



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**SEPTEMBER 2019**

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

MARKS/PUNTE: 150

This marking guideline consists of 16 pages.  
Hierdie nasienriglyn bestaan uit 16 bladsye.

QUESTION 1/VRAAG 1

1.1	$x = \frac{420,8}{80} = 5,26$	<p>Answer only: Full marks Stegs antwoord: Volpunte</p>	$\frac{420,8}{80}$ ✓ answer / antwoord	(2)
1.2	<p>total of heights / totaal van hoogtes  <math>= 4,86 \times 7 = 34,02</math>          Error/fout = <math>4,98 - 4,89 = 0,09</math>          new total of heights / nuwe totaal van hoogtes  <math>= 33,93</math>          new mean / nuwe gemiddelde = <math>\frac{33,93}{7} = 4,85</math> m</p>	<p>total of heights / totaal van hoogtes  <math>= 4,86 \times 7 = 34,02</math>          Error/fout = <math>4,98 - 4,89 = 0,09</math>          new total of heights / nuwe totaal van hoogtes  <math>= 33,93</math>          new mean / nuwe gemiddelde = <math>\frac{33,93}{7} = 4,85</math> m</p>	$\frac{420,8}{80}$ ✓ error / fout = 0,09 $\frac{420,8}{80}$ ✓ new total / nuwe totaal $\frac{420,8}{80}$ ✓ answer / antwoord	(2)
1.3	<p>Standard deviation of individual heights of the 80 giraffes would be bigger than that of 7 males.          There is a bigger spread of heights among population of juveniles and adults and babies.          Standaardafwyking van individuele hoogtes van 80 kameelperde sal groter wees as die van die 7 manlike kameelperde.          Daar is 'n groter verspreiding van hoogtes onder die jeugdige en volwasse en baba bevolking.</p>	<p>Standard deviation of individual heights of the 80 giraffes would be bigger than that of 7 males.          There is a bigger spread of heights among population of juveniles and adults and babies.          Standaardafwyking van individuele hoogtes van 80 kameelperde sal groter wees as die van die 7 manlike kameelperde.          Daar is 'n groter verspreiding van hoogtes onder die jeugdige en volwasse en baba bevolking.</p>	$\frac{420,8}{80}$ ✓ bigger/larger standard deviation groter standaardafwyking $\frac{420,8}{80}$ ✓ bigger spread of heights groter verspreiding van hoogtes	(2)
Total				71

\* 
$$\bar{x} = \frac{4,7,4 + 4,9,7 + \dots + 5,7,4}{4 + 7 + \dots + 4}$$

$$= \frac{420}{80}$$

$$= 5,26$$

QUESTION 2 / VRAAG 2

<p>2.1</p> <p>Price of 100g chocolate slab Prys van 100g sjokoladeblok</p> <p>(in rand/s)</p> <p>Price of 100g chocolate slab Prys van 100g sjokoladeblok</p> <p>2.1. ✓✓</p> <p>2.3. ✓</p> <p>✓ all points plotted correctly alle punte korrek afgesteek</p>	<p>2.2</p> <p><math>\hat{y} = a + bx</math>  <math>a = 4,64</math> ✓  <math>b = 0,27</math> ✓  <math>\hat{y} = 4,64 + 0,27x</math> ✓</p>	<p>2.3</p> <p>See line in 2.1 / Stien lyn in 2.1  <math>(\bar{x}, \bar{y}) = (39,38; 15,35)</math>          other point  <math>= (0; 4,64)</math></p>	<p>2.4</p> <p><math>r = 0,78</math> ✓</p>	<p>2.5</p> <p>fairly strong positive correlation in the % of cocoa and the price.          redelike sterk positiewe korrelasie tussen die % van kakao en die prys.</p>	<p>2.6.1</p> <p>Brand D / Handelsmerk D          OR / OF  <math>(35; 24)</math> ✓</p>	<p>2.6.2</p> <p><math>\hat{y} = 4,64 + 0,27(35)</math> ✓  <math>= R14,09</math> ✓          Overpriced by / Te duur: <math>R24,00 - R14,09 = R9,91</math> ✓</p>	<p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(3)</p> <p>131</p>
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QUESTION 3 / VRAAG 3

