Hillcrest High School

Grade 11

MATHEMATICS P2

NOVEMBER 2025

MARKS: 150

TIME: 3 Hours

EXAMINER: Mr M. Mthanti

MODERATOR: Mrs L. Janssens

NAME OF LEARNER: _____

NAME OF TEACHER:

JANSSENS	MBUYAZI	MTHANTI	REUBEN	WOODROW

Q	1	2	3	4	5	6	7	8	9	10
Mark										
Moderator										

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. This question paper consists of 23 pages. Please check that your question paper is complete.
2. Read all questions carefully and pay attention to the mark allocation of each.
3. Answer all questions on the question paper in the spaces provided.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless otherwise stated.
7. If necessary, round off your answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Write neatly and legibly.

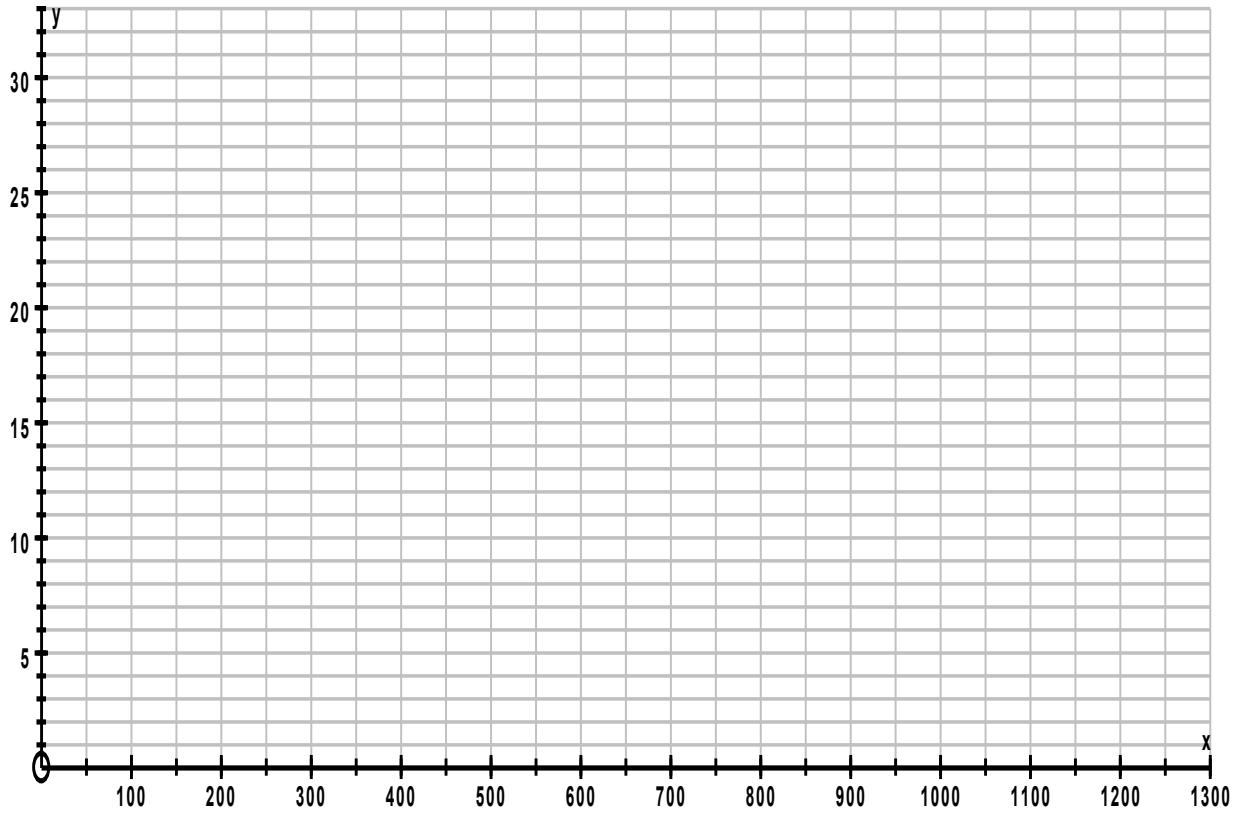
QUESTION 1

30 Grade 11 learners worked during the August holidays. The table below shows the distribution of the amount of money earned by each of them:

1.1 Complete the cumulative frequency column in the table below: (2)

Money earned	*Number of learners*	*Cumulative frequency*
$500 < x \leq 600$	1	
$600 < x \leq 700$	2	
$700 < x \leq 800$	3	
$800 < x \leq 900$	4	
$900 < x \leq 1000$	10	
$1000 < x \leq 1100$	7	
$1100 < x \leq 1200$	3	

1.2 Hence, draw a cumulative frequency ogive on the grid below: (3)



1.3 Use the ogive to estimate the percentage of learners who earned more than R1 000. (2)

1.4 Write down the modal class of the data. (1)

1.5 Calculate the interquartile range and show on the graph where you read your values from. (3)

1.6 Describe the skewness of the distribution. Justify your answer in terms of the mean and median. (2)

[13]

QUESTION 2

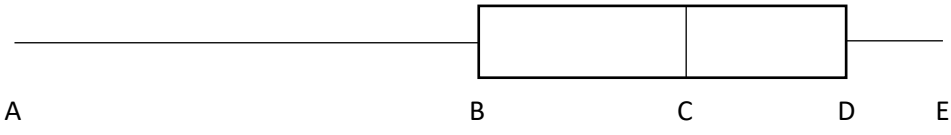
2.1. The table below shows the distances, sorted by stage length in kilometres, of the 21 stages of the 106th Tour de France, held during July 2019 (https://www.letour.fr/en/).

Stage	Dist. (km)	Stage	Dist. (km)
13	27,2	15	185
2	27,6	1	194,5
14	117,5	8	200,0
19	126,5	17	200
21	128	18	208
20	130	12	209,5
6	160,5	4	213,5
11	167,0	3	215,0
9	170,5	10	217,5
5	175,5	7	230,0
16	177		

