



ALEXANDER ROAD HIGH SCHOOL

NOVEMBER 2023

MATHEMATICS – PAPER 2

2 HOURS

EXAMINER: R. WEBER

MODERATOR: I. CONRADIE

TOTAL: 100

Self-Assessment & Evaluation

Full Name:	
Date:	22 / 11 /2023
Subject:	GRADE 10 MATHEMATICS
Assessment:	Paper 2

Before you start your assessment:

What percentage are you aiming to achieve for this assessment?

On a scale of 1 to 5, how prepared do you feel for this assessment?



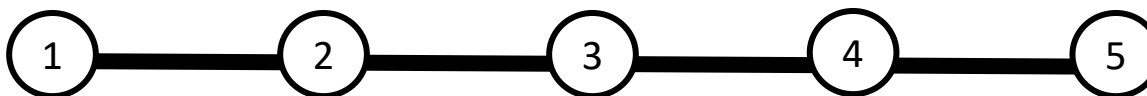
NOT PREPARED

WELL PREPARED

After the assessment:

What percentage did you think you achieved for this assessment?

On a scale of 1 to 5, how well do you feel you prepared for this assessment?



NOT PREPARED

WELL PREPARED

Once the assessment has been marked:

ACTUAL MARK
/100

Teacher Feedback

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GRADE 10
ALEXANDER ROAD HIGH SCHOOL
MATHEMATICS - PAPER 2

NOVEMBER 2023

TIME: 2 HOURS

EXAMINER : R. WEBER

MARKS: 100

Name:	
Teacher Code:	
Date:	22 November 2023

QUESTION	TOTAL MARKS	LEARNER MARK	MODERATED MARK	CHECKED
1	9			
2	5			
3	16			
4	21			
5	13			
6	11			
7	7			
8	13			
9	5			
TOTAL: 100				

INSTRUCTIONS:

- This question paper consists of NINE questions.
- Answer ALL the questions.
- Clearly show ALL calculations, diagrams, graphs, etc. that 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.
- Answers must be rounded off to **2 decimal places**, unless stated otherwise.
- Number your answers according to the numbering system used in this question paper.
- Write in ink, neatly and legibly. Diagrams may be done in pencil.
- An information sheet with formulae is provided below.

FORMULA SHEET

$$A = P(1 + ni)$$

$$A = P(1 + i)^n$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

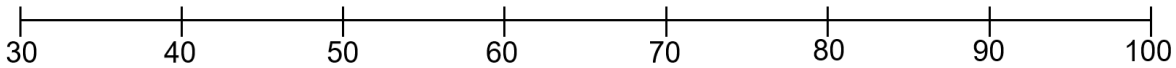
$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

QUESTION 1:

The Alex recycling club collected cans for a period of 23 school days. The number of cans collected each day was recorded and the data is shown below:

48 50 52 59 60 65 68 71
73 76 76 76 77 78 79 80
81 82 82 84 91 92 98

1.1	Determine the median number of cans collected each day.	(1)
1.2	Determine the range of the data.	(1)
1.3	Determine the Interquartile Range (IQR).	(2)
1.4	Draw a box-and-whisker diagram to represent the data.	(3)
		
1.5	The recycling club realises there was a mistake in the records. They actually collected 4 less cans per day. How will this impact the:	
	1.5.1 Range	(1)
	1.5.2 Mean	(1)
		[9]

QUESTION 2:

