GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2022

GRADE 10

MATHEMATICS

(PAPER 2)

TIME: 1 hour

MARKS: 50

6 pages

INSTRUCTIONS AND INFORMATION

1. This question paper consists of 8 questions.

2. Show ALL calculations, diagrams, graphs etc. that you have used to determine the answers, clearly.

3. Answers only will NOT necessarily be awarded full marks.

4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

5. If necessary, round-off answers to TWO decimal places, unless stated otherwise.

6. Diagrams are NOT necessarily drawn to scale.

7. Write neatly and legibly.

QUESTION 1

Study the diagram below and answer the questions that follow, without the use of a calculator.
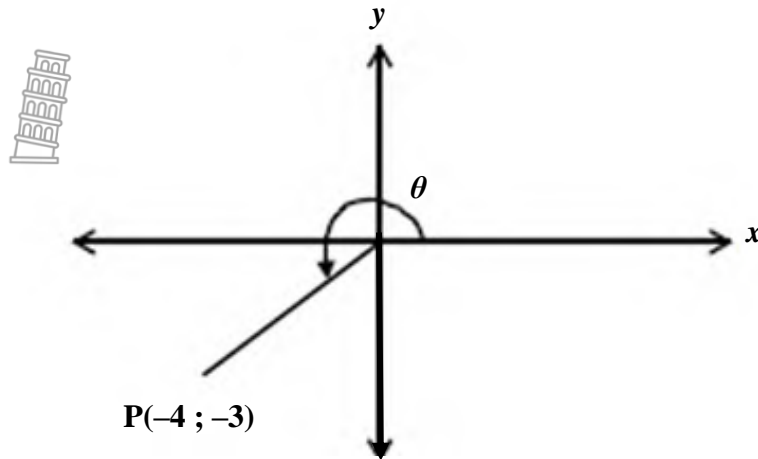
Determine the value of:

1.1 $\sin \theta$ (3)

1.2 $5\cos(90° - \theta) + 3 \cot \theta$ (3)
     [6]

QUESTION 2

Determine the acute angle β to 2 decimals:

2.1 $\sin(\beta - 17,8°) = 0,215$ (2)

2.2 $\tan 3\beta = \sqrt{3}$ (2)

2.3 $3 \sin \dfrac{\beta}{2} = 2,012$ (3)
     [7]

QUESTION 3

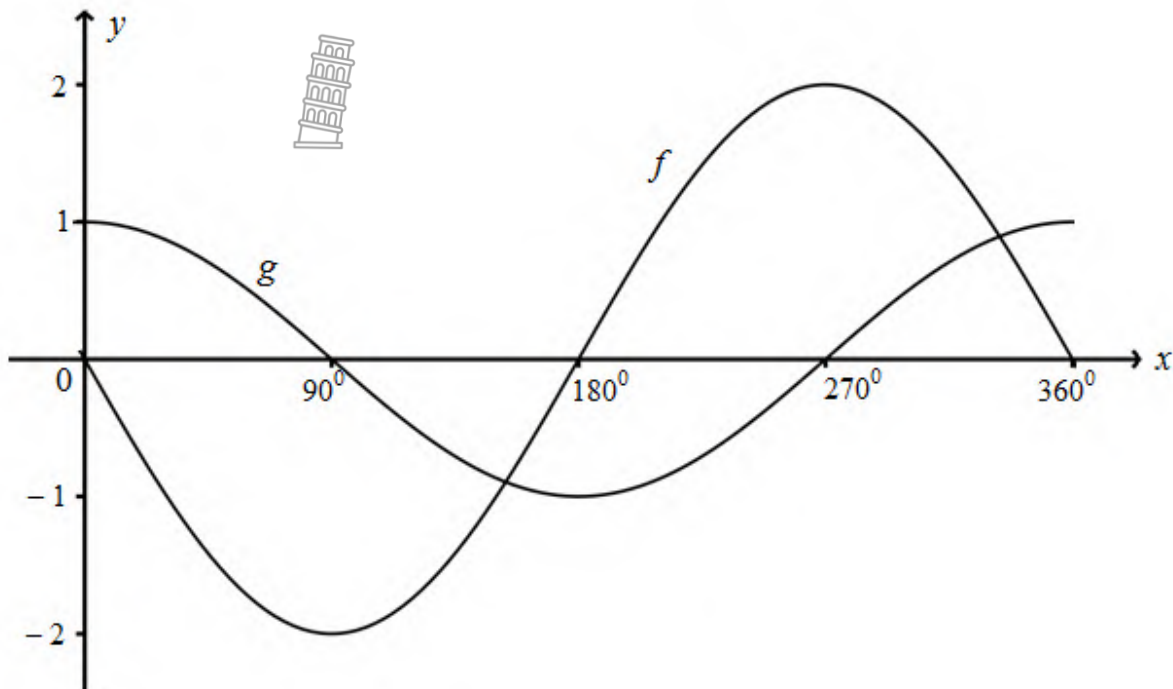Determine the value of θ if $\theta \in [0°; 90°]$, without the use of a calculator.