<p>3.1</p> <p><math>D(4; 0)</math> ✓</p>	<p>3.2</p> <p><math>m_{DE} = \frac{4 - 0}{3 - 0} = \frac{4}{3}</math> ✓  <math>= -\frac{4}{3} \times \left(-\frac{1}{4}\right)</math> ✓  <math>= \frac{1}{3}</math> ✓</p> <p><math>D(4; 0)</math>  <math>E(0; -\frac{4}{3})</math></p>	<p>3.3</p> <p>Angle of inclination of DE / Inklinasiehoek van DE  <math>\tan \theta = \frac{4}{3}</math> ✓  <math>\theta = 18,43^\circ</math> ✓  <math>\tan^{-1} \theta = 18,43^\circ</math> ✓  <math>\therefore \angle ODE = 18,43^\circ</math> (vert. opp. <math>\angle</math>s) / (regoorst. <math>\angle</math>e) ✓  <math>\angle OED = 71,57^\circ</math> (complementary <math>\angle</math>s) / (komplementêre <math>\angle</math>e) ✓  <math>\therefore PRB = 71,57^\circ</math> (corr. <math>\angle</math>s: DE <math>\parallel</math> BC) ✓  <math>\therefore PRB = 71,57^\circ</math> (oorreënk. <math>\angle</math>e: DE <math>\parallel</math> BC) ✓</p>	<p>3.4</p> <p><math>DE = \sqrt{(4-0)^2 + (0-\frac{4}{3})^2}</math> ✓  <math>= \frac{4\sqrt{10}}{3}</math> ✓</p> <p><math>D(4; 0)</math> ✓  <math>E(0; -\frac{4}{3})</math> ✓</p> <p><math>B(4; \frac{1}{3})</math> ✓  <math>D(4; 0)</math> ✓  <math>A(4; -3)</math> ✓</p> <p><math>AD = 0 - (-3) = 3</math>  <math>AB = 6 - (-3) = 9</math></p>	<p>3.5</p> <p><math>\frac{AD}{AB} = \frac{3}{9} = \frac{1}{3}</math> ✓  <math>\frac{DE}{BC} = \frac{\frac{4\sqrt{10}}{3}}{4\sqrt{10}} = \frac{1}{3}</math> ✓</p> <p>✓ ratios / verhoudings          ✓ simplified answer / vereenvoudigde antwoord</p>	<p>✓ answer / antwoord (1)</p> <p>✓ substitution / vervanging</p> <p>✓ answer / antwoord (2)</p> <p>✓ answer / antwoord</p> <p>✓ reason / rede</p> <p>✓ substitution / vervanging</p> <p>✓ answer / antwoord (2)</p> <p>✓ ratios / verhoudings          ✓ simplified answer / vereenvoudigde antwoord</p> <p>2</p> <p>2</p> <p>6 }          0 }          -3 }</p>
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<p>3.6</p> <p><math>\triangle ABC \parallel \triangle ADE</math></p> <p><math>\frac{AD}{AB} = \frac{DE}{BC} = \frac{1}{3}</math></p> <p><math>BC = 3 DE</math></p> <p><math>= 3 \left( \frac{4\sqrt{10}}{3} \right)</math></p> <p><math>\therefore BC = 4\sqrt{10}</math></p> <p>OR/OF</p> <p>equation of BC / vergelyking van BC</p> <p><math>y - 6 = \frac{1}{3}(x - 4)</math></p> <p><math>\therefore y = \frac{1}{3}x + \frac{14}{3}</math></p> <p><math>m_{AC} = \frac{5}{-4} = -\frac{5}{4}</math></p> <p>equation of AC / vergelyking van AC</p> <p><math>y = -\frac{5}{4}x - \frac{4}{3}</math></p> <p><math>\therefore \frac{1}{3}x + \frac{14}{3} = -\frac{5}{4}x - \frac{4}{3}</math></p> <p><math>4x + 56 = -5x - 16</math></p> <p><math>9x = -72</math></p> <p><math>\therefore x = -8</math></p> <p><math>y = \frac{1}{3}(-8) + \frac{14}{3}</math></p> <p><math>\therefore y = 2</math></p> <p>C (-8; 2) and/en B (4; 6)</p> <p><math>\therefore BC = \sqrt{(-8 - 4)^2 + (2 - 6)^2} = 4\sqrt{10}</math></p>	<p>✓ ratio of corresponding sides verhouding van ooreenstemmende sye</p> <p>✓ isolating / isoleer BC</p> <p>✓ substitution / vervanging</p> <p>OR/OF</p> <p>equation of BC / vergelyking van BC</p> <p>equation of AC / vergelyking van AC</p> <p>✓ answer / antwoord</p>
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En  $\triangle ABC, ADE$

