higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT (BEROEPSGERIG)

WISKUNDE
(Tweede Vraestel)
NKR VLAK 3

XX FEBRUARIE 2020

Hierdie nasienriglyn bestaan uit 10 bladsye.

Kopiereg voorbehou

1 punt ½ punt

Aanvaar ALLE wiskundig geldige oplossings.

VRAAG 1

1.1 1.1.1 $A = 4\pi r^2$
$= 4\pi(10)^2$✓
$= 1\,256,64$ or 1 256,637✓ (2)

1.1.2 $l = \sqrt{h^2 + r^2}$
$l = \sqrt{h^2 + r^2}$
$= \sqrt{50^2 + 10^2}$✓
$= 51\,\text{cm}$✓ (2)

1.1.3 Oppervlakte van geboë vlak van 'n keël = $\pi r l$
$= \pi \times 10 \times 51$✓
$= 1\,602,212$✓ (2)

1.1.4 $V_{cone} = \frac{1}{3}\pi r^2 \times_{\perp} h$
$= \frac{1}{3}\pi \times 10^2 \times 50$✓
$= 5235,988\,\text{cm}^3$✓ (2)

1.2 1.2.1 $m_{AB} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-(-8)}{-8-(-4)}$ ✓

$= \frac{12}{-4}$

$= -3$ ✓

$m_{AC} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2-(-8)}{14-(-4)}$ ✓

$= \frac{6}{18}$

$= \frac{1}{3}$ ✓

$m_{AB} \times m_{AC} = -3 \times \frac{1}{3} = -1$ √

$\therefore AB \perp AC$ √

$\therefore \Delta ABC$ is a right angled triangle (5)

1.2.2 $AB = \sqrt{[-8-(-4)]^2 + [4-(-8)]^2} = \sqrt{16+144} = \sqrt{160}$ ✓

$AC = \sqrt{[14-(-4)]^2 = [-2-(-8)]^2} = \sqrt{324+36} = \sqrt{360}$ ✓

Area of Δ ABC $= \frac{1}{2} AB \times AC$

$= \frac{1}{2} \times \sqrt{160} \times \sqrt{360}$ ✓

$= 120 u^2$ ✓ (4)

1.2.3 $M_{BC}: \left(\frac{14-8}{2}; \frac{-2+4}{2} \right)$

$= (3;1)$ √√ (1)

1.2.4 $m_{AC} = \frac{1}{3}$

$\therefore m_{MN} = \frac{1}{3}$ ✓

$y - 1 = \frac{1}{3}(x - 3)$ ✓

$y - 1 = \frac{1}{3}x - 1$

$y = \frac{1}{3}x$ ✓ (3)

1.2.5 $m_{AB} = \left(\frac{-8-4}{2}; \frac{4-8}{2}\right)$

$= (-6; -2)$ ✓

$y = \frac{1}{3}x$

LHS: $y = -2$ ✓

RHS: $y = \frac{1}{3}x$

$= \frac{1}{3}(-6)$

$= -2$ ✓

$\therefore$ LHS = RHS

Die halveerpunt van AB lê op lyn MN. ✓ (4)
[25]

VRAAG 2

2.1 $\dfrac{\sin 120°.\tan 150°}{\cos^2 315°}$

$= \dfrac{\sin(180° - 120°).\tan(180° - 30°)}{\cos^2(360° - 45°)}$

$= \dfrac{\sin 60°.(-\tan 30°)}{\cos^2 45°}$ √ √ √ ✓ ✓

$= \dfrac{\frac{\sqrt{3}}{2} \times \frac{-1}{\sqrt{3}}}{\left(\frac{1}{\sqrt{2}}\right)^2}$ ✓

$= -1$ √ (5)

2.2 2.2.1 $\dfrac{(\sin x + \cos x)^2}{\cos x} = \dfrac{1}{\cos x} + 2\sin x$

LHS:

$= \dfrac{\sin^2 x + 2\sin x \cos x + \cos^2 x}{\cos x}$ ✓

$= \dfrac{1 + 2\sin x \cos x}{\cos x}$ ✓

$= \dfrac{1}{\cos x} + \dfrac{2\sin x \cos x}{\cos x}$

$= \dfrac{1}{\cos x} + 2\sin x$ ✓

= RHS (3)

