



# basic education

---

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**SENIOR CERTIFICATE EXAMINATION/  
*SENIORSERTIFIKAAT-EKSAMEN***

**MATHEMATICS P2/*WISKUNDE V2***

**2015**

**MEMORANDUM**

**MARKS/*PUNTE*: 150**

**This memorandum consists of 18 pages./  
*Hierdie memorandum bestaan uit 18 bladsye.***

**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in ALL aspects of the marking memorandum.

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas.

**QUESTION/VRAAG 1**

3	4	4	5	23	29	32	36	40	47	56	66	68	76	82
---	---	---	---	----	----	----	----	----	----	----	----	----	----	----

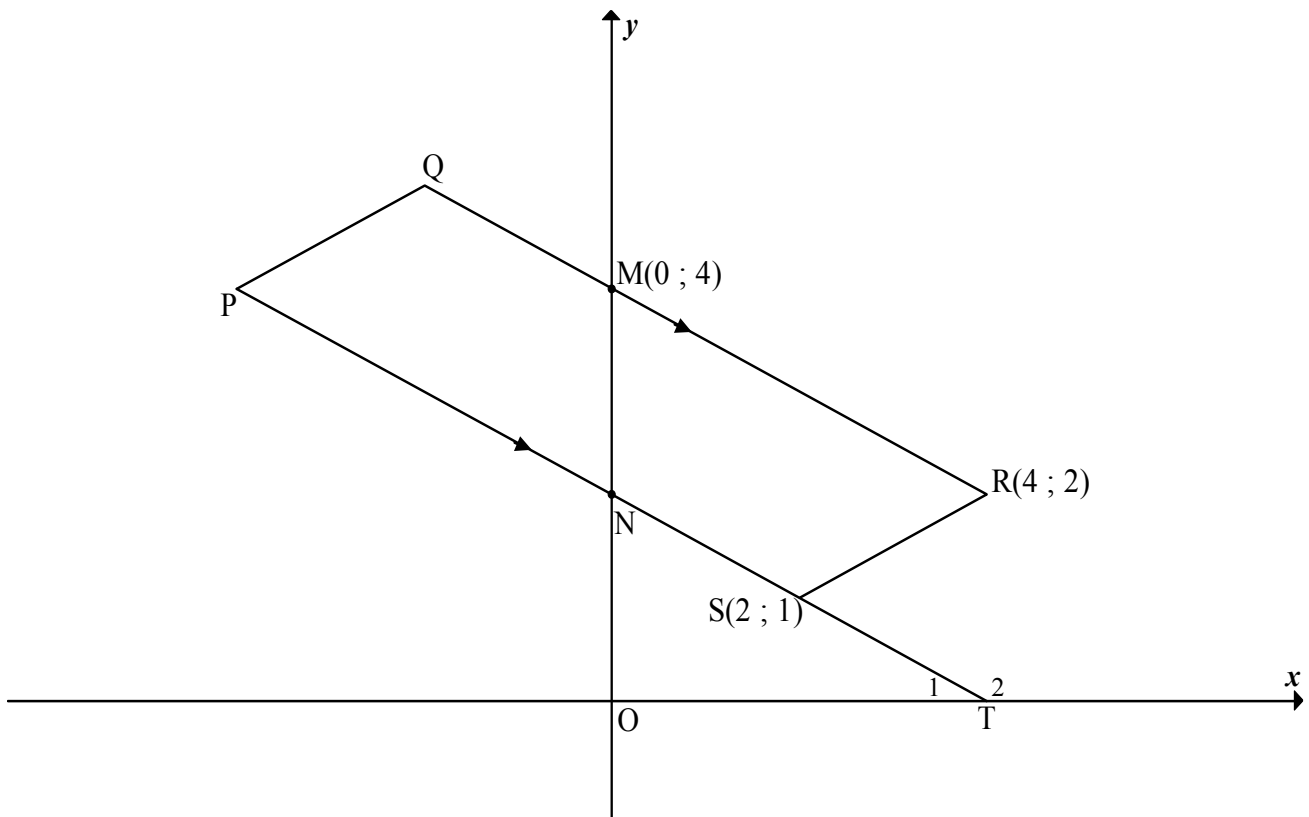
1.1.1	Mean/gemiddelde = $\frac{571}{15}$ = 38,07 years/jaar	✓ $\frac{571}{15}$ ✓ answer/antw (2)
1.1.2	Median/mediaan = 36 years/jaar	✓ answer/antw (1)
1.1.3	IQR/IKV = 66 – 5 = 61 years/jaar	✓ $Q_3 = 66$ ✓ $Q_1 = 5$ ✓ answer/antw (3)
1.1.4	Standard deviation/standaardafwyking = 26,388... = 26,39 years/jaar	✓✓ answer/antw (2)
1.2		✓ max & min ✓ median/ <i>mediaan</i> ✓ quartiles/ <i>kwartiele</i> (3)
1.3	The data is skewed to the right/ <i>Die data is skeef na regs</i>  <b>OR/OF</b>  positively skewed/ <i>positief skeef</i>	✓ answer/antw (1) <b>[12]</b>

**QUESTION/VRAAG 2**

Number of Saturdays attended	12	11	10	10	9	9	7	6	5	4	12	11	6
Mark (as a %)	96	91	78	83	75	62	70	68	56	34	88	90	59

2.1	$a = 22,26252159\dots$ $b = 5,898100173\dots$ $\therefore \hat{y} = 5,90x + 22,26$	$\checkmark 22,26$ $\checkmark 5,90$ $\checkmark$ equation/vgl (3)
2.2	$r = 0,92$ (0,9205276443...)	$\checkmark\checkmark$ answer/antw (2)
2.3	There is a very strong relationship between the variables/ <i>Daar is 'n baie sterk verband tussen die veranderlikes.</i>	$\checkmark$ very strong/ <i>baie sterk</i> (1)
2.4	$\therefore \hat{y} \approx 69,447 = 69,45 \approx 69\%$ (accept 70%) <b>OR/OF</b> $\therefore \hat{y} \approx 5,90(8) + 22,26$ $\approx 69,46\%$ $\approx 69\%$ (accept 70%)	$\checkmark\checkmark$ answer/antw (2) $\checkmark$ substitution/ <i>substitusie</i> $\checkmark$ answer/antw (2) <b>[8]</b>

