education

Department of Education
FREE STATE PROVINCE

# GRADE 12

## MATHEMATICS P2

## JUNE EXAMINATION
## 2024

# MARKING GUIDELINES

**MARKS: 150**

**This Marking Guidelines consists of 19 pages**

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**QUESTION/ VRAAG 1**

| | | |
|---|---|---|
| 1.1 | $C(0;6)$ | $C(0;6)$✓ (1) |
| 1.2 | $tanCX = m$<br>$tanC\hat{B}X = -1$<br>$C\hat{B}X = 135°$ | Substitution ✓<br>135° ✓ (2) |
| 1.3 | $D(0;10)$<br>$CD = 10 - 6$<br>$CD = 4$<br>**OR**<br>$CD = \sqrt{(0-0)^2 + (6-10)^2}$<br>$CD = 4$ | $CD = 10 - 6$ ✓<br>$CD = 4$ ✓<br>**OR**<br>$CD = \sqrt{(0-0)^2 + (6-10)^2}$ ✓<br>$CD = 4$ ✓ (2) |
| 1.4 | E(– 4;8) $\quad$ E$\left(-\frac{4}{3};\frac{22}{3}\right)$<br>$M\left(\frac{-4+6}{2};\frac{8+0}{2}\right)$ $\quad$ $M\left(\frac{\frac{-4}{3}+6}{2};\frac{\frac{22}{3}+0}{2}\right)$<br>$M(1;4)$ $\quad$ $M\left(\frac{7}{3};\frac{11}{3}\right)$<br>$y - y_1 = m(x - x_1)$<br>$y - 4 = 2(x-1)$ $\quad$ $-\frac{11}{3} = 2\left(-\frac{7}{3}\right) + c$<br>$y = 2x + 2$ $\quad$ $y = 2x + 1$ | Correct substitution ✓<br>answer ✓<br>Correct substitution ✓<br>equation✓ (3) |
| 1.5 | $tanE\hat{A}B = 2$<br>$E\hat{A}B = 63.43°$<br>$A\hat{E}B = 135° - 63.43°$<br>$A\hat{E}B = 71.57°$ | $tanE\hat{A}B = 2$ ✓<br>$E\hat{A}B = 63.43°$ ✓<br>$A\hat{E}B = 135° - 63.43°$ ✓<br>71.57° ✓ (4) |
| 1.6 | $2x = -10$<br>$x = -5$<br>$A(-5;0)$ | $A(-5;0)$ ✓ |


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| | **Using E(– 4 ; 8)**<br>midpoint EB = midpoint of AG.<br>$1 = \frac{-5+x}{2}$ $\quad 4 = \frac{0+y}{2}$<br>$x = 7$ $\quad y = 8$<br><br>$G(7;\ 8)$<br><br>**OR**<br>$2x = -10$<br>$x = -5$<br>$A(-5;0)$<br><br>By using translation geometry :<br><br>A → E<br><br>$(x\ ;y) \rightarrow \quad (x+1\ ;y+8)$<br><br>∴ B → G<br><br>$B(6\ ;0) \rightarrow \quad G(6+1\ ;0+8)$<br><br>$\therefore\ G(7\ ;8)$ | Method ✓<br>Midpoint of diagonals<br><br>$x-$ Co-ordinate. ✓<br><br>$y-$ Co-ordinate. ✓<br><br>**OR**<br><br>$A(-5;0)$ ✓<br><br>Method ✓<br><br>$x-$ Co-ordinate. ✓<br><br>$y-$ Co-ordinate. ✓ |
| | **Using E** $\left(\frac{7}{3};\frac{11}{3}\right)$<br>midpoint EB = midpoint of AG.<br>$\frac{7}{3}=\frac{-5+x}{2}$ $\quad \frac{11}{3}=\frac{0+y}{2}$<br>$x=\frac{19}{3}$ $\quad y=\frac{22}{3}$<br>$G\left(\frac{19}{3};\frac{22}{3}\right)$<br><br>**OR**<br>$2x = -10$<br>$x = -5$<br>$A(-5;0)$<br><br>By using translation geometry :<br><br>A → E<br><br>$(x\ ;y) \rightarrow \quad (x+0{,}33\ ;y+7{,}33)$<br><br>∴ B → G<br>$B(6\ ;0) \rightarrow \quad G(6+0{,}33\ ;0+7{,}33)$<br><br>$G\left(\frac{19}{3};\frac{22}{3}\right)$ | (4) |



