GRADE 10

MATHEMATICS P2

PAST PAPERS QUESTIONS

ORGANISED BY TOPICS

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THE ONLY WAY TO LEARN MATHEMATICS IS TO DO MATHEMATICS

NOV 19

STATISTICS

QUESTION 1

1.1 An ice cream vendor recorded his daily sales for a period of time. The number of ice creams that he sold each day is given in the table below.

5	7	10	13	15	15	21	24	29
30	32	36	38	44	45	51	55	

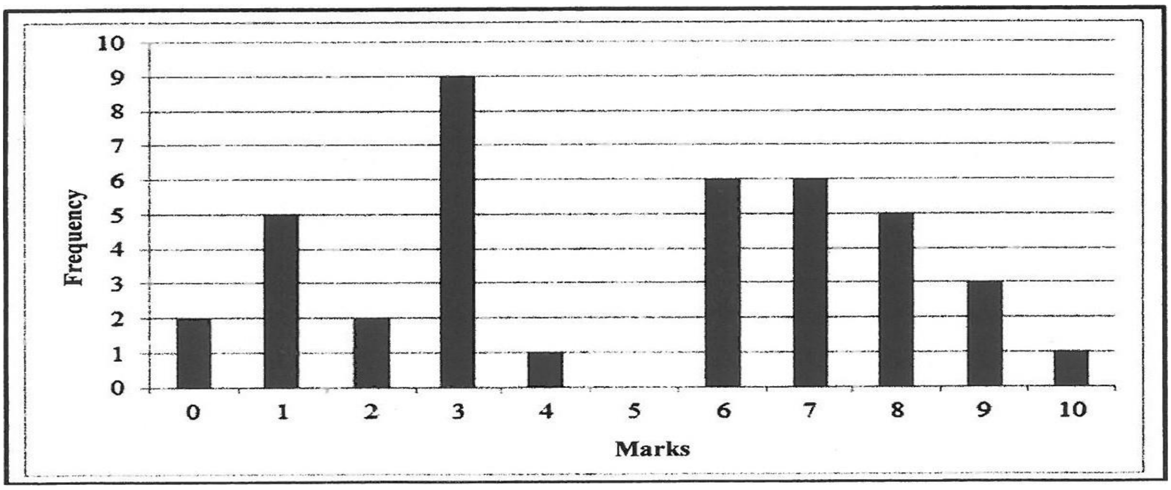
1.1.1 Write down the mode for the data set. (1)

1.1.2 Determine the median for the data set. (1)

1.1.3 Calculate interquartile range. (3)

1.1.4 Draw the box and whisker diagram for the data set. (2)

1.2 Learners in a certain class wrote a Mathematics test that had a maximum mark of 10. The teacher represented the marks obtained by the learners of this class in the bar graph below. Bar graph showing the distribution of marks scored in Mathematics test



1.2.1 How many learners scored eight marks out of 10 on the test? (1)

1.2.2 How many learners are in this class? (1)

1.2.3 Calculate the range of the marks scored in the test. (2)

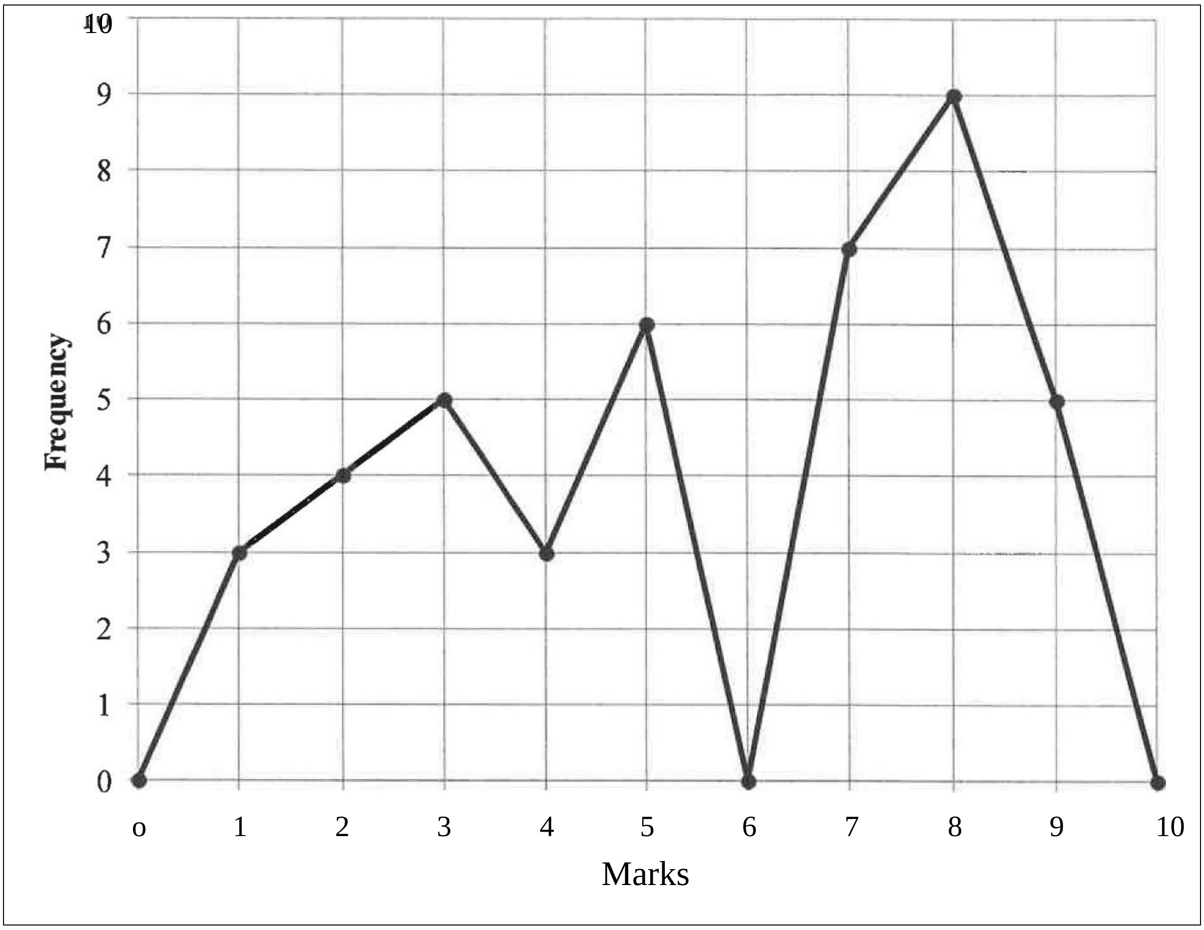
1.2.4 If the pass mark for the test was 50%, what percentage of learners failed the test? (2)

[16]

NOV 18

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 data (3)

1.4. Determine the median for the data. (3)

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

[14]

NOV 17

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)

QUESTION 2

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

TEMPERATURE (IN °C)	FREQUENCY
$20 \le T < 24$	2
$24 \le T < 28$	4
$28 \le T < 32$	9
$32 \le T < 36$	5
$36 \le T < 40$	7
$40 \le T < 44$	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 ^{o} c. (2)

[7]

NOV 16

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]

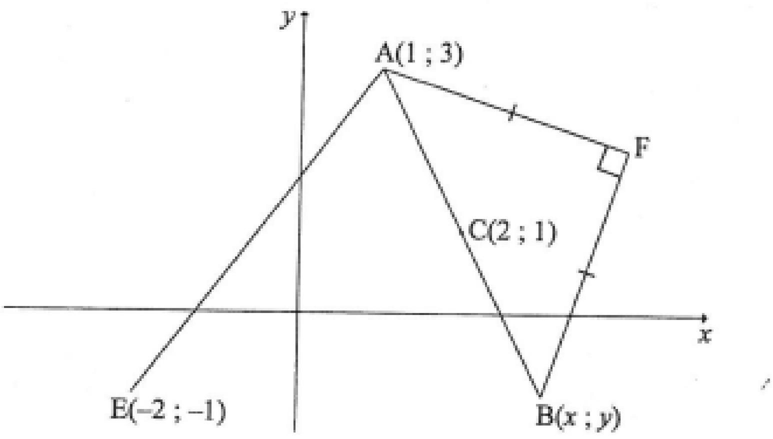
ANALYTICAL GEOMETRY

NOV 19

QUESTION 2

In the diagram below, A(1;3), B($x; y$;), and E(-2;-1) are points on a cartesian plane.

