



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

GRADE 11

TECHNICAL MATHEMATICS P2

MID-YEAR EXAMINATION 2018

MARKS: 100
TIME: 2 Hours

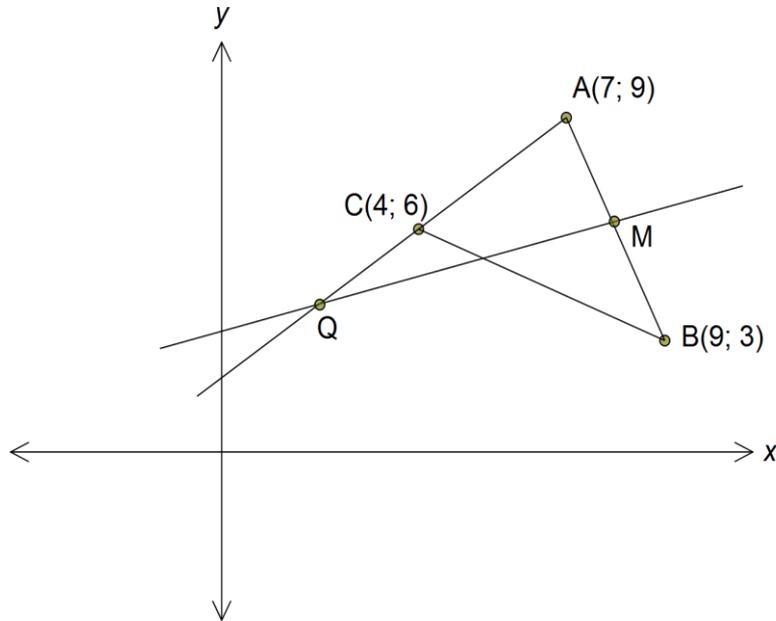
This question paper consists of 8 pages and 1 diagram sheet.



INSTRUCTIONS AND INFORMATION

1. This question paper consists of 7 questions. Answer ALL the questions.
2. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining the answers.
3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
5. Diagrams are NOT necessarily drawn to scale.
6. Number the answers correctly according to the numbering system used in this question paper.
7. It is in your own interest to write legibly and to present the work neatly.

Points A(7; 9), B(9; 3) and C(4; 6) are given. QM is the perpendicular bisector of AB, and Q lies on AC produced.



Determine:

- 1.1 the gradient of AB. (2)
- 1.2 the coordinates of M. (2)
- 1.3 the equation of MQ. (4)
- 1.4 the coordinates of Q. (7)
- 1.5 analytically that $QA = QB$. (3)
- 1.6 the coordinates of D if ABDC is a parallelogram. (2)

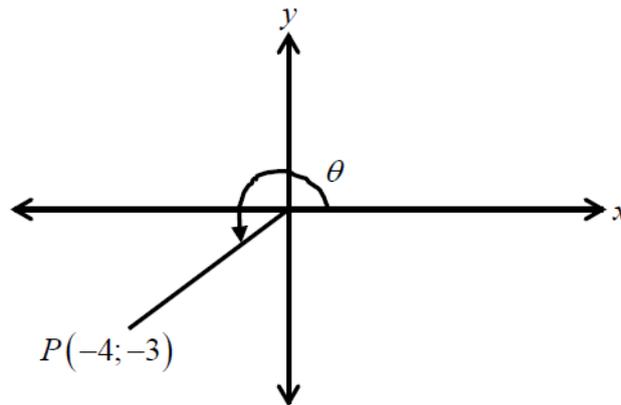
[20]

2.1 If $x = 54,73^{\circ}$ and $y = 142,89^{\circ}$. Determine the values of the following correct to 1 decimal place.

2.1.1 $\tan(y - x)$ (1)

2.1.2 $\cos 3y$ (2)

2.2 Consider the diagram given below:



Without using a calculator, determine:

2.2.1 $\tan \theta$ (1)

2.2.2 $\sin \theta$ (3)

2.3 If $\sin \alpha = \frac{5}{13}$ and $\cos \alpha < 0$. Determine, using a sketch, the value of $\tan \alpha$. (4)

[11]

