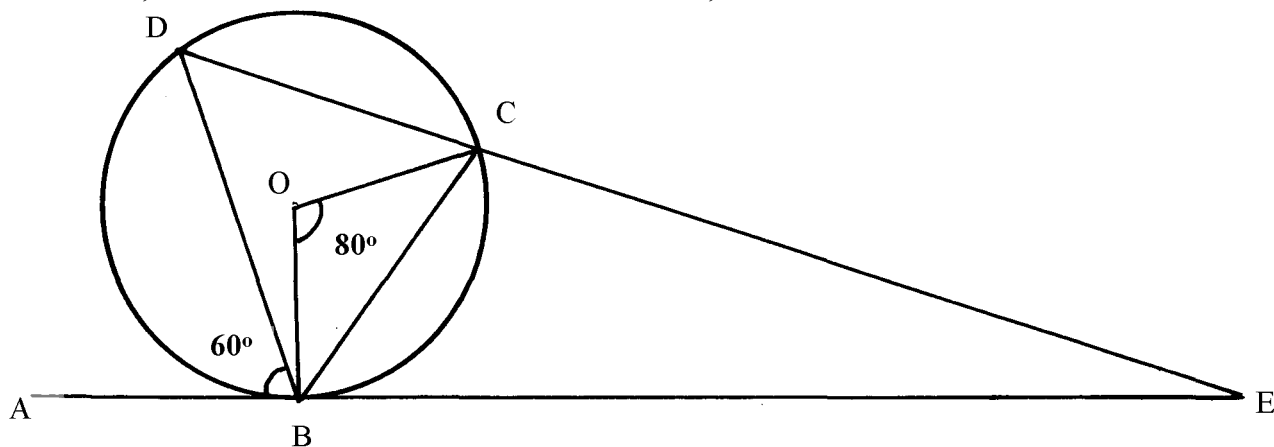


1. Graphical Methods

- The equation of a circle is given as $2x^2 + 2y^2 - 8x + 5y + 10 = 0$. Find the radius of the circle and the coordinates of its centre. (3 mks)
- The equation of a circle is given by $x^2 + 4x + y^2 - 5 = 0$. Find the centre of the circle and its radius.
- The equation of a circle is $x^2 + y^2 + 6x - 10y - 2 = 0$. Determine the co-ordinates of the centre of the circle and state its radius
- In the diagram below ABE is a tangent to a circle at B and DCE is a straight line. If $\angle ABD = 60^\circ$, $\angle BOC = 80^\circ$ and O is the centre of the circle, find with reasons $\angle BEC$



- Obtain the centre and the radius of the circle represented by the equation: $x^2 + y^2 - 10y + 16 = 0$

6. Complete the table below, for the function $y = x^3 + 6x^2 + 8x$

x	-5	-4	-3	-2	-1	0	1
x^3	-125		-27	-8		0	1
$6x^2$		96	54		6	0	6
$8x$	-40		-24			0	8
y			3	0		0	15

(a) Draw a graph of the function $y = x^3 + 6x^2 + 8x$ for $-5 \leq x \leq 1$ and use the graph to estimate the roots of the equation $x^3 + 6x^2 + 8x = 0$

(b) Find which values of x satisfy the inequality $x^3 + 6x^2 + 8x - 1 > 0$

- Sketch the curve of the function $y = x^3 - 3x + 2$ showing clearly minimum and maximum points and the y - intercept.
- Show that $4y^2 + 4x^2 = 12x - 12y + 7$ is the equation of a circle, hence find the co-ordinates of the centre and the radius
- Two variables R and P are connected by a function $R = KP^n$ where K and n are constants. The table below shows data involving the two variables

P	3	3.5	4	4.5	5
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R	36	49	64	81	100
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- Express $R = KP^n$ in a linear form
- Draw a line graph to represent the information above
- Find the values of constants K and n
- Write down the law connecting R and P
- Find the value of P when $R = 900$

- A circle of radius 3cm has the centre at $(-2, 3)$. Find the equation of the circle in the form of $x^2 + y^2 + Px + Qy + c = 0$
- In an experiment, the values of two quantities V and T were observed and the results recorded as shown below.

V	0	2	4	6	8	10
T	0.49	0.30	0.24	0.20	0.16	0.137

It is known that T and V are related by a law of the form $T = \frac{a}{b + V}$

where a and b are constants.