2.2.2 $\dfrac{1-2\sin^2 x}{1+2\sin x\cos x}=\dfrac{1-\tan x}{1+\tan x}$

LHS:

$$\frac{1-2\sin^2 x}{1+2\sin x\cos x}$$

$$=\frac{\sin^2 x+\cos^2 x-2\sin^2 x}{\sin^2 x+\cos^2 x+2\sin x\cos x} \quad \surd \surd$$

$$=\frac{\cos^2 x-\sin^2 x}{\sin^2 x+2\sin x\cos x+\cos^2 x}$$

$$=\frac{(\cos x-\sin x)(\cos x+\sin x)}{(\sin x+\cos x)^2} \quad \surd \surd$$

$$=\frac{\cos x-\sin x}{\sin x+\cos x}$$

$$=\frac{(\cos x-\sin x)\times\dfrac{1}{\cos x}}{(\sin x+\cos x)\times\dfrac{1}{\cos x}} \checkmark$$

$$=\frac{1-\dfrac{\sin x}{\cos x}}{\dfrac{\sin x}{\cos x}+1} \checkmark$$

$$=\frac{1-\tan x}{1+\tan x} \checkmark$$

= RHS (5)

2.3

$2\sin^2\alpha=-\sin\alpha$

$2\sin^2\alpha+\sin\alpha=0$ $\surd$

$\sin\alpha(2\sin\alpha+1)=0$ $\surd$

$\therefore \sin\alpha=0$ or $2\sin\alpha=-1$

$\surd$ $\surd$

$\therefore \sin\alpha=-\dfrac{1}{2}$ $\surd$

$\therefore$ ref angle $\alpha=0°$ or ref $\alpha=60°$ $\surd$ $<\alpha=0°$ or $180°$ or $360°$ or $240°$ or $300°$ (5)

$\surd$ $\surd$ $\surd$ $\surd$ $\surd$

2.4 2.4.1 *In* ΔABD:

$AD^2 = 24^2 + 15^2 - 2(24)(15)\cos 23°$ ✓✓

$= 138,2365$ ✓

$AD = 11,757\,m$ ✓ (4)

2.4.2 $\frac{\text{AC}}{\sin 23°} = \frac{24}{\sin 35°}$ ✓

$\text{AC} = \frac{24 \times \sin 23°}{\sin 35°}$ ✓

$\text{AC} = 16,349\,\text{m}$ ✓ (3)

[25]

VRAAG 3

3.1 3.1.1 12, 18, 54, 62, 63, 64, 65, 68, 69, 69, 69, 70, 79, 80, 82, 85, 86, 98, 112, 150

$Q_{2\,pos} = \frac{2}{4}(20+1)$

$= 10,5$ ✓

$Q_2 = 69 + 0,5(69-69)$

$= 69$ ✓

or $\frac{69+69}{2}$ ✓ $= 69$ ✓ (2)

3.1.2 12, 18, 54, 62, 63, 64, 65, 68, 69, 69, 69, 70, 79, 80, 82, 85, 86, 98, 112, 150

$Q_{1\,pos} = \frac{1}{4}(20+1)$

$= 5,25$ ✓

$Q_1 = 63 + 0,25(64-63)$

$= 63,25$ ✓

$Q_{3\,pos} = \frac{3}{4}(20+1)$

$= 15,75$ ✓

$Q_3 = 82 + 0,75(85-82)$

$= 84,25$ ✓ (4)

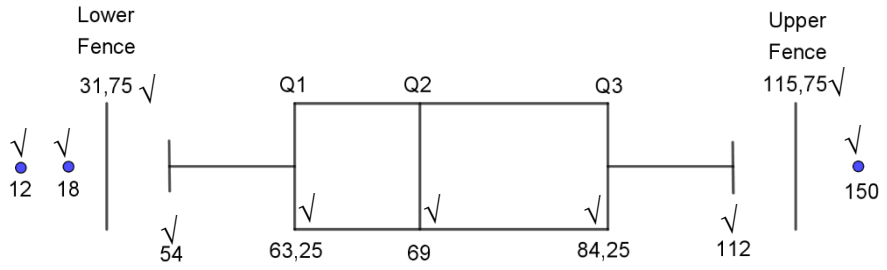
3.1.3 Upper fence $= 84,25 + 1,5(21)$ ✓
$= 115,75$ ✓

Lower fence $= 63,25 - 1,5(21)$ ✓
$= 31,75$ ✓

Gebruik waardes uit VRAAG 3.1.2 om by IKV uit te kom. KA-punte toegeken

(4)

3.1.4



(½ punt vir elke korrekte waarde wat in 'n houerstipping getoon word) (5)

