



**GAUTENG PROVINCE**

EDUCATION  
REPUBLIC OF SOUTH AFRICA

# **PREPARATORY EXAMINATION *VOORBEREIDENDE EKSAMEN***

**2020**

## **MARKING GUIDELINES / *NASIENRIGLYNE***

**MATHEMATICS (PAPER 2) (10612)  
*WISKUNDE (VRAESTEL 2) (10612)***

21 pages / *bladsye*

**NOTE:**

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

**LET WEL:**

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

| <b>GEOMETRY / MEETKUNDE</b> |  |
|-----------------------------|--|
| <b>S</b>                    | A mark for a correct statement<br>(A statement mark is independent of a reason.)                               |
|                             | <i>'n Punt vir 'n korrekte bewering<br/>( 'n Punt vir 'n bewering is onafhanklik van die rede.)</i>            |
| <b>R</b>                    | A mark for a correct reason<br>(A reason mark may only be awarded if the statement is correct.)                |
|                             | <i>'n Punt vir 'n korrekte rede<br/>( 'n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i> |
| <b>S / R</b>                | Award a mark if the statement AND reason are both correct.   |
|                             | <i>(Ken 'n punt toe as beide die bewering EN rede korrek is.)</i>  |

## QUESTION / VRAAG 1

|     |   |  |            |
|-----|---|--|------------|
| 1.1 | $\bar{x} = \frac{1\ 581}{31}$ $= 51$ <b>OR / OF</b><br>$\bar{x} = 51 \text{ (calculator method / sakrekenaar metode)}$  | $\checkmark \frac{1\ 581}{31}$ $\checkmark 51$ <b>OR / OF</b><br>$\checkmark \checkmark 51$  | (2)        |
| 1.2 | $\therefore$ skewed to the right (positively skewed)<br>$\therefore$ skeef na regs (positief skeef)   | $\checkmark$ answer / antwoord   | (1)        |
| 1.3 | Physical Sciences performed better.<br>$Q_1$ is 40% in Physical Sciences and 28% in Mathematics which indicates the lower 25% of the class performed much better in Physical Sciences than in Mathematics.<br><i>Fisiese Wetenskappe presteer beter.</i><br>$Q_1$ is 40% in Fisiese Wetenskappe en 28% in Wiskunde wat aandui dat die onderste 25% van die klas heelwat beter presteer in Fisiese Wetenskappe as in Wiskunde. | $\checkmark$ answer / antwoord<br><br>$\checkmark$ reason / rede   | (2)        |
| 1.4 | Accept any mark between 40 – 50.<br>Aanvaar enige punt tussen 40 – 50 .   | $\checkmark \checkmark$ answer / antwoord  | (2)        |
| 1.5 | The greatest difference is $87\% - 71\% = 16\%$<br>$\therefore$ the Physical Sciences mark is 71% .<br><i>Die grootste verskil is <math>87\% - 71\% = 16\%</math></i><br>$\therefore$ die Fisiese Wetenskappe punt is 71% .   | $\checkmark 87\% - 71\% = 16\%$<br>$\checkmark$ answer / antwoord<br><b>answer only full marks /</b><br><b>antwoord alleenlik volpunte</b> | (2)        |
|     |   |  | <b>[9]</b> |

## QUESTION / VRAAG 2

|     |   |   |     |
|-----|---|---|-----|
| 2.1 | $a = 12,41$<br>$b = 0,49$<br>$\hat{y} = 12,41 + 0,49x$  | $\checkmark a = 12,41$<br>$\checkmark b = 0,49$<br>$\checkmark \hat{y} = 12,41 + 0,49x$   | (3) |
| 2.2 | $\hat{y} = 12,41 + 0,49x$<br>$= 12,41 + 0,49(150)$<br>$= 85,91 \approx 86\%$<br><br><b>OR/OF</b><br>$\hat{y} = 85,17$   | $\checkmark$ substitution / vervanging<br>$\checkmark$ answer / antwoord<br><br><b>OR/OF</b><br>$\checkmark \checkmark \hat{y} = 85,17$ | (2) |
| 2.3 | $\hat{y} = 12,41 + 0,49x$<br>The y-intercept is 12,41 which means that a learner who did not begin the exam achieved 12,41%. This is clearly impossible.<br><i>Die y-afsnit is 12,41 wat beteken dat 'n leerling wat die eksamen nie begin het nie, alreeds 12,41% behaal het. Dit is onmoontlik.</i> | $\checkmark$ conclusion / gevolgtrekking  | (1) |

