1. (a) Without using mathematical tables or calculators, evaluate $\frac{0.015 \times 0.567}{0.05 \times 0.189}$, leaving the answer in standard form.

   (b) If $\frac{5y - x}{8y + 3x} = \frac{1}{5}$, find, correct to two decimal places, the value of $\frac{x}{y}$.

2. (a) Z varies directly as x and inversely as twice the cube root of y. If $Z = 8$, when $x = 4$ and $y = \frac{1}{8}$, find the relation for y in terms of x and Z

   (b) Factorize completely: $4b^2 - ab + (a + 9b)^2 - a^2$.

3. (a) Solve $\frac{5x - 7}{6} + \frac{2x - 3}{4} = -\frac{2}{3}$.

   (b) Evaluate $\frac{\sqrt{28} + \sqrt{343}}{2\sqrt{63}} + \frac{5}{3}$.

4. A car dealer made a profit of 22.5% by selling car for GHC 58, 000.00. Find, correct to two decimal places, the percentage profit if the car bad been sold for GHC 1,2000.00.

5. (a) A number is chosen at random from $Q = \{1, 2, 3, \ldots, 10\}$. Find the probability that the chosen number is either a prime factor of 42 or a multiple of 3.

   (b) If $110_x = 1020_{\text{four}}$, find the value of x.

6. (a) If $\mathbf{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ and $\mathbf{r} = \mathbf{a} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$, find:

      i. $\mathbf{r}$;

      ii. $|\mathbf{r}|$.

   (b) Given that $a = bc$ and $n = \frac{mk}{ec}$,

      i. express k in terms of a, b, e, m and n;

      ii. find, correct to three significant figures, the value of k, when $a = \frac{1}{2}, b = -4, e = 3$, $m = 7$ and $n = -5$.

7. (a) Copy and complete the table of values for $y = 5\sin x + 9\cos x$ for $0^\circ \leq x \leq 150^\circ$.

x	0°	30°	60°	90°	120°	150°
y		10.3			-0.2	

   (b) Using a scale of 2cm to 30° on the x -axis and 2cm to 2 units on the y -axis, draw the graph of $y = 5\sin x + 9\cos x$ for $0^\circ \leq x \leq 150^\circ$.

   (c) Use the graph to solve the equations:

      i. $5\sin x + 9\cos x = 0$

      ii. $5\sin x + 9\cos x = 2$

   (d) Using the graph, find, the value of y when $x = 45^\circ$.

8. (a) Using a ruler and a pair of compasses only, construct:

      i. the quadrilateral $ABCD$ such that $|AB| = 6.5$cm, $|BC| = 9$cm, $|AD| = 4$cm, $\angle ABC = 60^\circ$ and $\angle BAD = 120^\circ$.

      ii. the perpendicular bisectors of $\overline{BC}$ and $\overline{CD}$.

   (b) Locate the point of intersection, T, of the two bisectors in 8(a)(ii).

(c) With the point T in $8(b)$ as centre, draw a circle to pass through the vertices B, C and D.

(d) Measure:

i. $|BT|$;

ii. $|CD|$.

9. (a) Using a scale of 2cm to 1 unit on both axes. draw on a sheet of graph paper, two perpendicular axes $0x$ and $0y$ for $-5 \leq x \leq 5$ and $-5 \leq y \leq 5$.

(b) Draw on the same graph sheet, indicating clearly all vertices and their coordinates:

i. ΔABC with vertices $A(2,1), B(1,4)$ and $C(-1,2)$;

ii. the image $\Delta A_1B_1C_1$ of ΔABC under a reflection in the line $y = 0$, where $A \rightarrow A_1$ $B \rightarrow B_1$ and $C \rightarrow C_1$;

iii. the image $\Delta A_2B_2C_2$ of ABC under a translation by the vector $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$, where $A \rightarrow A_2, B \rightarrow B_2$ and $C \rightarrow C_2$;

iv. the image $\Delta A_3B_3C_3$ of ABC under an anticlockwise rotation of 90° about the origin, where $A \rightarrow A_3, B \rightarrow B$, and $C \rightarrow C_3$.

(c) What single transformation maps $\Delta A_1, B_1, C_1$ onto $\Delta A_3B_3C_3$ where $A_1 \rightarrow A_3, B_1 \rightarrow B_3$ and $C_1 \rightarrow C_3$.

10. (a) In a class of 50 students, 24 like football, 21 basketball and 18 cricket. 6 like football and basketball only, 3 like basketball only, 5 like all the three games and 14 did not like any of the three games.

i. Illustrate this information on a Venn diagram.

ii. Find the number of students who like;

α. football and cricket only;

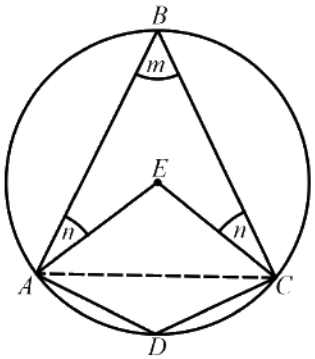
β. exactly one of the games.

(b) If $(3-a), 6, (7-5a)$ are consecutive terms of a Geometric Progression (G.P) with common ratio $r > 0$, find the values of a.

11. (a) Two passenger trains, A and B, 450km apart start to move towards each other at the same time and meet after 2 hours. If train B, travels $\frac{8}{7}$ as fast as train A, find the speed of each train.

(b) A solid cube of side 8cm was melted to form a solid circular cone. The base radius of the cone is 4cm. Calculate, correct to one decimal place, the height of the cone. $\left[\text{Take } \pi = \frac{22}{7}\right]$

12.



(a) The diagram shows a circle $ABCD$ with centre E. Quadrilateral $EADC$ is a rhombus, $\angle BAE = \angle ECB = n$ and $\angle ABC = m$. Find:

i. m

ii. n

(b) Find the quadratic equation whose roots are $\frac{3}{4}$ and -4.

13. (a) The fourth term of an Arithmetic Progression (A.P) is one less than twice the second term. If the sixth term is 7 find the first term.

(b) A clerk spends $\frac{1}{5}, \frac{1}{3}$ and $\frac{1}{8}$ of his annual salary on rent, transport and entertainment respectively. If after all these expenses he had GHC4, 100.00 left, find how much he earns per annum.

(c) Given that $f : x \to 2x^2 - 8x + 5$ $g : x \to x - 2$. Find:

i. $f(-3)$;

ii. the values of x such that $f(x) = g(x)$.