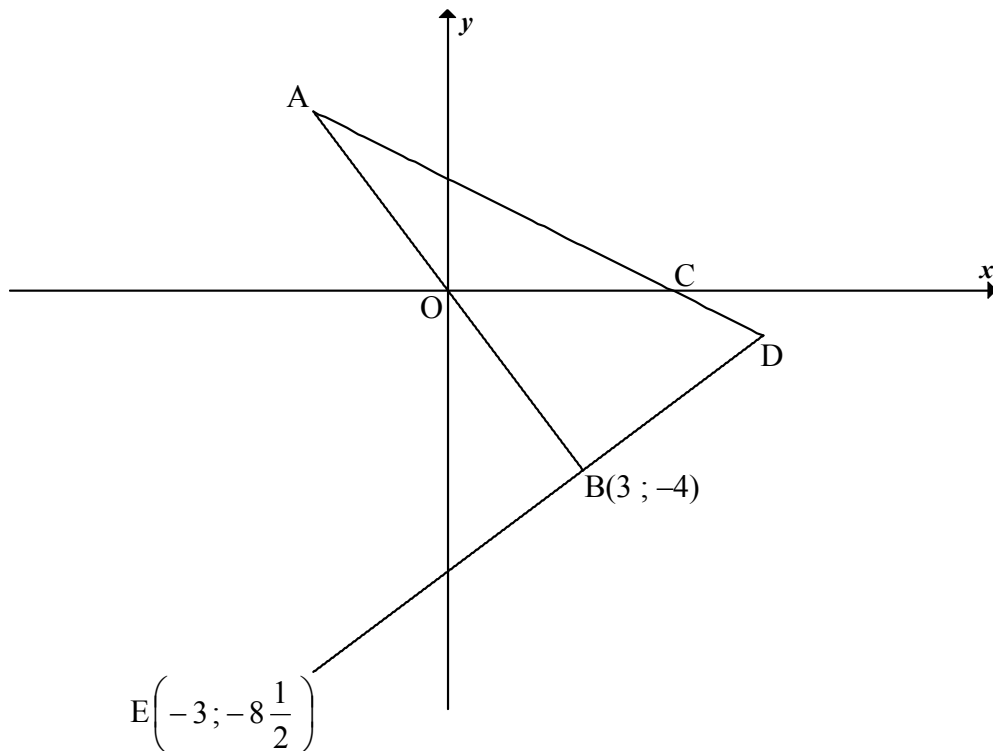
**QUESTION/VRAAG 3**



3.1	$m_{RS} = \frac{2-1}{4-2}$ $= \frac{1}{2}$	✓ correct subst/ korrekte subst ✓ answer/antw (2)
3.2	PQ is $y = \frac{1}{2}x + 6$ $\therefore PQ \parallel RS \left( m_{PQ} = m_{RS} = \frac{1}{2} \right)$ But/maar PS $\parallel$ QR $\therefore PQRS =$ parallelogram (opp sides of quad are $\parallel$ / teenoorst sye v vh $\parallel$ ) $\therefore PQ^2 = RS^2 = (4-2)^2 + (2-1)^2$ $= 2^2 + 1^2$ $\therefore PQ = RS = \sqrt{5} = 2,24$ (opp sides of $\parallel$ m / teenoorst sye v $\parallel$ m)	✓ S ✓ S/R ✓ subst of/subst v R(4 ; 2) and/en S(2 ; 1) ✓ answer/antw (4)

<p>3.3</p>	$m_{QR} = \frac{4-2}{0-4}$ $= -\frac{1}{2}$ $m_{PT} = m_{QR} = -\frac{1}{2} \quad (\text{PS} \parallel \text{QR})$ <p>Equation of/Vgl van PT:</p> $y - y_1 = -\frac{1}{2}(x - x_1) \qquad y = -\frac{1}{2}x + c$ $y - 1 = -\frac{1}{2}(x - 2) \qquad \text{OR/OF} \qquad 1 = -\frac{1}{2}(2) + c$ $y - 1 = -\frac{1}{2}x + 1 \qquad 2 = c$ $y = -\frac{1}{2}x + 2 \qquad y = -\frac{1}{2}x + 2$	<p>✓ <math>m_{QR}</math></p> <p>✓ <math>m_{PT}</math></p> <p>✓ subst of/subst v m and/en S(2 ; 1)</p> <p>✓ equation/vgl (4)</p>
<p>3.4</p>	<p>N(0 ; 2)</p>	<p>✓ coordinates (1)</p>
<p>3.5</p>	$\tan T_2 = m_{PT} = -\frac{1}{2}$ $T_2 = 153,4^\circ$ <p>Equation of/Vgl van NR: <math>y = 2</math></p> <p>∴ <math>\hat{R}\hat{N}\hat{S} = \hat{N}\hat{T}\hat{O}</math> (alt <math>\angle</math>s; NR <math>\parallel</math> OT)</p> $\hat{R}\hat{N}\hat{S} = \hat{N}\hat{T}\hat{O} = 180^\circ - 153,4^\circ$ $= 26,6^\circ$	<p>✓ <math>\tan T_2 = -\frac{1}{2}</math></p> <p>✓ <math>T_2 = 153,4^\circ</math></p> <p>✓ <math>y = 2</math></p> <p>✓ S</p> <p>✓ <math>\hat{R}\hat{N}\hat{S} = 26,6^\circ</math> (5) <b>[16]</b></p>