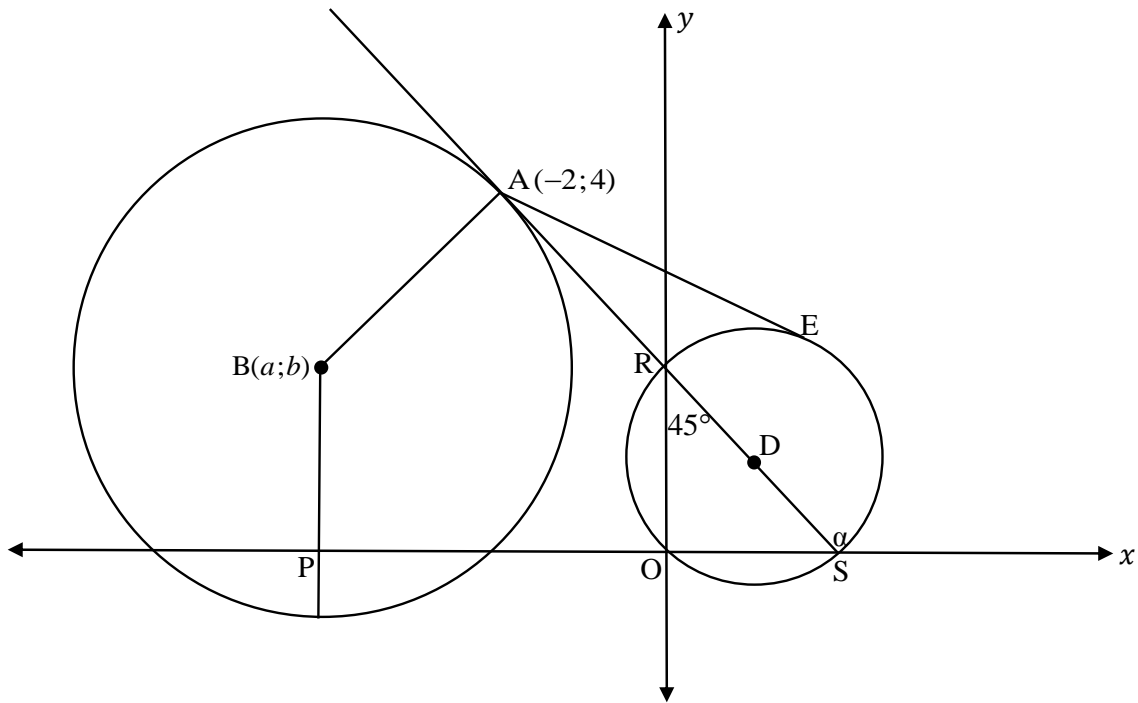
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|-----|---|---|
| 2.4 | 10,28   | ✓✓ 10,28<br>(2)   |
| 2.5 | $63,9 - \sigma = p$<br>$63,9 + \sigma = 103,59$<br>$127,92 = p + 103,59$<br>$p = 24,33$<br><br><b>OR / OF</b><br>$\sigma = 103,59 - 63,96$<br>$= 39,63$<br>$p = 63,96 - 39,63$<br>$= 24,33$ | $\checkmark 63,9 - \sigma = p$<br>$\checkmark 63,9 + \sigma = 103,59$<br><br>$\checkmark p = 24,33$<br><br><b>OR / OF</b><br>$\checkmark \sigma = 39,63$<br>$\checkmark 63,96 - 39,63$<br>$\checkmark p = 24,33$<br><br>(3) |
|     |   | [11]  |

## QUESTION / VRAAG 3

|     |  |   |
|-----|--|---|
|     |  |   |
| 3.1 | $E\left(\frac{12}{2}; \frac{6}{2}\right)$<br>$E(6; 3)$   | $\checkmark 6$<br>$\checkmark 3$<br><br>(2)   |
| 3.2 | $m_{BA} = \frac{6-0}{7-5}$<br>$= 3$<br><br>$y = mx + c$<br>$y = 3x + c$<br>$6 = 3(7) + c$ <b>OR / OF</b><br>$c = -15$<br>$y = 3x - 15$<br><br><b>OR / OF</b> | $\checkmark m_{BA} = 3$<br><br>$\checkmark$ substitution of m and<br>$(7; 6) / (5; 0)$<br><i>Vervanging van m en</i><br>$(7; 6) / (5; 0)$<br><br>$\checkmark y = 3x - 15$ |

|     |  |  |      |
|-----|--|--|------|
|     | $y = mx + c$<br>$y = 3x + c$<br>$0 = 3(5) + c$<br>$c = -15$<br>$y = 3x - 15$   | <b>OR / OF</b><br>$y - y_1 = m(x - x_1)$<br>$y - 0 = 3(x - 5)$<br>$y = 3x - 15$  | (3)  |
| 3.3 | $rx - 3y + 5 = 0$<br>$-3y = -rx - 5$<br>$y = \frac{r}{3}x + \frac{5}{3}$<br><br>$3 = \frac{r}{3}$<br>$r = 9$   | $\checkmark$ standard form /<br><i>standaardvorm</i><br><br>$\checkmark 3 = \frac{r}{3}$<br>$\checkmark r = 9$   | (3)  |
| 3.4 | Area $\Delta AOP = 10$<br>$\frac{1}{2} \times AO \times \perp h = 10$<br>$\frac{1}{2} \times 5 \times \perp h = 10$<br>$\perp h = 4$<br>but / <i>maar</i> $y < 0$<br>$\therefore y = -4$<br><br>$AP = BP$<br>$AP^2 = BP^2$<br>$(x - 5)^2 + (-4 - 0)^2 = (x - 7)^2 + (-4 - 6)^2$<br>$x^2 - 10x + 25 + 16 = x^2 - 14x + 49 + 100$<br>$4x = 108$<br>$x = 27$<br><br>P (27 ; -4) | $\checkmark \frac{1}{2} \times 5 \times \perp h = 10$<br><br>$\checkmark \perp h = 4$<br><br>$\checkmark y = -4$<br>$\checkmark (x - 5)^2 + (-4 - 0)^2$<br><i>and / en</i><br>$(x - 7)^2 + (-4 - 6)^2$<br>$\checkmark$ equate the two lengths /<br><i>gelykstel van die twee</i><br><i>lengtes</i><br>$\checkmark 4x = 108$<br>$\checkmark x = 27$ | (7)  |
|     |  |  | [15] |

