Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sport Ontwikkeling
Lefapha la Thuto le Tlhabololo ya Metshameko
NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P2

MID-YEAR EXAMINATION 2018

MARKS: 100

TIME: 2 hours

This question paper consists of 8 pages and 3 diagram sheets.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 6 questions.
2. AnswerALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper
4. Clearly show ALL calculations, diagrams, graphs, et cetera 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 stated otherwise.
7. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.

10. Write neatly and legibly.

QUESTION 1

1.1 $A(-1;-1)$, $B(2;0)$ and $C(5;p)$ are three points in a Cartesian plane.

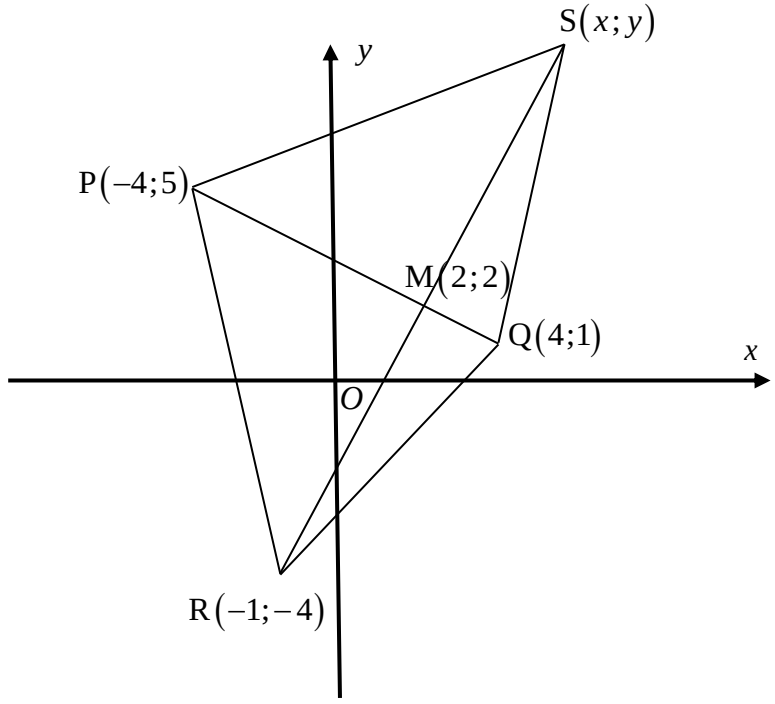
Determine the value(s) of p if:

1.1.1 A, B and C are collinear. (2)

1.1.2 AB is perpendicular to BC. (3)

1.1.3 the length of BC is 5 units. (3)

1.2 In a diagram $P(-4;5)$, $Q(4;1)$ and $R(-1;-4)$ are the vertices of a triangle in the Cartesian plane with M on PQ. $M(2;2)$ is the midpoint of straight line RS.



1.2.1 Determine the gradient of PQ. (2)

1.2.2 Show that $P\hat{M}S = 90°$ (3)

1.2.3 Determine the coordinates of S. (3)

1.2.4 Prove that ΔQRS is isosceles. (3)

1.2.5 Determine the area of ΔPRS. (5)

[24]

QUESTION 2

2.1 Given: $17\sin\alpha - 15 = 0$ and $90° < \alpha < 270°$

With the aid of a sketch and without using a calculator, determine:

2.1.1 $\tan\alpha$ (3)

2.1.2 $\cos(\alpha - 180°)$ (2)

2.2 If $\tan 70° = p$, write the following in terms of p:

2.2.1 $\tan 110°$ (2)

2.2.2 $\sin 290°$ (3)

2.3 Simplify the following without using a calculator:

$$\frac{\sin 150°.\tan 225°}{\sin(-30°).\sin 420°}$$ (6)

[16]

QUESTION 3

3.1 Simplify without using a calculator:

$$\frac{\cos 390°}{\cos(-30°)} - \tan(360° - x).\cos(180° + x).\cos(x - 90°)$$ (8)

3.2 Prove the identity:

$$\frac{\cos x.\tan^2 x}{\frac{1}{\cos x} + 1} + \cos x = 1$$ (6)

