HILLCREST HIGH SCHOOL

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INTERNAL ASSESSMENT

GRADE 10

MATHEMATICS
PAPER 2
November 2022

MARKS : **100** **TIME : 2 Hours**

NAME : _____

Circle or Highlight your teacher

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ALBOROUGH (M)	OOSTHUYZEN	REUBEN

This question paper consists of 14 pages and 1 information sheet.

Question	Q1	Q2	Q3	Q4	Q5	Q6	Total
Total	18	11	21	20	22	8	100
Mark							
Moderated							

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions

1. This assignment consists of 6 questions and 14 pages.
2. Read the questions carefully.
3. Answer ALL the questions in the space provided.
4. Number your answers exactly as the questions are numbered.
5. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
6. Answers only will NOT necessarily be awarded full marks.
7. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
9. Diagrams are NOT necessarily drawn to scale.
10. Write neatly and legibly.
11. An information sheet with formulae is included at the end of the question paper.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

QUESTION 1

1. **STATISTICS**

1.1. The following Mathematics test marks of a Grade 10 class are recorded below:-

45	49	50	51	52	55	56	58	59	60
64	66	70	71	73	74	76	82	88	

1.1.1. Write down the median mark for this class (1)

_____

1.1.2. Calculate the interquartile range mark of this class (3)

_____

_____

_____

_____

1.1.3. Represent this data on a box and whisker diagram. (3)

1.2. A choir teacher kept a record of the number of learners who attended her practices during the year. Where x is the number of learners at a practise.

Interval	Frequency (f)	Midpoint (X)	fX
$0 < x \leq 10$	2	5	10
$10 < x \leq 20$	8		
$20 < x \leq 30$	15		
$30 < x \leq 40$	27		
$40 < x \leq 50$	11		
$50 < x \leq 60$	7		
Totals			

1.2.1. Complete the table above (4)

1.2.2. How many practices where there in total? (1)

_____

1.2.3. Calculate an estimate of the mean number of learners at practice. (3)

_____

_____

_____

_____

1.2.4. In which interval does the

1.2.4.1. Median lie? (1)

_____

1.2.4.2. 80^{th} percentile lie? (2)

_____

_____

_____

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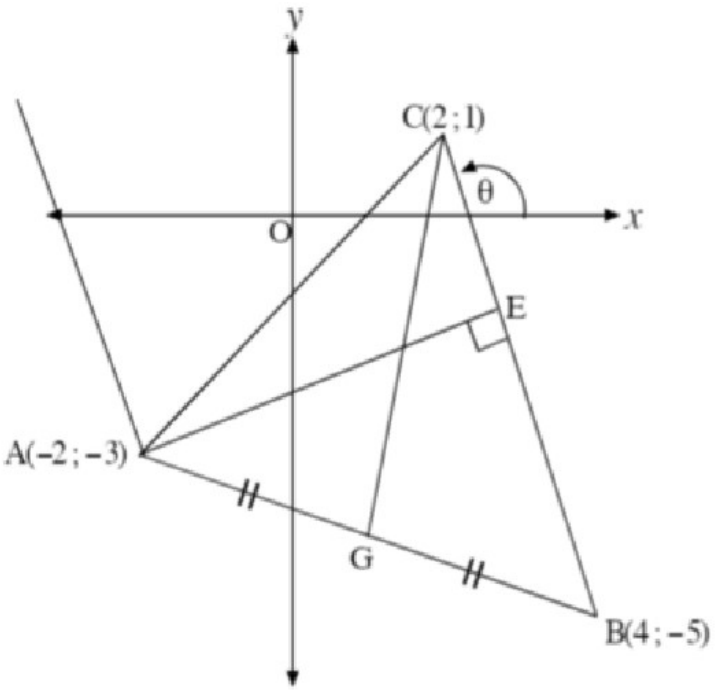
QUESTION 2

2. **ANALYTICAL GEOMETRY**

2.1. In the diagram, $A(-2;-3), B(4;-5)$ and $C(2;1)$ are vertices of a triangle in a Cartesian plane. CG is a line such that $AG = GB$ and $AE \perp BC$



2.1.1. Calculate the coordinates of G, the midpoint of AB. (2)

2.1.2. Calculate the length of CG. Leave your answer in surd form. (2)

2.1.3. Determine the gradient of line BC. (2)

2.1.4. Determine the equation of the straight-line AE. (3)

2.1.5. Determine the coordinates of Point S (not shown) so that parallelogram ACBS is formed. (2)

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QUESTION 3

3. **TRIGINOMETRY**

3.1. If $\beta = 38.7°$ and $\alpha = 128.9°$, determine the following correct to two decimal places :-

3.1.1. $Sec\ \beta + \sin\alpha$ (2)

