DBE NOV 2026 PAPER 2

Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.

Answers only will NOT necessarily be awarded full marks.

You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

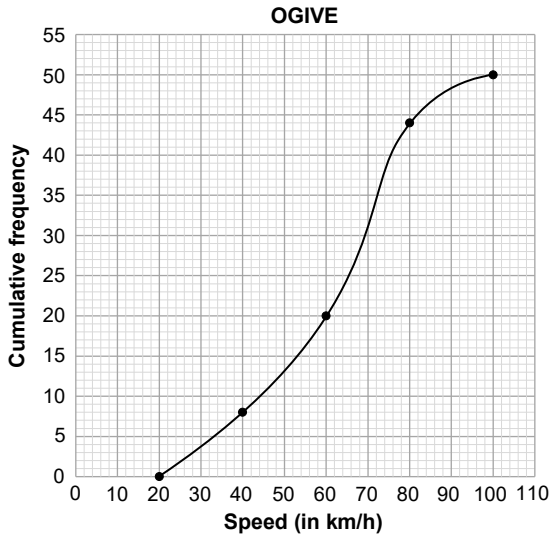
*If necessary, round off answers to **TWO** decimal places, unless stated otherwise.*

Diagrams are NOT necessarily drawn to scale.

▸ STATISTICS [21]

QUESTION 1

A traffic officer recorded the speed (in km/h) at which motorists drove past a point on the road for a period of 1 hour. The information was summarised and presented in the cumulative frequency graph (ogive) below.



1.1 How many vehicles passed the traffic officer during this time? (1)

1.2 Write down the median speed at which the motorists drove past this point. (1)

1.3 How many motorists were travelling more than 60 km/h when they passed the traffic officer? (1)

1.4 Complete the frequency table below.

Speed (in km/h)	Frequency
20 ≤ t < 40	
40 ≤ t < 60	
60 ≤ t < 80	
80 ≤ t < 100	

(2)

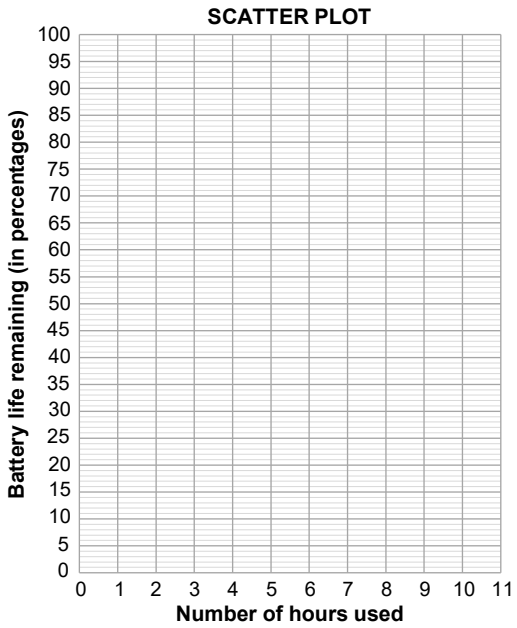
1.5 Calculate the estimated average speed recorded by the traffic officer. (3) **[8]**

QUESTION 2

2.1 A homeowner used an inverter on each day that there was load shedding. The table below shows the battery life remaining (as a percentage) after the inverter was used for a certain number of hours on each day. The battery of the inverter was fully charged before it was used on each occasion.

