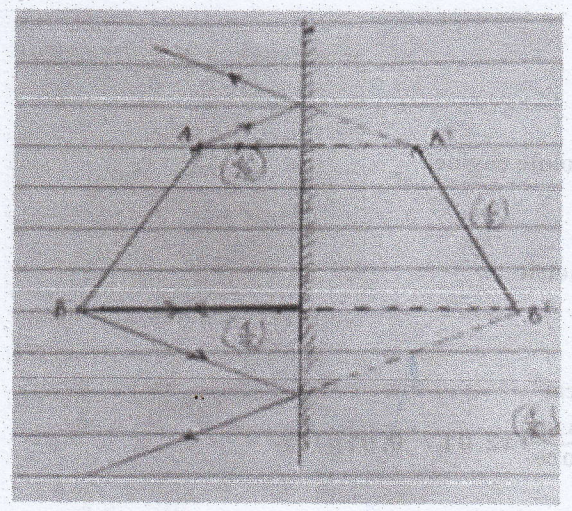
O'LEVEL PHYSICS NATIONAL EXAMINATION PAPER 2020/2021

SECTION A: ATTEMPT ALL QUESTIONS (55 marks)

1) **Answer:**
   a) **False**
   b) **True**
   c) **False**
   d) **True**
   e) **True**
2) **Answer:**
   a) **Difference in temperature of the object and the environment**
   b) **Thermoregulation**
   c) **Plant growth**
   d) **Global warming**
      Green house:
      Carbon dioxide
3) **Answer:**
   a)



   b) **Image is: - Virtual**
      - Upright or erect
      - Same size as the object
      - laterally inverted or left right reversed
4) **Answer:**
   a) **Yes**
      - The incident ray, the reflected ray and the normal to the surface of the mirror all lie in the same plane
      - The angle of incidence is equal to the angle of reflection
   b) **i) Concave mirror**
      ii) Image is bigger than the object

5) Answer:
   a) J/kg
   b) The object cools down because its temperature is greater than the temperature of its surroundings. Its real energy moves out of it into the cooler object around it by conduction, convection or radiation.
   c) This means that water takes 4200J of heat to raise its temperature of 1kg by 1°C
6) Answer:
   a) Resistance of the conductor or the time for which current flows or the amount of current or the voltage across the resistor.
   b) Magnetic effect
   c) Chemical effect of electric current/ physiological effect.
7) Answer:
   a) Evaporation
   b) i) Distillation or boiling and condensation
      ii) Filtration or decantation
8) Answer:
   a) a) Q = Heat
      W = work done
   b) DU = Q + W = -140kJ – 60KJ = -200KJ
   c) – Refrigerator
      - Air conditioner
      - Heater
      - Heat pump
      - Carnot engine/ diesel or gasoline engine
9) Answer:
   a) Isobaric process
   b) Isochoric process or isovolumetric
   c) Charles's law
10) Answer:
   a) $\delta = \frac{m}{v} = \frac{60.30}{30.00} g/cm^3 = 2.01 g/cm^3$
   b) $\frac{\Delta\delta}{\delta} = \left(\frac{\Delta m}{m} + \frac{\Delta V}{V}\right)\delta = \left(\frac{0.2}{60.30} + \frac{0.10}{30.00}\right) x 2.01 = 0.01 g/cm^3$
11) Answer:
   a) Atmospheric pressure decreases with increasing altitude
   b) $F_b = \delta_{liquid} x\, V_{liquid\ displaced}\, x\, g = 1000\, x\, 0.0456 x 9.81 = 447.336N$
12) Answer:
   a) I = F x t = 2 x 3 = 6NS
   b) I = m(v-U) = mV
      $V = \frac{I}{m} = \frac{6}{1.5}\frac{m}{s} = 4\, m/s$
      Or $V = \frac{Fxt}{m} = \frac{2Nx3S}{1.5kg} = 4m/s$
13) Answer:
   a) $a = \frac{\Delta V}{\Delta t} = \frac{25-13}{5} = 2.4 m/s^2$

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b) $x = \frac{1}{2}(25 + 13)x5 = 95m$

Or

$X = \frac{1}{2}at^2 + ut = \frac{1}{2}x2.4x\ 5x\ 5 + 13x5 = 95m$

Or

$x = \frac{v^2 - u^2}{2a} = \frac{25^2 - 13^2}{2x2.4} = 95m$

14) Answer:

a) $I_{rms} = \frac{I_m}{\sqrt{2}} = \frac{3}{\sqrt{2}} = 2.12A$

b) $X_L = 2\pi fR = 2x\ 3.14x\ 1000Hz\ x\ 0.400\Omega = 2512\Omega$

15) Answer:

a) i) The balloon repel each other (because of like charges)

ii) A and B are negatively charged or A and B are positively charged

iii) By contact/ conduction or

By rubbing/ friction

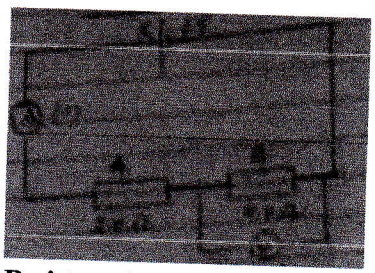
By induction

b) $V = k\frac{Q}{d}$ $\qquad V\alpha\frac{Q}{d}$

SECTION B: ATTEMPT ANY THREE QUESTIONS (30 marks)