1.  $\hat{A} = \hat{A}$  Common

2.  $\hat{A}BC = \hat{A}DE$  con "s" =, DE || BC

$\therefore \triangle ABC \parallel \triangle ADE$  AAA

(\*)

<p>3.7.1</p> <p>Midpoint of DE / Middelpunt van DE</p> <p><math>\left( \frac{4+0}{2}, \frac{0-3}{2} \right)</math></p> <p><math>\left( 2, -\frac{3}{2} \right)</math></p>	<p>✓ coordinates / koördinate</p>
<p>3.7.2</p> <p><math>m_{\text{bisector}} / m_{\text{halveertyn}} = -3</math></p> <p><math>y = -3x + c</math></p> <p>sub (2, -3/2)</p> <p><math>-\frac{3}{2} = -3(2) + c</math></p> <p><math>\therefore y = -3x + \frac{16}{3}</math></p>	<p>✓ gradient of bisector / graadient van halveertyn</p> <p>not 3.7.1. b/d</p> <p>✓ substitution / vervanging</p>
<p>3.8</p> <p>LHS/LK = -3</p> <p>RHS/RK = <math>-3(4) + \frac{16}{3}</math></p> <p><math>= -\frac{20}{3} = -6\frac{2}{3} \approx -6,66</math></p> <p>LHS/LK <math>\neq</math> RHS/RK</p> <p>No. bisector does not pass through A. / Nee, die halveertyn gaan nie deur A nie</p>	<p>✓ equation / vergelyking</p> <p>✓ substitution / vervanging</p> <p>✓ conclusion / gevolgtrekking</p>

$y = -3x + \frac{16}{3}$  A(4; -3)

LHS = -3 RHS =  $-3(4) + \frac{16}{3}$

$= -6,66$

LHS  $\neq$  RHS

$\therefore$  No,  $\perp$  bisector does NOT pass through A.

ratio  $\triangle ABC \parallel \triangle ADE$

$\frac{AD}{AB} = \frac{DE}{BC}$

$\frac{1}{3} = \frac{4\sqrt{10}}{3} \cdot \frac{1}{BC}$

$\therefore BC = 3 \cdot \frac{4\sqrt{10}}{3} = 4\sqrt{10} = 12,65$

(\*)