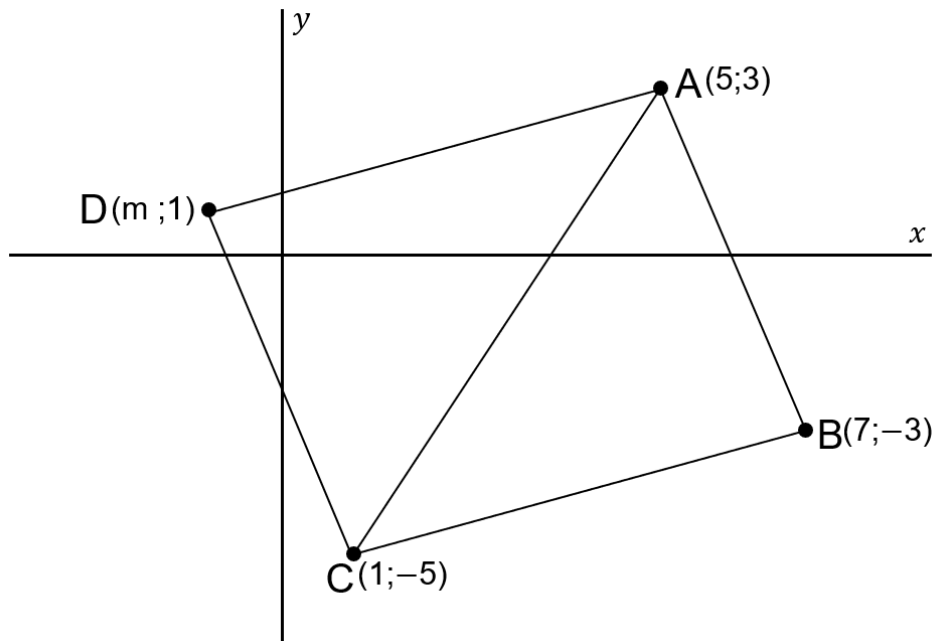
The heights, h , of the learners at Hogwarts High School in a Grade 10 class were measured and recorded as follows:

Height/length (in cm)	No. of learners (f_1)
$120 \leq x < 130$	5
$130 \leq x < 140$	6
$140 \leq x < 150$	11
$150 \leq x < 160$	13
$160 \leq x < 170$	5
Total	40

2.1	Write down the modal class for the data.	(1)
2.2	Determine the estimated mean for the data. Round off your answer to the nearest cm.	(3)
2.3	In which interval would the median of the data lie?	(1)
		[5]

QUESTION 3:

3.1 In the diagram below, $A(5; 3)$, $B(7; -3)$, $C(1; -5)$ and $D(m; 1)$ are the four vertices of a **quadrilateral** in the Cartesian plane.

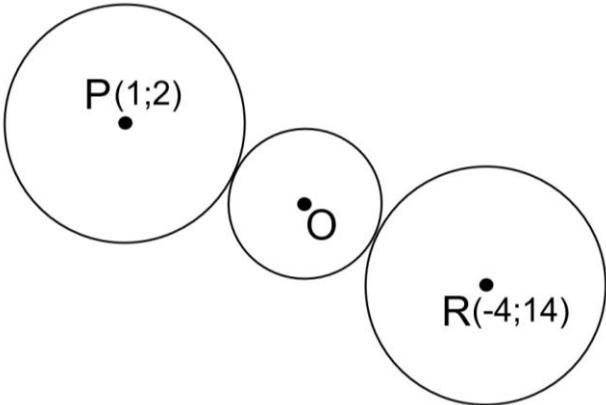


3.1.1 Determine the midpoint of AC. (2)

3.1.2 Determine the gradient of AB. (2)

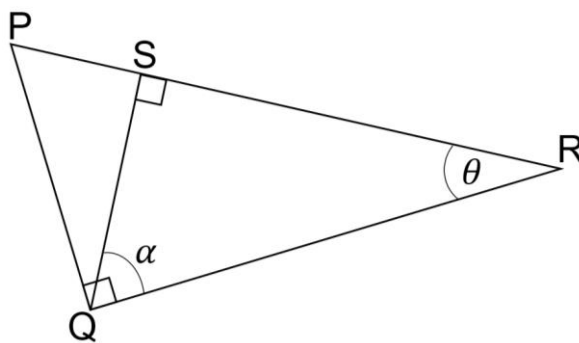
3.1.3 Prove that $AB \perp BC$. (3)

3.1.4	Hence, determine the area of ΔABC .	(4)
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3.1.5	If $AD \parallel BC$, show that $m = -1$.	(2)
	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	

3.2	<p>Two identical circles with centres $P(1; 2)$ and $R(-4; 14)$ touch a third circle with centre O as shown in the diagram below.</p> <p>P, O and R lie on the same straight line.</p>	
		