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| 1.7 | **Use G(7 ; 8)**<br>In parm ABGE<br><br>Perp h = 8 $units$<br><br>Base = $x_B - x_A = 6 - (-5) = 11\ units$<br><br>Area parm ABGE = (perp h)(base)<br>= $(8)(11)$ = 88 units$^2$<br><br>OR<br><br>In $\Delta AEB$<br><br>Perp h = 8 $units$<br><br>Base = $x_B - x_A = 6 - (-5) = 11\ units$<br><br>Area $\Delta AEB = \frac{1}{2}(b)(h)$<br><br>$= \frac{1}{2}(11)(8)$<br><br>$= 44\ units^2$<br>Area parm ABGE = (2)(Area $\Delta AEB$ )<br>= $(2)44 = 88 units^2$<br><br>**Use** $G\left(\frac{19}{3};\frac{22}{3}\right)$<br>In parm ABGE<br><br>Perp h = $\frac{22}{3}$ units<br><br>Base = $x_B - x_A = 6 - (-5) = 11\ units$<br><br>Area parm ABGE = (perp h)(base)<br>= $11 \times \frac{22}{3} = 80,67$ units$^2$ | Perp h = 8 ✓<br><br>Base = 11 $units$ ✓<br><br>Substitution ✓<br><br>Area ✓<br><br>OR<br><br>Perp h = $\frac{22}{3}$ ✓<br><br>Base = 11 $units$ ✓<br><br>Substitution ✓<br><br>Area parm ABGE ✓ (4) |
| 1.8 | Midpoint of CD $(0\ ;8)$<br><br>M$(3\ ;4) \rightarrow$ C$(0;8)$<br><br>M must be translated 3 units left and 4 units up. | midpoint ✓<br><br>✓✓3 units left<br>✓✓4 units up (5) |
| | | **[24]** |


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**QUESTION/ VRAAG 2**

| | | |
|---|---|---|
| 2.1 | $ML = 4 - (-5) = 9$ units.<br><br>$(x-3)^2 + (y-4)^2 = 9^2$<br><br>$(x-3)^2 + (y-4)^2 = 81$ | <br><br>Substitution ✓<br><br>Answer ✓ (2) |
| 2.2 | T(– 1;8)<br>$m_r = \frac{8-4}{-1-3} = -1$<br>$m_{rad} \times m_{tan} = -1$<br>$m_{tan} = 1$<br><br>$y - y_1 = m(x - x_1)$<br>$y - (8) = (x - (-1))$<br><br>$y = x + 7$<br><br>**T**$(-1; 4+\sqrt{65})$<br><br>$m = \frac{4+\sqrt{65}-4}{-1-3}$<br>$m = -2,02$<br>$m_{rad} \times m_{tan} = -1$<br>$m = \frac{4}{\sqrt{65}}$<br>$y = \frac{4}{\sqrt{65}}x + 8 + \sqrt{65}$ | T(– 4 ; 8)<br>$m_r = \frac{8-4}{-4-3} = -\frac{4}{7}$<br>$m_{rad} \times m_{tan} = -1$<br><br>$m_{tan} = \frac{7}{4}$<br><br><br>$8 = \frac{7}{4}(-4) + c$<br><br>$y = \frac{7}{4}x + 15$ | $m_{rad}$ ✓<br>$m_{rad} \times m_{tan} = -1$ ✓<br><br>$m_{tan}$✓<br><br><br>Substitution ✓<br><br>equation✓ (5) |
| 2.3 | $(x-3)^2 + (y-4)^2 = {r_2}^2$<br><br>$(7-3)^2 + (3-4)^2 = 17$<br><br>${r_2}^2 < {r_1}^2$<br><br>$17 < 81$<br><br>$\therefore$ *Inside the circle*<br><br>**OR** | <br><br>Substitution ✓<br><br>${r_2}^2 = 17$ ✓<br><br>$17 < 81$ ✓<br><br>*Inside*<br>✓ (4)<br><br>**OR** |