QUESTION 4/IRAAG 4

<p>4.1</p> <p><math>x^2 - 6x + y^2 = 16</math>  <math>(x-3)^2 + (y-0)^2 = 16 + 9</math>  <math>(x-3)^2 + (y-0)^2 = 25</math>                  Hence centre / Gevolglik middelpunt (3; 0)                  Radius/Radius = <math>\sqrt{25} = 5</math></p>	<p>✓ completing the square                  voltooiing van vierkant                  ✓ final form / finale vorm                  ✓ taking square root / vierkaniswortel</p>	<p>(3)</p>
<p>4.2.1</p> <p><math>y = 0</math>: hence/gevolglik <math>(x-3)^2 = 25</math>  <math>x-3 = \pm 5</math>  <math>x = 3 \pm 5</math>                  B (8; 0)</p> <p>OR / OF</p> <p><math>r = 5</math>                  M(3; 0) B(8; 0)</p>	<p>✓ equating / stel <math>y = 0</math>                  ✓ solving for <math>x</math> / Los op vir <math>x</math>                  ✓ coordinates of B                  koördinate van B</p> <p>OR / OF</p> <p>✓ use of horizontal distance / gebruik van horisontale afstand                  ✓ equating <math>x</math> to 0                  stel <math>x</math> gelyk aan 0</p> <p>✓ coordinates of C                  koördinate van C</p>	<p>(3)</p>
<p>4.2.2</p> <p><math>x = 0</math>: then/dan <math>(-3)^2 + y^2 = 25</math>  <math>9 + y^2 = 25</math>  <math>y^2 = 16</math>  <math>y = \pm 4</math>                  C(0; -4)</p> <p>OR/OF</p> <p>using Pythagoras / gebruik van Pythagoras  <math>MD^2 = OM^2 + OD^2</math>  <math>5^2 = 3^2 + OD^2</math>  <math>4 = OD = OC</math>                  C(0; -4)</p>	<p>✓ use of Pythagoras                  gebruik van Pythagoras                  ✓ coordinates of C                  koördinate van C</p> <p>OR/OF</p> <p>✓ radius <math>\perp</math> tangent                  radius <math>\perp</math> raaklyn                  ✓ substitution into Pythag.                  Them vervanging in Stelling van Pyth                  ✓ answer / antwoord</p> <p>OR/OF</p> <p>✓ calculation of PO                  berekening van PO</p> <p>✓ substitution into Pythag.                  Them vervanging in Stelling van Pyth                  ✓ answer / antwoord</p>	<p>(2)</p>
<p>4.3</p> <p><math>\widehat{MCP} = 90^\circ</math>  <math>PM^2 = MC^2 + PC^2</math>  <math>(8\frac{1}{3})^2 = 5^2 + PC^2</math>  <math>PC = \sqrt{\frac{400}{9} - 20} = 6,67</math></p> <p>OR / OF</p> <p><math>\widehat{POC} = 90^\circ</math>  <math>PC^2 = PO^2 + OC^2</math>  <math>PO = 8\frac{1}{3} - 5 + 2 = \frac{16}{3}</math> and/en <math>OC = 4</math>  <math>PC^2 = (\frac{16}{3})^2 + 4^2</math>  <math>PC = \sqrt{\frac{400}{9} - \frac{20}{3}} = 6,67</math></p>	<p>✓ radius <math>\perp</math> tangent                  radius <math>\perp</math> raaklyn                  ✓ substitution into Pythag.                  Them vervanging in Stelling van Pyth                  ✓ answer / antwoord</p> <p>OR/OF</p> <p>✓ calculation of PO                  berekening van PO</p> <p>✓ substitution into Pythag.                  Them vervanging in Stelling van Pyth                  ✓ answer / antwoord</p>	<p>(3)</p>

$P(-\frac{16}{3}; 0)$  ✓  
 $PC = \sqrt{(-4-0)^2 + (0 - (-\frac{16}{3}))^2}$  ✓  
 $= 20/3$  ✓

<p>4.4</p> <p><math>m_{BD} = -\frac{1}{2}</math>  <math>\tan^{-1}(-\frac{1}{2}) = -26,57^\circ</math>  <math>\therefore \alpha = 180^\circ - 26,57^\circ</math>  <math>\therefore \theta = 180^\circ - 153,43^\circ = 26,57^\circ</math>  <math>D\widehat{B}C = 2 \times 26,57^\circ = 53,14^\circ</math></p>	<p>OR / OF</p> <p><math>\sin \theta = \frac{4}{\sqrt{(8)^2 + (-4)^2}}</math> ✓  <math>\sin^{-1}(0,4472...) = 26,57^\circ</math> ✓  <math>D\widehat{B}C = 2 \times 26,57^\circ = 53,14^\circ</math> ✓</p> <p>OR / OF</p> <p><math>\tan D\widehat{B}O = \frac{4}{8} = \frac{1}{2}</math>  <math>D\widehat{B}O = 26,57^\circ</math>  <math>D\widehat{B}C = 2 \times 26,57^\circ = 53,14^\circ</math></p>	<p><math>m_{BD} = \frac{0-4}{8-0} = -\frac{1}{2}</math>  <math>DB = \sqrt{(4-0)^2 + (0-8)^2} = \sqrt{80}</math></p> <p>✓ gradient of BD / gradiënt van BD                  ✓ calculation of <math>\alpha</math> / berekening van <math>\alpha</math>                  ✓ angle <math>\theta</math> / hoek <math>\theta</math>                  ✓ doubling the angle / verdubbeling van hoek</p> <p>OR / OF</p> <p>✓ sin definition / sin-definisie                  ✓ use of arcsin / gebruik van <math>\sin^{-1}</math>                  ✓ angle <math>\theta</math> / hoek <math>\theta</math>                  ✓ doubling the angle / verdubbeling van hoek</p> <p>OR / OF</p> <p>✓ tan ratio / tan verhouding                  ✓ use of arctan to find angle / gebruik van <math>\tan^{-1}</math> om hoek te bepaal                  ✓ angle / hoek                  ✓ doubling the angle / verdubbeling van hoek</p>	<p>(4)</p>
<p>4.5</p> <p>New circle centre/Nuwe sirkel                  middelpunt - M(5; 1)</p> <p><math>C'(2; -3)</math>  <math>m_{MC'} = \frac{3}{4}</math>  <math>m_{tan} = -\frac{4}{3}</math>  <math>-3 = -\frac{3}{4}(2) + c</math>  <math>\therefore c = -\frac{3}{2}</math>  <math>\therefore y = -\frac{3}{4}x - \frac{3}{2}</math></p>	<p>OR / OF</p> <p><math>\frac{1-L-3}{5-2}</math>  <math>\tan \perp rad</math></p>	<p>✓ coordinates of M' and C'                  koördinate van M' en C'                  ✓ gradient of MC' / gradiënt van MC'                  ✓ gradient of tangent / gradiënt van raaklyn</p> <p>equation / vergelyking</p>	<p>(4)</p>