C(2:1) is a midpoint of AB. Also, F is a point such that AF = FB and AF ⊥FB.



2.1 Determine the:

2.1.1	Length of AE	(2)
2.1.2	Gradient of AC	(2)
2.1.3	Coordinates of B	(3)

2.2 BE is joined to form a special quadrilateral AFBE. Name the special

quadrilateral AFBE. Give full justification for your answer. (3)

2.3 Calculate the area of △AFB. (5)

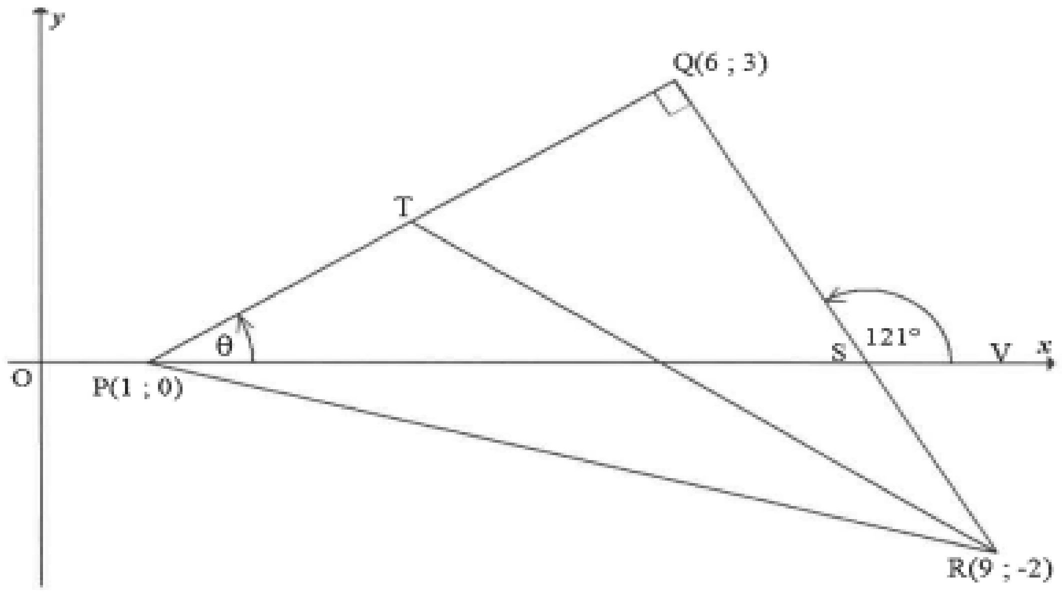
[15]

NOV 18

QUESTION 2

In the diagram below, P(l ; 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 QSV = 121°.

$\angle QPS = \theta.$



2.1 Determine the:

2.1.1	Length of PQ. Leave your answer in surd form.	(2)
2.1.2	The gradient of PQ.	(2)
2.1.3	Coordinates of T.	(2)

2.2 Calculate the:

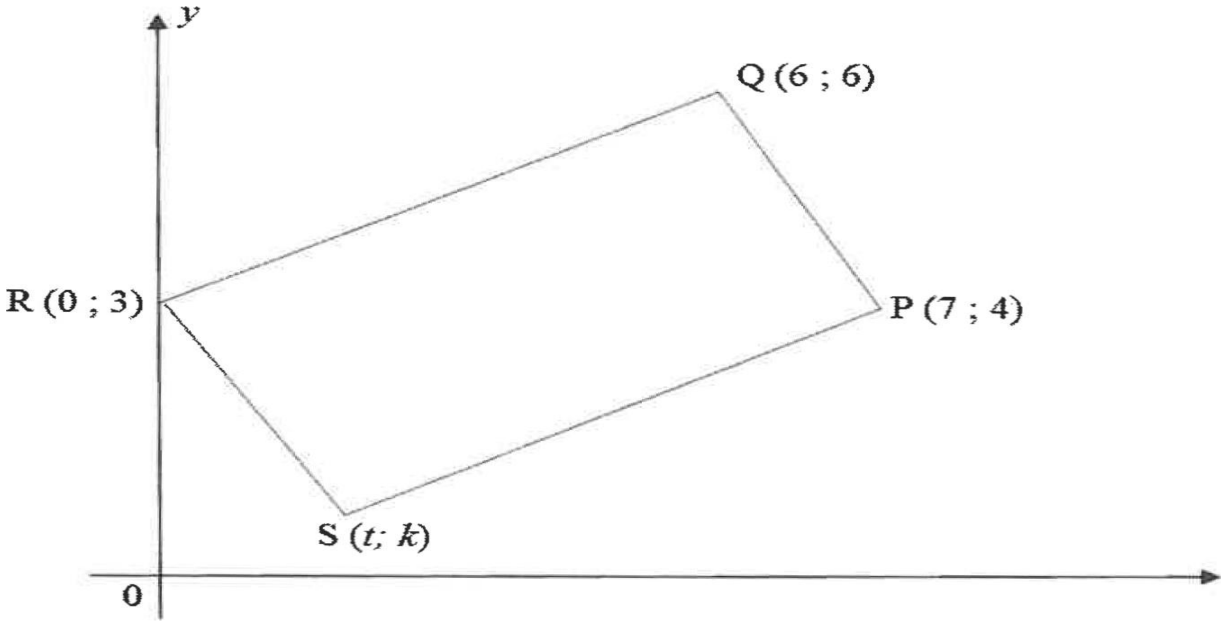
2.2.1	Area of QTR	(3)
2.2.2	Size of θ	(2)
2.2.3	Coordinates of S	(3)

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 $(\frac{7}{2};\frac{7}{2})$is the midpoint of QS, determine the coordinates of S. (3)

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

3.4 Show that QR ⊥ RS. (4)

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

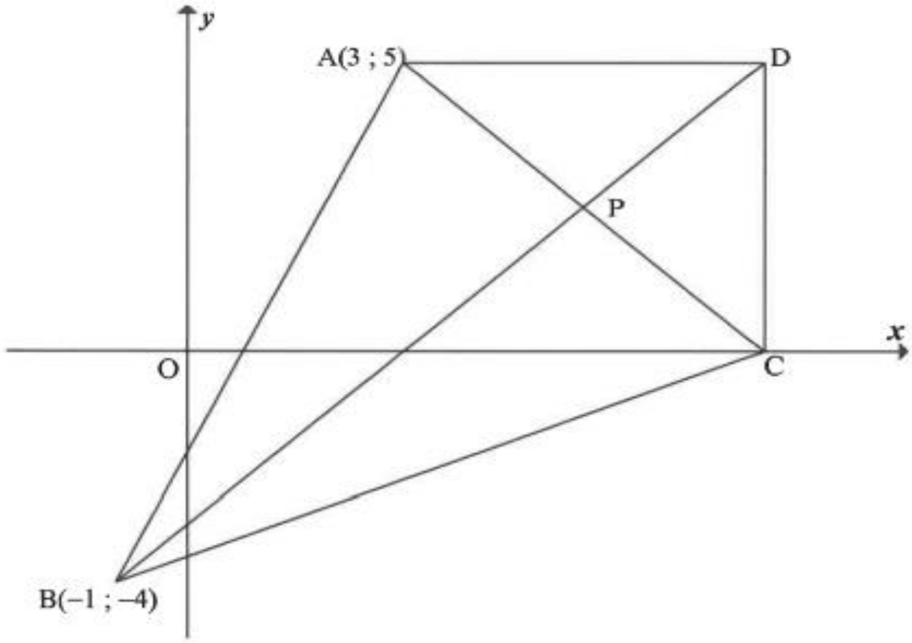
3.6 Calculate the size of ∠RSQ. (3)

