

Hillcrest High School

Grade 10

MATHEMATICS P2
NOVEMBER 2024

MARKS: 100

TIME: 2 Hours

EXAMINER: Mr M.L Mthanti

MODERATOR: Mrs D Knight

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions and 9 pages.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and nongraphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.

QUESTION 1

1.1 A tuck shop at a particular school sells soft drink cans. The economic friendly club of this school collected soft drink cans for recycling for a period of 20 days. The number of cans collected was recorded and the data is given below:

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

- 1.1.1 Determine the median of the cans collected. (1)
- 1.1.2 Calculate the interquartile (IQR) range of the data. (3)
- 1.1.3 Draw a box and whisker diagram. (3)
- 1.1.4 Comment on the skewness of the data. (2)

1.2 Vodacom conducted a survey regarding the duration of telephone calls made by people in a certain community. The information was then tabulated as indicated below:

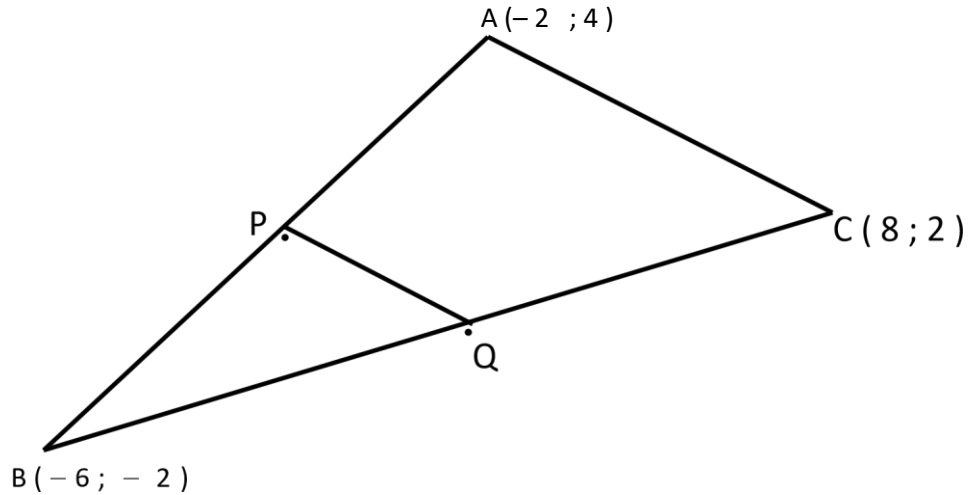
Duration (min)	No of calls (f)	Midpoint (x)	$(f) \times (x)$
$2 \leq t < 5$	47	3,5	164,5
$5 \leq t < 8$	139	6,5	903,5
$8 \leq t < 11$	211	9,5	2004,5
$11 \leq t < 14$	102	12,5	1275
$14 \leq t < 17$	58	15,5	899
$17 \leq t < 20$	19	A	B

- 1.2.1 Calculate the values of **A** and **B**. (2)
- 1.2.2 Determine the approximate mean for the duration of the telephone calls. (3)
- 1.2.3 In which interval does the 75th percentile lie? (2)

[16]

QUESTION 2

In the diagram below, the coordinates of $\triangle ABC$ are given as $A(-2; 4)$, $B(-6; -2)$ and $C(8; 2)$. P and Q are the midpoints of AB and BC respectively.

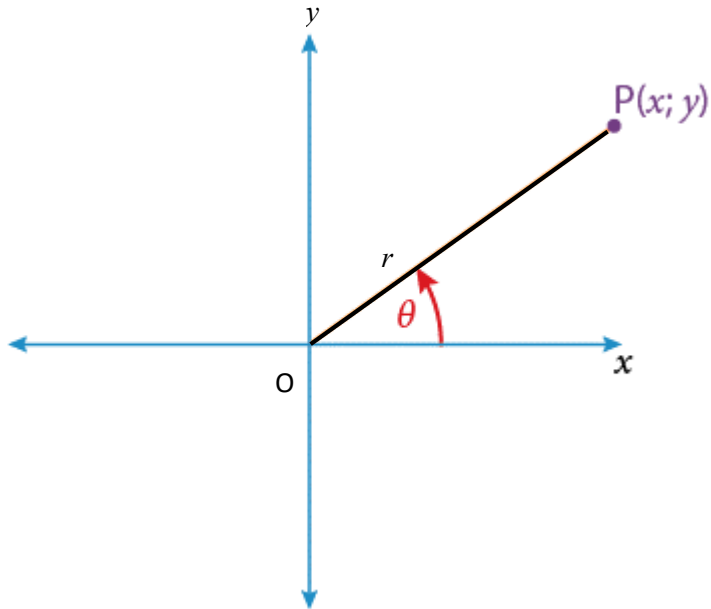


- 2.1 Calculate the length of AB (2)
- 2.2 Calculate the coordinates of P and Q . (4)
- 2.3 Show that:
- 2.3.1 $PQ \parallel AC$ (4)
- 2.3.2 $PQ = \frac{1}{2}AC$ (4)
- 2.4 Calculate, to two decimal places, the perimeter of $\triangle ABC$. (4)