$M(3; 0) \xrightarrow{2} M'(5; 1)$   
 $C(0; -4) \xrightarrow{2} C'(2; -3)$



(\*)

5.3.  $\sin(-200^\circ)$

$= \sin 160^\circ$

$= \sin(180^\circ - 20^\circ)$

$= \sin 20^\circ$

$\cdot \cos 310^\circ$

$= \cos(360^\circ - 50^\circ)$

$= \cos 50^\circ$

$\cdot \tan(-135^\circ)$

$= \tan(180^\circ + 45^\circ)$

$= \tan(225^\circ)$

$= \tan 45^\circ$

$= \frac{1}{1}$

$= 1$

$\cdot \cos 380^\circ$

$- 360^\circ$

$= \cos 20^\circ$

$\cdot \sin 230^\circ$

$= \sin(180^\circ + 50^\circ)$

$= -\sin 50^\circ$

Then, as in sections

$\cdot -\sin 200^\circ$

$= -\sin(180^\circ + 20^\circ)$

$= -[-\sin 20^\circ]$

$= \sin 20^\circ$

$\cdot \cos 310^\circ$

$= \cos(270^\circ + 40^\circ)$

$= \sin 40^\circ$

same

$+ 360^\circ$

same

$\cdot \sin 230^\circ$

$= \sin(270^\circ - 40^\circ)$

$= -\cos 40^\circ$

$\cdot (\sin 20^\circ)(\sin 40^\circ) + (1)(\cos 20^\circ)(-\cos 40^\circ)$

$= \sin 20^\circ \sin 40^\circ - \cos 20^\circ \cos 40^\circ$

$= -\cos 20^\circ \cos 40^\circ + \sin 20^\circ \sin 40^\circ$

$= -[\cos 20^\circ \cos 40^\circ - \sin 20^\circ \sin 40^\circ]$

$= -\cos(20^\circ + 40^\circ)$

$= -\cos 60^\circ$

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

IV -

QUESTION 6/VR44G 6

<p>6.1</p>	<p>✓ completing / voltooiing van <math>f(x) = \sin 2x</math> graph/grafiek</p>	<p>6.2 See graph in 6.1 / Sien grafiek in 6.1</p> <p><math>y_{int} = 0,87</math> ✓</p> <p>end <math>(-90; -0,5)</math> ✓</p> <p>tp <math>(30; 1)</math> ✓</p> <p>x int <math>x_{int} = -60</math> or <math>120</math> ✓</p> <p>6.3 <math>\sin 2x = \cos(x - 30)</math></p> <p><math>\theta = 40</math> or <math>-80</math> ✓</p> <p><math>\theta = 60</math> ✓</p> <p>1 sin term and 1 cos term</p> <p>coefs are ±!</p> <p>angles are different</p>
<p>6.2</p> <p><math>g(x) = \cos(x - 30)</math></p> <p>✓ y intercept / y-afsnit <math>(0,87)</math></p> <p>✓ end points / eindpunte <math>(-90; -0,5)</math> and <math>(180; 1)</math></p> <p>✓ turning point / draaipunte <math>(30; 1)</math></p> <p>✓ x intercepts / x-afsnitte <math>x = -60</math> or <math>120</math></p>	<p>6.3</p> <p>co-ratio on RHS</p> <p>ko-verhouding RK</p> <p>simplification</p> <p>vereenvoudiging</p> <p><math>x = 40</math> or <math>k. 120</math></p> <p><math>x = 60</math> or <math>k. 360</math></p> <p>✓ solutions / oplossings</p>	<p>(6) (11)</p>

