



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIORSERTIFIKAAT**

GRADE/GRAAD 12

JUNE/JUNIE 2023

**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 12 pages.
Hierdie nasienriglyn bestaan uit 12 bladsye.

QUESTION 1/VRAAG 1 8 8 10^{10,17} 12 16 17 18 18^{21,83} 18 25 26

1.1	16 ✓✓ $\frac{18+26+\dots+8}{11} = \frac{176}{11}$ 2	✓✓ answer / antwoord	(2)
1.2	$\sigma = 5,83$ ✓✓ 2	✓✓ answer / antwoord	(2)
1.3	$16 + 5,83 = 21,83$ ∴ 2 above/bokant. ✓✓ 2	✓✓ answer / antwoord	(2)
1.4	$16 - 5,83 = 10,17$ $\frac{3}{11} \times 100 = 27,27\%$ ✓✓ 2	✓✓	(2)
			[8]

QUESTION 2/VRAAG 2

Hours / Ure	Number of dads Aantal pa's	Cumulative frequency Kumulatiewe frekwensie
$0 < x \leq 5$	1	1
$5 < x \leq 10$	18	19
$10 < x \leq 15$	24	43
$15 < x \leq 20$	25	68
$20 < x \leq 25$	18	86 ✓
$25 < x \leq 30$	12	98
$30 < x \leq 35$	1	99
$35 < x \leq 40$	1	100

2.1

Working dads help working moms.
Werkende pa's help werkende ma's

✓ table / tabel
✓ anchor point / ankerpunt (0;0)
✓ (10; 19)
✓ (25; 86)
✓ (40; 100)

2.2 16 (Accept values from 14 to 18) ✓✓
 $M = T_{\frac{1}{2}(1+100)} = T_{50,5}$ 2

2.3 $15 < x \leq 20$ ✓

2.4 $\bar{x} = 16,8$ ✓✓
 $\frac{2,5 \times 1 + 7,5 \times 18 + \dots + 37,5 \times 1}{100} = \frac{1680}{100}$ 2

2.5 Mean \approx Median and lies in the Modal class.
Data is symmetrical / Normal / Data not skewed.
Gemiddelde \approx Mediaan en lê in die Modale klas
Data is simmetries / Normaal / Data nie skeef nie. ✓✓ reason / rede

(4)
(2)
(1)
(2)
(3)
[12]

$$\begin{aligned} 2.5. \quad \bar{x} - M &= 16,8 - 16 \\ &= 0,8 \quad \checkmark \end{aligned}$$

\bar{x} and M lie in the modal interval / class. \checkmark

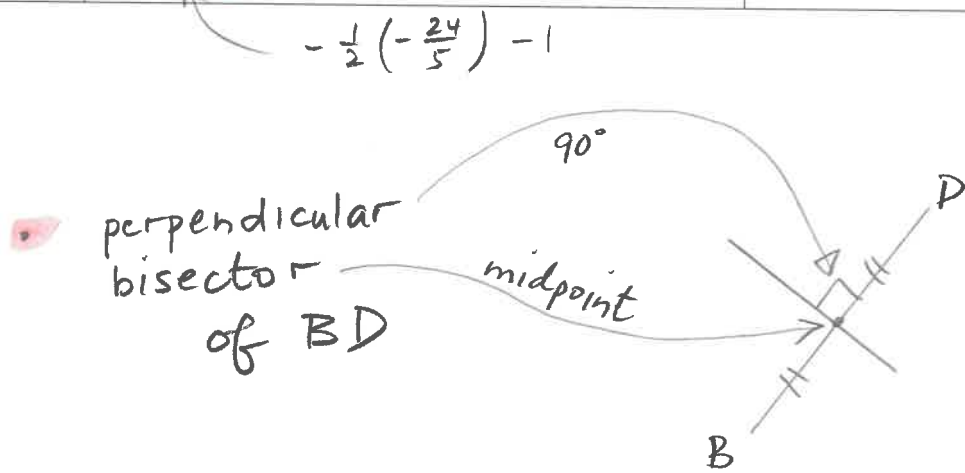
\therefore data is almost symmetrical, just slightly positively (to the right) skewed.

