HILLCREST HIGH SCHOOL

INTERNAL ASSESSMENT

GRADE 11

Mathematics Paper 2
November 2024

Learners Name: _____

Teacher: _____

	Data Handling/ Statistics		Analytical Geometry		Trigonometry			Measure	Euclidean Geometry				Total
Question	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
Maximum	**13**	**8**	**15**	**16**	**27**	**13**	**9**	**8**	**9**	**11**	**11**	**10**	**150**

MARKS: 150

TIME: 3 hours

EXAMINER: Mr Reuben

MODERATOR: Mrs Janssens

This question paper consists of 20 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 12 questions. Answer ALL the questions.

2. Clearly show ALL calculations, diagrams, graphs, et cetera, which you have used in determining the answers.

3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.

4. Round off your answers to TWO decimal places, if necessary, unless stated otherwise.

5. Diagrams are NOT necessarily drawn to scale.

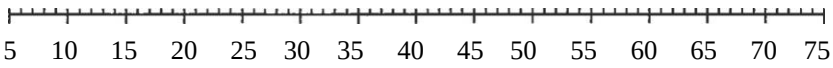
6. Number the answers correctly according to the numbering system used in this question paper.

7. Write legibly and to present your work neatly.

QUESTION 1

The table below shows the number of cans of food collected by 9 classes during a charity drive.

5	8	15	20	25	27	31	36	75

1.1	Calculate the range of the data.	(1)
1.2	Calculate the standard deviation of the data.	(2)
1.3	Determine the median of the data.	(1)
1.4	Determine the interquartile range of the data.	(3)
1.5	Use the number line provided to draw a box and whisker diagram for the data above.	(3)
		
1.6	Describe the skewness of the data.	(1)
1.7	Identify outliers, if any exist, for the above data.	(2)
		[13]

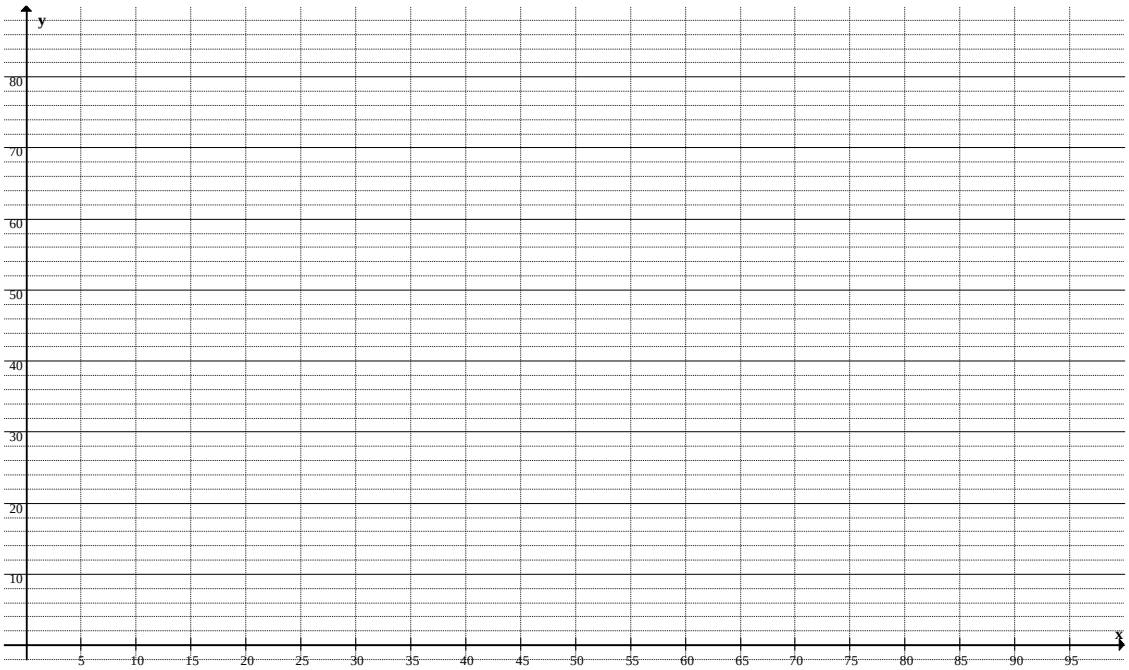
QUESTION 2

The following table represents the percentages of 75 grade 11 learners of Future Private school:

2.1	Complete the cumulative frequency table.	(3)

Interval	Frequency	Cumulative frequency
$10 \leq x < 20$	3	
$20 \leq x < 30$	6	
$30 \leq x < 40$	10	
$40 \leq x < 50$	12	
$50 \leq x < 60$	15	
$60 \leq x < 70$	13	
$70 \leq x < 80$	9	
$80 \leq x < 90$	5	
$90 \leq x < 100$	2	

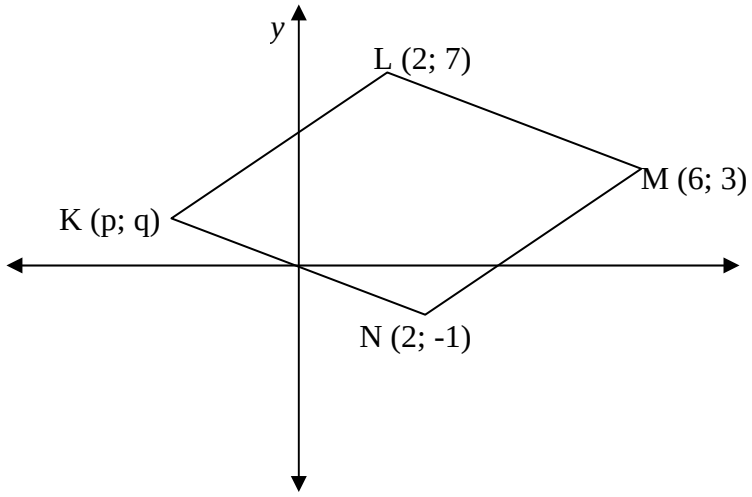
2.2	Draw the ogive (cumulative frequency curve) for the above data.	(3)



2.3	The ogive curve is used to determine the median of the percentages. The school decides that 5% should be added on. What is the new median?	(2)
		[8]

QUESTION 3

K (p ; q), L(2 ; 7), M(6 ; 3) and N(2 ; -1) are the vertices of a parallelogram KLMN as shown below:

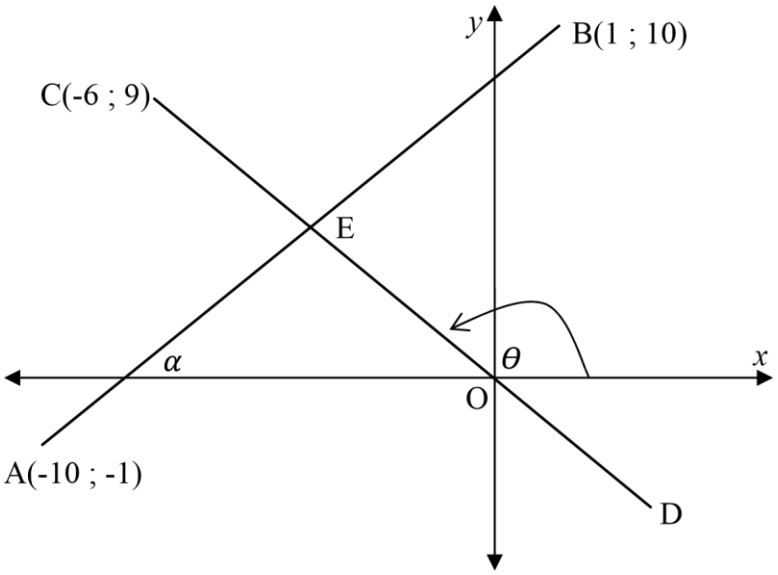


3.1	Determine:	
3.1.1	the gradient of MN.	(3)
3.1.2	the coordinates of G, the midpoint of NL.	(2)
3.1.3	the equation of KL.	(4)
3.1.4	the values of p and q.	(2)

