SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN

OCTOBER / NOVEMBER
OKTOBER / NOVEMBER

2004

MATHEMATICS

WISKUNDE

(Second Paper: Geometry)
(Tweede Vraestel: Meetkunde)

LG

301-3/2 (LS)

12 pages
12 *bladsye*

301 3 2 LG

GAUTENGSE DEPARTEMENT VAN ONDERWYS

SENIORSERTIFIKAAT-EKSAMEN

WISKUNDE LG
(Tweede Vraestel: Meetkunde)

TYD: 3 uur

PUNTE: 150

INSTRUKSIES:

- Daar is 12 vrae.
- Beantwoord al die vrae. Toon alle berekenings.
- Formules wat nodig is vir die berekeninge word voorsien.
- Dit is nie nodig om die gegewe diagramme in jou antwoordboek oor te teken nie.
- Vrae mag nie op die diagramvelle beantwoord word nie.
- Sakrekenaars mag gebruik word.

TRIGONOMETRIE

VRAAG 1

1.1 Bereken, afgerond tot twee desimale syfers, die waarde van die volgende:

1.1.1 $0{,}5 \sin (80° + 71{,}4°)$ (2)

1.1.2 $\sin \frac{1}{2}(80° + 71{,}4°)$ (3)

1.1.3 $\cos 131{,}4° \cdot \tan 131{,}4°$ (3)

1.2 Bereken die waarde van die volgende, afgerond tot twee desimale syfers, as:

$x = 43{,}7°$ en $y = 61{,}8°$

1.2.1 $\cos(y - x)$ (2)

1.2.2 $3 \sin^2 y$ (2)

1.2.3 $\tan \frac{x}{2}$ (2)

1.2.4 $\sqrt{\cos y + \sin y}$ (3)

GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

MATHEMATICS LG
(Second Paper: Geometry)

TIME: 3 hours

MARKS: 150

INSTRUCTIONS:

- There are 12 questions.
- Answer all questions. Show all calculations.
- Formulae needed for calculations are supplied.
- It is not necessary to redraw the given diagrams in your answer book.
- Questions are not to be answered on the diagram sheet.
- Calculators may be used.

TRIGONOMETRY

QUESTION 1

1.1 Calculate, rounded off to two decimal digits, the value of the following:

1.1.1 $0,5 \sin (80° + 71,4°)$ (2)

1.1.2 $\sin \frac{1}{2}(80° + 71,4°)$ (3)

1.1.3 $\cos 131,4° \cdot \tan 131,4°$ (3)

1.2 Calculate the value of the following, rounded off to two decimal digits, if:

$x = 43,7°$ and $y = 61,8°$

1.2.1 $\cos(y - x)$ (2)

1.2.2 $3 \sin^2 y$ (2)

1.2.3 $\tan \frac{x}{2}$ (2)

1.2.4 $\sqrt{\cos y + \sin y}$ (3)

1.3 Bereken θ, afgerond tot een desimale syfer, as:

1.3.1 $\sin \frac{3}{4}\theta = 0{,}25$ (2)

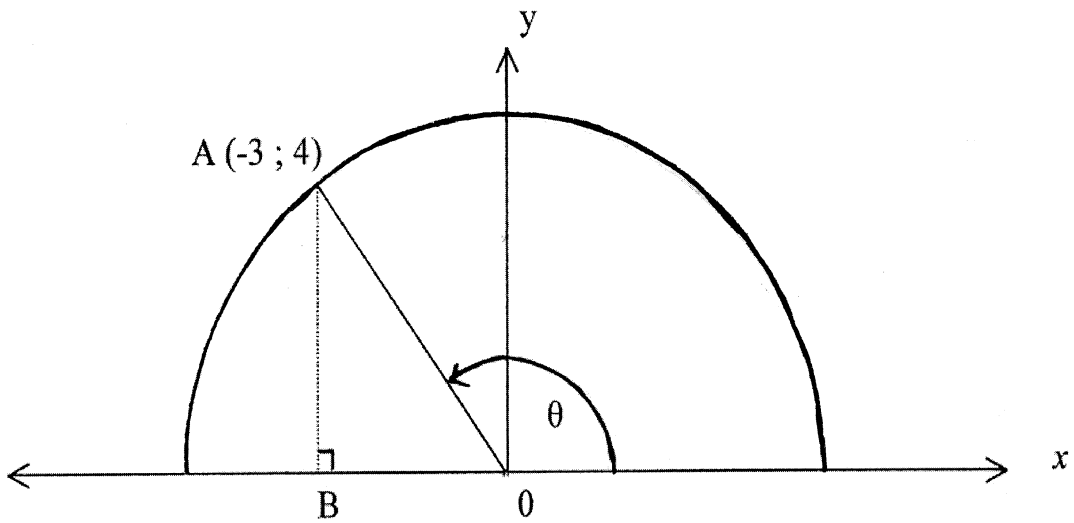
1.3.2 $\frac{3}{4}\sin\theta = 0{,}25$ (2)

1.3.3 $\sin\theta - \frac{3}{4} = -0{,}25$ (3)

[24]

VRAAG 2

In die skets is $A\hat{O}X = \theta$ en A se koördinate is (–3 ; 4).