	Determine the length of the diameter of the third circle, with centre O , if the two identical circles each have a radius of 4,5 units each.	(3)
	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
		[16]

QUESTION 4:

4.1 In the diagram below, ΔPQR is a right-angled triangle. $PQ \perp QR$ and $QS \perp SR$.



4.1.1 Write down a ratio for $\tan \theta$ in the ΔPQR .

(1)

$\tan \theta = \text{———}$

4.1.2 Write down the ratio for $\sec \alpha$.

(1)

$\sec \alpha = \text{———}$

4.2 Given: $\hat{A} = 112,4^\circ$ and $\hat{B} = 48,6^\circ$.

4.2.1 Determine the value of $\sin(A - B)$.

(2)

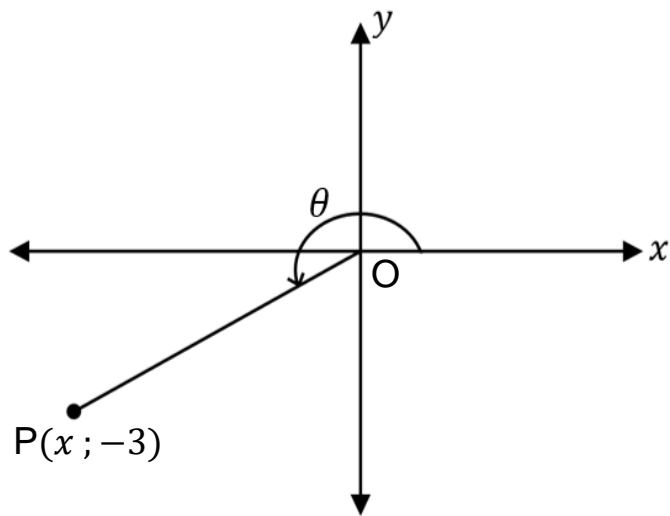
4.2.2 Prove, using a calculator, that $\cos 2A = \cos^2 A - \sin^2 A$.

(3)

Additional space:

4.3	WITHOUT USING A CALCULATOR, simplify as far as possible:		
4.3.1	$\sqrt{3} \sin 60^\circ - \cos 45^\circ \cdot \sin 45^\circ - \sin 90^\circ$	(5)	
	<div style="border: 1px solid black; height: 310px;"></div>		
4.2.2	$\frac{\cos^2(180^\circ + x) \cdot \tan(360^\circ - x)}{\tan(180^\circ - x)}$	(4)	
	<div style="border: 1px solid black; height: 292px;"></div>		
Additional space:			

4.3 In the diagram below, P is a point $(x ; -3)$ in the third quadrant and $OP = 5$ units. θ is the angle from the positive x – axis to OP .



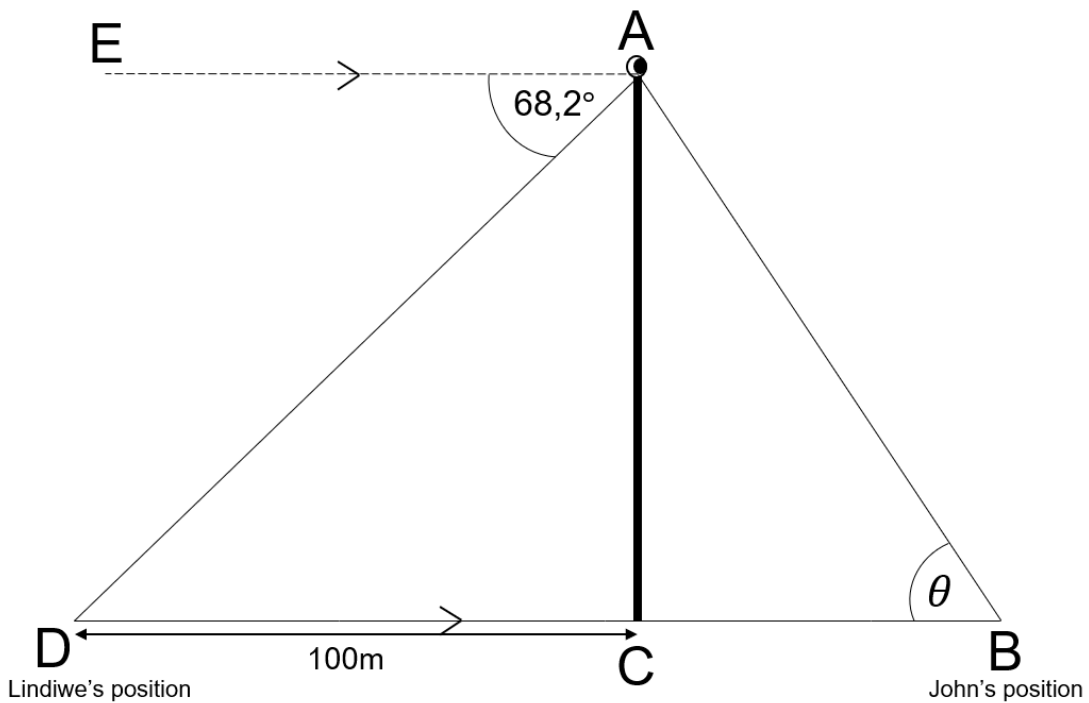
	4.3.1	Determine the value of x .	(2)	
	4.3.2	Calculate the value of $\cot \theta + \sin \theta$ WITHOUT the use of a calculator.	(3)	
				[21]