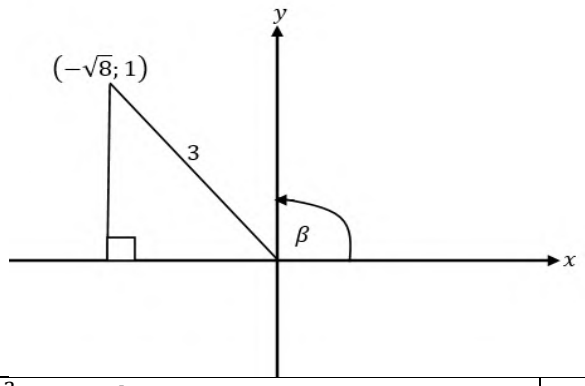


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| | $d = \sqrt{(3-7)^2 + (4-3)^2}$<br>$d = \sqrt{17} = 4.12$<br>$d < r$<br>$\therefore$ *Inside the circle* | Substitution ✓<br>$d = \sqrt{17}$ ✓<br>$d < r$ ✓<br>*Inside*<br>✓ (4) |
| 2.4 | T(– 1;8) T(– 4 ; 8)<br>$y_k = y_l = -5$ $y_k = y_l = -5$<br>$m_{rad} = m_{MK} = -1$ ( collinear points)<br>$-1 = \frac{4-(-5)}{3-x_k}$ $-\frac{4}{7} = \frac{4-(-5)}{3-x}$<br>$-3 + x = 9$ $-12 + 4x = 36$<br>$12 = x_k$ $12 = x_k$<br>**T**$(-1; 4+\sqrt{65})$<br>$y_k = y_l = -5$<br>$m_{rad} = m_{MK} = -1$<br>$-\frac{\sqrt{65}}{4} = \frac{9}{3-x}$<br>$-3\sqrt{65} + \sqrt{65}x = 36$<br>$7{,}47 = x_k$ | $y_k = -5$ ✓<br>$m_{rad} = m_{MK}$ ✓✓<br>substitution✓<br>$x$-value✓ (5) |
| | | **[14]** |


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**QUESTION/VRAAG 3**




| | | |
|---|---|---|
| 3.1.1 | $r^2 = x^2 + y^2$ pyth<br>$3^2 = x^2 + 1^2$<br>$x = -\sqrt{8}$<br>$tan\beta = -\frac{1}{\sqrt{8}}$ | Method ✓<br>$x = -\sqrt{8}$ ✓<br>answer ✓<br>(3) |
| 3.1.2 | $cos2\beta = 1 - 2sin^2\beta$<br>$= 1 - 2\left(\frac{1}{3}\right)^2$<br>$= \frac{7}{9}$ | double angle identity ✓<br>answer ✓ (2) |
| 3.1.3 | $\cos\left(-\beta - 450^\circ\right) = \cos(-\beta - 90°)$<br>$= -\cos(90° + \beta)$<br>$= \sin\beta = \frac{1}{3}$ | $-\cos(90° + \beta)$ ✓<br>Answer ✓ (2) |
| 3.2 | $\frac{4\cos(-x).\cos(90^\circ + x)}{\sin(30^\circ - x).\cos x + \cos(30^\circ - x).\sin x}$<br>$= \frac{-4\cos x \sin x}{\frac{1}{2}\left(\cos^2 x + \sin^2 x\right)}$<br>$= \frac{-4\cos x \sin x}{\frac{1}{2}\left(1 - \sin^2 x + \sin^2 x\right)}$<br>$= -8\, sinxcosx = -4\sin 2x$ | $4cosx$ ✓<br>$-sinx$ ✓<br>$\left(\cos^2 x + \sin^2 x\right)$ ✓<br>$\frac{1}{2}$ ✓<br>$-8sinx\cos x$ ✓<br>$-4sin2x$ ✓ (6) |
| 3.3.1 | $tan203°$ | $\tan 23°$ ✓ |



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| | $tan23° = \frac{\sqrt{1-a^2}}{a}$ | $\sqrt{1-a^2}$ ✓<br>Answer ✓ (3) |
| 3.3.2 | $sin46°$<br>$= \sin 2(23°)$<br>$= 2sin23°cos23°$<br>$= 2a\sqrt{1-a^2}$ | <br>double angle ✓<br>Expansion ✓<br>Answer ✓ (3) |
| 3.4.1 | $\sin(60° + 45°)$<br>$= sin60°.cos45° + cos60°.sin45°$<br>$= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$<br>$= \frac{\sqrt{3}+1}{2\sqrt{2}}$ OR $\frac{\sqrt{6}+\sqrt{2}}{4}$<br><br>OR<br><br>$= \sin(180° - 75°)$<br>$= sin75°$<br>$= sin30°.cos45° + cos30°.sin45°$<br>$= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$<br>$= \frac{\sqrt{3}+1}{2\sqrt{2}}$ OR $\frac{\sqrt{6}+\sqrt{2}}{4}$ | compound angles ✓<br>expansion ✓<br>substitution ✓<br>answer ✓ (4)<br><br>OR<br>$sin75°$✓<br><br>expansion ✓<br>substitution ✓<br>answer ✓ |
| 3.4.2 | $cos69°.cos9 + cos81°.cos21°$<br>$= cos69°.cos9° + sin9°.sin69°$<br>$= cos60°$<br>$= \frac{1}{2}$ | co-function :<br>$cos81°.cos21° = sin9°.sin69°$ ✓<br>$cos60°$✓<br>answer ✓<br><br>OR |

