SECTION A (40 MARKS)

Answer all questions in this section

1. Solve the simultaneous equations: *(04 marks)*

$$3x - 4y - 2 = 0; \qquad x + 5y - 7 = 0$$

2. The average of three consecutive numbers is 42. Find the value of the smallest number. *(04 marks)*

3. Factorise the following completely: *(04 marks)*

   (i) $4my - 6mx - 2ny + 3nx$

   (ii) $2x - 8x^3$

4. Given that $\begin{pmatrix} x-2 & x+2 \\ 2x & x \end{pmatrix}$ has no inverse, find the values of x. *(04 marks)*

78 876

5. Solve for x in the inequality: *(04 marks)*

   $2x + 3 \leq 5 + x \leq 2x + 7$

768

786

6. Given that $m * n = \frac{m^2+n}{m-n}$; find a such that $a * 1 = 5$ *(04 marks)*

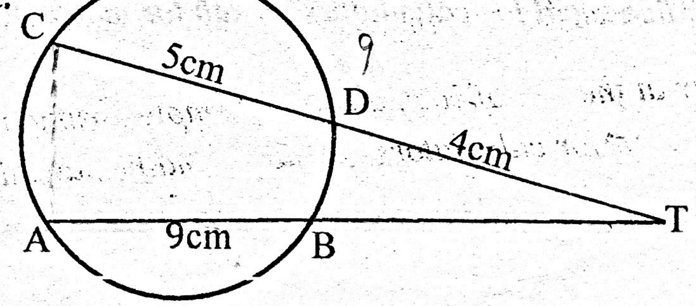
7. A three digit number is formed from the digits $2, 5, 6$ *and* 8 without repeating any digit.

   (a) List down all the possible numbers.

   (b) Calculate the probability that a number picked at random from that set is an even number. *(04 marks)*

8. Given that $12cos\theta - 6 = 0$ *and* $0^0 \leq \theta \leq 360^0$, find the two possible values of θ. *(04 marks)*

9. In the figure below, AT and CT are secants, $CD = 5cm$, $DT = 4cm$ and $AB = 9cm$. *(04 marks)*



Calculate the length BT.

10. The triangle ABC whose area is $42cm^2$ is mapped on to a triangle $A^{I}B^{I}C^{I}$ by a transformation matrix $M = \begin{pmatrix} 3 & 4 \\ 2 & 5 \end{pmatrix}$. Find the area of the triangle $A^{I}B^{I}C^{I}$. *(04 marks)*

SECTION B (60 marks)

Answer any five questions from this section.
All questions carry equal marks.

11. (a) Copy and complete the table of values below for $y = 2x^2 + 3x - 3$ *(03 marks)*

x	-3	-2	-1	0	1	2	3
$2x^2$	18	8	+2	0	2	8	18
$3x$	-9	-6	-3	0	3	6	9
-3	-3	-3	-3	-3	-3	-3	-3
y	6	-1	-4	-3	2	11	24

(b) Use your completed table to draw the graph of $y = 2x^2 + 3x - 3$. Use a scale of 1cm:2units for the vertical axis and 1cm:0.5 units for the horizontal axis. *(04 marks)*

(c) Draw on the same graph the line $y = 7x - 3$. Hence solve the equation $2x(x - 4) = 0$ *(05 marks)*

$2x^2 - 8x = 0$

12. (a) Given that $A = \begin{pmatrix} 3 & 0 & 5 \\ 1 & 3 & 1 \end{pmatrix}$ *and* $B = \begin{pmatrix} 1 & 4 & 0 \\ 3 & 2 & 2 \\ 1 & -1 & 1 \end{pmatrix}$ *and* $C = AB$;

(i) State the order of the matrix C;

(ii) Find the matrix C. *(04 marks)*

$y = 7x - 3$

$= 7x - 3$

(b) Gilbert, Harriet and Allen went shopping at Quality Super Market. Gilbert bought 4 *LG TVs*; 5 blankets; 7 chapatis and 8 bottles of sodas.
Harriet bought 3 *LG TVs*, 6 blankets and 3 chapatis.
Allen bought 5LG TVs; 2 blankets; 4 chapatis and 9 bottles of soda.
The LG TVs are sold at sh. 600,000 each, blankets at sh. 100,000 each, chapatis at sh. 2,000 each and sodas at sh. 1,500 per bottle.

(i) Write the items bought as a 3x4 matrix and the price of each as a row matrix. *(04 marks)*

(ii) By matrix multiplication, find how much each person spent. *(08 marks)*

13. (a) Make x the subject of the formula: $y = \frac{x^2}{(x-m)(x+m)}$

Hence find the values of x such that $y = 5$ *and* $m = 2$ *(06 marks)*

$\frac{y}{1} = \frac{x^2}{(x-m)(x+m)}$

(b) Papa bought 15kg of Irish potatoes and 9 bars of soap at sh. 84,000 in may, in June he bought 10kg of Irish potatoes and 5bars of soap at shs. 50,000. What was the price of each item during the two month. *(06 marks)*

14. Using a ruler, a pencil and a pair of compasses only:
   (a) construct a triangle PQR such that angle $PQR = 120^o$, $\overline{PQ} = 8cm$ and $\overline{PR} = 6.5cm$. *(05 marks)*

   (b) Measure the length $\overline{QR}$ *and angle* PRQ. *(02 marks)*

   (c) (i) Draw an inscribed circle in the triangle PQR
   (ii) Find the radius of the circle. *(05 marks)*

15. A bag contains 4 blue, and 6 white balls. Three balls are randomly selected in succession from the bag without replacement.

   (a) Draw a probability tree diagram to represent the given information *(05 marks)*

   (b) Find the probability that:
   (i) all the three balls are of the same colour; *(02 marks)*
   (ii) the second ball is blue; *(02 marks)*
   (iii) atleast two white balls are selected. *(03 marks)*

16. A square whose vertices are A, B, C *and* D is mapped on a square whose vertices are $A'(1,4), B'(4,16), C'(13,28)$ *and* $D'(10,16)$ by matrix of transformation $\begin{pmatrix} 1 & 3 \\ 4 & 4 \end{pmatrix}$. The square $A'B'C'D'$ is then mapped onto a square A'', B'', $C''$and D'' by matrix of transformation $N = \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$

   (a) Describe the matrix N fully. *(02 marks)*
   (b) Find the:
   (i) coordinates of $A''B''C''D''$ *(03 marks)*
   (ii) single matrix of transformation which would map$A''B''C''D''$ to $ABCD$. Hence find the coordinates of $ABCD$. *(07 marks)*

17. (a) By shading the unwanted regions, show on the same graph the region satisfying the inequalities below:
   $x \geq 0;\ y \geq 0, y > x;\ 3x + 2y \leq 24, 3x + y \geq 15.$ *(08 marks)*
   (b) Use your graph in (a) above to find the integral values of x *and* y which satisfy the minimum value for both $3x + 2y$ *and* $3x + y$. *(04 marks)*

END