$$\frac{tan\ 30°°.\ cosec\ 60°}{cos\ 45°.\ sin\ 45°}$$ (4)
     [4]

QUESTION 4

The diagram below represents the graphs of $f(x) = a \sin x$ and $g(x) = b \cos x$ for $x \in [0°;360°]$.

4.1   Write down the values of a and b.   (2)

4.2   For which value(s) of x will g be a decreasing function?   (2)

4.3   What is the amplitude of f ?   (1)

4.4   What is the range of g?   (2)

4.5   For which value(s) of x is $f(x) - g(x) = 2$?   (1)
                                                                                                                                           [8]

QUESTION 5

Use the list of quadrilaterals given below to answer the questions that follow.

- Parallelogram
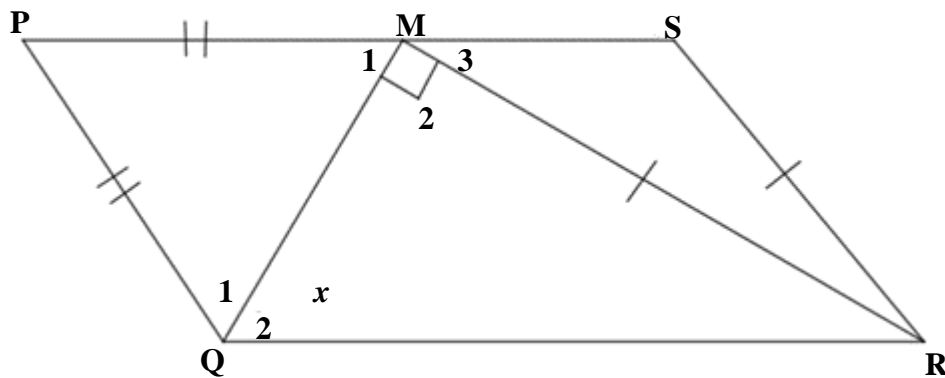- Rectangle
- Rhombus
- Square
- Kite
- Trapezium

Write down the name of the quadrilateral(s) that have the following properties:

5.1 Diagonals bisect the interior angles (1)

5.2 Diagonals have the same length (1)

5.3 Diagonals bisect the area of the quadrilateral (2)

[4]

QUESTION 6

PQRS is a parallelogram with M on PS such that PM = PQ and SM = SR.
$Q\hat{M}R = 90°$ and $\hat{Q}_2 = x$.

6.1 Determine, with reasons, two other angles which are equal to x. (4)

6.2 Determine the size of $\hat{M}_3$ in terms of x. (2)

6.3 Calculate the numerical value of x. (2)

[8]

QUESTION 7

ABCD is a parallelogram with AD ‖ BC and BA ‖ CD.

Using the diagram above, prove the theorem that states that the opposite sides of a parallelogram are equal.   **[5]**

QUESTION 8

ABCD is a parallelogram. BD and AC intersect at O. AF = OD, CO = FB.
DA and BF produced meet at E.