3

QUESTION 3/VRAAG 3

3.1	$y = -\frac{1}{3}x + 10$ ✓ ($m_1 \times m_2 = -1$) $\frac{p}{2} = -\frac{1}{3}(4) + 10$ ✓ $p = \frac{52}{3}$ ✓ $17,33$ 3	✓ equation of line / verg. van lyn ✓ substitution of point / vervanging van punt ✓ answer / antwoord	(3)
3.2	O(0;0) and/en P(-2;p-1) and/en $OP = \sqrt{(-2-0)^2 + (p-1-0)^2}$ ✓ $OP^2 = (-2-0)^2 + (p-1-0)^2$ $(2p)^2 = 4 + p^2 - 2p + 1$ ✓ $4p^2 = p^2 - 2p + 5$ $3p^2 + 2p - 5 = 0$ ✓ $(3p+5)(p-1) = 0$ ✓ $p = \frac{5}{3}$ reject or $p = 1$ $\therefore p = 1$ ✓ 5	✓ substitution / vervanging ✓ simplification / vereenvoudiging ✓ standard form / standaardvorm ✓ factors / faktore ✓ answer / antwoord with selection	(5)
3.3.1	$m_{BD} = 2$ ✓ $\frac{-5-3}{-2-2} = \frac{B(2;3)}{D(-2;-5)}$ 2	✓ ✓ answer / antwoord	(2)
3.3.2	Midpoint of BD : Middelpunt van BD (0;-1) $y = -\frac{1}{2}x - 1$ ✓ $x_M = \frac{2+(-2)}{2} = 0$ ✓ $y_M = \frac{3+(-5)}{2} = -1$ ✓ 3	✓ ✓ midpoint / middelpunt ✓ answer / antwoord	(3)
3.3.3	$x^2 + y^2 = 25$ ✓ 2	✓ ✓ answer / antwoord	(2)
3.3.4	$x^2 + \left(-\frac{1}{2}x - 1\right)^2 = 25$ ✓ $x^2 + \frac{1}{4}x^2 + x + 1 = 25$ ✓ $4x^2 + x^2 + 4x + 4 = 100$ $5x^2 + 4x - 96 = 0$ ✓ $(5x+24)(x-4) = 0$ ✓ $x = -\frac{24}{5}$ or/of $x = 4$ ✓ $\therefore y_c = \frac{7}{5}$ ✓ 6	✓ substitution / vervanging ✓ simplification / vereenvoudiging ✓ standard form / standaardvorm ✓ factorisation / faktoriserings ✓ x-values / x-waardes ✓ answer / antwoord	(6)

[21]



3.1.

OR

$$m_1 = 3$$

$$m_2 = -\frac{1}{3} \quad \perp$$

$$\checkmark \frac{10 - \frac{p}{2}}{0 - 4} = -\frac{1}{3} \checkmark$$

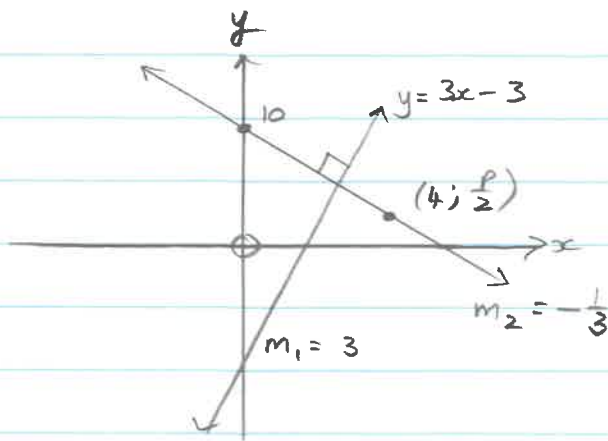
$$10 - \frac{p}{2} = \frac{4}{3}$$

$$-\frac{p}{2} = -\frac{26}{3}$$

$$\underline{p = \frac{52}{3} \checkmark}$$

17,33

3



3.3.4.

