i.

    A.   40°.   B.   50°.   C.   60°.   D.   70°.

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    (i)   rod attracts small steel pins.
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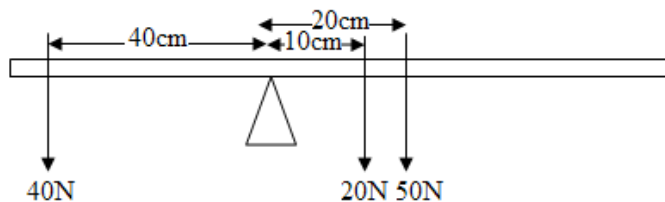
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    A.   (ii) only   B.   (iii) only
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22. Blotting paper is used to dry ink split on a surface by a process called
    A.   osmosis   B.   diffusion.   C.   surface tension.   D.   capillarity.

23. Forces of 40N, 20N and 50N are applied on a metre rule supported on a knife edge as shown in figure below.

14

The metre rule will
A.   balance.   B.   ascillate.
C.   turn in a clockwise direction.   D.   turn in anti clockwise direction.

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A.   mass, frequency and power.   B.   time, density and pressure.
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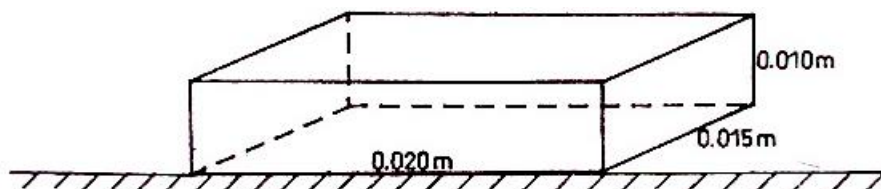A.   strong.   B.   Elastic.   C.   ductile.   D.   brittle.

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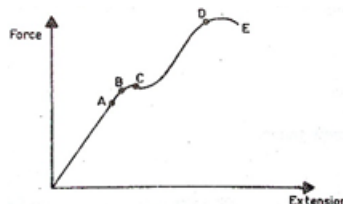
30.

A box is placed on top of a table as shown above, with dimensions indicated. If its mass is 40kg, find the pressure it exerts on the table.
A. $\dfrac{40}{0.020 \times 0.015}$ B. $\dfrac{40}{0.015 \times 0.10}$
C. $\dfrac{40 \times 10}{0.020 \times 0.015}$ D. $\dfrac{40 \times 10}{0.020 \times 0.010}$

31.

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The above figure shows how the extension of a wire varies with the forces applied. Point B represents

    A.   proportional limit   B.   elastic limit   C.   breaking stress   D.   yield point

32.   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.

33.   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.   Burrete, overflows can, irregular object, a string, measuring cylinder, and retort stand.

34.   Which of the following is true about atmospheric pressure? As the height above the earth's surface increases

	Density of air	Pressure exerted by air
A.	increases	İncreases
B.	increases	Decreases
C.	decreases	Decreases
D.	decreases	İncreases

35.   A glass block of mass 3.0kg rests on a horizontal flat surface. The pressure exerted by the glass block on its base of area $0.12m^2$ is
    A.   25.0Pa.   B.   250Pa.   C.   0.36Pa.   D.   3.60Pa.

36.   Which one of the following does not make use of an electromagnet?
    A.   Telephone receiver.   B.   Electric bell.
    C.   Electric iron box.   D.   Loudspeaker.

37.   The strength of an electromagnet depends upon, except
    A.   the number of turns in the coil.   B.   the current through the coil.
    C.   the polarities of the induced magnetism.   D.   the nature of the material used for the core.
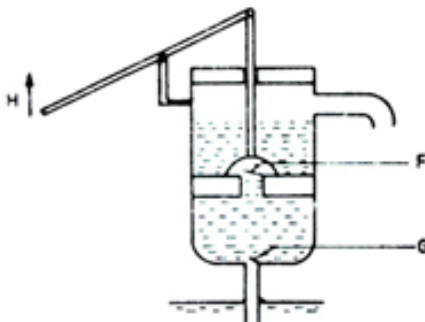
38.