QUESTION 5:

5.1	Solve for x , where $0^\circ \leq x \leq 90^\circ$. Give your answers correct to TWO decimal places.	
5.1.1	$\operatorname{cosec} x + 1,4 = 3$	(3)

5.1.2	$3\sin(x + 20^\circ) = 2,952$	(3)

5.2 A Grade 10 Science class visited the weather tower as part of a class trip. During the trip Lindiwe (at D) and John (at B) were standing on opposite sides of the tower (AC) as shown in the diagram below. D, C and B lie on the same straight line. Lindiwe was standing 100m away from the base of the tower (C). The angle of depression from E to D is $68,2^\circ$.

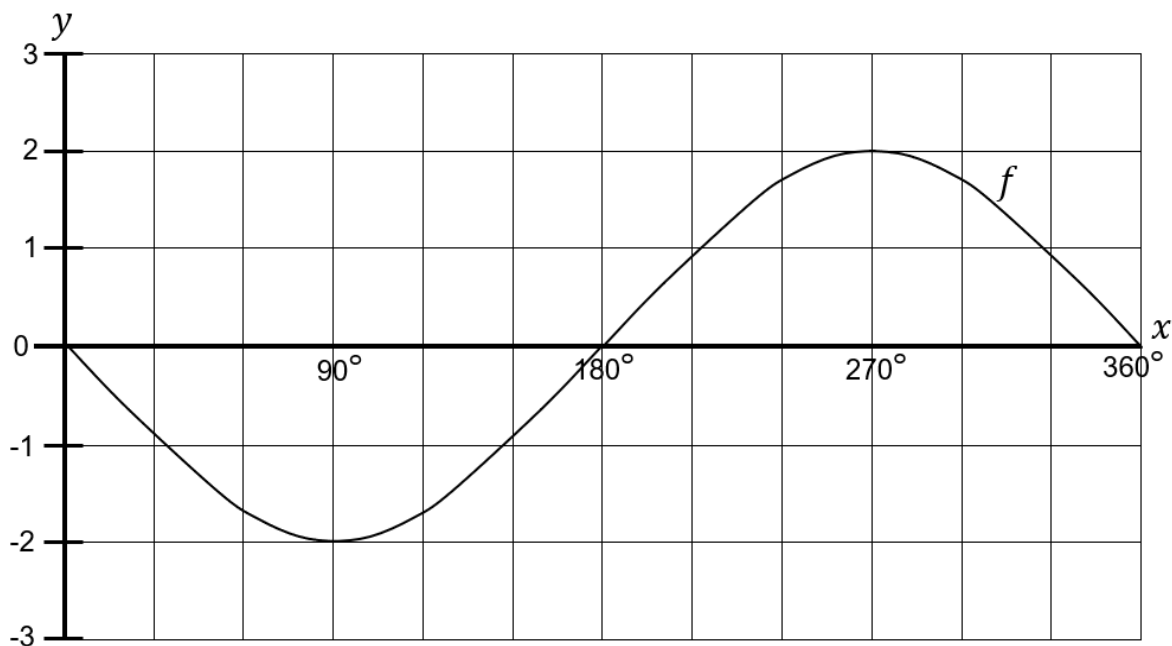


5.2.1	Write down the size of \hat{D} . Give a reason for your answer.	(1)
5.2.2	Calculate the height of the tower, correct to the nearest metre .	(3)