2.1.1. Calculate the mean stage distance. (2)

2.1.2. Calculate the standard deviation of the stage distances. (2)

2.1.3. The box-and-whisker for the data above is shown below. Write down the values for each of A to E.

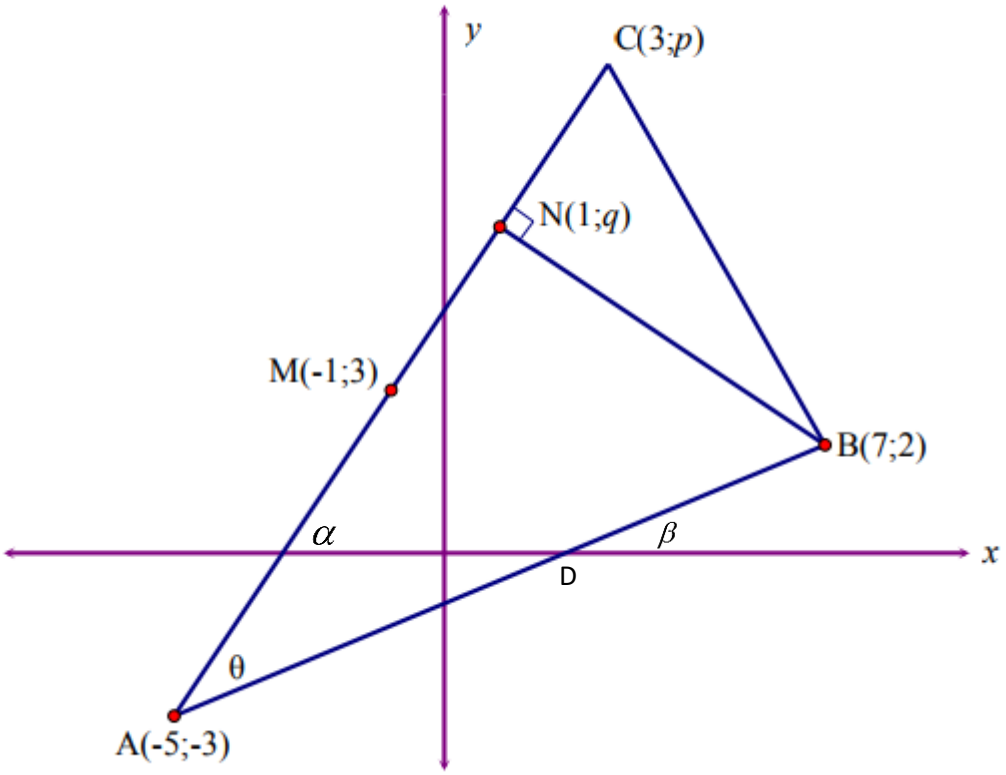


(5)

[9]

QUESTION 3

Refer to the sketch below, showing points $A(-5;-3)$, $B(7;2)$ and $C(3;p)$ as the vertices of ΔABC on the Cartesian plane. $BN \perp AC$, $M(-1;3)$ is the midpoint of AC and N is the point $N(1;q)$:



3.1 Show that $p = 9$. (3)

3.2 Calculate the gradient of AB. (2)

3.3 Determine the equation of AB and the coordinates of D. (5)

3.4 Calculate the length of AC. (Leave your answer in simplest surd form) (2)

3.5 Find q if it is given that $NB = 2\sqrt{13}$. (3)

3.6 Calculate the area of ΔABC. (2)

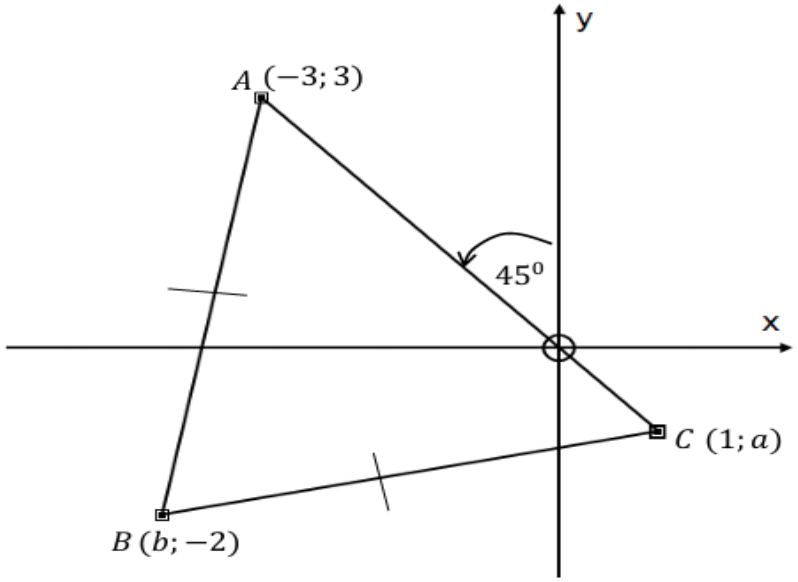
3.7 Calculate the size of angle θ correct to 1 decimal place. (4)

3.8 Determine the coordinates of P(x; y) so that the quadrilateral *ABMP* is a parallelogram (2)

[23]

QUESTION 4

Given ΔABC, with $A(-3;3)$, $B(b;-2)$, $C(1;a)$ and $Y\hat{O}A = 45^0$.