[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)

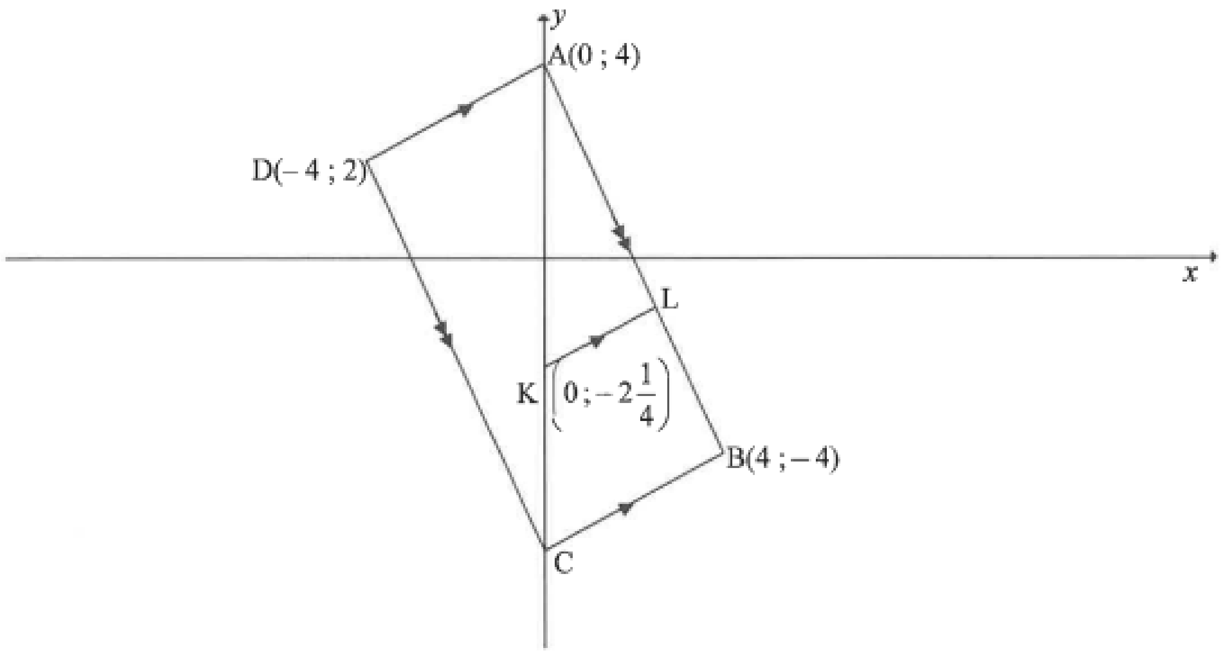
3.2 In the diagram below, ADCB is a kite with A(3 ; 5) and B(–1 ; –4). AD = DC and AB = BC. D is a point such that AD is parallel to the x-axis and AD = 5 units. CD is perpendicular to the x-axis. The diagonals intersect at P.



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 $\perp$ 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]**

TRIGONOMETRY

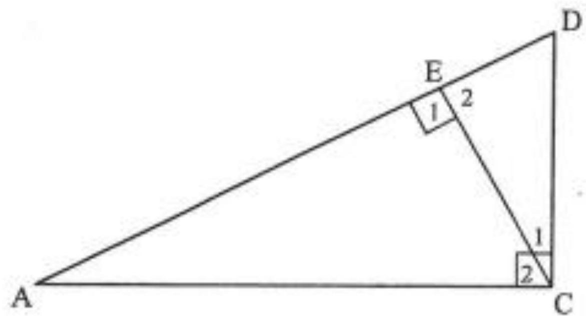
NOV 19

QUESTION 3

3.1 If $x = 37°$ and $y = 44°$, calculate the value of $\sin^2 x + 2\cos y$. (1)

3.2 WITHOUT using a calculator, determine the value of $\dfrac{\sin 30°.\cot 45°}{\cos 30°.\tan 60°}$ (3)

3.3 In the diagram below, ΔACD is right-angled at C. E lies on AD such that CE is perpendicular to AD.



3.3.1 Write down the ratio for $\cos D$ in ΔACD. (1)

3.3.2 Write down the ratio for $\cos D$ in ΔCED. (1)

3.3.3 If $AD = 13$ units and $DC = 5$ units, calculate the length of ED. (2)

3.4 Given that $\cos\theta = \dfrac{5}{13}$ and $\sin\theta < 0$.

With the aid of a diagram and WITHOUT using a calculator, determine the value of:

3.4.1 $\sin\theta$ (3)

3.4.2 $\sec\theta + \tan^2\theta + 1$ (4)

[15]

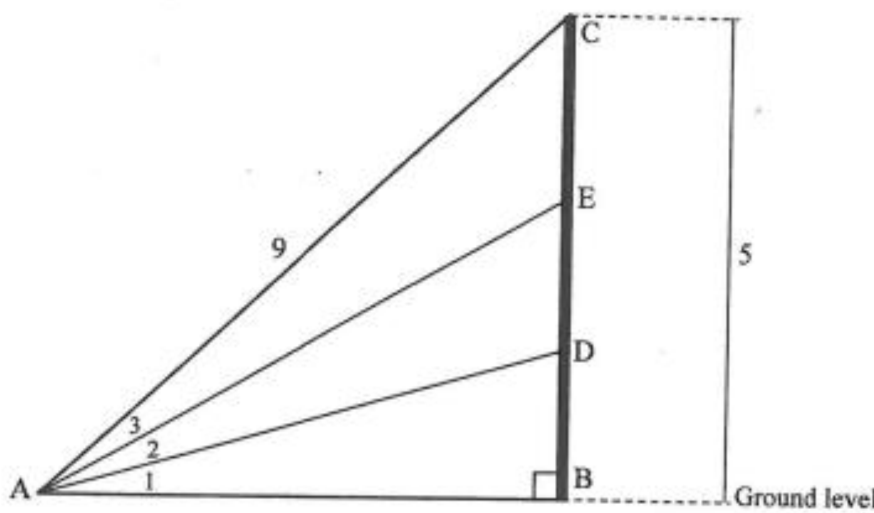
QUESTION 4

4.1 If $0° \leq \theta \leq 90°$, solve for θ in each of the following questions:

4.1.1 $2\sin\theta + 1 = 1{,}28$ (2)

4.1.2 $\tan 2\theta = 4\cot 60^0$ (3)

4.2 In the diagram below, B is the foot of a multi-storey building. Three people, D, E and C, are standing at the windows on three different floors. They are all looking at object A on the ground, which is in the same horizontal plane as B. $AC = 9$ units, $BC = 5$ units and $\hat{A}_1 = \hat{A}_2 = \hat{A}_3$.



Calculate the:

4.2.1 Size of $C\hat{A}B$ (2)

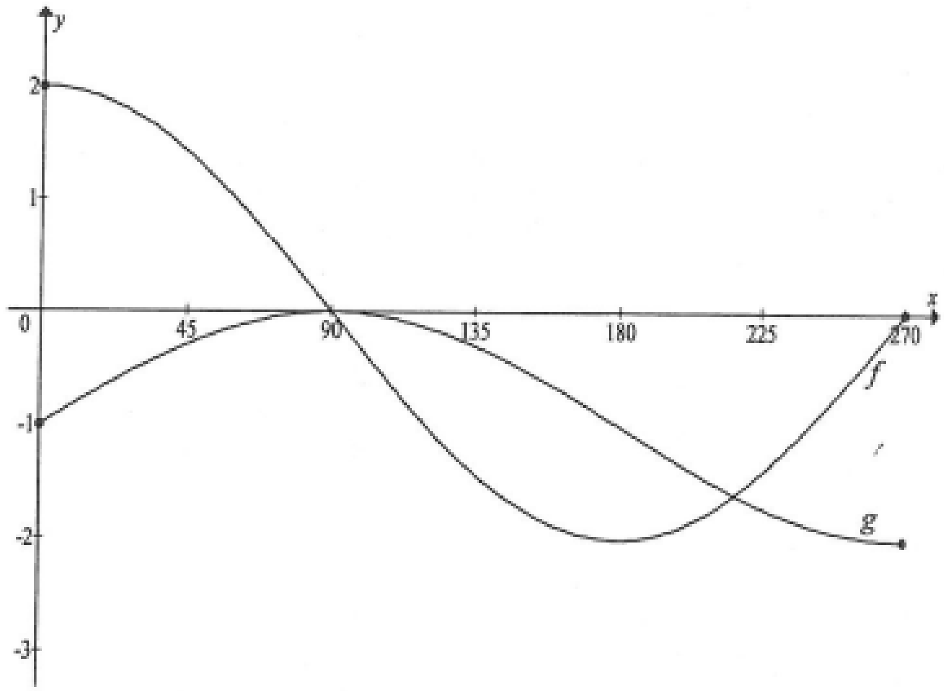
4.2.2 Length of AE (5)

4.2.3 Length of DE (4)

[16]

QUESTION 5

Sketched below are the graphs of $f(x) = 2\cos x$ and $g(x) = \sin x - 1$ for the interval $x \in [0°; 270°]$.