Number of hours used	3	1	4	10	2	5	1	6	8	9
Battery life remaining (in percentage)	65	96	50	47	73	62	63	58	52	32

2.1.1 Draw a scatter plot of the data on the grid below. (3)



2.1.2 Determine the equation of the least squares regression line. (3)

2.1.3 Predict the percentage battery life remaining after the inverter had been used for 7 hours on a certain day. (2)

2.1.4 Calculate the standard deviation of the battery life remaining after the inverter was used. (1)

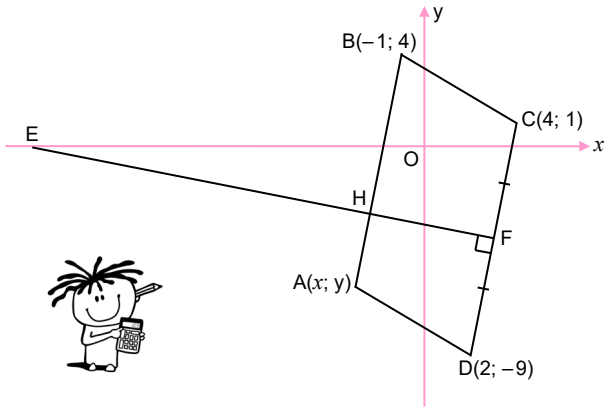
2.2 When the inverter was charged in the first month after it was bought, the battery lasted 100 hours before the inverter needed to be charged again. In the second month after the inverter was bought, the battery lasted 98 hours before the inverter needed to be charged again. In each month thereafter, the number of hours that the battery lasted decreased by 2% in respect to the previous month.

How many months, after buying the inverter, will the battery of the inverter last for 54,55 hours, before it needs to be charged again? (4) **[13]**

▸ ANALYTICAL GEOMETRY [41]

QUESTION 3

In the diagram, A(x; y), B(−1; 4), C(4; 1) and D(2; −9) are the vertices of parallelogram ABCD. F is the midpoint of CD.
E is a point on the x-axis such that EF ⊥ CD. EF intersects AB at H.



3.1 Calculate the gradient of CD. (2)

3.2 Calculate the coordinates of F. (2)

3.3 Show that the coordinates of E are (−17; 0). (3)

3.4 Calculate the area of ΔCDE. (4)

3.5 Calculate the size of $A\hat{B}C$. (4)

3.6 Determine the equation of the circle passing through E, H and A in the form $(x - a)^2 + (y - b)^2 = r^2$ (6) **[21]**

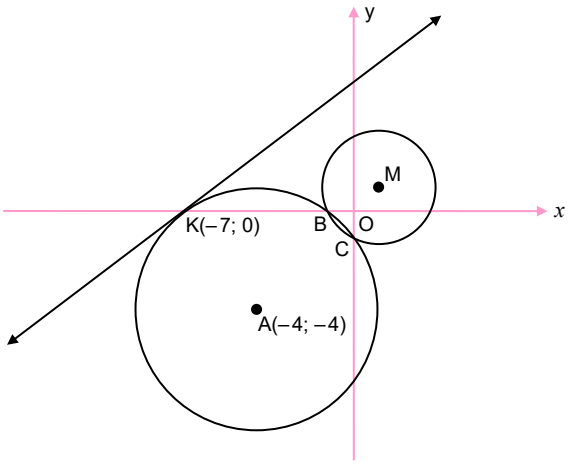
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QUESTION 4

In the diagram, the larger circle with centre A(–4; –4) intersects the y-axis at C and the x-axis at K(–7; 0) and B.

A tangent is drawn to the larger circle at K.

The smaller circle with centre M intersects the larger circle at B and C.



4.1 Show that the equation of the larger circle is $(x + 4)^2 + (y + 4)^2 = 25$. (1)

4.2 Calculate the gradient of AK. (1)

4.3 Determine the equation of the tangent at K in the form $y = mx + c$. (3)

4.4 The equation of the smaller circle is $x^2 + y^2 - 2x - 2y - 3 = 0$. Calculate the coordinates of M, the centre of the smaller circle. (3)

4.5 Hence, write down the length of the radius of the smaller circle. (1)

4.6 Calculate the coordinates of T if T is a reflection of B about the line $y = -4$. (4)

4.7 Show that K, A and T are collinear. (2)

4.8 Calculate the percentage by which the radius of the smaller circle must reduce for the two circles to touch externally. (5)

[20]

▶ TRIGONOMETRY [50]