- Draw the graph of $\frac{1}{T}$ against V
 - Use your graph to find;
 - The values of a and b .
 - V when $T = 0.38$
 - T when $V = 4.5$
- Find the equation of the tangent to the curve $y = 2x^3 + x^2 + 3x - 1$ at the point $(1, -5)$ expressing your answer in the form $y = mx + c$
 - Given that :- $243 = (81)^{-1} \times \left(\frac{1}{27}\right)^x$ determine the value of x
 - Show that $3x^2 + 3y^2 + 6x - 12y - 12 = 0$ is an equation of a circle hence state the radius and centre of the circle
 - (a) Fill in the table below for the function $y = -6 + x + 4x^2 + x^3$ for $-4 \leq x \leq 2$

x	-4	-3	-2	-1	0	1	2
-6	-6	-6	-6	-6	-6	-6	-6
x	-4	-3	-2	-1	0	1	2
$4x^2$			16			4	
x^3							
y							

- Using the grid provided draw the graph for $y = -6 + x + 4x^2 + x^3$ for $-4 \leq x \leq 2$
 - (i) Use the graph to solve the equations:-
 - $x^3 + 4x^2 + x - 4 = 0$
 - $-6 + x + 4x^2 + x^3 = 0$
 - $-2 + 4x^2 + x^3 = 0$
- The table below shows the results obtained from an experiment to determine the relationship

between the length of a given side of a plane figure and its perimeter

Length of side l (cm)	1	2	3	4	5
Perimeter P (cm)	6.28	12.57	18.86	21.14	31.43

- (a) On the grid provided, draw a graph of perimeter P , against l
 (b) Using your graph determine;
 (i) the perimeter of a similar figure of side 2.5cm
 (ii) the length of a similar figure whose perimeter is 9.43cm
 (iii) the law connecting perimeter p and the length l
 (c) If the law is of the form $P = 2kl + c$ where k and c are constants, find the value of k

17. In an experiment with tungsten filament lamp, the reading below of voltage (V) current (I), power (P) and resistance (R) were obtained. It was established that P was related to R by a law $P = aR^n - 0.6$. Where a and n are constants.

V	1.30	2.00	2.80	4.40	5.70
I	1.50	1.80	2.10	2.50	2.90
P	0.73	2.05	3.28	7.44	10.62
R	0.89	1.13	1.33	1.78	1.99

Plot a suitable line graph and hence use it to determine the value of a and n

18. Find the gradient of a line joining the centre of a circle whose equation is $x^2 + y^2 - 6x = 3 - 4y$ and a point $P(6,7)$ outside the circle..

19. a) Complete the table below for the function $y = -x^3 + 2x^2 - 4x + 2$.

x	-3	-2	-1	0	1	2	3	4
$-x^3$	27	8		0		-8		
$2x^2$	18	8	2	0				
$-4x$		8		0				-16
2	2	2	2	2	2	2	2	2
y		26		2		-6		-46

- b) On the grid provided below draw the graph of $-x^3 + 2x^2 - 4x + 2$ for $-3 \leq x \leq 4$.
 c) Use the graph to solve the equation $-x^3 + 2x^2 - 4x + 2 = 0$.
 d) By drawing a suitable line on the graph solve the equation. $-x^3 + 2x^2 - 5x + 3 = 0$.

20. Determine the turning point of the curve $y = 4x^3 - 12x + 1$. State whether the turning point is a maximum or a minimum point.

21. (a) Complete the table below for the equation of the curve given by $y = 2x^3 - 3x^2 + 1$

X	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3
$2x^3$	-16		-2		0		2		16		
$-3x^2$	-12			0.75	0	-0.75					-27
1	1				1						
y	-27	-12.5			1						13.5

- (b) Use the table to draw the graph of the function $y = 2x^3 - 3x^2 + 1$
 c) Use your graph to find the values of x for :-
 (i) $y > 0$
 (ii) The roots of the equation $2x^3 - 3x^2 + 1 = 0$
 (iii) $2x^3 - 3x^2 = 9$

22. Find the radius and the centre of a circle whose equation is :

$$2x^2 + 2y^2 - 6x + 10y + 9 = 0$$