The figure above shows the super position of the earth's magnetic field and the field due to a magnet. Identify point marked 1,2,3 and 4.

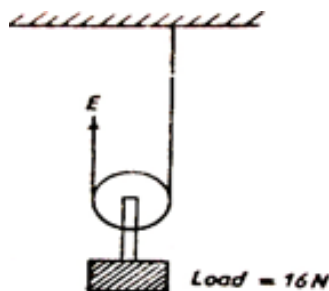|	1	2	3	4
A.	South pole	North pole	Neutral point	Neutral point
B	North pole	South pole	Neutral point	Neutral point
C.	Neutral point	Neutral point	North pole	South pole
D.	Neutral point	Neutral point	South pole	North pole

39.

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

A.   F and G will both close   B.   F and G will both open

C.   F will close, and G will open   D.   F will open and G will close

40.

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

A.   128   B.   2   C.   1   D. $\frac{1}{2}$

SECTION B

41.   (a)   State the kinetic theory of matter.   (01 mark)

        It states that matter is made up of tiny particles which are in constant random motion.

    (b)   A potassium permanganate crystal is carefully placed at the bottom of a beaker containing clear water. Explain what is observed   (03 marks)

        The purple colour of potassium permanganate crystal is observed spreading from the bottom of the liquid to the top until all the water turns purple. This is because of diffusion. The molecules of potassium permanganate crystal move from a region high concentration to a region of low concentration. Therefore, this makes the water to turn purple.

42.   (a)   Define the joule.   (01 marks)

        A joule is work done when a force of one newtons moves a body through a distance of one metre in the direction of the force.

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(b)   The work done to move a body through a distance of 5m is 30J. Find the force that acts on the body.   (03 marks)

$$workdone = force \times distance$$
$$30 = f \times 5$$
$$f = \frac{30}{5}$$
$$f = 6N$$

43.   (a)   Define the term lateral inversion as applied to mirrors.   (01 mark)

Lateral inversion is when the left hand side of the object becomes the right hand side of the image.

(b)   State two properties of an image formed in a concave mirror when the object is placed between the focal point and the mirror.   (01 mark)

the same size as the object.
the same distance behind the mirror as the object is in front.
laterally inverted
virtual (it cannot be formed on a screen)   ***any two***

(c)   An object of height 3cm is placed at 20cm in front of a concave mirror. A real image formed is 10cm from the pole of the mirror. Calculate the height of the image formed.   (02 marks)

$$\frac{h_I}{h_o} = \frac{v}{u}$$
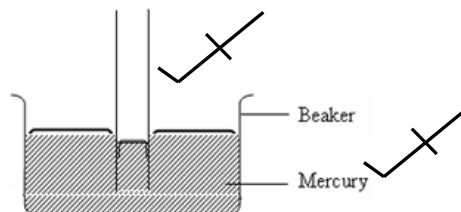$$\frac{h_I}{3} = \frac{10}{20}$$
$$h_I = \frac{10 \times 3}{20}$$
$$h_I = 1.5cm$$

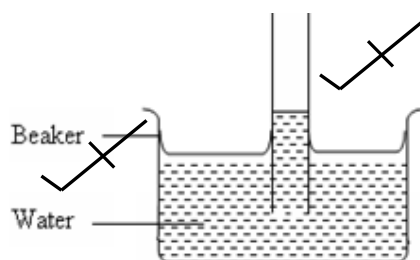44.   (a)   Distinguish between cohesion and adhesion.

Cohesion is the force of attraction between the molecules of the same kind whereas adhesion is the force of attraction between molecules of different substances.

