PHYSICS PAPER 1

ANSWERS

KCSE 2012

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PHYSICS PAPER 1 ANSWERS

SECTION A.

1. 7.6+(0.6x3);
   7.6+1.8
   9.4ml; (2 marks)

2. Frictional force is equal to the applied force but in the opposite direction, hence the net applied force is zero; (1 mark)

3. $m = \frac{w}{g}$;
   $= \frac{16.5}{1.7}$;
   $= 9.71kg$; (3 marks)

4. The gas diffuses; from the region of higher concentration to a region of low concentration. (1 mark)

5. Glass is a poor conductor; unequal expansion leads to cracking; (2 marks)

6. Oil film spreads over a large surface of the sea reducing inflow of air needed by the aquatic life;
   - Reduces the light entering
   - Beaches become dirty;
   - Poisons marine animals when taken in;
   (any two correct) (2 marks)

7. Stop rising when upthrust is equal to the weight of the balloon and its contents; (1 mark)

8. Mass of gas must be constant; (1 mark)

9. - The height of it's centre of gravity above the surface is constant;
   - Position of its center of gravity does not change. (1 mark)

10. It is within the elastic limit; because
    - the values of $\frac{F}{e}$ = constant in all the cases $\frac{F}{e}$=5;

    OR

    - a graph of force against extension is straight line through the origin;
    - conclusion from graph; (2 marks)

11. The body's velocity **decreases uniformly** from 20m/s and becomes zero after 5 seconds; the velocity then starts increasing in the **opposite direction** to a maximum value of 20m/s. (2 marks)

12. • Friction between the moving parts of the pulley system;
• Work done against friction;
• Work done lifting the moving parts of the pulley system; (2 marks)

13. (i) OA - heat gained is breaking intermolecular forces of the molecules/melt the ice without change in temperature;

(ii) AB - temperature of the water formed starts to rise until it starts to boil; (2 marks)

14. (a) Air above the plane moves faster than air below it (because of it's shape) creating a region of low pressure above the place hence plane experiences a lift; due to the pressure difference. (1 mark)

(b) At B; because the cross-sectional area is smaller hence the air moves faster in that region; (2 marks)

SECTION B

15. (a) Extrapolation of graph to cut the temperature axis;

absolute zero = 278 ± 2°c; (-272 ± 2°c to -280° ± 2°c; (2 marks)

(b) (i) When tube is horizontal pressure of air is equal to atmospheric pressure; i.e. 76cmHg. (1 mark)

(ii) (I) When vertical,
pressure of air = pressure due to mercury column+atmospheric pressure
= (24+76)cmHg
= 100cmHg; (1 mark)

(II) PV = a constant;
76x15=(76+24)l;
$l = \frac{76 \times 15}{100}$

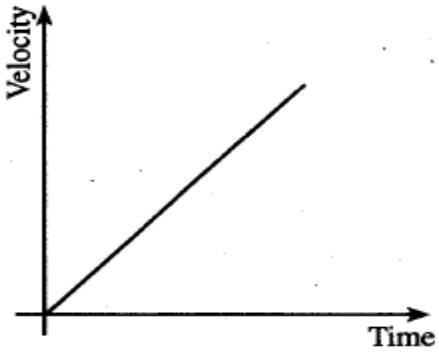
= 11.4cm; (3 marks)

(c) (i) To expel air; (1 mark)

(ii) Pressure of air outside the bottle is greater than the pressure of air inside; (1 mark)

(iii) Cooling causes condensation of vapour;
Creating a partial vacuum; (2 marks)

16. (a) (i)



(straight line not necessarily through the origin but with positive gradient)

acceleration;
constant acceleration; (2 marks)

(ii) Net force on the parachute becomes zero. (Sum of downward forces on it should be equal to sum of upward forces) (1 mark)

(b) (i) Net force = 2+-0.4; =-2.4N; (2 marks)

(ii) F=ma;
-2.4 = 0.2a';
$a = -12ms^2$; (3 marks)