$$y = -\frac{1}{2}x - 1$$

$$y + 1 = -\frac{1}{2}x$$

$$-2y - 2 = x \checkmark$$

$$x^2 + y^2 = 25$$

$$(-2y - 2)^2 + y^2 = 25 \checkmark$$

$$4y^2 + 8y + 4 + y^2 = 25 \checkmark$$

$$5y^2 + 8y - 21 = 0 \checkmark$$

$$(y + 3)(5y - 7) = 0 \checkmark$$

$$\therefore y = -3 \text{ or } \frac{7}{5}$$

$$\therefore \underline{y_c = \frac{7}{5} \checkmark}$$

6

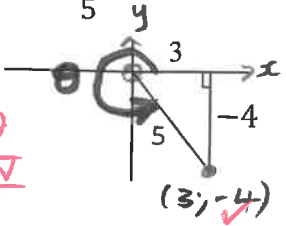
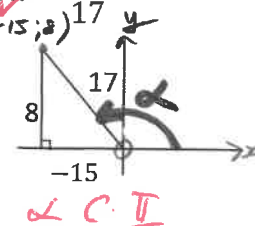
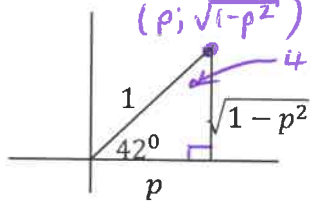
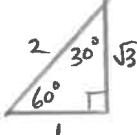
3.1.

QUESTION 4 / VRAAG 4

<p>4.1</p>	$x^2 + y^2 = 16$ $x^2 + (4 - 2x)^2 = 16$ $x^2 + 16 - 16x + 4x^2 = 16$ $5x^2 - 16x = 0$ $x(5x - 16) = 0$ $x = 0 \quad \text{or/of} \quad x = \frac{16}{5} = 3,2$ $y = 4 - 2(0) \quad y = 4 - 2(3,2)$ $y = 4 \quad y = -2,4$	<ul style="list-style-type: none"> ✓ $y = 4 - 2x$ ✓ substitution / <i>vervanging</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ x-values / x-waardes ✓ substitution / <i>vervanging</i> ✓ y-values / y-waardes 	<p style="text-align: right;">7</p> <p style="text-align: right;">(7)</p>
<p>4.2</p>	$S(-3,2; 2,4) \quad \frac{x_s + 3,2}{2} = 0 \quad \frac{y_s + (-2,4)}{2} = 0 \quad \text{radii}$	<ul style="list-style-type: none"> ✓✓ answer / <i>antwoord</i> 	<p style="text-align: right;">2</p> <p style="text-align: right;">(2)</p>
<p>4.3</p>	$y = 4 - 2x$ $0 = 4 - 2x$ $2x = 4$ $x = 2$ $R(2; 0)$ $\therefore \text{radius} = 2 \text{ units / eenhede}$ $(x - 2)^2 + y^2 = 4$	<ul style="list-style-type: none"> ✓ equating to 0 / <i>gelyk stel aan 0</i> ✓ $x = 2$ ✓ radius = 2 units/eenhede ✓ answer / <i>antwoord</i> 	<p style="text-align: right;">4</p> <p style="text-align: right;">(4)</p>
<p>4.4</p>	$(x - y)^2 + y^2 - y = 12$ $(x - 6)^2 + y^2 - y + \frac{1}{4} = 12 + \frac{1}{4}$ $(x - 6)^2 + \left(y - \frac{1}{2}\right)^2 = \frac{49}{4}$ <p>Centre/Middelpunt $\left(6; \frac{1}{2}\right)$ and/en $O(0; 0)$</p> $d = \sqrt{(6-0)^2 + \left(\frac{1}{2}-0\right)^2} = \sqrt{\frac{145}{4}}$ $d \approx 6,02$	<ul style="list-style-type: none"> ✓ completing the square / <i>vierkantsvoltooiing</i> ✓ simplification / <i>vereenvoudiging</i> ✓ coordinates of midpoint / <i>koördinate van middelpunt</i> ✓ substitution in distance formula / <i>vervanging in afstand formule</i> ✓ answer / <i>antwoord</i> 	<p style="text-align: right;">5</p> <p style="text-align: right;">(5)</p>
<p>[18]</p>			