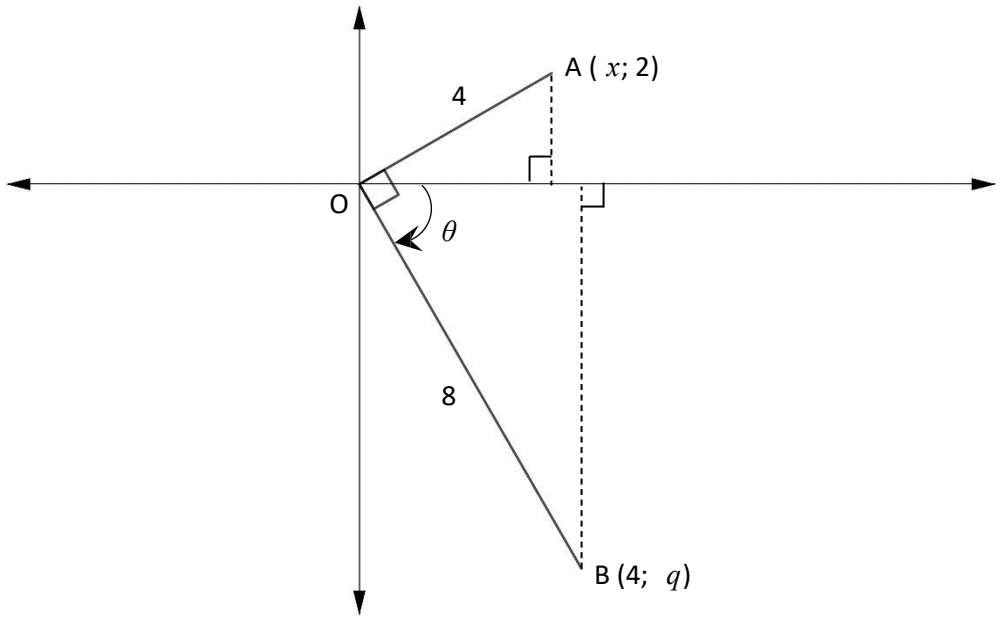
4.1.1 Show that C$(1;-1)$ (4)

4.1.2 If it is given that AB = BC, determine the value of **b**. (4)

[8]

QUESTION 5

5.1. In the diagram below, OA = 4, OB = 8 and $X\hat{O}B = \theta$. OA $\perp$ OB .



5.1.1. Calculate the value of x (express your answer in simplest surd form). (2)

5.1.2. Determine the value of θ. (2)

5.1.3. Determine the value of q (express your answer in simplest surd form). (2)

5.2. Given $\sin 36° = t$, express each of the following in terms of t by making use of a suitable diagram.

5.2.1. $\sin 144°$ (3)

5.2.2. $\sin 234°$ (2)

5.3. Simplify the following to a single trig ratio of θ

$$\frac{\sin(180°-\theta)-2\cos(90°-\theta).cos\theta}{2cos^2(360+\theta)-\cos(-\theta)}$$ (8)

5.4 Given the following identity: $\frac{cosx-sinx}{1-tanx} = cosx$

5.4.1 Prove the identity (4)

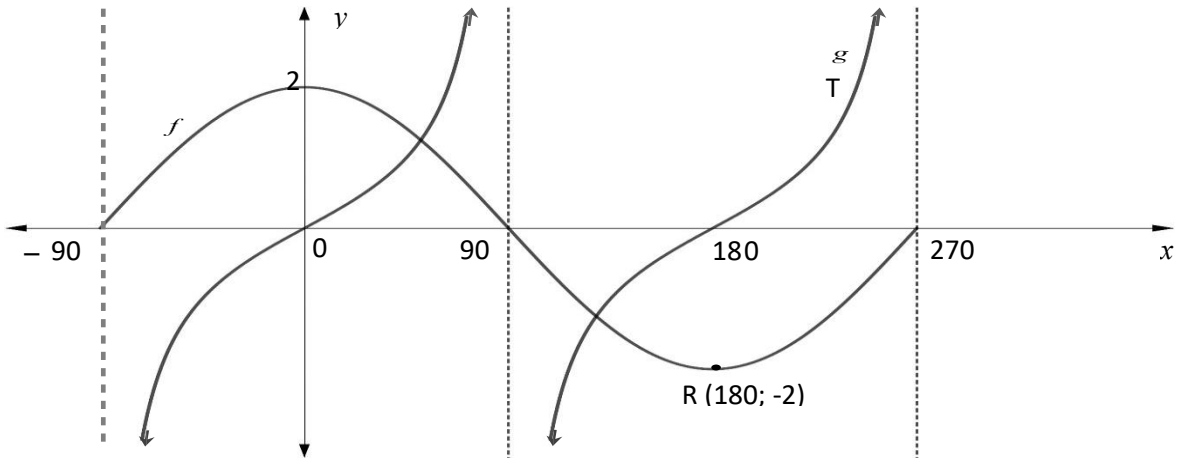
5.4.2. For which values of x is the identity undefined? (2)