QUESTION 3

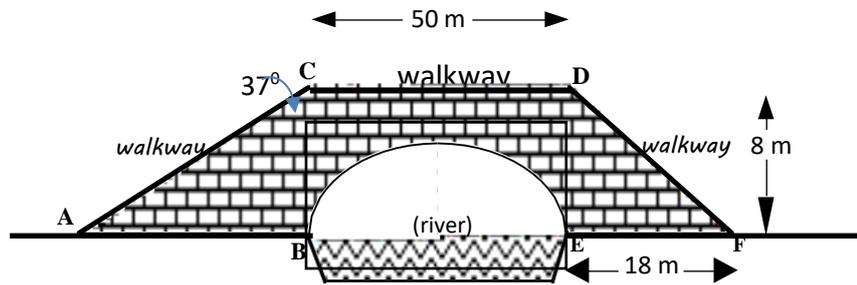
3.1 Solve for x , correct to 2 decimal places, $x \in [0^{\circ}; 90^{\circ}]$

3.1.1 $\sin x = 0,234$ (1)

3.1.2 $\cot x = \tan 53^{\circ} + \sin 233^{\circ}$ (3)

3.2 A design for a bridge walkway over a river is shown below. $CD \parallel AF$.

$DE = BC = 8\text{m}$, $CD = 50\text{m}$, $EF = 18\text{m}$ and $\hat{ACB} = 37^\circ$.



The architect has been given instructions that the total walkway length must not exceed 100 metres.

Has the architect designed the bridge properly? Explain your answer in full showing of all your calculations. (7)

[11]

QUESTION 4

4.1 Convert $134,251^\circ$ to degrees, minutes and seconds. (2)

4.2 Convert $27^\circ 36' 54''$ to decimal degree correct to 3 decimal places. (2)

4.3 Add $\frac{\pi}{4} + \frac{2\pi}{3}$ and give the answer in degrees. (4)

4.4 Calculate the value of $\sin \frac{\pi}{2} + \cos \frac{\pi}{4}$, without using a calculator. (4)

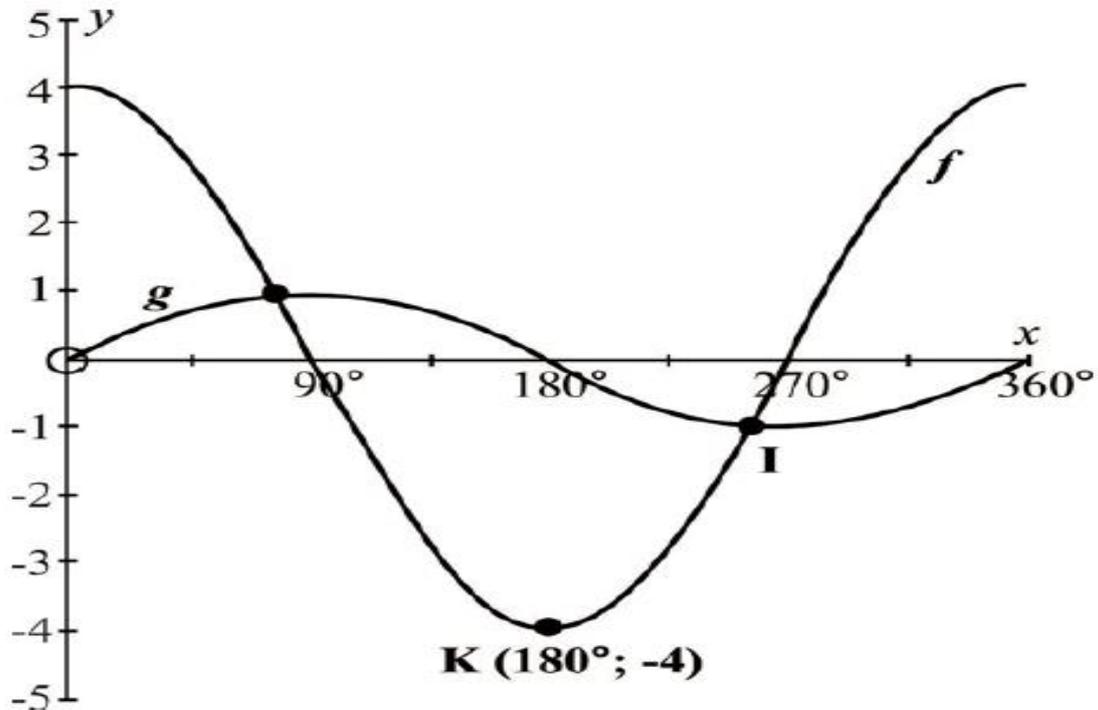
4.5 What is the measure (in radians) of a central angle θ , that intercepts an arc of length 5cm on a circle with a radius of 10cm? (3)