3.2	Calculate the lengths of LM and MN and hence determine whether KLMN is a rhombus or not.	(4)
		[15]

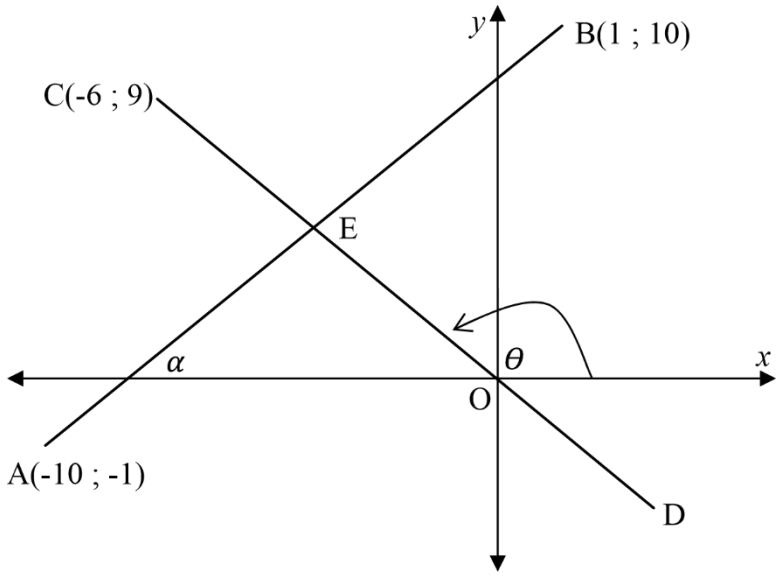
QUESTION 4

4.1 The diagram below shows two straight lines AB and CO intersecting at point E.



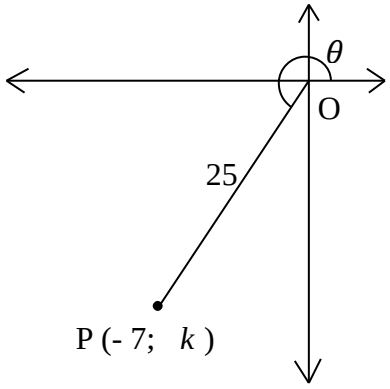
4.1.1	Determine the equations of AB and CD	(6)

4.1.2	Determine the coordinates of E.	(4)
4.1.3	Calculate the size of θ, the angle of inclination of CD.	(3)
4.1.4	Hence, determine the size of $A\widehat{E}D$.	(3)
		[16]



QUESTION 5

5.1 In the diagram, $P\ (-7; k)$ is a point in the third quadrant such that $OP = 25$ units.



	Determine the value of the following:	
5.1.1	k	(2)
5.1.2	$\tan\theta$	(1)
5.1.3	$\sin(360° - \theta)$	(2)
5.2	Given $\sin 36^0 = t$, express each of the following in terms of *t*.	
5.2.1	$\sin 144^0$	(3)

