GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

JUNE 2017

GRADE 11

MATHEMATICS

PAPER 2

TIME: 2 hours

MARKS: 100

8 pages + 3 diagram sheets + 1 answer sheet

P.T.O.

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(Paper 2)

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INSTRUCTIONS AND INFORMATION

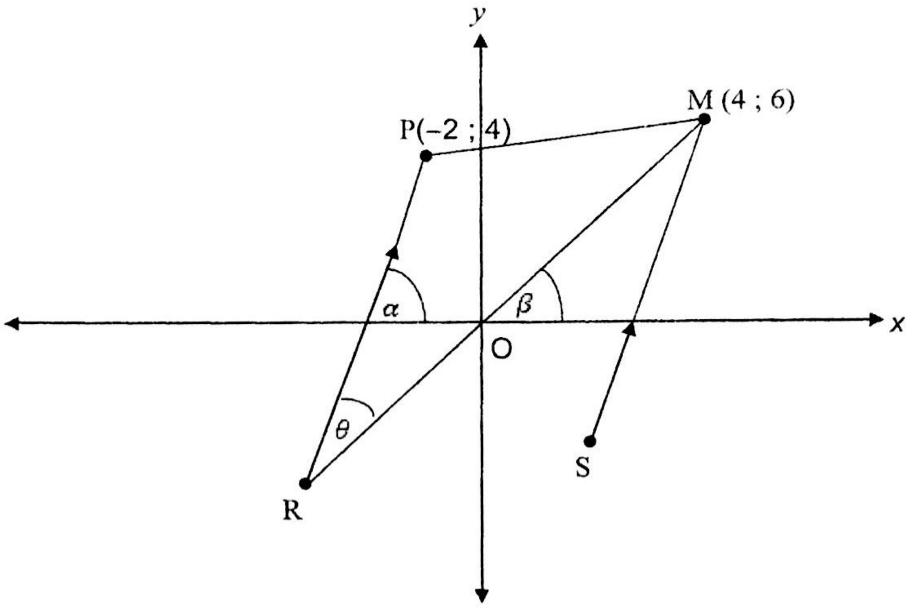
Read the following instructions carefully before answering the questions.

1. This question paper consists of SIX questions. Answer ALL the questions.
2. Number your answers according to the numbering system that is used in the question paper.
3. Use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
4. Round-off the answer correctly to TWO decimal places, unless instructed otherwise.
5. Show ALL calculations, diagrams, graphs, etc. that were used in determining the answers.
6. Answers only will not necessarily be awarded maximum marks.
7. Diagrams are NOT necessarily drawn to scale.
8. Reasons MUST accompany statements made in QUESTIONS 4, 5 and 6.
9. Question 3.1 must be answered on the ANSWER SHEET provided on Page 9.
   Detach this page and insert it into your ANSWER BOOK.
10. It is in your interest to write legibly (in blue ink) and present all answers neatly and logically.
11. Use the diagram sheets on pages 10, 11 and 12 to assist you in answering Questions 4, 5 and 6 respectively.

P.T.O.

QUESTION 1 **[25]**

In the diagram below, points P (–2; 4), R and M are the vertices of ΔPMR. Line MR passes through the origin. The angle between lines PR and MR is θ and PR||MS.
The equation of line MS is given as $y - 5x + 14 = 0$.



1.1	Determine the equation of line MR.	(3)
1.2	Calculate the equation of line PR.	(4)
1.3	Calculate the size of θ, rounded-off to TWO decimal places.	(5)
1.4	Show that the coordinates of point R can be given as (–4; –6).	(4)
1.5	Calculate the length of line MR, in simplified surd form.	(2)
1.6	If the area of ΔPMR = ½ PR.MR.sinθ, calculate the area of ΔPMR.	(5)
1.7	Write down the coordinates of point S, given that PMSR is a parallelogram.	(2)

QUESTION 2 **[26]**

2.1 If $\cos\theta = -\frac{7}{25}$, and $\theta \in (180°\ ;\ 360°)$ calculate the value of

$14\tan\theta$,

with the aid of a diagram and WITHOUT the use of a calculator. (4)

2.2 Simplify WITHOUT the use of a calculator:

$$\frac{\cos(90° + x).\sin(180° + x)}{\tan 225° - \cos^2(-x)}.$$ (6)

2.3 Determine the general solution of

$2\cos 2\theta = -0{,}44$. (6)

2.4 Prove that

$$\frac{\tan\theta - \sin\theta}{1 - \cos\theta} = \tan\theta.$$ (5)

2.5 If $\alpha + \beta = 90°$, determine WITHOUT the use of a calculator

$$\frac{\cos 700°}{\sin 70°} - \frac{\sin\alpha}{\sin(90° - \beta)}.$$ (5)

QUESTION 3 **[14]**

Given $f(x) = 2\cos x + 1$ and $g(x) = 1 - \sin x$

3.1 Use the ANSWER SHEET provided on Page 9, and sketch the graphs of f and g for the interval $x \in [-90°\ ;360°]$. (6)

