

- 21) In an experiment to determine the specific heat capacity of a substance **c**, the following results were obtained:

Temperature, $t/^{\circ}\text{C}$	Quantity of heat, Q/J
5	200
10	400
15	600
20	800
25	1000
30	1200

- a) Plot the graph of quantity of heat **Q** against temperature, **t**. (9 marks)
- b) From the graph, find the gradients **S** of the graph showing clearly how you get your answer. (3 marks)
- c) Use the formula $S = mc$ to determine the specific heat of substance **c**. take mass **m**, of the substance to be 20g. (3 marks)

END

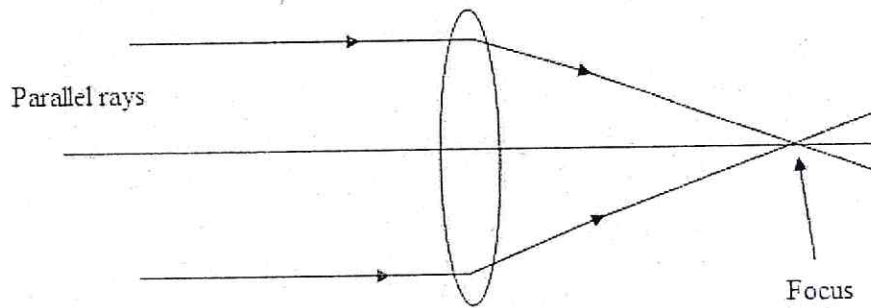
PHYSICS I ANSWER GUIDE

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2017

<p>1. a) The density of fresh milk at $20^{\circ}\text{C} = \frac{103.5\text{g}}{100\text{cm}^3}$ = $1.035\text{g}/\text{cm}^3$</p> <p>b) Density of milk shows that it is pure milk. Density of milk ranges from $1027 - 1033\text{kg}/\text{m}^3$</p>	<p>2. a) Displacement is distance moved in a specific direction while Distance is length travelled in any direction.</p> <p>b) Displacement of the car from Town A to C = $\sqrt{(30^2 + 40^2)} \text{ km} = 50\text{km}$</p>
<p>5. a) Deceleration is the rate of decrease of velocity with time</p> <p>b) $u = 72\text{km}/\text{h} = 20\text{m}/\text{s}$, $v = 18\text{km}/\text{h} = 5\text{m}/\text{s}$ and $a = -2\text{m}/\text{s}^2$.</p> <p>From the formula; $v = u + at$, $5\text{m}/\text{s} = 20\text{m}/\text{s} + (-2\text{m}/\text{s}^2)t$</p> $t = \frac{5-20}{-2} \text{ s} = 7.5\text{s}$ <p>The car will take 7.5s to reach a velocity of $18\text{km}/\text{h}$</p>	<p>4. a) Kinetic energy of the student = $\frac{1}{2}mv^2$ = $\frac{1}{2} \times 40 \times 2^2 \text{ J}$ = 80 J</p> <p>b) The kinetic energy of the student would increase four times i.e. = $\frac{1}{2} \times 40 \times (2 \times 2)^2 \text{ J} = 320 \text{ J}$</p> <p>5. a) Center of gravity of a body is the point through which its total weight acts.</p> <p>b) Let the mass of the meter rule be m, then $m \times (65 - 50) = 24 \times (100 - 65)$ so $m = \frac{24 \times 35}{15}$; $g = 56\text{g}$</p>

c) A clinical thermometer is a fairly accurate thermometer because the liquid used is mercury which expands uniformly and is a good conductor of heat. The volume of the mercury in the bulb is small so the mercury reaches the temperature to be measured. The stem has a narrow bore and is capable of measuring small changes in temperature which makes it more sensitive. The clinical thermometer is a maximum thermometer because it has a constriction just above the bulb. When the thermometer is used, the force of expansion pushes the mercury past the constriction until it reaches the maximum temperature on removal. The mercury cannot pass the constriction unless it is shaken. It therefore remains, indicating maximum temperature. To reset the thermometer, the mercury must be shaken vigorously to make it pass the constriction.

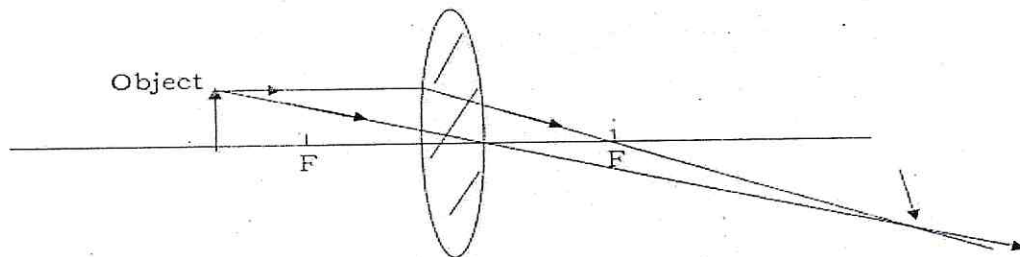
16. a)



- b) The focal length of a lens is the distance from the principal focus to the middle of the lens.
 c) The power of a lens depends on its focal length. A short focal length lens has a higher power than a long focal lens.