PTO

3

3

QUESTION 7/VR44G 7

<p>7.1</p> <p><math>\tan y = \frac{PB}{k}</math></p> <p><math>\therefore PB = k \cdot \tan y</math></p> <p><math>\frac{PB}{\tan x} = \frac{PB}{BC}</math></p> <p><math>\therefore BC = \frac{PB}{\tan x}</math></p> <p>Hence/Gevolglik <math>BC = \frac{k \cdot \tan y}{\tan x}</math></p> <p><math>(AC)^2 = (4,73)^2 + (3)^2 - 2(4,73)(3)(\cos 100)</math></p> <p><math>= 36,301 \dots</math></p> <p><math>AC = 6,03 \text{ m}</math></p>	<p>✓ use of tan ratio</p> <p>gebruik van tan verhouding</p> <p>✓ <math>PB = k \cdot \tan y</math></p> <p>✓ <math>BC = \frac{PB}{\tan x}</math></p> <p>✓ use of cosine rule</p> <p>gebruik van cosinusreël</p> <p>✓ correct substitution in cosine rule</p> <p>korrekte vervanging in cosinusreël</p> <p>✓ answer / antwoord</p>
<p>7.2</p>	<p>(3)</p> <p>(6)</p>

4

\* 6.3.

6

$\sin 2x = \cos(x - 30)$

$\sin A = \cos B$

$\sin(90 - B) = \sin(90 + B)$

$\sin A = \sin(90 - B)$  or  $\sin A = \sin(90 + B)$

$A = 90 - B + k \cdot 360$

$2x = 90 - (x - 30) + k \cdot 360$

$2x = 90 - x + 30 + k \cdot 360$

$3x = 120 + k \cdot 360$

$x = 40 + k \cdot 120$

(KEZ)

12.1.

3

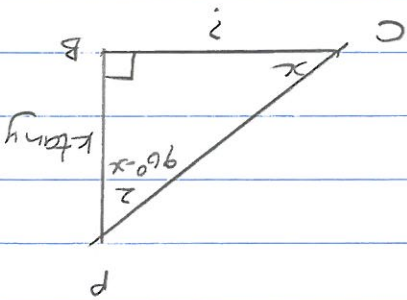
$$= \frac{BP \cos x}{\sin x} = \frac{BP \tan x}{\tan x}$$

$$= \frac{BP \cos x}{\sin x} = BP \cdot \left( \frac{\cos x}{\sin x} \right) = BP \div \left( \frac{\sin x}{\cos x} \right)$$

$$\frac{CB}{\cos x} = \frac{BP}{\sin x}$$

$$\frac{CB}{BP} = \frac{\sin(90^\circ - x)}{\sin x}$$

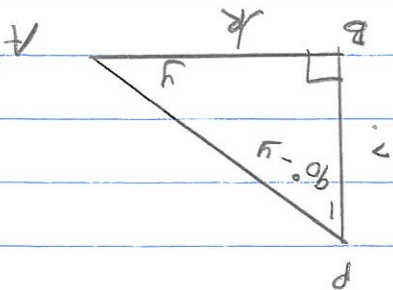
$\hat{P} = 90^\circ - x$  sum 'is in  $\Delta = 180^\circ$