QUESTION 5

5.1 If $\cos 12^\circ = k$, determine, **without using a calculator**, the following in terms of k:

5.1.1 $\sin 12^\circ$ (2)

5.1.2 $\tan(-12^\circ)$ (2)

5.1.3 $1 - 2\sin^2 39^\circ$ (2)

5.2 **Without using a calculator**, show that:

$$\frac{\sin(90^\circ - \theta)\cos^2(360^\circ - \theta) + \sin^2\theta \sin(180^\circ + \theta)}{\cos\theta + \sin(360^\circ - \theta)} = 1 + \sin\theta\cos\theta$$

(6)

5.3 Determine the value of θ, in the interval $\theta \in [180^\circ; 360^\circ]$, for which $\frac{2\sin^2\theta + \sin 2\theta}{\sin\theta - \cos\theta}$ is undefined. (3)

[15]

QUESTION 6

6.1.1 Use the compound angle expansion of $\cos(A - B)$ to write $\cos 25^\circ$ in terms of 35° and 10°. (2)

6.1.2 Hence, or otherwise, calculate the value of the following expression **without using a calculator**:

$\cos 25^\circ - 2\sin 10^\circ \sin 35^\circ$ (3)

6.2 Prove that:

$4\sin\theta\cos^3\theta - 4\cos\theta\sin^3\theta = \sin 4\theta$ (3)

6.3 It is given that $\sin A = \frac{4}{5}$ and $0^\circ < A < 90^\circ$.

6.3.1 Calculate the size of A. (1)

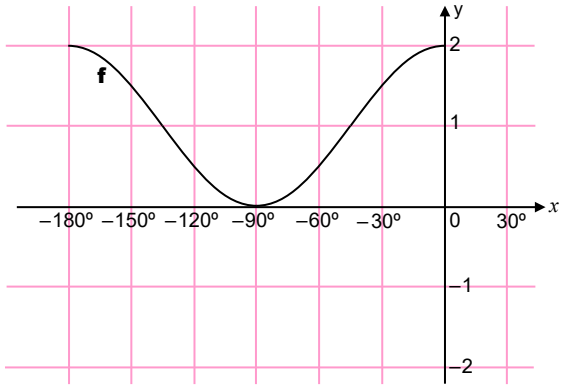
6.3.2 Hence, determine the general solution of $4\cos x - 3\sin x = 1$ (6)

[15]



QUESTION 7

In the diagram, the graph of $f(x) = \cos 2x + 1$ is drawn for the interval $x \in [-180^\circ; 0^\circ]$.



7.1 Write down the range of f. (1)

7.2 Write down the period of f. (1)

7.3 On the system of axes above, sketch the graph of $g(x) = -\cos x - 1$ for the interval $x \in [-180^\circ; 0^\circ]$. (3)

7.4 A is a point on f and B is a point on g such that AB is parallel to the y-axis.

7.4.1 Show that $AB = 2\cos^2 x + \cos x + 1$ (2)

7.4.2 Calculate the minimum distance of AB in the given domain. (2)

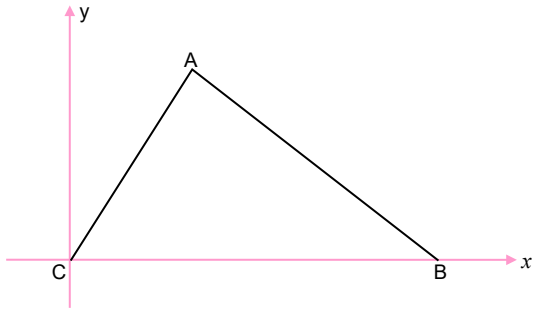
[9]