[15]

In the diagram below, the graphs of f and g are drawn.

$$f(x) = a \cos x \quad \text{and} \quad g(x) = b \sin x \quad \text{for } 0^\circ \leq x \leq 360^\circ.$$

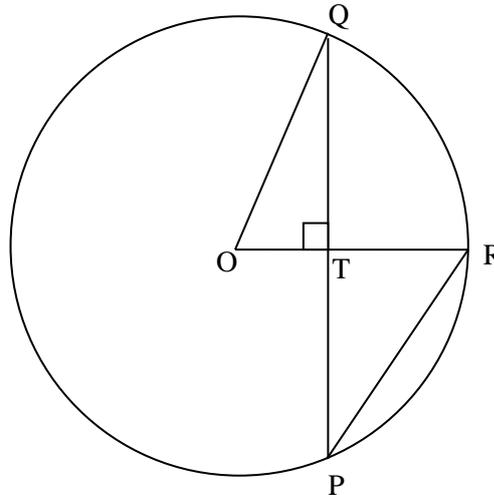
$I(x; y)$ is a point of intersection of the graphs. $K(180^\circ; -4)$ is the turning point of f .



- 5.1 Determine the value of a and b . (2)
- 5.2 Write down the range of f . (1)
- 5.3 Estimate the coordinates of I by reading from the graph (2)
- 5.4 For which values of x is:
- 5.4.1 $f(x) < 0$? (1)
- 5.4.2 $f(x) - g(x) = 4$? (2)

[8]

- 6.1 In the diagram below, PQ is the chord of circle O. OR is perpendicular to PQ and OR intersects PQ at T. $PQ = 24$ cm, $TR = 8$ cm and $OT = m$.

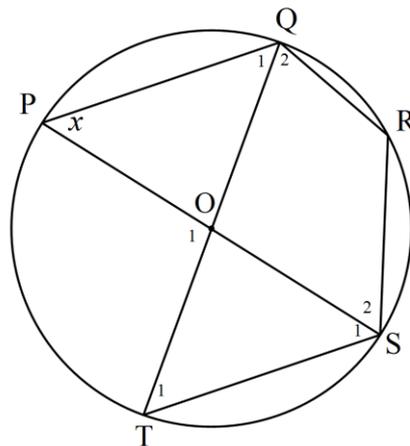


- 6.1.1 Determine the length of TQ. (2)
 6.1.2 Express OQ in terms of m . (1)
 6.1.3 Determine the value of m . (4)
 6.1.4 Determine the length of the radius of the circle. (1)

- 6.2 Complete the sentence:

The opposite angles of a cyclic quadrilateral ... (1)

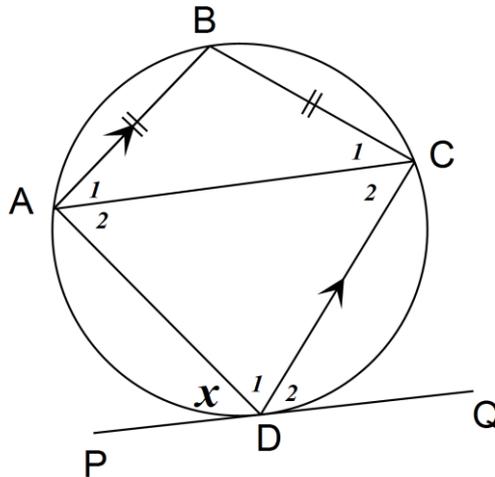
- 6.3 In the diagram below, O is the centre of the circle, SOP and QOT are straight lines and $\hat{P} = x$.