5.1 Write down the:

5.1.1 Period of f (1)

5.1.2 Range of g (2)

5.1.3 Number of solution(s) to $f(x) = g(x)$ in the interval $0° \leq x \leq 270°$ (1)

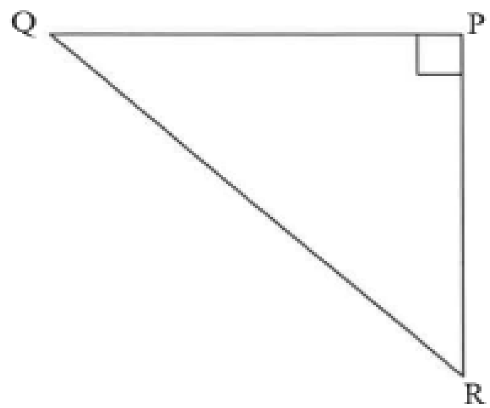
5.2 For which value(s) of x in the interval $0° \leq x \leq 270°$ is $f(x).g(x) \geq 0$? (2)

5.3 The graph h is obtained by reflecting graph g about the x-axis. Write down the coordinates of the minimum turning point of h in the interval $0° \leq x \leq 270°$. (2)

[8]

QUESTION 3

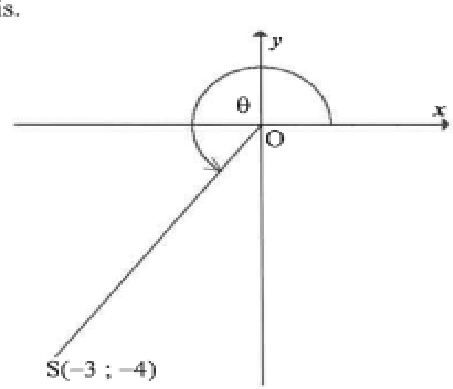
3.1 In the diagram below, ΔQPR is a right-angled triangle with $Q\hat{P}R = 90°$.



3.1.1 Use the sketch to determine the ratio of $\tan(90° - R)$.

3.1.2 Write down the trigonometric ratio that is equal to $\frac{QR}{QP}$.

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)

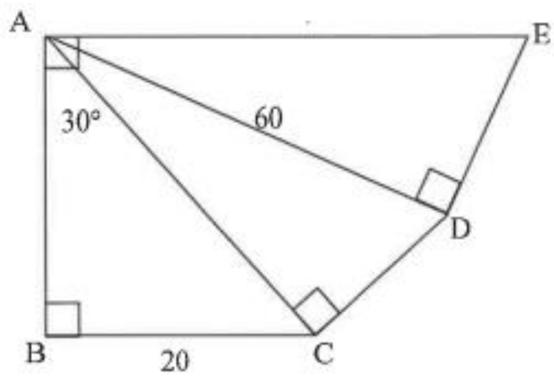
3.3 Determine the value of the following WITHOUT using a calculator:

$$\frac{\operatorname{cosec} 45°}{\sin 90° . \tan 60°}$$ (4)

[11]

QUESTION 4

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



Calculate the:

4.1.1 Length of AC (2)

4.1.2 Size of $C\hat{A}D$ (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 5

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

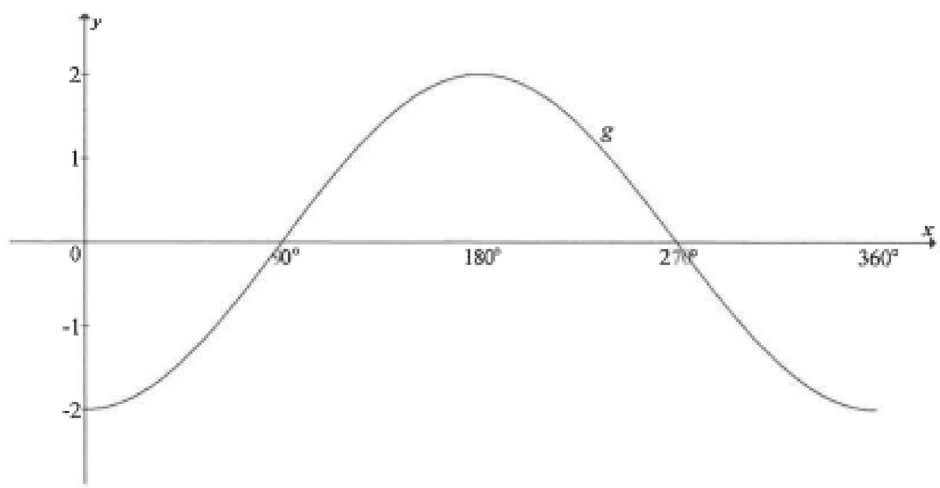
5.1.1 Sketch, on the grid provided in the ANSWER BOOK, the graph of f for $0° \le x \le 360°$. Clearly show ALL the intercepts and asympotes. (3)

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:

$$-2(\cos 0° + \cos 1° + \cos 2° + \ldots + \cos 358° + \cos 359° + \cos 360°)$$ (2)

[12]

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:

$$\cos 30° \tan 60° + \text{cosec}^2 45° \sin^2 60°$$ (3)

4.3 Solve for θ correct to TWO decimal places, if

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

[16]

QUESTION 5

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

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

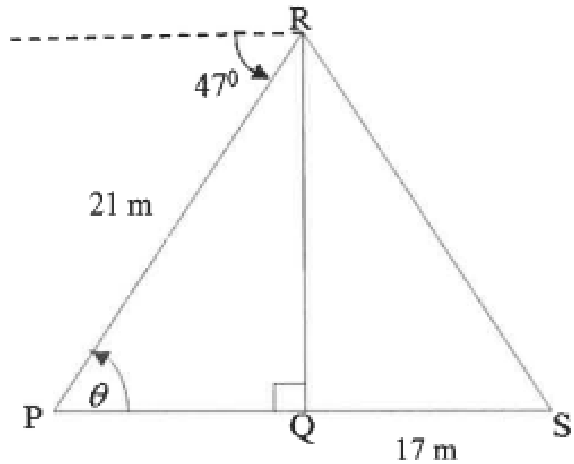
5.3.1 Number of solutions to $f(x) = g(x)$ in the interval $0° \le x \le 270°$ (1)

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

[13]

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. $R\hat{P}Q = \theta$.