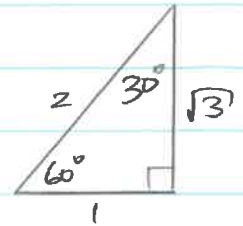
QUESTION 5/VRAAG 5

NB correct labelling of θ and α

<p>5.1</p>	<p>$5 \cos \theta - 3 = 0$ $\cos \theta = \frac{3}{5}$ ✓  $(3; -4)$ ✓ <i>Q IV</i></p>	<p>$17 \sin \alpha = 8$ $\sin \alpha = \frac{8}{17}$ ✓  $(-15; 8)$ ✓ <i>Q II</i></p>	<p>✓ $\cos \theta = \frac{3}{5}$ • measured from direction of +ve x-axis ✓ $\sin \alpha = \frac{8}{17}$ • anti clockwise ✓ -4 in correct quadrant in korrekte kwadrant ✓ -15 in correct quadrant in korrekte kwadrant ✓ correct values / korrekte waardes ✓ answer / antwoord</p>	<p>(6)</p>
<p>$\tan \alpha + \tan \theta$ $= -\frac{8}{15} + \left(-\frac{4}{3}\right)$ ✓ both $\frac{8}{-15}$ $-\frac{4}{3}$ $= -\frac{28}{15}$ ✓ 6</p>				
<p>5.2</p>	<p>$\cos 42^\circ = p$  $(p; \sqrt{1-p^2})$ 48° Sum \hat{A}'s in $\Delta = 180^\circ$</p>		<p>(2)</p>	
<p>5.2.1</p>	<p>$\sin 48^\circ = p$ ✓ ✓ $\sin (90^\circ - 42^\circ) = \cos 42^\circ$</p>	<p>✓ ✓ answer / antwoord 2</p>	<p>(2)</p>	
<p>5.2.2</p>	<p>$\sin(-2202^\circ)$ $\textcircled{072}$ $\sin 318^\circ$ $= \sin(-42^\circ) = \sin(360^\circ - 42^\circ)$ $= -\sin 42^\circ = -\sin 42^\circ$ $= -\sqrt{1-p^2}$ ✓ ✓ $= \frac{0}{h} = \frac{\sqrt{1-p^2}}{1}$</p>	<p>✓ $-\sin(42^\circ)$ 2 ✓ answer / antwoord</p>	<p>(2)</p>	
<p>5.2.3</p>	<p>$\cos 84^\circ$ $= \cos 2(42^\circ)$ ✓ $= 2 \cos^2 42^\circ - 1$ ✓ $= 2p^2 - 1$ ✓</p> <p>$\cos 2x = 2 \cos^2 x - 1$ $x = 42^\circ$ $\cos 84^\circ = 2 \cos^2 42^\circ - 1$</p>	<p>✓ $\cos 2(42^\circ)$ 2 ✓ answer / antwoord</p>	<p>(2)</p>	
<p>5.3</p>	<p>$\frac{\tan 300^\circ + \cos(90^\circ + x)}{\sin(180^\circ - x) + 2 \cos(-30^\circ)}$ $= \frac{-\tan 60^\circ - \sin x}{\sin x + 2 \left(\frac{\sqrt{3}}{2}\right)}$ ✓ $= \frac{-\sqrt{3} - \sin x}{\sin x + \sqrt{3}}$ $= \frac{-(\sin x + \sqrt{3})}{(\sin x + \sqrt{3})}$ ✓ $= -1$ ✓</p> <p></p>	<p>✓ $-\tan 60^\circ$ ✓ $-\sin x$ ✓ $\sin x$ ✓ $\frac{\sqrt{3}}{2}$ 6 ✓ taking out of negative sign. uithaal van negatiewe teken ✓ answer / antwoord</p>	<p>(6)</p>	