## QUESTION / VRAAG 4



|     |   |  |
|-----|---|--|
| 4.1 | $\alpha = 135^\circ$ ext $\angle$ of $\Delta$ / buite $\angle$ van $\Delta$<br>$\tan(135^\circ) = m$<br>$m = -1$<br>$y = mx + c$<br>$y = -1x + c$<br>$4 = -1(-2) + c$ <b>OR / OF</b> $y - y_1 = m(x - x_1)$<br>$c = 2$ $y - 4 = -1(x - 2)$<br>$y = -x + 2$ $y = -1x - 2 + 4$<br>$y = -x + 2$ $y = -x + 2$ | $\checkmark \tan(135^\circ) = m$<br>$\checkmark m = -1$<br>$\checkmark$ substitute $m$ and $(-2; 4)$ /<br>vervang $m$ en $(-2; 4)$<br>$\checkmark$ equation / vergelyking<br>(4) |
| 4.2 | $P(-4; 0)$<br>$a = -4$<br>$m_{BA} \cdot m_{AS} = -1$<br>$m_{BA} = 1$<br>$m_{BA} = \frac{4 - b}{-2 + 4}$<br>$1 = \frac{4 - b}{2}$<br>$2 = 4 - b$<br>$b = 2$  | $\checkmark a = -4$<br>$\checkmark m_{BA} = 1$<br>$\checkmark$ substitute / vervang<br>$\checkmark b = 2$<br>(4)   |

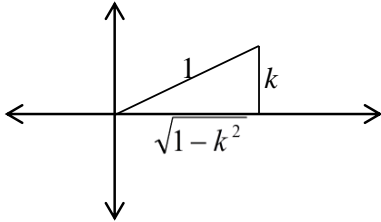
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|-----|---|--|
| 4.3 | $(x-a)^2 + (y-b)^2 = r^2$ $(x+4)^2 + (y-2)^2 = r^2$ $(-2+4)^2 + (4-2)^2 = r^2$ $4+4=r^2$ $(x+4)^2 + (y-2)^2 = 8$  | ✓ substitute midpoint in correct formula / <i>vervang middelpunt in korrekte formule</i><br>✓ substitute / <i>vervang</i> (-2;4)<br>✓ $(x+4)^2 + (y-2)^2 = 8$<br>(3)   |
| 4.4 | $x^2 - 2x + y^2 - 2y = 0$ $(x^2 - 2x + 1) + (y^2 - 2y + 1) = 1 + 1$ $(x-1)^2 + (y-1)^2 = 2$   | ✓ $(x-1)^2$<br>✓ $(y-1)^2$<br>✓ 2<br>(3)   |
| 4.5 | D (1 ; 1)   | ✓ answer / <i>antwoord</i><br>(1)  |
| 4.6 | $DE = \sqrt{2}$ $DA = \sqrt{(-2-1)^2 + (4-1)^2}$ $= \sqrt{9+9}$ $= \sqrt{18} \quad \mathbf{OR/OF} \quad = 3\sqrt{2}$<br>$\hat{D}EA = 90^\circ$ radius $\perp$ tangent / <i>radius <math>\perp</math> raaklyn</i><br>$AD^2 = DE^2 + AE^2$ pythagoras<br>$(\sqrt{18})^2 = (\sqrt{2})^2 + AE^2$<br>$18 - 2 = AE^2$<br>$AE = 4$ | ✓ $DE = \sqrt{2}$<br>✓ correct substitution in correct formula / <i>korrekte vervanging in korrekte formule</i><br>✓ $DA = \sqrt{18}$ <b>OR/OF</b> $3\sqrt{2}$<br>✓ $\hat{D}EA = 90^\circ$<br><br>✓ $(\sqrt{18})^2 = (\sqrt{2})^2 + AE^2$<br><br>✓ $AE = 4$<br>(6) |
|     |   | [21]   |

## QUESTION / VRAAG 5

|     |   |   |
|-----|---|---|
| 5.1 | $1 - 4\sin^2 15^\circ$ $= 1 - 4\sin^2(45^\circ - 30^\circ)$ $= 1 - 4[\sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ]^2$ $= 1 - 4\left[\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2}\right]^2$ $= 1 - 4\left[\frac{\sqrt{6} - \sqrt{2}}{4}\right]^2$ $= 1 - 4\left[\frac{6 - 4\sqrt{3} + 2}{16}\right]$ $= 1 - 4\left[\frac{8 - 4\sqrt{3}}{16}\right]$ $= 1 - \left[\frac{8 - 4\sqrt{3}}{4}\right]$ $= \sqrt{3} - 1$ <p><b>OR/OF</b></p> $1 - 4\sin^2 15^\circ$ $= 1 - 4\sin^2(60^\circ - 45^\circ)$ $= 1 - 4[\sin 60^\circ \cos 45^\circ - \cos 60^\circ \sin 45^\circ]^2$ $= 1 - 4\left[\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2}\right]^2$ $= 1 - 4\left[\frac{\sqrt{6} - \sqrt{2}}{4}\right]^2$ $= 1 - 4\left[\frac{6 - 4\sqrt{3} + 2}{16}\right]$ $= 1 - 4\left[\frac{8 - 4\sqrt{3}}{16}\right]$ $= 1 - \left[\frac{8 - 4\sqrt{3}}{4}\right]$ $= \sqrt{3} - 1$ | $\checkmark 1 - 4\sin^2(45^\circ - 30^\circ)$ $\checkmark \sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ$ $\checkmark \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2}$ $\checkmark 1 - 4\left[\frac{6 - 4\sqrt{3} + 2}{16}\right]$ $\checkmark \sqrt{3} - 1$ <p><b>OR/OF</b></p> $\checkmark 1 - 4\sin^2(60^\circ - 45^\circ)$ $\checkmark \sin 60^\circ \cos 45^\circ - \cos 60^\circ \sin 45^\circ$ $\checkmark \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$ $\checkmark 1 - 4\left[\frac{6 - 4\sqrt{3} + 2}{16}\right]$ $\checkmark \sqrt{3} - 1$ <p style="text-align: right;">(5)</p> |
|-----|---|---|