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QUESTION 8

8.1 In the diagram, ΔABC is drawn with C at the origin and B on the x-axis.



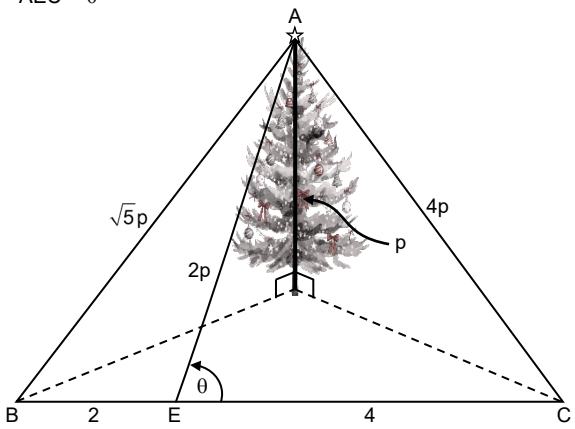
Use the diagram to prove that $c^2 = a^2 + b^2 - 2ab\cos C$. (4)

8.2 In the diagram, A is the top of a Christmas tree and D is a point directly below A. Three young children stand in a straight line at points B, E and C respectively, looking at the star at the top of the Christmas tree. D, B, E and C lie on the same horizontal plane.

AD = p metres, AB = $\sqrt{5}$p metres, AE = 2p metres,

AC = 4p metres, BE = 2 metres and EC = 4 metres.

$A\hat{E}C = \theta$



8.2.1 In ΔACE, show that $\cos\theta = \frac{4-3p^2}{4p}$ (2)

8.2.2 Hence, or otherwise, calculate the height of the Christmas tree. (5)

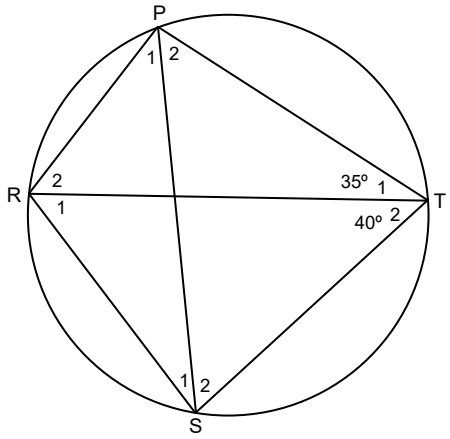
[11]

▶ EUCLIDEAN GEOMETRY [38]

Give reasons for your statements in QUESTIONS 9, 10 and 11.

QUESTION 9

9.1 In the diagram, cyclic quadrilateral PRST and chords PS and RT are drawn. $\hat{T}_1 = 35°$ and $\hat{T}_2 = 40°$.



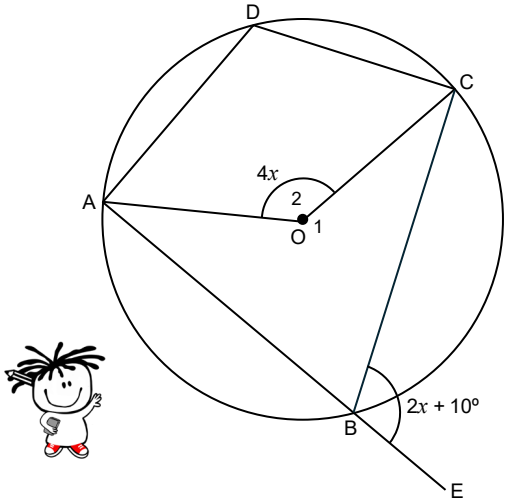
Calculate, with reasons, the size of:

9.1.1 $\hat{P}_1$ (2)

9.1.2 $P\hat{R}S$ (2)



9.2 In the diagram, a circle with centre O is given. ABCD is a cyclic quadrilateral. AB is produced to E. AO and OC are drawn. $\hat{O}_2 = 4x$ and $C\hat{B}E = 2x + 10°$.