5.3.
$$\frac{\tan 300^\circ + \cos(90^\circ + x)}{\sin(180^\circ - x) + 2\cos(-30^\circ)}$$

• $\tan 300^\circ = \tan(360^\circ - 60^\circ) = -\tan 60^\circ \checkmark$
 $= -\frac{a}{b}$
 $= -\frac{\sqrt{3}}{1}$
 $= -\sqrt{3}$



• $\cos(90^\circ + x) = -\sin x$

• $\sin(180^\circ - x) = \sin x$

• $\cos(-30^\circ) = \cos 30^\circ$
 $= \frac{a}{h}$
 $= \frac{\sqrt{3}}{2}$

•
$$\frac{-\sqrt{3} + (-\sin x)}{\sin x + 2\left(\frac{\sqrt{3}}{2}\right)}$$

$= \frac{-\sqrt{3} - \sin x}{\sin x + \sqrt{3}}$

$= \frac{-(\sqrt{3} + \sin x)}{\sin x + \sqrt{3}} \checkmark$

$= \underline{-1} \checkmark$

6

5.4	$\frac{1 - \sin 2x}{\cos 2x} = \frac{\cos x - \sin x}{\cos x + \sin x}$ $LHS = \frac{1 - 2 \sin x \cos x}{\cos^2 x - \sin^2 x}$ $LHS = \frac{\cos^2 x - 2 \sin x \cos x + \sin^2 x}{\cos^2 x - \sin^2 x}$ $LHS = \frac{(\cos x - \sin x)(\cos x - \sin x)}{(\cos x - \sin x)(\cos x + \sin x)}$ $LHS = \frac{\cos x - \sin x}{\cos x + \sin x}$	$\checkmark 2 \sin x \cos x$ $\checkmark \cos^2 x - \sin^2 x$ $\checkmark 1 = \cos^2 x + \sin^2 x$ $\checkmark \text{factorising / faktorisering}$ $\checkmark \text{factorising / faktorisering}$	<p style="text-align: center; color: red; font-size: 2em;">5</p> <p style="text-align: right;">(5)</p>
5.5	$\cos x - \sin x = \sqrt{2}$ $\frac{1}{\sqrt{2}} \cos x - \frac{1}{\sqrt{2}} \sin x = 1$ $\cos 45^\circ \cos x - \sin 45^\circ \sin x = 1$ $\cos(45^\circ + x) = 1$ $45^\circ + x = 360^\circ \cdot k$ $x = -45^\circ + 360^\circ \cdot k ; k \in \mathbb{Z}$	$\checkmark \text{division by / deling deur } \sqrt{2}$ $\checkmark \frac{1}{\sqrt{2}} = \cos 45^\circ / \sin 45^\circ$ $\checkmark \text{expansion rule / reël}$ $\checkmark 45^\circ + x = 360^\circ \cdot k$ $\checkmark \text{answer / antwoord}$	<p style="text-align: right;">(5)</p>
			[28]

5.5.

(OR)

$$\cos x - \sin x = \sqrt{2}$$

$$(\cos x - \sin x)^2 = (\sqrt{2})^2$$

$()^2$ b.s. \therefore check solns

$$\cos^2 x - 2 \sin x \cos x + \sin^2 x = 2 \quad \checkmark$$

$$\checkmark 1 - 2 \sin x \cos x = 2$$

$$- \sin 2x = 1$$

$$\sin 2x = -1 \quad \checkmark$$

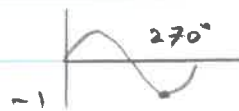
$$\sin A = -1$$

$$A = 270^\circ + k \cdot 360^\circ$$

$$2x = 270^\circ + k \cdot 360^\circ$$

$$x = 135^\circ + k \cdot 180^\circ \quad \checkmark$$

$$A = 2x$$



... ; ~~-225°~~ ; ~~-45°~~ ; ~~135°~~ ; 315° ; ~~495°~~ ; 675° ; ... check

\therefore ... ; -45° ; 315° ; 675° ; ...

