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| **NATIONAL**  **SENIOR CERTIFICATE**  ***NASIONALE***  ***SENIOR SERTIFIKAAT*** | | | | | |
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|  | | | **GRADE/*GRAAD* 11** |  | |
|  | | | | | |
| **NOVEMBER 2019** | | | | | |
|  | | | | | |
| **MATHEMATICS P2/*WISKUNDE V2***  **MARKING GUIDELINE/*NASIENRIGLYN*** | | | | | |
|  | | | | | |
| **MARKS/*PUNTE*:** | **150** | | | | |
|  | | | | | |
|  | | This marking guideline consists of 13 pages.  *Hierdie nasien riglyn bestaan uit 13 bladsye.* | | |  |

**QUESTION 1/*VRAAG 1***

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| --- | --- | --- | --- | --- | --- |
| 1.1 | = 549,5 | ✓✓ answer/*antwoord* | | | (2) |
|  |  | | | |  |
| 1.2 | SD = 69,08 | ✓ answer/*antwoord* | | | (1) |
|  |  | | | |  |
| 1.3 | Min/*Min* : 440  Q1 : 490  Q2 : 545  Q3 : 615  Max/*Maks* : 680 | | | ✓ Min and max/  *Min en maks*  ✓ Q1  ✓ Q2  ✓ Q3    ✓ box correctly in place / *diagram korrek geteken* | (5) |
|  |  | | | |  |
| 1.4 | Data skewed slighly right as mean > median | | ✓✓ slightly skewed to the right/ positively skewed  *effens skeef na regs / positief skeef* | | (2) |
|  |  | |  | |  |
| 1.5 | Snack bars have greater variety in energy levels as the SD is greater than that of the cereals which means the data is more widely spread about the mean.  *Peuselstaffies het ’n groter verskeidenheid in energievlakke omdat die SA groter as die van die graanpapsoorte, wat beteken dat die data meer wyd verspreid rondom die gemiddelde is.* | | ✓ snack bars / *peuselstaffies*  ✓ greater SD hence / *groter SA*  ✓greater spread about the mean /  *groter verspreiding om die*  *gemiddelde* | | (3) |
|  | | | | | **[13]** |

**QUESTION 2/*VRAAG 2***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 2.1 | | |  |  |  | | --- | --- | --- | | **Wind Speed (km/hr)**  ***Windsnelheid(km/h)*** | **Frequency**  ***Frekwensie*** | **Cumulative Frequency**  ***Kumulatiewe Frekwensie*** | | 10 < *x* 12 | 1 | 1 | | 12 < *x* 14 | 2 | 3 | | 14 < *x* 16 | **3** | 6 | | 16 < *x* 18 | 4 | 10 | | 18 < *x* 20 | 7 | **17** | | 20 < *x* 22 | 7 | 24 | | 22 < *x* 24 | 4 | 28 | | 24 < *x* 26 | **2** | 30 | | 26 < *x* 28 | 1 | **31** | | ✓ complete freq.  column  *voltooi frekwensie*  *kolom*  ✓ complete cum. freq. column / *voltooi kum. frekwensie kolom* | | (2) |
|  | |  |  | |  |
| 2.2 |  | | | ✓upper boundary values  *boonste grens waardes*  ✓correct points  *korrekte punte*  ✓smooth curve  *egalige kurwe* | (3) |
|  | |  | |  |  |
| 2.3.1 | | Median wind speed = 17,5 km/hr  *Gemiddelde windsnelheid* = 17,5 km/h | | ✓✓ answer with units  *antwoord met eenhede* | (2) |
|  | |  | |  |  |
| 2.3.2 | | 31 – 29 = 2 days/*dae* | | ✓ 29  ✓ answer / *antwoord* | (2) |
|  | | | | | **[9]** |

**QUESTION 3 / *VRAAG 3***

|  |  |  |  |
| --- | --- | --- | --- |
| 3.1 | 3(0) + 2*y* = 6  *y* = 3  E (0 ; 3) | ✓substitution / *vervanging*  *x* = 0  ✓ answer / *antwoord* | (2) |
|  |  |  |  |
| 3.2 | *y* =  *m*CD = | ✓ standard form /  *standaardvorm*  ✓ answer / *antwoord* | (2) |
|  |  |  |  |
| 3.3 | tan – 1 () =  α = 180o – 56,31o  α = 123,69o  OR  Ref. angle / Verw. hoek  = tan  – 1 () =  α = 180o – 56,31o  α = 123,69o | ✓ tan – 1  ✓answer / *antwoord* | (2) |
|  |  |  |  |
| 3.4 | β = 123,69o – 63,69o  β = 60o | ✓answer / *antwoord* | (1) |
|  |  |  |  |
| 3.5 | Gradient of/*van* AB : tan (60o) =  E(0 ; 3)  *y* = *x* + 3 | ✓use of tan / *gebruik van* tan  ✓✓ answer / *antwoord* | (3) |
|  |  |  |  |
| 3.6 | *t* = ( ) + 3  *t* = 6 | ✓ substitute/*vervang* *x* =  ✓ answer / *antwoord* | (2) |
|  |  |  |  |