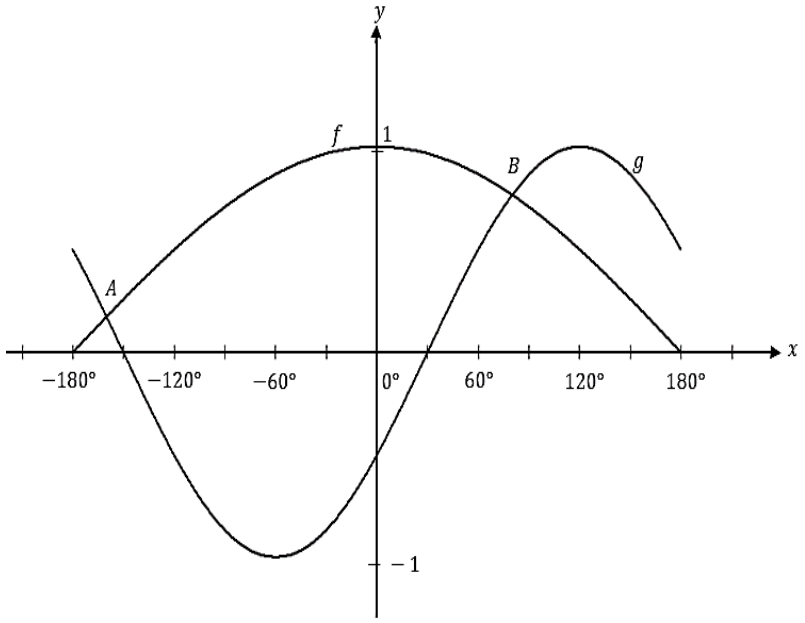


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| | OR<br>$sin21°.cos9° + cos21°.sin9°$<br>$= sin30°$<br>$= \frac{1}{2}$ | co-function<br>$cos69°.cos9° = sin21°.cos9°$ ✓<br>$sin30°$✓<br>answer ✓ (3) |
| 3.5 | $LHS = \frac{2sinx.cosx-cosx}{1-(1-2sin^2x)-sinx}$<br>$= \frac{2sinx.cosx-cosx}{2sin^2x-sinx}$<br>$= \frac{cosx(2sinx-1)}{sinx(2sinx-1)}$<br>$= \frac{cosx}{sinx}$<br>$= \frac{1}{\frac{sinx}{cosx}}$<br>$\frac{1}{tanx} = RHS$ | $2sinx.cosx$ ✓<br>$1-2sin^2x$ ✓<br>factorization ✓<br>simplification ✓<br>identity for $\tan x$ ✓ (5) |
| 3.6 | $\cos 2x = \cos x + 2$<br>$2\cos^2 x - 1 - \cos x - 2 = 0$<br>$2\cos^2 x - \cos x - 3 = 0$<br>$(2\cos x - 3)(\cos x + 1) = 0$<br>$\cos x \neq \frac{3}{2}$ or $\cos x = -1$<br>$x = 180°$ | ✓ expansion<br>✓ standard form<br>✓factors<br>✓✓answers<br>✓ rejection<br>✓ $x = 180°$ (7) |
| | | **[38]** |

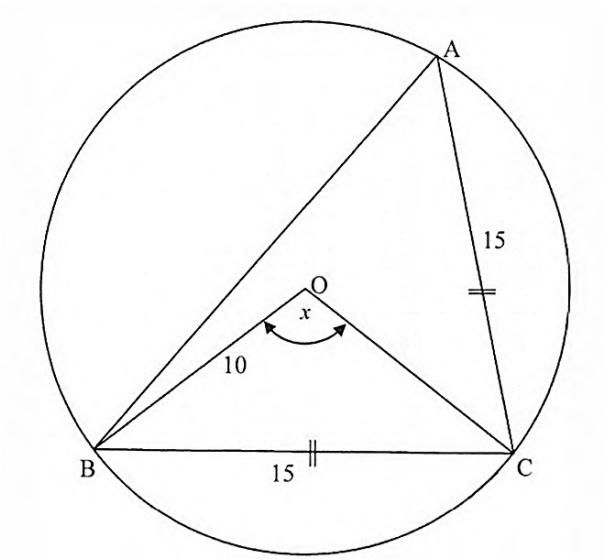

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**QUESTION/VRAAG 4**

| | | |
|---|---|---|
| 4 |  | |
| 4.1 | $f(0°) - g(0°) = 1 - \left(-\frac{1}{2}\right) = \frac{3}{2}$ units | ✓Answer ✓ (1) |
| 4.2 | Period of $f(4x) = \frac{360°}{4\left(\frac{1}{2}\right)}$<br>$= 180°$ | ✓substitution<br>✓answer (2) |
| 4.3 | Range : $y \in [-4\,;\,4]$ or $-4 \leq y \leq 4$ | ✓ ✓ answer (2) |
| 4.4 | $x_A = -160°$<br>$x_B = 80°$ | $x_A = -160°$ ✓<br>$x_B = 80°$ ✓ (2) |
| 4.5.1 | $-160° < x < 80°$ | ✓ ✓ answer (2) |
| 4.5.2 | $0° < x < 30°$ | ✓ ✓ answer (2) |
| | | [**11**] |


