basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

MATHEMATICS P2

PAST PAPER QUESTIONS

ORGANISED BY TOPIC

October 2019 Edition

CONTENTS

All exam questions in this document have been extracted from Department of Education exam papers.

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PROGRESS TRACKER

Statistics

Attempts	DBE Nov 18 Q1		DBE Nov 17 Q1		DBE Nov 17 Q2		DBE Nov 16 Q1		DBE Nov 16 Q2		DBE Nov 15 Q1		DBE Nov15 Q2		Exemplar 12 Q1	
	[14]	%	[10]	%	[7]	%	[9]	%	[6]	%	[10]	%	[4]	%	[8]	%
1st																
2nd																
3rd																

Attempts	Exemplar 12 Q2	
	[7]	%
1st		
2nd		
3rd		

Coordinate Geometry

Attempts	DBE Nov 18 Q2		DBE Nov 17 Q3		DBE Nov 16 Q3		DBE Nov 15 Q3		Exemplar 12 Q3	
	[17]	%	[16]	%	[15]	%	[18]	%	[18]	%
1st										
2nd										
3rd										

Trig: Equations & Identities

Attempts	DBE Nov 18 Q3		DBE Nov 17 Q4		DBE Nov 16 Q4		DBE Nov 15 Q5		Exemplar 12 Q4	
	[11]	%	[16]	%	[17]	%	[18]	%	[12]	%
1st										
2nd										
3rd										

Trig: Applications

Attempts	DBE Nov 18 Q4		DBE Nov 17 Q6		DBE Nov 16 Q5		DBE Nov 16 Q7		DBE Nov 15 Q4		Exemplar 12 Q5	
	[15]	%	[10]	%	[12]	%	[11]	%	[7]	%	[16]	%
1st												
2nd												
3rd												

Trig: Functions

Attempts	DBE Nov 18 Q5		DBE Nov 17 Q5		DBE Nov 16 Q6		DBE Nov 15 Q6		Exemplar 12 Q6	
	[12]	%	[13]	%	[8]	%	[13]	%	[8]	%
1st										
2nd										
3rd										

Measurement	Attempts	DBE Nov 18 Q6		DBE Nov 17 Q7		DBE Nov 15 Q7		Exemplar 12 Q7	
		[7]	%	[6]	%	[8]	%	[12]	%
	1st								
	2nd								
	3rd								

Euclidean Geometry	Attempts	DBE Nov 18 Q7		DBE Nov 18 Q8		DBE Nov 17 Q8		DBE Nov 17 Q9		DBE Nov 16 Q8		DBE Nov 16 Q9		DBE Nov 15 Q8		DBE Nov 15 Q9	
		[9]	%	[15]	%	[13]	%	[9]	%	[16]	%	[6]	%	[8]	%	[14]	%
	1st																
	2nd																
	3rd																

	Attempts	Exemplar 12 Q8		Exemplar 12 Q9	
		[6]	%	[13]	%
	1st				
	2nd				
	3rd				

QUESTION 1

The line graph below shows test marks out of 10 obtained by a Grade 10 class.
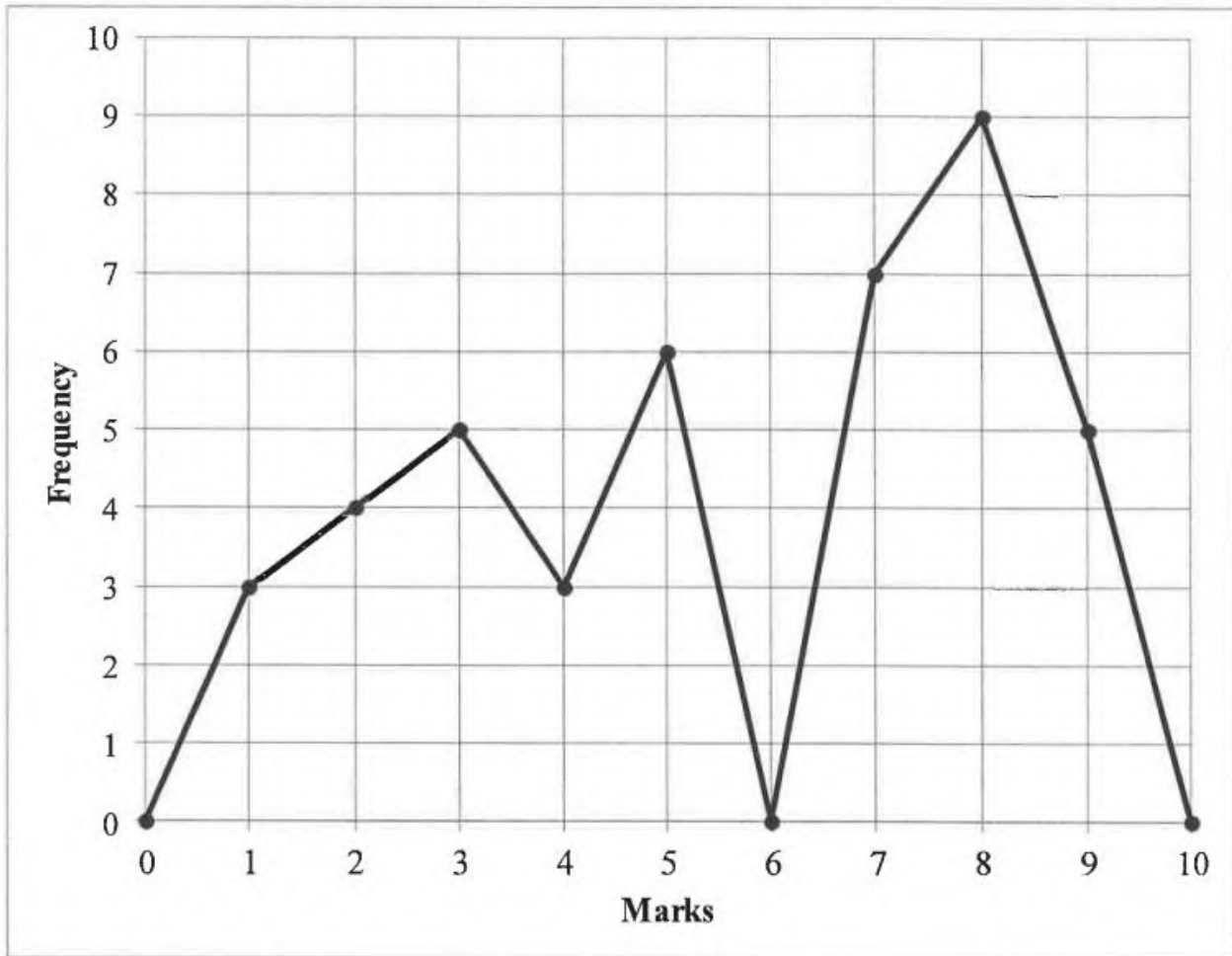
1.1 Complete the frequency column in the table provided in the ANSWER BOOK. (2)

1.2 How many learners wrote the test? (1)

1.3 Calculate the:

    1.3.1 Range for the data (2)

    1.3.2 Mean for the test (3)

1.4 Determine the median for the data. (3)

1.5 Draw a box and whisker diagram for the data. (3)

[14]

QUESTION 1

The data below shows the number of laptops sold by 15 sales agents during the last financial year.

43 48 62 52 46 90 58 37 48 73 84 68 54 34 78

1.1 Determine the median of the number of laptops sold. (2)

1.2 Calculate the range of the data. (2)

1.3 Calculate the interquartile range (IQR). (3)

1.4 Draw a box and whisker diagram for the data above. (3)

[10]

QUESTION 2

A learner did a project on climate change. At 14:00 each day, she recorded the temperature (in °C) for a certain town. The information is given in the frequency table below.

TEMPERATURE (IN °C)	FREQUENCY
$20 \leq T < 24$	2
$24 \leq T < 28$	4
$28 \leq T < 32$	9
$32 \leq T < 36$	5
$36 \leq T < 40$	7
$40 \leq T < 44$	3

2.1 For how many days did the learner collect the data? (1)

2.2 Write down the modal class for the data. (1)

2.3 Estimate the mean of the data. (3)

2.4 Calculate the percentage of days on which the temperature was at least 28 °C. (2)

[7]

QUESTION 1

The heights of 20 children were measured (in centimetres) and the results were recorded. The data collected is given in the table below.

127	128	129	130	131	133	134	134	135	136
137	138	139	140	141	142	142	143	144	145

1.1   Write down the median height measured.   (1)

1.2   Determine:

    1.2.1   The mean height   (2)

    1.2.2   The range   (1)

    1.2.3   The interquartile range   (3)

1.3   Draw a box and whisker diagram to represent the data.   (2)
    [9]

QUESTION 2

The intelligence quotient score (IQ) of a Grade 10 class is summarised in the table below.

IQ INTERVAL	FREQUENCY
$90 \leq x < 100$	4
$100 \leq x < 110$	8
$110 \leq x < 120$	7
$120 \leq x < 130$	5
$130 \leq x < 140$	4
$140 \leq x < 150$	2

2.1   Write down the modal class of the data.   (1)

2.2   Determine the interval in which the median lies.   (2)

2.3   Estimate the mean IQ score of this class of learners.   (3)
    [6]

QUESTION 1

Nineteen girls were required to complete a puzzle as quickly as possible. Their times (in seconds) were recorded and are shown in the table below.

14	15	16	16	17	17	18	18	19	19
19	20	21	21	22	23	24	24	29	

1.1   Identify the median time taken by the girls to complete the puzzle. (1)

1.2   Determine the lower and upper quartiles for the data. (2)

1.3   Draw a box and whisker diagram to represent the data. (2)

1.4   The five-number summary of the time (in seconds) taken by 19 boys to complete the same puzzle is (15 ; 19 ; 23 ; 26 ; 30).

    1.4.1   Calculate the interquartile range for the time taken by the boys. (2)

    1.4.2   If only one boy took 19 seconds to complete the puzzle, what percentage of the boys took at least 19 seconds to complete the puzzle? (1)

1.5   In which group, the girls or the boys, did a larger number of learners complete the puzzle in less than 23 seconds? Justify your answer. (2)

[10]

QUESTION 2

The table below shows information about the number of hours 120 learners spent on their cellphones in the last week.

NUMBER OF HOURS (h)	FREQUENCY
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

2.1   Identify the modal class for the data. (1)

2.2   Estimate the mean number of hours that these learners spent on their cellphones in the last week. (3)

[4]

QUESTION 1

A baker keeps a record of the number of scones that he sells each day. The data for 19 days is shown below.