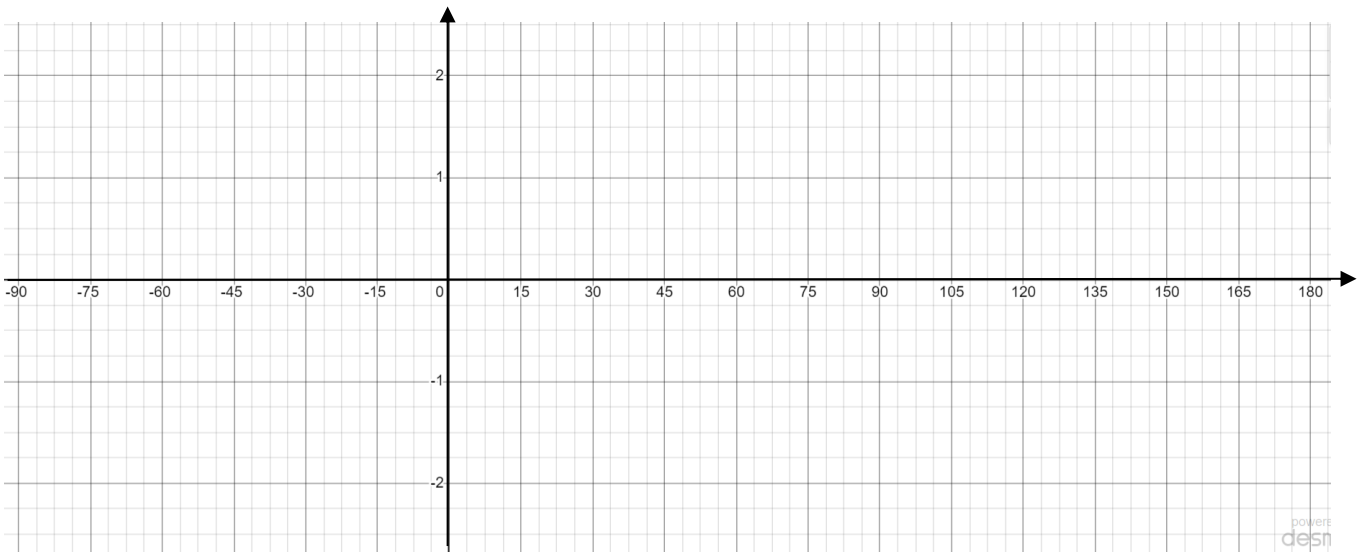
5.2.2	$\sin 234^0$	(2)
5.3	Simplify the following to a single trig ratio of θ: $\frac{\cos(90° + x).\sin(360° + x) - \mathbf{cos^2}(\boldsymbol{x - 180^0})}{\cos(-x)}$	(6)
5.4	Consider the identity: $\frac{1}{\cos^2 x} - \tan^2 x = 1$	
5.4.1	Prove the identity.	(3)
5.4.2	For which values of $x \in [180^0; 360^0]$ is the identity undefined?	(2)

5.5	Determine the general solution to the equation: $3\sin^2 x + 2\sin x - 1 = 0$	(6)
		[27]

QUESTION 6

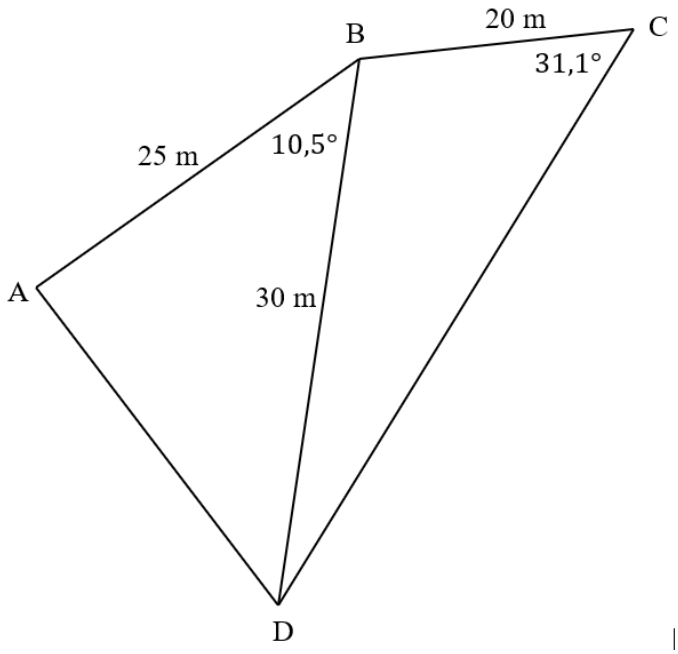
Given $f(x) = \tan x$ and $g(x) = \sin(x + 45°)$:

6.1	Draw the sketch graphs of f and g on the same set of axes for $x \in [-90°; 180°]$.	(6)



6.2	Use your graph to determine the values of x for which:	
6.2.1	$g(x) - f(x) = 1$	(2)
6.2.2	$g(x) \geq f(x)$ for $x \in [-90°;90°]$	(2)
6.2.3	State the period of $y = f(2x)$.	(1)
6.3	Write down the equation of h if h is obtained from g by a translation of 30° to the left and 2 units down.	(2)
		[13]

QUESTION 7

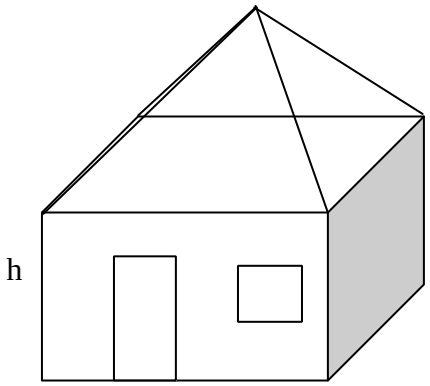


In quadrilateral $ABCD$, $AB = 25$ m, $BC = 20$ m, $BD = 30$ m, $A\hat{B}D = 10{,}5°$ and $B\hat{C}D = 31{,}1^0$.

	Determine:	
7.1	the area of ΔABD.	(3)
7.2	the size of $B\widehat{D}C$.	(3)
7.3	the length of CD.	(3)
		[9]

QUESTION 8

A 'square' house (a house with all four sides equal) is built with a pyramid as roof as shown below. The height (H) of the pyramid is 0,6 m. Each side of the house is 5,2 m long and the height (h) of the walls is 2,5 m.

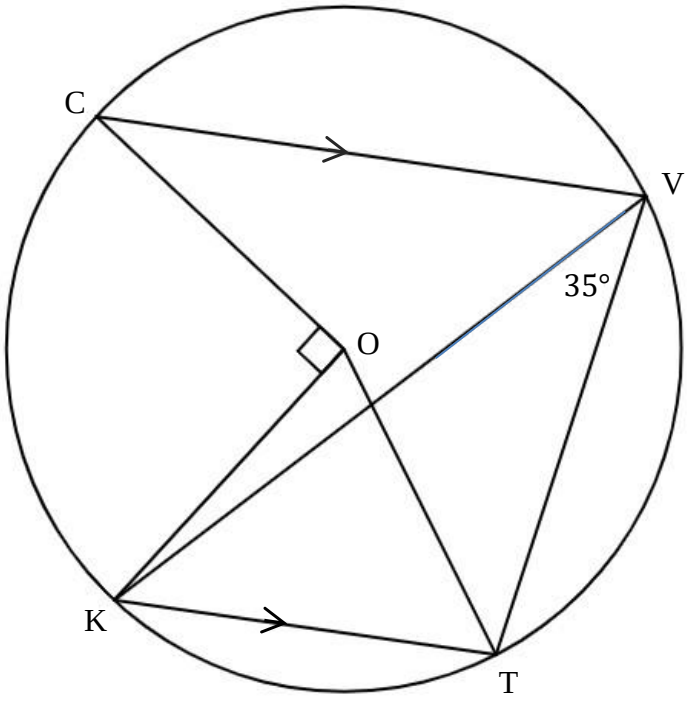


8.1	Calculate the total volume of the house.	(5)
8.2	Determine the surface area of the house (including the door, windows and floor) *without* the roof.	(3)
		[8]

In Questions 9-12, you must provide an acceptable reason for each statement/answer you provide.

QUESTION 9

In the diagram below, O is the centre of the circle and CV || KT.