2.1 Bereken die lengte van AO. (4)

2.2 Bereken die waarde van:

2.2.1 $\tan\theta$ (1)

2.2.2 $\cos^2\theta$ (2)

2.3 Bereken die waarde van:

$\tan\theta \cdot \cos\theta + \sin\theta$ (5)

[12]

1.3 Determine θ, rounded off to one decimal place, if:

1.3.1 $\sin \frac{3}{4}\theta = 0,25$ (2)

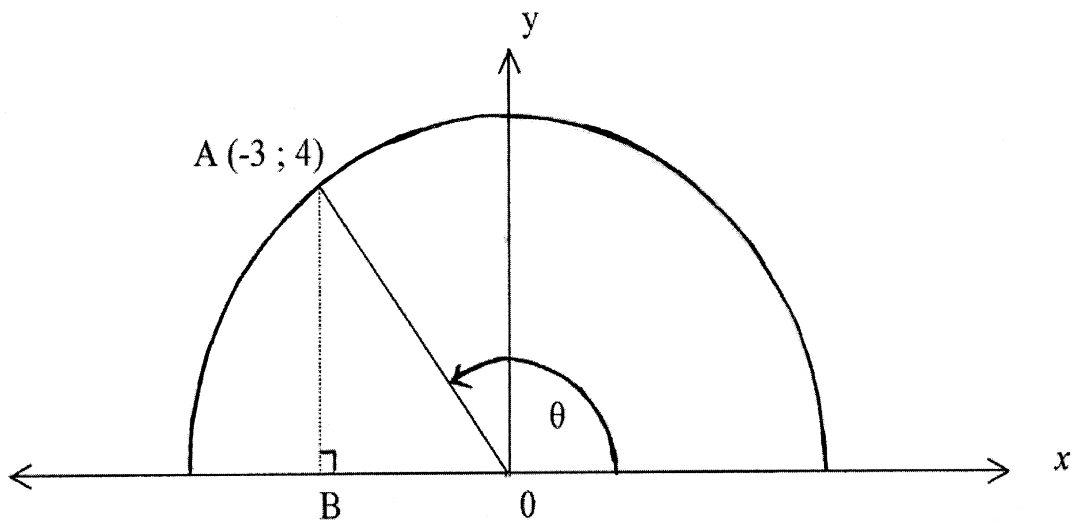
1.3.2 $\frac{3}{4}\sin\theta = 0,25$ (2)

1.3.3 $\sin\theta - \frac{3}{4} = -0,25$ (3)

[24]

QUESTION 2

In the sketch, $A\hat{O}X = \theta$ and A has co-ordinates (–3 ; 4).



2.1 Calculate the length of AO. (4)

2.2 Calculate the value of:

2.2.1 $\tan\theta$ (1)

2.2.2 $\cos^2\theta$ (2)

2.3 Calculate the value of:

$\tan\theta \cdot \cos\theta + \sin\theta$ (5)

[12]

VRAAG 3

3.1 Gee die waarde van:

3.1.1 tan 45° (1)

3.1.2 tan 135° (1)

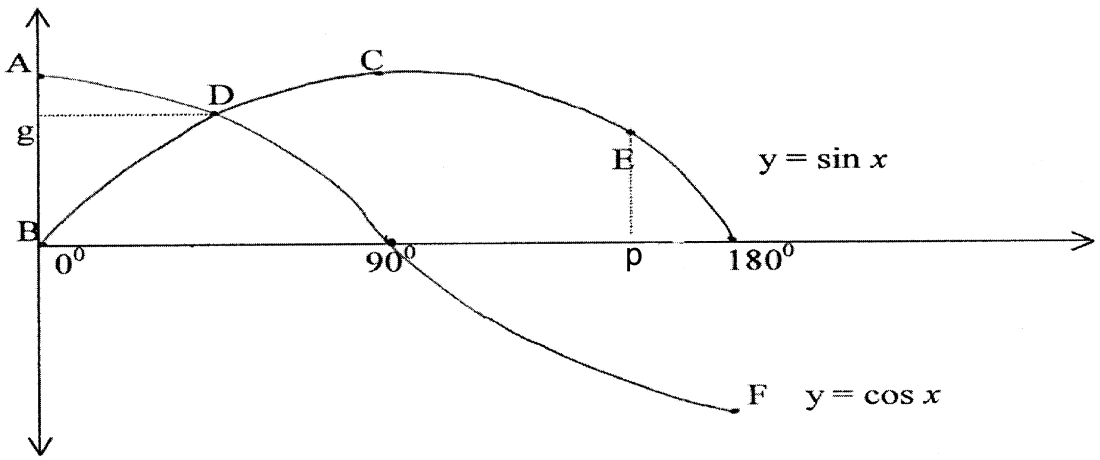
3.1.3 tan 180° (1)

3.2 Skets die grafiek van:

y = tan x as [0° $\leq x \leq$ 180°; $x \neq$ 90°] (8)

[11]

VRAAG 4



Die skets toon die grafieke van y = sin x en y = cos x vir

$x \in$ (0° ; 180°). D (45° ; g) en E (p° ; 0,5) is punte op die grafieke.

C en F is draaipunte.