|     |  |   |
|-----|--|---|
| 5.2 | $\frac{\sqrt{3} \sin x \cdot \sin^2 72^\circ + \sin^2 198^\circ \cdot \sqrt{3} \cos(x-90^\circ)}{\tan 120^\circ \cdot \sin x}$ $= \frac{\sqrt{3} \sin x \cdot \sin^2(90^\circ - 18^\circ) + \sin^2(180^\circ + 18^\circ) \cdot \sqrt{3} \sin x}{\tan(180^\circ - 60^\circ) \cdot \sin x}$ $= \frac{\sqrt{3} \sin x \cdot \cos^2 18^\circ + \sin^2 18^\circ \cdot \sqrt{3} \sin x}{-\tan 60^\circ \cdot \sin x}$ $= \frac{\sqrt{3} \sin x (\cos^2 18^\circ + \sin^2 18^\circ)}{-\sqrt{3} \cdot \sin x}$ $= -1$ <p><b>OR/OF</b></p> $\frac{\sqrt{3} \sin x \cdot \sin^2 72^\circ + \sin^2 18^\circ \cdot \sqrt{3} \sin x}{-\tan 60^\circ \cdot \sin x}$ $= \frac{\sqrt{3} \sin x (\sin^2 72^\circ + \cos^2 72^\circ)}{-\sqrt{3} \cdot \sin x}$ $= \frac{\sqrt{3} \sin x (1)}{-\sqrt{3} \cdot \sin x}$ $= -1$ | <p>✓ <math>\sin x</math></p> <p>✓ <math>\cos^2 18^\circ</math></p> <p>✓ <math>\sin^2 18^\circ</math></p> <p>✓ <math>-\tan 60^\circ</math></p> <p>✓ factorise / <i>faktoriseer</i></p> <p>✓ <math>-1</math></p> <p><b>OR/OF</b></p> <p>✓ <math>\sin^2 18^\circ</math></p> <p>✓ <math>\sin x</math></p> <p>✓ <math>-\tan 60^\circ</math></p> <p>✓ factorise / <i>faktoriseer</i></p> <p>✓ <math>\cos^2 72^\circ</math></p> <p>✓ <math>-1</math></p> <p style="text-align: right;">(6)</p> |
| 5.3 | $6 \sin x \cdot \cos x + 3 \cos x - 4 \sin^2 x - 2 \sin x = 0$ $3 \cos x(2 \sin x + 1) - 2 \sin x(2 \sin x + 1) = 0$ $(2 \sin x + 1)(3 \cos x - 2 \sin x) = 0$ $\sin x = -\frac{1}{2} \quad \text{OR/OF} \quad 3 \cos x = 2 \sin x$ $\tan x = \frac{3}{2}$ <p>RA = <math>30^\circ</math>                      RA = <math>56,31^\circ</math></p> <p><math>x = 210^\circ + k \cdot 360^\circ</math>        <math>x = 56,31^\circ + k \cdot 180^\circ</math></p> <p><math>x = 330^\circ + k \cdot 360^\circ</math>        <math>x = 236,31^\circ + k \cdot 180^\circ; k \in \mathbb{Z}</math></p> <p><b>OR/OF</b></p>   | <p>✓ grouping / <i>groepeer</i></p> <p>✓ factorise / <i>faktoriseer</i></p> <p>✓ <math>\sin x = -\frac{1}{2}</math></p> <p>✓ <math>\tan x = \frac{3}{2}</math></p> <p>✓ <math>210^\circ + k \cdot 360^\circ</math></p> <p>✓ <math>330^\circ + k \cdot 360^\circ</math> ,</p> <p>✓ <math>56,31^\circ + k \cdot 180^\circ, k \in \mathbb{Z}</math></p> <p><b>OR/OF</b></p>  |

|       |  |  |
|-------|--|--|
|       | $6 \sin x \cdot \cos x + 3 \cos x - 4 \sin^2 x - 2 \sin x = 0$ $(6 \sin x \cdot \cos x + 3 \cos x) - (4 \sin^2 x + 2 \sin x) = 0$ $3 \cos x(2 \sin x + 1) - 2 \sin x(2 \sin x + 1) = 0$ $(2 \sin x + 1)(3 \cos x - 2 \sin x) = 0$ $\sin x = -\frac{1}{2} \quad \text{OR/OF} \quad 3 \cos x = 2 \sin x$ $\tan x = \frac{3}{2}$ $x = -30^\circ + k \cdot 360^\circ \quad x = 56,31^\circ + k \cdot 180^\circ \quad ; k \in \mathbb{Z}$ $x = 210^\circ + k \cdot 360^\circ$ | <p>✓ grouping / <i>groepeer</i></p> <p>✓ factorise / <i>faktoriseer</i></p> <p>✓ <math>\sin x = -\frac{1}{2}</math></p> <p>✓ <math>\tan x = \frac{3}{2}</math></p> <p>✓ <math>-30^\circ + k \cdot 360^\circ</math></p> <p>✓ <math>210^\circ + k \cdot 360^\circ</math></p> <p>✓ <math>56,31^\circ + k \cdot 180^\circ ; k \in \mathbb{Z}</math></p> <p>(7)</p> |
| 5.4   | $(1 - \tan A) \left( \frac{\cos A}{\cos 2A} \right) = \frac{1}{\cos A + \sin A}$ $\text{LHS/LK} = (1 - \tan A) \left( \frac{\cos A}{\cos 2A} \right)$ $= \left( 1 - \frac{\sin A}{\cos A} \right) \left( \frac{\cos A}{\cos^2 A - \sin^2 A} \right)$ $= \left( \frac{\cos A - \sin A}{\cos A} \right) \left( \frac{\cos A}{(\cos A - \sin A)(\cos A + \sin A)} \right)$ $= \frac{1}{\cos A + \sin A}$ <p>LHS / LK = RHS / RK</p>   | <p>✓ <math>\frac{\sin A}{\cos A}</math></p> <p>✓ <math>\cos^2 A - \sin^2 A</math></p> <p>✓ <math>\frac{\cos A - \sin A}{\cos A}</math></p> <p>✓ <math>(\cos A - \sin A)(\cos A + \sin A)</math></p> <p>(4)</p>   |
| 5.5.1 | $\cos 2\theta$ $= \sqrt{1 - k^2}$  <p>OR/OF</p> $\cos^2 2\theta = 1 - \sin^2 2\theta$ $= 1 - k^2$ $\cos 2\theta = \sqrt{1 - k^2}$   | <p>✓ ✓ <math>\sqrt{1 - k^2}</math></p> <p>OR/OF</p> <p>✓ <math>\cos^2 2\theta = 1 - \sin^2 2\theta</math></p> <p>✓ <math>\sqrt{1 - k^2}</math></p> <p>(2)</p>  |