16) Answer:

a)



b) Resistors A and B are in series

c) i) $R_T = R_A + R_B = 2.0\ \Omega + 4.0\Omega = 6\Omega$

ii) $I = \frac{U}{R} = \frac{1.5\Omega}{6\Omega} = 0.25A$

Or

$I = \frac{U_B}{R_B} = \frac{1\Omega}{4\Omega} = 0.25A$

d) $E = R_A I^2\ t = 20\ x\ (0.25A)^2\ x\ 80s = 10J$

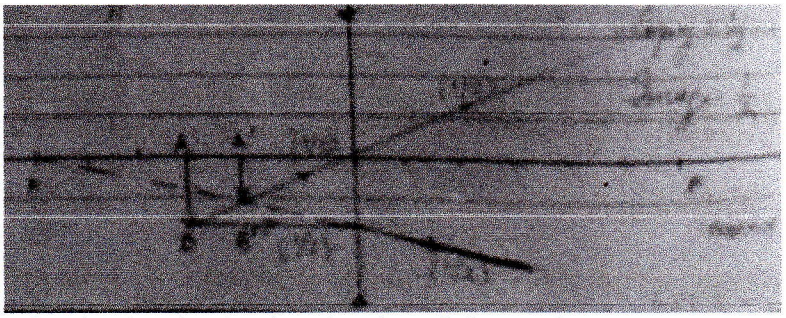
e) Since $R = \rho\frac{L}{s}$

f) The resistance of conductor depends upon

- Resistivity of the conductor
- Length of the conductor
- Cross sectional area of the conductor or radius or diameter

17) Answer:

a)



b) i) $\frac{1}{f} = \frac{1}{p} + \frac{1}{q} \Rightarrow \frac{1}{q} = \frac{1}{f} - \frac{1}{p} = \frac{1}{-6} - \frac{1}{3} = \frac{-2-1}{12} = -\frac{6}{12}$

q = -2cm

ii) The size of image $\frac{i}{o} = -\frac{q}{p} \Rightarrow i = -\left(-\frac{2}{3}\right) x\ 1cm = \frac{2}{3}cm$

c) i) Image is: - Virtual, smaller than object and upright/ erect

ii) Concave lens is used:

- To make eye glasses
- To correct near sightedness/ myopia
- In flsaslights, binoculars
- as headlights of ear

18) Answer:

a) i) Fossil fuel: coal, crude oil (petroleum) or natural gas

ii) Fossil fuel comes from the decomposition of organo-materials (plants and animals) reserved million years inside the earth.

b) i) Any five renewable energy sources:

- sun
- wind
- water
- biomass (energy)
- geothermal (energy)

ii) Any one form this use:

- wind energy
- Hydroelectric power
- biomass
- ocean waves power
- tidal energy

c) – Exploitation of little resources

- protection of environment
- less emission of the greenhouse gases
- biogas generation reduces soil and water pollution
- biogas generation produces organic fertilizer
- It is simple to find and cheap
- healthy cooking alternative

19) Answer:

a) Lever, wheel and axle, inclined plane, wedge, pulley, screw

b) i) Inclined plane

ii) Lever or wedge

c) i) MA = $\eta VR = \frac{80}{100} x4 = 3.2$

ii) $\eta A = \frac{L}{E}$

E = $\frac{L}{MA} = \frac{480N}{3.2} = 150N$

20) Answer:

a) Measurement of fluid pressure or Measurement of liquid or gas pressure or Determination of relative density of fluid

Or

- Measurement of blood pressure
- Climate forecasting/ weather forecasting
- Measurement of atmosphere pressure

b) i) 101.2kPa = 101.2kN/m^2 = 101200N/m^2

ii) 11.2cm = 0.11m = 11.2x10^{-2}m

c) i) No ($P_{atm} > P_{air}$ in container)

Atmospheric pressure pushes oil column down on the right side of U tube and pushes it up in the left side

ii) Poil = $\rho_{oil} xgh = 860x\ 0.112\ x\ 9.82Pa = 944.89Pa$

iii) Student A

iv) $P_{oil} = P_{atm} - P_{air}$

P_{air} = 101200Pa – 944.89Pa = 100 255Pa

SECTION C: THIS QUESTION IS COMPULSORY (15 marks)

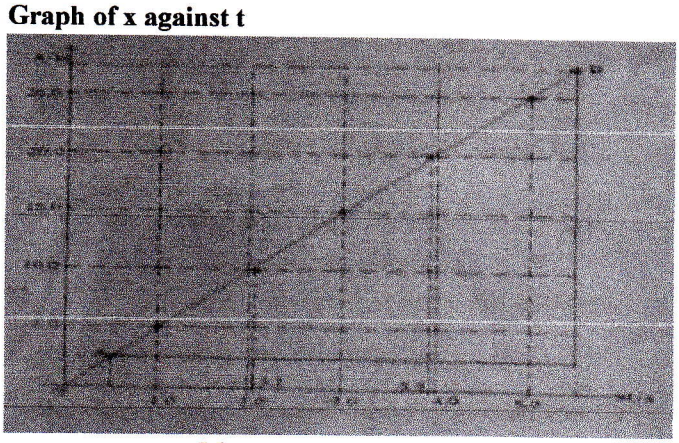
21) Answer:

a) Determination of the average speed/ velocity of the car or

- The investigation of the impact of the friction force on the motion of a car
- The study of the frictionless of the road
- The study of the characteristics of rectilinear motion

b) i) time ii) position

c) Graph of x against t



d) i) the slope S = $\frac{27.5-2.5}{5.5-0.5} = 5.0m/s$

ii) This is the average speed of the car

e) All points are not aligned