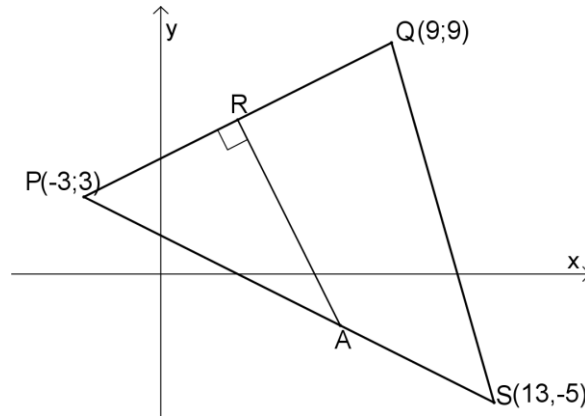




## Junie-eksamen, vraestel 2, 2023 - memorandum

## Vraag 1

Die skets toon  $\triangle PQS$  met  $P(-3; 3)$ ,  $Q(9; 9)$  en  $S(13; -5)$ . R is die middelpunt van PQ en AR is loodreg op PQ met A op PS.



$$PQ = \sqrt{(9 + 3)^2 + (9 - 3)^2} \checkmark \checkmark$$

$$PQ = 6\sqrt{5} \text{ eenhede} \checkmark$$

1.1 Bereken die lengte van PQ. (3)

$$M_{PQ} = \left( \frac{-3+9}{2}; \frac{3+9}{2} \right) \checkmark$$

$$M_{PQ} = (3; 6) \checkmark$$

1.2 Bepaal die koördinate van R, die middelpunt van PQ. (2)

1.3 Bepaal die gradiënt van PQ. (2)

$$m_{PQ} = \frac{9-3}{9-(-3)} \checkmark$$

$$m_{PQ} = \frac{6}{12}$$

$$m_{PQ} = \frac{1}{2} \checkmark$$

1.4 Bepaal vervolgens die vergelyking van RA. (4)

$$y = -2\sqrt{x} + c \text{ [RA} \perp \text{PQ]} \checkmark$$

Stel in (3; 6)

$$6 = -2(3) + c \checkmark$$

$$12 = c$$

$$y = -2x + 12 \checkmark$$

1.5 Die vergelyking van PS is  $x + 2y = 3$ . Bepaal die koördinate van A. (4)

$$y = -2x + 12 \dots (1)$$

$$x + 2y = 3 \dots (2)$$

Stel (1) in (2):

$$x + 2(-2x + 12) = 3 \checkmark$$

$$x - 4x + 24 = 3$$

$$-3x = -21$$

$$x = 7 \checkmark$$

Stel  $x = 7$  in (1):

$$y = -2(7) + 12 \checkmark$$

$$y = -2$$

$$A(7; -2) \checkmark$$

1.6 Bepaal die grootte van  $Q\hat{P}S$ , korrek tot twee desimale syfers. (5)

$$m_{PS} = \frac{3 - (-5)}{-3 - 13} \checkmark \quad \text{Tan } \alpha = 0,5 \checkmark$$

