



UNIVERSITY
JOHANNESBURG
FACULTY OF SCIENCE
FAKULTEIT NATUURWETENSKAPPE

DEPARTMENT OF PURE AND APPLIED MATHEMATICS
DEPARTEMENT SUIWER EN TOEGEPASTE WISKUNDE

MODULE	MAFT0B1 / MA1BFET
	MATHEMATICS FOR TEACHERS
	WISKUNDE VIR ONDERWYSERS
CAMPUS	APK
KAMPUS	APK
EXAM	NOVEMBER 2015
EKSAMEN	NOVEMBER 2015

ASSESSOR: MS S RICHARDSON

MODERATOR: MS R DURANDT
MODERATOR

DURATION: 2 HOURS	MARKS: 100
TYDSDUUR: 2 URE	PUNTE: 100

SURNAME AND INITIALS
VAN EN VOORLETTERS

STUDENT NUMBER
STUDENTENOMMER

CONTACT NR
KONTAK NO

NUMBER OF PAGES: 14 PAGES (including front page)

AANTAL BLADSYE: 14 BLADSYE (insluitend voorblad)

INSTRUCTIONS: ANSWER ALL THE QUESTIONS, CALCULATORS ARE NOT ALLOWED.

INSTRUKSIES: BEANTWOORD AL DIE VRAE, SAKREKENAARS WORD NIE TOEGELAAT NIE.

SECTION A: TRIGONOMETRY / AFDELING A: TRIGONOMETRIE

Question / Vraag 1

[14]

Give a short answer to the following questions: / Gee 'n kort antwoord vir die volgende vrae:

Question / Vraag	Answer / Antwoord
Give the amplitude of the trigonometric function: / Gee die amplitude van die trigonometriese funksie: $y = -\frac{1}{2} \cos \left(x - \frac{\pi}{3} \right)$	
Simplify: / Vereenvoudig: $1 - \sin^2 \theta = \cos^2 \theta$	
Convert to radians: / Herlei na radiale: -420°	
Simplify the expression: / Vereenvoudig die uitdrukking: $\frac{10 \tan 7x \cot 7x}{\cos 7x}$	
Find the value of: / Bepaal die waarde van: $\tan \frac{3\pi}{4}$	
Complete the identity: / Voltooi die identiteit: $1 + \cot^2 x = \dots$	
For which values of x will the identity above be undefined? / Vir watter waardes van x sal die identiteit hierbo ongedefinieer wees?	

Question / Vraag 2:**[10]**

The following questions are multiple choice questions. There is only one correct answer from the choices given. Select the correct option by marking the option with an X. /
Die volgende vrae is veelkeusige vrae. Daar is slegs een korrekte antwoord uit al die opsies gegee. Merk die korrekte antwoord met 'n X.

MARK YOUR ANSWERS HERE: / MERK U ANTWOORDE HIEROP:

2.1	A	B	C	D	E
2.2	A	B	C	D	E
2.3	A	B	C	D	E
2.4	A	B	C	D	E
2.5	A	B	C	D	E

2.1 $\theta \in [-360^\circ; 0^\circ]$; $\sin \theta$ is negative and $\tan \theta$ is positive. Then $\theta \in \dots$.
 $\theta \in [-360^\circ; 0^\circ]$; $\sin \theta$ is negatief en $\tan \theta$ is positief. Dan is $\theta \in \dots$.

- a) $(-90^\circ; 0^\circ)$
- b) $(-180^\circ; -90^\circ)$
- c) $(-270^\circ; -180^\circ)$
- d) $(-360^\circ; -270^\circ)$
- e) None of the above. / Geeneen van bovenoemde nie.

2.2 The area of any ΔABC is... / Die oppervlakte van enige ΔABC is...

- a) $\frac{1}{2}ac \sin A$
- b) $\frac{1}{2}bc \sin(A + B)$
- c) $\frac{1}{2}ac \sin(B + C)$
- d) $\frac{1}{2}bc \sin(B + C)$
- e) None of the above. / Geeneen van bovenoemde nie.

2.3 $3 \tan(\pi + \theta) = \dots$

a) $\frac{3}{2} \tan \theta$

b) $-\frac{3}{2} \tan \theta$

c) $3 \tan \theta$

d) $\frac{-3 \sin \theta}{\cos \theta}$

e) None of the above. / Geeneen van bogenoemde nie.

2.4 Simplify: / Vereenvoudig:

$$\sin 65^\circ \cos 20^\circ + \cos 65^\circ \sin 20^\circ$$

a) $\sin 85^\circ$

b) $\cos 45^\circ$

c) $\sin 45^\circ$

d) $\cos 85^\circ$

e) None of the above. / Geeneen van bogenoemde nie.