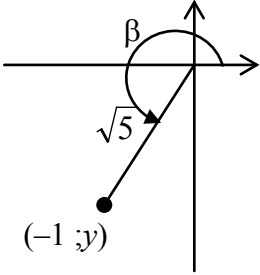
**QUESTION/VRAAG 4**



4.1	A(-3 ; 4)	✓ $x = -3$ ✓ $y = 4$ (2)
4.2	$r^2 = (3)^2 + (-4)^2$ <b>OR</b> $r^2 = (-3)^2 + (4)^2$ $r^2 = 25$ ∴ Equation of the circle through A, B and C/ <i>Vgl vd sirkel deur A, B en C: <math>x^2 + y^2 = 25</math></i>	✓ substitution/ <i>substitusie</i> ✓ $r^2 = 25$ ✓ answer/antw (3)
4.3	$r = 5$ ∴ AB = 10 units/eenhede	✓ $r = 5$ ✓ answer/antw (2)
4.4	AB ⊥ ED <b>OR</b> $\hat{A}BD = 90^\circ$ (radius ⊥ tangent/raaklyn) $BD^2 = AD^2 - AB^2$ (Theorem of Pythagoras/ <i>st v Pythagoras</i> ) $BD^2 = (\sqrt{125})^2 - (10)^2$ $BD^2 = 25$ BD = 5 units/eenhede	✓ S/R ✓ subst into/in Pyth th/stelling ✓ answer/antw (3)
4.5	area of/ <i>oppervlakte van</i> $\Delta ABD = \frac{1}{2}$ base/ <i>basis</i> × ⊥ height/ <i>hoogte</i> $= \frac{1}{2}(5)(10)$ $= 25$ square units/ <i>vk eenhede</i>	✓ formula/ <i>formule</i> ✓ substitution/ <i>substitusie</i> ✓ answer/antw (3)

4.6	<p>AE is a diameter/<i>middel lyn</i> (line subtending a right angle/ <i>lyn onderspan 'n regte hoek</i>)</p> <p><math>AE = 4 - (-8,5) = 12,5</math> units/<i>eenhede</i></p> <p><math>\therefore r = 6\frac{1}{4}</math> or/of <math>\frac{25}{4}</math></p> <p>Centre of new circle/<i>middelpunt v nuwe sirkel</i>:</p> <p><math>= (-3; \frac{4 + -8,5}{2})</math></p> <p><math>= (-3; -2\frac{1}{4})</math> or <math>(-3; -\frac{9}{4})</math> or <math>(-3; -2,25)</math></p> <p><math>\therefore</math> Equation of new circle/<i>Vgl v nuwe sirkel</i>:</p> <p><math>(x + 3)^2 + (y + \frac{9}{4})^2 = \frac{625}{16} = 39,06</math></p>	<p>✓ S/R</p> <p>✓ <math>AE = 12,5</math></p> <p>✓ <math>r = 6\frac{1}{4}</math> or/of <math>\frac{25}{4}</math></p> <p>✓ <math>x = -3</math></p> <p>✓ <math>y = -2\frac{1}{4}</math></p> <p>✓ equation/vgl</p> <p>(6) <b>[19]</b></p>
-----	---	---