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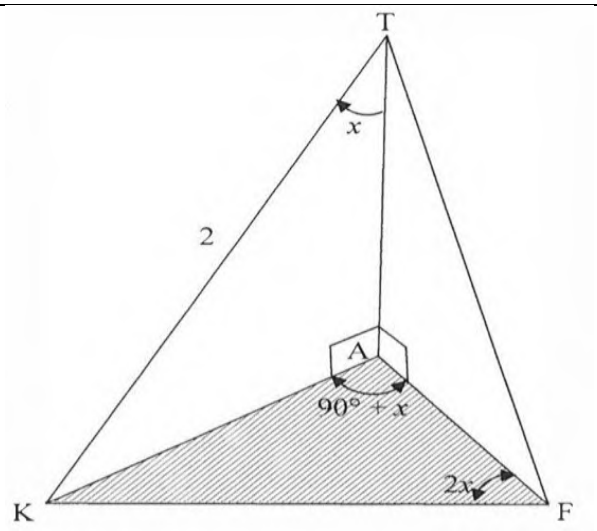
**QUESTION/VRAAG 5**




| | | |
|---|---|---|
| 5.1.1 | In $\Delta BOG$ :<br>$15^2 = 10^2 + 10^2 - 2(10)(10)cosx$<br>$225 = 100 + 100 - 200cosx$<br>$\cos x = -\frac{25}{200}$<br>$x = 97{,}18°$ | Substitution into cosine rule ✓<br>simplification ✓<br>Answer ✓ (3) |
| 5.1.2 | $\hat{A} = \frac{1}{2}(\hat{O}) = 48{,}59°$ ∠ center = 2 ∠ circumference<br>$\hat{C} = 180° - 2(48{,}59°) = 82{,}82°$<br>Area = $\frac{1}{2}(15)(15)sin82{,}82°$<br>$= 111{,}62units^2$ | $\hat{A} = 48{,}59°$ ✓<br>$\hat{C} = 82{,}82°$ ✓<br>Area rule ✓<br>Answer ✓ (4) |



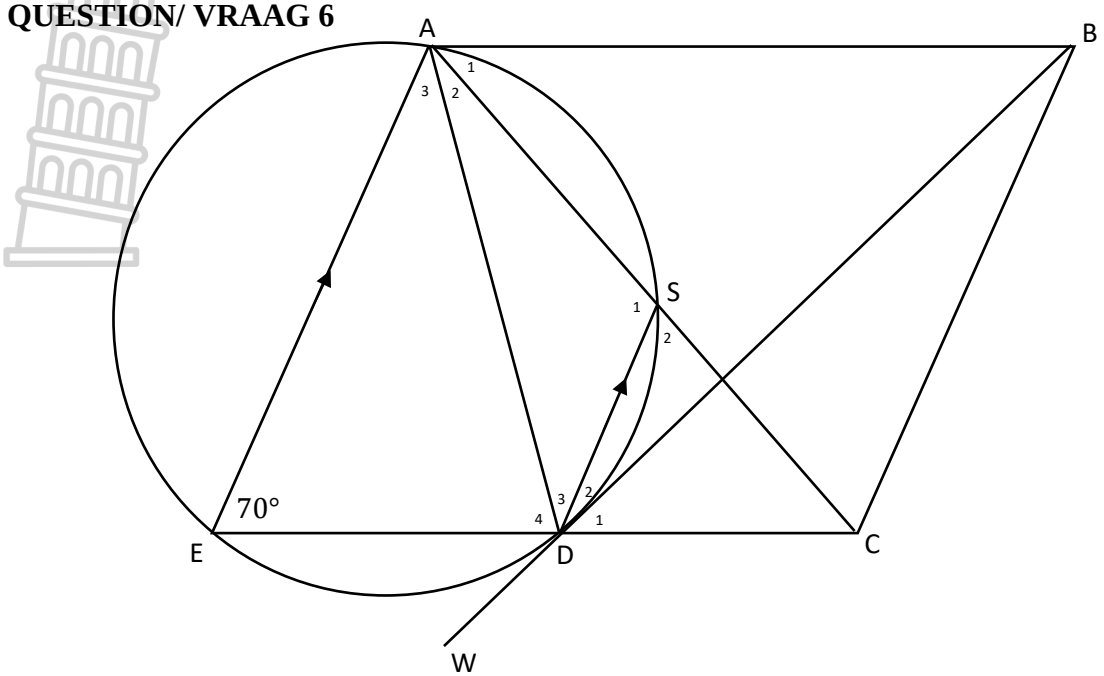
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| 5.2 |  | |
| 5.2.1 | $\frac{AK}{2} = sinx$<br>$AK = 2\sin x$ | $\frac{AK}{2} = sinx$ ✓<br>Answer ✓ (2) |
| 5.2.2 | $\frac{KF}{\sin(90°+x)} = \frac{AK}{sin2x}$<br>$\frac{KF}{\cos x} = \frac{2sinx}{2sinxcosx}$<br>$\frac{KF}{\cos x} = \frac{1}{cosx}$<br>KF = 1 unit | Substitution into sine rule ✓<br>$cos\ x$ ✓<br>$2sinxcosx$ ✓<br>Simplification ✓<br>Answer ✓ (5) |
| | | **[14]** |