4.1 Bereken die waarde / grootte van g en p, afgerond tot een desimale syfer. (4)

4.2 Skryf die koördinate van A, B en C neer. (6)

[10]

QUESTION 3

3.1 State the value of:

3.1.1 tan 45° (1)

3.1.2 tan 135° (1)

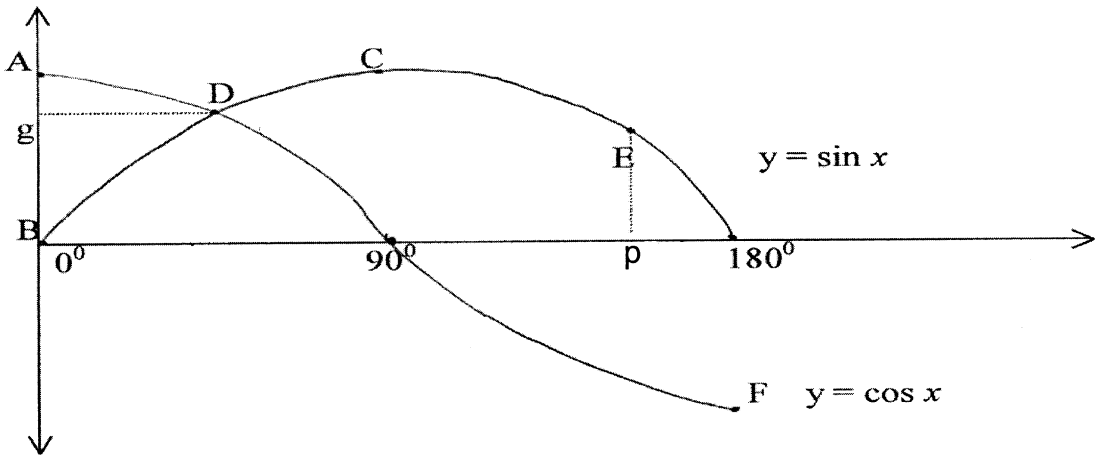
3.1.3 tan 180° (1)

3.2 Sketch the graph of:

y = tan x if [0° $\leq x \leq$ 180°; $x \neq$ 90°] (8)

[11]

QUESTION 4



The sketch shows the graphs of y = sin x and y = cos x for

$x \in$ (0° ; 180°). D (45° ; g) and E (p° ; 0,5) are points on the graphs.

C and F are turning points.

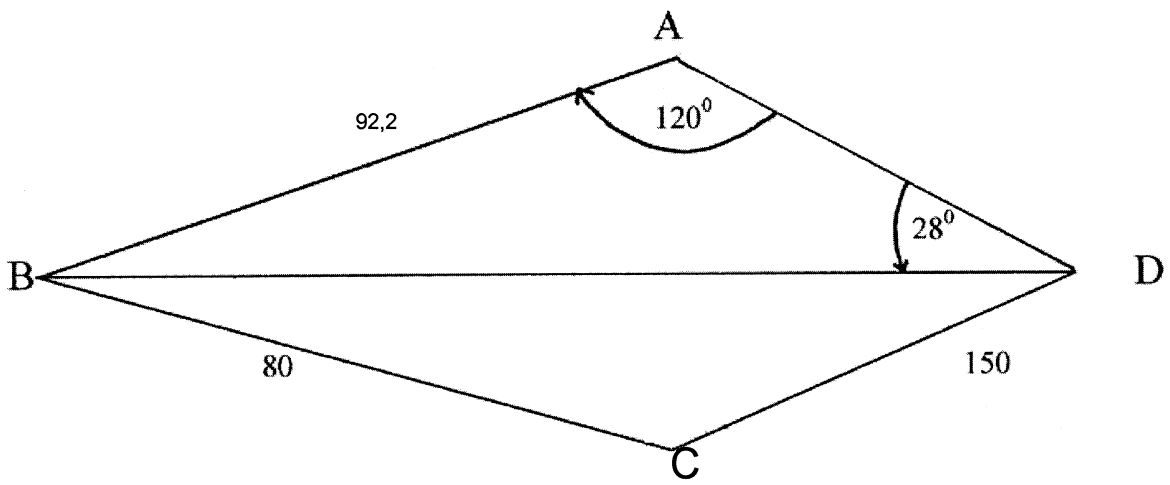
4.1 Calculate the value / size of g and p, rounded off to one decimal digit. (4)

4.2 Write down the co-ordinates of A, B and C. (6)

[10]

VRAAG 5

Sinus Reël	Cosinus Reël
In enige Δ ABC:	In enige Δ ABC:
$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$	$a^2 = b^2 + c^2 - 2bc \cos A$ $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	$b^2 = a^2 + c^2 - 2ac \cos B$ $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$
	$c^2 = a^2 + b^2 - 2ab \cos C$ $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$



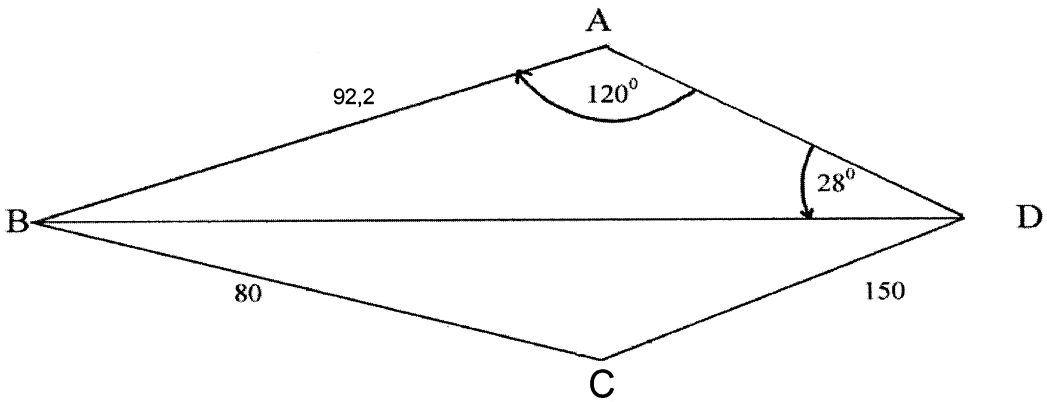
ABCD is 'n vierhoek met $\hat{A}$ = 120°, $A\hat{D}B$ = 28°, AB = 92,2; BC = 80 en CD = 150.