3.1.2. $\cos^2(\beta + \alpha)$ (2)

3.2. Calculate θ in each of the following correct to two decimal places, showing all working.

3.2.1. $2\cos\theta = 0.76$ (2)

3.2.2. $3\tan(2\theta - 15) = 8$ (4)

3.3. Simplify fully, WITHOUT the use of a calculator, showing all working.

3.3.1. $4\cos^2 45° + \tan 30°.\sin 60°$ (3)

3.4. Given that $13\cos\theta = 5$ and $\theta \in \{180°; 360°\}$. With the aid of a diagram and WITHOUT the use of a calculator, determine the value of :-

Space for Diagram

3.4.1. $\sin\theta$ (3)

3.4.2. $\sec\theta + \tan\theta - 1$ (3)

3.4.3. Hence, prove that $\sin^2\theta + \cos^2\theta = 1$ (2)

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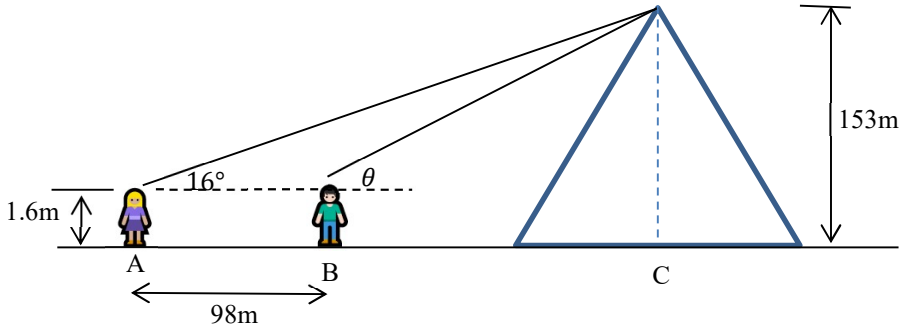
QUESTION 4

4. **2D PROBLEMS AND TRIG FUNCTIONS**

4.1. The Great Pyramid at Giza is 153m high. Two people A and B are looking at the top of the pyramid the angle of elevation of the top of the pyramid from A is 16°. The distance between A and B is 98m.



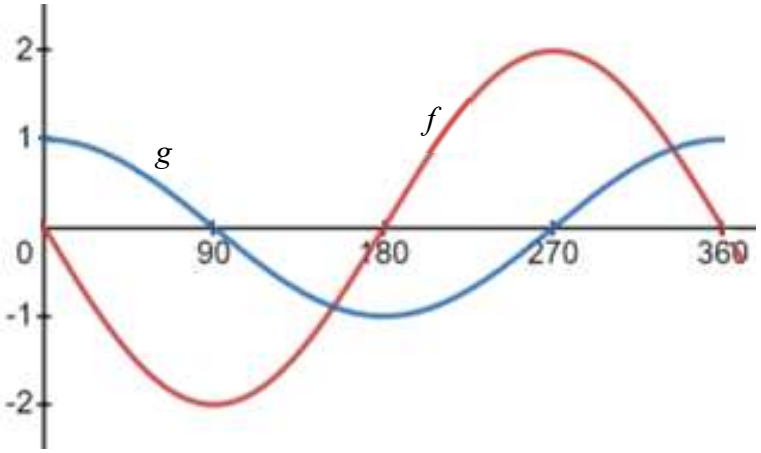
If both A and B are 1.6m tall, calculate :-

4.1.1. The distance on the ground from A to the centre of the base of the pyramid, indicated as point C. (round off to the nearest unit) (4)

4.1.2. Hence, calculate the distance BC. (2)

4.1.3. The angle of elevation θ, of the top of the pyramid from B. (3)

4.2. The diagram below represents the graphs of $f\ (x)\ =\ a\ sin\ x$ and $g\ (x)\ =\ b\ cos\ x$ for $x\ \epsilon[0°\ ;\ 360°]$.



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

_____

4.2.2. For which value(s) of x will g be increasing? (2)

_____

4.2.3. What is the amplitude of f ? (1)

_____

4.2.4. What is the range of g? (2)

_____

4.2.5. Determine the equation of $k(x)$ if $k(x)\ =\ 2f(x)-\ 2$, and then state the range of $k(x)$. (3)

_____

_____

4.2.6. State ONE value for which value(s) of x is $f\ (x)\ -\ g\ (x)\ =\ 2$ (1)

_____

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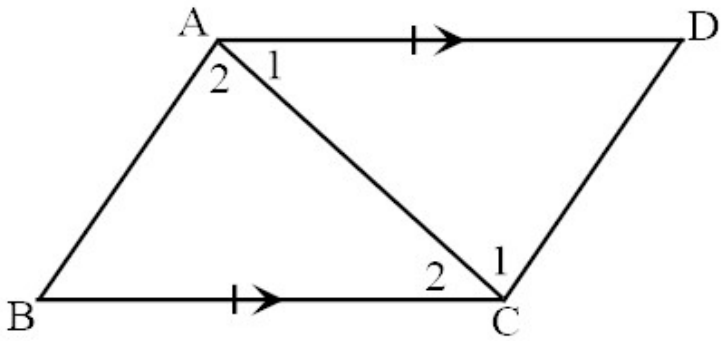
QUESTION 5 **NB <u>ALL REASONS HAVE TO BE GIVEN FOR THIS QUESTION</u>