[18]

QUESTION 3

3.1 If point $P(x; y)$ is a point on the Cartesian plane and $OP = r$ units.



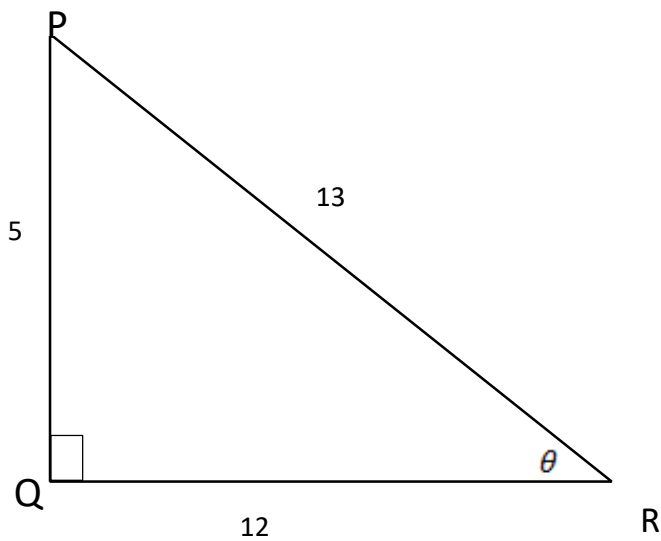
Determine the following:

3.1.1 $\sin\theta$ (1)

3.1.2 $\operatorname{cosec}\theta$ (1)

3.2 In ΔPQR , $\hat{Q} = 90^\circ$ $\hat{R} = \theta$; $PQ = 5$ units, $QR = 12$ units and $PR = 13$ units.

Determine the following:



3.2.1 $\sin\theta$ (1)

$$3.2.2 \quad 3\sec^2\theta + \tan\theta \quad (2)$$

[5]

QUESTION 4

4.1 If $x = 42^\circ$ and $y = 68^\circ$, by using a calculator, determine the value of:

$$4.1.1 \quad \sin x + 2\cos 3y \quad (2)$$

$$4.1.2 \quad 3\tan^2(x+y) \quad (2)$$

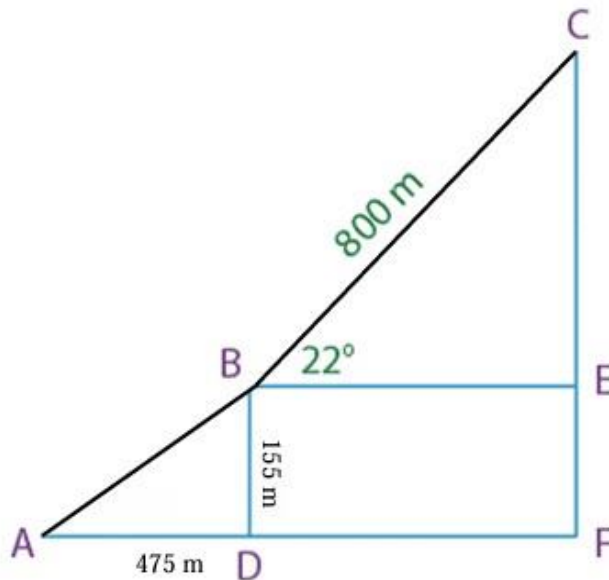
4.2 Determine the value of θ , if $\theta \in 0^\circ \leq \theta \leq 90^\circ$, correct to 3 decimal places.

$$4.2.1 \quad 2\sin\theta = 1,432 \quad (2)$$

$$4.2.2 \quad \tan 3\theta = 6,345 \quad (3)$$

[9]

4.3 In the diagram below BDFE is a rectangle with $BD = 155$ m. $AD = 475$ m and $BC = 800$ m. The angle of elevation from B to C is 22° .



Calculate:

$$4.3.1 \quad \hat{A} \quad (2)$$

$$4.3.2 \quad CF \quad (3)$$

4.4 **Without the use of a calculator**, calculate the value of the following:

$$4\cos^2 60^\circ + \tan 30^\circ \cdot \sin 60^\circ \quad (5)$$

[19]

QUESTION 5

If $4\tan\theta = -3$ and $\theta \in [90^\circ; 270^\circ]$, with the aid of a diagram calculate the value of :

5.1.1 $3\cot\theta + 5\sin\theta$

(5)

5.2 Given: $f(x) = 2\tan x$
 $g(x) = \cos x + 1$

5.2.1 Sketch the graphs of f and g on the same set of axes on the ANSWER SHEET For $x \in [0^\circ; 360^\circ]$].

(5)

5.2.2 Write down the amplitude of g .

(1)