So

$$\underline{x = 315^\circ + k \cdot 360^\circ ; k \in \mathbb{Z}} \quad \checkmark$$

5

QUESTION 6/VRAAG 6

<p>6.1</p>		<ul style="list-style-type: none"> ✓ shape / vorm ✓ intercepts / afsnitte ✓ starting and end points / begin en eindpunte 	<p>(3)</p>
<p>6.2</p>	<p>Period / Periode = 180°</p>	<p>✓ answer / antwoord</p>	<p>(1)</p>
<p>6.3</p>	<p>$h(x) = \tan x + 2$</p>	<p>✓ answer / antwoord</p>	<p>(1)</p>
<p>6.4</p>	<p>$-135^\circ \leq x < -90^\circ$ $\cos 2x \leq \tan x - 1$ $y_g \leq y_f$</p>	<p>✓ -135° ✓ -90° ✓ answer / antwoord</p>	<p>(3)</p>
<p>6.5</p>	<p>$\cos B + 1 = \tan \frac{1}{2} B$ Let/Laat $B = 2x$ $\cos 2x + 1 = \tan \frac{1}{2} (2x)$ $\cos 2x = \tan x - 1$ $x = -135^\circ$ and/en $x = 45^\circ$ $\therefore B = -270^\circ$ and/en $B = 90^\circ$</p>	<p>✓ $\cos 2x + 1 = \tan \frac{1}{2} (2x)$ ✓ $\cos 2x = \tan x - 1$ ✓ both x-values beide x-waardes ✓ both B values / beide B waardes</p>	<p>(4)</p>
			<p>[12]</p>

QUESTION 7/VRAAG 7

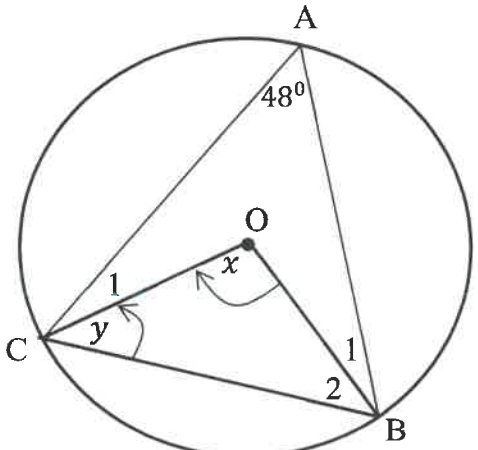
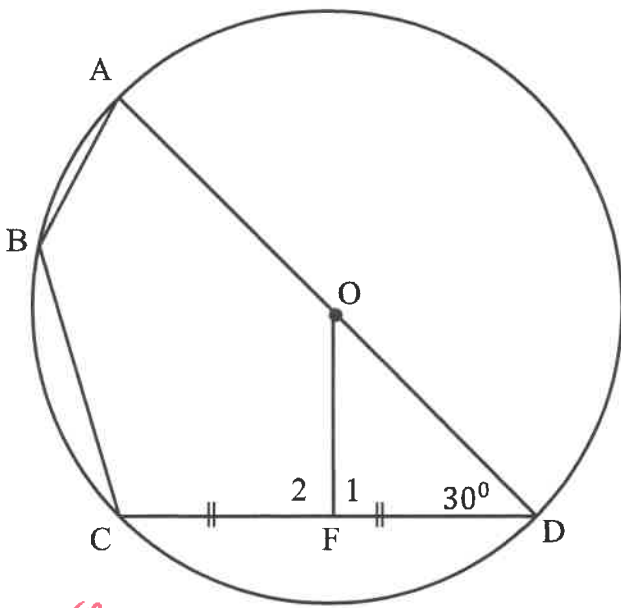