31	36	62	74	65	63	60	34	46	56
37	46	40	52	48	39	43	31	66	

1.1 Determine the mean of the given data. (2)

1.2 Rearrange the data in ascending order and then determine the median. (2)

1.3 Determine the lower and upper quartiles for the data. (2)

1.4 Draw a box and whisker diagram to represent the data. (2)

[8]

QUESTION 2

Traffic authorities are concerned that heavy vehicles (trucks) are often overloaded. In order to deal with this problem, a number of weighbridges have been set up along the major routes in South Africa. The gross (total) vehicle mass is measured at these weigh bridges. The histogram below shows the data collected at a weighbridge over a month.
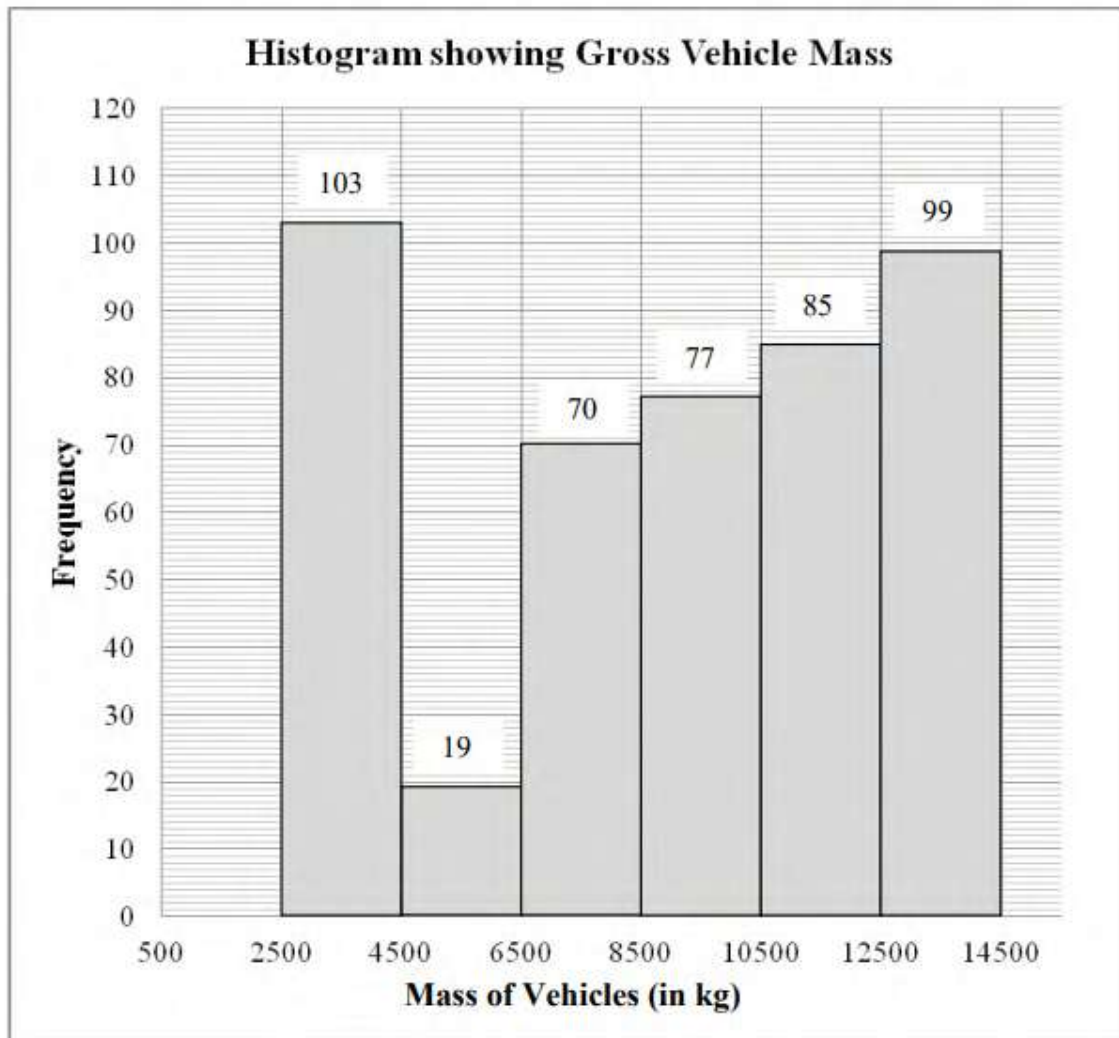
2.1 Write down the modal class of the data. (1)

2.2 Estimate the mean gross vehicle mass for the month. (5)

2.3 Which of the measures of central tendency, the modal class or the estimated mean, will be most appropriate to describe the data set? Explain your choice. (1)

[7]

QUESTION 2

In the diagram below, P(1 ; 0), Q(6 ; 3) and R (9; –2) are the vertices of a triangle such that PQ = QR and PQ ⊥ QR. T is a point on PQ such that T is the midpoint of PQ. S is the point of intersection of RQ and the x-axis. V is a point on the x-axis such that QŜV = 121°. QP̂S = θ
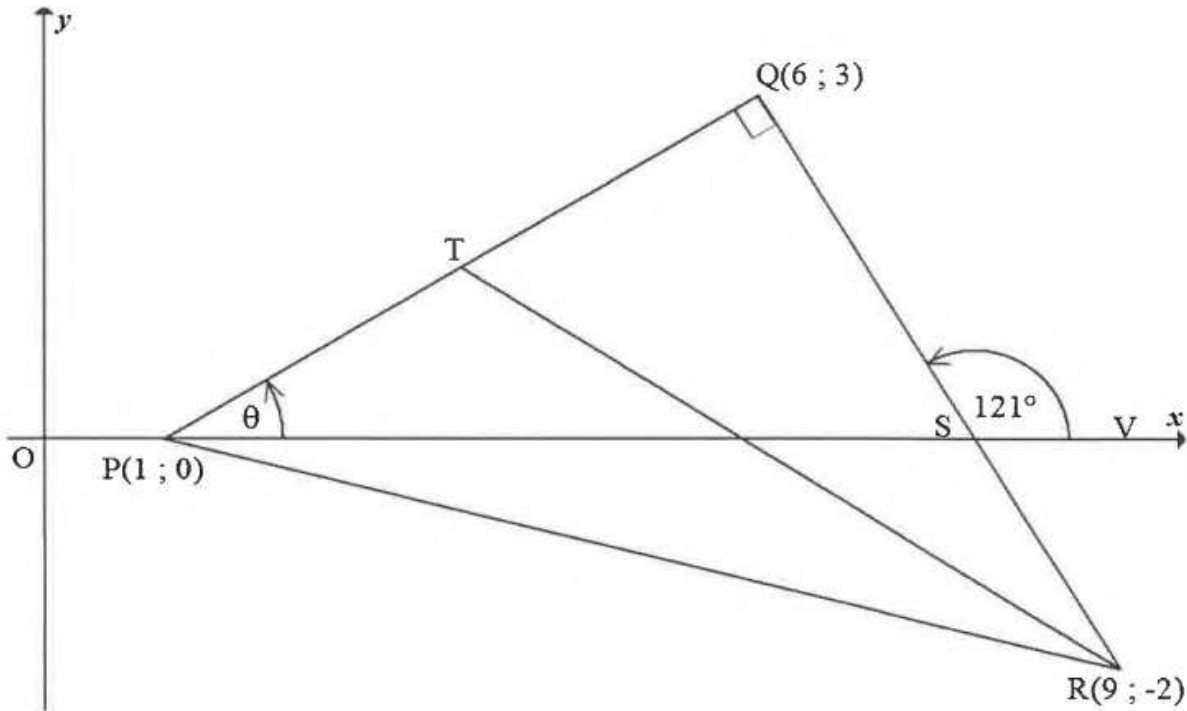
2.1   Determine the:

      2.1.1   Length of PQ. Leave your answer in surd form.   (2)

      2.1.2   Gradient of PQ   (2)

      2.1.3   Coordinates of T   (2)

2.2   Calculate the:

      2.2.1   Area of ΔQTR   (3)

      2.2.2   Size of θ, with reasons   (2)

      2.2.3   Coordinates of S   (3)

2.3   Determine, with reasons, the gradient of the line through T and the midpoint of PR.   (3)

[17]

QUESTION 3

In the diagram below, P(7 ; 4), Q(6 ; 6), R(0 ; 3) and S(t ; k) are the vertices of quadrilateral PQRS.
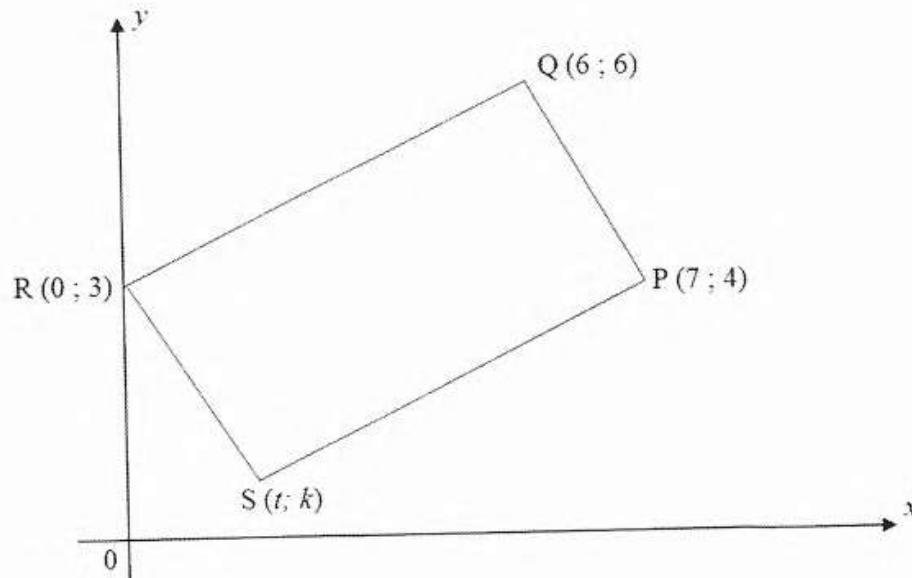
3.1   Calculate the length of PQ. Leave your answer in surd form.   (2)

3.2   If $T\left(\dfrac{7}{2};\dfrac{7}{2}\right)$ is the midpoint of QS, determine the coordinates of S.   (3)

3.3   If the coordinates of S are (1 ; 1), show that PR = QS.   (2)

3.4   Show that QR $\perp$ RS.   (4)

3.5   Hence, what type of special quadrilateral is PQRS? Motivate your answer.   (2)

3.6   Calculate the size of $R\hat{S}Q$.   (3)

[16]

QUESTION 3

3.1　　Show that a triangle ABC, with vertices A(1 ; 1); B(3 ; 6) and C(6 ; 3), is an isosceles triangle. (4)

3.2　　In the diagram below, ADCB is a kite with A(3 ; 5) and B(–1 ; –4). AD = DC and AB = BC. D is a point such that AD is parallel to the x-axis and AD = 5 units. CD is perpendicular to the x-axis. The diagonals intersect at P.
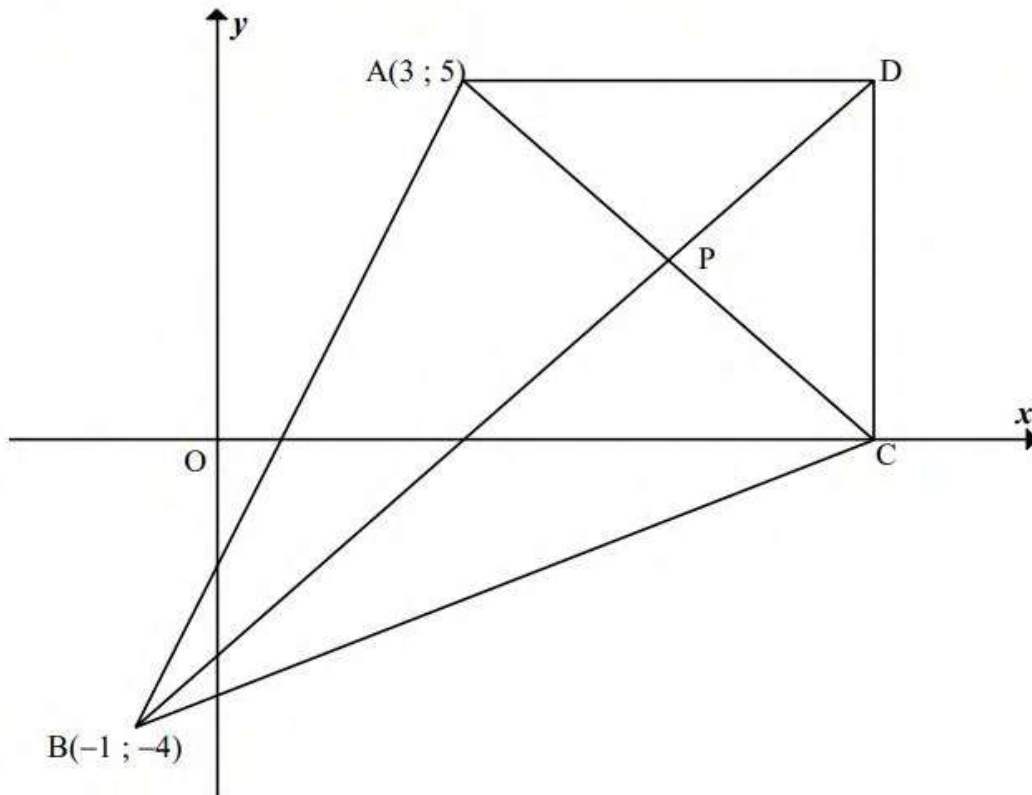
3.2.1　　Show that the coordinates of C are (8 ; 0). (2)

3.2.2　　Write down the coordinates of point P. (2)

3.2.3　　Calculate the gradient of line BD. (2)

3.2.4　　Calculate the length of line AC. (2)

3.2.5　　Calculate the area of the kite ADCB. (3)

[15]