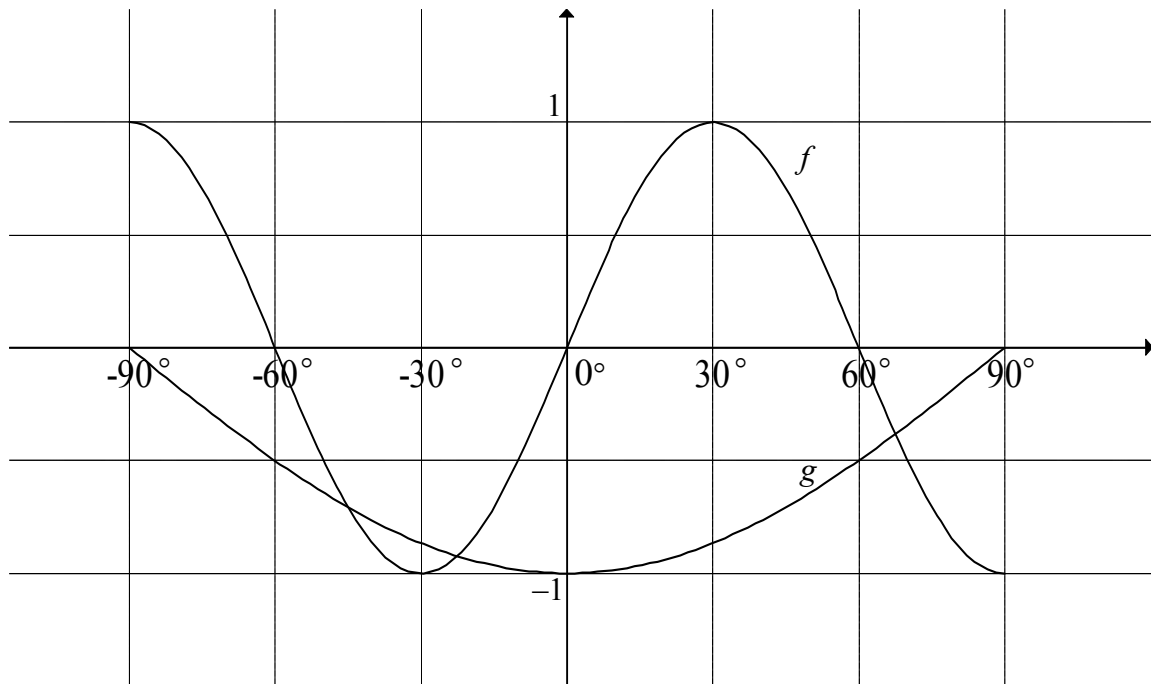
**QUESTION/VRAAG 5**

5.1	$\cos \beta = -\frac{1}{\sqrt{5}} \text{ and/en } 180^\circ < \beta < 360^\circ$ $(-1)^2 + y^2 = (\sqrt{5})^2$ $1 + y^2 = 5$ $y^2 = 4$ $y = -2$ $\therefore \sin \beta = -\frac{2}{\sqrt{5}}$ 	<u>sketch/skets:</u> ✓ correct quad/ <i>korrekte kwadr</i> ✓ $x = -1$ ✓ subst into Pyth/ <i>subst in Pyth</i>  ✓ value of/waarde <i>van y</i>  ✓ value of/waarde <i>van sin beta</i> (5)
5.2	$\frac{(-\tan x) \cdot (-\sin(90^\circ - x))}{4 \sin x}$ $\frac{(-\tan x) \cdot (-\cos x)}{4 \sin x}$ $= \frac{\left(-\frac{\sin x}{\cos x}\right) \cdot (-\cos x)}{4 \sin x}$ $= \frac{1}{4}$	✓ $-\tan x$ ✓ $-\sin(90^\circ - x)$ ✓ $\sin x$ ✓ $-\cos x$  ✓ $\frac{\sin x}{\cos x}$  ✓ answer/antw (6)
5.3.1	$\tan A = \frac{\sin A}{\cos A} = \frac{p}{q}$	✓ answer/antw (1)
5.3.2	$p^4 - q^4 = (p^2 + q^2)(p^2 - q^2)$ $= (\sin^2 A + \cos^2 A)(\sin^2 A - \cos^2 A)$ $= (1)(\sin^2 A - \cos^2 A)$ $= -1(\cos^2 A - \sin^2 A)$ $= -\cos 2A$	✓ factors/faktore  ✓ identity/identiteit ✓ $-1$ as CF/GF ✓ answer/antw (4)
5.4.1	$\text{LHS/LK} = \frac{\cos^2 \theta - \cos 2\theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\cos^2 \theta - (\cos^2 \theta - \sin^2 \theta)}{\sin \theta \cdot \cos \theta}$ $= \frac{\cos^2 \theta - \cos^2 \theta + \sin^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin \theta}{\cos \theta} = \tan \theta = \text{RHS/RK}$ <p><b>OR</b></p>	✓ writing as single <i>term/skryf as</i> <i>enkelterm</i> ✓ expansion/ <i>uitbreiding</i>  ✓ simplify/vereenv  ✓ simplify/vereenv  ✓ simplify/vereenv (5)



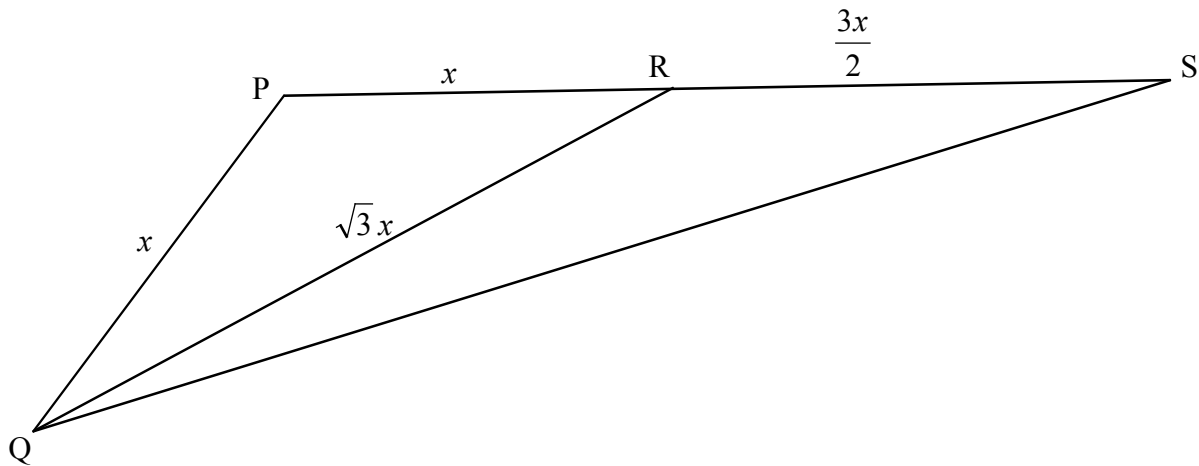
	$\begin{aligned} \text{LHS/LK} &= \frac{\cos^2 \theta - \cos 2\theta}{\sin \theta \cdot \cos \theta} \\ &= \frac{\cos^2 \theta - (2\cos^2 \theta - 1)}{\sin \theta \cdot \cos \theta} \\ &= \frac{1 - \cos^2 \theta}{\sin \theta \cdot \cos \theta} \\ &= \frac{\sin^2 \theta}{\sin \theta \cdot \cos \theta} \\ &= \frac{\sin \theta}{\cos \theta} \\ &= \tan \theta = \text{RHS/RK} \end{aligned}$	<ul style="list-style-type: none"> <li>✓ writing as single term/skryf as enkelterm</li> <li>✓ expansion/uitbreiding</li> <li>✓ simplify/vereenv</li> <li>✓ identity/identiteit</li> <li>✓ simplify/vereenv (5)</li> </ul>
5.4.2	Undefined when/Ongedefinieerd as: $\cos \theta = 0, \sin \theta = 0$ $\therefore \theta = 90^\circ$	<ul style="list-style-type: none"> <li>✓✓ answer/antw (2)</li> </ul>
5.5	$\begin{aligned} 2(2\sin x \cdot \cos x) + 3 \sin x &= 0 \\ 4\sin x \cdot \cos x + 3 \sin x &= 0 \\ \sin x (4\cos x + 3) &= 0 \\ \sin x = 0 \quad \text{or/of} \quad \cos x &= -\frac{3}{4} \end{aligned}$ <p> <math>x = 0^\circ + k \cdot 360^\circ</math> or <math>180^\circ + k \cdot 360^\circ; k \in \mathbb{Z}</math>  <b>OR/OF</b>  <math>x = k \cdot 180^\circ; k \in \mathbb{Z}</math> </p> <p> or/of  <math>x = 138,59^\circ + k \cdot 360^\circ</math> or/of <math>221,41^\circ + k \cdot 360^\circ; k \in \mathbb{Z}</math>  <b>OR/OF</b>  <math>x = \pm 138,59^\circ + k \cdot 360^\circ; k \in \mathbb{Z}</math> </p>	<ul style="list-style-type: none"> <li>✓ expansion/uitbreiding</li> <li>✓ factorise/faktoriseer</li> <li>✓ both equations/beide vgl's</li> <li>✓ <math>x = 0^\circ + k \cdot 360^\circ</math> or <math>180^\circ + k \cdot 360^\circ</math> <b>OR/OF</b> <math>x = k \cdot 180^\circ</math></li> <li>✓ <math>138,59^\circ + k \cdot 360^\circ</math> or <math>221,41^\circ + k \cdot 360^\circ</math> <b>OR/OF</b> <math>\pm 138,59^\circ + k \cdot 360^\circ</math></li> <li>✓ <math>k \in \mathbb{Z}</math></li> </ul> <p style="text-align: right;">(6) [29]</p>