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**QUESTION/ VRAAG 6**




| | | | |
|---|---|---|---|
| 6.1.1 | $\hat{S}_2 = \hat{E} = 70°$ | ext ∠ of cyclic quad / buite ∠van kvh | ✓ S ✓ R<br>(2) |
| 6.1.2 | $\hat{S}_2 = \hat{A}_2 + \hat{A}_3 = 70°$<br>$\hat{A} + \hat{E} = 180°$<br>$\therefore \hat{A}_1 = 40°$ | corresp ∠s; AE \|\| DS / ooreenk. ∠e ; AE \|\| DS<br>co-int ∠s; AB \|\| EC / ko-binne ∠e ; AB \|\| EC | ✓S/R<br>✓S/R<br>✓S<br>(3) |
| 6.1.3 | $\hat{D}_3 = \hat{A}_1 = 40°$ | tan chord theorem / raakl koord stelling | ✓S ✓R<br>(2) |
| 6.1.4 | AE = BC<br>ED=DC and AE//SD<br>∴ AS = SC<br>∴ SD = ½ AE<br>SD = 8 cm | Opp sides of parm / Teenoorst. Sye parm<br>Given / gegee<br>Converse midpt th. / Omgekeerde middelpt st. | ✓S<br>✓S<br>✓ 8 cm<br>(3) |


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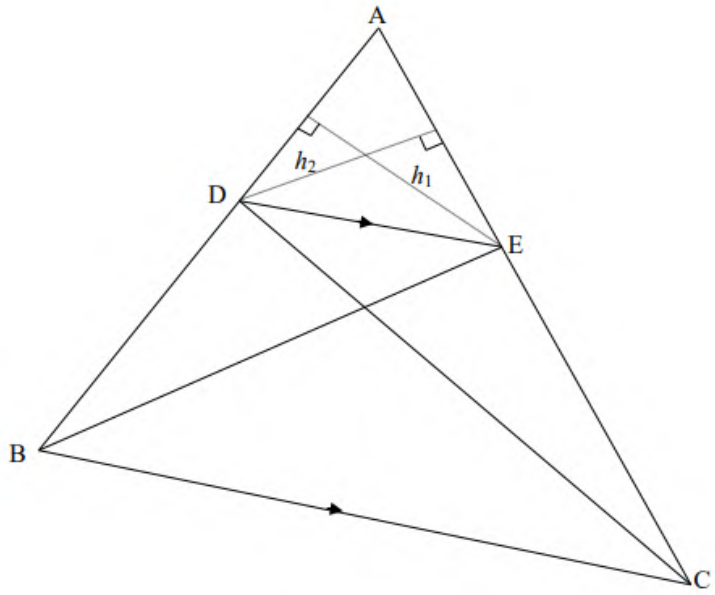
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| 6.2.1 | $\widehat{D}_3 = \widehat{D}_1 = 40°$<br>$\therefore \widehat{D}_1 = \hat{A}_1$<br>$\therefore ABCD$ is cq / kvh | Given / Gegee<br><br>converse ∠s in the same seg<br>omgekeerde ∠e in dies. Θ segm | ✓S<br><br>✓R<br>(2) |
| 6.2.2 | $\hat{B} = \hat{E} = 70°$<br>$A\widehat{D}C + \hat{B} = 180°$<br>$\therefore \widehat{D}_2 = 30°$<br><br>$\hat{S}_2 = \hat{A}_2 + \widehat{D}_3$<br>$\therefore \hat{A}_2 = 30°$<br><br>$\therefore \widehat{D}_2 = \hat{A}_2$<br>$\therefore DB$ is a tangent /<br>DB is 'n raaklyn | opp ∠s of parm / teenoorst. ∠e van parm.<br>opp ∠s of cyclic quad / teenoorst. ∠e van kvh<br><br>ext ∠ of Δ/ buite ∠ van Δ<br><br>converse tan chord theorem /<br>omgekeerde raakl. koord stelling | ✓S/R<br><br>✓S 30°<br><br>✓S / R<br><br>✓S<br><br>✓R<br>(5)<br>**[17]** |