	5.2.3	If the distance DB between John and Lindiwe is 144m, determine the angle of elevation, θ , from John to the top of the tower. Round your answer off to the nearest degree .	(3)
		<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
			[13]

QUESTION 6:

6.1	The graph of $f(x) = -2 \sin x$ is given. Sketch the graph of $g(x) = \cos x + 1$ on the set of axes given below, clearly indicating all turning points and intercepts with axes.	(3)
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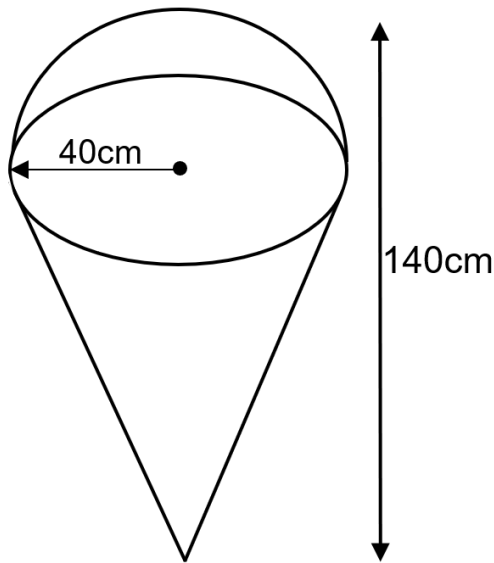


6.2	Write down the amplitude of $f(x)$.	(1)
6.3	Write down the range of $g(x)$.	(2)
6.3	For which value(s) of x is $f(x)$ an increasing function ?	(2)
6.4	For which value(s) of x will $f(x) \cdot g(x) \geq 0$	(2)
6.5	Write down the equation of $h(x)$ if $h(x)$ is the reflection of $f(x)$ about the x – axis and then translated 1 unit upwards.	(1)
		[11]

QUESTION 7:

The model below shape is constructed by using a hemisphere and a cone.

The height of the model is 140 cm and the radius of the hemisphere is 40 cm.



Available Formulae

$$V = \frac{1}{3} \pi r^2 h$$

$$V = \frac{4}{3} \pi r^3$$

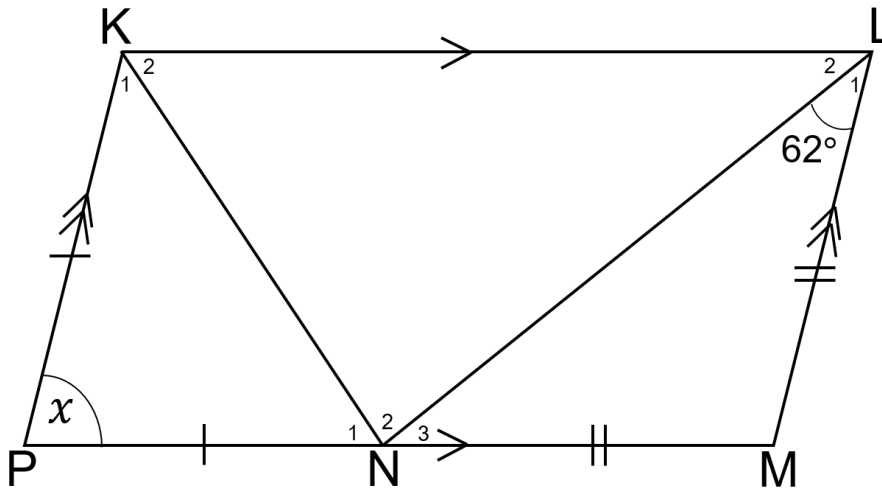
$$SA = \pi r^2 + \pi r s$$

$$SA = 4\pi r^2$$

7.1	Calculate the volume of the model in cm ³ .	(3)
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7.2	Calculate the total exterior surface area of the model in cm ² .	(4)
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		[7]