7.1	<p>In $\triangle OAK$ $\sin x = \frac{AK}{2}$ ✓ $AK = 2 \sin x$ ✓ $2 \sin x = 2 KT \sin x$ $KT = 1$ ✓</p> <p>In $\triangle KAT$ $\frac{AK}{\sin 2x} = \frac{KT}{\sin(90^\circ + x)}$ ✓ $AK = \frac{KT 2 \sin x \cos x}{\cos x}$ ✓ $AK = 2KT \sin x$ ✓</p>	<p>✓ $\sin x = \frac{AK}{2}$ ✓ $AK = 2 \sin x$ ✓ use of sine rule / gebruik van sinusreël ✓ $AK = 2KT \sin x$ ✓ $KT = 1$</p>	(5)
7.2	<p>In $\triangle KAT$ $T\hat{K}A = 90^\circ - 3x$ ✓ $\frac{AT}{\sin(90^\circ - 3x)} = \frac{1}{\sin(90^\circ + x)}$ ✓ $AT = \frac{\cos 3x}{\cos x}$ ✓</p>	<p>✓ $T\hat{K}A = 90^\circ - 3x$ ✓ use of sine rule gebruik van sinusreël</p>	(2)
7.3	<p>$AT = \frac{\cos 3x}{\cos x}$ $AT = \frac{\cos(2x + x)}{\cos x}$ $AT = \frac{\cos 2x \cos x - \sin 2x \sin x}{\cos x}$ ✓ $AT = \frac{\cos x}{\cos 2x \cos x - 2 \sin x \cos x \sin x}$ $AT = \frac{\cos x}{\cos x (\cos 2x - 2 \sin^2 x)}$ ✓ $AT = \frac{\cos x}{1 - 2 \sin^2 x - 2 \sin^2 x}$ ✓ $AT = 1 - 4 \sin^2 x$ ✓</p>	<p>✓ splitting of $\cos 3x$ and expansion opbreek van $\cos 3x$ en uitbreiding ✓ common factor / gemene faktor ✓ expansion of $\cos 2x$ uitbreiding van $\cos 2x$ ✓ answer / antwoord</p>	(4)

[11]

$90^\circ + x + 2x + T\hat{K}A = 180^\circ$ sum Δ in $\Delta = 180^\circ$
 $T\hat{K}A = 90^\circ - 3x$

QUESTION 8/VRAAG 8

<p>8.1</p>			
<p>8.1.1</p>	<p>$x = 96^\circ$ [∠ at centre = 2 × ∠ at circumference] [middelpunte ∠ = 2 × omtrekshoek]</p>	<p>✓ answer / antwoord ✓R 2</p>	<p>(2)</p>
<p>8.1.2</p>	<p>$\hat{B}_2 = y$ ✓SR [angles opp = sides], radii [hoeke teenoor = sye] $2y + 96^\circ = 180^\circ$ [sum of angles of Δ] [som van die hoeke van Δ] $y = 42^\circ$ ✓SR</p>	<p>✓ S/R ✓ answer / antwoord 2</p>	<p>(2)</p>
<p>8.2</p>			
<p>8.2.1</p>	<p>$\hat{F}_1 = 90^\circ$ [line from centre O to midpt of chord] [lyn vanaf middelpunt halveer koord]</p>	<p>✓ S ✓R 2</p>	<p>(2)</p>
<p>8.2.2</p>	<p>$\hat{A}BC = 150^\circ$ [opp angles of cyclic quad] [teenoorst. hoeke van koordevierhoek]</p>	<p>✓ S ✓R 2</p>	<p>(2)</p>

<p>8.3</p>			
<p>8.3.1</p>	<p>$\hat{B}_1 = x$ ✓✓ → [angles opp equal sides] [hoeke teenoor gelyke sye]</p>	<p>✓S ✓R</p>	<p>2 (2)</p>
<p>8.3.2</p>	<p>$\hat{K}_2 + \hat{C} = x$ ✓✓ $\hat{C} = \hat{K}_2$ ✓✓ $\hat{C} = \frac{x}{2}$ → [ext angle of Δ] / [buitehoek van Δ] [angles opp equal sides] [hoeke teenoor gelyke sye]</p>	<p>✓S ✓R ✓S/R</p>	<p>3 (3)</p>
<p>8.3.3</p>	<p>$\hat{K}_1 = 180^\circ - 2x$ ✓✓ ✓✓ [sum of angles of Δ] [som van die hoeke van Δ] $108^\circ + 180^\circ - 2x + \frac{x}{2} = 180^\circ$ ✓✓ ✓✓ [angles on str line] [hoeke op reguitlyn] $x = 72^\circ$ ✓✓</p>	<p>✓S/R ✓S ✓R ✓ answer / antwoord</p>	<p>4 (4)</p>
			<p>[17]</p>