QUESTION 3

In the diagram, C is a point on the y-axis such that A(0 ; 4), B(4 ; – 4), C and D(– 4 ; 2) are vertices of parallelogram ABCD. K is the point $\left(0 ; -2\frac{1}{4}\right)$ and L is a point on AB such that KL || CB.
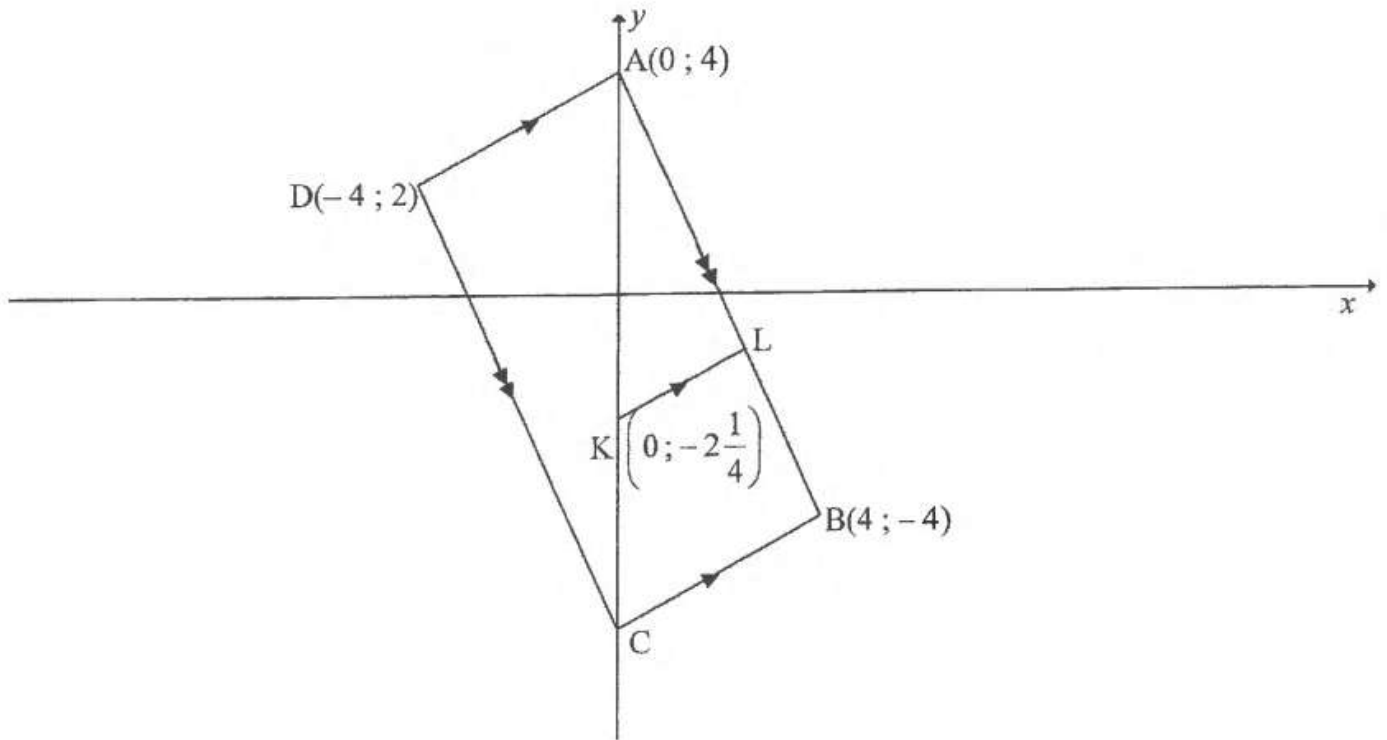
3.1	Calculate the length of diagonal DB.	(3)
3.2	Calculate the coordinates of M, the midpoint of DB.	(3)
3.3	Calculate the gradient of AD.	(3)
3.4	Prove that AD ⊥ AB.	(3)
3.5	Give a reason why parallelogram ABCD is a rectangle.	(1)
3.6	Determine the equation of KL in the form $y = mx + c$.	(2)
3.7	Write down, with reasons, the coordinates of C.	(3)

[18]

QUESTION 3

3.1 In the diagram below, D(–3 ; 3), E(3 ; –5) and F(–1 ; k) are three points in the Cartesian plane.
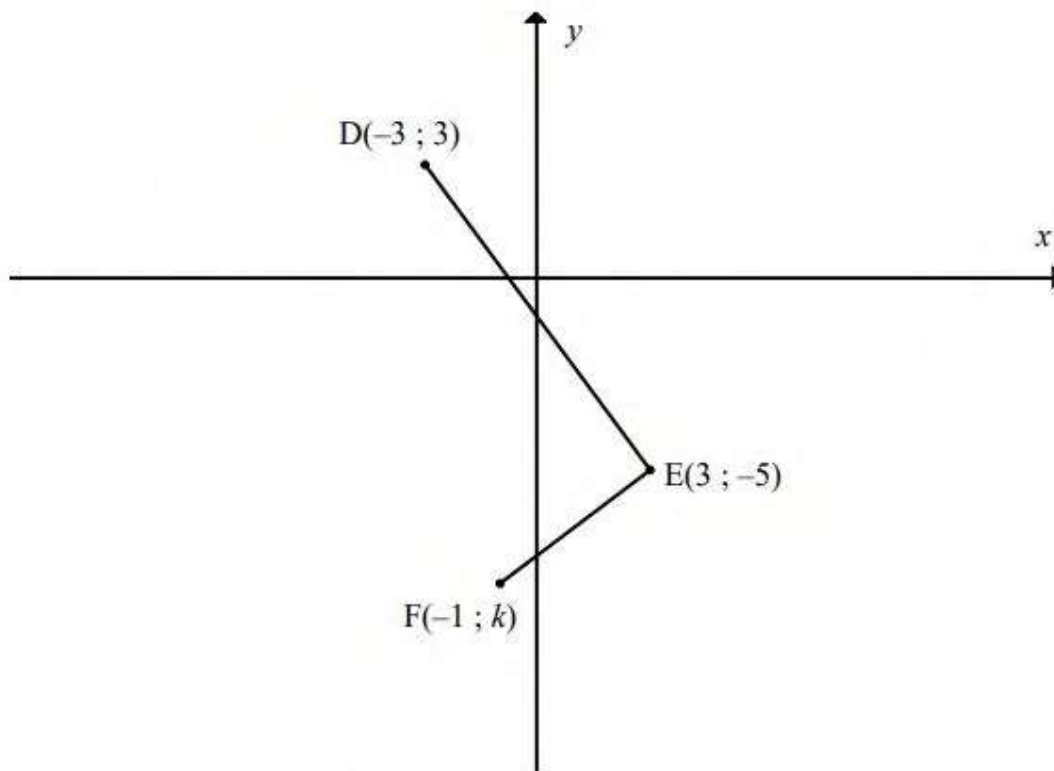
3.1.1 Calculate the length of DE. (2)

3.1.2 Calculate the gradient of DE. (2)

3.1.3 Determine the value of k if $D\hat{E}F = 90°$. (4)

3.1.4 If $k = –8$, determine the coordinates of M, the midpoint of DF. (2)

3.1.5 Determine the coordinates of a point G such that the quadrilateral DEFG is a rectangle. (4)

3.2 C is the point (1 ; –2). The point D lies in the second quadrant and has coordinates $(x ; 5)$. If the length of CD is $\sqrt{53}$ units, calculate the value of x. (4)

[18]

QUESTION 3

3.1 In the diagram below, ΔQPR is a right-angled triangle with $Q\hat{P}R = 90°$.
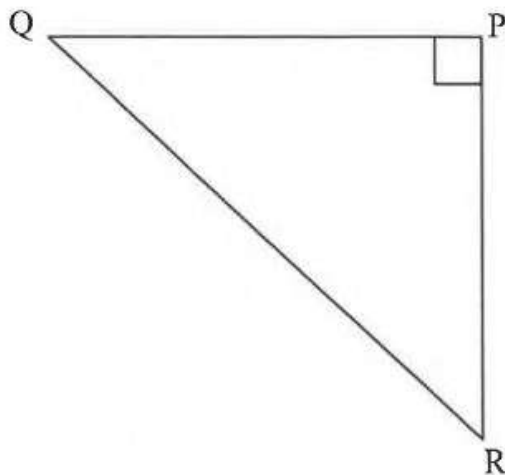
3.1.1 Use the sketch to determine the ratio of $\tan(90° - R)$. (1)

3.1.2 Write down the trigonometric ratio that is equal to $\dfrac{QR}{QP}$. (1)

3.2 $S(-3 ; -4)$ is a point on the Cartesian plane such that OS makes an angle of θ with the positive x-axis.
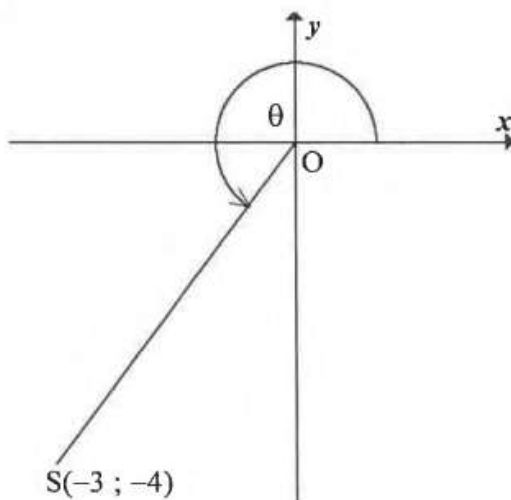
Calculate the following WITHOUT using a calculator:

3.2.1 The length of OS (2)

3.2.2 The value of $\sec\theta + \sin^2\theta$ (3)

3.3 Determine the value of the following WITHOUT using a calculator:
$$\frac{\operatorname{cosec} 45°}{\sin 90° . \tan 60°}$$
(4)

[11]

QUESTION 4

4.1 Given $4\cot\theta + 3 = 0$ and $0° < \theta < 180°$.

4.1.1 Use a sketch to determine the value of the following. DO NOT use a calculator.

(a) $\cos\theta$ (4)

(b) $\dfrac{3\sin\theta\sec\theta}{\tan\theta}$ (4)

4.1.2 Hence, show that $\sin^2\theta - 1 = -\cos^2\theta$. (3)

4.2 Simplify the following expression WITHOUT using a calculator:

$$\cos 30° \tan 60° + \csc^2 45° \sin^2 60°$$ (3)

4.3 Solve for θ correct to TWO decimal places, if

$$\frac{4}{3}\sin\theta = \cos 37° \quad \text{and} \quad 0° \le \theta \le 90°.$$ (2)

[16]

QUESTION 4

4.1   A right-angled triangle has sides a, b and c and the angle θ, as shown below.
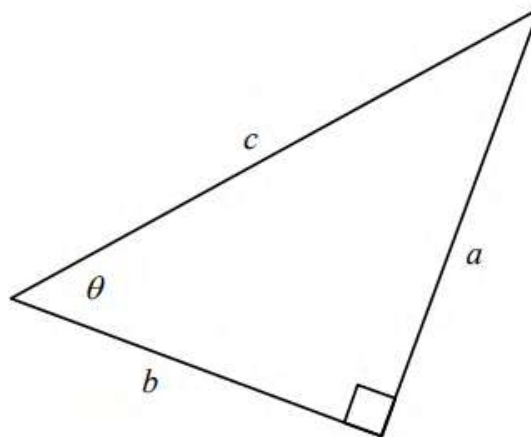
4.1.1   Write the following in terms of a, b and c:

(a) $\cos \theta$ (1)

(b) $\tan \theta$ (1)

(c) $\sin(90° - \theta)$ (2)

4.1.2   If it is given that $a = 5$ and $\theta = 50°$, calculate the numerical value of b.   (2)

4.2   Given that $\hat{A} = 38,2°$ and $\hat{B} = 146,4°$.

Calculate the value of $2\operatorname{cosec}A + \cos3B$.   (3)

4.3   Simplify fully, WITHOUT the use of a calculator:

$$\frac{\sin 45°.\tan^2 60°}{\cos 45°}$$ (4)

4.4   Given that $5\cos \beta - 3 = 0$ and $0° < \beta < 90°$.

If $\alpha + \beta = 90°$ and $0° < \alpha < 90°$, calculate the value of $\cot \alpha$.   (4)

[17]

QUESTION 5

5.1 In the diagram below, P(x ; y) is a point in the third quadrant. RÔP = β and 17 cos β + 15 = 0.
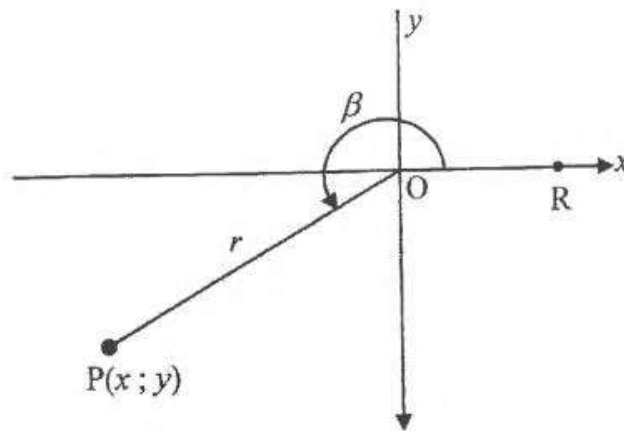

5.1.1 Write down the values of x, y and r. (4)

5.1.2 WITHOUT using a calculator, determine the value of:

    (a)   sin β (1)

    (b) $\cos^2 30°.\tan β$ (3)

5.1.3 Calculate the size of RÔP correct to TWO decimal places. (2)

5.2 In each of the following equations, solve for x where $0° \leq x \leq 90°$. Give your answers correct to TWO decimal places.