Calculate, with reasons, the size of $\hat{D}$. (6)

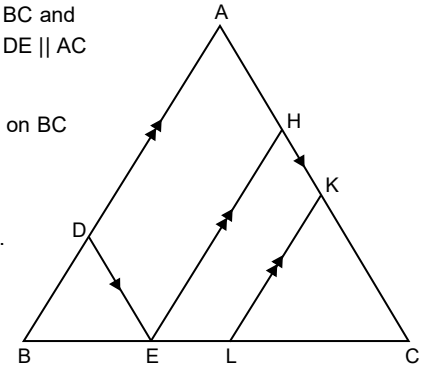
[10]

QUESTION 10

In the diagram, ΔABC is drawn. D lies on AB, E lies on BC and H lies on AC such that DE || AC and AB || HE.

K lies on AC and L lies on BC such that KL || HE.

It is also given that BE : EL : LC = 2 : 1 : 3.



10.1 If KC = 12 cm, calculate the length of HK. (3)

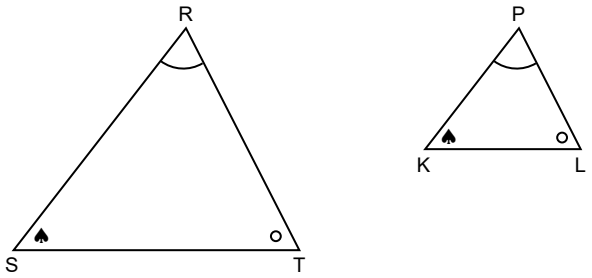
10.2 Hence, calculate $\frac{\text{Area of } \Delta BDE}{\text{Area of DECA}}$ (4)

[7]

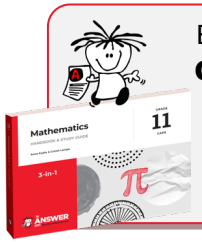
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QUESTION 11

11.1 In the diagram, ΔRST and ΔPKL are drawn such that $\hat{R} = \hat{P}$, $\hat{S} = \hat{K}$ and $\hat{T} = \hat{L}$.



Use the diagram to prove the theorem which states that if two triangles are equiangular, then the corresponding sides are in proportion, i.e. that $\frac{RS}{PK} = \frac{RT}{PL}$. (6)



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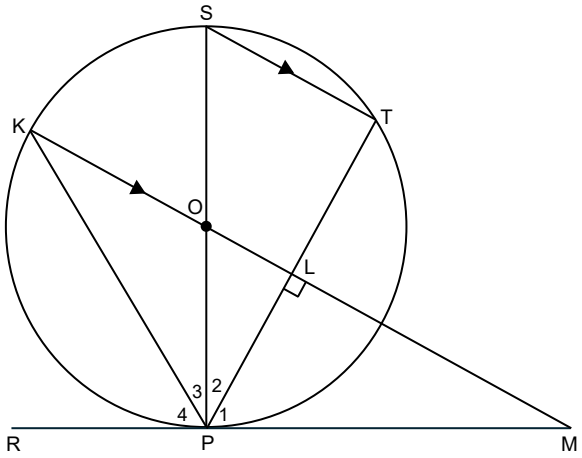
11.2 In the diagram below, a circle with centre O is given.

POS is a diameter of the circle. K and T are points on the circle.

RM is a tangent to the circle at P. KM is a straight line passing through O.

ST is drawn such that ST || KM and PT ⊥ KM at L.

KP is drawn.



11.2.1 Give a reason for TL = LP. (1)

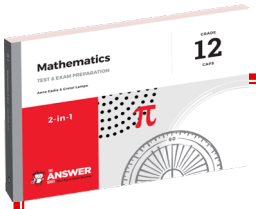
11.2.2 Prove that $\Delta PML \,|||\, \Delta OMP$. (4)

11.2.3 Prove that $\frac{PT}{ML} = \frac{PS}{MP}$ (5)

11.2.4 Show that $\frac{MP}{PT} = \frac{1}{2}\sqrt{\frac{OM}{OL}}$ (5)

[21]

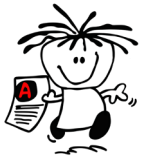
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