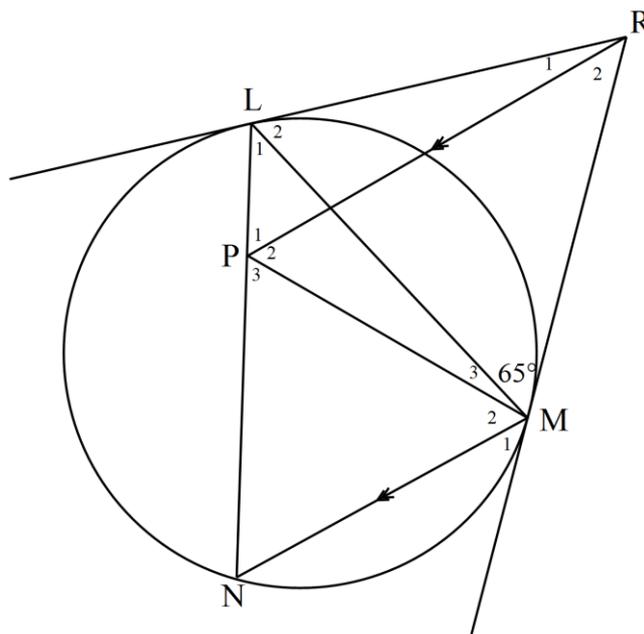
- 6.3.1 Name, with reasons, two other angles each equal to x . (4)
 6.3.2 If $x = 43^\circ$, determine, with reasons, the size of the following angles:
 (a) \hat{R} (2)
 (b) \hat{O}_1 (2)
 6.3.3 Give a reason why $PQ \parallel TS$. (1) **[18]**

QUESTION 7

- 7.1 In the figure below, PQ is a tangent to the circle at D.
 AB = BC and AB || DC. $\hat{ADP} = x$.



- 7.1.1 Show that $\hat{ADP} = \hat{BCA}$ (5)
- 7.1.2 Express \hat{ADC} in terms of x only. (4)
- 7.1.3 If $x = 40^\circ$. Determine the size of \hat{D}_2 . (3)
- 7.2 In the diagram, LR and MR are tangents to the circle at L and M respectively.
 RP is parallel to MN and N lies on the circumference of the circle.
 LPN is a straight line. $\hat{LMR} = 65^\circ$.



Show that LPMR is a cyclic quadrilateral. (5) [17]

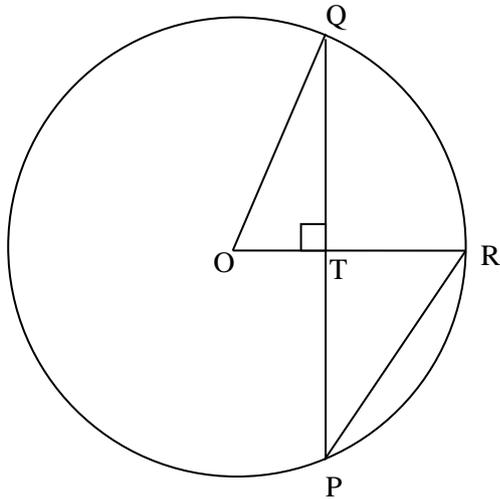
TOTAL:100

DIAGRAM SHEET

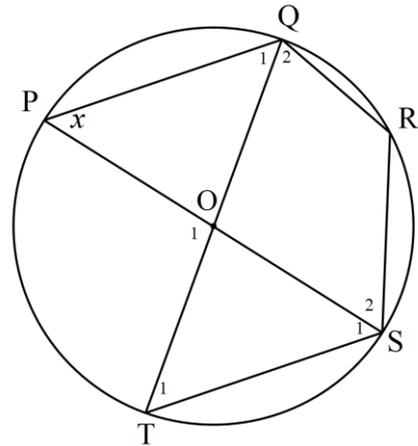
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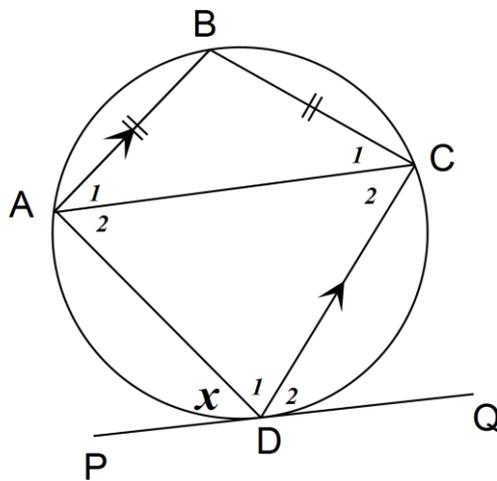
QUESTION 6.1



QUESTION 6.3



QUESTION 7.1



QUESTION 7.2