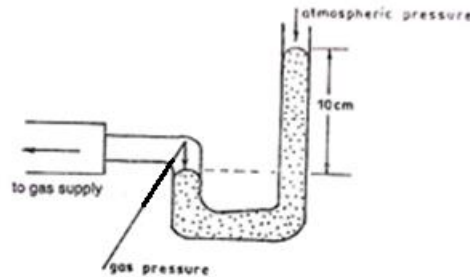(b)   Sketch diagrams to show the level of liquid in a capillary tube that is immersed in a liquid which has greater:

    (i)   cohesion than adhesion   (01 mark)

    (ii)   adhesion than cohesion   (01 mark)

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45. (a) State any two factors which affect pressure in liquids.   (02 marks)
         (i)   *the depth/height of the liquid.*
         (ii)   *the density of a liquid.*

     (b) The diagram in the figure below shows an instrument used for measuring gas pressure in a
          laboratory. Find the pressure in Nm^{-2} of the gas if atmospheric pressure is 76cmHg [density of
          mercury $= 13.6 \times 10^3 kgm^{-3}$]   (02 marks)
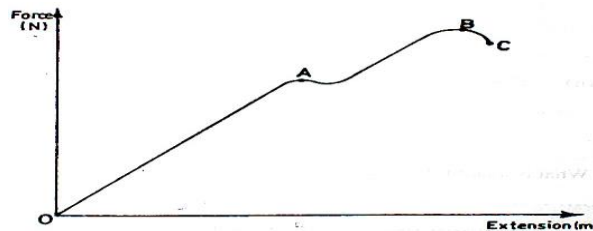

$$P_g = P_{atm} + h\rho g$$
$$P_g = \frac{76}{100} \times 13600 \times 10 + \frac{10}{100} \times 13600 \times 10$$
$$P_g = 116960 Nm^{-2}$$

46. (a) Define the following terms
         (i)   Strain   (01 mark)
         This is the extension per unit original length of the solid.

         (ii)   Stress   (01 mark)
         This is the normal force per unit area.

     (b)

     The curve in the figure shows the force versus extension graph for a copper wire. Describe what is
     happening between points A and B.   (02 marks)
     *Beyond point A the copper wire begins to deform losing its shape and size and when the force is
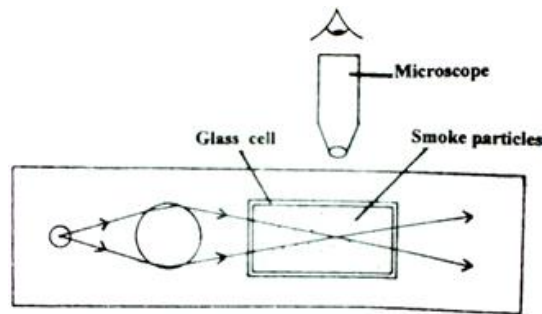   removed it can not regain its original shape and size.*

47.

     A pin is placed on a bloating paper which is on the surface of water as shown in figure above.
     (a) Explain what happens after some time.   (02 marks)
          *After some time, the blotting paper absorbs enough water and it sinks leaving the pin floating.
          This because of surface tension which makes the water surface to behave like a stretched, thin
          elastic skin which enables the pin to float.*

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(b)   Explain what happens when some soap solution is carefully added to the water.   (02 marks)
When some soap solution is applied to the water, the pin moves away from the soap solution until it eventually sinks. This is because the soap solution reduces the surface tension of the liquid so that it can no longer support the pin, hence the pin sinks.

48.

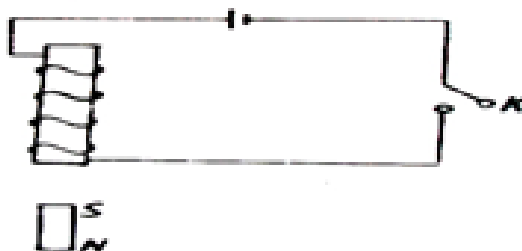The diagram above shows an arrangement for observing Brownian motion.

(a)   Explain:
       (i)   the observation made.   (02 marks)
       *Smoke particles are seen as **bright specks** of light moving in a continuous random (zig-zag) motion. This is because the large particles of smoke are bombarded on all sides by the invisible air particles in the smoke cell, hence the random motion.*

       (ii)   What will be observed when the glass cell temperature is raised.   (01 mark)
       When the temperature of the smoke cell is increased, the smoke particles are seen moving faster.