$$m_{PS} = \frac{8}{-16} \quad \alpha = 26,56505 \dots \checkmark$$

$$m_{PS} = -\frac{1}{2} \quad \text{Tan } \beta = 0,5 \checkmark$$

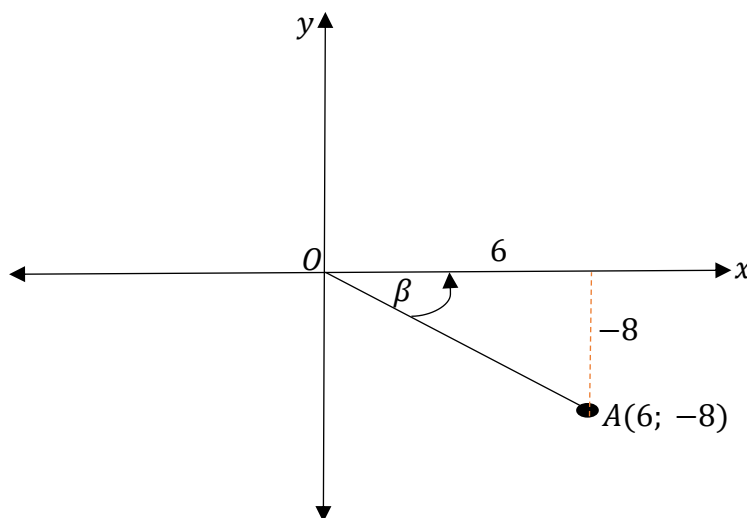
$$\beta = 26,56505 \dots$$

$$Q\hat{P}S = \alpha + \beta = 53,13^\circ \checkmark$$

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## Vraag 2

2.1 Beskou die onderstaande skets en beantwoord die vrae wat volg:



Bepaal:

2.1.1 die lengte van  $OA$ . (2)

$$OA^2 = 6^2 + (-8)^2 \checkmark [\text{Pyth}]$$

$$OA^2 = 100$$

$$OA = 10 \text{ eenhede} \checkmark$$

$$2.1.2 \quad \tan\beta \quad (2)$$

$$= \frac{-8}{6} \checkmark$$

$$= \frac{-4}{3} \checkmark$$

$$2.1.3 \quad \sin^2(90^\circ + \beta) \quad (2)$$

$$= \cos^2\beta \checkmark$$

$$= \left(\frac{6}{10}\right)^2$$

$$= \frac{9}{25} \checkmark$$

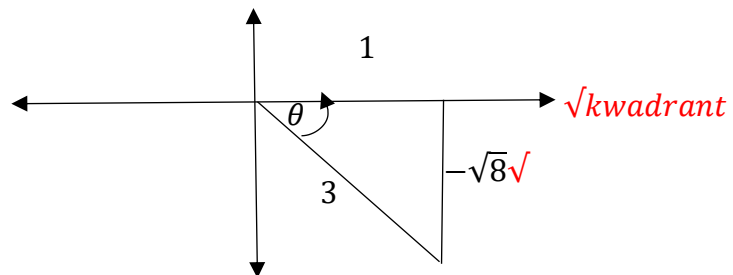
$$2.1.4 \quad \frac{1}{4}\sin\beta + \frac{4}{5} \quad (2)$$