**QUESTION/VRAAG 6**



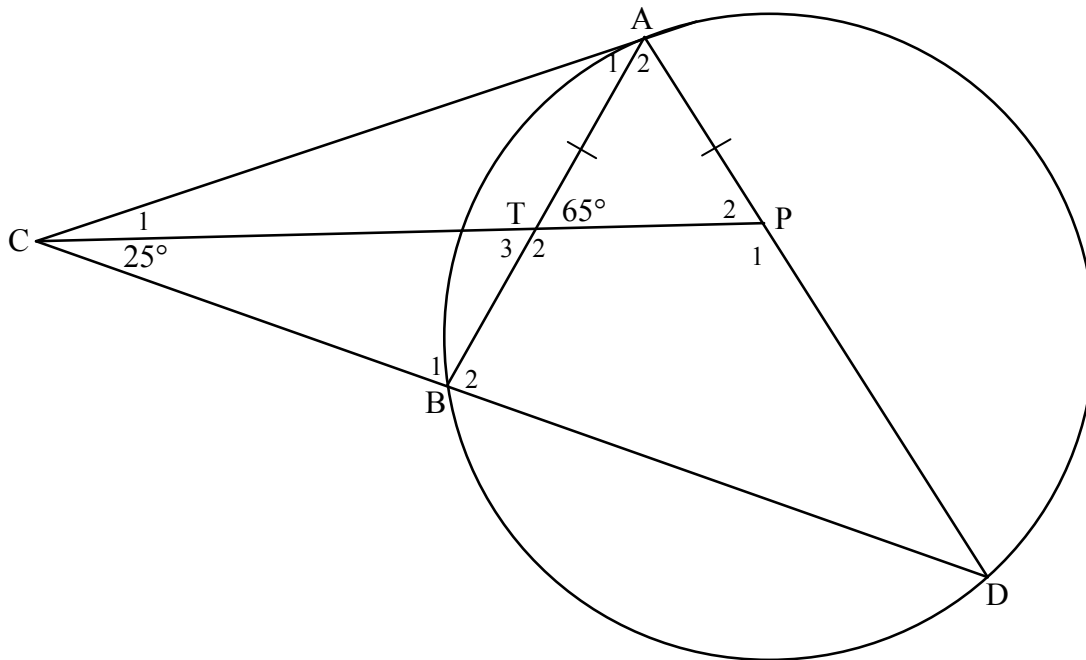
6.1	Period of/Periode van $f = 120^\circ$	✓ $120^\circ$ (1)
6.2	$b = 3$	✓ $b = 3$ (1)
6.3	$x = -45^\circ$ or/of $x = -22,5^\circ$ or/of $x = 67,5^\circ$	✓ $x = -45^\circ$ ✓ $x = -22,5^\circ$ ✓ $x = 67,5^\circ$ (3)
6.4	$x \in (-45^\circ ; -22,5^\circ) \cup (67,5^\circ ; 90^\circ]$  <b>OR/OF</b>  $-45^\circ < x < -22,5^\circ$ or/of $67,5^\circ < x \leq 90^\circ$	✓ critical values ✓ notation ✓ critical values ✓ notation (4)  ✓ kritieke waardes ✓ notasie ✓ kritieke waardes ✓ notasie (4) <b>[9]</b>

**QUESTION/VRAAG 7**



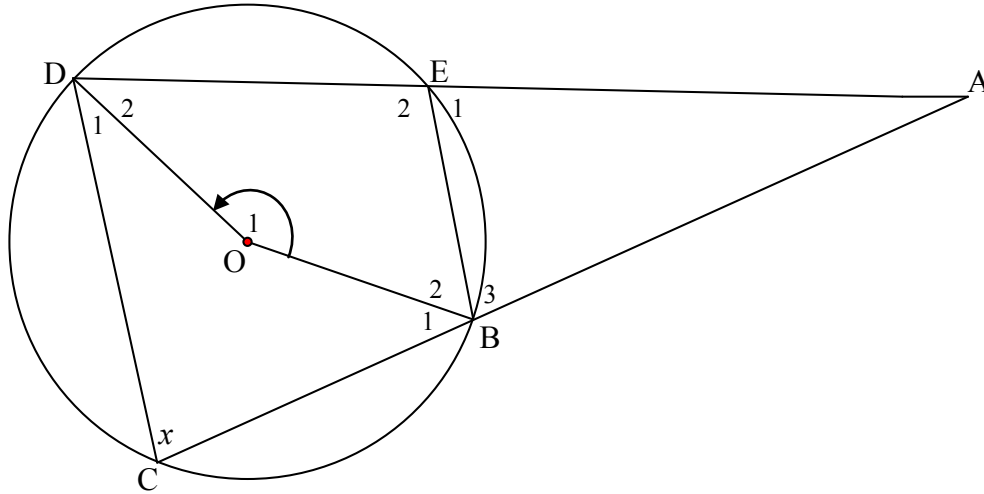
<p>7.1</p>	$QR^2 = PQ^2 + RP^2 - 2.PQ.RP.\cos \hat{P}$ $(\sqrt{3}x)^2 = x^2 + x^2 - 2.x.x.\cos \hat{P}$ $\cos \hat{P} = \frac{x^2 + x^2 - (\sqrt{3}x)^2}{2x.x}$ $\cos \hat{P} = \frac{-x^2}{2x^2}$ $\cos \hat{P} = -\frac{1}{2}$ $\hat{P} = 120^\circ$	<p>✓ correct subst into cosine rule/korrek subst in cos-reël</p> <p>✓ cos <math>\hat{P}</math> as subj/onderw</p> <p>✓ simplify/vereenv</p> <p>✓ answer/antw</p> <p>(4)</p>
<p>7.2</p>	<p><math>\hat{P}RQ = \hat{P}QR = 30^\circ</math> (<math>\angle</math>s opp equal sides/<math>\angle</math>e teenoor gelyke sye)</p> <p><math>\hat{Q}RS = 150^\circ</math> (<math>\angle</math>s on a str line/<math>\angle</math>e op reguitlyn)</p> <p>Area of/Opp van <math>\Delta QRS = \frac{1}{2}(QR)(RS)(\sin \hat{Q}RS)</math></p> $= \frac{1}{2}(\sqrt{3}x)\left(\frac{3}{2}x\right)(\sin 150^\circ)$ $= \left(\frac{3\sqrt{3}}{4}x^2\right)\left(\frac{1}{2}\right)$ $= \frac{3\sqrt{3}}{8}x^2 = 0,65x^2$	<p>✓ S</p> <p>✓ S</p> <p>✓ correct subst into area rule/korrek subst in opp-reël</p> <p>✓ simplify/vereenv</p> <p>✓ answer/antw</p> <p>(5)</p> <p><b>[9]</b></p>