5.1 Bereken BD, afgerond tot die naaste heelgetal. (6)

5.2 As BD = 170, bereken die grootte van $\hat{C}$. (6)
[12]

QUESTION 5

Sine Rule	Cosine Rule
In any Δ ABC:	In any Δ ABC:
$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$	$a^2 = b^2 + c^2 - 2bc \cos A$ $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	$b^2 = a^2 + c^2 - 2ac \cos B$ $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$
	$c^2 = a^2 + b^2 - 2ab \cos C$ $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$



ABCD is a quadrilateral with $\hat{A}$ = 120°, $A\hat{D}B$ = 28°, AB = 92,2; BC = 80 en CD = 150.

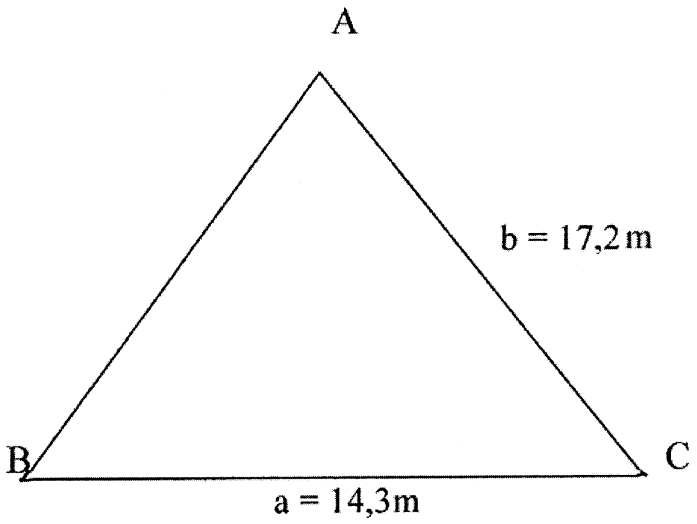
5.1 Calculate BD, rounded off to the nearest integer. (6)

5.2 If BD = 170, calculate the size of $\hat{C}$. (6)

[12]

VRAAG 6

Oppervlakte van Δ ABC = $\frac{1}{2}$ ab sin C



Bereken $\hat{C}$ as:

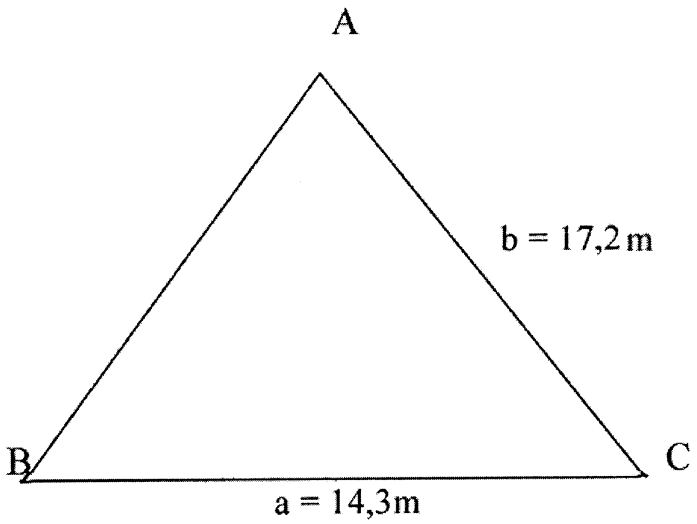
a = 14,3m

b = 17,2m

en die Oppervlakte van ΔABC = 93m^2. (7)
[7]

QUESTION 6

Area of Δ ABC = $\frac{1}{2}$ ab sin C



Determine $\hat{C}$ if:

a = 14,3m

b = 17,2m

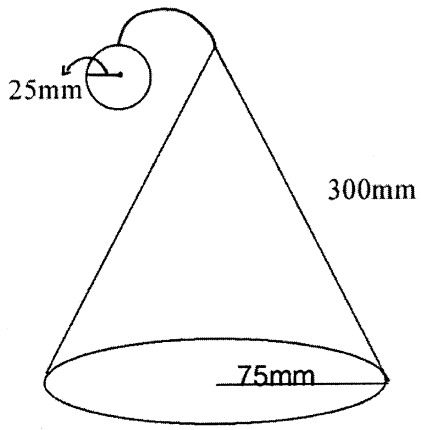
and the Area of ΔABC = 93m^2. (7)

[7]

DRIEDIMENSIONELE VORMS

VRAAG 7

FORMULES
Die totale buite-oppervlakte van 'n regte keël waar h die skuinshoogte is: $A = \pi rh + \pi r^2$
Die buite-oppervlakte van 'n bol: $A = 4\ \pi r^2$
Die volume van 'n bol: $V = \frac{4}{3} \pi r^3$



Die diagram dui 'n keëlvormige dwerghoed op 'n sirkelvormige basis aan wat benodig word vir 'n kleuterskoolkonsert.
Die hoed het 'n radius van 75mm en 'n skuinshoogte van 300mm.
'n Klokkie bestaande uit 'n hol bal met 'n albaster binne-in is vasgemaak aan die punt van die hoed.
Die bal het 'n radius van 25mm terwyl die albaster, binne-in die bal, 'n volume van 15 500,8 kubieke millimeter het.