5.2.3 What is the period of f ?

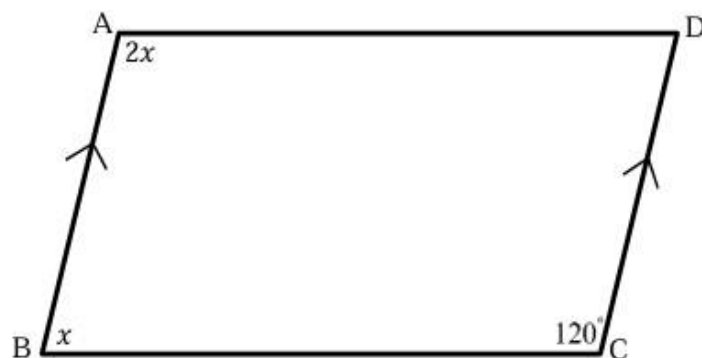
(1)

5.2.4 Write down the range of g

(2)

[14]**QUESTION 6**

In the diagram below quadrilateral ABCD, $AB \parallel CD$; $\hat{A} = 2x$; $\hat{B} = x$ and $\hat{C} = 120^\circ$.



6.1.1 Prove that $AD \parallel BC$.

(4)

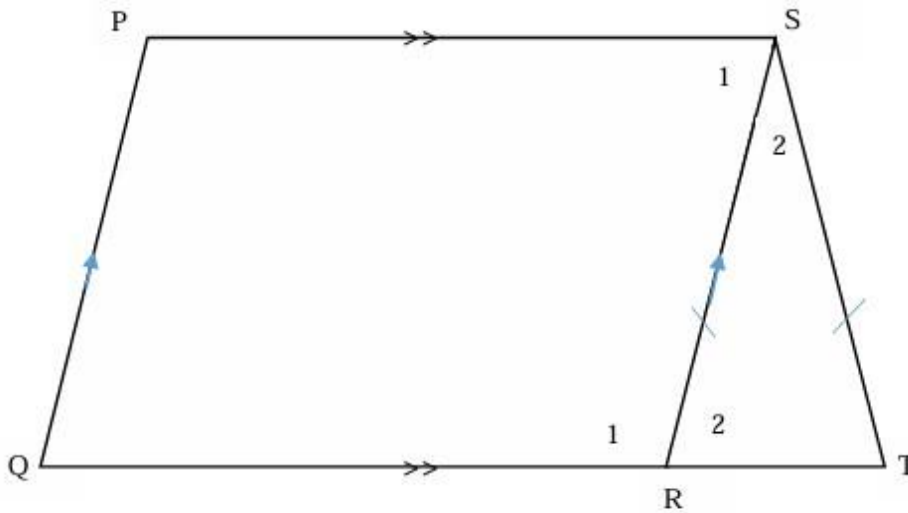
6.1.2 What type of quadrilateral is ABCD? Give a reason for your answer.

(2)

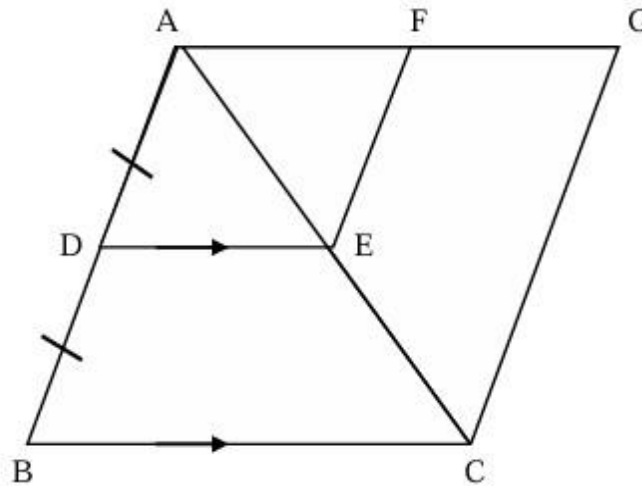
6.2 PQRS is a parallelogram, $SR = ST$ and $\hat{P} = 120^\circ$.

$S_2 = 4x$, Calculate the value of x .

(4)



6.3 In the diagram below, D is the midpoint of AB and $DE \parallel BC$.



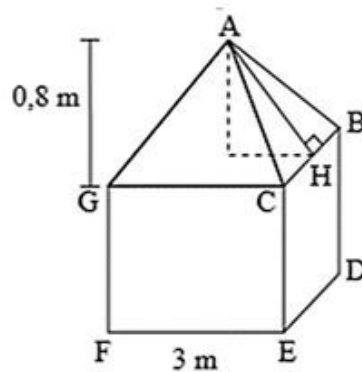
6.3.1 Give a reason why E is the midpoint of AC. (1)

6.3.2 If it is further given that F is the midpoint of AG, ADEF is a parallelogram and that $BD = \sqrt{32}$, determine the length of CG. (5)

[16]

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 meters 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.

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

- 7.2.1 Calculate the volume of metal used to make this ball. Give your answer 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]

TOTAL=[100]