$$= \frac{k \cdot \sin y}{\cos y} = k \cdot \tan y$$

$$\frac{PB}{k} = \frac{\sin(90^\circ - y)}{k}$$

1.  $\hat{P} = 90^\circ - y$  sum 'is in  $\Delta = 180^\circ$



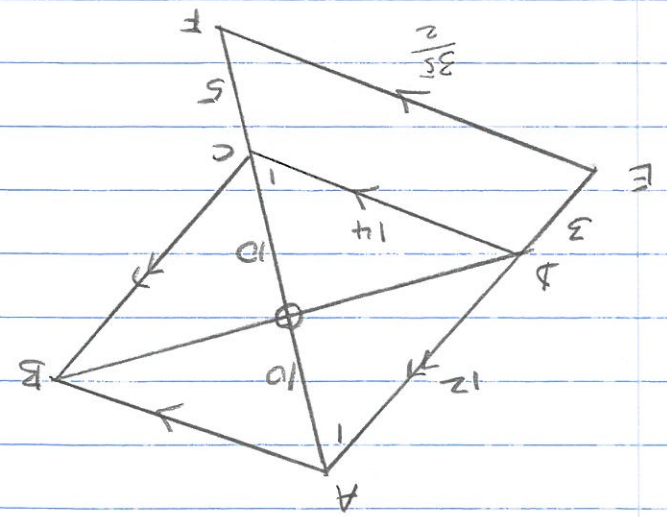




9.1.3. In  $\Delta A'DC'$ ,  $A'E'F'$   
 1.  $\angle A' = \angle A'$  Common  
 2.  $\angle C' = \angle F'$  Com<sup>ns</sup>,  $DC' \parallel EF'$   
 $\therefore \Delta A'DC' \sim \Delta A'E'F'$  (AAA)  
 $\frac{AD}{A'E'} = \frac{DC'}{E'F'} = \frac{A'D}{A'E'}$   
 $\frac{12}{15} = \frac{14}{E'F'}$   
 $12 \cdot E'F' = 14 \cdot 15$   
 $E'F' = \frac{2}{35} = 17.5$

9.1.2.  $AO = 10$  ✓  
 Diags llgm bisect ✓

9.1.1.  $\frac{AC}{AD} = \frac{CF}{DF}$  ✓  
 line  $\parallel$  side of  $\Delta$  ✓  
 $\frac{5}{12} = \frac{3}{DF}$  ✓  
 $AC = 20$  ✓

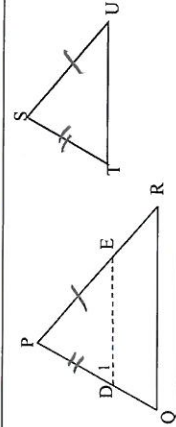


9.2. Area  $\Delta ADO$   
 Area  $\Delta AEF$

$$\frac{\frac{1}{2}(AD)(AO) \sin A_1}{\frac{1}{2}(AE)(AF) \sin A_1} = \frac{12 \cdot 10}{15 \cdot 25} = \frac{8}{25}$$

3

QUESTION 10/VRAAAG 10



Construction: Mark D on PQ and E on PR such that PD = ST and PE = SU. Join DE.  
 Konstruksie: Merk D op PQ en E op PR sodat PD = ST en PE = SU. Verbind DE.  
 Proof/Bewys: In  $\Delta PDE$  and  $\Delta STU$   
 $\hat{P} = \hat{S}$  (given) / (gegeve)  
 $PD = ST$  (construction) / (konstruksie)  
 $PE = SU$  (construction) / (konstruksie)  
 $\Delta PDE \cong \Delta STU$  (SAS) *vs*  
 $\therefore \hat{D}_1 = \hat{T}$  *vs*  $(\Delta PDE \cong \Delta STU)$   
 But/Maar:  $\hat{Q} = \hat{T}$  (given) / (gegeve)  
 $\therefore \hat{D}_1 = \hat{Q}$  *vs* both =  $\hat{T}$   
 $\therefore DE \parallel QR$  (corr.  $\angle$  s =) / (ooreenk.  $\angle$  e =) *vs*  
 $\therefore \frac{PD}{PQ} = \frac{PE}{PR}$   
 $\therefore \frac{PD}{ST} = \frac{PE}{SU}$   
 $\therefore \frac{PD}{PQ} = \frac{PE}{PR}$

*✓ konstr*

$\checkmark$  construction / konstruksie  
 $\checkmark$  S & R  
 $\checkmark \hat{D}_1 = \hat{T}$   
 $\checkmark \hat{D}_1 = \hat{Q}$   
 $\checkmark$  reason for lines  
 $\parallel$  rede vir  $\parallel$  byne  
 $\checkmark$  R  
 eweredigh. stelling;  
 DE  $\parallel$  QR  
 $\checkmark$  statement(S)  $\checkmark$   
 $\checkmark$  reason(R)  
 $\checkmark$  S & R

10.2.1  $\hat{A} = x$  (tan chord thm) *vs*  
 $\hat{C}_3 = x$  (angles opp. = sidesy  $\hat{C}_3 = \hat{A}$ ) *vs*  
 (6)