Rond al die antwoorde af tot een desimale syfer.

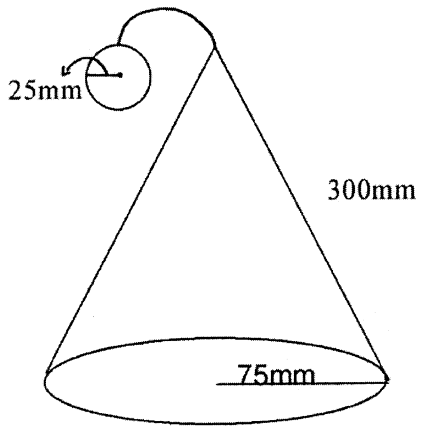
Bereken die hoeveelheid materiaal wat benodig sal word om die volgende dele te bedek:

7.1 Die buite-oppervlakte van die hoed. (5)
7.2 Die buite-oppervlakte van die bal. (5)
7.3 Bereken die volume lug binne-in die hol bal. (7)
[17]

THREE-DIMENSIONAL SHAPES

QUESTION 7

FORMULAE
The total surface area of a right circular cone where h is the slant height: $A = \pi rh + \pi r^2$
The surface area of a sphere: $A = 4\ \pi r^2$
The volume of a sphere: $V = \frac{4}{3} \pi r^3$



The diagram shows a cone-shaped dwarf hat on a circular base, which is required for a nursery school concert.
The hat has a radius of 75mm and a slant height of 300mm.
A bell, consisting of a hollow ball with a marble inside, is tied at the top.
The ball has a radius of 25mm while the marble inside the ball, has a volume of 15 500,8 cubic millimetres.

Round all answers off to one decimal digit.

Calculate the quantity of material which will be required to cover the following parts:

7.1 The external surface area of the hat. (5)
7.2 The external surface area of the ball. (5)
7.3 Calculate the volume of air inside the hollow ball. (7)
[17]

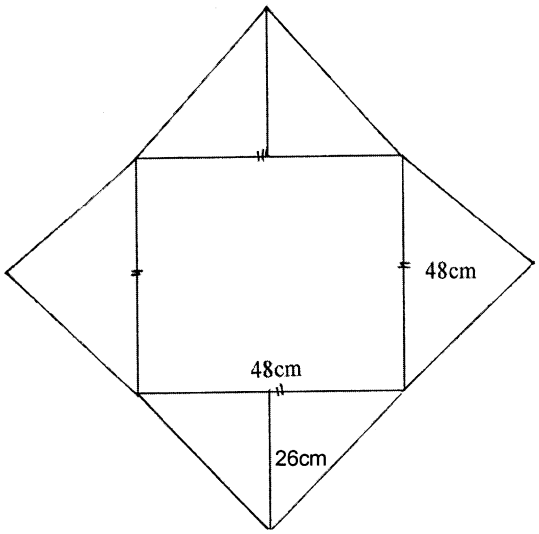
VRAAG 8

FORMULES

$r^2 = x^2 + y^2$

Oppervlakte van vierkant = ℓ^2

Oppervlakte van driehoek = $\frac{1}{2}$ x b x h



Die bygaande skets wys 'n regte piramide met sye van 48cm en 'n skuinshoogte van 26cm op 'n vierkantige basis wat oopgevou is.

8.1 Wys deur berekeninge dat die vertikale hoogte 10cm is. (4)

8.2 Bereken die:

8.2.1 basisoppervlakte van die piramide. (2)
8.2.2 oppervlakte van die vier driehoeke. (4)
8.2.3 totale oppervlakte van die piramide. (3)
[13]

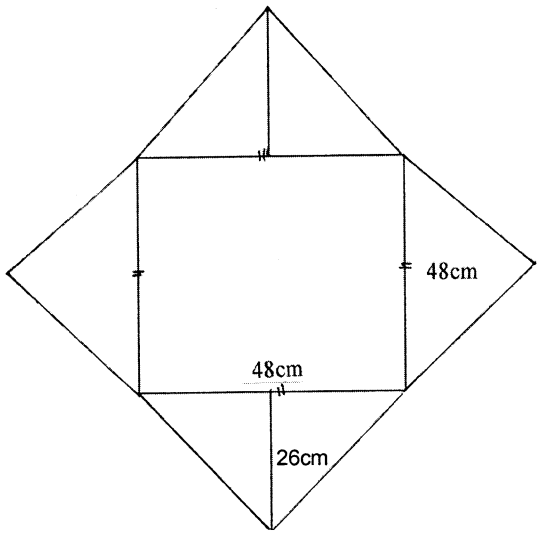
QUESTION 8

FORMULAE

$r^2 = x^2 + y^2$

Area of a square = ℓ^2

Area of triangle = $\frac{1}{2}$ x b x h



The accompanying sketch shows a right pyramid on a square base, with sides of 48cm and a slant height of 26cm.