2.5 The equation of the graph in the diagram is ... / Die vergelyking van die grafiek in die diagram is...

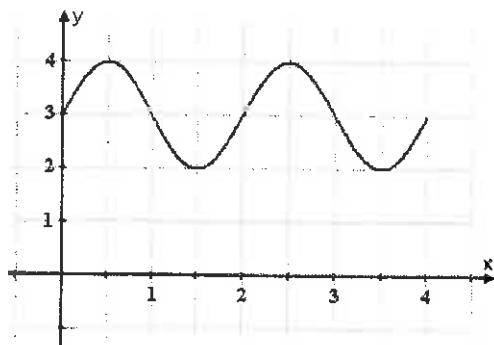
a) $y = \sin \pi x + 4$

b) $y = \cos 4\pi x$

c) $y = 4 \cos \pi x$

d) $y = \sin \pi x + 3$

e) None of the above. / Geeneen van bogenoemde nie.



Question / Vraag 3

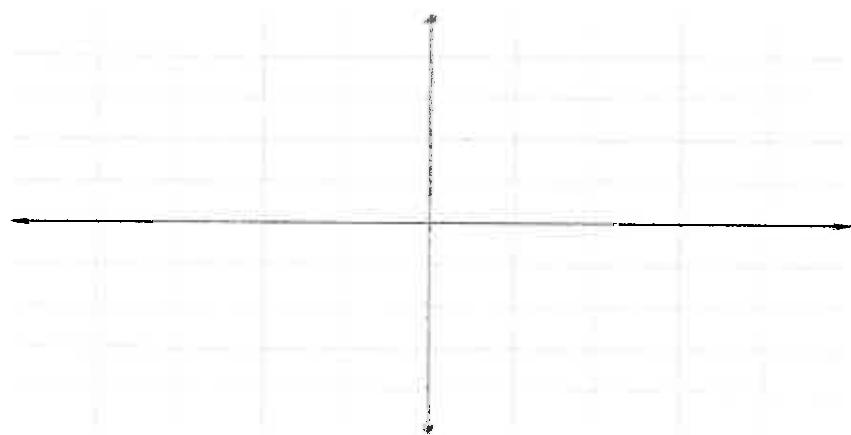
[7]

- 3.1.1 Graph the function (use the provided set of axes). Show clear readings on both axes. /
Skets die grafiek van die funksie (gebruik die gegewe assestelsel). Toon duidelike aflesings aan op beide asse.

$$f(x) = -2 \cos\left(x + \frac{\pi}{2}\right); \quad x \in [-\pi; \pi]$$

(4)

DO YOUR CALCULATIONS HERE:



- 3.1.2 Give the maximum value of $f(x) - 3$. / Skryf die maksimumwaarde van $f(x) - 3$ neer.

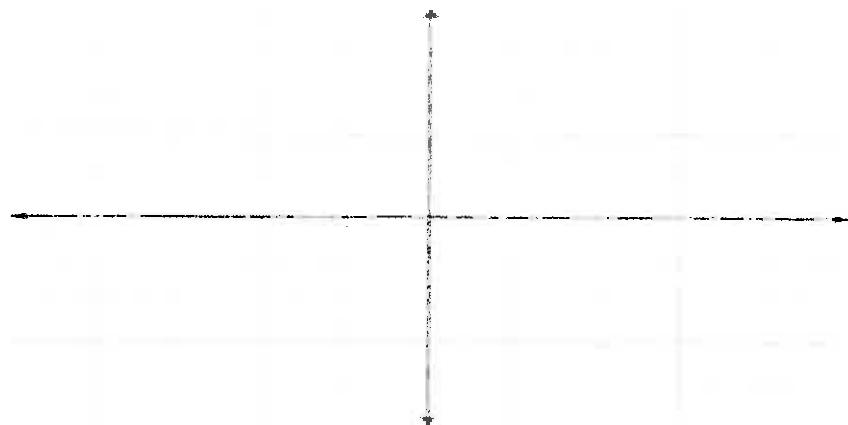
(1)

3.2 Graph the function (use the provided set of axes). Show clear readings on both axes. /

Skets die grafiek van die funksie (gebruik die gegewe assestelsel). Toon duidelike aflesings aan op beide asse.

$$y = \tan^{-1} x$$

(2)



Question 4 / Vraag 4

[9]

4.1 Find the exact value of the composite function: / Bepaal die presiese waarde van die saamgestelde funksie:

$$\sin\left(\cos^{-1}\frac{\sqrt{3}}{2}\right)$$

(3)

- 4.2 Simplify to a single trigonometric function: / Vereenvoudig tot 'n enkele trigonometriese funksie:

$$\frac{\sin(\pi - 2\theta) \cos(\pi - \theta) - \sin(-\theta)}{\cos(\pi - 2\theta)}$$