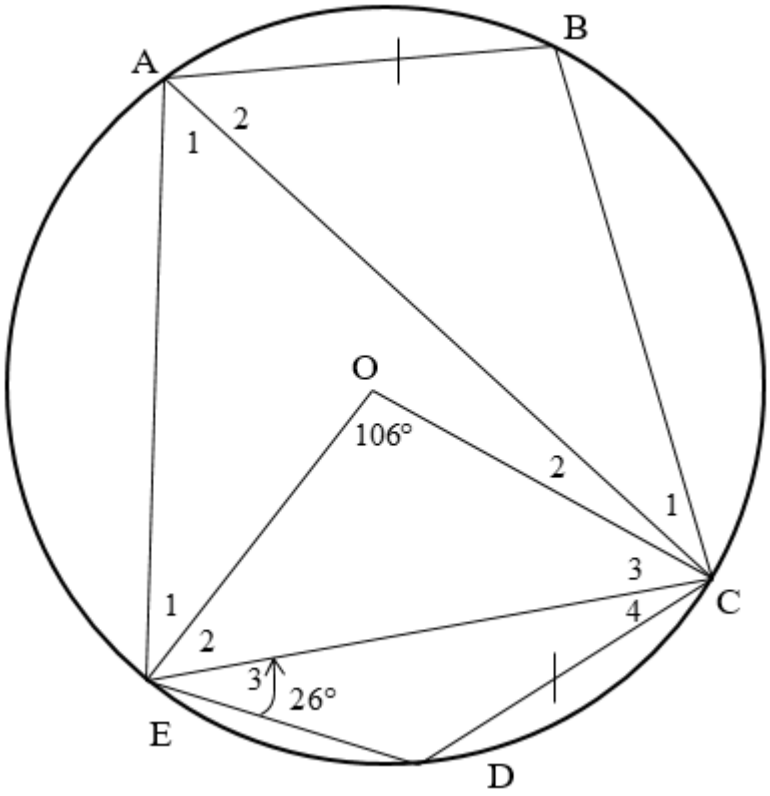
3.3 Determine the general solution of

$$6\cos x - 5 = \frac{4}{\cos x};\quad \cos x \neq 0$$ (6)

[20]

QUESTION 4

O is the centre of circle ABCDE with $D\hat{E}C = 26°$, $AB = DC$ and $E\hat{O}C = 106°$.



Calculate the size of:

4.1 $B\hat{C}A$ (2)

4.2 $\hat{A}_1$ (2)

4.3 $O\hat{C}D$ (6)

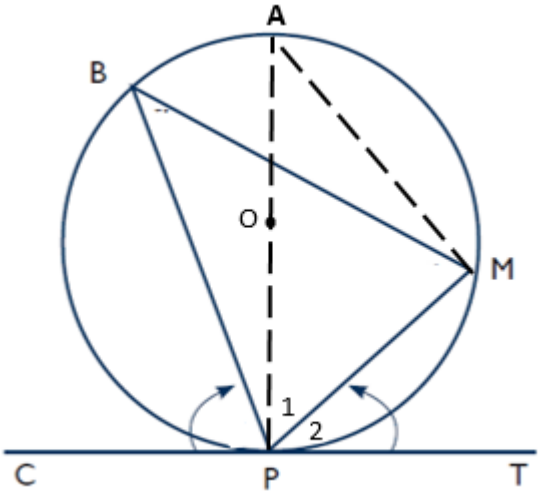
[10]

QUESTION 5

5.1 Complete the missing information in the theorem below:

The angle subtended by the diameter at the circumference of the circle is … (1)

5.2 Given: Circle centre O, tangent CPT at P chord PM and the point B on the major arc.



Complete the proof:

Required to proof: $M\hat{P}T = P\hat{B}M$

Construction: Draw diameter PA and join AM

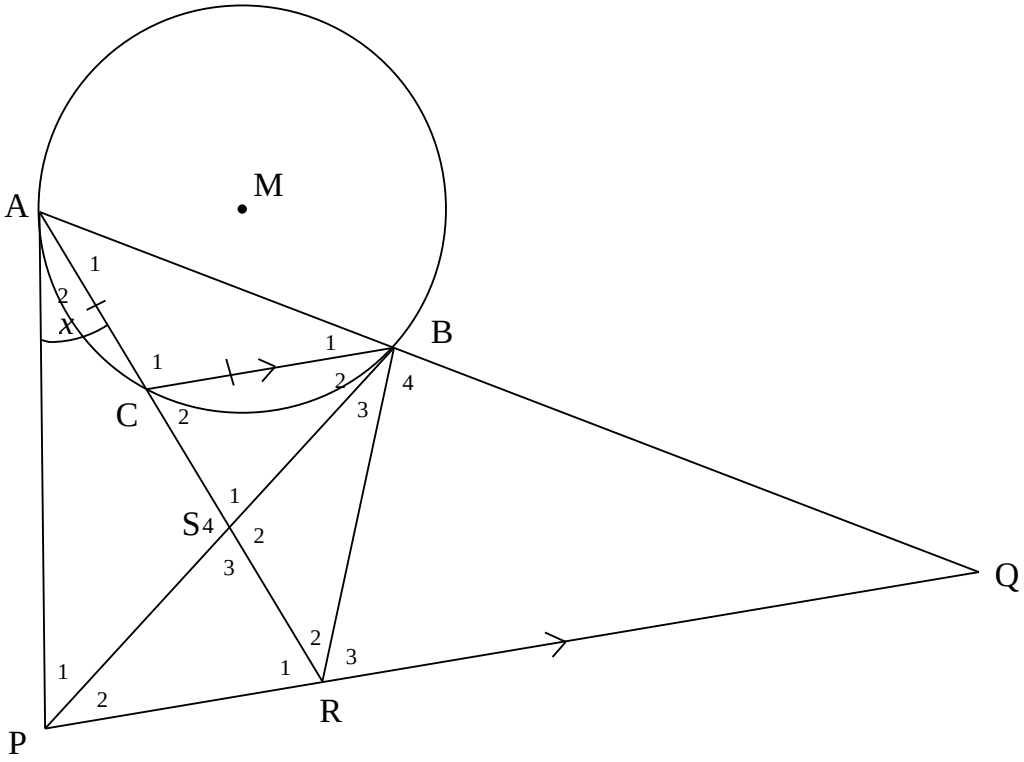
Proof:

……..

……...

…….. (5)

5.3 PA and PB are tangent to circle M with AC = BC. $\hat{A}_2 = x$. BC // PQ.



5.3.1 Determine with reasons FOUR other angles equal to x. (8)

5.3.2 Prove that ABRP is a cyclic quadrilateral (2)

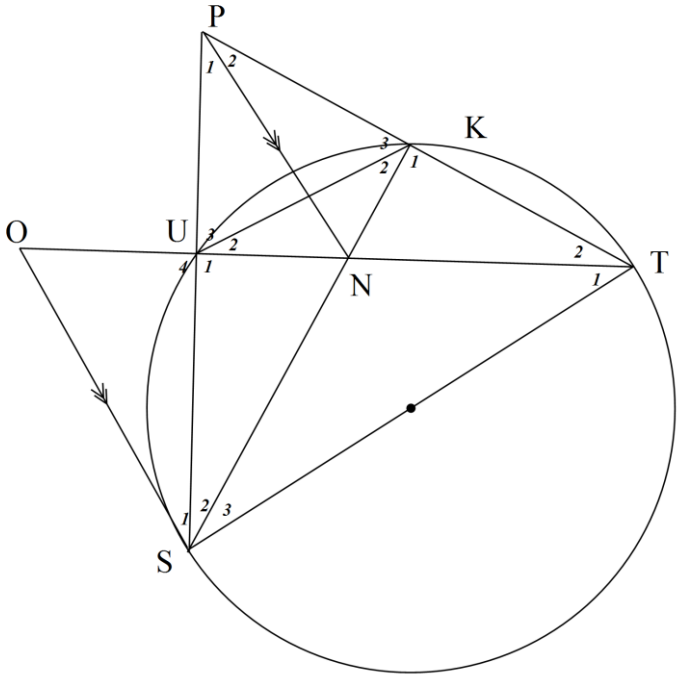
5.3.3 Prove that AP = BQ (3)

[19]

QUESTION 6

Refer to the diagram below, ST is a diameter of the circle.