QUESTION 8:

8.1 In the diagram below, **KLMP** is a parallelogram.
 $LM = MN$, $KP = PN$, $\hat{L}_1 = 62^\circ$ and $\hat{P} = x$.



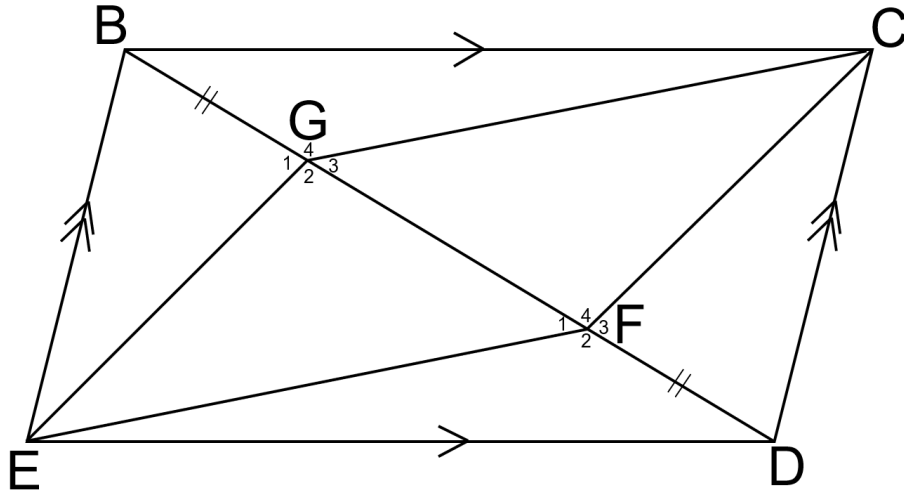
8.1.1 Calculate the value of x .

(3)

8.1.2 Show through calculation that $\triangle KNL$ is a right-angled triangle.

(4)

8.2 In the diagram below, BCDE is a parallelogram and $BG = FD$.



8.2.1 Prove that $\triangle BGE \cong \triangle DFC$.

(3)

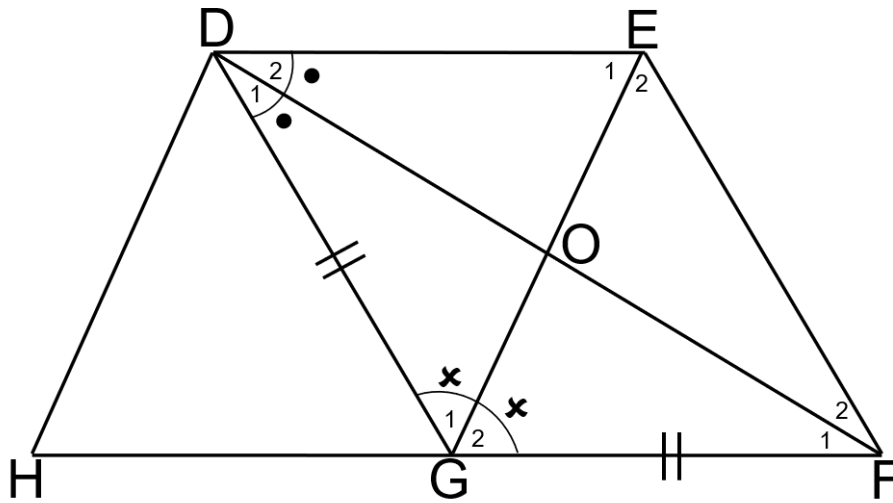
8.2.2 Hence, or otherwise, prove that $EG \parallel FC$.

(3)

[13]

QUESTION 9:

In the diagram below, $\widehat{D}_1 = \widehat{D}_2$, $\widehat{G}_1 = \widehat{G}_2$ and $DG = GF$.



9.1 Prove that DEFG is a parallelogram.

(5)

[5]

