

6.0 SCIENCE

The revised Primary Science syllabus which comprises aspects of *Agriculture, Home Science*, and Emerging Issues such as *Environment* and *HIV/AIDS* was tested for the second time in 2007.

As a requirement, the questions were sampled from all the topics in the syllabus. In addition, the questions tested the skills of *Knowledge, Comprehension, Application* and *Higher abilities* (analysis, synthesis and evaluation).

6.1 CANDIDATES' GENERAL PERFORMANCE

Out of the **704,733** registered candidates, **698,325** candidates took the Science paper.

The details of this performance are given in the table below including data for the 2006 KCPE Science for comparison.

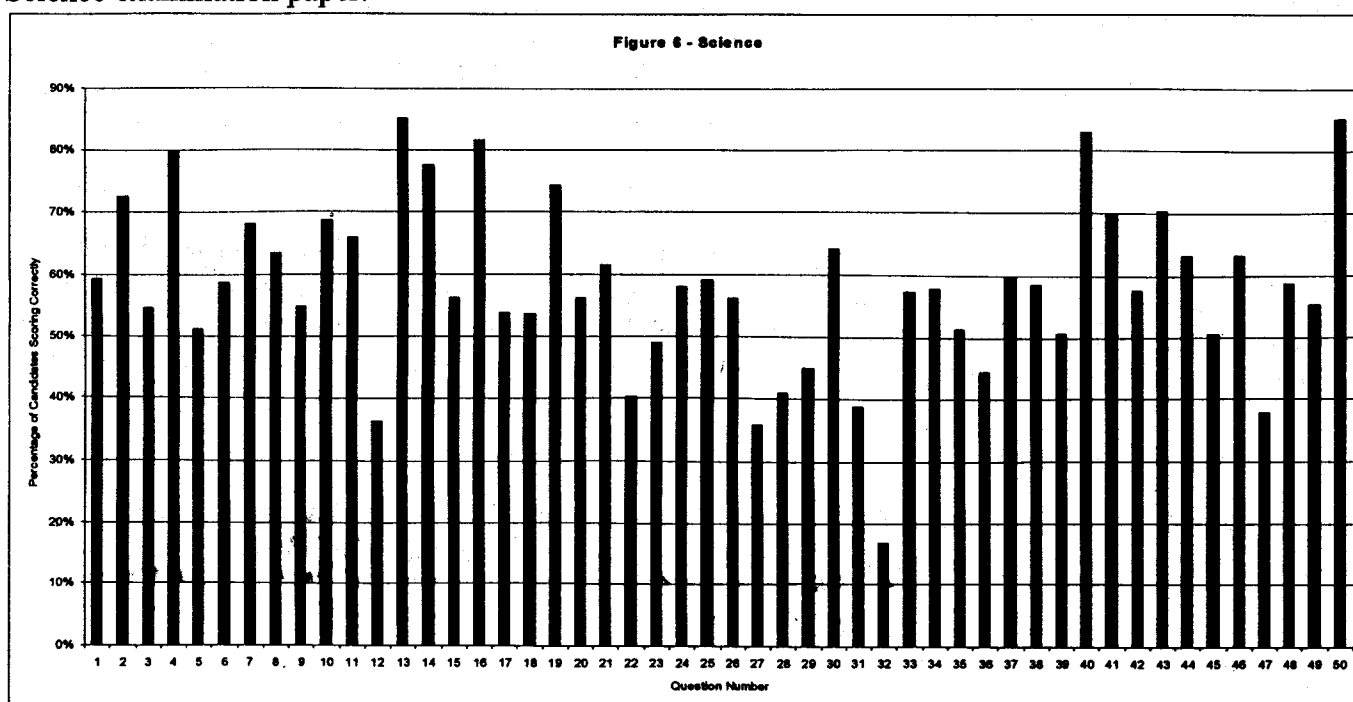
Table 10: Candidates' Performance

YEAR	2006	2007
Number Sat	660,388	698,299
Mean Raw Marks/60	26.51	29.72
Standard Deviation	8.01	9.20
Mode Mark	26	33

From the table, it can be observed that, the performance in the 2007 KCPE Science significantly improved compared to that of the 2006 KCPE Science. The mean mark, standard deviation and mode mark increased from **26.51, 8.01** and **26** in 2006 to **29.72, 9.20** and **33** in 2007 respectively.

6.2 ANALYSIS OF PERFORMANCE IN SELECTED ITEMS

The figure below shows the facility index of each of the **50 questions** offered in the 2007 KCPE Science examination paper.



A question that is scored by less than 30% of the candidates is considered as having been poorly performed. In 2006, 10 questions out of 50 had less than 30% of the candidates scoring correctly while in 2007 only *one (1)* question out of 50 had less than 30% of the candidates indicating an improved performance.

However, questions scored by less than 40% will be analysed (a deviation from the 30% rule) but this does not mean that the questions were poorly performed.

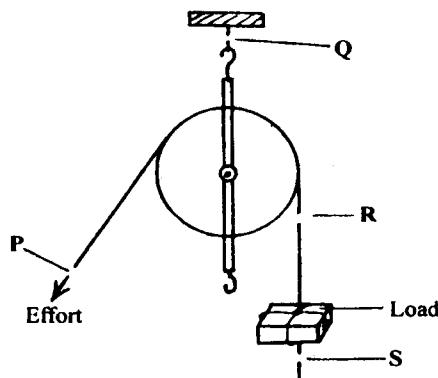
The question numbers and the percentage of candidates choosing the correct response are shown in the table below.