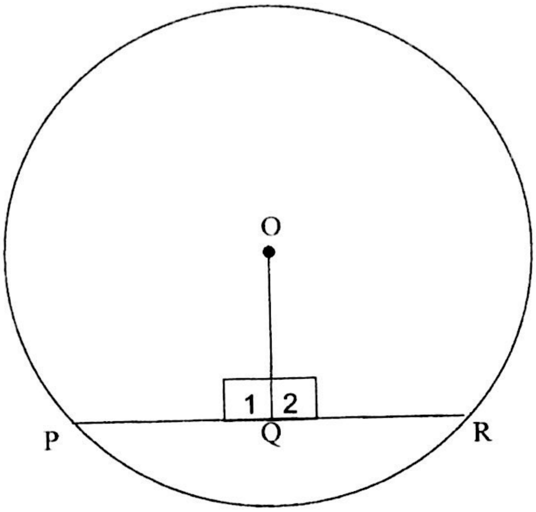
3.2 Write down the amplitude of f. (2)

3.3 Determine the values of x for which $f(x) - g(x) = 0$. (6)

STATEMENTS AND REASONS ARE REQUIRED WHEN ANSWERING QUESTIONS 4, 5 AND 6.

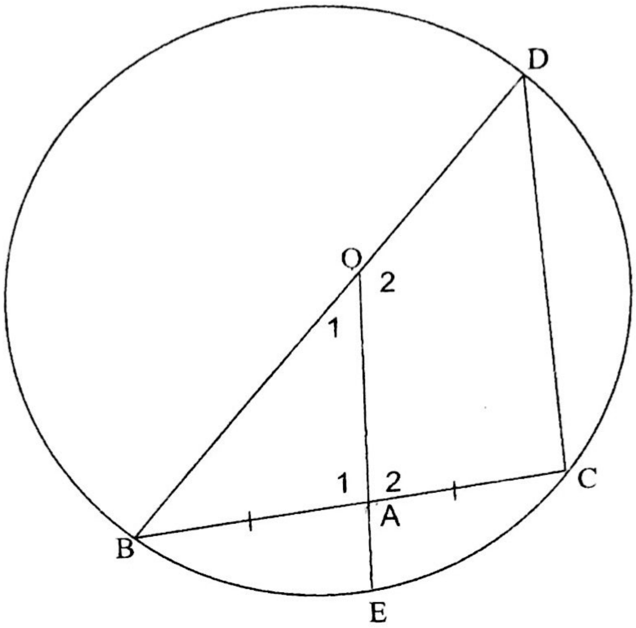
QUESTION 4 **[13]**

4.1 Using the diagram below, prove that the line drawn perpendicular from the centre of a circle to a chord will bisect the chord.



(5)

4.2 In the diagram below, BD is the diameter of the circle with centre O.
$AB = AC$, $\hat{O}_1 = 40°$, $CD = 40$ mm and $AB = 15$ mm.



Calculate

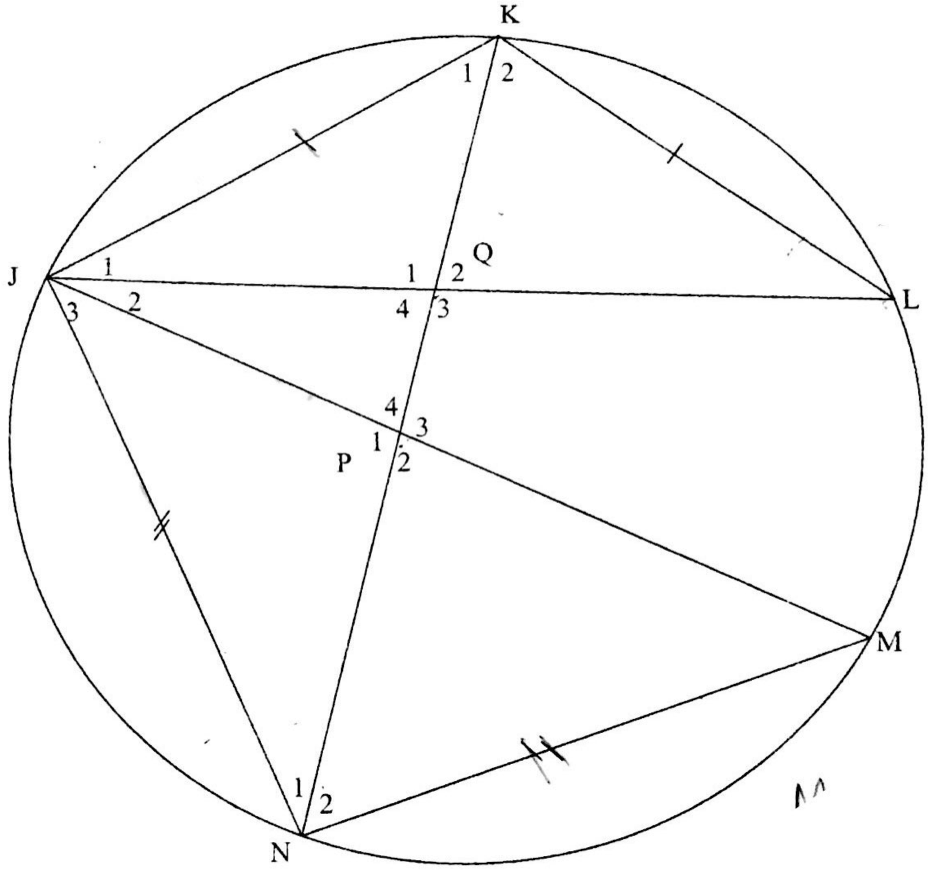
4.2.1 $\hat{B}$. (2)