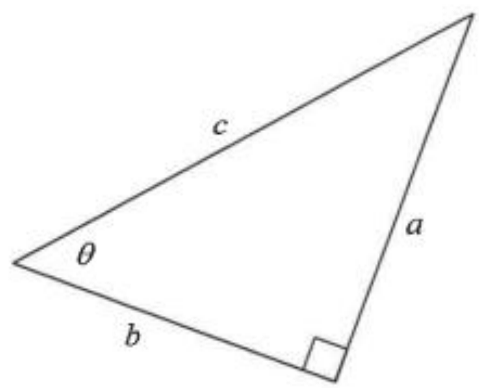


6.1	Write down the size of θ.	(1)
6.2	Calculate the length of RQ.	(3)
6.3	Hence, calculate the size of $\hat{S}$.	(2)
6.4	If P, Q and S lie in a straight line, how far apart are the anchors of the wire cables?	(4)
		[10]

NOV 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 $2\text{cosec}A + \cos 3B$. (3)

4.3 Simplify fully, WITHOUT the use of a calculator:

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

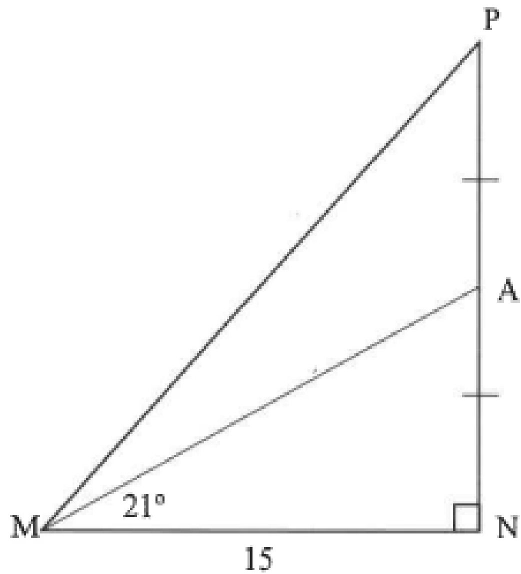
4.4 Given that $5\cos\beta - 3 = 0$ and $0° < \beta < 90°$.

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

[17]

QUESTION 5

5.1 In the 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)

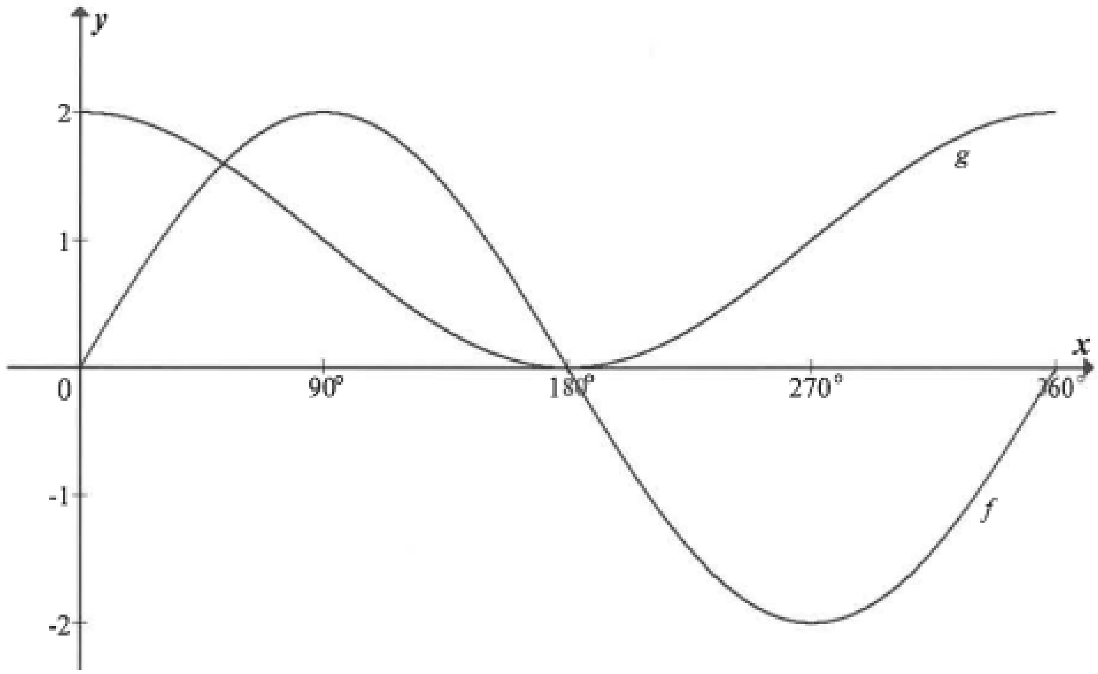
5.1.3 MP (3)

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

[12]

QUESTION 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]

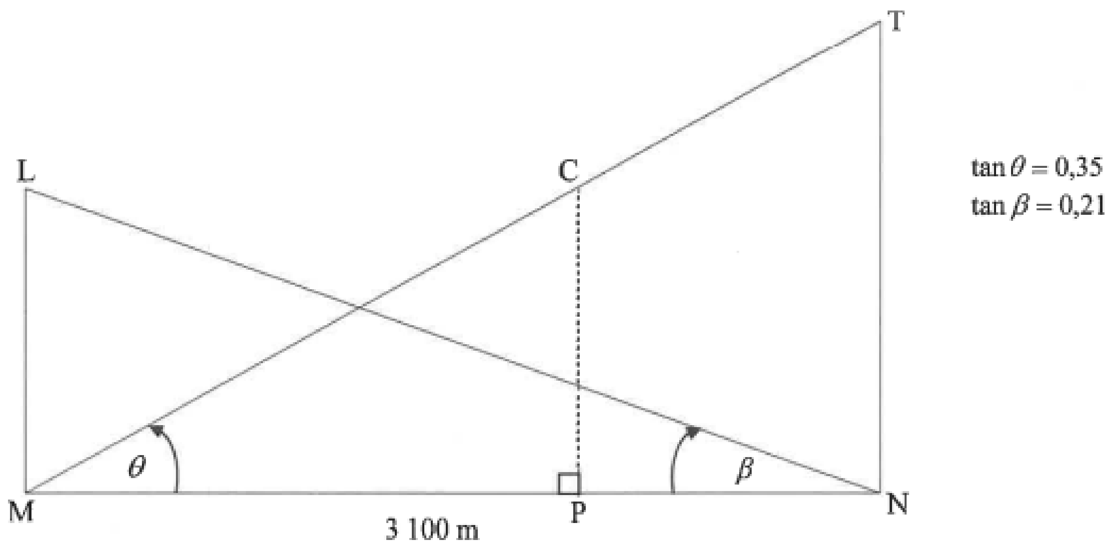
QUESTION 7

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 $\tan\beta = 0{,}21$.



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)

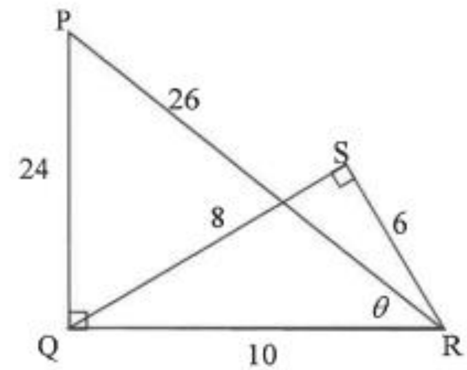
7.2.2 If the cable car, C, travels along the cable, such that TC = 400 m, calculate the height of the cable car above sea level at that instant. (5)

[11]

NOV 15

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)

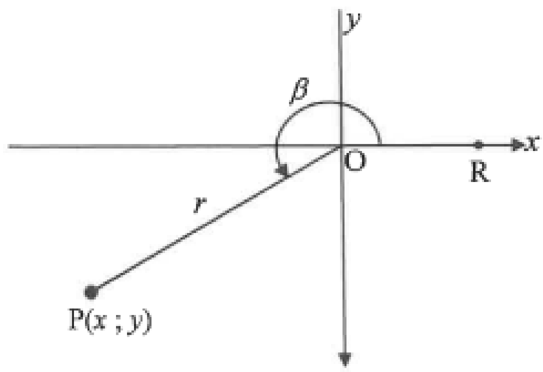
4.1.4 $\sec S\hat{R}Q$ (1)

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 In the diagram below, $P(x\ ;\ y)$ is a point in the third quadrant. $R\hat{O}P = \beta$ and $17\cos\beta + 15 = 0$.