5.2.1 tan x = 2,22 (2)

5.2.2 $\sec(x + 10°) = 5,759$ (3)

5.2.3 $\dfrac{\sin x}{0,2} - 2 = 1,24$ (3)

[18]

QUESTION 4

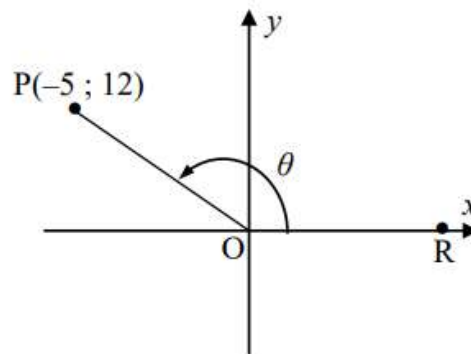4.1 In the diagram below, ΔABC is right-angled at B.
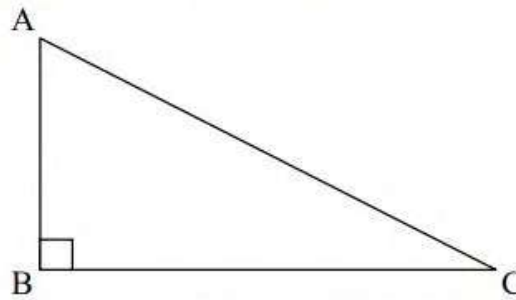
Complete the following statements:

4.1.1 $\sin C = \dfrac{AB}{\ldots}$ (1)

4.1.2 $\ldots A = \dfrac{AB}{BC}$ (1)

4.2 **Without using a calculator**, determine the value of: $\dfrac{\sin 60°.\tan 30°}{\sec 45°}$ (4)

4.3 In the diagram, P(−5 ; 12) is a point in the Cartesian plane and $\hat{ROP} = \theta$.
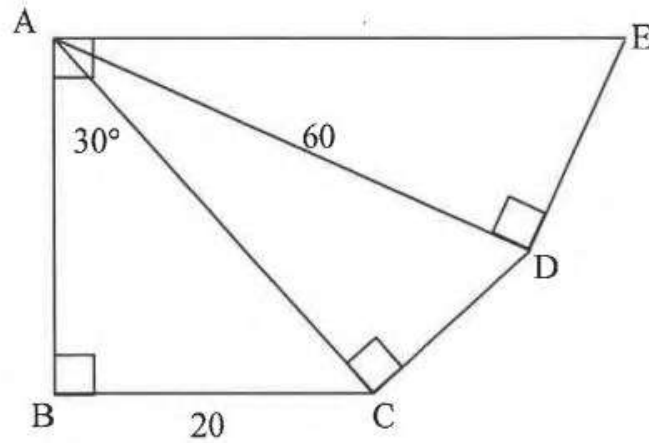

Determine the value of:

4.3.1 $\cos \theta$ (3)

4.3.2 $\operatorname{cosec}^2\theta + 1$ (3)

[12]

QUESTION 4

4.1   In the diagram below, ABC, ACD and ADE are right-angled tirangles.
       $\hat{BAE} = 90°$ and $\hat{BAC} = 30°$. BC = 20 units and AD = 60 units.

       Calculate the:
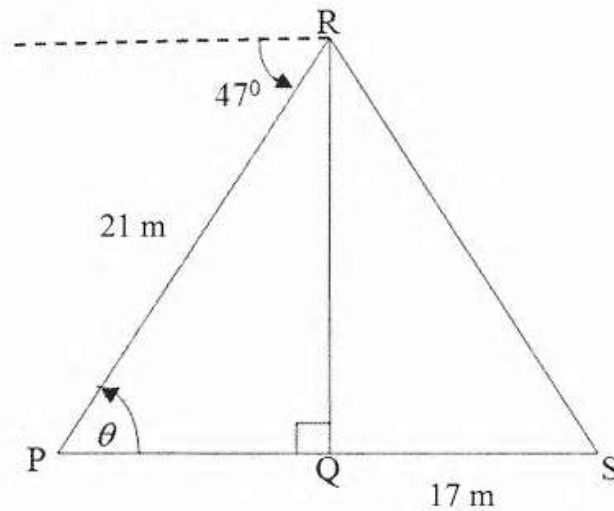
       4.1.1   Length of AC   (2)

       4.1.2   Size of $\hat{CAD}$ (2)

       4.1.3   Length of DE   (3)

4.2   Solve for x, correct to ONE decimal place, where $0° \leq x \leq 90°$:

       4.2.1 $\tan x = 2{,}01$ (2)

       4.2.2 $5\cos x + 2 = 4$ (3)

       4.2.3 $\dfrac{\operatorname{cosec} x}{2} = 3$ (3)

                                                                               [15]
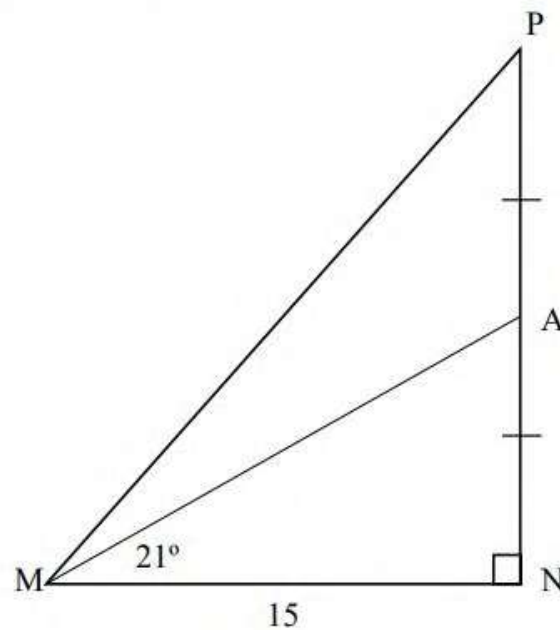
QUESTION 6

RQ is a vertical pole. The foot of the pole, Q, is on the same horizontal plane as P and S. The pole is anchored with wire cables RS and RP. The angle of depression from the top of the pole to point P is $47°$. PR is 21 m and QS is 17 m. $R\hat{P}Q = \theta$.

6.1	Write down the size of θ.	(1)
6.2	Calculate the length of RQ.	(3)
6.3	Hence, calculate the size of $\hat{S}$.	(2)
6.4	If P, Q and S lie in a straight line, how far apart are the anchors of the wire cables?	(4)
		[10]

QUESTION 5

5.1   In the sketch below, ΔMNP is drawn having a right angle at N and MN = 15 units. A is the midpoint of PN and $A\hat{M}N = 21°$.

Calculate:

5.1.1   AN   (3)

5.1.2 $P\hat{M}N$ (3)

5.1.3   MP   (3)

5.2   Calculate θ if $2\sin(\theta + 15°) = 1{,}462$ and $0° \le \theta \le 90°$.   (3)

                                       [12]

QUESTION 7

The diagram below represents a cross-section of the peaks of Table Mountain, T, and Lions Head, L, above sea level. Points M and N are directly below peaks L and T respectively, such that MPN lies on the same horizontal plain at sea level and P is directly below C.

MN = 3 100 m.

The angle of elevation of L from N is β and the angle of elevation of T from M is θ.

It is given that $\tan \theta = 0,35$ and $\tan \beta = 0,21$.

$\tan \theta = 0,35$
$\tan \beta = 0,21$
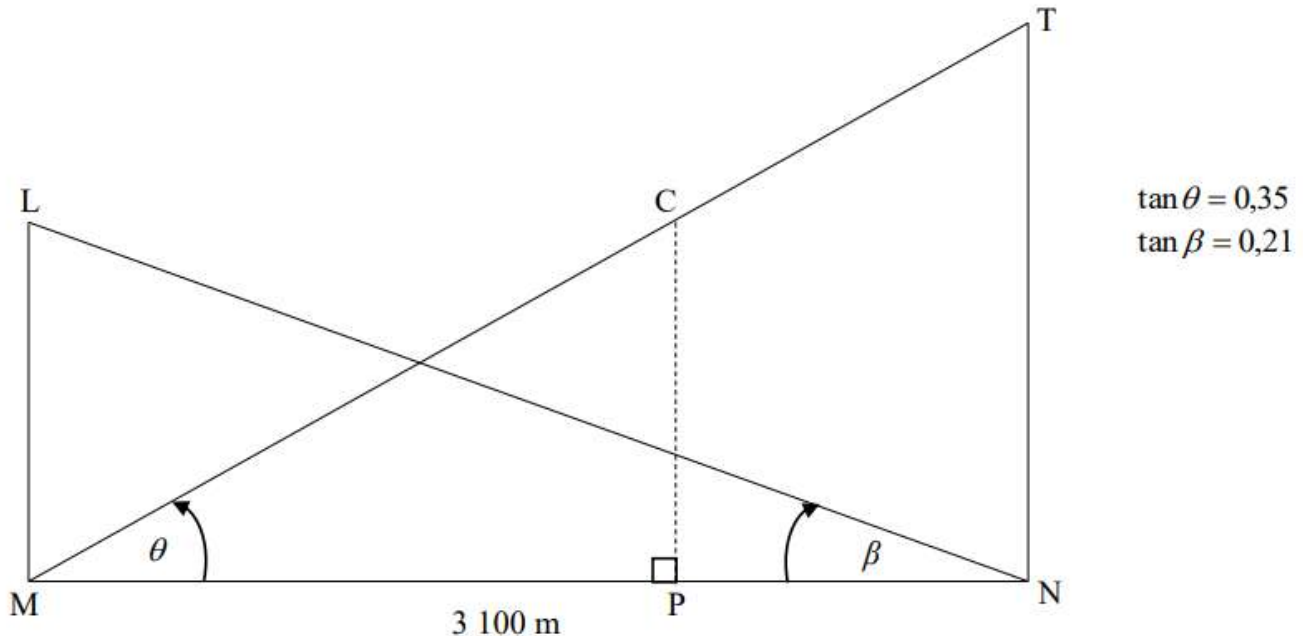
7.1 Calculate the ratio of LM : TN. (4)

7.2 A cable car, C, travelling from the top of Table Mountain, T, follows a path along TCM.

    7.2.1 Calculate the angle formed ($M\hat{T}N$) between the cable and the vertical height TN. (2)

    7.2.2 If the cable car, C, travels along the cable, such that TC = 400 m, calculate the height of the cable car above sea level at that instant. (5)

[11]