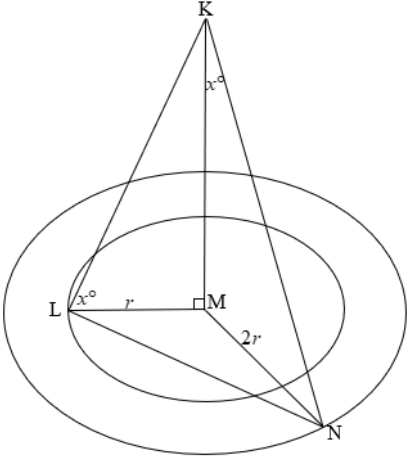
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| 5.5.2 | $\frac{\sin 2\theta}{\tan \theta}$ $= \frac{2 \sin \theta \cdot \cos \theta}{\frac{\sin \theta}{\cos \theta}}$ $= 2 \sin \theta \cdot \cos \theta \cdot \frac{\cos \theta}{\sin \theta}$ $= 2 \cos^2 \theta$ <p>But/maar <math>\cos 2\theta = \sqrt{1-k^2}</math></p> $2 \cos^2 \theta - 1 = \sqrt{1-k^2}$ $2 \cos^2 \theta = \sqrt{1-k^2} + 1$ $\frac{\sin 2\theta}{\tan \theta} = \sqrt{1-k^2} + 1$ | $\checkmark 2 \sin \theta \cdot \cos \theta$ $\checkmark \frac{\sin \theta}{\cos \theta}$ $\checkmark 2 \cos^2 \theta$ $\checkmark 2 \cos^2 \theta - 1$ $\checkmark \sqrt{1-k^2} + 1$ <p style="text-align: right;">(5)</p> |
|       |   | <b>[29]</b>   |

## QUESTION / VRAAG 6

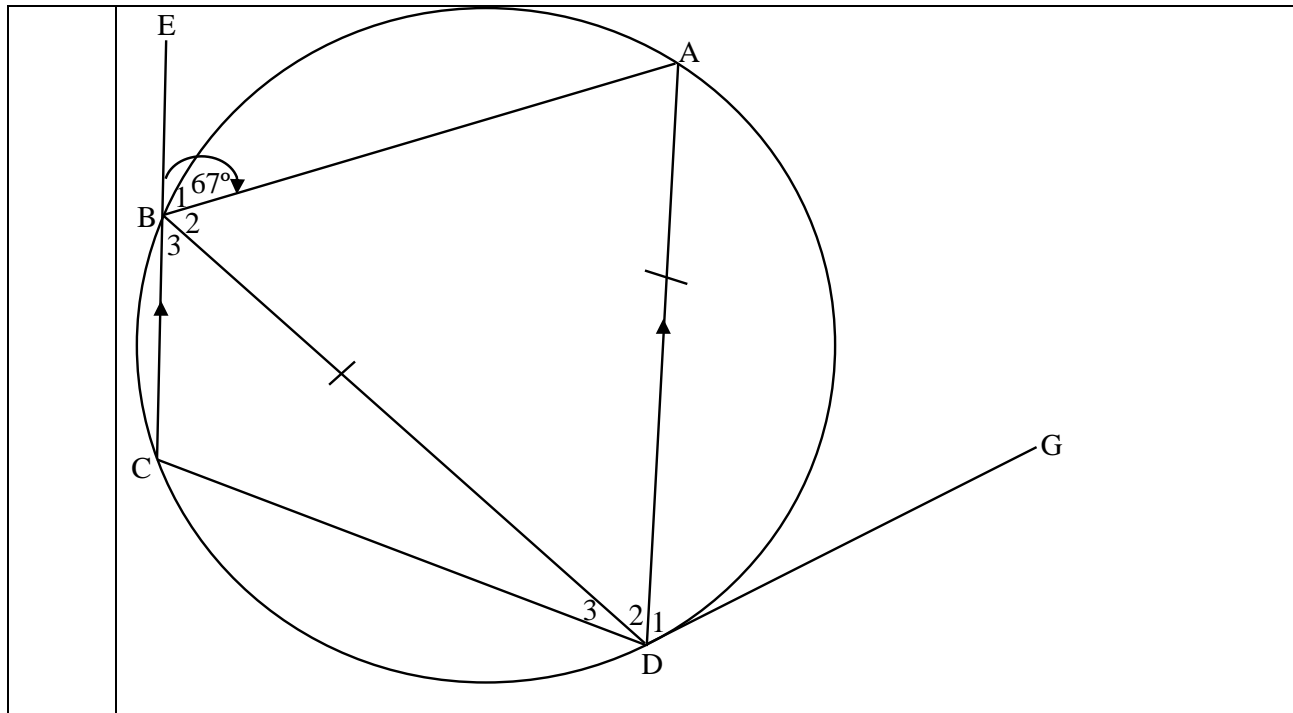
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| 6.1   | $a = -1$<br>$d = 2$   | ✓ $a = -1$<br>✓ $d = 2$<br><br>(2)   |
| 6.2   | $D\left(-150^\circ; \frac{1}{2}\right)$   | ✓ $\left(-150^\circ; \frac{1}{2}\right)$<br><br>(1)  |
| 6.3.1 | $-90^\circ < x < 90^\circ$<br><b>OR / OF</b><br>$x \in (-90^\circ; 90^\circ)$     | ✓ $-90^\circ$ and / en $90^\circ$<br>✓ correct inequality /<br>korrekte ongelykheid<br><br>(2)   |
| 6.3.2 | $-135^\circ < x < -45^\circ$<br><b>OR / OF</b><br>$x \in (-135^\circ; -45^\circ)$ | ✓ $-135^\circ$ and / en $-45^\circ$<br>✓ correct inequality /<br>korrekte ongelykheid<br><br>(2) |
|       |   | [7]  |