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) $\sin\beta$ (1)

(b) $\cos^2 30°.\tan\beta$ (3)

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)

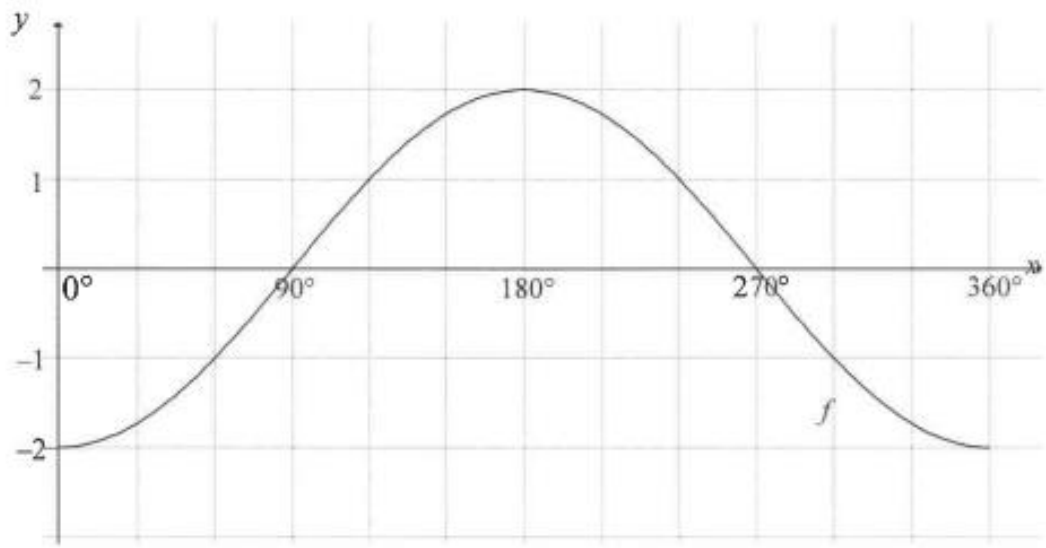
5.2.2 $\sec(x + 10°) = 5{,}759$ (3)

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

[18]

QUESTION 6

In the diagram below, the graph of $f(x) = -2\cos x$ is drawn for the interval $0° \leq x \leq 360°$.



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 $0° \leq x \leq 360°$. (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 $0° \leq x \leq 360°$. (2)

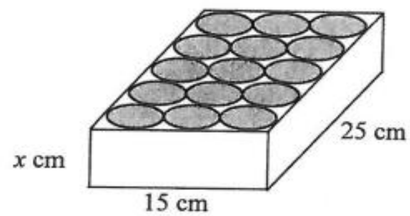
[13]

MEASUREMENTS

NOV 19

QUESTION 6

An open rectangular cardboard box has the following dimensions: length = 25 cm, breadth = 15 cm and height = x cm. The volume of the box is $3\ 000\ cm^3$. Fifteen (15) identical cans of cold drink fit snugly into the box, as shown in the diagram below. The box and the cans are of equal height. (Ignore the thickness of the cardboard in your calculations.)

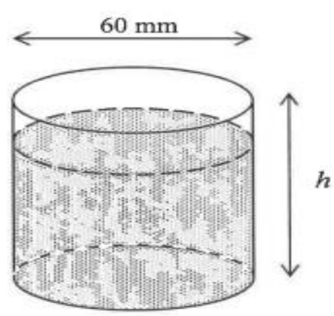


6.1	Calculate the height of the box.	(3)
6.2	Calculate the radius of a can.	(2)
6.3	If a can is filled to the top, calculate the volume of cold drink contained in the can.	(2)
6.4	Calculate the volume of the space in between all the cans in the box.	(2)
		[9]

NOV 18

QUESTION 6

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

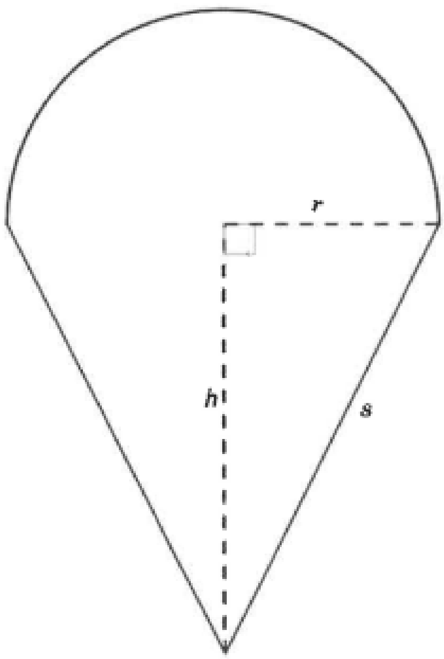


Calculate the:

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)

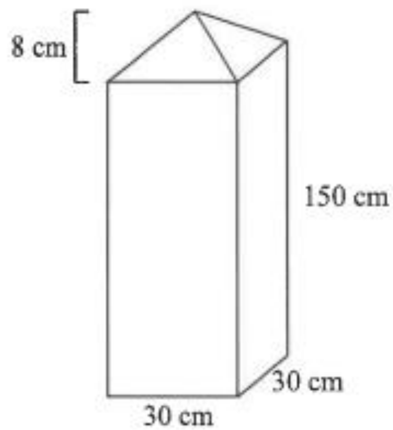
7.2 The slant height, s, of the cone (2)

7.3 The surface area of the solid (2)
[6]

NOV 15

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 $= \frac{1}{3}$ area of the base $\times$ height
Total surface area of a pyramid = area of the base $+ \frac{1}{2}$ (perimeter of the base $\times$ 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)

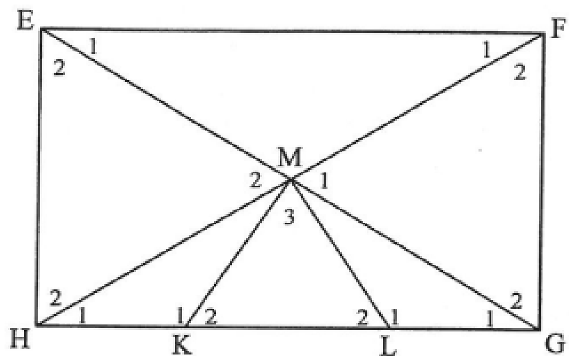
[8]

NOV 19

Give reasons for ALL geometry statements used in QUESTIONS 7 and 8.

QUESTION 7

7.1 In the diagram, EFGH is a rectangle having diagonals intersecting at M. $\hat{M}_2 = 60°$ and $\hat{L}_2 = 40°$.

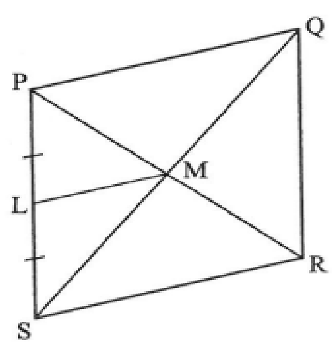


Calculate the size of:

7.1.1 $\hat{F}_1$ (2)

7.1.2 $G\hat{M}L$ (3)

7.2 PQRS is a rhombus with diagonals PR and SQ intersecting at M. The perimeter of the rhombus is 12 cm. L is the midpoint of PS.



Calculate the length of LM. (4)

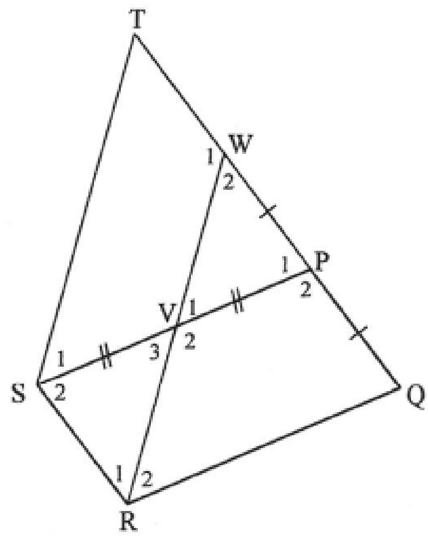
[9]

QUESTION 8

8.1 Complete the statement so that it is TRUE:

The diagonals of a parallelogram … each other. (1)

8.2 In the diagram below, P is the midpoint of side WQ of ΔWQR. V is on WR such that $VP \parallel RQ$. PV is produced by its own length to S. PW is produced to T and ST drawn.