QUESTION 9 / VRAAG 9

<p>Construct radii OF and OH. $\widehat{FOH} = 2 \times \widehat{G}$ Reflex $\widehat{FOH} = 2 \times \widehat{E}$ $\widehat{FOH} + \widehat{F\widehat{O}H} = 2\widehat{G} + 2\widehat{E}$ but $\widehat{FOH} + \widehat{F\widehat{O}H} = 360^\circ$ $2\widehat{G} + 2\widehat{E} = 360^\circ$ $\widehat{G} + \widehat{E} = 180^\circ$</p>	<p><i>SR</i> $\widehat{FOH} = 2 \times \widehat{G}$ [angle at centre = 2 × angle at circum] <i>SR</i> Reflex $\widehat{FOH} = 2 \times \widehat{E}$ [angle at centre = 2 × angle at circum] $\widehat{FOH} + \widehat{F\widehat{O}H} = 2\widehat{G} + 2\widehat{E}$ but $\widehat{FOH} + \widehat{F\widehat{O}H} = 360^\circ$ <i>SR</i> \wedge <i>S</i> \wedge <i>R</i> \wedge <i>S</i> in arc = 360° $2\widehat{G} + 2\widehat{E} = 360^\circ$ $\widehat{G} + \widehat{E} = 180^\circ$</p> <p style="text-align: right; color: red; font-size: 2em;">6</p>	<p>✓S ✓S/R ✓S/R ✓S ✓S/R ✓S</p>
<p>Trek radiusse OF en OH. $\widehat{FOH} = 2 \times \widehat{G}$ Omwenteling $\widehat{FOH} = 2 \times \widehat{E}$ $\widehat{FOH} + \widehat{F\widehat{O}H} = 2\widehat{G} + 2\widehat{E}$ maar $\widehat{FOH} + \widehat{F\widehat{O}H} = 360^\circ$ $2\widehat{G} + 2\widehat{E} = 360^\circ$ $\widehat{G} + \widehat{E} = 180^\circ$</p>	<p>[middelpunte $\angle = 2 \times$ omtrekshoek] [middelpunte $\angle = 2 \times$ omtrekshoek] [hoeke rondom 'n punt]</p>	<p>✓S ✓S/R ✓S/R ✓S ✓S/R ✓S</p>
		<p>[6]</p>

10.4.

AF = FC

radii

AB = BC

given

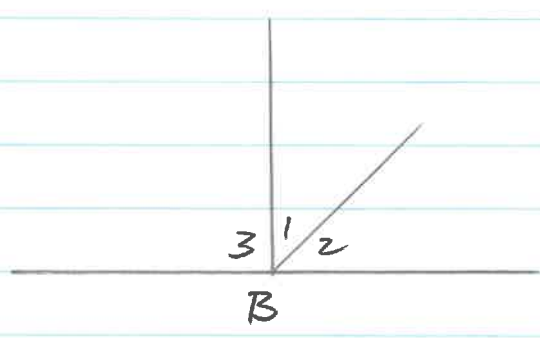
∴ BF || CE ^{✓^s} ^{✓^r}

midpt thm

∴ $\frac{BC}{AC} = \frac{FE}{AE}$ ^{✓^s} ^{✓^r} line || to 1 side of Δ

$BC = \frac{AC \cdot FE}{AE}$ 4

NB SUBDIVIDED ANGLES



Please be specific

\hat{B}_1 \hat{B}_2 \hat{B}_3 $\hat{B}_1 + \hat{B}_2$ etc

NOT JUST \hat{B} !!!

I mark what I see : not what you may be thinking !!!