If learner gives all three answers, then maximum 1/2 / Indien 'n leerling al drie die antwoorde gee, dan maksimum 1/2  
 $x \in (-135^\circ; -45^\circ)$  or/of  $(0^\circ; 45^\circ)$  or/of  $(135^\circ; 180^\circ)$

## QUESTION / VRAAG 7

|     |  |  |
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|     |   |  |
| 7.1 | <p>In <math>\Delta KLM</math></p> $\frac{KM}{LM} = \tan x$ $\frac{KM}{r} = \tan x$ $KM = r \tan x$ <p>In <math>\Delta KMN</math></p> $\frac{MN}{KM} = \tan x$ $\frac{2r}{KM} = \tan x$ $\frac{2r}{r \tan x} = \tan x$ $2 = \tan^2 x$ $\sqrt{2} = \tan x$ $x = 54,74^\circ$ <p style="text-align: center;"><b>OR/OF</b></p> $KM = \frac{2r}{\tan x}$ $r \tan x = \frac{2r}{\tan x}$ | <p>✓ correct trig ratio / <i>korrekte trig verhouding</i></p> <p>✓ <math>KM = r \tan x</math> (simplification / <i>vereenvoudiging</i>)</p> <p>✓ <math>\frac{2r}{KM} = \tan x</math></p> <p>✓ <math>\frac{2r}{r \tan x}</math></p> <p>✓ <math>\sqrt{2} = \tan x</math></p> <p>✓ <math>x = 54,74^\circ</math></p> <p style="text-align: right;">(6)</p> |
| 7.2 | $LN^2 = LM^2 + MN^2 - 2LM \cdot MN \cos M$ $LN^2 = (5)^2 + (10)^2 - 2(5) \cdot (10) \cos 110^\circ$ $LN^2 = 159,20$ $LN = \sqrt{159,20}$ $LN = 12,62m$   | <p>✓ correct substitution in cos-rule / <i>korrekte vervanging in cos-reël</i></p> <p>✓ 12,62m</p> <p style="text-align: right;">(2)</p>   |
|     |  | <b>[8]</b>   |

QUESTION / VRAAG 8



|       |   |  |   |
|-------|---|--|---|
| 8.1.1 | $\hat{A}DC = 67^\circ$<br><b>OR / OF</b><br>$\hat{B}_2 + \hat{B}_3 = 113^\circ$<br>$\hat{A}DC = 67^\circ$ | ext. $\angle$ of cyclic quad / buite $\angle$ van kvh<br><br>$\angle^s$ straight line / $\angle^e$ op reguit lyn<br>opp $\angle^s$ of cyclic quad / oorst $\angle^e$ van kvh   | $\checkmark$ S $\checkmark$ R<br><br><b>OR / OF</b><br><br>$\checkmark$ S $\checkmark$ R<br>(2) |
| 8.1.2 | $\hat{C} = 180^\circ - 67^\circ$<br>$= 113^\circ$   | co-int $\angle^s$ $BC \parallel AD$ /<br>ko-binne $\angle^e$ $BC \parallel AD$   | $\checkmark$ S/R<br>(1)   |
| 8.1.3 | $\hat{A} = 67^\circ$  | opp $\angle^s$ of cyclic quad / alt $\angle^s$ $BC \parallel AD$ /<br>alt $\angle^s$ $EC \parallel AD$<br>oorst $\angle^e$ van kvh / verwisselende $\angle^e$<br>$BC \parallel AD$ / verwis $\angle^e$ $EC \parallel AD$ | $\checkmark$ S/R<br>(1)   |
| 8.1.4 | $\hat{B}_2 = 67^\circ$<br>$\hat{D}_2 = 180^\circ - 67^\circ - 67^\circ$<br>$= 46^\circ$                   | $\angle^s$ opposite = sides / $\angle^e$ teenoor = sye<br>sum of $\angle^s$ in $\Delta$ / som vd $\angle^e$ v $\Delta$   | $\checkmark$ S $\checkmark$ R<br><br>$\checkmark$ S<br>(3)                                      |
| 8.1.5 | $\hat{B}DG = 113^\circ$<br><b>OR / OF</b><br>$\hat{D}_1 = 67^\circ$<br>$\hat{B}DG = 113^\circ$            | tan chord theorem / raaklyn koordstelling<br><br>tan chord theorem / raaklyn koordstelling   | $\checkmark$ S $\checkmark$ R<br><br><b>OR / OF</b><br>$\checkmark$ R<br>$\checkmark$ S<br>(2)  |