4.2.2 $\hat{D}$. (2)

4.2.3 the length of line AE. (4)

QUESTION 5 [10]

Points J, K, L, M and N are on the circumference of the circle drawn below.
JK = KL and JN = MN.
JL, JM and KN are straight lines. $\hat{J}_1 = x$ and $\hat{J}_3 = y$.



5.1 Write down TWO other angles, equal to x. (3)

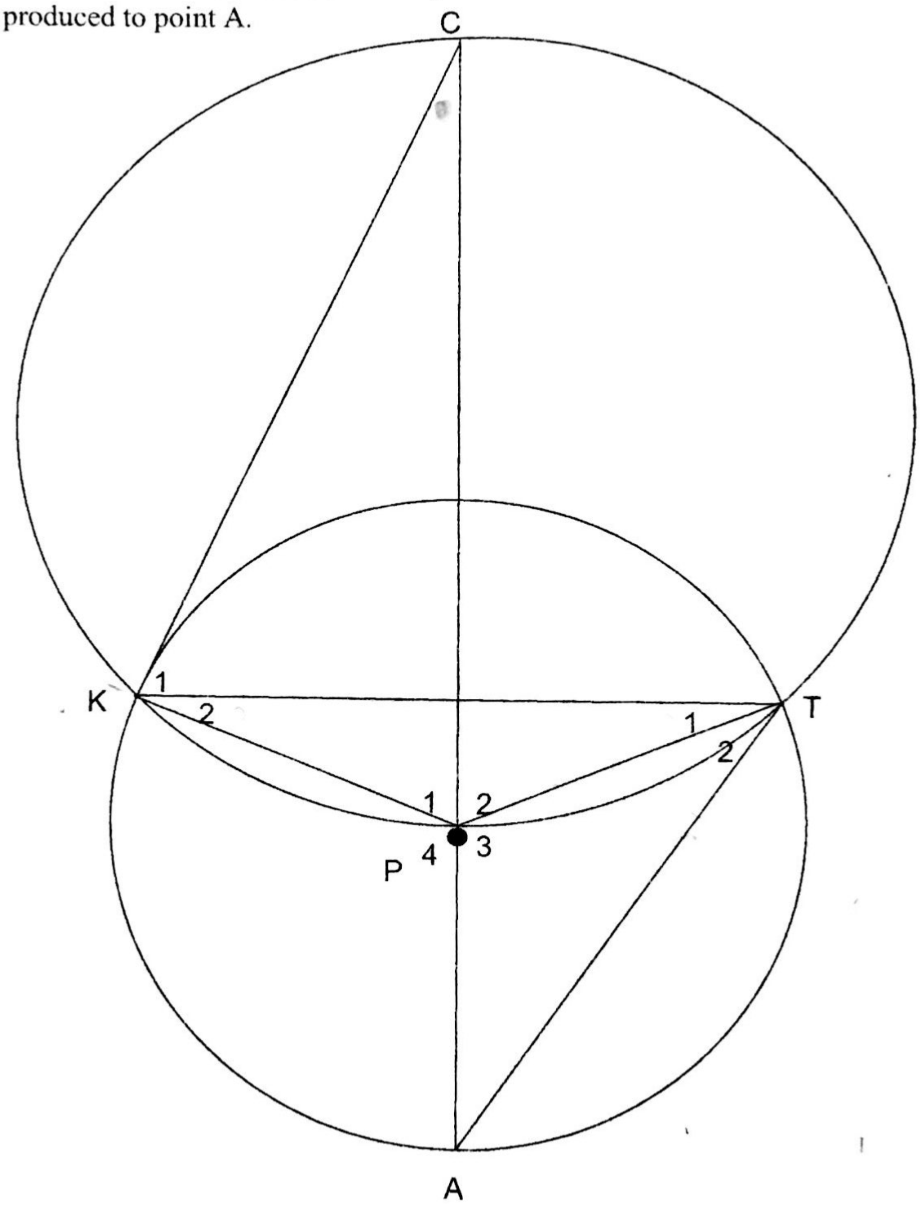
5.2 Prove that $\hat{Q}_2 = \hat{P}_2$. (4)

5.3 Prove that JQ = JP. (3)

[12]

QUESTION 6

Two circles of different radii are drawn such that they intersect at points K and T respectively. Point P is the centre of the smaller circle and is also a point on the circumference of the larger circle. Line CP is produced to point A.



Prove that

6.1 $\hat{K}_2 = \hat{C}$ (3)

6.2 $\hat{K}_1 = 2\hat{T}_2$ (4)

6.3 $\hat{P}_4 = 2\hat{C} + \hat{K}_1$ (5)

TOTAL: 100

END