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| 3.7 | 0 = *x* + 3  = *x*  *x* = , hence/*vervolgens* A(; 0)  3*x* + 2(0) = 6  *x* = 2 , hence/*vervolgens* D(2 ; 0)  Length of AD (base of  *Lengte van* AD (*basis van* Δ ABD)  + 2 = 3,73  Height/*Hoogte* = 6  Hence area /  *Vervolgens is oppervlakte van* ΔABD  =  = 11,19 units2/eenhede2  OR  Length of AD (base of  *Lengte van* AD (*basis van* Δ ABD)  + 2  Hence area /  *Vervolgens is oppervlakte van* ΔABD  = + 2) 6  =11,20 units2 | ✓ calculation of A /  *berekening van* A  ✓calculation of D /  *berekening van* D  ✓height / *hoogte*  ✓area formula /  *oppervlakte formule*  ✓answer / *antwoord* | (5) |
|  | | | **[17]** |

**QUESTION 4 / *VRAAG 4***

|  |  |  |  |
| --- | --- | --- | --- |
| 4.1 | D  E  (3 ; *y*)  *(a ; b)*      **OR/*OF*** 20 = 4 + *y*2 – 6*y* + 9  **OR/*OF*** 0 = *y*2 – 6*y* – 7  *y* = 7 or – 1 **OR/*OF*** 0 = (*y* – 7)(*y* + 1)  A(3 ; 7) | ✓distance formula  *afstand formule*  ✓*x* = 3 and/*en* (y – 3)  ✓solving for *y*  *oplossing vir y*  ✓coordinates  *koördinate* | (4) |
|  |  |  |  |
| 4.2 | C(3 ; 2) | ✓✓ coordinates  *koördinate* | (2) |
|  |  |  |  |
| 4.3 |  | ✓✓substitution in corr formula  *vervanging in korrekte formule* | (2) |
|  |  |  |  |
| 4.4 | D(5;6)  **OR/*OF*** using the gradient of AB = = gradient of BC  Hence | ✓use of midpoint theorem  *Gebruik van middelpunt stelling*  ✓✓coordinates of D  *koördinate van* D  ✓gradient/*gradiënt*  ✓✓coordinates of D | (3) |
|  |  |  |  |
| 4.5 | B'(9;0) | | (2) |
|  | | | | **[13]** |

**QUESTION 5/*VRAAG 5***

|  |  |  |  |
| --- | --- | --- | --- |
| 5.1 | 3    3  θ  2  1 | ✓diagram / *diagram*  ✓ reduction / *reduksie*  ✓answer / *antwoord* | (3) |
| 5.1.1 | tan(1800 + θ)  = tan θ  = |
|  |  |  |  |
| 5.1.2 | 3sin (θ – 90o)  =3(cos θ)  =3  = 1 | ✓reduction / *reduksie*  ✓answer / *antwoord* | (2) |
|  |  |  |  |
| 5.2.1 |  | ✓✓sin and cos reduction  sin *en* cos *reduksie*  ✓✓ cos and sin reduction  cos *en* sin *reduksie*  ✓answer / *antwoord* | (5) |
|  |  |  |  |
| 5.2.2 | sin(360o + *x*) 0  3600 + *x* 0o + k.3600 or/*of* 3600 + *x* 1800 + k.3600  *x* 3600 ; 180o ; 0 ; 180o ; 3600 | ✓✓answers / *antwoorde* | (2) |
|  |  |  |  |
| 5.3 | LHS/*LK* :  =  =  =  = 1  = RHS/*RK* | ✓single fraction/*enkel breuk*  ✓changing tan/ *verander* tan  ✓identity / *identiteit*  ✓taking square root /  *vierkantswortel* | (4) |

|  |  |  |  |
| --- | --- | --- | --- |
| 5.4 | 2sin2 *θ* = 1 + sin *θ*  2sin2 θ – sin θ – 1 = 0  (2sin θ + 1)(sin θ – 1) = 0    θ = – 30o + k.360o or/*of* θ = 210o + k.360o  **OR/OF** θ = 330o + k.360o or/*of* θ = 210o + k.360o  or/of θ = 90o + k.360o ; k Z | ✓standard form / *standaardvorm*  ✓factorising / *faktorisering*  ✓solving / *los op*  ✓✓✓ solutions / *oplossings*  Penalise 1 mark if no k Z  *Penaliseer 1 punt indien geen k ε Z* | (6) |
|  | | | **[22]** |