d)

The image is converted, real and enlarged



e) Its used in cameras

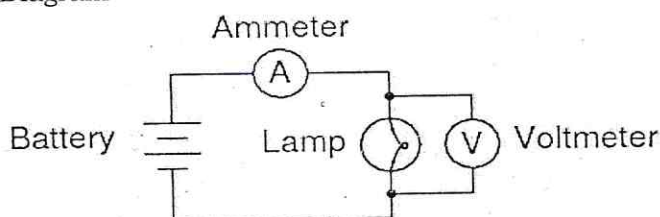
17. a) Magnetic, heat + light effect, chemical effect

b) A coulomb is a unit of charges and it is the charge passing any point in a circuit when a steady current of 1 ampere flows for 1 second.

c) $Q = It = 4A \times 5s = 20C$

d) The resistance of the filament of the torch bulb increases.

e) i) Diagram

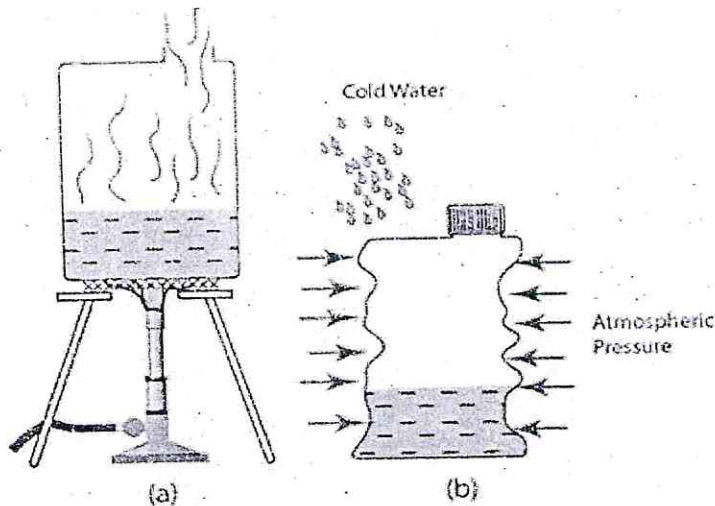


$$\text{ii) } R_1 = \frac{2.0V}{1.0A} = 2\Omega$$

$$R_2 = \frac{12V}{2A} = 6\Omega$$

iii) When the filament is hot its resistance increases.

18. a) The two needles repel because their ends are both north poles (like poles of a magnet repel)
- b) When the bar magnet is heated, it loses its magnetism. A magnet is made up many tiny regions called domains. Each domain behaves like a magnet. In a magnet, the domains are aligned in the same direction so that their effects add together to make a strong magnetic field. Heating a magnet gives the domains energy so that they can turn back to their original random arrangement and the magnetism is lost.
- c) neutral point
- d) The earth behaves like a giant magnet. The geographic N pole of the earth is a south magnetic pole. This is a south seeking pole because it attracts the N pole of a magnet. Near the geographic S pole is N pole magnetic pole.
19. a) Force is that which changes a body's state of rest or of uniform motion in a straight line. The unit of force is a Newton i.e. the force needed to give a mass of one kilogram an acceleration of one meter per second squared. Pressure is the force acting normally per unit area. The unit of pressure is Newton per meter squared (N/m^2). $1 N/m^2$ is the same as 1 Pascal (1 Pa).
- b) When the fluid is completely enclosed in a vessel and a pressure is applied to it at any part of its surface, then the pressure is transmitted equally throughout the whole of the enclosed fluid.
- c) Water is poured into a metal can and then heated while its mouth is open. Water is allowed to boil for some time driving out all the air in the can. The steam above the water in the metal can drives out all the air in the can. The cork is then tightly fitted in the mouth of the can and then the flame is removed. Cold water is poured over the can. This causes the steam inside the can to condense producing water and water vapor at very low pressure. The outside atmospheric pressure on the can causes the can to collapse inwards hence demonstrating large forces which can be produced by atmospheric pressure.
- Diagram:



SECTION C:

20. a)			b) Teacher's guidance	
Time, t/s	t²/s²	Distance, h/m	c) The slope, S of the graph = $\frac{129 - 10}{26 - 2} = \frac{119}{24} \approx 5.0$ d) From $L = \frac{1}{2} gt^2$ $g = \frac{2L}{t^2}$ $= 2 \times 5.0 \text{ m/s}^2$ $= 10 \text{ m/s}^2$	
1	1	5		
2	4	20		
3	9	45		
4	16	80		
5	25	125		
21. a) - Title: The graph of heat, Q, against temperature, t, - Vertical Axis - Arrows, Units - Horizontal Axis - Arrows, units - Points - Line joining the points			b) $\frac{\Delta Q}{\Delta t}$ $= 40\text{J}/^\circ\text{C}$	c) $S = mc, c = \frac{S}{m}$ $= \frac{40\text{J}/^\circ\text{C}}{20\text{g}} = 2\text{J/g}^\circ\text{C}$ $= 2000\text{J/kg}^\circ\text{C}$

END