5.5. Determine the general solution of: $3sin\beta = 2cos\beta$. (4)

[29]

QUESTION 6

The diagram below shows the graphs of $f(x) = a\cos x$ and $g(x) = \tan x$, for $x \in [-90° ; 270°]$.



6.1. Write down the value of a. (1)

6.2. Write down the range of f. (2)

6.3. Write down the period of g. (1)

6.4. Graph h is obtained by shifting graph f 90° to the right followed by a vertical shift of 2 units upwards.

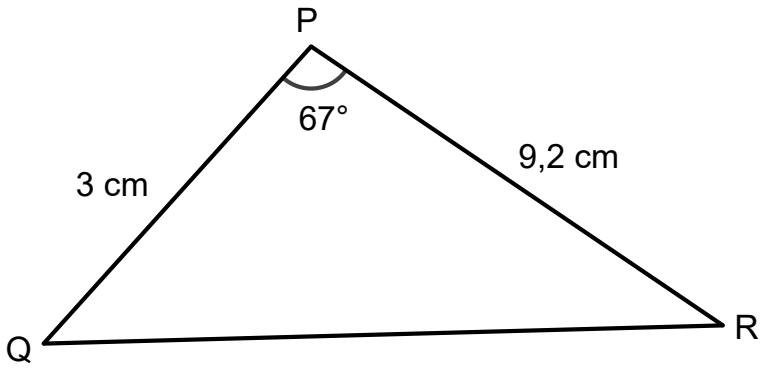
6.4.1. Write down the equation of h, in simplest form. (2)

6.4.2 Hence write down the coordinates of P, the image of R under this transformation. (2)

[8]

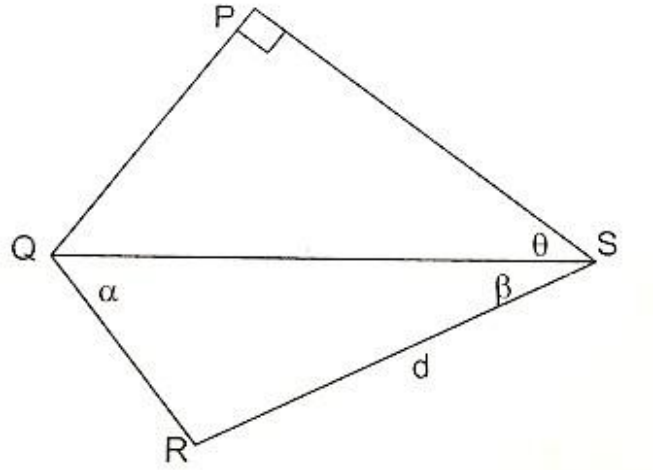
QUESTION 7

In the diagram below, $\hat{P} = 67°$, $PQ = 3$ cm and $PR = 9,2$ cm:



7.1 Determine the length of QR. (3)

7.2 Use the diagram below and answer the following questions giving reasons where necessary.



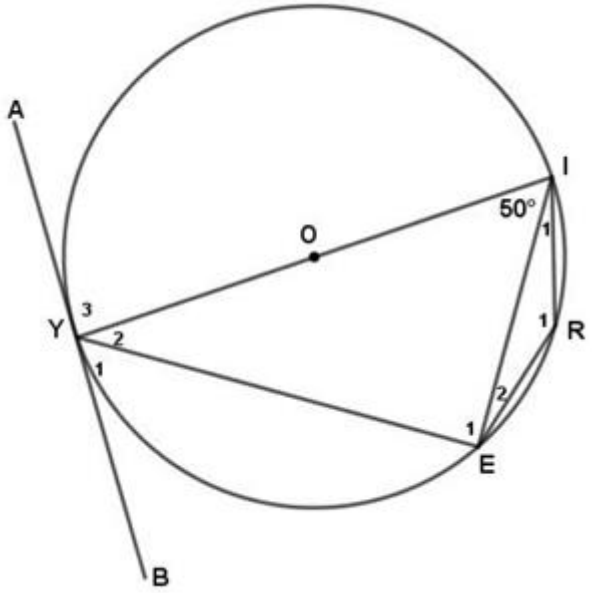
7.2.1 Determine $\hat{R}$ in terms of α and β. (2)