**QUESTION/VRAAG 8**



8.1.1	$\hat{P}_2 = 65^\circ$	( $\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye)	$\checkmark$ S $\checkmark$ R (2)
8.1.2	$\hat{D} = 40^\circ$	(ext $\angle$ of $\triangle CDP$ /buite $\angle$ v $\triangle CDP$ ) <b>OR/OF</b> ( $\angle$ s on a str line; sum of $\angle$ s in $\triangle$ / $\angle$ e op regt lyn; som v $\angle$ e in $\triangle$ )	$\checkmark$ S $\checkmark$ R (2)
8.1.3	$\hat{A}_1 = 40^\circ$	(ext $\angle$ of $\triangle CAT$ /buite $\angle$ v $\triangle CAT$ ) <b>OR/OF</b> ( $\angle$ s on a str line; sum of $\angle$ s in $\triangle$ / $\angle$ e op regt lyn; som v $\angle$ e in $\triangle$ )	$\checkmark$ S $\checkmark$ R (2)
8.2	$\hat{A}_1 = \hat{D} = 40^\circ$ $\therefore$ CA is a tangent to the circle ( $\angle$ between line and chord)/ CA is 'n raaklyn aan die sirkel ( $\angle$ tussen lyn en koord)		$\checkmark$ S $\checkmark$ R (2) <b>[8]</b>

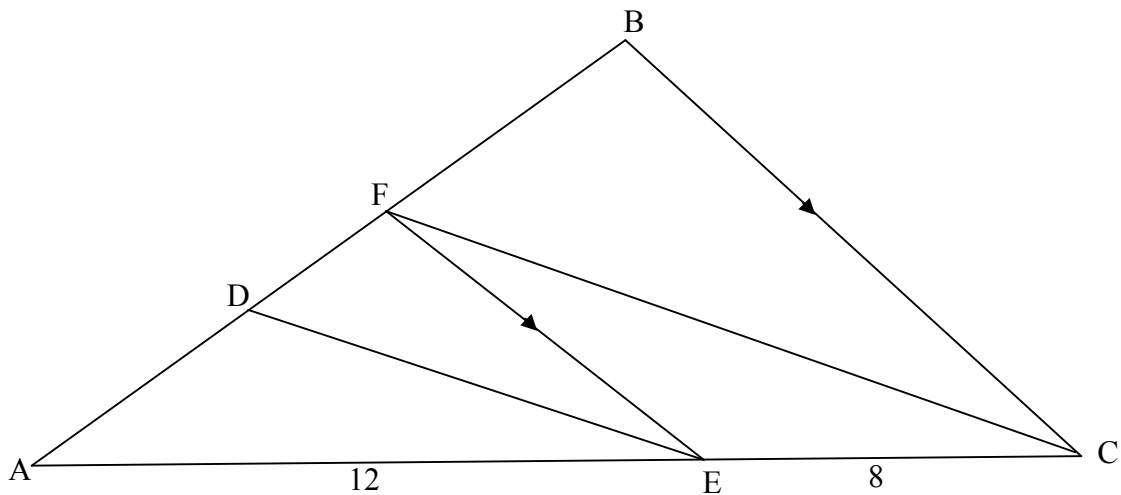
**QUESTION/VRAAG 9**



9.1.1	ext∠ of cyclic quad/buite ∠ van koordevh	✓R (1)
9.1.2	∠ at centre = 2 × ∠ at circumference / midpts∠ = 2 × omtreks∠	✓R (1)
9.2.1	$\hat{CDA} = \hat{E}_1 = x$ (corresp∠s/ooreenk ∠e; EB ∥ DC) $\therefore \hat{CDA} = \hat{C} = x$ $\therefore AC = AD$ (sides opp equal ∠s/sye teenoor gelyke ∠e)	✓S ✓R  ✓S ✓(justification) (4)
9.2.2	$\hat{A} = 180^\circ - 2x$ (sum of ∠s in Δ/som van ∠e in Δ) $\hat{O}_1 = 2x$ <b>OR</b> $\hat{A} + \hat{O}_1 = 180^\circ - 2x + 2x = 180^\circ$ $\therefore ABOD$ is a cyclic quad/koordevh (opp∠s quad supp/ teenoorst ∠e van vh suppl)	✓S ✓ linking the 2 ∠s ✓R (3) <b>[9]</b>