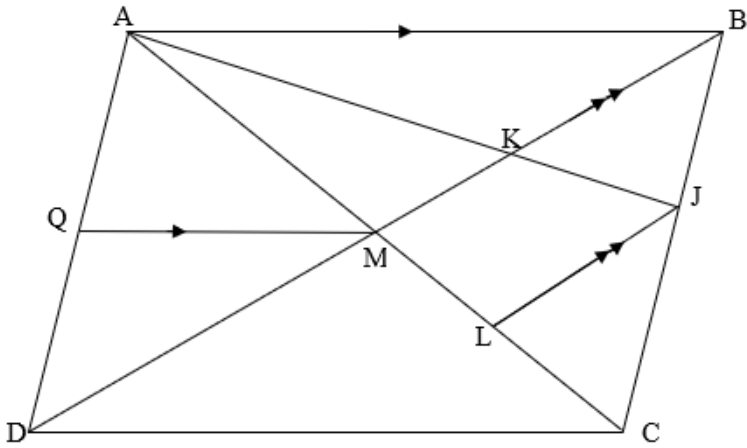
|          |  |  |   |
|----------|--|--|---|
| 9.1.1(b) | $\hat{A}_1 = \hat{CDB} = x$<br>$\hat{M}_2 = 90^\circ$<br>$\therefore \hat{ABO} = 90^\circ - x$<br><br><b>OR/OF</b><br>$\hat{O}_1 = 2x$<br>$\hat{M}_1 = 90^\circ$<br><br>$\hat{C} = 90^\circ - 2x$<br>$\hat{B}_1 = 90^\circ - 2x$<br>$\hat{ABO} = 90^\circ - x$ | $\angle^s$ in the same segment /<br>$\angle^e$ in dies. segment<br>line from centre to midpoint of chord / <i>lyn van middelpunt van sirkel na middelpunt van koord</i><br>sum of $\angle^s$ in $\Delta$ / ext $\angle$ of a $\Delta$ /<br><i>som vd <math>\angle^e</math> v <math>\Delta</math> / buite <math>\angle</math> v <math>\Delta</math></i><br><br>proved/ <i>reeds bewys</i><br>line from centre to midpoint of chord / <i>lyn van middelpunt van sirkel na middelpunt van koord</i><br>sum of $\angle^s$ in $\Delta$ / <i>som vd <math>\angle^e</math> v <math>\Delta</math></i><br>$\angle^s$ in the same segment /<br>$\angle^e$ in dies. segment | $\checkmark$ S/R<br>$\checkmark$ S<br>$\checkmark$ R<br><br>$\checkmark$ S<br><br><b>OR/OF</b><br>$\checkmark$ S<br>$\checkmark$ R<br><br>$\checkmark$ S<br>$\checkmark$ S/R<br><br>(4) |
|----------|--|--|---|



|       |  |  |  |
|-------|--|--|--|
| 9.1.2 | <p>AD  OB<br/> <math>\hat{O}_1 = \hat{A}\hat{D}\hat{C} = 2x</math></p> <p><math>\therefore \hat{D}_1 = x</math><br/> <math>\hat{A}_1 = x</math><br/> <math>\therefore \hat{D}_1 = \hat{A}_1</math></p> <p>AB is a tangent / <i>is 'n raaklyn</i></p> <p><b>OR / OF</b></p><br><br><br><br><br><br><br><br><br><br><br>$\hat{A}_2 = 90^\circ$<br>$\therefore AD  OB$<br>$\hat{C}\hat{D}\hat{A} = \hat{O}_1 = 2x$<br>$\therefore \hat{D}_1 = x$<br>$\hat{D}_1 = \hat{A}_1$ <p>AB is a tangent / <i>is 'n raaklyn</i></p> | <p>midpoint theorem / <i>middelpunt stelling</i><br/>         corresponding <math>\angle^s AD    OB</math> /<br/> <i>ooreenkom <math>\angle^e AD    OB</math></i></p> <p>proved / <i>reeds bewys</i></p> <p>converse tan chord theorem /<br/> <i>omgekeerde raaklyn koordstelling</i></p><br><br><br><br><br><br><br><br><br><br><br>$\angle$ in a semi-circle / $\angle$ in <i>halwe sirkel</i><br>corr $\angle^s$ are equal / <i>ooreenk <math>\angle^e</math> gelyk</i> <p>corr <math>\angle^s DA    OB</math> / <i>ooreenk <math>\angle^e DA    OB</math></i></p> <p>converse tan chord theorem /<br/> <i>omgekeerde raaklyn koord</i></p> | <p>✓S ✓R<br/>         ✓S<br/>         ✓S<br/>         ✓S<br/>         ✓R<br/>         ✓R<br/>         ✓S<br/>         ✓S<br/>         ✓S<br/>         ✓S<br/>         ✓R<br/>         ✓R</p> <p><b>OR / OF</b></p><br><br><br><br><br><br><br><br><br><br><br>✓S ✓R<br>✓R<br>✓S<br>✓S<br>✓R <p>(6)</p> |
| 9.1.3 | <p><math>DC^2 = AD^2 + AC^2</math><br/>         but / <i>maar</i> <math>AC = 2AM</math><br/>         and / <i>en</i> <math>DC = 2DO</math><br/> <math>(2DO)^2 = AD^2 + (2AM)^2</math><br/> <math>4DO^2 = AD^2 + 4AM^2</math></p> <p>but / <i>maar</i> In <math>\triangle ABM</math><br/> <math>AM^2 = AB^2 - MB^2</math><br/> <math>\therefore 4DO^2 = AD^2 + 4(AB^2 - MB^2)</math><br/> <math>AD^2 = 4DO^2 - 4AB^2 + 4MB^2</math></p>   | <p>Pythagoras</p><br><br><br><br><br><br><br><br><br><br><br>Pythagoras  | <p>✓S<br/>         ✓S<br/>         ✓S<br/>         ✓substitution /<br/> <i>vervanging</i></p> <p>(4)</p>   |