**QUESTION 6 / *VRAAG 6***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 6.1 |  | | *f*  ✓turning pts/*draaipunte*  ✓*x*-intercepts/*x-afsnitte*  ✓*y*-intercept / *y-afsnit*  *g:*  ✓intercepts / *afsnitte*  ✓turning pts/*draaipunte*  ✓shape / *vorm* | | (6) |
|  | |  |  |  | |
| 6.2.1 | | *x* = 0o | answer/*antwoord* | (1) | |
|  | |  |  |  | |
| 6.2.2 | | *x* [ – 90o ; 90o]  **OR/*OF*** – 90o *x*  90o | ✓✓interval end points */ interval eindpunte* | (2) | |
|  | |  |  |  | |
| 6.2.3 | | *x* (0o ; 45o) **OR/*OF*** 0o < *x <* 45o  *x* (135o ; 180o) **OR/*OF*** 135o < *x <* 180o | ✓ answer/*antwoord*  ✓ answer/*antwoord* | (2) | |
|  | |  |  |  | |
| 6.3 | | *h*(*x*) = 2cos (*x* – 30o) | ✓positive cos /  *positiewe* cos  ✓(*x* – 30o) | (2) | |
|  | | | | **[13]** | |

**QUESTION 7 / *VRAAG 7***

|  |  |  |  |
| --- | --- | --- | --- |
| 7.1.1 | = 70o | ✓answer / *antwoord* | (1) |
|  |  |  |  |
| 7.1.2 |  | ✓sine rule / *sinusreël*  ✓correct substitution /  *korrekte vervanging*  ✓answer for AC /  *antwoord vir* AC  ✓sine ratio/*sinus verhouding*  ✓answer / *antwoord* | (5) |
|  | | | |
| 7.2.1 | AB2 = *r*2 + *r*2 – 2 *r* *r* cos 45o  AB2 = 2r2(1 – cos 45o)  AB2 = r2 (2 – 2 )  AB = r ( )  Perimeter/*Omtrek* = 8 × AB = 8 r | ✓use of cos rule  *gebruik van cos-reël*  ✓expression for AB  *uitdrukking vir* AB  ✓answer / *antwoord* | (3) |
|  |  |  |  |
| 7.2.2 | Area of the octagon /  *Oppervlakte van agthoek*  =  =  =  = | ✓×8  ✓angle in triangle/*hoek in driehoek*  ✓area formula/*oppervlakte formule*  ✓sin 45o value / *waarde* | (4) |
|  | | | **[13]** |

**QUESTION 8 / *VRAAG 8***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 8.1.1 | ’s | ✓ (S) and (R)  *(S) en (R)*  ✓ S  ✓ R | (3) | |
| 8.1.2 (a) | R.T.P /*Te Bewys*: CE = DE  Proof/*Bewys* :  (proved above / *bo bewys*)  CE = DE (equal sides opp equal ’s)  (*gelyke sye tenoor gelyke hoeke*) | ✓ S  ✓ R | (2) | |
|  |  |  |  | |
| 8.1.2 (b) | R.T.P/*Te Bewys* : CD is the diameter of a circle passing through ECD / *CD is die middellyn van die sirkel deur punte E, C en D gaan*  Proof/*Bewys* :  (3 ’s/*e* )  CD is diameter (line subtends 90o)  CD *is die middellyn* ( *lyn onderspan* 90o) | ✓ S  ✓ R | | (2) |
|  |  |  | |  |
| 8.2.1 (a) | =70o (equal ’s opp equal sides / *gelyke ∠e teenoor gelyke sye*) | ✓ S ✓ R | | (2) |
| 8.2.1 (b) | = 35o (exterior of / *buitehoek van driehoek*) | ✓ S ✓ R | | (2) |
| 8.2.1 (c) | = 350 ( ‘s in same segment / ∠*e in dieselde segment*) | ✓ S ✓ R | | (2) |
| 8.2.2 | R.T.P./*Te Bewys* :  Proof/*Bewys* :  ( proved above / *bo bewys*)  =70o (equal ’s opp equal sides /  *gelyke ∠e teenoor gelyke sye*)      BE bisects  / BE *halveer* | ✓ S  ✓ R  ✓ | | (3) |
| 8.3.1 | R.T.P/*Te Bewys* : CDOB is a cyclic quadrilateral / *is ’n koordevierhoek*  Proof/*Bewys* :  (CO AB given / *gegee*)  (angle in a semi-circle)/(*hoek in halwe sirkel*)  (angles on st line) / (*hoeke op ’n reguitlyn*)  CDOB is a cyclic quadrilateral / *is ’n koordevierhoek*  *(*’s in same seg) | ✓ S/R  ✓ S/R  ✓ S  ✓ S | | (4) |
| 8.3.2 | R.T.P/*Te Bewys*. :  Proof/*Bewys* :  (equal ’s opp equal radii)/  (*gelyke ∠e teenoor gelyke radiusse*)  (’s in the same segment of cyclic quad.)  (∠*e in dieselfde segment van koordevierhoek*) | ✓ S/R  ✓ S/R | | (2) |
|  | | | | **[22]** |