QUESTION 4

ΔPQR and ΔSQR are right-angled triangles as shown in the diagram below.
$PR = 26$, $PQ = 24$, $QS = 8$, $SR = 6$, $QR = 10$ and $P\hat{R}Q = \theta$.
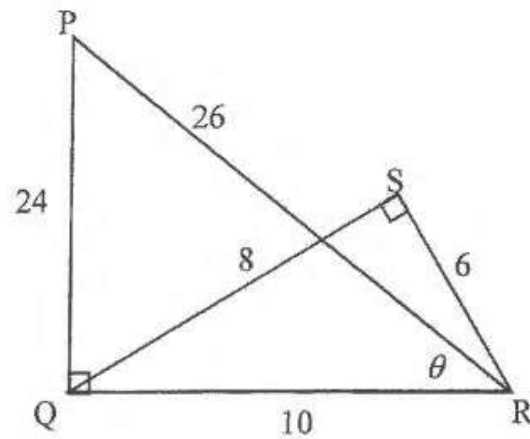
4.1 Refer to the diagram above and, WITHOUT using a calculator, write down the value of:

    4.1.1 $\tan \hat{P}$ (1)

    4.1.2 $\sin S\hat{Q}R$ (1)

    4.1.3 $\cos \theta$ (1)

    4.1.4 $\sec S\hat{R}Q$ (1)

4.2 WITHOUT using a calculator, determine the value of $\dfrac{\cot \theta}{\operatorname{cosec} Q\hat{R}S}$.

    (3)

    [7]

QUESTION 5

5.1   Solve for x, correct to ONE decimal place, in each of the following equations where $0° \leq x \leq 90°$.

      5.1.1 $5\cos x = 3$ (2)

      5.1.2 $\tan 2x = 1,19$ (3)

      5.1.3 $4\sec x - 3 = 5$ (4)

5.2   An aeroplane at J is flying directly over a point D on the ground at a height of 5 kilometres. It is heading to land at point K. The angle of depression from J to K is 8°. S is a point along the route from D to K.
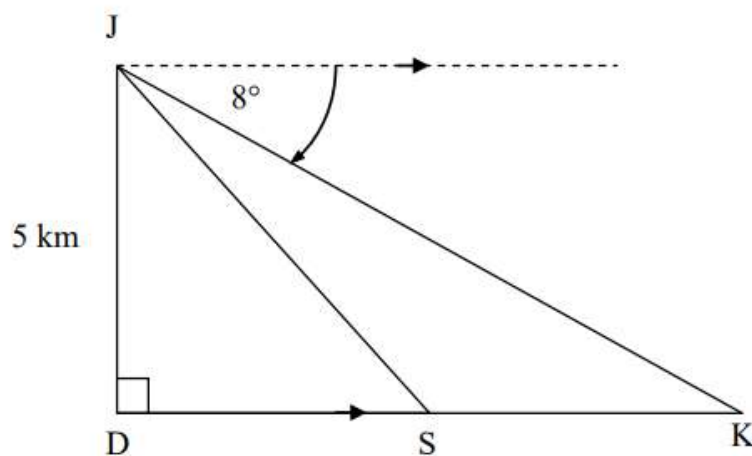
      5.2.1   Write down the size of $J\hat{K}D$.   (1)

      5.2.2   Calculate the distance DK, correct to the nearest metre.   (3)

      5.2.3   If the distance SK is 8 kilometres, calculate the distance DS.   (1)

      5.2.4   Calculate the angle of elevation from point S to J, correct to ONE decimal place.   (2)

                                                                                [16]
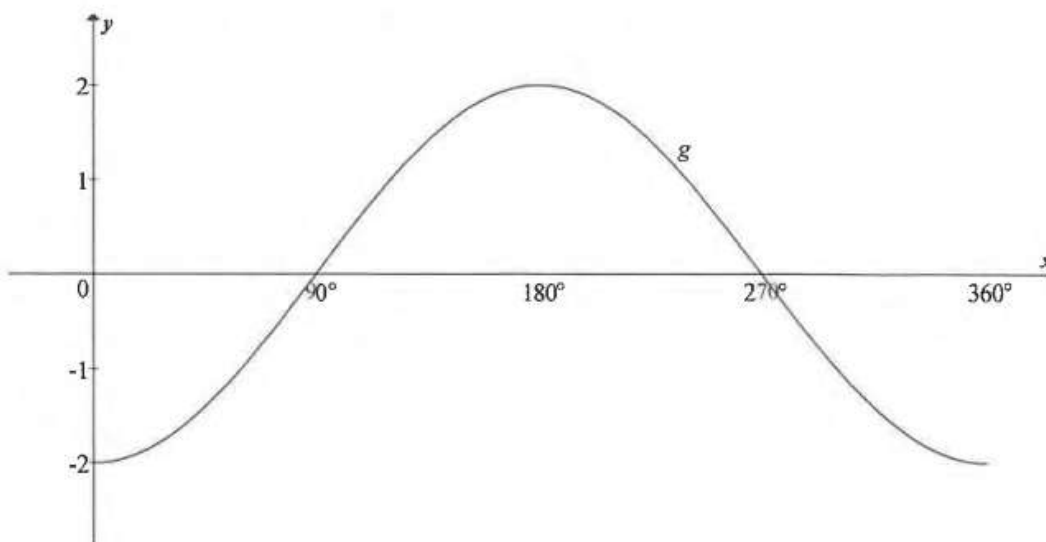
QUESTION 5

5.1   Consider the function $f(x) = -3 \tan x$.

      5.1.1   Sketch, on the grid provided in the ANSWER BOOK, the graph of f for $0° \le x \le 360°$. Clearly show ALL the intercepts and asympotes.   (3)

      5.1.2   Hence, or otherwise, write down the:

         (a)   Period of f (1)

         (b)   Equation of h if h is the reflection of f about the x-axis   (1)

5.2   Sketched below is the graph of $g(x) = a.\cos b\theta$

      5.2.1   Write down the values of a and b.   (2)

      5.2.2   Use the graph to determine the value(s) of x for which $g(x) > 0$.   (1)

      5.2.3   Determine the range of h if h is the image of g if g is shifted down TWO units.   (2)

      5.2.4   Determine, using the graph, the value of:

$$-2\left(\cos 0° + \cos 1° + \cos 2° + ... + \cos 358° + \cos 359° + \cos 360°\right)$$ (2)

                                           [12]

**QUESTION 5**

Given $f(x) = \sin x - 1$ and $g(x) = 2\cos x$ for $0° \leq x \leq 270°$.

5.1   Sketch, on the grid provided in the ANSWER BOOK, the graph of f and g for $0° \leq x \leq 270°$. (6)

5.2   Write down the following:

      5.2.1   Amplitude of g (1)

      5.2.2   Range of f (2)

5.3   Use your graph to determine the following:

      5.3.1   Number of solutions to $f(x) = g(x)$ in the interval $0° \leq x \leq 270°$ (1)

      5.3.2   Value(s) of x in the interval $0° \leq x \leq 180°$ for which $\sin x = 2 + 2\cos x$ (3)

                                                    [13]

QUESTION 6

The graphs of $f(x) = a \sin x$ and $g(x) = \cos x + 1$ for $x \in [0 ; 360]$ are sketched below.
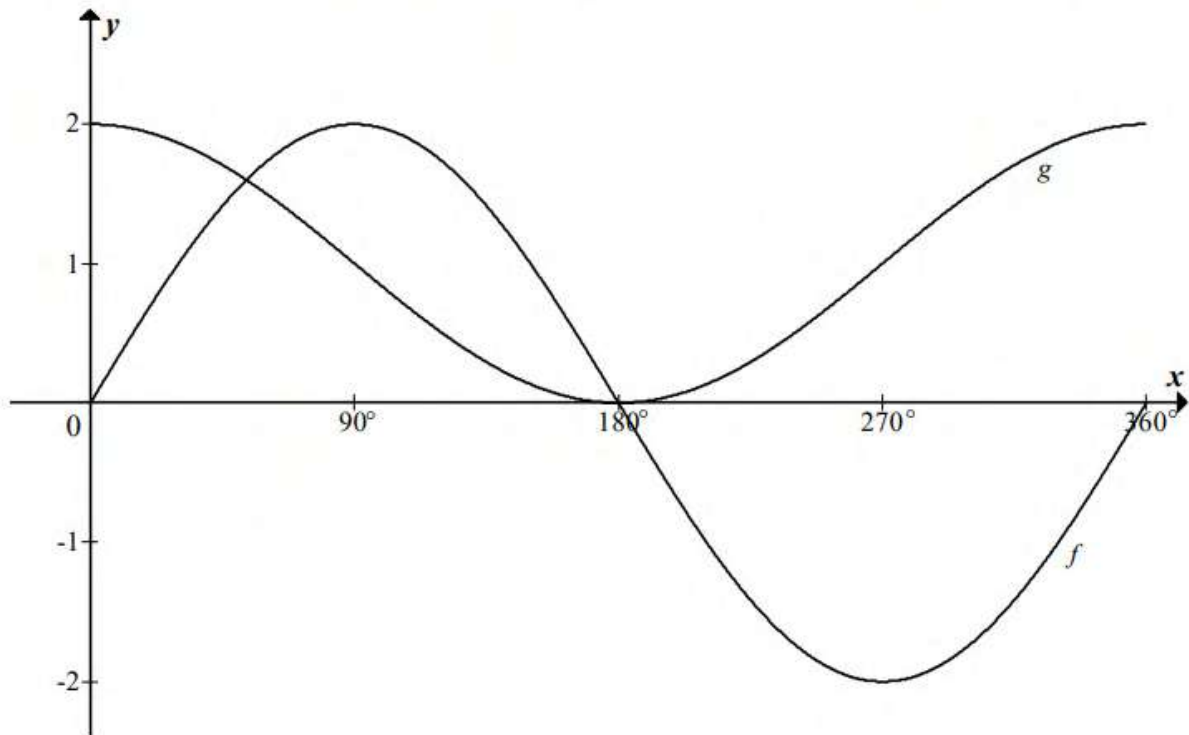
6.1	Write down the value of a.	(1)

6.2	Write down the period of f.	(1)

6.3	Write down the range of g.	(2)

6.4	For which values of x for $x \in [0° ; 360°]$ will $f(x).g(x) > 0$?	(2)

6.5	The graph g is reflected about the x-axis and then shifted 2 units upwards to obtain the graph h. Write down the equation of h.	(2)

[8]

QUESTION 6

In the diagram below, the graph of $f(x) = -2\cos x$ is drawn for the interval $0° \le x \le 360°$.
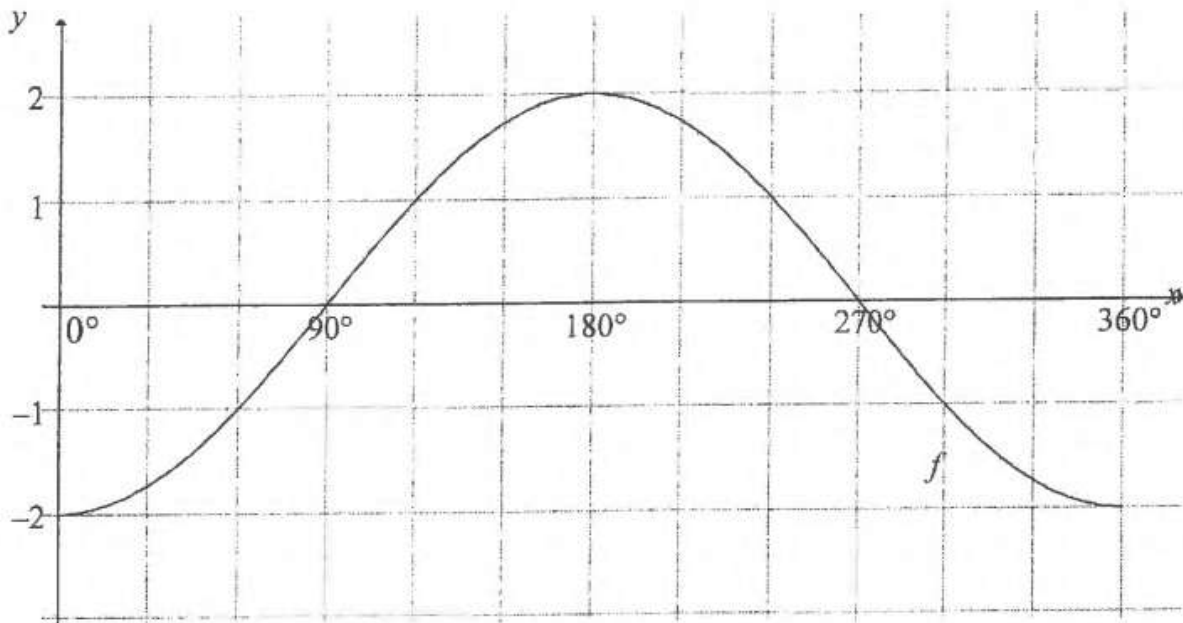
6.1 Write down the amplitude of f. (1)