8.2.1 Give a reason why $WV = VR$. (1)

8.2.2 Prove that:

(a) $\Delta VWP \equiv \Delta VRS$ (3)

(b) SWPR is a parallelogram (2)

(c) PQRS is a parallelogram (3)

8.2.3 If it is further given that RSTW is a parallelogram, show that $TQ = 3SR$. (2)

[12]

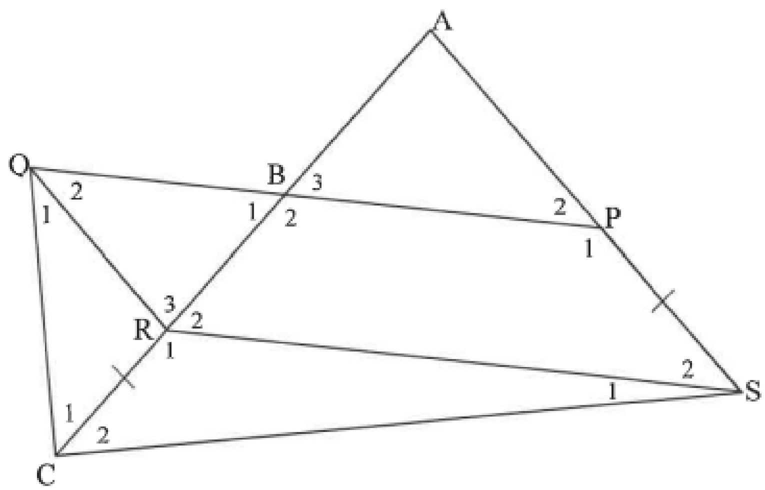
NOV 18

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.



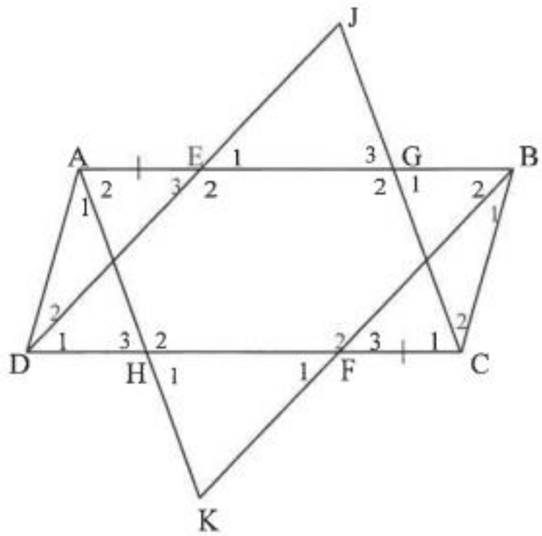
7.2.1 Calculate the size of $\hat{A}$. (5)

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.



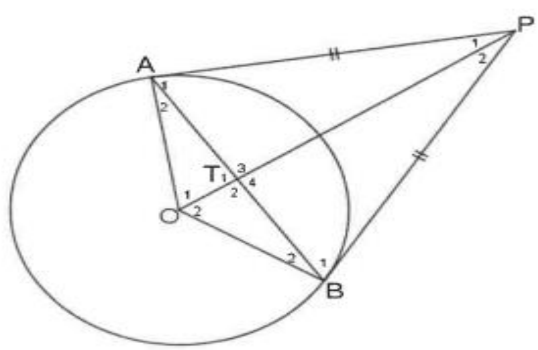
Prove that:

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.

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:

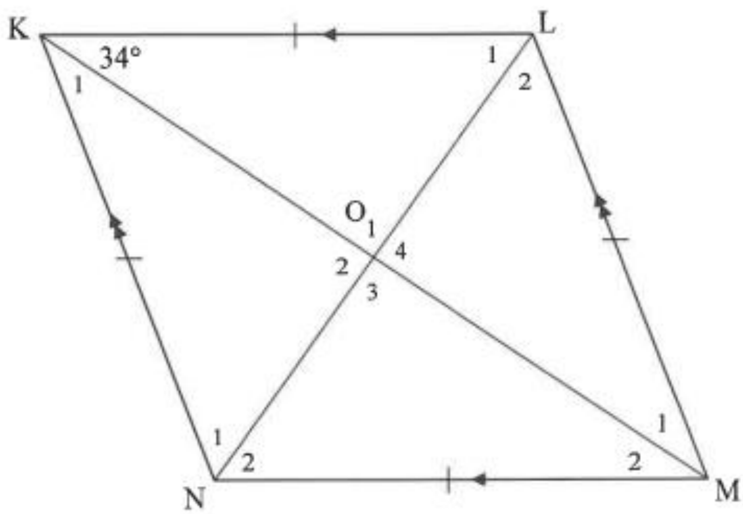
8.2.1 AT = BT (5)

8.2.2 $O\hat{T}A = 90°$ (1)

[15]

QUESTION 8

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

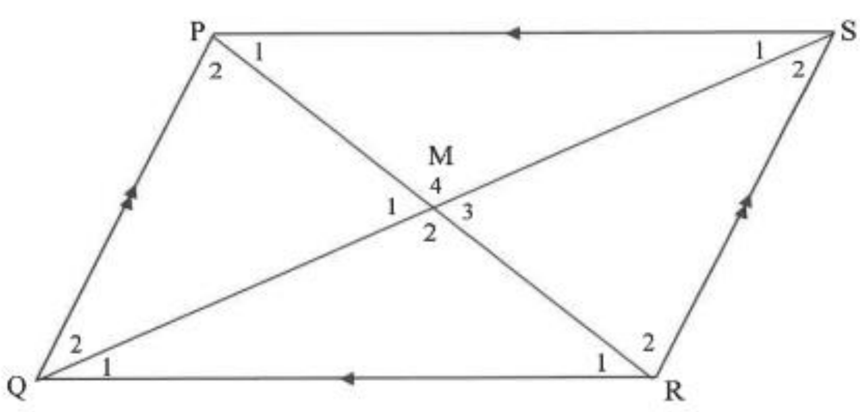


8.1.1 Write down the size of $\hat{O}_1$. (1)

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

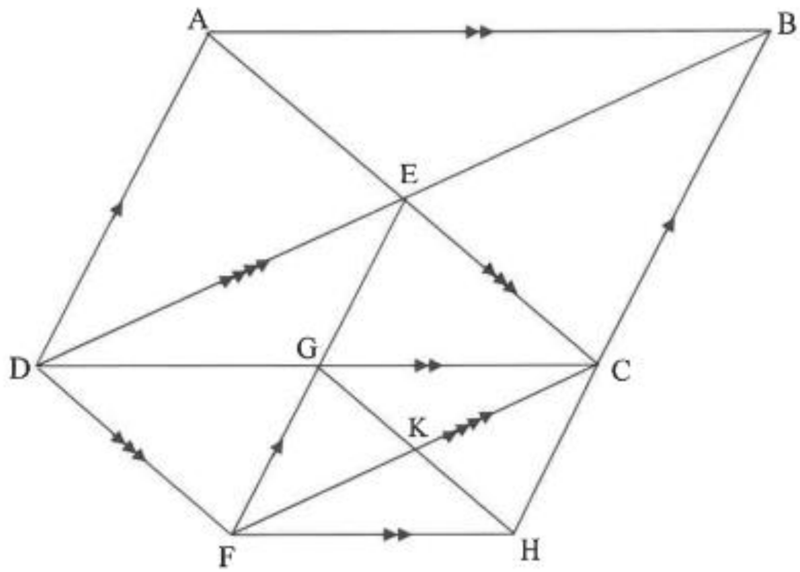
8.1.3 Calculate the size of $K\hat{N}M$. (2)

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



Prove that the diagonals bisect each other. (4)

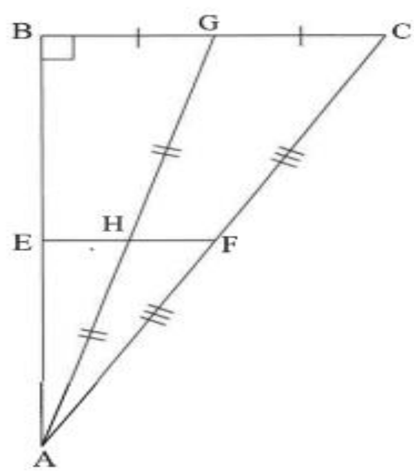
8.3 In the diagram, ABCD is a parallelogram with diagonals intersecting at E. The diagonals of parallelogram DECF intersect at G. The diagonals of parallelogram FGCH intersect at K.