7.2.2 Prove that $PS = \frac{d\ sin(\alpha+\beta)\ cos\ \theta}{sin\alpha}$ (5)

[10]

QUESTION 8

In the diagram O is the centre of the circle.YÎE is 50°and AYB is a tangent.



81. Determine with reasons, the size of the following.

8.1.1 $\widehat{Y_1}$ (2)

8.1.2 $\widehat{E_1}$ (2)

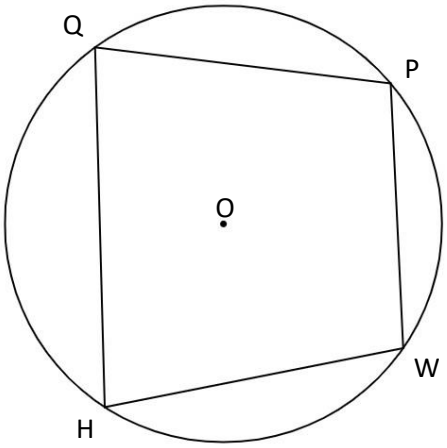
8.1.3 $\widehat{Y_3}$ (2)

8.1.4 $\widehat{Y_2}$ (2)

8.1.5 $\widehat{R_1}$ (2)

8.2 In the diagram below, O is the centre of the circle and QPWH is a cyclic quadrilateral.

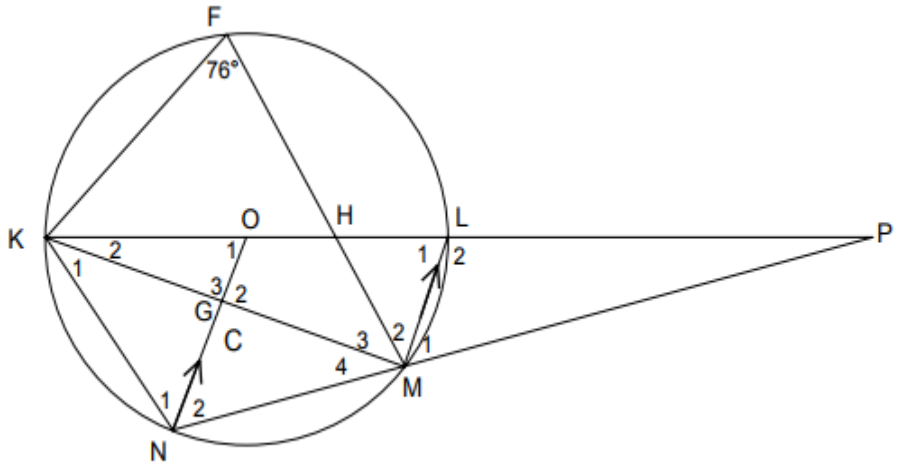
Prove the theorem which states that $\widehat{Q} + \widehat{W} = 180°$. (5)



[15]

QUESTION 9

Refer to the diagram below. O is the centre of the circle and diameter KL is produced to meet chord NM produced at P. ON//LM and $\hat{F} = 76°$:



Calculate the size of the following angles, giving reasons:

9.1.1 $\hat{L}_1$ (2)

9.1.2 $\hat{O}_1$ (2)