**QUESTION 9 / *VRAAG 9***

|  |  |  |  |
| --- | --- | --- | --- |
| 9.1 | P  T  R  Q  S  1  2  R.T.P/*Te Bewys* :  Construction: Draw diameter SP. Join SQ  *Konstruksie:* *Teken middellyn* SP. *Verbind* SQ  Proof/*Bewys* :  (tang diameter)/  (*raaklyn* ⊥ *middellyn*)  ( in semi-circle)/(∠ *in halwe sirkel*)  (’s in ) / (∠*e in* Δ)  But/*Maar*  ( ’s in same segment) /  (∠e *in dieselfde segment*)    Hence/*Vervolgens* *is* | ✓construction/*konstruksie*  ✓ S/R  ✓ S/R  ✓ S/R  ✓ S/R | (5) |
|  |  |  |  |
| 9.2.1 | *= y* (tan chord thrm ) / (*raaklyn koord stelling*) | ✓ S ✓ R | (2) |
| 9.2.2 | *= x + y (*ext of / (*buite* ∠ *van* Δ) | ✓ S ✓ R | (2) |
|  |  |  |  |
| 9.3 | R.T.P/*Te Bewys* : AB EC  Proof/*Bewys* : = *= x + y* (’s in same segment)  (∠*’e in dieselfde segment*)    AB EC (equal alt ’s) / (*gelyke verw.* ∠*e*) | ✓ S  ✓ R  ✓ R | (3) |
| 9.4.1 | R.T.P/*Te Bewys* :  Proof/*Bewys* :  ( ’s in same segment) /  (∠*’e in dieselfde segment*)  (corresp ’s lines) / (ooreenk. ∠ : **||** lyne) | ✓ S  ✓ R  ✓ S | (3) |

|  |  |  |  |
| --- | --- | --- | --- |
| 9.4.2 | R.T.P / *Te Bewys* :  Proof / *Bewys* :  ( ’s of )/(∠*e van* Δ)  ( ’s of ) / (∠*e van* Δ)  But  ( tan chord thrm) / (*raaklyn koord stelling*)    **OR/*OF***    and/*en*  (tan chord thrm)/(*raaklyn koord stelling*)  (’s in same segment)/(∠*e in dies. segment*)  (ext cyclic quad) / (*buite* ∠ *van* k.v) | ✓ S  ✓ S  ✓ R  ✓ S  ✓ S  ✓ R | (3) |
|  | | | **[18]** |

**QUESTION 10 / *VRAAG 10***

|  |  |  |  |
| --- | --- | --- | --- |
| 10.1 | Surface area of sides = perimeter of the base × slant ht  *Buite oppervlakte van sye* = ½ × *omtrek van basis* × *skuinshg*  Slant height/*Skuinshoogte*: 3062 = 252 + (s)2 Pythagoras  s = 304,98 m  θ  25  306  s  SA =  = 30498 m2 | ✓Pytha eqn  *Pyth. verg.*  ✓25m  ✓substitution in formula  *vervanging in formule*  ✓answer /  *antwoord* | (4) |
| 10.2 | tan – 1 θ =  θ = 85,33o | ✓arctan  ✓answer/  *antwoord* | (2) |
|  | | | **[6]** |

**QUESTION 11 / *VRAAG 11***

|  |  |
| --- | --- |
| *y*  *h*  *x*  C  B  A  *b*  *a*  *a2 = h2 + y2*  *b2 = h2 + x2*  Adding/*Optel* : *a2 + b2 = 2h2 + x2 + y2*  = *2(xy) + x2 + y2*  *a2 + b2 = (x + y)2*  BC2 + AC2 = AB2    Hence triangle is rht ’d given : *h2 = xy*  *Die driehoek is vervolgens reghoekig, gegee dat*: *h2 = xy* | ✓ use of Pythag  *gebruik van Pyth*.  ✓adding / *optel*  ✓substitution /  *vervanging*  ✓factorising /  *faktorisering*  **[4]** |
|  |  |

**TOTAL/TOTAAL: 150**