GENERAL SCIENCE PAPER 2

ANSWERS

KCSE 2010

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30.7.2 General Science Paper 2 (237/2)

SECTION A: BIOLOGY (34 marks)

1. (a) Enables a plant to expose its shoot/leaves to light (for photosynthesis); (1 mark)

   (b) Hearing;
   Balance/posture; (2 marks)

2. (a) All organisms that live and interact within a particular habitat; (1 mark)

   (b) (i) Accumulates moisture in the sub-stomatal air spaces leading to reduced diffusion gradients;
   (ii) Increases the diffusion distance; (2 marks

3. (a) Water;
   Oxygen;
   Optimum temperature/warmth; (3 marks)

   (b) Complete metamorphosis – distinct development stages are egg, larva pupa and adult;
   Incomplete metamorphosis – developmental stages are egg, nymph and adult in which the nymph resembles the adult but is small and sexually immature; (2 marks)

4. (a) Ingestion of contaminated food/water; (mark)

(b) Bites by female anopheles mosquito carrying malaria parasites: (1 mark)

5. Individuals with advantageous variations; and selected for hence they survive and reproduce; (2 marks)

6. Allows passage of dissolved food substances from the mother to the foetus;
Allows passage of oxygen from the mother's blood to the foetus;
Allows passage of antibodies from the mother's blood to the foetus;
Allows passage of metabolic waste products from the foetus' blood to the mother;
(; ; ; ; any three) (3 marks

7. (a) (i) Genetic counseling – giving hereditary information for informed decision making; (1 mark)
(ii) Genetic engineering – the alteration/manipulation of the structure of DNA by man for beneficial use; (1mark)
(b) (i) Father – AO;
((ii) Mother – BO;
(iii) Child - OO; (3 marks)

8. To obtain resources from the environment (e.g light, water and nutrients);
In support of heavy load of their own mass, including animals that climb or live on them;
To withstand forces in the environment (e.g gravity, air currents/wind/storms);
Approriate positioning of parts for photosynthesis, pollination and dispersal;
(;;; any three) (3 marks)

9. (a) A – Lens;
B – Vitreous humour; (2 marks)
(b) Is where the image is formed; (1 mark)

10. (a) Oestrogen/progesterone; (1 mark)
(b) Oestrogen – repair and healing of uterine wall;
- stimulates anterior pituitary gland to secrete Luteinising hormone;/

Progesterone - thickening of the uterine wall
- Inhibits production of FSH/LH; (2 marks)

(c)

Mitosis	**Meiosis**
Two daughter cells are produced	-Four daughter cells are produced;
Occurs in somatic/body cells	-Occurs in reproductive cells;
Daughter cells are diploid (2n)	-Daughter cells re haploid(n);

(Any one, fully contrasted) (1 mark)

SECTION B: CHEMISTRY (33 Marks)

11. (a) The volume of a fixed mass of a gas is directly proportional to its absolute temperature at constant pressure;

(b)

$$\frac{V1}{T1} = \frac{V2}{T2}$$

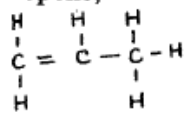
$$T_2 = \frac{V_2 T_1}{V_1} = \frac{402.5 \times 298}{35};$$

=342.7k;

12. (a) Cracking;

(b) acting as a catalyst;

(c) Propene;



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13. (a) It form acid rain;
Acid rain kills organism/corrodes
Metallic structures;

(b) (i) Oxygen;

(ii) to separate NO_2 from Oxygen;

14. R.f.m. of Na_2CO_2=(2 x 23 +12 x 1 +12 x 3)=106g
Weigh 106g of sodium hydroxide;
Dissolve it in distilled water and top it up to make 1 litre of solution;

15. (a) The heat change when one mole of a substance is formed from it's constituent elements at standard conditions;

(b) (i) -46.2 KJ/mole;

(ii) -the yield of ammonia will reduce;
-increase in temperature favours the reverse reaction which is the formation of hydrogen and nitrogen. (This is because reaction for formation of ammonia is exothermic);

16. (a) $CH_{4(g)} + 20_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$;

(b) 1 mole of methane = 16g
16g CH_4 gives 890.4 KJ
36g CH_4 gives $\frac{890.4 \times 36}{16}$;

=2003.4KJ;

17. (a) The existence of an element in more than one form but in the same physical state;