8.1 Show by means of calculation, that the vertical height is 10cm. (4)

8.2 Calculate the:

8.2.1 base area of the pyramid (2)

8.2.2 area of the four triangles (4)

8.2.3 total surface area of the pyramid (3)

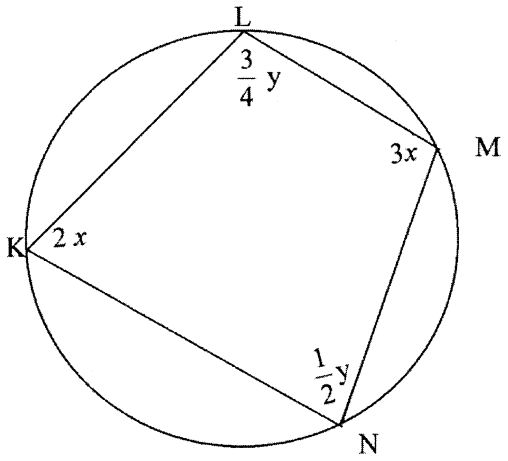
[13]

MEETKUNDE

VRAAG 9

KLMN is 'n koordevierhoek.

$$\hat{K} = 2x \; ; \; \hat{L} = \frac{3}{4}y \; ; \; \hat{M} = 3x \; ; \; \hat{N} = \frac{1}{2}y$$



Bereken met redes:

9.1 $\hat{K}$ (5)

9.2 $\hat{M}$ (2)

9.3 $\hat{L}$ (5)

9.4 $\hat{N}$ (2)

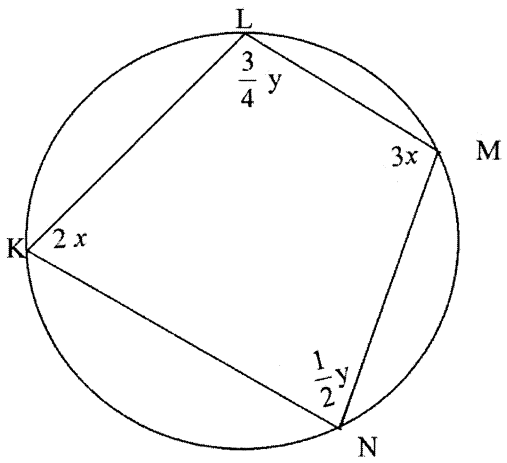
[14]

GEOMETRY

QUESTION 9

KLMN is a cyclic quadrilateral.

$$\hat{K} = 2x \; ; \; \hat{L} = \frac{3}{4}y \; ; \; \hat{M} = 3x \; ; \; \hat{N} = \frac{1}{2}y$$



Calculate with reasons:

9.1 $\hat{K}$ (5)

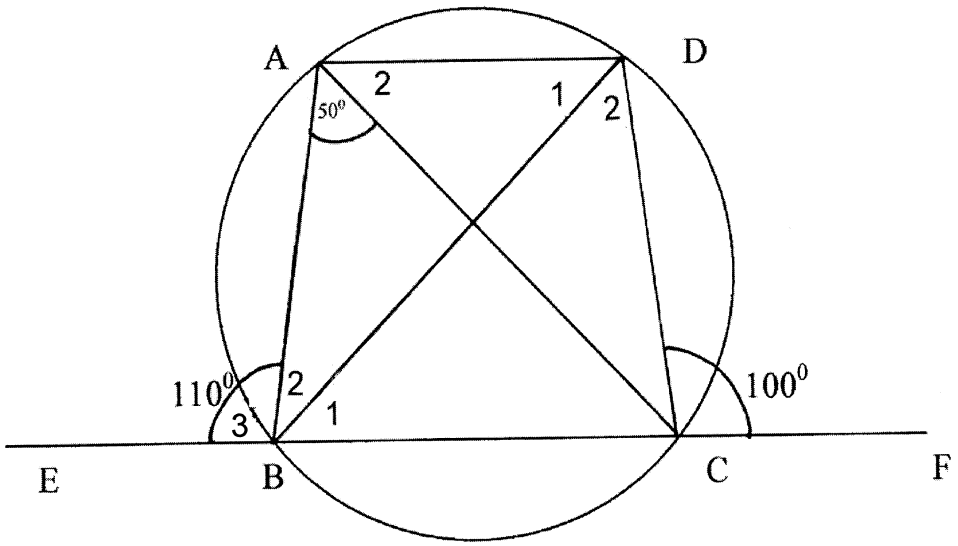
9.2 $\hat{M}$ (2)

9.3 $\hat{L}$ (5)

9.4 $\hat{N}$ (2)

[14]

VRAAG 10



ABCD is 'n koordevierhoek.