8.1   Prove that BOAF is a parallelogram.   (4)

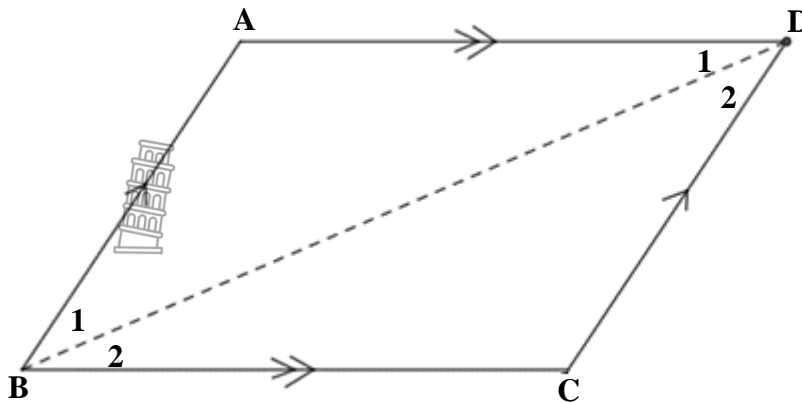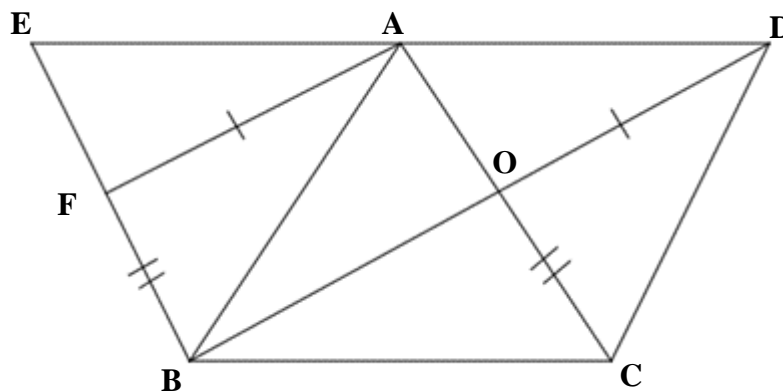8.2   Prove that AD = EA.   (4)
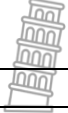   **[8]**

                                                                                                        TOTAL: 50

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION/

PROVINSIALE EKSAMEN

JUNE/*JUNIE* 2022

GRADE/*GRAAD* 10

MARKING GUIDELINES/ *NASIENRIGLYNE*

MATHEMATICS/*WISKUNDE*
(PAPER 2)/(*VRAESTEL 2*)

5 pages/*bladsye*

Q./Vr. 1	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
1.1	$r^2 = (-3)^2 + (-4)^2$ $r^2 = 25$ $r = 5$ $\therefore \sin\theta = -\dfrac{3}{5}$	✓ Using Pythagoras correctly/*Gebruik Pythagoras korrek* ✓ $r = 5$ ✓ Answer/*Antwoord*	(3)
1.2	$5\cos(90° - \theta) + 3\cot\theta$ $5(\frac{-3}{5}) + 3\left(\frac{-4}{-3}\right)$ $= -3 + 4$ $= 1$	$5(\frac{-3}{5})$ ✓ $3\left(\frac{-4}{-3}\right)$ ✓ Answer/*Antwoord* ✓	(3)
			[6]
Q./Vr. 2	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
2.1	$\sin(\beta - 17.8°) = 0{,}215$ $\beta - 17{,}8° = 12{,}41554°$ $\beta = 30{,}22°$	✓ $12{,}41554°$ ✓ $30{,}22°$	(2)
2.2	$\tan 3\beta = \sqrt{3}$ $3\beta = 60°$ $\beta = 20°$	✓ $3\beta = 60°$ ✓ Answer/*Antwoord*	(2)
2.3	$3\sin\dfrac{\beta}{2} = 2{,}012$ $\sin\dfrac{\beta}{2} = 0{,}6706666$ $\dfrac{\beta}{2} = 37{,}42097785°$ $\beta = 74{,}84°$	✓ $0{,}6706666$ ✓ $37{,}4209778°$ ✓ $74{,}84°$	(3)
Q./Vr. 3	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
3.1	$\dfrac{\tan 30°°.\,\csc 60°}{\cos 45°.\,\sin 45°}$ $\dfrac{\frac{\sqrt{3}}{3} \times \frac{\sqrt{2}}{3}}{\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2}}$ $= \dfrac{\sqrt{6}}{3}$	✓ $\frac{\sqrt{3}}{3}$ ✓ $\frac{\sqrt{2}}{3}$ ✓ $\frac{\sqrt{2}}{2}$ $\frac{\sqrt{2}}{2}$ ✓ Answer/*Antwoord*	(4)
			[4]