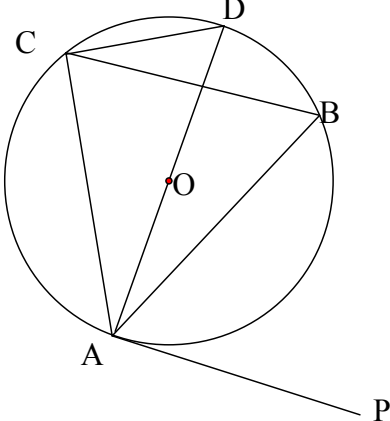
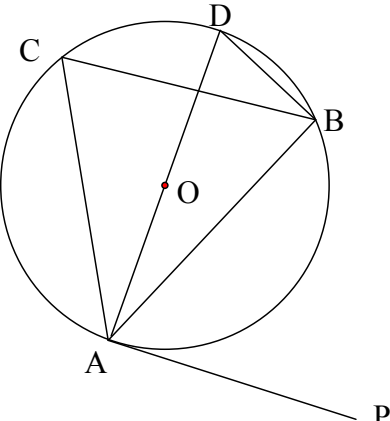
**QUESTION/VRAAG 10**

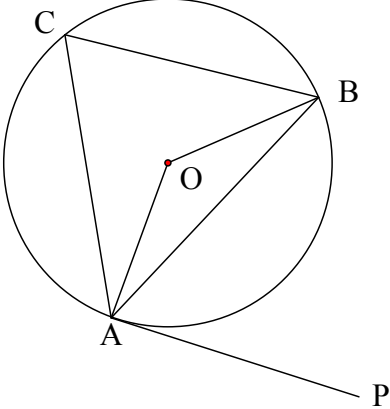
10.1	then the line is <b>parallel</b> to the <b>third side</b> / <i>is die lyn ewewydig aan die derde sy.</i>	✓ S  (1)
------	--	----------------



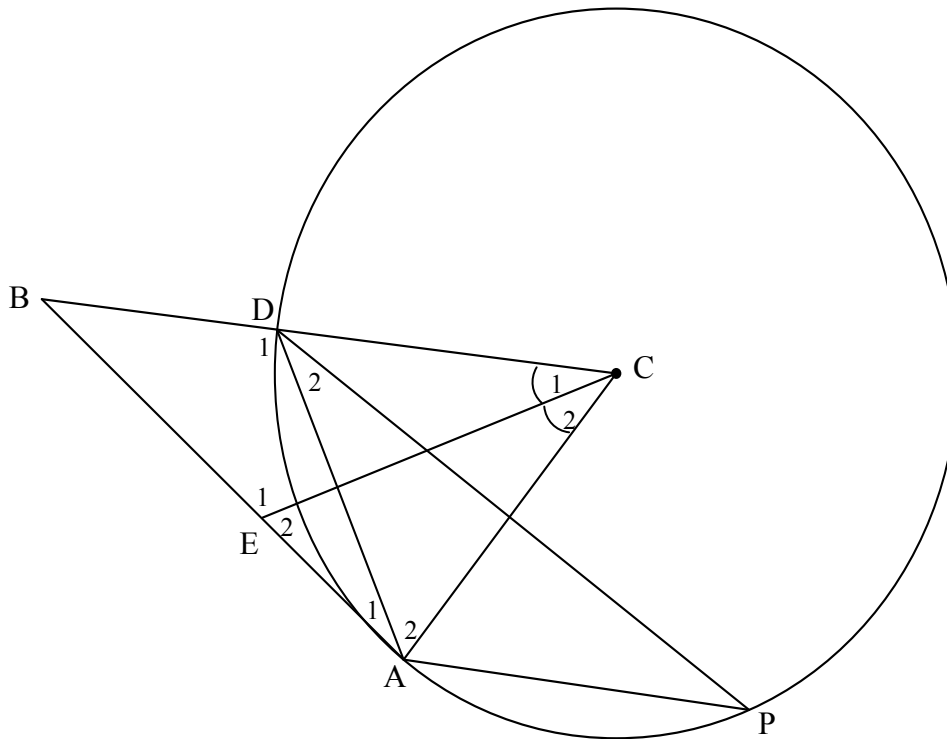
10.2.1	$\frac{AE}{AC} = \frac{12}{20} = \frac{3}{5}$ $\frac{AD}{AF} = \frac{3}{5}$ $\therefore \frac{AE}{AC} = \frac{AD}{AF}$ $\therefore DE \parallel FC$ <p style="text-align: center;">(line divides two sides of <math>\Delta</math> in prop/ <i>lyn verdeel twee sye v <math>\Delta</math> in dieselfde verh</i>)</p>	✓ S  ✓ S ✓ R  (3)
10.2.2	$\frac{BF}{BA} = \frac{8}{20}$ <p style="text-align: center;">(prop theorem/<i>eweredigh st</i>; <math>BC \parallel FE</math>)</p> $\therefore BF = \frac{8}{20}(14)$ $\therefore BF = \frac{28}{5} \text{ OR/OR } FB = 5\frac{3}{5} \text{ OR/OR } FB = 5,6$	✓ S/R  ✓ substitute 14/ <i>stel 14 in</i>  ✓ answer/ <i>antw</i>  (3) <b>[7]</b>

**QUESTION/VRAAG 11**

<p>11.1</p>	<p>Draw diameter AD and join DC. <i>Trek middellyn AD en verbind DC.</i></p>  <p>Proof/Bewys:  <math>\hat{B}AP + \hat{B}AD = 90^\circ</math> (tangent/raaklyn <math>\perp</math> radius)  <math>\hat{D}CB + \hat{A}CB = 90^\circ</math> (<math>\angle</math> in semi circle/halfsirkel)                  but  <math>\hat{B}AD = \hat{D}CB</math> (<math>\angle</math>s in same segment/<math>\angle</math>e in dies segm)  <math>\therefore \hat{B}AP = \hat{A}CB</math></p> <p><b>OR/OF</b></p> <p>Draw diameter AD and join DB. <i>Trek middellyn AD en verbind DB.</i></p>  <p>Proof/Bewys:  <math>\hat{P}AB + \hat{B}AD = 90^\circ</math> (tangent/raaklyn <math>\perp</math> radius)  <math>\hat{D}BA = 90^\circ</math> (<math>\angle</math> in semi circle/halfsirkel)  <math>\hat{B}AD + \hat{A}DB = 90^\circ</math> (sum of <math>\angle</math>s in <math>\Delta</math>/som van <math>\angle</math>e in <math>\Delta</math>)  <math>\hat{A}DB = \hat{A}CB</math> (<math>\angle</math>s in same segment/<math>\angle</math>e in dies segm)  <math>\therefore \hat{B}AP = \hat{A}CB</math></p>	<p>✓ construction/ konstruksie</p> <p>✓ S ✓ R                  ✓ S ✓ R</p> <p>✓ S/R</p> <p>(6)</p> <p>✓ construction/ konstruksie</p> <p>✓ S ✓ R                  ✓ S ✓ R</p> <p>✓ S/R</p> <p>(6)</p>
-------------	--	---