(6)

Question / Vraag 5

[10]

- 5.1 Find the general solution for x . Give your answer in radians. / Vind die algemene oplossing vir x . Gee u antwoord in radiale.

$$4 \sec 4x = 8$$

(5)

- 5.2 Solve for / Los op vir θ if / as $\theta \in [0; \frac{\pi}{2}]$

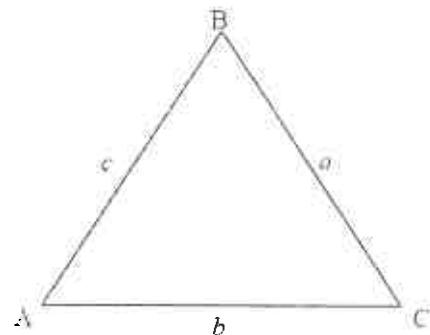
$$\tan \theta = \frac{2 \sin \frac{\pi}{4}}{\sqrt{2}}$$

(2)

5.3 Triangle ABC is isosceles with AB = BC. / Driehoek ABC is gelykbenig met AB=BC.

Prove that/ Bewys dat

$$\cos B = 1 - \frac{b^2}{2a^2}$$



(3)

SECTION B: GEOMETRY / AFDELING B: MEETKUNDE

Question / Vraag 6

[14]

Give a short answer to the following questions: / Gee 'n kort antwoord vir die volgende vrae:

Question / Vraag	Answer / Antwoord
In a regular polygon, every exterior angle is 36° . How many sides does the polygon have? <i>In 'n reëlmaterige veelhoek, is elke buitehoek gelyk aan 36°. Hoeveel sye het die veelhoek?</i>	
Complete the statement: <i>Voltooи die stelling:</i> $\Delta AOB \equiv \dots$	
A diagram of a circle with a central point labeled 'O'. Three points on the circumference are labeled 'A', 'B', and 'C'. Chords are drawn from 'O' to 'B' and from 'O' to 'C'. The angle at the center 'O' between these two chords is labeled with a question mark '?'.	

Which statement is FALSE?

Watter stelling is ONWAAR?

- A. Every rhombus is a quadrilateral. /
Elke ruit is 'n vierhoek.
- B. Every rhombus is a parallelogram. /
Elke ruit is 'n parallelogram.
- C. Every rhombus is a square./ *Elke ruit is 'n vierkant.*
- D. Every square is a rhombus./ *Elke vierkant is 'n ruit.*
- E. They are all true. /*Almal is waar.*

Complete the statement:

The angle between the tangent and the chord

...

Voltooi die stelling:

Die hoek tussen die raaklyn en die koord ...

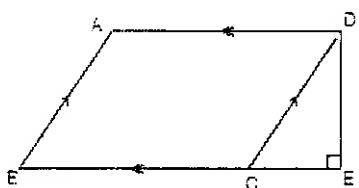
Given/

Gegee:

$BC = 60\text{cm}$,

$AB = 50\text{cm}$,

$BE = 90\text{cm}$



Calculate the perimeter of trapezium ABED. /

Vind die omtrek van trapesium ABED.

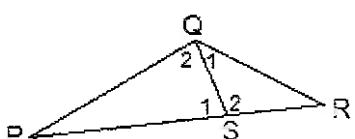
Complete the statement:/ *Voltooi die stelling:*

The exterior angle of a cyclic quadrilateral is....

Die buitehoek van 'n koordevierhoek is...

QR will be a tangent to the circle passing through P, Q and S if

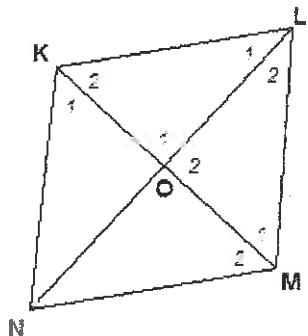
QR sal 'n raaklyn wees aan die sirkel deur P, Q en S as...



Question / Vraag 7

[20]

- 7.1 If it is given that $KLMN$ is a rhombus, prove $\Delta KLO \cong \Delta MLO$, stating all your reasons.
Indien dit gegee is dat $KLMN$ 'n ruit is, bewys, met redes, dat $\Delta KLO \cong \Delta MLO$.