Q./*Vr 4*	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
4.1	$a = -2$; $b = 1$	✓ $a = -2$ ✓ $b = 1$	(2)
4.2	$0° \leq x \leq 180°$	✓ IneQ /*Ongelykhede* ✓ critical values/ *kritieke waardes*	(2)
4.3	2	✓ Answer/*Antwoord*	(1)
4.4	$-1 \leq y \leq 1$ **OR** [-1;1]	✓ Inequalities/ *Ongelykhede* ✓ critical values/*kritieke waardes*	(2)
4.5	$x = 270°$	✓ Answer/*Antwoord*	(1)
			[8]
Q./*Vr. 5*	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
5.1	Square and Rhombus/*Vierkant en Ruit*	✓ Answer/ *Antwoord*	(1)
5.2	Square and Rectangle/*Vierkant en Reghoek*	✓ Answer/ *Antwoord*	(1)
5.3	Square; Rectangle; Parallelogram; Rhombus *Vierkant; Reghoek; Parallelogram; Ruit*	✓✓ Answer/ *Antwoord*	(2)
			[4]

Q./*Vr. 6*	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
6.1	$\hat{M}_1 = x$ [alternate $<$ s PS// QR] /[*verwiss* $\angle^e$; *PS* // *QR*] $\hat{Q}_1 = x$ [angles opp $=$ sides]/[$\angle^e$ *teenoor gelyke sye*]	✓ S ✓R ✓ S ✓R	(4)
6.2	$\hat{S} = \hat{Q}_1 + \hat{Q}_2$ [opp $<$ s of //gm]/[*oorst* $\angle^e$ *van* //^{m}] $\hat{S} = 2x$ $\hat{M}_3 = 2x$ [$<$ s opp $=$ sides]/[$\angle^e$ *teenoor gelyke sye*] **OR/*OF*** $\hat{P} = 180° - (\hat{Q}_1 + \hat{Q}_2)$ [co-interior $<$ s PS//QR/ *ko-binne* $\angle^e$; *PS* // *QR*] $\hat{P} = 180° - 2x$ $\hat{P} + \hat{S} = 180$ [co-interior $<$ s SR//PQ/ *ko-binne* $\angle^e$; *SR* // *PQ*] $\hat{S} = 2x$ $\hat{M}_3 = 2x$ [$<$ s opp $=$ sides / $\angle^e$ *teenoor gelyke sye*]	✓ S/R ✓S/R **OR/*OF*** ✓ S/R ✓ S/R	(2)
6.3	$\widehat{M}_1 + \widehat{M}_2 + \widehat{M}_3 = 180°$ [sum of interior $<$ s of Δ *som binnehoeke van Δ*] $x + 90° + 2x = 180°$ $3x = 90°$ $x = 30°$	✓ S/R ✓ Answer/*Antwoord*	(2)
			[8]
Q./*Vr. 7*	Suggested solution/*Voorgestelde oplossing*	Explanation/ *Verduideliking*	Marks/ *Punte*
	$BD = BD$ [common/ *gemeenskaplik*] $\hat{D}_1 = \hat{B}_2$ [alternate $<$ s AD// BC/ *verwisselende binne* $\angle^e$; *AD* // *BC*] $\hat{B}_1 = \hat{D}_2$ [alternate $<$ s AB // DC/ *verwisselende binne* $\angle^e$; *B* // *DC*] $\therefore \Delta ABC \equiv \Delta CBD$ [AAS] / $\angle\angle S$ $\therefore AD = BC$ and/*en* $AB = DC$	✓ S ✓ S/R ✓ S ✓ S ✓ R	(5)
			[5]

Q./*Vr. 8*	Suggested solution/*Voorgestelde oplossing*	Explanation/*Verduideliking*	Marks/*Punte*
8.1	$AO = OC$ [diagonals of //gm bisect/ *hoeklyne van //^{n} halveer*] $DO = OB$ [diagonals of //gm bisect/ *hoeklyne van //^{n} halveer*] $\therefore BOAF$ is $a'n$ // gm [opp sides of a quad equal/ *oorst sye van vierhoek is gelyk*]	✓ S ✓ R ✓ S ✓ R	(4)
8.2	$EA // BC$ given / *gegee* $BF // AC$ proven / *bewys* $EBCA$ is $a'n$ // gm [two pairs of opp sides ∥ / *twee pare teenoorst sye* ∥] $EA = BC$ $EA = AD$	✓ S ✓ S ✓ R ✓ S	(4)
			[8]

TOTAL/*TOTAAL*: 50