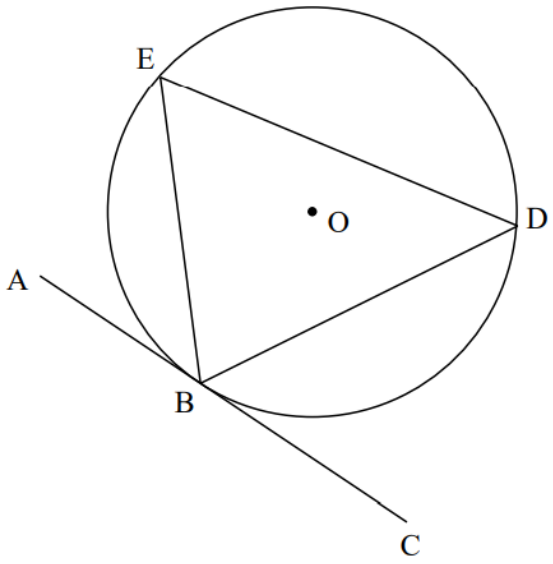


	Determine the size of:	
9.1	$C\hat{V}K$	(2)
9.2	reflex $C\hat{O}T$	(3)
9.3	$O\hat{K}V$	(4)

		[9]

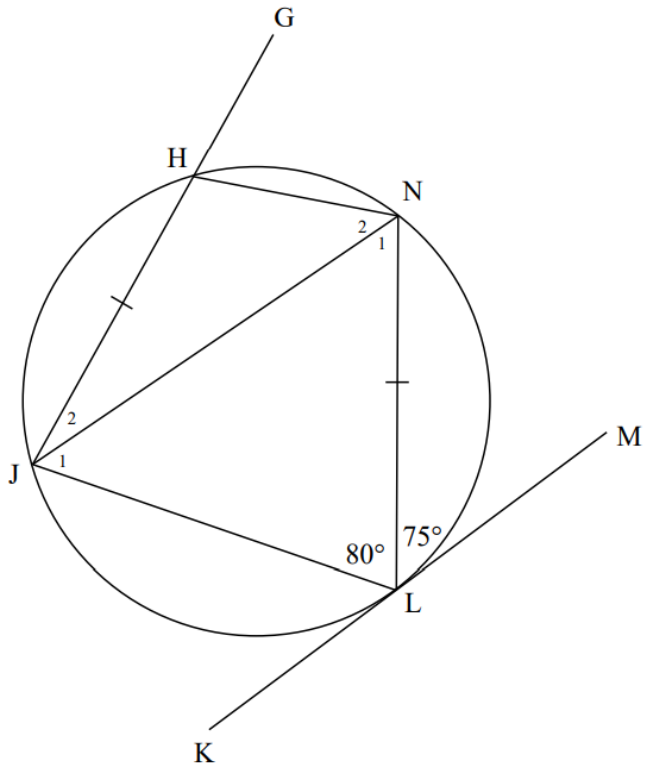
QUESTION 10

10.1 In the diagram, ABC is a tangent to circle O at B.



10.1	Prove the theorem that states that $D\hat{B}C = D\hat{E}B$.	(5)

10.2 In the diagram, KLM is a tangent to the circle at L. $N\hat{L}M = 75°$ and $J\hat{L}N = 80°$.



	Determine, with reasons, the size of:	
10.2.1	$\hat{J}_1$	(2)
10.2.2	$G\hat{H}N$	(2)
10.2.3	$\hat{N}_2$	(2)
		[11]