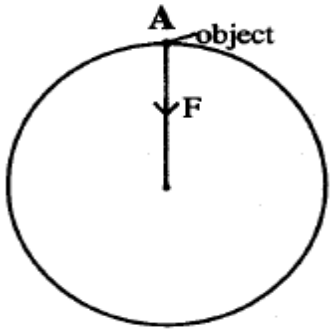
(iii) $V^2 = u^2 + 2as$;

$s = \frac{0 - 5^2}{-2 \times 12}$;

$\simeq 1.04m$; (3 marks)

(c) (i) - Weight of object;
- Tension in the string; (2 marks)

(ii)



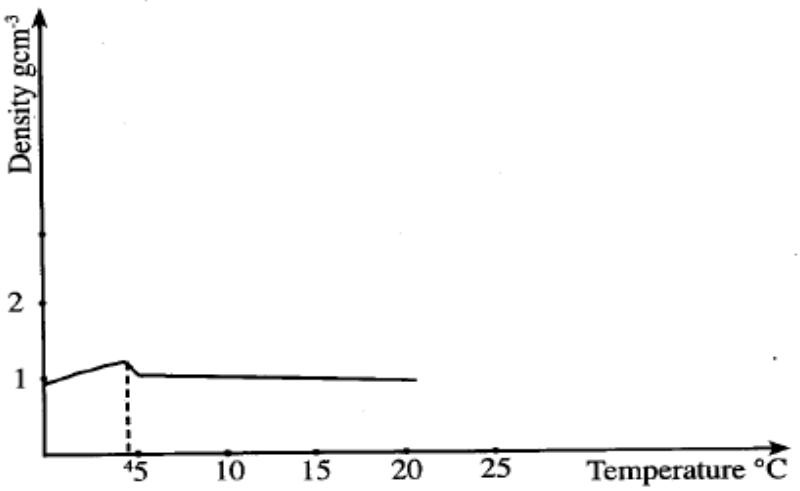
The force should be from point A to the center but not beyond

(1 mark)

17. (a) - Fire heats air around region C which expands and becomes less dense;
- The less dense air rises up the vent and emerges at A;
- Cool (more dense) air moves down the vent at B introducing fresh air into the mine (3 marks)

(b) The flask has double walls which are silverly on both sides the shiny surface is a good reflector of heat; (1 mark)

(c)



(1 mark)

(d) (i) Heat gained by water = power x time;
$= 2.5 \times 10^3 \times 4 \times 60$;
$= 6.0 \times 10^5$J; (3 marks)

(ii) $E = mc\Delta\theta$;

$$\Delta\theta = \frac{2.5 \times 10^3 \times 4 \times 60}{2 \times 4.2 \times 10^3};$$

$= 71.43$°C; (3 marks)

18. (a) (i) Lengths BC and CD; (1 mark)

(ii) 100 x BC = S x CD;

$$S = \frac{100BC}{CD};$$ (2 marks)

(b) (i) Volume of 10g = $\frac{mass}{density}$;

$$= \frac{20}{800};$$

$= 2.5 \times 10^{-2} m^3$; (3 marks)

(ii) Upthrust = weight of water displaced

$$= \frac{20}{800} \times 100 \times 10;$$

$= 2.5 \times 10^2$N; (2 marks)

(iii) Tension = U-mg;
= 250 - 200
= 50N; (2 marks)

19. (a) (i) Valve B rests under its own weight;
- pressure in the cylinder decreases and water rises into the cylinder pushing the valve open; (2 marks)

(ii) Valve A rests under its own weight and the weight of the water; high pressure is created in the region between valve A and valve B forcing valve B to open; (1 mark)

(b) The water is lifted up by the piston ad comes out through the spout; (1 mark)

(c) $P_w g h_w = P_p g h_p$;

$h_p = \frac{1000 \times 10}{800}$;

=12.5m; (3 marks)

(d) - Force applied on piston (during downstroke);

- Ability of the parts of the pump to withstand the pressure of the liquid column; (2 marks)