10.2.2 R.T.P/Te Bewys:  $\Delta TOC \parallel \Delta BPC$

$\hat{A}CB = 90^\circ$  ( $\angle$  in the semi-circle) / ( $\angle$  in halwe sirkel)  
 Proof/Bewys:  $\hat{C}_3 = \hat{C}_1 = x$  (proved) / (reeds bewys)  
 $\hat{T}_2 = 90^\circ + x$  (ext.  $\angle$  of  $\Delta$ ) / (buite  $\angle$  van  $\Delta$ )  
 $\hat{B}_1 = 90^\circ + x$  (ext.  $\angle$  of  $\Delta$ ) / (buite  $\angle$  van  $\Delta$ )  
 $\therefore \hat{T}_2 = \hat{B}_1$   
 $\therefore \hat{O}_2 = \hat{P}$  (sum of  $\angle$  s in  $\Delta$ ) / (som van  $\angle$  e in  $\Delta$ )  
 $\therefore \Delta TOC \parallel \Delta BPC$  ( $\angle$  s  $\angle$  s)

OR/OR  
 $\hat{A}CB = 90^\circ$  ( $\angle$  in the semi-circle) / (hoek in halwe sirkel)  
 $\hat{B}_2 = 90^\circ - x$  (sum of  $\angle$  s in  $\Delta$ ) / (som van  $\angle$  e in  $\Delta$ )  
 $\therefore \hat{P} = 90^\circ - 2x$  (ext.  $\angle$  of  $\Delta$ ) / (buite  $\angle$  van  $\Delta$ )  
 $\hat{O}_1 = 2x$  ( $\angle$  at centre =  $2 \times \angle$  at circum.) / (Middelpunt  $\angle$  =  $2 \times$  Omtrekhoek)  
 $\therefore \hat{O}_2 = 90^\circ - 2x$  (SO  $\perp$  AB)  
 $\therefore \hat{O}_2 = \hat{P}$   
 $\hat{C}_3 = \hat{C}_1 = x$  (proved above) / (alreeds bo bewys)  
 $\therefore \Delta TOC \parallel \Delta BPC$  ( $\angle$  s  $\angle$  s)

*PTO*

10.2.3	R.T.P/Te Bewys: $TO \cdot PC = OB \cdot BP$ Proof/Bewys: $\frac{TO}{BP} = \frac{OC}{PC}$ But/Maar $OC = OB$ (radii) / (radiusse) $\therefore \frac{TO}{BP} = \frac{OB}{PC}$ $\therefore TO \cdot PC = OB \cdot BP$	$\checkmark$ sides in prop. sye is eweredig $\checkmark$ S	(2)
10.2.4	In $\Delta OPC$ : $OP^2 = OC^2 + PC^2$ (Pyth. theorem/stelling) But/Maar: $OB = OC = BP$ (radii) / (radiusse) $\therefore (2OC)^2 = OC^2 + PC^2$ $4OC^2 = OC^2 + PC^2$ $\therefore PC^2 = 3OC^2$	$\checkmark$ S & R $\checkmark OB = OC = BP$ $\checkmark (2OC)^2 = OC^2 + PC^2$	(3)
<b>TOTAL/TOTAAL:</b>			<b>150</b>

*6*

*3*

10.2.2

$\Delta B_1 \Delta_1 S T_2 O_2 C_3, B_1 P C_1$

1.  $\angle C_3 = \angle C_1$

both = x

2.  $\angle C_2 + \angle C_3 = 90^\circ$

in semi circle  $\angle = 90^\circ$

$\therefore \angle B_1 = 90^\circ + x$

ext  $\Delta$

$\therefore \angle T_2 = 90^\circ + x$

ext  $\Delta$

$\therefore \angle T_2 = \angle B_1$

$\Delta T_2 O C \parallel \Delta B_1 P C$

5

10.2.3

$\frac{T_2 O}{B_1 P} = \frac{O C}{P C}$

$\Delta T_2 O C \parallel \Delta B_1 P C$

$\therefore T_2 O \cdot P C = O C \cdot B_1 P$

radii

but  $O C = O B$

5

$\therefore T_2 O \cdot P C = O B \cdot B_1 P$

2

10.2.4

fit  $B P = y$

$\therefore O B = y$

$\therefore O C = y$

given radii

5

$\angle C P = 90^\circ$

for  $\perp$  rad

$\therefore P C^2 + y^2 = (2y)^2$

fig thag

$P C^2 + y^2 = 4y^2$

$P C^2 = 3y^2$

$= 3 \cdot O C^2$

3