# SECTION A (40 MARKS)
## *Answer all questions in this section*

1. Express the decimal 1.3181818....as an improper fraction in its lowest terms
   *(04 marks)*

2. If $n(P) = 23$, $n(Q) = 25$, $n(P' \cap Q') = 4$ and $n(\Sigma) = 45$, find $n(P \cap Q)$
   *(04 marks)*

3. A salesman gets a basic monthly salary of sh.761,000. He also gets a 5% commission on the sales. In a certain month, his sales were sh. 2,800,000 Calculate her income for that month. *(04 marks)*

4. Given that p varies inversely as the square of q and $p = 9$ when $q = 4$, find the value of p when $q = 8$. *(04 marks)*

5. Without using tables or a calculator, evaluate; $\dfrac{78.65^2 - 21.35^2}{5.73}$ *(04 marks)*

6. Without using a calculator or mathematical tables, evaluate $\log_{10} 7 - \log_{10} 35 + \log_{10} 5000$ *(04 marks)*

7. Given that $OB = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $OA = \begin{pmatrix} -2 \\ 10 \end{pmatrix}$,

   **(a)** Determine the column vector for AB *(04 marks)*

   **(b)** Hence find the length of AB

8. Find the equation of the line which is a perpendicular bisector of the line passing through the points $A(-1,7)$ and $B(3, -1)$. *(04 marks)*

9. Simplify $\dfrac{2^{-4} \times 27^{-1} \times 12^{10}}{24^5}$. *(04 marks)*

10. On a map whose scale is 1: 50,000, a sugarcane estate is represented by an area of $25cm^2$. Calculate the actual area of the estate in $km^2$. *(04 marks)*

## SECTION B (60 MARKS)
*Answer any five questions from this section.*
*All questions carry equal marks.*

11. (a) Given that $g(x) = ax^2 + 2x$ and $g(3) = 24$, find the value of:
    (i)   a                                                          *(06 marks)*
    (ii)  g(−3)

    (b) Given that $f(x) = \frac{x+5}{2}$ , $g(x) = \frac{1-3x}{3}$, determine the value (s) of $x$ for
    which $fg(x) = \frac{x^2+2x-20}{6}$.                              *(06 marks)*

12. The diagram below shows a giant water tank ABCDE which is made in the shape of a right cone mounted on a cylinder. The base radius of the cylinder = 6m. The slant length of the cone ED = CD = 7.5m and the height of the cylinder BC = AE = 10m.
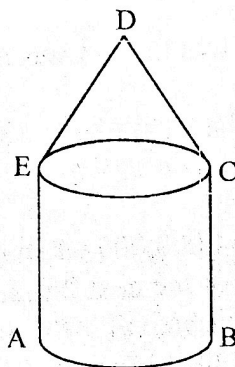


    (a) If the tank has to be painted on the outer surface, calculate the surface area to be painted in m² ( take $\prod = 3.142$). *(04 marks)*
    (b) Calculate the volume of the water needed to fill the tank in m³. *(08 marks)*

13. In the triangle ABC, the midpoints of BC, AC and AB are L, M and N respectively. AM = m and AN = n. Point G lies on AL such that 3AG = 2AL.

    (a) Express the following vectors in terms of m and n :
                                                                      *(09 marks)*
    (i)   AB

    (ii)  AC

    (iii) BC

    (iv)  BC

    (v)   GM.
    (b) Show that the points B,G and M are collinear          *(03 marks)*

14. A quantity P is partly constant and partly varies as the square of x. When x = 2, p = 95 and when x = 3, p = 120. Find:
    (a) The equation connecting p and x.

(b)  (i)   the value of p when x = 5          *(08 marks)*

     (ii)  value of x when p = 1200            *(04 marks)*

15.  At 11: 15am, a trailer left Kasese and travelled o Mbale at an average speed of 40km/h. At 1:45 pm, a bus left Kasese and travlled along the same road at an average speed of 60 km/h. The distance from Kasese to Mbale is 500km.

(a)   Calculate the distance travelled by the traer before the bus started.
                                                *(04 marks)*

(b)   At what time did the bus overtake the trailr?          *(04 marks)*

(c)   How far from Mbale was the bus when it ovrtook the trailer?
                                                *(04 marks)*

(d)   Find how far from Mbale the trailer was whenthe bus reached Mbale?
                                                *(04 marks)*

16.  (a)   A generator costs sh.54,000,000 when new. Its value depreciated by 10% during the first year. For the next 2 years, the value of the generator depreciated at a constant rate of 20% per year. Calculate the value of the generator at the end of the third year.          *(06 marks)*

(b)   Okellona borrowed shs.500,000 from Totokona Bank at 20% per annum compound interest. If he repaid a total of shs. 1,038,000, find how long he borrowed the money.          *(06 marks)*

17.  Kawuku Seed school has 60 students in S5, out of which 53 offer Sciences and the rest offer Arts. Of the science students, 30 study Chemistry, 20 study Physics and 15 study Biology. Six study both Chemistry and Physics, four study both Biology and Chemistry while five study both Physics and Biology.

(a)   Represent the above information on a venn diagram.          *(06 marks)*

(b)   Use it to find the number of students who study all the science subjects.
                                                *(02 marks)*

(c)   A student is selected at random from the class, find the probability that:

     (i)   he studies Arts subjects only,

     (ii)  he studies Physics but not Biology.          *(04 marks)*

## END