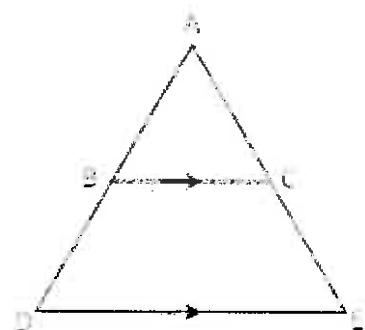


(4)

- 7.2 Prove the theorem: A line parallel to one side of a triangle divides the other two sides in the same proportion. \therefore Prove that $\frac{AB}{BD} = \frac{AC}{CE}$

Bewys die stelling: 'n Lyn ewewydig aan een sy van 'n driehoek verdeel die ander twee sye eweredig.

$$\therefore \text{Bewys dat } \frac{AB}{BD} = \frac{AC}{CE}$$

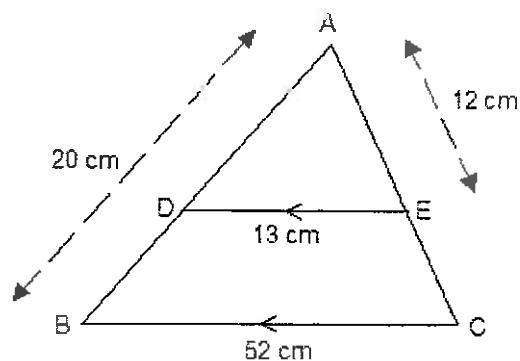


(6)

- 7.3 Use the given sketch to answer the following questions:

Gebruik die gegewe skets om die volgende vrae te beantwoord:

- a. Determine the length of EC.
Vind die lengte van EC.



(3)

- b. Determine the length of AD.

Vind die lengte van AD.

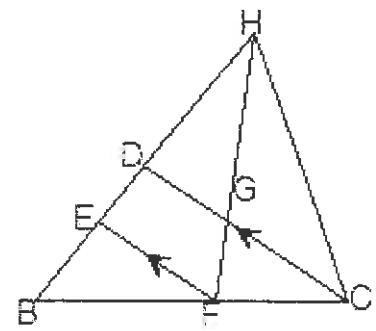
(3)

- 7.4 In ΔHBC , D is the midpoint of HB. F is a point on BC such that $BF : BC = 3 : 5$.

HF and DC intersect at G. EF is drawn parallel to DGC.

In ΔHBC is D die middelpunt van HB. F is 'n punt op BC so dat $BF : BC = 3 : 5$.

HF en DC sny by G. EF word ewewydig aan DGC getrek.



Determine the numerical values of: /Bereken die numeriese waardes van:

a. $\frac{DE}{EB}$

(2)

b. $\frac{HG}{GF}$

(2)

Question 8 / Vraag 8

[5]

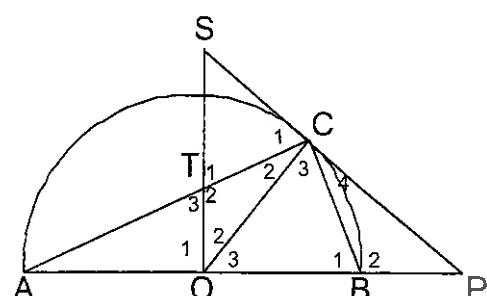
PCS is a tangent to the semicircle at C

$$\hat{C}_4 = x$$

PCS is 'n raaklyn aan die semisirkel by C.

$$\hat{C}_4 = x$$

- 8.1 Write down, with a reason, the size of: / Skryf neer, met redes, die grootte van:



$$\hat{C}_1 + \hat{C}_2$$

(2)

- 8.2 Write down, with reasons, TWO other angles each equal to x . / Skryf neer, met redes, TWEE ander hoeke wat ook gelyk is aan x .

(2)

- 8.3 Express \hat{O}_3 in terms of x . / Druk \hat{O}_3 uit in terme van x .

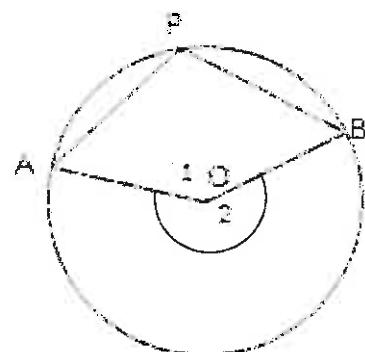
(1)

Question / Vraag 9

[11]

- 9.1 Prove the theorem which states that $\hat{O}_2 = 2\hat{P}$.

Bewys die stelling wat beweer dat $\hat{O}_2 = 2\hat{P}$.



(5)

- 9.2 In the figure, O is the centre of the circle. K, L, M and N are points on the circumference of the circle such that $LM = MN$ and $\angle L\hat{O}N = 100^\circ$.

In die figuur is O die middelpunt van die sirkel. K, L, M en N is punte op die omtrek van die sirkel so dat $LM = MN$ en $\angle L\hat{O}N = 100^\circ$.

Determine, with reasons, the values of the following: / Bereken, met redes, die waardes van die volgende:

a. $\angle LMN$

(2)

b. $\angle LKM$

(4)