Prove that DB = 4KC. (4)
[13]

QUESTION 9

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

9.3 Hence, calculate the area of ΔABC. (3)
[9]

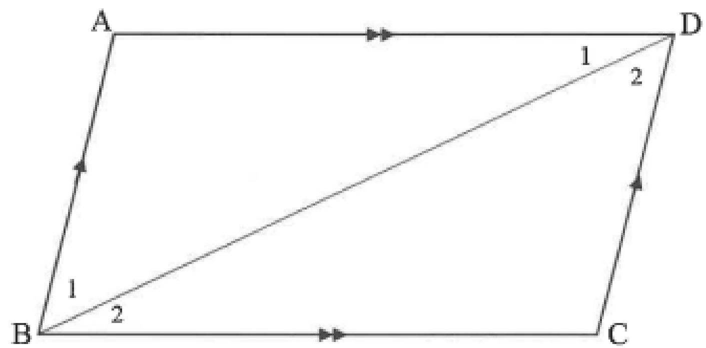
Give reasons for your statements in QUESTIONS 8 and 9.

QUESTION 8

8.1 Complete the following statement:

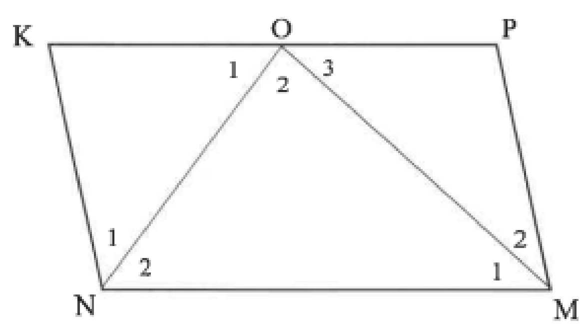
If the opposite angles of a quadrilateral are equal, then the quadrilateral … (1)

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)

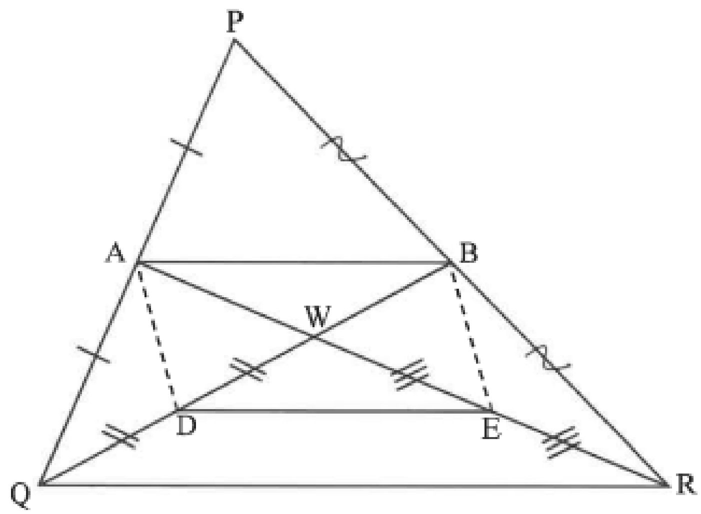
[16]

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 $WE = ER$.

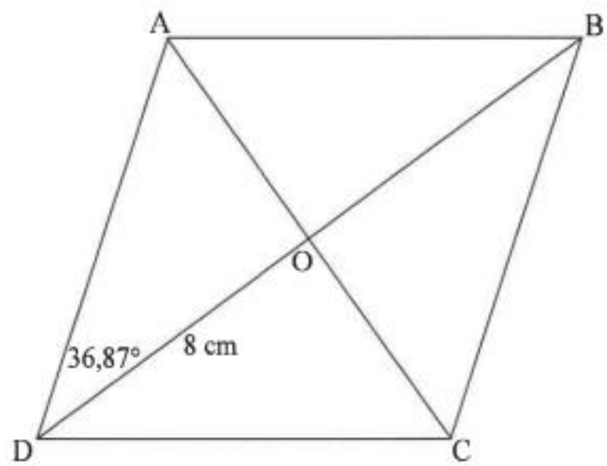


Prove that $ADEB$ is a parallelogram. (5)

[6]

QUESTION 8

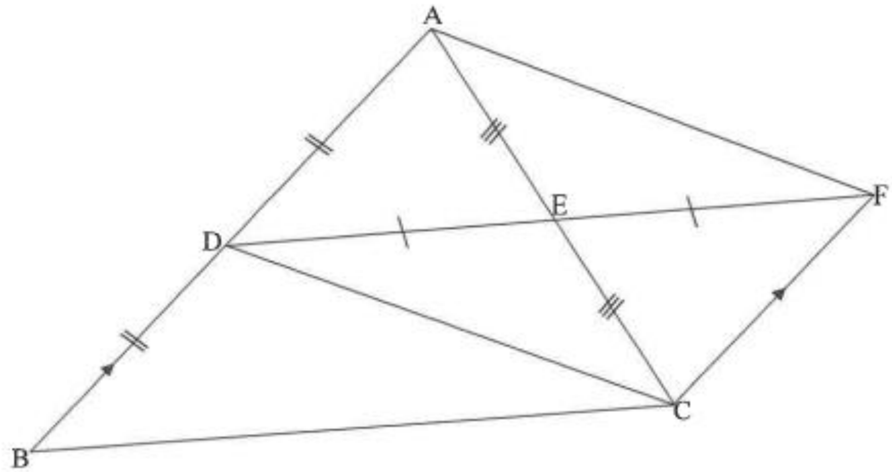
In the diagram, ABCD is a rhombus having diagonals AC and BD intersecting in O. $A\hat{D}O = 36{,}87^\circ$ and DO = 8 cm.



8.1	Write down the sizes of the following angles:		
	8.1.1	$C\hat{D}O$	(1)
	8.1.2	$A\hat{O}D$	(1)
8.2	Calculate the length of AO.		(2)
8.3	If E is a point on AB such that OE || 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 $DE = EF$. $CF \parallel BA$.

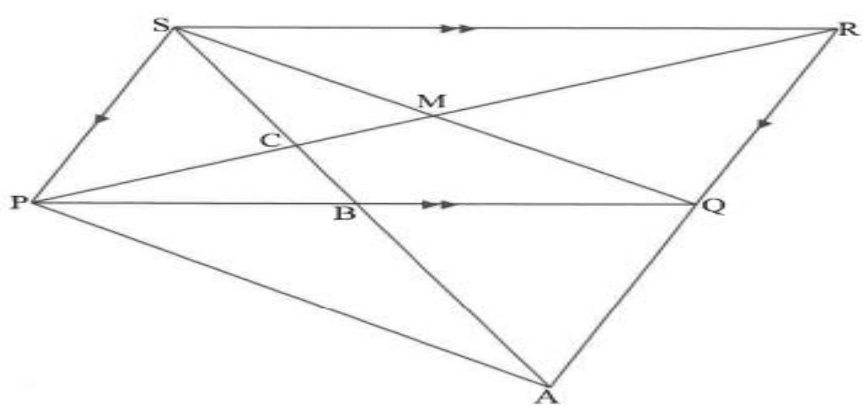


9.1.1 Write down a reason why $\Delta ADE \equiv \Delta CFE$. (1)

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]