6.2 Write down the minimum value of $f(x) + 3$. (1)

6.3 On the same system of axes, draw the graph of g, where $g(x) = \sin x + 1$ for the interval $0° \le x \le 360°$. (3)

6.4 Use the graphs to determine the following:

    6.4.1 The value of $f(180°) - g(180°)$ (2)

    6.4.2 For which value(s) of x will $f(x).g(x) > 0$ (2)

6.5 The graph of f is reflected about the x-axis and then moved 3 units downwards to form the graph of h. Determine:

    6.5.1 The equation of h (2)

    6.5.2 The range of h for the interval $0° \le x \le 360°$. (2)

[13]

QUESTION 6

6.1   Consider the function $y = 2 \tan x$.

      6.1.1   Make a neat sketch of $y = 2 \tan x$ for $0° \le x \le 360°$ on the axes provided on DIAGRAM SHEET 1. Clearly indicate on your sketch the intercepts with the axes and the asymptotes.   (4)

      6.1.2   If the graph of $y = 2 \tan x$ is reflected about the x-axis, write down the equation of the new graph obtained by this reflection.   (1)

6.2   The diagram below shows the graph of $g(x) = a \sin x$ for $0° \le x \le 360°$.
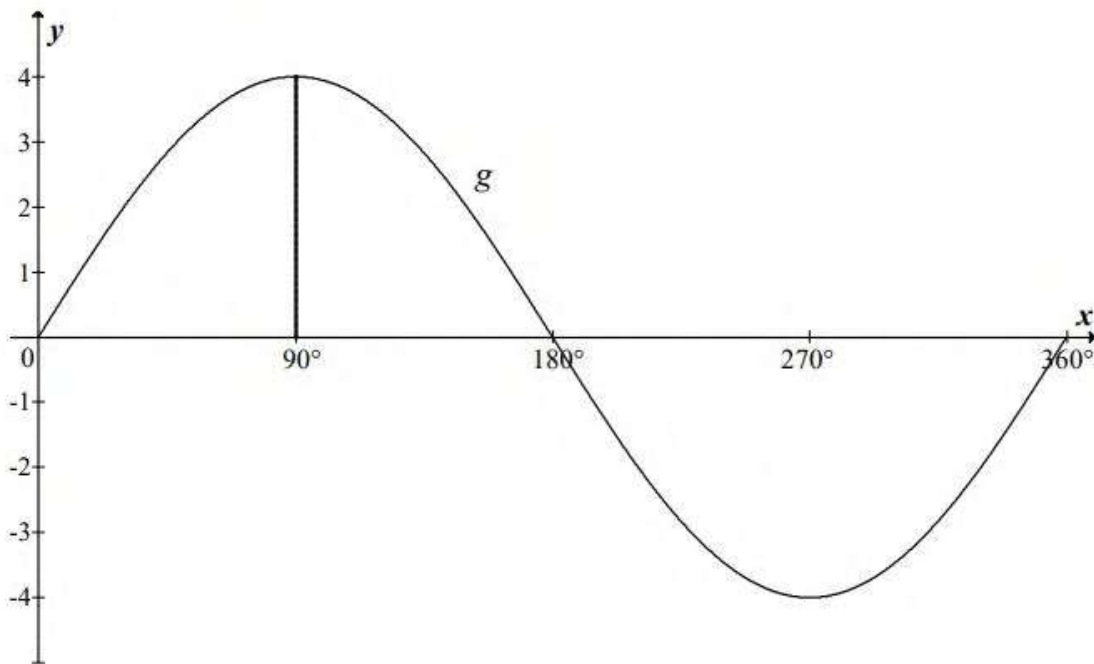
      6.2.1   Determine the value of a.   (1)

      6.2.2   If the graph of g is translated 2 units upwards to obtain a new graph h, write down the range of h.   (2)

                                                                           [8]

QUESTION 6

The diagram below shows a cup with a volume of 117π cm^3 and an inner diameter of 60 mm. Ignore the thickness of the cup.
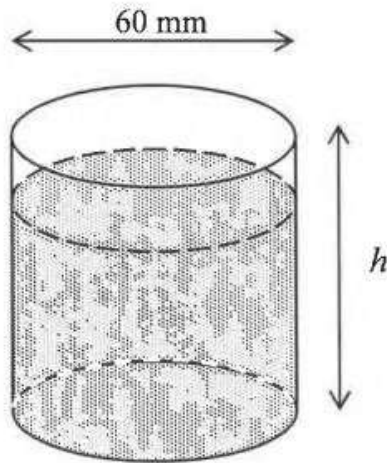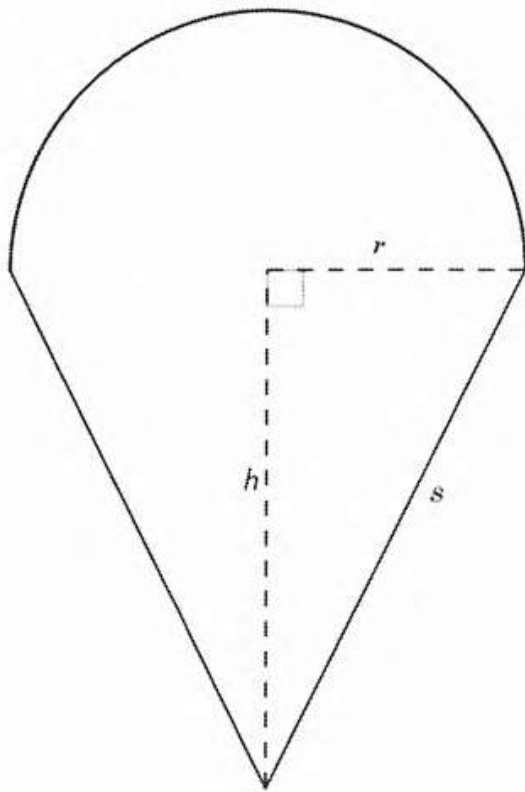

Calculate the:

6.1	Height of the cup	(3)
6.2	Total surface area of the water that touches the cup if the cup is 80% full with water	(4)
		[7]

QUESTION 7

The diagram below shows the cross-section of a solid made up of a hemisphere placed on top of a right circular cone with radius r and slant height s. The perpendicular height of the cone, h, is 6,5 cm and the volume of the cone is 83,38 cm^3.

Formulae:

Surface area of sphere $= 4\pi r^2$

Volume of sphere $= \dfrac{4}{3}\pi r^3$

Surface area of cone $= \pi r^2 + \pi r s$

Volume of cone $= \dfrac{1}{3}\pi r^2 h$

Calculate, correct to TWO decimal places:

7.1   The radius, r, of the cone (2)

7.2   The slant height, s, of the cone (2)

7.3   The surface area of the solid (2)

[6]

QUESTION 7

A concrete gate post comprises a right rectangular prism having a square base and a pyramid at the top, as shown in the diagram below. The length of the sides of the base is 30 cm and the height of the rectangular section is 150 cm. The perpendicular height of the pyramid section is 8 cm.
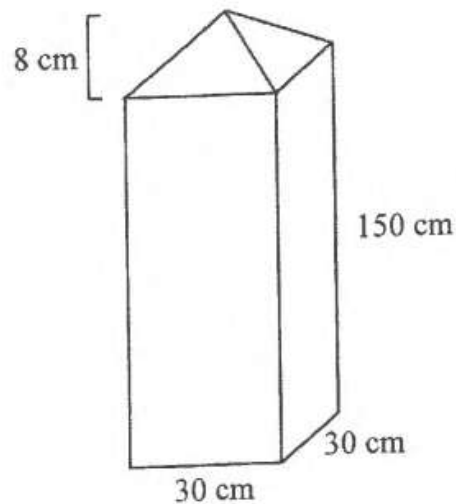
Volume of a pyramid $= \dfrac{1}{3}$ area of the base × height

Total surface area of a pyramid = area of the base $+ \dfrac{1}{2}$ (perimeter of the base × slant height)

7.1	Calculate the volume of concrete required to make ONE post.	(3)
7.2	Calculate the surface area of the pyramid section of the post.	(3)
7.3	If the length of the sides of the base is halved, how many posts, having the same design as the original, can be made with the same volume of concrete as the original post?	(2)
		[8]

QUESTION 7

7.1   The roof of a canvas tent is in the shape of a right pyramid having a perpendicular height of 0,8 metres on a square base. The length of one side of the base is 3 metres.
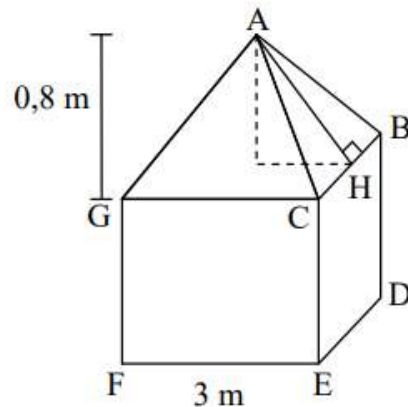
7.1.1	Calculate the length of AH.	(2)
7.1.2	Calculate the surface area of the roof.	(2)
7.1.3	If the height of the walls of the tent is 2,1 metres, calculate the total amount of canvas required to make the tent if the floor is excluded.	(2)

7.2   A metal ball has a radius of 8 millimetres.

|		
7.2.1	Calculate the volume of metal used to make this ball, correct to TWO decimal places.	(2)
7.2.2	If the radius of the ball is doubled, write down the ratio of the new volume : the original volume.	(2)
7.2.3	You would like this ball to be silver plated to a thickness of 1 millimetre. What is the volume of silver required? Give your answer correct to TWO decimal places.	(2)

[12]

EUCLIDEAN GEOMETRY

QUESTION 7

7.1 Complete the statement so that it is TRUE:

The line drawn from the midpoint of the one side of a triangle, parallel to the second side, … (1)

7.2 ACS is a triangle. P is a point on AS and R is a point on AC such that PSRQ is a parallelogram. PQ intersects AC at B such that B is the midpoint of AR. QC is joined. Also, CR = PS, $\hat{C}_1 = 50°$ and BP = 60 mm.
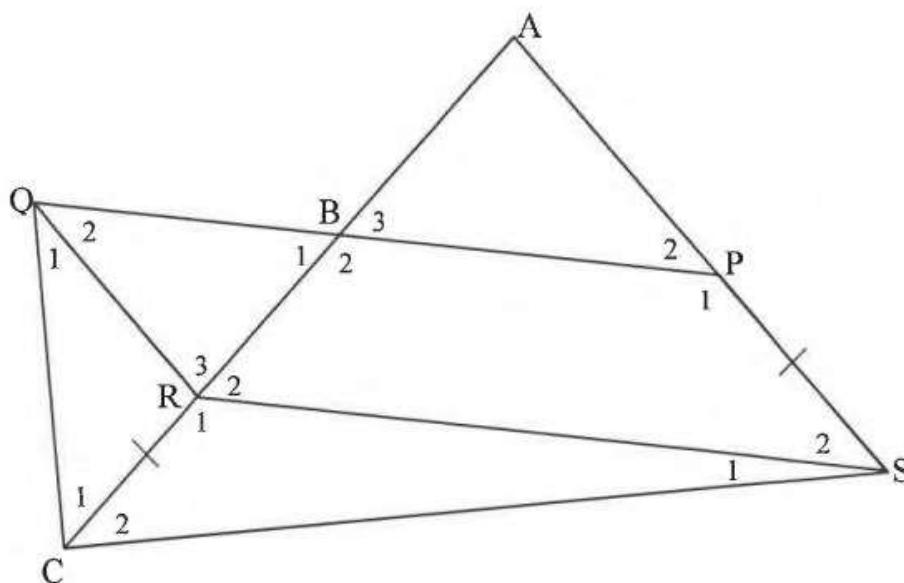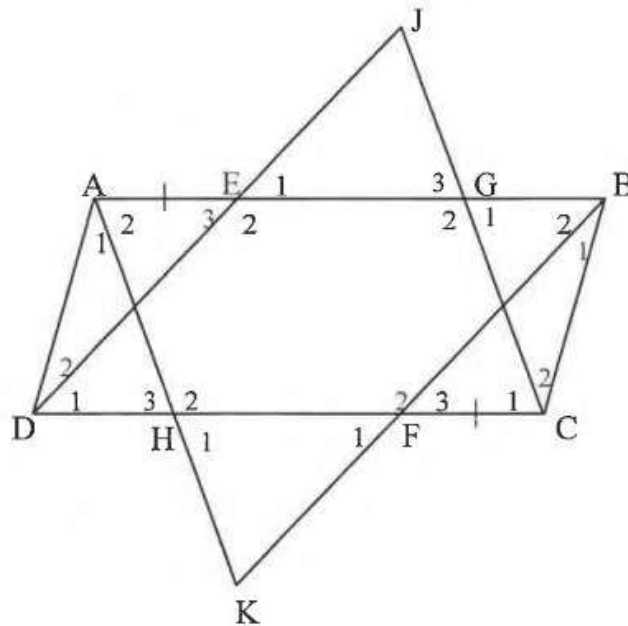

7.2.1 Calculate the size of $\hat{A}$. (5)

7.2.2 Determine the length of QP. (3)

[9]

QUESTION 8

8.1   ABCD is a parallelogram. E and F are points on AB and DC respectively such that AE = CF. DE is produced to J and CJ is drawn. BF is produced to K and AK is drawn.