(b)   State one factor which determines the rate of diffusion of a gas.   (01 mark)
       (i)   Size of the diffusing molecules
       (ii)   Molecular weight
       (iii)   Temperature
       (iv)   Pressure
       (v)   Size of the pore (in the porous material) across which the molecules diffuse
       (vi)   The concentration gradient
       (vii)   Medium of diffusion
       (viii) Density of the Diffusing Substance   ***any two***

49.   (a)   state two factors which affect the strength of an electromagnet.   (02 marks)
       Current in the coil.
       Number of turns in the coil.
       Nature and size of the material i.e soft iron material is the most suitable for a powerful electromagnet.
       Distance between the poles: the closer the poles, the stronger the resultant magnetic field.
                                                                                       Any two
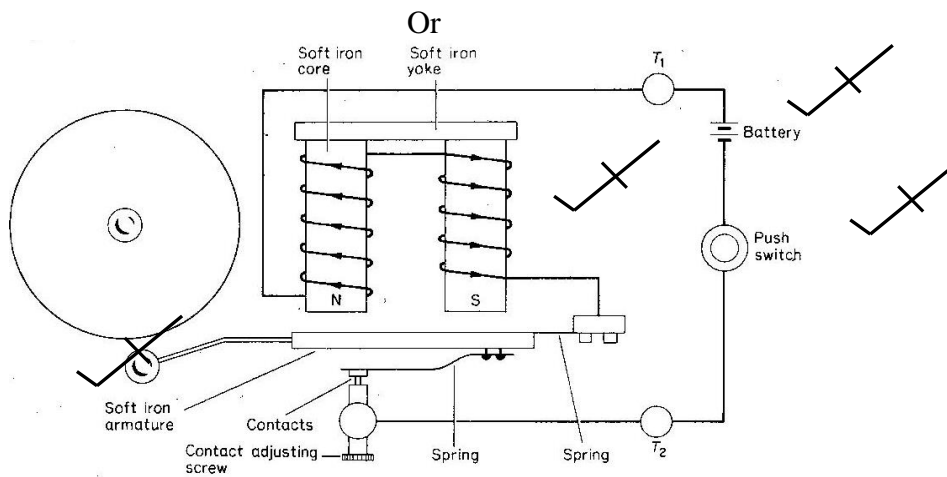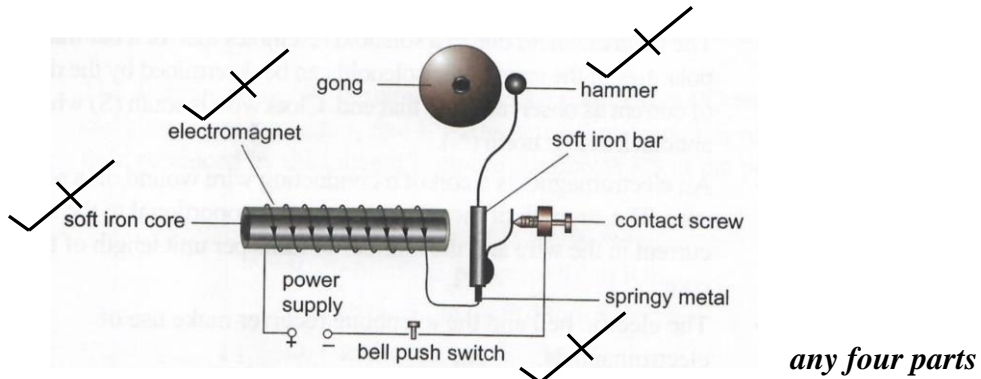
       (b)

The diagram above shows a small magnet placed near an electromagnet. Describe what happens to it when the key K is closed. (02 marks)

The magnet is attracted to the electromagnet. This is because the electromagnet is magnetised when current passes through it and in accordance to the righthand grip rule, its lower end of the electromagnet attains a North pole which attacts the South pole of the bar magnet.

50. (a) What is an electromagnet? (01 mark)

An electromagnet is a type of magnet in which a magnetic field is produced by the flow of an electric current through a conducting wire wound on a soft magnetic material.

(b) Draw a well labeled diagram of an electric bell (02 marks)

any four parts

Or

(c) State two ways in which a bar-magnet can be demagnetized. (01 mark)

Hammering
Hitting or violent handling
Heating to red hot
Using alternating current (a.c)

END.