Table 11: Questions with a Facility Index of 40% and below

QUESTION NUMBER	12	27	31	32	47
% of Candidates Choosing the Correct Response	36.5	35.51	38.79	16.85	37.76

Question 12

The diagram below represents a set-up that is used to lift a load.



To investigate the force required to lift the load a spring balance must be at

- A. P
- B. Q
- C. R
- D. S.

Response pattern

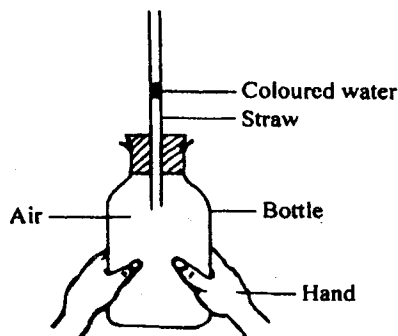
Option	A*	B	C	D
% Choosing Option	36.50	35.62	19.59	7.09
Mean mark in other Questions	31.06	28.32	225.68	25.40

This question was testing candidates' knowledge of use of pulleys and the principle involved. It also required candidates to have carried out the investigation in class. A practical approach to teaching was necessary to enable candidates develop the correct concept and therefore be able to get the right answer. The force required to lift a load can only be measured from where the effort is applied. A spring

balance at *S* will measure nothing. At *R* it will measure the load. At *Q* it will measure the pulley, load and the string used. It is only at *P* it will measure the effort required to lift the load.

Question 27

The diagram below shows a set up that was used to demonstrate a certain property of matter.



The coloured water rises up the straw because

- A. liquids expand when heated
- B. liquids occupy space
- C. air occupies space
- D. air expands when heated.

Response pattern

OPTION	A	B	C	D*
% Choosing Option	16.37	5.53	41.11	35.51
Mean mark in other Questions	28.10	24.28	27.20	33.21

This is another question testing experimental design that was poorly performed.

Other than having not performed the experiment or a demonstration, it is obvious that for the coloured water to move up and down the straw, the volume of the air in the bottle has to change. The volume of the air is being changed by the warm hands around the bottle. It is the warmth of the hands that will make the air to expand. The demonstration has nothing to do with the other three options.

Question 31

The following are forms of energy:

- (i) heat
- (ii) electricity
- (iii) light
- (iv) sound

The two forms of energy that **DO NOT** require a medium for transmission are

- A. (ii) and (iv)
- B. (i) and (iii)
- C. (i) and (ii)
- D. (iii) and (iv).

Response pattern

Option	A	B*	C	D
% Choosing Option	14.91	38.79	14.88	30.32
Mean mark in other Questions	24.36	22.93	29.23	28.27

This question tested forms of energy and their modes of transmission. The question tested higher order skills and the candidates were required to sort out two among the four forms of energy that require a medium for transmission.

Heat can be transmitted by radiation and therefore does not require a medium. Light can be transmitted through a vacuum and it also does not require a medium. Electricity requires transmission cables of copper or aluminium while sound requires a medium for the waves to be transmitted, hence the two were wrong; the correct ones are therefore *heat* and *light*.

Question 32

The following practices help to conserve energy:

- (i) *using improved firewood jikos*
- (ii) *switching off lights that use hydro-electric power when not needed*
- (iii) *using public transport whenever possible*
- (iv) *using biogas for cooking*

Which **two** practices conserve non-renewable sources of energy?

- A. (i) and (ii).
- B. (ii) and (iii).
- C. (ii) and (iv).
- D. (iii) and (iv).

Response pattern

OPTION	A	B	C	D*
% Choosing Option	16.75	42.10	23.13	16.85
Mean mark in other Questions	28.14	31.36	26.22	29.86

This is the only question that was scored poorly by the standards of other years where a question is scored poorly if scored by less than 30%.

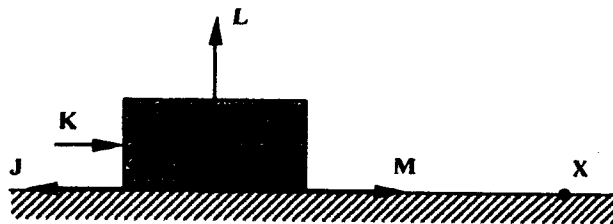
Analysis of how each option conserves energy; whether renewable or non-renewable shows that;

- (i) Using improved firewood jiko conserves trees. Trees are renewable because others can be planted.
- (ii) Switching off lights that use hydro-electric power when not needed conserves energy but this is only as far as the consumer is concerned. Hydro-electric power is generated from water that turns turbines and all that is needed is water from any source hence renewable.

- (iii) Using public transport means using few vehicles hence less petrol or diesel needed. Petrol and diesel obtained from crude oil is non-renewable. The sources can be depleted and cannot be replaced in any way other than the natural way.
- (iv) Using biogas for cooking means not using natural gas which is obtained from crude oil hence helping in conserving non-renewable source of energy.

Question 47

The diagram below represents a block of wood being pushed along a surface towards point X.



Which one of the arrows represents the direction of the force of friction?

- A. J.
- B. K.
- C. L.
- D. M.

Response pattern

OPTION	A*	B	C	D
% Choosing Option	37.76	24.59	9.27	27.12
Mean mark in other Questions	34.81	25.67	20.96	27.99

Analysis of the given options shows that:

- (i) When pushing a block of wood along a surface, the force of friction is directly opposite the direction of push hence J is the correct response and therefore the key is A.
- (ii) Friction is neither in the direction of push, upwards or above the point of contact with the surface as given in the options B, C and D and therefore these options are incorrect.
- (iii) Friction is at the point of contact and opposite to direction of the push and therefore the correct response is A.