OS // PN, TO bisects $\hat{STP}$.



Prove that

6.1 PUNK is a cyclic quadrilateral (5)

6.2 SO is a tangent to circle KUST (6)

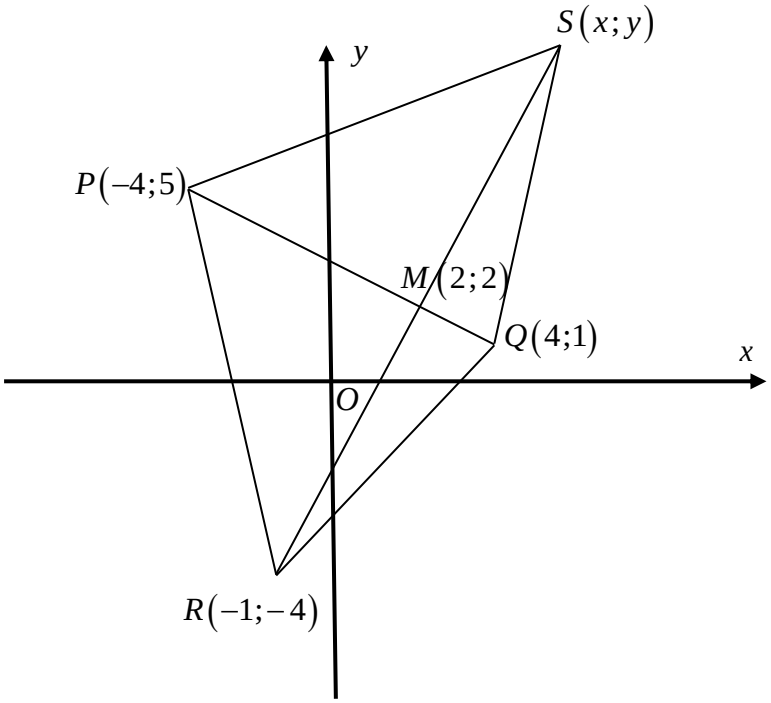
[11]

TOTAL: [100]

NAME: …….. CLASS: …….

