THE KENYA NATIONAL EXAMINATIONS COUNCIL

ARTISAN CERTIFICATE

GENERAL FITTER
MOTOR VEHICLE MECHANICS
AGRICULTURAL MECHANICS
WELDING AND FABRICATION

ELECTRICAL INSTALLATION
CARPENTRY AND JOINERY

PAINTING AND DECORATING
MASONRY
PLUMBING
GARMENT MAKING
FOOD AND BEVERAGE
PRODUCTION AND SERVICE
LEATHER WORK
GENERAL AGRICULTURE

SUPPORT SUBJECTS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
    Three answer booklets;
    Mathematical tables;
    Drawing instruments.
This paper consists of *THREE* sections; A, B and C.
Each section *MUST* be answered in a separate answer booklet.
Answer *ALL* the questions in *part I* of each section, any *TWO* questions in *part II* of sections A and B and any *FIVE* questions in *part II* of section C.
Maximum marks for each part of a question are shown.
Candidates should answer the questions in English.

This paper consists of 8 printed pages.

Candidates should check the question paper to ascertain that all
pages are printed as indicated and that no questions are missing.

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SECTION A: MATHEMATICS

PART I (24 marks)

Answer ALL the questions in this part.

1. Simplify $\dfrac{7 \times 3^4}{3^5 \times 7 \times 5^{-2}}$, expressing the answer with positive indices. (3 marks)

2. Express 47 seconds as a percentage of 5 minutes. (2 marks)

3. Express $\frac{12}{17}$ as a decimal correct to 3 significant figures. (2 marks)

4. A water tank is 2 m long 75 cm wide and 50 cm high. Determine the:

   (a) capacity of the tank in litres; (2 marks)
   (b) wetted area when the tank is $\frac{3}{4}$ full. (2 marks)

5. The length of a rectangular box with square ends is 15 cm greater than the breadth. If the total length of the edges is 2.04 m, determine the dimensions of the box. (4 marks)

6. Solve the simultaneous equations:

   $2x - y = 4$
   $x + y = 5$ (4 marks)

7. Make G the subject of formular in the equation $\nu = \dfrac{K + \frac{4}{3}G}{P}$. (2 marks)

8. Determine the area of the parallelogram shown in Figure 1 if all the dimensions are in millimetres. (3 marks)
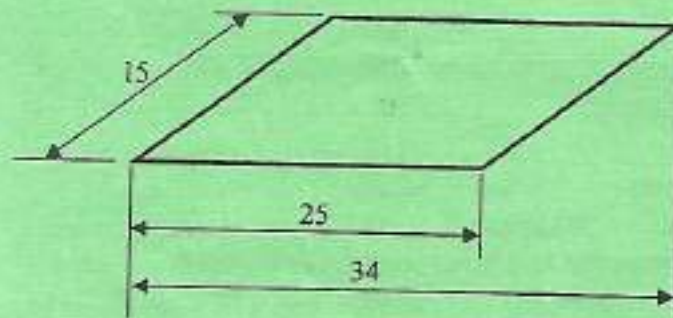

Fig. 1

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PART II (16 marks)

*Answer any **TWO** questions from this part.*

9. (a) A hollow shaft 1.8 m long has an outside diameter of 4.9 cm and an inside diameter of 2.8 cm. Determine the cross sectional area of the shaft. (3 marks)

   (b) A square right pyramid has a base of sides 5 cm and a vertical height of 12 cm. Determine the:

   (i) volume;
   (ii) total surface area. (5 marks)

10. (a) The following set of data refers to the lengths of sticks. Determine the mean, median and mode.

   27.90, 34.70, 54.40, 18.92, 47.60, 39.68 (5 marks)

   (b) Triangle DEF has sides DE = 8, EF = 17 and DEF = 90°. Determine sin EDF. (3 marks)

11. (a) The roots of a quadratic equation are 8 and –2. Determine the equation. (2 marks)

   (b) Without plotting a graph, determine the gradient and the y-axis intercept for the equation $y - 2 = 4x + 9$. (3 marks)

   (c) Two aircrafts leave an airfield at the same time. One travels due north at an average speed of 300 km/h and the other due west at an average speed of 220 km/hr. Calculate their distance apart after 4 hours. (3 marks)

SECTION B: SCIENCE

PART I (24 marks)

*Answer **ALL** questions from this part.*

12. State the units of measurement for each of the following:

   (a) pressure;
   (b) luminous intensity. (2 marks)

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13. (a) Define friction.