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**QUESTION / VRAAG 7**

7.1

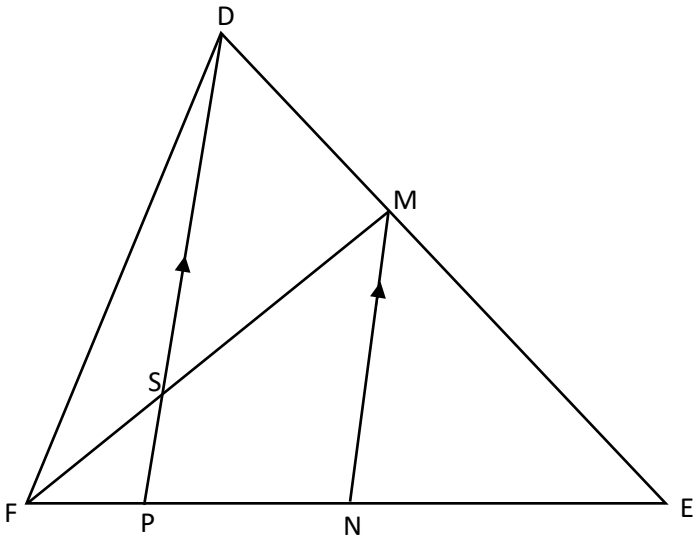



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| | Constr: Draw $h_1$ from E $\perp$ AD and $h_2$ from D $\perp$ AE<br>*Konstr: Trek* $h_1$ *vanaf* E $\perp$ AD *en* $h_2$ *vanaf* D $\perp$ AE<br><br>Proof/*Bewys*:<br>$\frac{\text{area } \Delta ADE}{\text{area } \Delta BDE} = \frac{\frac{1}{2}AD \times h_1}{\frac{1}{2}DB \times h_1} = \frac{AD}{DB}$<br><br>$\frac{\text{area } \Delta ADE}{\text{area } \Delta DEC} = \frac{\frac{1}{2}AE \times h_2}{\frac{1}{2}EC \times h_2} = \frac{AE}{EC}$<br><br>But area $\Delta BDE$ = area $\Delta DEC$ [same base & height or DE $\parallel$ BC/ *dies basis & hoogte*; of DE $\parallel$ BC]<br>$\therefore \frac{\text{area } \Delta ADE}{\text{area } \Delta BDE} = \frac{\text{area } \Delta ADE}{\text{area } \Delta DEC}$<br>$\therefore \frac{AD}{DB} = \frac{AE}{EC}$ | ✓ constr/*konstr* **OR**<br>**reason: common vertex or same height**<br><br>✓ $\frac{\text{area } \Delta ADE}{\text{area } \Delta BDE} = \frac{\frac{1}{2}AD \times h_1}{\frac{1}{2}DB \times h_1}$<br><br>✓ $\frac{\text{area } \Delta ADE}{\text{area } \Delta DEC} = \frac{AE}{EC}$<br><br>✓ S / R<br><br>✓ S<br><br>(5) |



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7.2

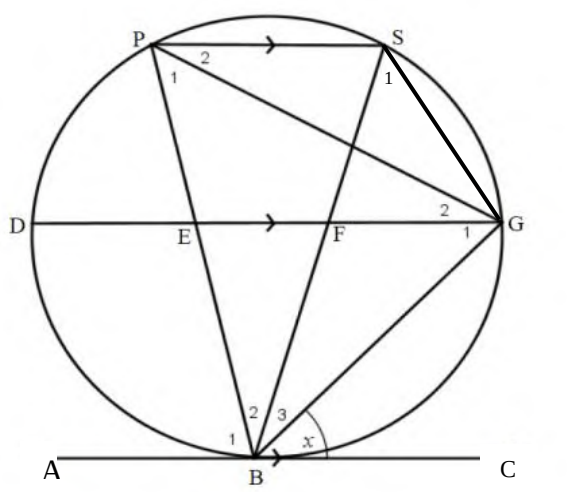



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| 7.2.1 | $\frac{PN}{NE}=\frac{DM}{ME}$<br>$\frac{PN}{NE}=\frac{2}{3}$<br>$\therefore PN=35\times\frac{2}{5}$<br>$PN=14\ cm$ | line \|\| one side of Δ / lyn \|\| een sy van Δ<br>**or / of**<br>prop theorem,DP//MN<br>eweredighst. DP//MN | ✓ S/ R<br>✓ 14 cm<br>(2) |
| 7.2.2 | $\frac{FP}{FN}=\frac{FS}{FM}$<br>$FP=\frac{14}{2}$<br>$FP=7$ | line \|\| one side of Δ / lyn \|\| een sy van Δ<br>_____ | ✓S / R<br>✓S<br>✓ A (3)<br>**[10]** |