DIAGRAM SHEET 1

QUESTION 1.2



QUESTION 4

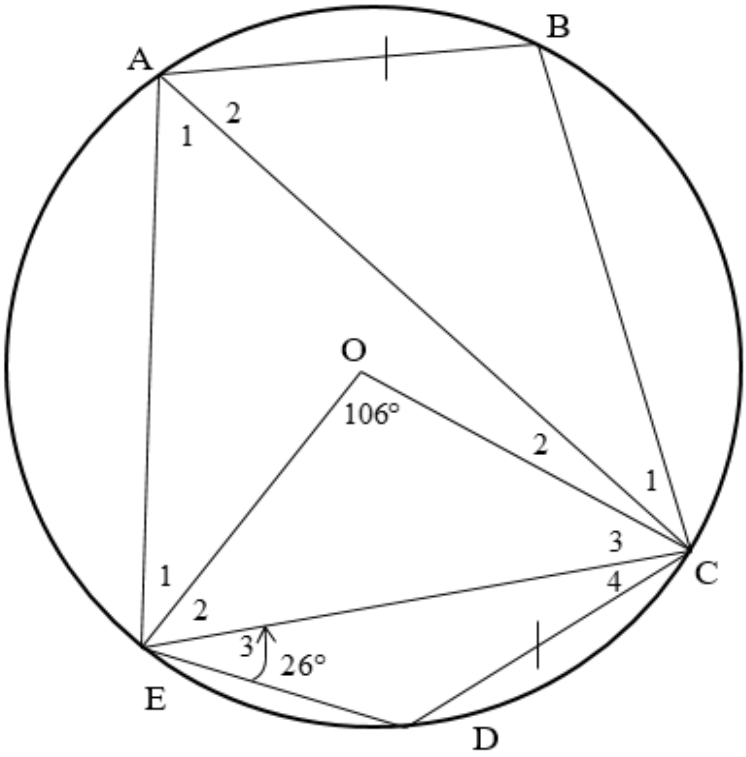


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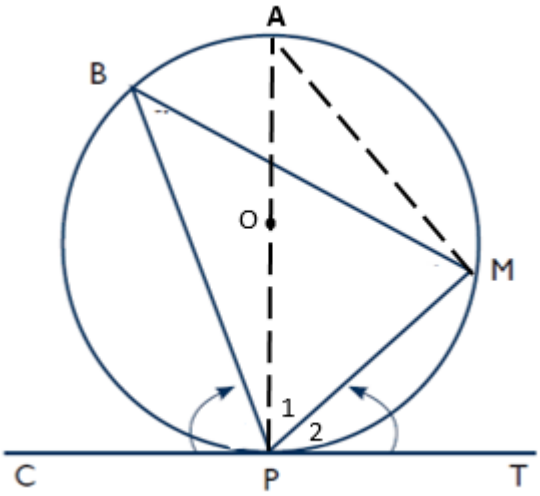
DIAGRAM SHEET 2

QUESTION 5.2



QUESTION 5.3

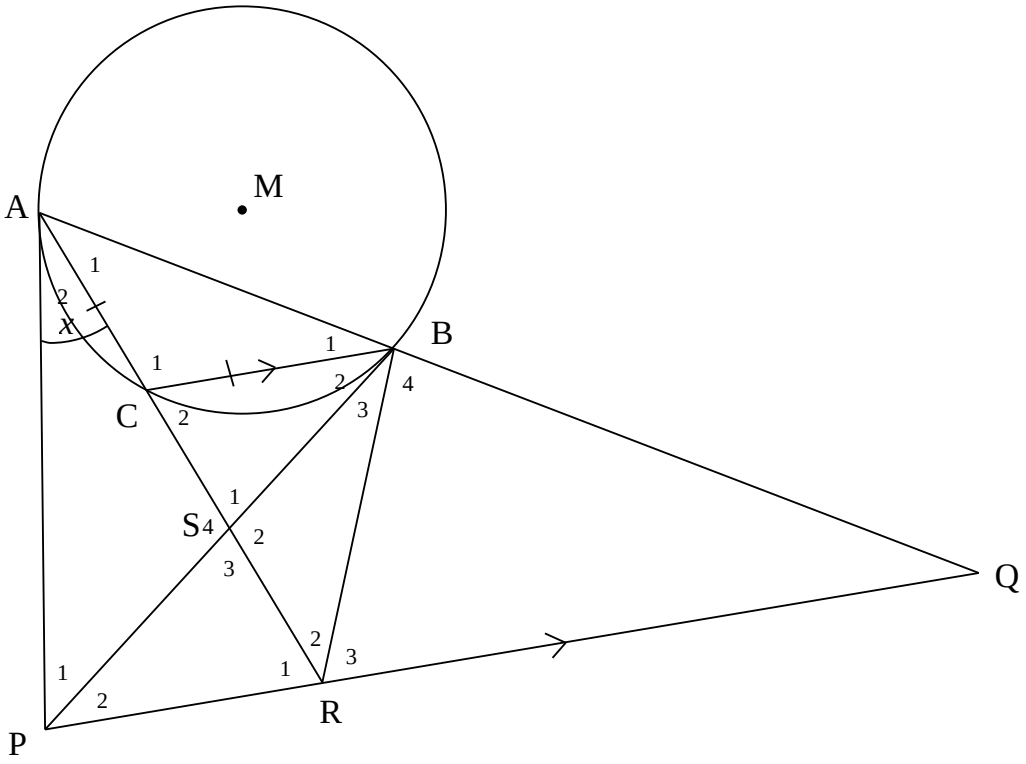


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DIAGRAM SHEET 3

QUESTION 6