    (b) State two causes of friction. (3 marks)

14. With the aid of a sketch, outline the procedure of verifying that sound travels through air. (4 marks)

15. Figure 2 shows the arrangement for lifting a mass of 60 kg through a distance of 4 m on a plane inclined at 30°. Determine the work done. (2 marks)

    Take $g = 10$ m/s^2
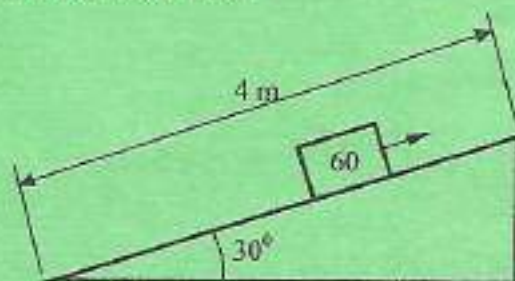
Fig. 2

16. Illustrate the existence of atmospheric pressure. (2 marks)

17. With the aid of a sketch, show that depth affects pressure in liquids. (3 marks)

18. Outline two:

    (a) uses of electrolysis; (2 marks)
    (b) features of a dry cell. (2 marks)

19. Explain expansion in solids using the particle theory. (2 marks)

20. Figure 3 shows the magnetic field between two magnets X and Y.

Fig. 3

    (a) State the poles P and Q.

    (b) State which of the two magnets is stronger and give the reason for your answer. (2 marks)

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PART II (16 marks)

Answer any TWO questions from this part.

21. (a) (i) With the aid of a sketch, show the bonding process in the formation of a sodium chloride molecule.

        (ii) Sketch and label the parts of an atom.   (4 marks)

  (b) Illustrate the process of preparing dry hydrogen in a laboratory.   (4 marks)

22. (a) Name **two** alloy metals and state **two** constituents and **two** uses of each in the construction industry.   (3 marks)

  (b) Calculate the work done by a mason in lifting a 5.5 kg stone through a height of 2 m.   (3 marks)

  (c) State the law of:

        (i) reflection;
        (ii) refraction.   (2 marks)

23. (a) State **two** characteristics and **one** example of each of the following:

        (i) scalar quantity;
        (ii) vector quantity.   (3 marks)

  (b) Distinguish direct current from alternating current.   (2 marks)

  (c) Explain the circuit elements of a ring main for a domestic house.   (3 marks)

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SECTION C: GENERAL STUDIES

PART I (20 marks)

Answer BOTH questions in Part I.

24.   *Read the passage below and answer the questions that follow.*

The influx of **second hand** vehicles into the Kenyan market aims at satisfying transport demands that the local motor vehicle industry is unable to meet. The imports cut across the transport sector raging from personal to heavy commercial vehicles. This has led to the increase of used vehicle showrooms, with majority doing their own importation.

While buying a vehicle online has been made easy, internet adverts can be very misleading on the **actual** condition of the vehicle. However, before buying a second hand vehicle, there are various factors that one should consider. One such factor is the age of the vehicle. Age determines the condition of the vehicle especially if it is not well maintained. The model of the vehicle should also be considered. This is because some models are more expensive to maintain than others.

In addition, one should consider the value of the vehicle. This is because the value determines the amount of Excise Duty to be paid at the port of entry. Besides, one should consider the engine capacity of the vehicle. A big engine determines fuel consumption of the vehicle and this may make it difficult to maintain.

There are several reasons why people prefer second hand vehicles. One of them is that second hand vehicles are relatively cheap. Besides, they are of high quality as they are inspected before the shipping is done. Hence, buying them enables many people to **own** vehicles without much financial strain.

(a)   State the meaning of each of the following words as used in the passage:

   (i)   second hand;
   (ii)   actual;
   (iii)   prefer;
   (iv)   own.

(4 marks)

(b)   State, according to the passage, the factors that should be considered before importing a second hand vehicle.

(4 marks)

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(c)   State, according to the passage, why people prefer second hand vehicles.   (2 marks)

25.   (a)   State **three** reasons why a business person keeps records.   (3 marks)

(b)   State **three** types of energy that do not pollute the environment.   (3 marks)

(c)   State **two** causes of sea pollution.   (2 marks)

(d)   Rewrite the following sentences correctly.

     (i)   who's house is this
     (ii)   The manager has been to a meeting since 8.00 a.m. to 10.00 a.m.   (2 marks)

PART II (20 marks)

*Answer any **FIVE** questions from this part.*

26.   (a)   State **two** ways in which cooperatives contribute in nation building.   (2 marks)

(b)   State **two** reasons why games should be encouraged in society.   (2 marks)

27.   (a)   Name **two** physical barriers to communication.   (2 marks)

(b)   State **two** crimes associated with overpopulation.   (2 marks)

28.   (a)   State **two** reasons why water pollution should be controlled.   (2 marks)

(b)   List **two** functions of the civil service.   (2 marks)

29.   (a)   Outline **two** methods of increasing sales in a business.   (2 marks)

(b)   State **two** examples of revenue expenses in a business.   (2 marks)

30.   (a)   List **two** factors that may be considered when choosing communication media.   (2 marks)

(b)   State **two** reasons why same sex marriages are on the increase in Kenya.   (2 marks)

31.   (a)   List **two** state corporations that help in protecting the environment.   (2 marks)

(b)   List **two** costs that are incurred in production of a product.   (2 marks)

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32. (a) State **two** functions of a county government. (2 marks)

   (b) State **two** details found in a cash sales receipt. (2 marks)

33. (a) List **two** reasons why charcoal burning is discouraged. (2 marks)

   (b) State **two** roles of the National Assembly. (2 marks)

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