$$= \frac{1}{4}\left(\frac{-8}{10}\right) \checkmark + \frac{4}{5}$$

$$= \frac{3}{5} \checkmark$$

2.1.5 Indien  $3\cos\theta - 1 = 0$  en  $\sin\theta < 0$ , bepaal sonder die gebruik van 'n sakrekenaar:

$$\sqrt{8}\tan\alpha - 1 \text{ waar } \alpha = 90^\circ - \theta. \quad (4)$$

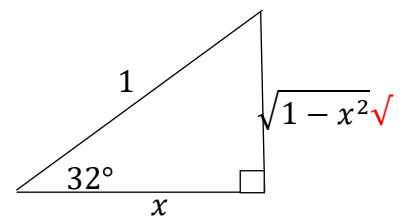


$$= \sqrt{8}\left(-\frac{1}{\sqrt{8}}\right) \checkmark - 1$$

$$= -1 - 1$$

$$= -2 \checkmark$$

2.1.6 Indien  $-\cos 32^\circ + x = 0$ , bepaal elk van die volgende in terme van  $x$ :



$$2.3.1 \quad \tan(-58^\circ) \quad (3)$$

$$= -\tan(58^\circ) \checkmark$$

$$= -\frac{x}{\sqrt{1-x^2}} \checkmark$$

$$2.3.2 \quad \cos^2(90^\circ - 32^\circ) \quad (3)$$

$$= \sin^2(32^\circ) \checkmark$$

$$= (\sqrt{1-x^2})^2 \checkmark$$

$$= 1 - x^2 \checkmark$$

$$2.3.3 \quad \cos(-212^\circ) \quad (2)$$

$$= -\cos(32^\circ) \checkmark$$

$$= -x \checkmark$$

### Vraag 3

3.1 Gegee:  $\frac{\sin(x-360^\circ)\sin(90^\circ-x)\tan(-x)}{\cos(90^\circ+x)}$

3.1.1 Vereenvoudig die gegewe uitdrukking volledig. (6)

$$= \frac{\sin x \sqrt{\cos x} \sqrt{-\tan x}}{-\sin x}$$

$$= \cos x \times \frac{\sin x}{\cos x} \sqrt{\phantom{x}}$$

$$= \sin x \sqrt{\phantom{x}}$$

3.1.2 Vervolgens, of andersins, los op vir  $x$ , sonder die gebruik van 'n sakrekenaar, as  $x \in [0^\circ; 360^\circ]$ :

$$\frac{\sin(x-360^\circ)\sin(90^\circ-x)\tan(-x)}{\cos(90^\circ+x)} = \frac{\sqrt{3}}{2} \quad (2)$$

$$\sin x = \frac{\sqrt{3}}{2} \sqrt{\phantom{x}}$$

Verwysingshoek:  $x = 60^\circ$

$$\therefore x = 60^\circ; 120^\circ \sqrt{\phantom{x}}$$

3.2 Vereenvoudig volledig:  $\frac{\sin 156^\circ \cdot \tan(-18^\circ) \cdot \cos 18^\circ}{\sin 378^\circ \cdot -\cos 246^\circ}$  (7)

$$= \frac{\sin 24^\circ \sqrt{\phantom{x}} \cdot -\tan 18^\circ \sqrt{\phantom{x}} \cdot \cos 18^\circ}{\sin 18^\circ \sqrt{\phantom{x}} \cdot \cos 66^\circ \sqrt{\phantom{x}}}$$

$$= \frac{\sin 24^\circ \cdot \frac{\sin 18^\circ}{\cos 18^\circ} \sqrt{\phantom{x}} \cos 18^\circ}{\sin 18^\circ \cdot \sin 24^\circ \sqrt{\phantom{x}}}$$

$$= -1 \sqrt{\phantom{x}}$$

3.3 Bewys:  $\frac{8}{\sin^2 \alpha} - \frac{4}{1+\cos \alpha} = \frac{4}{1-\cos \alpha}$  (5)

$$LK: \frac{8}{\sin^2 \alpha} - \frac{4}{1+\cos \alpha}$$

$$= \frac{8}{1-\cos^2 \alpha} \sqrt{\phantom{x}} - \frac{4}{1+\cos \alpha}$$

$$= \frac{8}{(1-\cos \alpha)(1+\cos \alpha)} \sqrt{\phantom{x}} - \frac{4}{1+\cos \alpha}$$

$$= \frac{8-4(1-\cos \alpha)}{(1-\cos \alpha)(1+\cos \alpha)} \sqrt{\phantom{x}}$$

$$= \frac{8-4+4\cos \alpha}{(1-\cos \alpha)(1+\cos \alpha)}$$

$$= \frac{4+4\cos \alpha}{(1-\cos \alpha)(1+\cos \alpha)}$$

$$= \frac{4(1+\cos \alpha) \sqrt{\phantom{x}}}{(1-\cos \alpha)(1+\cos \alpha)}$$

$$= \frac{4}{(1-\cos \alpha)} \sqrt{\phantom{x}}$$

3.4 Los op vir  $x$ , indien  $5^{\tan x} = 125$  indien  $x \in [0^\circ; 360^\circ]$ . (5)

$$\tan x = 3 \sqrt{\phantom{x}}$$

Verwysingshoek:  $x = 71,57^\circ \sqrt{\phantom{x}}$

$$\therefore x = 71,57^\circ + 180^\circ k \sqrt{\phantom{x}} \quad k \in \mathbb{Z}$$

$$\therefore x = 180 + 71,57^\circ + 180^\circ k$$

$$\therefore x = 251,57^\circ + 180^\circ k \sqrt{\phantom{x}}$$

$$\therefore x = 71,57^\circ; 251,57^\circ \sqrt{\phantom{x}}$$