|               |  |  |
|---------------|--|--|
| 10.2          |   |  |
| 10.2.1<br>(a) | $\frac{ML}{LC} = \frac{BJ}{JC} = \frac{2}{3}$ <p>line <math>\parallel</math> one side <math>\triangle BCM</math> <b>OR</b> prop theorem<br/> <math>MB \parallel JL</math> / lyn <math>\parallel</math> aan een sy van <math>\triangle BCM</math> <b>OF</b><br/> <i>eweredigheidsstelling <math>MB \parallel JL</math></i></p>  | $\checkmark$ S<br>$\checkmark$ R<br><br>(2)  |
| 10.2.1<br>(b) | $\frac{MC}{ML} = \frac{BC}{BJ} = \frac{5}{2}$ <p><math>AM = MC</math></p> $\frac{AM}{ML} = \frac{5}{2}$<br>$\frac{AK}{KJ} = \frac{AM}{ML} = \frac{5}{2}$ <p>line <math>\parallel</math> one side <math>\triangle BMC</math> <b>OR</b> prop theorem<br/> <math>MB \parallel JL</math> / lyn <math>\parallel</math> aan een sy van <math>\triangle BMC</math><br/> <b>OF</b> eweredigheidsstelling <math>MB \parallel JL</math></p> <p>diagonals of a parm bisect / <i>hoeklyne van parm halveer</i></p> <p>line <math>\parallel</math> one side <math>\triangle AJL</math> <b>OR</b> prop theorem<br/> <math>MK \parallel JL</math> / lyn <math>\parallel</math> aan een sy van <math>\triangle AJL</math> <b>OF</b><br/> <i>eweredigheidsstelling <math>MK \parallel JL</math></i></p>                                   | $\checkmark$ S<br><br>$\checkmark$ S/R<br><br>$\checkmark$ S<br><br>(3)              |
| 10.2.2        | <p><math>AB \parallel CD</math><br/> <math>AB \parallel QM</math><br/> In <math>\triangle ADC</math><br/> <math>\therefore QM \parallel CD</math><br/> <math>AM = MC</math><br/> <math>\therefore AQ = QD</math></p> <p><i>but</i> <math>AD = BC</math><br/> <math>AQ = \frac{1}{2} AD</math><br/> <math>= \frac{1}{2} \left( \frac{2\sqrt{10}}{3} \right)</math><br/> <math>\therefore AQ = QD = \frac{2}{3} \sqrt{10} \div 2</math><br/> <math>= \frac{\sqrt{10}}{3}</math> units</p> <p>opposite sides of parm / <i>oorst sye van parm</i></p> <p>proved / <i>reeds bewys</i><br/> line passing through the midpoint of 1 side<br/> <math>\parallel</math> to second side / <i>lyn sny die middelpunt van 1 sy <math>\parallel</math> aan tweede sy</i></p> <p>opposite sides of parm / <i>oorst sye van parm</i></p> | $\checkmark$ S<br><br>$\checkmark$ S / R<br><br>$\checkmark$ S<br><br>$\checkmark$ S |

|  | <b>OR / OF</b>  | <b>OR / OF</b>  |
|--|---|---|
|  | <p>In <math>\triangle ABD</math><br/> <math>BM = MD</math><br/> <math>QM \parallel AB</math><br/> <math>\therefore AQ = QD</math><br/> <math>\therefore QM = \frac{1}{2} AB</math><br/> <math>AQ = QD</math><br/> <math>AQ = \frac{1}{2} \left( \frac{2}{3} \sqrt{10} \right)</math><br/> <math>= \frac{\sqrt{10}}{3}</math> units/eenhede</p>  | <p>diag of a parm / <i>hoeklyne van parm</i><br/> given / <i>gegee</i><br/> Line passing through the midpoint of<br/> 1 side <math>\parallel</math> 2<sup>nd</sup> side / <i>lyn deur middelpunt aan</i><br/> <i>een sy <math>\parallel</math> tweede sy</i> <b>OR/OF</b><br/> midpoint theorem / <i>middelpunt stelling</i></p> <p>✓S<br/> ✓S/R<br/> ✓S/R<br/> ✓S</p>  |
|  | <p><b>OR / OF</b><br/> Let/stel <math>BC = 2k</math> en/and<br/> <math>AB = 3k</math><br/> <math>3k = \sqrt{10}</math><br/> <math>k = \frac{\sqrt{10}}{3}</math><br/> <math>BC = \frac{2\sqrt{10}}{3}</math><br/> <math>\frac{AQ}{AD} = \frac{AM}{AC} = \frac{5}{10}</math><br/> <math>AQ = \frac{1}{2} AD</math><br/> <math>AD = BC = \frac{2\sqrt{10}}{3}</math><br/> <math>AQ = \frac{\sqrt{10}}{3}</math></p> | <p><b>OR / OF</b><br/> line <math>\parallel</math> one side <math>\triangle ADC</math> <b>OR</b> prop<br/> theorem <math>QM \parallel DC</math> / <i>lyn <math>\parallel</math> aan een sy van</i><br/> <math>\triangle ADC</math> <b>OF</b> eweredigheidsstelling<br/> <math>QM \parallel DC</math><br/> opposite sides of parm / <i>oorst sye van</i><br/> <i>parm</i></p> <p>✓S<br/> ✓S/R<br/> ✓R<br/> ✓S</p> <p>(4)</p> |

[15]

**TOTAL / TOTAAL: [150]**