3.2 3.2.1

Klasse (ouderdomme)	Frekwensie (f_i)	Halveerpunt	$f_i \times x_i$	< Kumulatiewe frekwensie
$0 \le x < 10$	27	5	135	27
$10 \le x < 20$	6	15	90	33
$20 \le x < 30$	30	25	750	**63** ✓
$30 \le x < 40$	5	35	175	**68** ✓
$40 \le x < 50$	12	45	540	**80** ✓
$50 \le x < 60$	20	55	1 100	**100** ✓
Totaal	100		$\sum f_i x_i = 2\,790$ ✓	

(5)

3.2.2 $\dfrac{\sum f_i x_i}{n} = \dfrac{2790}{100}$ ✓
$= 27,9$ ✓

(2)

3.2.3 $Me_{position} = \dfrac{1}{2}(n+1) = 50,5$

$Me = l + \dfrac{\left(\frac{n}{2} - F\right)}{f} \times c$

✓ ✓ ✓
$= 20 + \dfrac{\left(\frac{100}{2} - 33\right)}{30} \times 10$ ✓

$= 25,67$ ✓

Of 25,667

Ken 3 punte toe as die leerder die verkeerde klas gekies het, maar korrek gesubstitueer het.

(4)

3.2.4 $$Mo = l + \frac{f_m - f_{m-1}}{2f_m - f_{m-1} - f_{m+1}} \times c$$
$$= 20 + \frac{30-6}{2(30)-6-5} \times 10 \checkmark\checkmark\checkmark$$
$$= 20 + \frac{24}{49} \times 10$$
$$= 24,898 \checkmark$$

Ken 3 punte toe as die leerder die verkeerde klas gekies het, maar korrek gesubstitueer het.

(4)
[30]

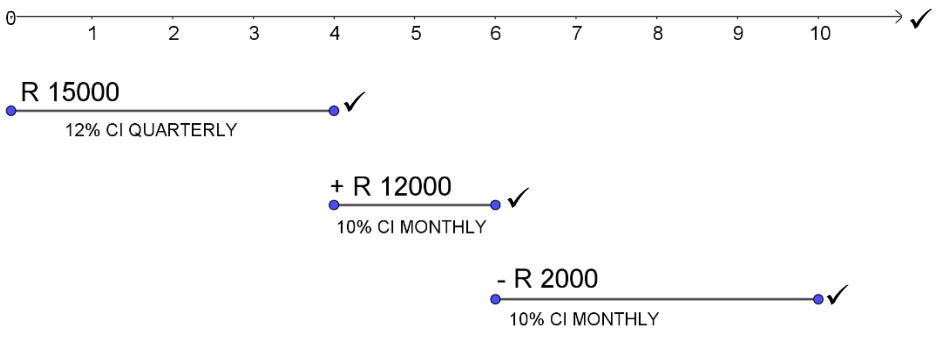
VRAAG 4

4.1 $$A = P(1+in)$$
$$= 12\,000(1+0,098\times 6) \quad \checkmark$$
$$= \text{R } 19\,056 \quad \checkmark$$
(2)

4.2 $$A = P(1+i)^n$$
$$2\,700 = 1\,200(1+i)^3 \quad \surd$$
$$\frac{2\,700}{1\,200} = (1+i)^3 \quad \surd$$
$$2,25 = (1+i)^3 \surd$$
$$1+i = \sqrt[3]{2,25} \quad \surd$$
$$1+i = 1,31 \quad \surd$$
$$i = 0,31$$
$$\therefore r = 31\% \quad \surd$$
(3)

4.3 $$A = P(1+i)^n$$
$$150\,000 = P\left(1+\frac{0,12}{12}\right)^{12\times 7} \checkmark\checkmark$$
$$150\,000 = P(1=0,01)^{84} \checkmark$$
$$150\,000 = P\times 2,3067 \checkmark$$
$$P = 65\,027,96 \text{ or } 65\,027,32 \text{ if calculator was not switched off} \checkmark$$
(5)

4.4 4.4.1



(4)

4.4.2 $A = P(1+i)^n$

$= 15\,000\left(1+\frac{0,12}{4}\right)^{4\times4}$ ✓

$= \text{R}24\,070,60$ ✓

$A = \text{R}24\,070,60+\text{R}12\,000=\text{R}36\,070,60$ √

$A = P(1+i)^n$

$= 36\,070,60\left(1+\frac{0,10}{12}\right)^{2\times12}$ ✓

$= \text{R}44\,020,23$ √

$A = \text{R}44\,020,23-\text{R}2\,000=\text{R}42\,020,23$ √

$A = P(1+i)^n$

$= 42\,020,23\left(1+\frac{0,10}{12}\right)^{4\times12}$ ✓

$= \text{R}62\,583$ √

(6)
[20]

TOTAAL: 100

Kopiereg voorbehou