<p><b>OR/OF</b> Draw radii OA and OB. <i>Trek radii OA en OB.</i></p>  <p>Proof/Bewys:  <math>\widehat{OAB} + \widehat{BAP} = 90^\circ</math> (tangent/raaklyn <math>\perp</math> radius)  <math>\therefore \widehat{BAP} = 90^\circ - \widehat{OAB}</math>  <math>\widehat{OAB} = \widehat{OBA}</math> (<math>\angle</math>s opp equal sides/<math>\angle</math>e to gelyke sye)  <math>\widehat{AOB} = 180^\circ - 2\widehat{OAB}</math> (sum of <math>\angle</math>s in <math>\Delta</math>/som van <math>\angle</math>e in <math>\Delta</math>)  <math>\therefore \widehat{ACB} = 90^\circ - \widehat{OAB}</math> (<math>\angle</math> at centre = <math>2 \times \angle</math> at circumference/  <i>midpts <math>\angle = 2 \times</math> omtreks <math>\angle</math>)</i>  <math>\therefore \widehat{BAP} = \widehat{ACB}</math></p>	<p>✓ construction/ <i>konstruksie</i></p> <p>✓ S ✓ R          ✓ S          ✓ S/R          ✓ S</p> <p>(6)</p>
--	--





<p>11.2.1</p>	<p> <math>\hat{DCA} = 2x</math> (EC bisector)  <math>\hat{P} = x</math> (<math>\angle</math> at centre = <math>2 \times \angle</math> at circumference/  <i>midpts</i> <math>\angle = 2 \times</math> <i>omtreks</i> <math>\angle</math>)  <math>\hat{A}_1 = \hat{P} = x</math> (tangent-chord theorem/<i>rkl-kd st</i>)                      In <math>\triangle BAD</math> and <math>\triangle BCE</math>:  <math>\hat{B} = \hat{B}</math> (common/<i>gemeen</i>)  <math>\hat{A}_1 = \hat{C}_1</math> (proven above)  <math>\therefore \triangle BAD \equiv \triangle BCE</math> (<math>\angle\angle\angle</math>)                 </p> <p style="text-align: center;"><b>OR/OF</b></p> <p> <math>\hat{DCA} = 2x</math> (EC bisector)  <math>\hat{P} = x</math> (<math>\angle</math> at centre = <math>2 \times \angle</math> at circumference/  <i>midpts</i> <math>\angle = 2 \times</math> <i>omtreks</i> <math>\angle</math>)  <math>\hat{A}_1 = \hat{P} = x</math> (tangent-chord theorem/<i>rkl-kd st</i>)                      In <math>\triangle BAD</math> and <math>\triangle BCE</math>:  <math>\hat{B} = \hat{B}</math> (common/<i>gemeen</i>)  <math>\hat{A}_1 = \hat{C}_1</math> (proven above)  <math>\hat{D}_1 = \hat{E}_1</math>  <math>\therefore \triangle BAD \equiv \triangle BCE</math> </p>	<p> <math>\checkmark</math> S <math>\checkmark</math> R  <math>\checkmark</math> S <math>\checkmark</math> R  <math>\checkmark</math> S  <math>\checkmark</math> S (with justification)  <math>\checkmark</math> R                      (7)                 </p> <p> <math>\checkmark</math> S <math>\checkmark</math> R  <math>\checkmark</math> S <math>\checkmark</math> R  <math>\checkmark</math> S  <math>\checkmark</math> S (with justification)  <math>\checkmark</math> S                      (7)                 </p>
---------------	---	---

11.2.2(a)	$\hat{BAC} = 90^\circ$ (tangent/raakl $\perp$ radius) $\therefore BC^2 = 8^2 + 6^2 = 100$ (Pythagoras theorem/stelling) $BC = 10$ $AC = DC = 6$ (radii) $\therefore BD = 10 - 6 = 4$ units/eenhede	$\checkmark$ R $\checkmark$ substitution into Pyth theorem $\checkmark$ $BC = 10$ $\checkmark$ $DC = 6$ $\checkmark$ $BD = 4$ (5)
11.2.2(b)	$\frac{BA}{BC} = \frac{BD}{BE}$ ( $\triangle BAD \parallel \triangle BCE$ ) $\therefore \frac{8}{10} = \frac{4}{BE}$ $\therefore BE = 5$ units/eenhede	$\checkmark$ S $\checkmark$ substitution/ <i>substitusie</i> $\checkmark$ $BE = 5$ (3)
11.2.2(c)	$AE = 3$ In $\triangle ACE$ : $\tan x = \frac{3}{6}$ $\therefore x = 26,57^\circ$ <b>OR/OF</b> $\sin 2x = \frac{8}{10}$ $\therefore 2x = 53,1301\dots$ ( $2x < 90^\circ$ ) $\therefore x = 26,57^\circ$	$\checkmark$ correct trig ratio/ <i>korrekte trigv</i> $\checkmark$ correct trig eq/ <i>korrekte trigvgl</i> $\checkmark$ answer/antw (3) $\checkmark$ correct trig ratio/ <i>korrekte trigv</i> $\checkmark$ correct trig eq/ <i>korrekte trigvgl</i> $\checkmark$ answer/antw (3) <b>[24]</b>

**TOTAL/TOTAAL: 150**