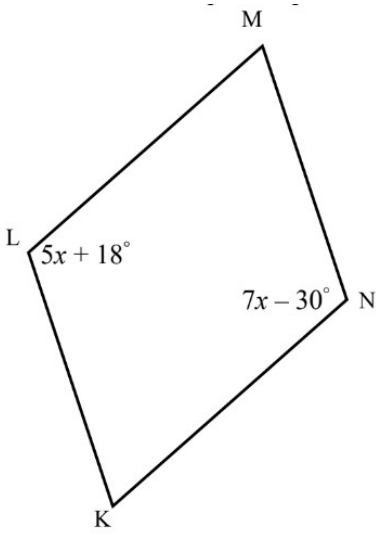
5. **EUCLIDEAN**

5.1. Given parallelogram ABCD with diagonal AC and $AD = BC$ and $AD//BC$.



Prove that the $\hat{B} = \hat{D}$ and $\hat{A} = \hat{C}$. (4)

5.2. In the diagram below, KLMN is a parallelogram with $\widehat{N} = 7x - 30°$ and $\hat{L} = 5x + 18°$.



5.2.1. Calculate the value of x. (3)

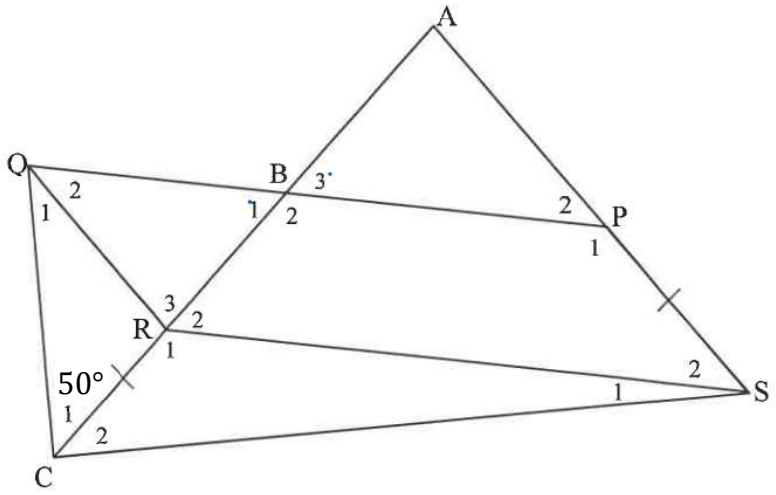
5.2.2. If it is further given that $L\widehat{K}N = 3y$, determine the value of y. (3)

5.3. Complete the following statement for ΔABC : (*Hint : draw a sketch)

If D is a point on AB and E is a point on AC such that $AD = DB$ and $DE \parallel BC$, then _____ (2)

_____

5.4. 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 $BP = 60mm$.



5.4.1. Give a reason why $PS = QR$ and $PS \parallel QR$ (1)

_____

5.4.2. Hence, calculate the size of angle $\hat{A}$ (5)

_____

_____

_____

_____

_____

5.4.3. Determine the length of QP. (3)

_____

_____

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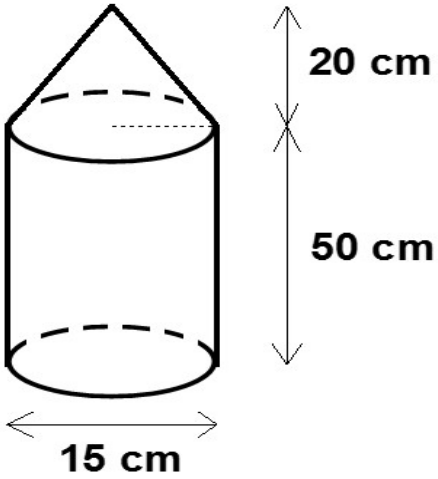
QUESTION 6

6. **MEASUREMENT**

6.1. A time capsule is made up of a cone and a cylinder. The diameter of the cylinder is 15 cm. The height of the cone is 20 cm and the height of the cylinder is 50 cm.



6.1.1. Calculate the volume of the capsule. (3)

6.1.2. Calculate the total surface area of the solid. (5)

[8]

TOTAL **[100]**