Prove that:

8.1.1   DJ ∥ BK   (5)

8.1.2 $\hat{E}_1 = \hat{F}_1$ (4)
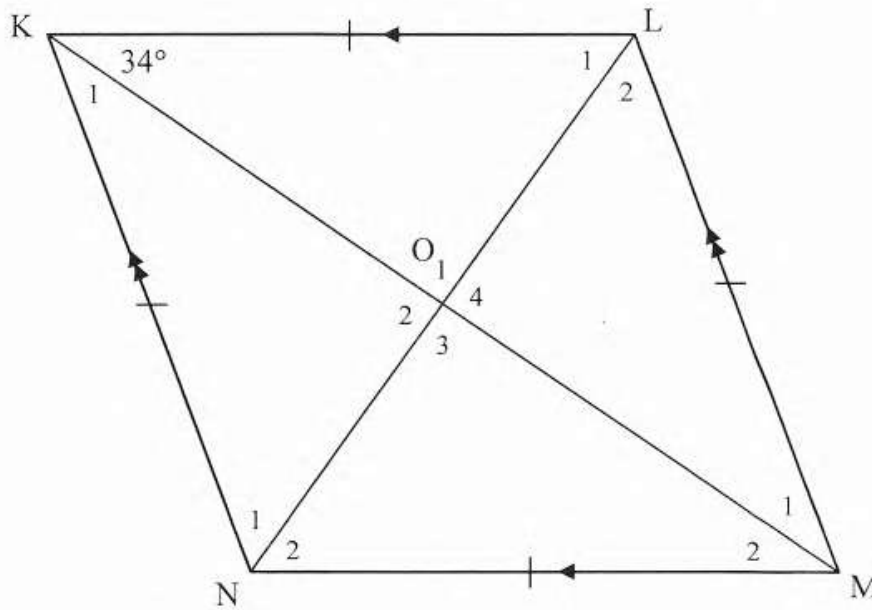
8.2   In the diagram below O is the centre of the circle. A and B lie on the circumference of the circle. AP = BP.
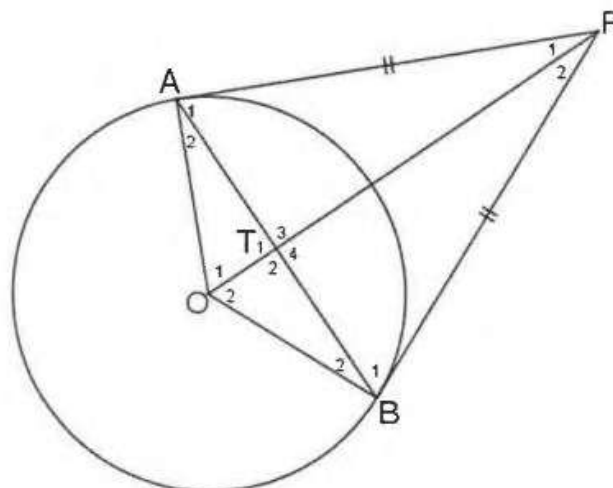
Prove that:

8.2.1   AT = BT   (5)

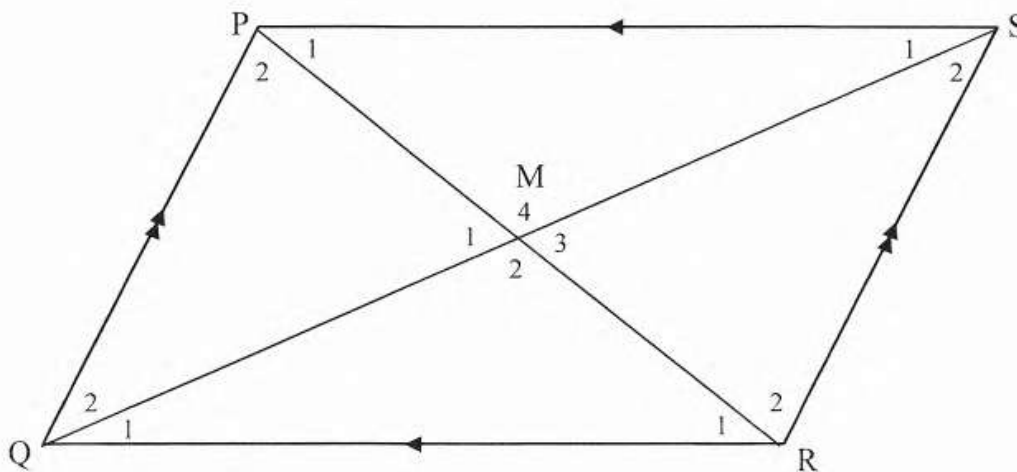8.2.2 $O\hat{T}A = 90°$ (1)

   **[15]**

QUESTION 8

8.1   KLMN is a rhombus with diagonals intersecting at O. $L\hat{K}M = 34°$.

8.1.1   Write down the size of $\hat{O}_1$.   (1)

8.1.2   Calculate the size of $\hat{L}_1$.   (2)

8.1.3   Calculate the size of $K\hat{N}M$.   (2)

8.2   Given parallelogram PQRS with diagonals PR and QS intersecting at M.

Prove that the diagonals bisect each other.   (4)

8.3 In the diagram, ABCD is a parallelogram with diagonals intersecting at E. The diagonals of parallelogram DECF intersect at G. The diagonals of parallelogram FGCH intersect at K.
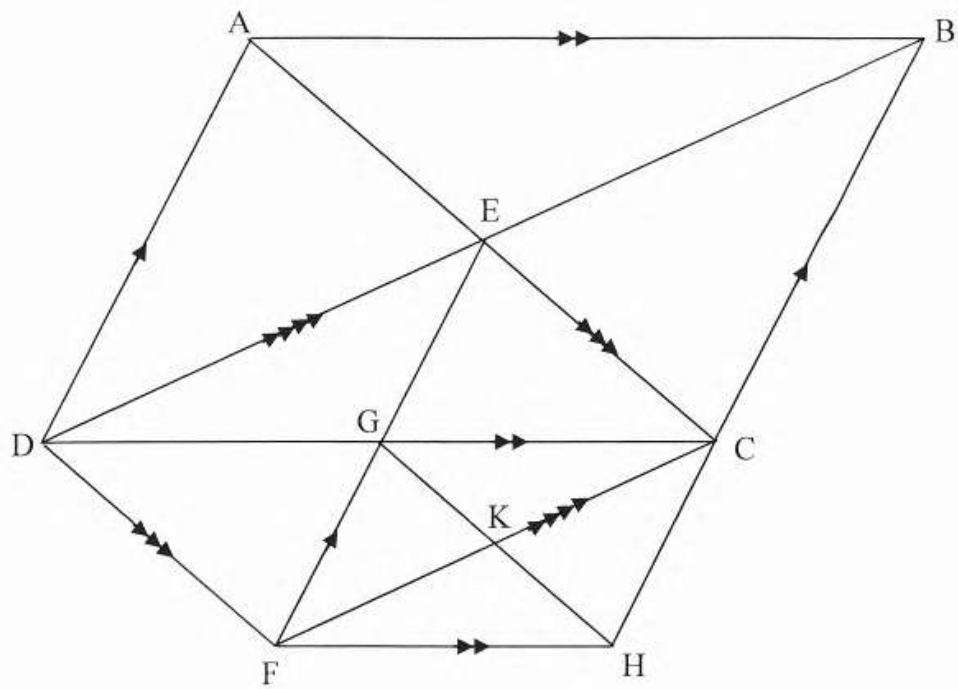
Prove that DB = 4KC. (4)

[13]

QUESTION 9

$\triangle ABC$ is right-angled at B. F and G are the midpoints of AC and BC respectively.
H is the midpoint of AG. E lies on AB such that FHE is a straight line.
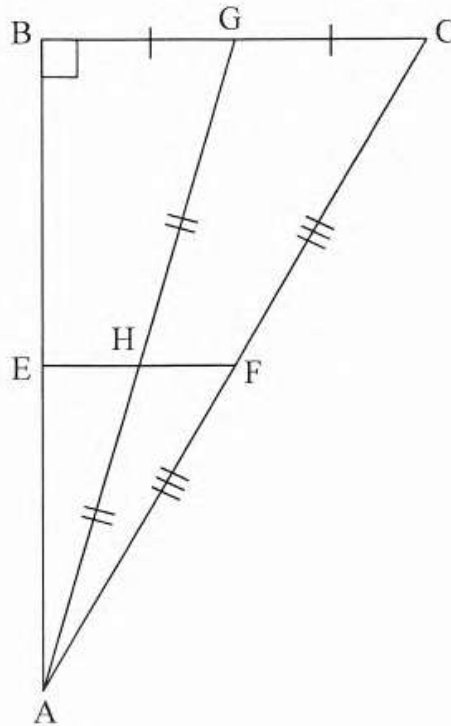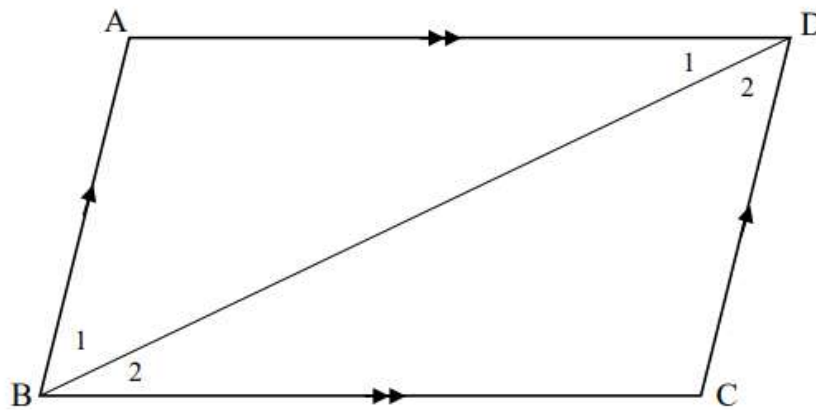

9.1   Prove that E is the midpoint of AB.   (3)

9.2   If $EH = 3,5 \text{ cm}$ and the area of $\triangle AEH = 9,5 \text{cm}^2$, calculate the length of AB.   (3)

9.3   Hence, calculate the area of $\triangle ABC$.   (3)
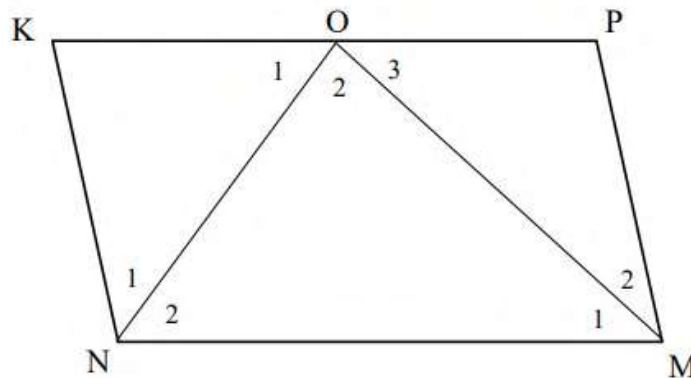
[9]

QUESTION 8

8.1 Complete the following statement:

If the opposite angles of a quadrilateral are equal, then the quadrilateral … (1)