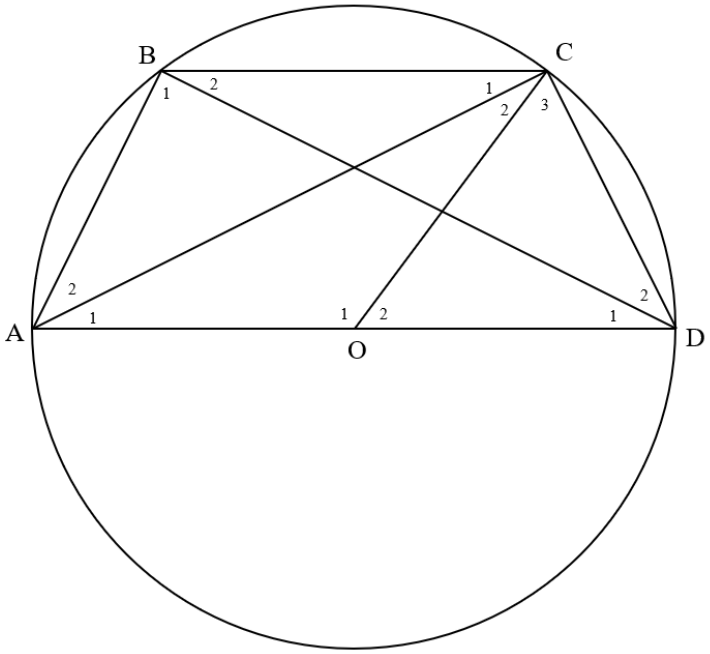
QUESTION 11

11.1 Complete the following statements:

11.1.1 The opposite angles of a cyclic quadrilateral _____ _____ (1)

11.1.2 The angle subtended by an arc at the centre of a circle is _____ _____ (2)

11.2 In the diagram, O is the centre of the circle $ABCD$. AOD is the diameter and OC is a radius. AB, BC, CD, AC and BD are straight lines.



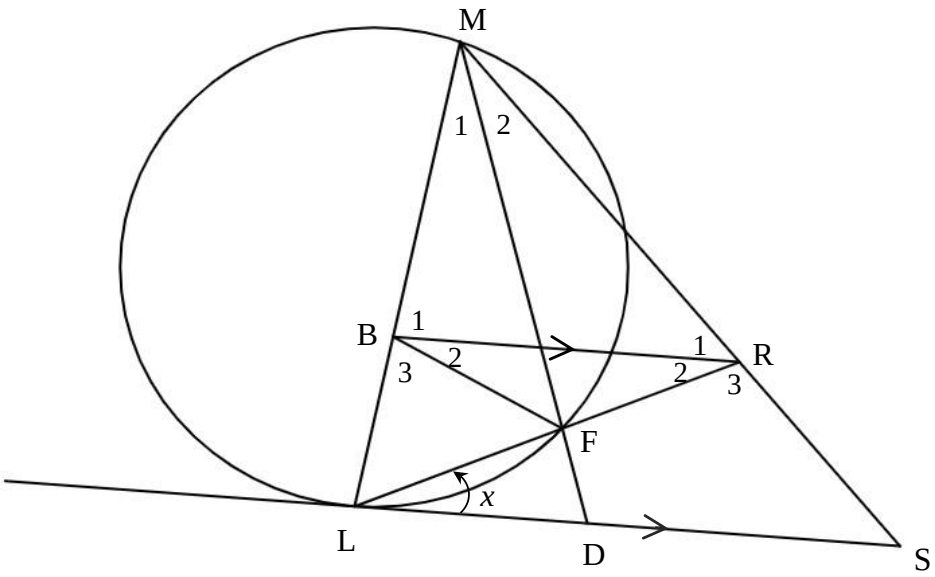
Write down, with a reason, an equation that expresses the relationship between each of the given groups of angles. An example has been given to you.

	ANGLES	EQUATION	REASON
e.g.	$\hat{O}_1;\ \hat{O}_2$	$\hat{O}_1 + \hat{O}_2 = 180^0$	∠'s on a straight line
11.2.1	$\hat{D}_1; \hat{C}_1$		
11.2.2	$\hat{O}_2;\ \hat{B}_2$		
11.2.3	$\hat{B}_1; \hat{B}_2; \hat{D}_1; \hat{D}_2$		
11.2.4	$\hat{D}_1; \hat{C}_3; \hat{D}_2$		
			[11]

QUESTION 12

In the diagram below, LS is a tangent to the circle at L. BR∥LS and MD bisects $L\widehat{M}R$.

$S\hat{L}R = x$



12.1	Name, with reasons, three other angles equal to *x*.	(6)
12.2	State why MBFR is a cyclic quadrilateral.	(1)
12.3	Prove that BF = FR.	(3)
		[10]

	EXTRA WORKING SPACE	

	EXTRA WORKING SPACE	