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7.3



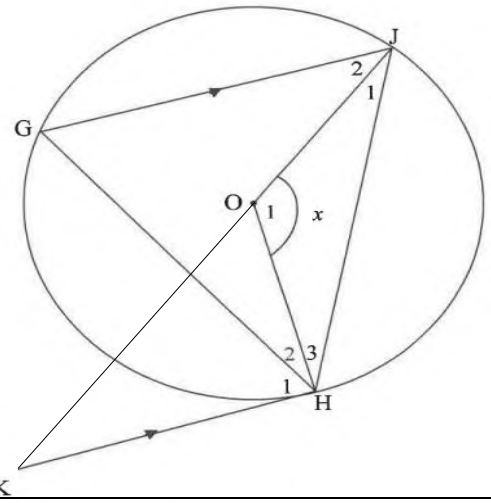

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|---|---|---|
| 7.3.1 | In $\Delta PGB$ and $\Delta GEB$<br>• $\hat{B}$ *is common* / gemeenskaplik<br>- $\hat{G}_1 = x$ alt ∠s; DG \|\| AC / verw. ∠e ; DG \|\| AC<br>- $\hat{P}_1 = x$ tan chord theorem / raakl. koord stelling<br>• $\therefore \hat{P}_1 = \hat{G}_1$<br>• $P\hat{G}B = G\hat{E}B$ 3rd ∠s / 3de ∠e<br>$\therefore\ \Delta PGB$ III $\Delta GEB$ $(\angle\angle\angle)$ | ✓R<br>✓R<br>✓R<br>✓R ∠∠∠<br>(4) |
| 7.3.2 | $\frac{PG}{GE} = \frac{GB}{EB} = \frac{PB}{GB}$<br>$\therefore\ GB^2 = PB.EB$<br>In ΔSGB and $\Delta GFB$<br>• $\hat{B}_3$ *is common* gemeenskaplik<br>- $\hat{S}_1 = \hat{P}_1 = x$ ∠s in same segm. / ∠e in dies. segm.<br>• $\therefore \hat{S}_1 = \hat{G}_1$<br>• B$\hat{F}G = S\hat{G}B$ 3rd ∠s / 3de ∠e<br>$\therefore$ ΔSGB III $\Delta GFB$ $(\angle\angle\angle)$<br>$\therefore\ GB^2 = SB.FB$ $\therefore\ SB.FB = EB.PB$ | $GB^2 = PB.EB$✓<br>S/R✓<br>$GB^2 = SB.FB$ ✓<br>(3) |



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| | | |
|---|---|---|
| 7.3.3 | $\frac{PG}{GE} = \frac{GB}{EB}$<br><br>$\therefore \frac{PG}{9} = \frac{9}{0,6PG}$<br><br>$0,6PG^2 = 81$<br><br>$PG = \sqrt{135}$<br><br>$PG = 11,62cm$ | sub 9 ✓<br><br>sub 0,6PG ✓<br><br>11,62cm✓<br><br>(3)<br><br>**[10]** |

**QUESTION/ VRAAG 8**




| | | | |
|---|---|---|---|
| 8.1.1 | $2\hat{G} = \hat{O}_1$<br><br>$\hat{G} = 60^0$ | ∠ at centre = 2 ×∠ at circumference<br><br>Midpts∠ = 2 x Omtreks∠ | ✓ R<br><br>✓ answer<br>(2) |
| 8.1.2 | $\hat{H}_3 = \hat{J}_1$<br><br>$\hat{H}_3 + \hat{J}_1 + \hat{O}_1 = 180°$<br><br>$\hat{H}_3 = 30°$ | ∠s opp equal radii / ∠e teenoor gelyke rad<br><br>∠ sum in Δ / binne ∠e van Δ | ✓S/R<br><br>✓S<br><br>✓answer<br>(3) |
| 8.2 | $\hat{K} = 120 - 90°$<br><br>$\sin(120 - 90°) = \frac{OH}{OK}$<br><br>$OH = OJ$<br><br>$cosx = -\frac{OJ}{OK}$ | ext ∠ of ΔKOH / buite ∠ van ΔKOH<br><br>$\Delta OKH$<br><br>Radii / radiuses | ✓S<br><br>✓trig ratio<br><br>✓S<br>(3)<br>**[8]** |

**TOTAL 150**



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