$\hat{A} = 50°$; $\hat{B}_3 = 110°$; $D\hat{C}F = 100°$

Bereken, met redes, die groottes van die volgende hoeke:

10.1 $\hat{A}_2$ (3)

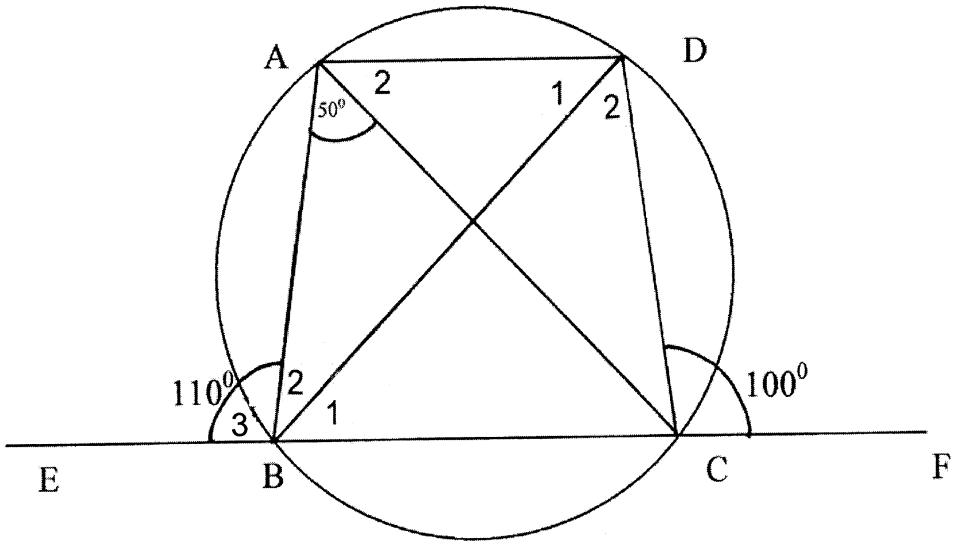
10.2 $\hat{D}_2$ (2)

10.3 $\hat{D}_1$ (3)

10.4 $\hat{B}_1$ (2)

[10]

QUESTION 10



ABCD is a cyclic quadrilateral.

$\hat{A} = 50°$; $\hat{B}_3 = 110°$; $D\hat{C}F = 100°$

Calculate, stating reasons, the sizes of the following angles:

10.1 $\hat{A}_2$ (3)

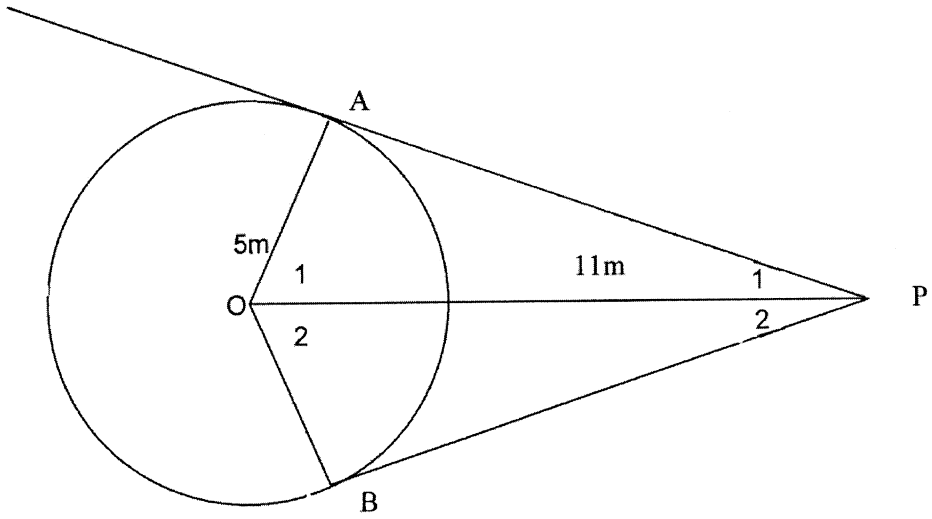
10.2 $\hat{D}_2$ (2)

10.3 $\hat{D}_1$ (3)

10.4 $\hat{B}_1$ (2)

[10]

VRAAG 11



O is die middel van die sirkel.

AP en PB is raaklyne aan die sirkel by punte A en B.

$\hat{P}_1 = 25°$; AB = BP ; OA = 5m ; OP = 11m

Bereken, met redes, die groottes van die volgende hoeke:

11.1 $O\hat{A}P$ (2)

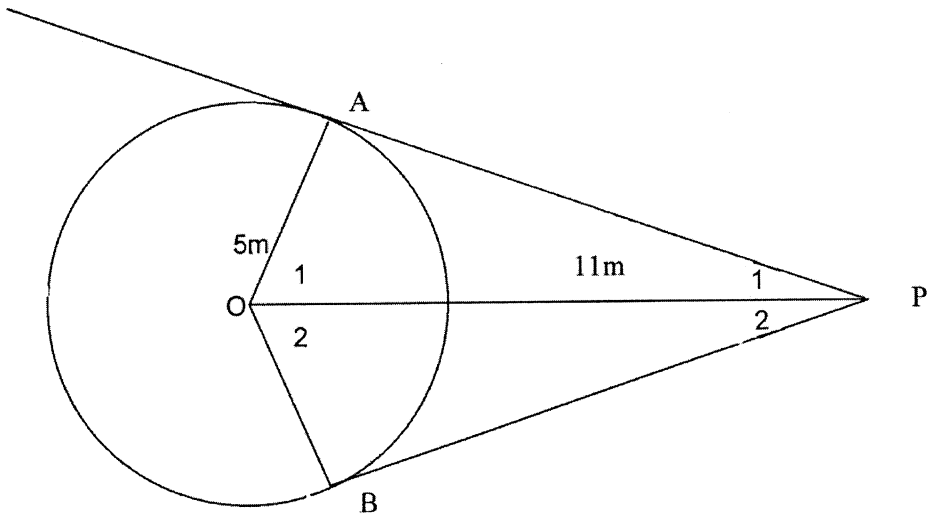
11.2 $\hat{O}_1$ (3)

11.3 $\hat{O}_2$ (2)

11.4 $\hat{P}_2$ (3)

11.5 AP (afgerond tot een desimale syfer) (3)
[13]

QUESTION 11



O is the centre of the circle.