(b) Layers are held by weak vander waals forces which make them slide over one another hence leave a mark on paper;

18. (a) $MgCO_{3(s)} + 2HCl_{(aq)} \rightarrow MgCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$

(b) R.M.M. of $MgCO_3 \equiv 84$

R.M.M. of $CO_2 \equiv 44$ } Both must be correct

Moles of MgCO3 = $\frac{8.4}{84} = 0.1$

Moles of $CO_2 = 0.1$

Mass of CO_2 produced = 0.1 x 44
= 4.4g

19. Endothermic reactions are those in which heat energy is absorbed from the surroundings while exothermic reactions are those in which heat is released to the surroundings;

20. (a) Aluminium, Carbon, Iron. (2 marks
(if order is wrong but carbon is in the middle (1 mark)

(b) Oxygen produced at the anode reacts with the anode, thus depleting it;

(c) Aluminium is a good conductor of heat;

SECTION C: PHYSICS (33 marks)

21.

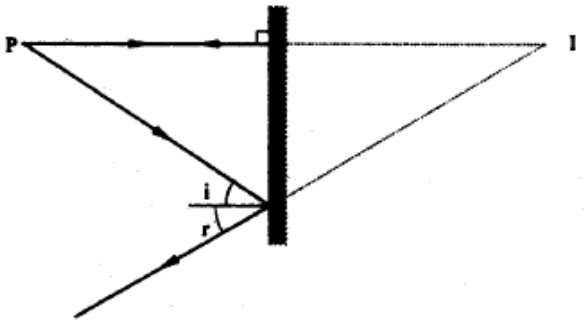

Figure 1

22. Virtual, upright and diminished. (1) (any correct)

23. Different colours are refracted differently. (1)
Blue is refracted more than red.(1)

24. $V = \frac{600}{2} = 30m/s$ (1)

$V = \lambda f$ (1)

$300 = \lambda\ 1000$

$\lambda = 0.3m$ (1)

25. (a) V = IR (1)
=1.5 x 5
=7.5V

(b) V =10 – 7.5
=2.5V (1)
R = $\frac{2.5}{1.5}$ =1.67 ohms (1)

26. Lead (IV) oxide OR lead dioxide.

27. Z is south pole (1) since it points southwards.
Bring the unmarked magnet close to Y, and observe the end where (1) repulsion occurs to conform the polarity as north.

28. -amount of current. (1)
-resistance of the coil (1)

29. By increasing the accelerating voltage. (1)

30.

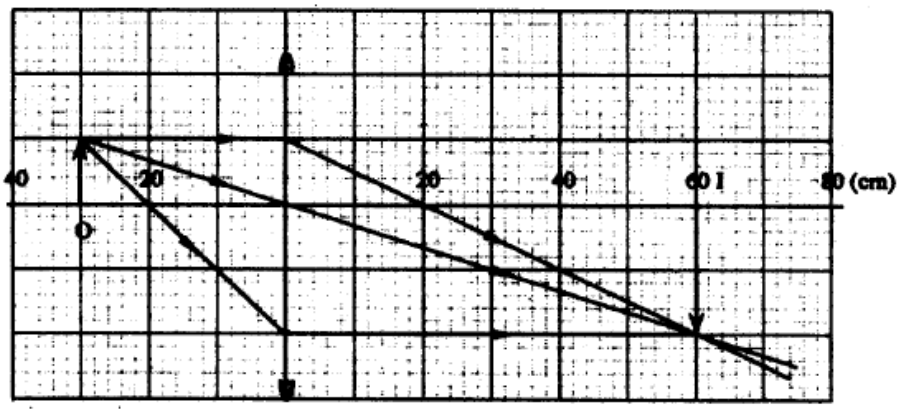

Figure 2

31. - the bulb will not light. (1)
- the pin junction is reverse biased. (1)

32. Unlike charges attract (1), when they touch the negative charges move to the conductor to neutralize (1) it. Since positive charges are more, the conductor charges the sphere positively and repels (1) it.

33. Student is nearer one cliff. (1)
The first echo is a reflection from the (1) nearest cliff and the second echo is a reflection from the furthest cliff.

34. Energy = P x t (1)
$=60 \times 10^{-3} \times 5 \times 6$
$= 1.8$ Kwh (1)

35. $100 \xrightarrow[150s]{(1)} 50 \xrightarrow[150s]{(1)}$ 25 after 300 seconds count rate is 25 counts/sec.