8.2 Use the sketch below to prove that the opposite sides of a parallelogram are equal.

(6)

8.3 In the sketch below, KPMN is a parallelogram. ON bisects $K\hat{N}M$ and OM bisects $N\hat{M}P$.

8.3.1 Show that $N\hat{O}M = 90°$. (3)

8.3.2 Prove that O is the midpoint of KP. (6)
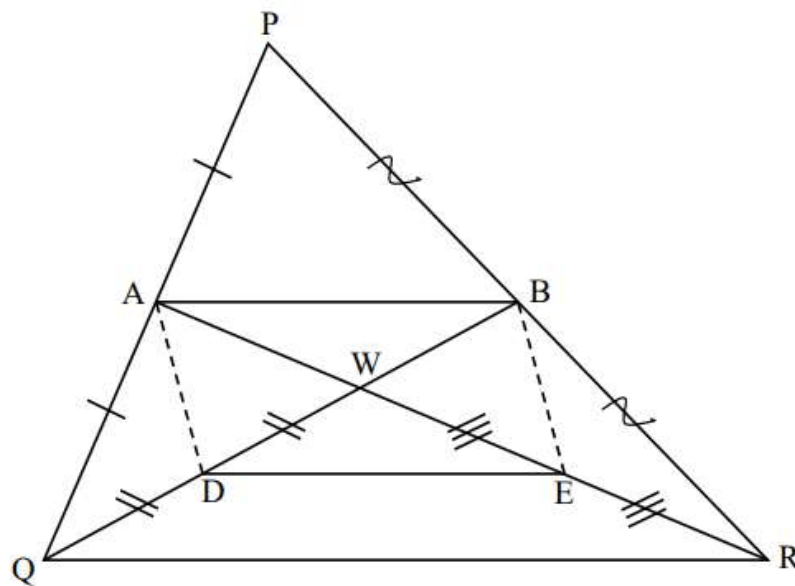
[16]

QUESTION 9

9.1   Complete the following statement:

The line through the midpoint of two sides in a triangle is parallel to and … the third side.   (1)

9.2   In ΔPQR, A and B are the midpoints of sides PQ and PR respectively. AR and BQ intersect at W. D and E are points on WQ and WR respectively such that WD = DQ and WE = ER.
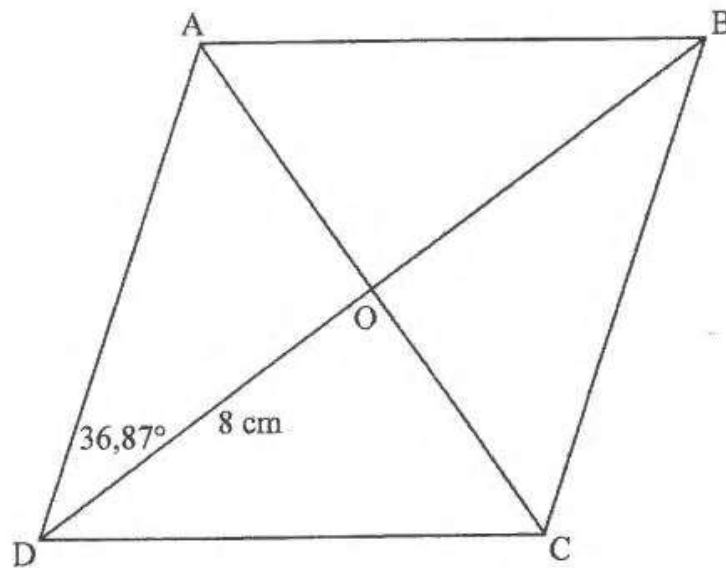

Prove that ADEB is a parallelogram.   (5)

[6]

QUESTION 8

In the diagram, ABCD is a rhombus having diagonals AC and BD intersecting in O.
$\hat{ADO} = 36,87°$ and DO = 8 cm.

8.1   Write down the sizes of the following angles:

      8.1.1 $\hat{CDO}$ (1)

      8.1.2 $\hat{AOD}$ (1)
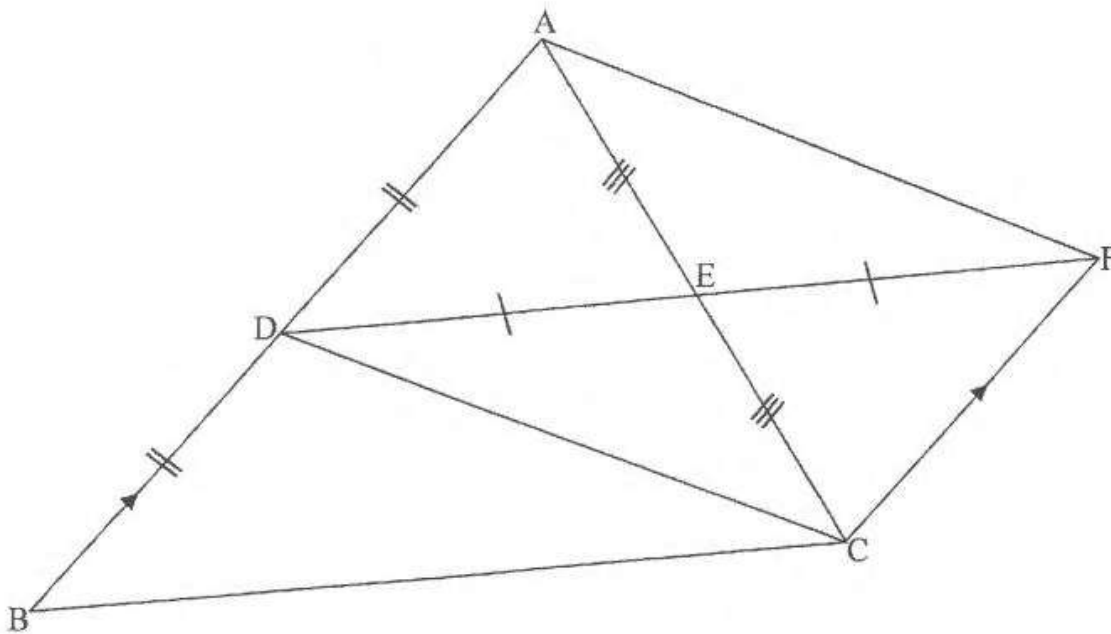
8.2   Calculate the length of AO.   (2)

8.3   If E is a point on AB such that OE $\parallel$ DA, calculate the length of OE.   (4)

                                                                                  [8]

QUESTION 9

9.1   In the diagram below, D is the midpoint of side AB of ΔABC. E is the midpoint of AC. DE is produced to F such that DE = EF. CF || BA.

9.1.1   Write down a reason why ΔADE ≡ ΔCFE.   (1)

9.1.2   Write down a reason why DBCF is a parallelogram.   (1)

9.1.3   Hence, prove the theorem which states that $DE = \frac{1}{2}BC$.   (2)

9.2 In the diagram below, PQRS is a parallelogram having diagonals PR and QS intersecting in M. B is a point on PQ such that SBA and RQA are straight lines and SB = BA. SA cuts PR in C and PA is drawn.
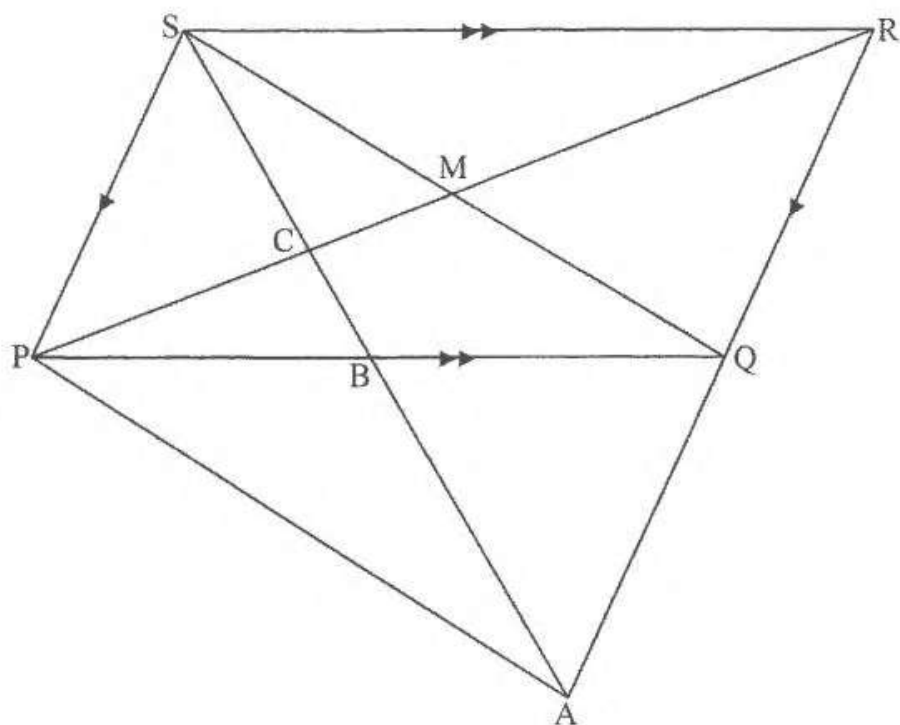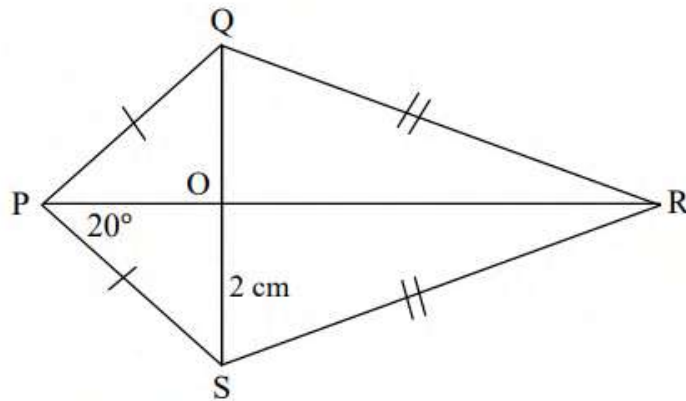
9.2.1	Prove that SP = QA.	(4)
9.2.2	Prove that SPAQ is a parallelogram.	(2)
9.2.3	Prove that AR = 4MB.	(4)
		[14]

QUESTION 8

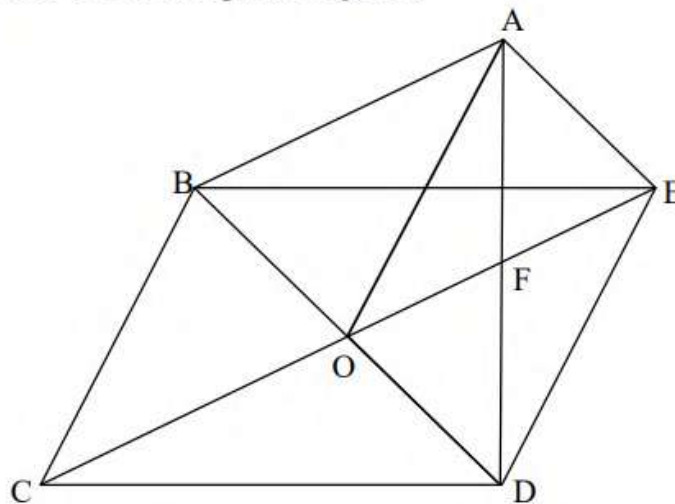PQRS is a kite such that the diagonals intersect in O.
OS = 2 cm and $\hat{OPS} = 20°$.

8.1	Write down the length of OQ.	(2)
8.2	Write down the size of $\hat{POQ}$.	(2)
8.3	Write down the size of $\hat{QPS}$.	(2)

[6]

QUESTION 9

In the diagram, BCDE and AODE are parallelograms.

9.1	Prove that OF ‖ AB.	(4)
9.2	Prove that ABOE is a parallelogram.	(4)
9.3	Prove that ΔABO ≡ ΔEOD.	(5)

[13]