AP and PB are tangents of the circle at A and B.

$\hat{P}_1 = 25°$; AB = BP ; OA = 5m ; OP = 11m

Calculate, stating reasons, the sizes of the following angles.

11.1 $O\hat{A}P$ (2)

11.2 $\hat{O}_1$ (3)

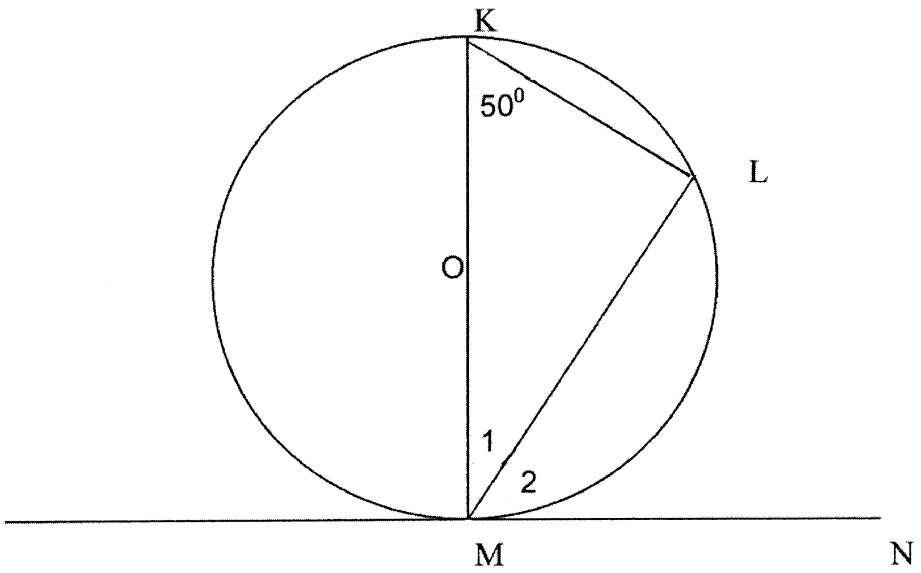
11.3 $\hat{O}_2$ (2)

11.4 $\hat{P}_2$ (3)

11.5 AP (rounded off to one decimal digit) (3)

[13]

VRAAG 12



O is die middel van die sirkel.

MN is 'n raaklyn aan sirkel O.

$\hat{K} = 50°$

Bereken, met redes, die groottes van die volgende hoeke:

12.1 $\hat{L}$ (2)

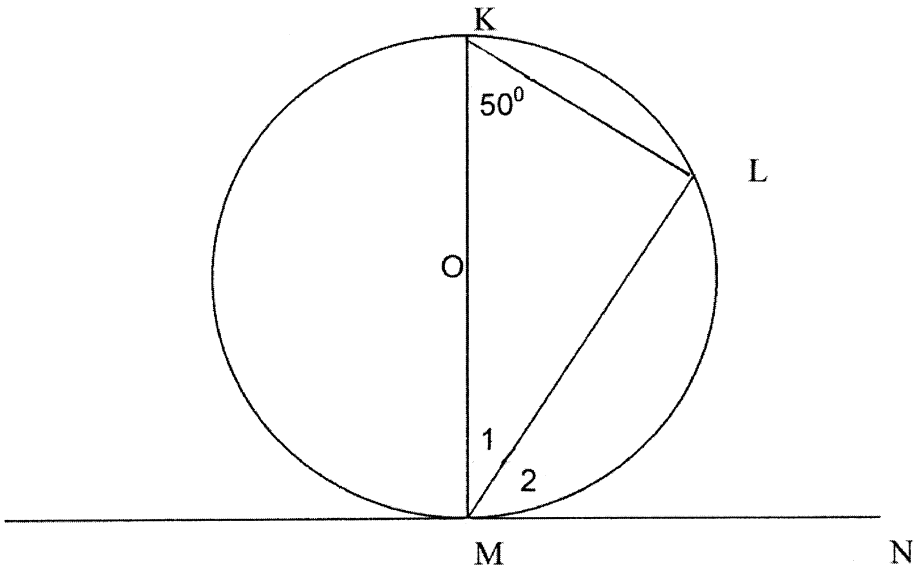
12.2 $\hat{M}_1$ (3)

12.3 $\hat{M}_2$ (2)
[7]

TOTAAL: 150

EINDE

QUESTION 12



O is the centre of the circle.

MN is a tangent to circle O.

$\hat{K} = 50°$

Calculate, stating reasons, the sizes of the following angles:

12.1 $\hat{L}$ (2)

12.2 $\hat{M}_1$ (3)

12.3 $\hat{M}_2$ (2)
[7]

TOTAL: 150

END