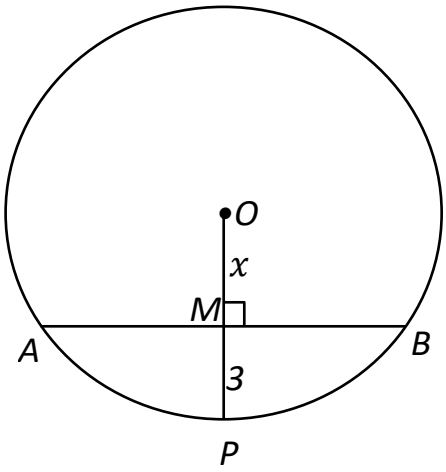
9.1.3 $\hat{M}_4$ (2)

9.1.4 $\hat{N}_1 + \hat{N}_2$ (2)

9.1.5 $\hat{M}_1$ (4)

9.1.6 Prove that $KG = GM$ (4)

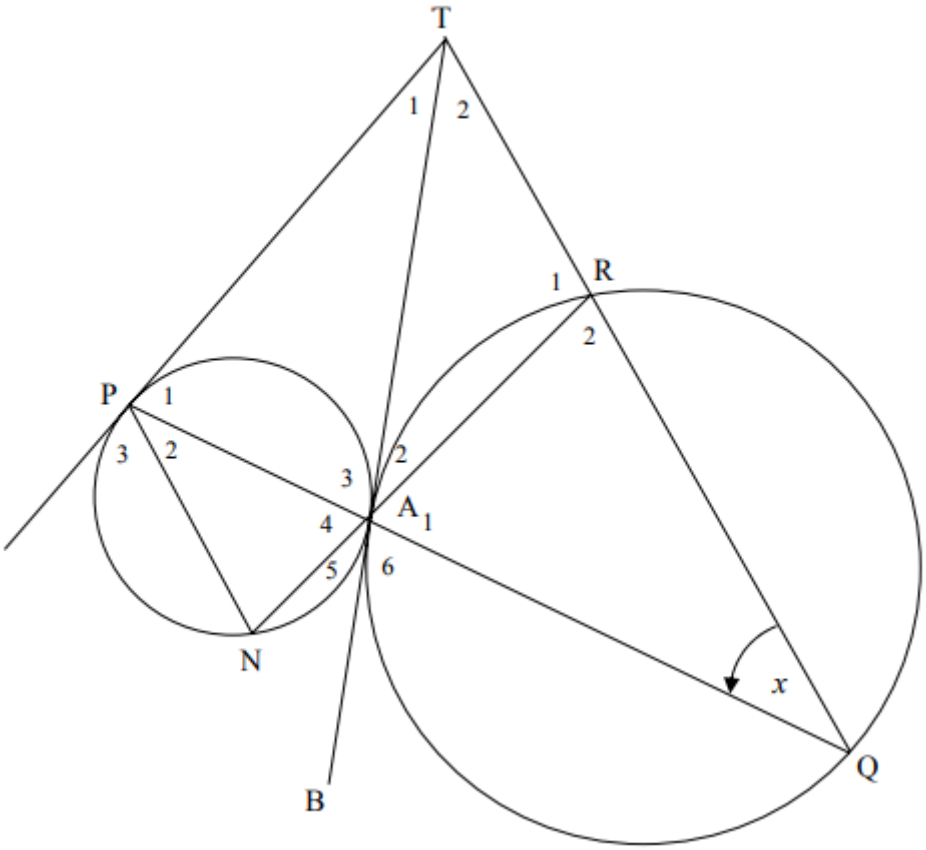
9.2 In the diagram, AB is a chord of a circle with centre O.$OMP \perp AB$, $AB = 14$, $MP=3$ and $OM = x$. Determine, with reasons, the length of the radius of the circle. (5)



[21]

QUESTION 10

In the diagram below, two circles have a common tangent TAB. PT is a tangent to the smaller circle. PAQ, QRT and NAR are straight lines. Let $\hat{Q} = x$:



10.1 Name, with reasons, THREE other angles equal to x. (6)

10.2 Prove $TQ//PN$. (2)

10.3 Prove APTR is a cyclic quadrilateral. (6)

[14]

TOTAL=150

ADDITIONAL SPACE: