

Trigonometry Memo

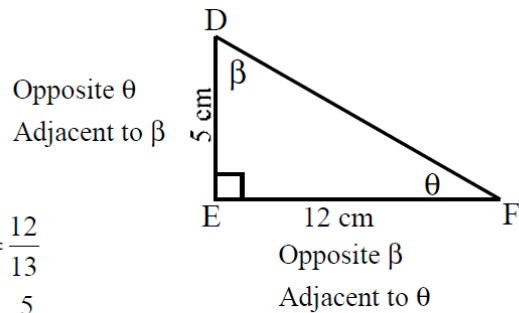
Example 1

Solutions

(a) $DF^2 = 5^2 + 12^2$ [Pythagoras]
 $\therefore DF^2 = 169$
 $\therefore DF = 13 \text{ cm}$

(b) $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{5}{13}$
 $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{12}{13}$
 $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{5}{12}$

(c) $\sin \beta = \frac{\text{opp}}{\text{hyp}} = \frac{12}{13}$
 $\cos \beta = \frac{\text{adj}}{\text{hyp}} = \frac{5}{13}$
 $\tan \beta = \frac{\text{opp}}{\text{adj}} = \frac{12}{5}$



Example 2

(a) $PR^2 = 15^2 - 9^2$
 $\therefore PR^2 = 144$
 $\therefore PR = \sqrt{144} = 12 \text{ cm}$
 $\therefore \tan Q = \frac{\text{opp}}{\text{adj}} = \frac{12}{9} = \frac{4}{3}$

(b) $SV^2 = 25^2 - 7^2$
 $\therefore SV^2 = 576$
 $\therefore SV = \sqrt{576} = 24 \text{ cm}$
 $\therefore \cos V = \frac{\text{adj}}{\text{hyp}} = \frac{24}{25}$

Example 3

- a) $\sin K = \frac{k}{m}$
- b) $\cos K = \frac{g}{m}$
- c) $\tan K = \frac{k}{g}$
- d) $\sin G = \frac{g}{m}$
- e) $\cos G = \frac{k}{m}$
- f) $\tan G = \frac{g}{k}$

Example 4

- | | | |
|--|--|--|
| (a) $\cos(35^\circ) = 0,82$ | (b) $\tan(36^\circ) = 0,73$ | (c) $\sin(83^\circ) = 0,99$ |
| (d) $\sin(43^\circ) = 0,68$ | (e) $\cos(14^\circ) = 0,97$ | (f) $\tan(45^\circ) = 1$ |
| (g) $5 \cos(60^\circ) = 2,5$ | (h) $\frac{\sin(12^\circ)}{12} = 0,02$ | (i) $\frac{1}{3} \tan(36^\circ) = 0,24$ |
| (j) $\frac{20,35}{\sin(38^\circ)} = 33,05$ | (k) $\sin(35^\circ + 75^\circ) = 0,94$ | (l) $\sin 35^\circ + \sin 75^\circ = 1,54$ |

Take note: $\sin(35^\circ + 75^\circ) \neq \sin 35^\circ + \sin 75^\circ$ (An important result)

Example 5

- | | | |
|---|--|--|
| (a) $\sin(23,8^\circ + 18,1^\circ)$
$= \sin(41,9^\circ)$
$= 0,667... \approx 0,7$ | (b) $\tan(2(18,1^\circ))$
$= \tan(36,2)$
$= 0,7318... \approx 0,7$ | (c) $\cos^2(2(23,8^\circ) - 10^\circ)$
$= \cos^2(37,6^\circ)$
$= (\cos(37,6^\circ))^2$
$= 0,627... \approx 0,6$ |
|---|--|--|

Example 6

- (a) (1) $\cos \theta = 0,5$ press [shift] [cos] then 0,5
 $\therefore \theta = \cos^{-1}(0,5)$ as it appears on the calculator screen
 $\therefore \theta = 60^\circ$
- (2) $\tan \theta = 4,123$ press [shift] [tan] then 4,123
 $\therefore \theta = \tan^{-1}(4,123)$ as it appears on the calculator screen
 $\therefore \theta = 76,4^\circ$
- (3) $\sin \theta = 0,706$ press [shift] [sin] then 0,706
 $\therefore \theta = \sin^{-1}(0,706)$ as it appears on the calculator screen
 $\therefore \theta = 44,9^\circ$
- (b) (1) $2 \sin \theta = 1,124$ $\sin \theta$ has been multiplied by 2
 $\therefore \sin \theta = 0,562$ isolate $\sin \theta$ by dividing by 2
 $\therefore \theta = \sin^{-1}(0,562)$
 $\therefore \theta = 34,2^\circ$
- (2) $\sin(2\theta) = 0,435$ insert the brackets
 $\therefore 2\theta = \sin^{-1}(0,435)$
 $\therefore 2\theta = 25,78529...^\circ$ determine θ
 $\therefore \theta = 12,9^\circ$ divide by 2 and then determine θ
- (3) $\frac{1}{2} \tan 2x = 3$ LCD: 2
 $\therefore 2 \times \frac{1}{2} \tan 2x = 3 \times 2$ isolate $\tan 2x$
 $\therefore \tan 2x = 6$
 $\therefore 2x = \tan^{-1}(6)$
 $\therefore 2x = 80,537...^\circ$
 $\therefore x = 40,3^\circ$
- (4) $1 + 2 \cos(x + 10^\circ) = 2,356$
 $\therefore 2 \cos(x + 10^\circ) = 1,356$
 $\therefore \cos(x + 10^\circ) = 0,678$
 $\therefore x + 10^\circ = \cos^{-1}(0,678)$
 $\therefore x + 10^\circ = 47,3124...^\circ$
 $\therefore x = 37,3^\circ$

Example 7

$$(a) \quad \cos 45^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{1}{\sqrt{2}} \text{ (Triangle A)}$$

$$(b) \quad \cos 60^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{1}{2} \text{ (Triangle B)}$$

$$(c) \quad \tan 45^\circ = \frac{\text{opp}}{\text{adj}} = \frac{1}{1} = 1 \text{ (Triangle A)}$$

$$(d) \quad \sin 30^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1}{2} \text{ (Triangle B)}$$

Example 8

$$(a) \quad \begin{aligned} \sin 30^\circ + \cos 60^\circ \\ \frac{1}{2} + \frac{1}{2} \\ = 1 \end{aligned}$$

$$(b) \quad \begin{aligned} \tan 60^\circ - \cos 30^\circ \\ = \frac{\sqrt{3}}{1} - \frac{\sqrt{3}}{2} \\ = \frac{2\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \\ = \frac{2\sqrt{3} - \sqrt{3}}{2} = \frac{\sqrt{3}}{2} \end{aligned}$$

$$(c) \quad \begin{aligned} \frac{\sin 30^\circ}{\tan 30^\circ} &= \frac{\frac{1}{2}}{\frac{1}{\sqrt{3}}} \\ &= \frac{1}{2} \times \frac{\sqrt{3}}{1} = \frac{\sqrt{3}}{2} \end{aligned}$$

$$(d) \quad \begin{aligned} \cos^2 45^\circ &= (\cos 45^\circ)^2 \\ &= \left(\frac{1}{\sqrt{2}} \right)^2 \\ &= \frac{1}{2} \end{aligned}$$

Example 9

Solution

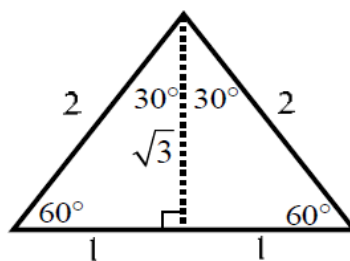
$$2 \cos x - \sqrt{3} = 0$$

$$\therefore 2 \cos x = \sqrt{3}$$

$$\therefore \cos x = \frac{\sqrt{3}}{2}$$

$\sqrt{3}$ is adjacent to 30° and 2 is the hypotenuse

$$\therefore x = 30^\circ \text{ since } \cos 30^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{\sqrt{3}}{2}$$



Example 10

Step 1 : Identify the opposite and adjacent sides and the hypotenuse

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$
$$\sin 50^\circ = \frac{x}{100}$$

Step 2 : Rearrange the equation to solve for x

$$x = 100 \times \sin 50^\circ$$

Step 3 : Use your calculator to find the answer

$$x = 76,6$$

Example 11

Let O be your point of reference (given angle).

You want side ON, which is **adjacent** to 57° .

You have side NC, which is **opposite to** 57° .

You now need to create an equation involving the ratio $\frac{\text{opp}}{\text{adj}}$ and the angle 57° :

$$\frac{\text{opp}}{\text{adj}} = \tan 57^\circ$$

$$\therefore \frac{12,1}{\text{ON}} = \tan 57^\circ$$

$$\therefore 12,1 = \text{ON} \tan 57^\circ$$

$$\therefore \frac{12,1}{\tan 57^\circ} = \text{ON}$$

$$\therefore \text{ON} = 7,9 \text{ cm}$$

Alternatively: $\hat{C} = 33^\circ$ (int $\angle$ s of Δ)

$$\text{From } \hat{C}: \frac{\text{opp}}{\text{adj}} = \tan 33^\circ$$

$$\therefore \frac{\text{ON}}{12,1} = \tan 33^\circ$$

$$\therefore \text{ON} = 12,1 \tan 33^\circ$$

$$\therefore \text{ON} = 7,9 \text{ cm}$$

Example 12

- (a) We have side PU, which is **adjacent** to θ .

Side PN is the **hypotenuse**.

Now form an equation involving the ratio $\frac{\text{adj}}{\text{hyp}}$ and angle θ :

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\therefore \cos \theta = \frac{10}{16}$$

$$\therefore \cos \theta = 0,625$$

$$\therefore \theta = 51,3^\circ$$

- (b) We have side AF, which is **adjacent** to θ . Side FN is **opposite** θ .

Now form an equation involving the ratio $\frac{\text{opp}}{\text{adj}}$ and angle θ :

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\therefore \tan \theta = \frac{11,2}{13}$$

$$\therefore \tan \theta = 0,8615384615 \quad (\text{don't round off})$$

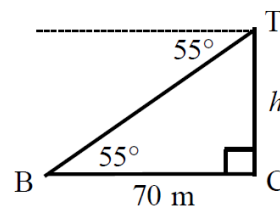
$$\therefore \theta = 40,7^\circ$$

Example 13

- (a) The angle of elevation of the top of the cliff from the boat is 55° , i.e. $\hat{B} = 55^\circ$.

- (b) We can calculate the height of the cliff as follows:

$$\begin{aligned}\frac{h}{70 \text{ m}} &= \tan 55^\circ \\ \therefore h &= (70 \text{ m}) \tan 55^\circ \\ \therefore h &= 100 \text{ m}\end{aligned}$$



Example 14

- a) 1st quadrant
- b) 3rd quadrant
- c) 3rd quadrant
- d) 2nd quadrant
- e) 3rd quadrant
- f) 2nd quadrant

Example 15

Solution

Given : $\cos \theta = \frac{4}{5} = \frac{x}{r}$

and $x^2 + y^2 = r^2$ Pythagoras

$$\therefore (4)^2 + y^2 = (5)^2$$

$$\therefore 16 + y^2 = 25$$

$$\therefore y^2 - 9 = 0$$

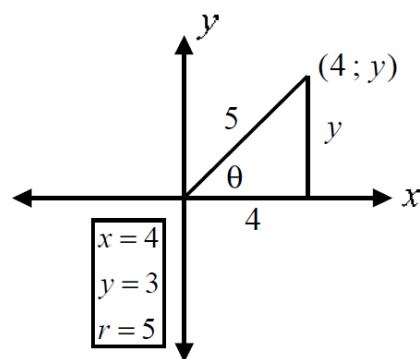
$$\therefore (y+3)(y-3) = 0$$

$$\therefore y = \pm 3$$

But y is positive in Quadrant 1

$$\therefore y = 3$$

$$\therefore \tan^2 \theta = \left(\frac{y}{x}\right)^2 = \left(\frac{3}{4}\right)^2 = \frac{9}{16}$$



Quicker method to solve for y :

$$y^2 - 9 = 0$$

$$\therefore y^2 = 9$$

$$\therefore y = \pm\sqrt{9}$$

$$\therefore y = \pm 3$$

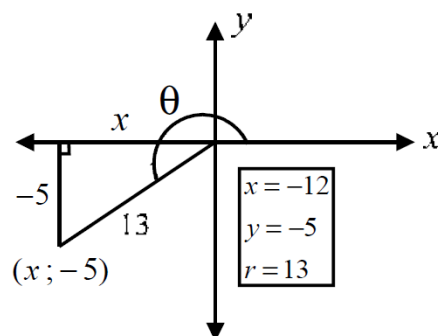
Example 16

$$13 \sin \theta = -5$$

$$\therefore \sin \theta = -\frac{5}{13} = \frac{-5}{13} = \frac{y}{r} \quad (r \text{ is always positive})$$

$\sin \theta$ is negative and therefore the terminal arm will lie in the **third or fourth** quadrant.

But with $\theta \in [90^\circ; 270^\circ]$, the terminal arm will lie in the **third** quadrant.



Example 17

$$(a) \quad (1) \quad \operatorname{cosec} 45^\circ \\ = \frac{2}{1} = 2$$

$$(2) \quad \sec 30^\circ \cdot \cot 60^\circ \\ = \frac{2}{\sqrt{3}} \cdot \frac{1}{\sqrt{3}} = \frac{2}{3}$$

$$(b) \quad (1) \quad \cot 26^\circ \\ = \frac{1}{\tan 26^\circ} = 2,05$$

$$(2) \quad \sec 36^\circ + \operatorname{cosec} 63^\circ \\ = \frac{1}{\cos 36^\circ} + \frac{1}{\sin 63^\circ} = 2,36$$

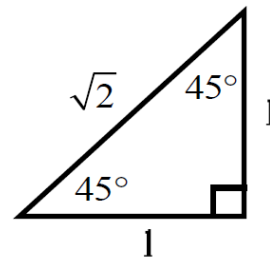
Example 18**Solution**

$$\operatorname{cosec} \theta = \sqrt{2}$$

$$\therefore \operatorname{cosec} \theta = \frac{\sqrt{2}}{1}$$

$\sqrt{2}$ is the hypotenuse and 1 is opposite 45°

$$\therefore x = 45^\circ \quad \text{since} \quad \operatorname{cosec} 45^\circ = \frac{\text{hyp}}{\text{opp}} = \frac{\sqrt{2}}{1}$$



Alternatively:

$$\operatorname{cosec} \theta = \frac{\sqrt{2}}{1}$$

$$\therefore \sin \theta = \frac{1}{\sqrt{2}}$$

$\sqrt{2}$ is the hypotenuse and 1 is opposite 45° .

$$\therefore x = 45^\circ \quad \text{since} \quad \sin 45^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1}{\sqrt{2}}$$

Example 19

$$\sec \theta = 1,5$$

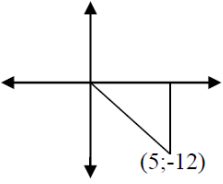
$$\therefore \cos \theta = \frac{1}{1,5}$$

$$\therefore \cos \theta = \frac{2}{3}$$

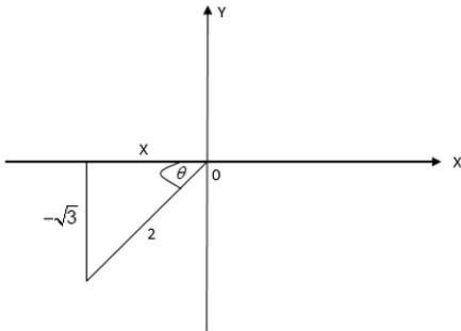
$$\therefore \theta = \cos^{-1}\left(\frac{2}{3}\right) = 48,19^\circ$$

PAST EXAM PAPERS

2019 November Paper 2 Q 3

3.1	$\sin^2 x + 2 \cos y$ $= \sin^2 37^\circ + 2 \cos 44^\circ$ $= 1,80$	✓ answer/antwoord (1)
3.2	$\frac{\sin 30^\circ \cdot \cot 45^\circ}{\cos 30^\circ \cdot \tan 60^\circ}$ $= \frac{\frac{1}{2} \cdot 1}{\frac{\sqrt{3}}{2} \cdot \sqrt{3}}$ $= \frac{1}{3}$	✓ $\frac{1}{2}$ and/en 1 ✓ $\frac{\sqrt{3}}{2}$ and/en $\sqrt{3}$ ✓ answer/antwoord (3)
3.3.1	In ΔACD , $\cos D = \frac{CD}{AD}$	✓ answer/antwoord (1)
3.3.2	In ΔCDE , $\cos D = \frac{DE}{CD}$	✓ answer/antwoord (1)
3.3.3	$\frac{CD}{AD} = \frac{DE}{CD}$ both/beide = $\cos D$ $ED = \frac{CD^2}{AD}$ $ED = \frac{25}{13}$ $ED = 1,92 \text{ units/eenhede}$	✓ equating/ gelykstelling ✓ answer/antwoord (2)
3.4.1	$\cos \theta = \frac{5}{13}$ $y^2 = r^2 - x^2$ $= (13)^2 - (5)^2$ $= 144$ $y = -12$ (in the 4th quad/ in 4de kwad) $\therefore \sin \theta = -\frac{12}{13}$	 ✓ diagram ✓ y-value/-waarde ✓ answer/antwoord (3)
3.4.2	$\sec \theta + \tan^2 \theta + 1$ $= \frac{13}{5} + \left(\frac{-12}{5} \right)^2 + 1$ $= \frac{13}{5} + \frac{144}{25} + 1$ $= \frac{234}{25}$	✓ $\frac{13}{5}$ ✓ $\frac{-12}{5}$ ✓ simplification/ vereenvoudiging ✓ answer/antwoord (4)
		[15]

2023 KwaZulu Natal November Paper 2 Q 4

4.1.1(i)	$\sqrt{3}\operatorname{cosec}\theta + 2 = 0$ $\operatorname{cosec}\theta = -\frac{2}{\sqrt{3}}$ $\sin\theta = -\frac{\sqrt{3}}{2}$ OR $\frac{1}{\sin\theta} = -\frac{2}{\sqrt{3}}$ $-2\sin\theta = \sqrt{3}$ $\sin\theta = -\frac{\sqrt{3}}{2}$  $x^2 + (-\sqrt{3})^2 = 2^2$ [Theorem of pythagoras] $x = -1$ $\therefore \cos\theta = -\frac{1}{2}$	✓ $\sin\theta = -\frac{\sqrt{3}}{2}$ or $\operatorname{cosec}\theta = -\frac{2}{\sqrt{3}}$ ✓ diagram ✓ $x = -1$ ✓ $\cos\theta = -\frac{1}{2}$	(4)
4.1.1(ii)	$\frac{\sin\theta \tan\theta}{\cos\theta} = \frac{\left(-\frac{\sqrt{3}}{2}\right)\left(-\frac{\sqrt{3}}{-1}\right)}{\left(-\frac{1}{2}\right)}$ $= 3$ OR $\frac{\sin\theta\left(\frac{\sin\theta}{\cos\theta}\right)}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta} \times \frac{1}{\cos\theta}$ $= \frac{\left(-\frac{\sqrt{3}}{2}\right)}{\left(-\frac{1}{2}\right)} \times \frac{1}{\left(-\frac{1}{2}\right)}$ $= 3$	✓ $-\frac{\sqrt{3}}{2}$ ✓ $\frac{-\sqrt{3}}{-1}$ ✓ $-\frac{1}{2}$ ✓ Answer ✓ $\frac{\sin\theta}{\cos\theta}$ ✓ $-\frac{\sqrt{3}}{2}$ ✓ $-\frac{1}{2}$ ✓ Answer	(4)

	OR $\frac{\sin^2 \theta}{\cos^2 \theta} = \left(\frac{\sqrt{3}}{2} \right)^2 \div \left(-\frac{1}{2} \right)^2$  $= 3$	$\checkmark \frac{\sin^2 \theta}{\cos^2 \theta}$ $\checkmark -\frac{\sqrt{3}}{2}$ $\checkmark -\frac{1}{2}$ $\checkmark \text{ Answer}$	(4) (4)
4.1.2	$\cos(2\alpha - \theta)$ $= \cos[2(38^\circ) - 25^\circ]$ $= \cos 51^\circ$ $= 0,6$	$\checkmark \text{ substitution}$ $\checkmark \cos 51^\circ$ $\checkmark \text{ Answer}$	(3)
4.2	$\operatorname{cosec}^2 60^\circ + \tan^2 45^\circ + \sec 60^\circ$ $= \frac{1}{\sin^2 60^\circ} + \tan^2 45^\circ + \frac{1}{\cos 60^\circ}$ $= \frac{1}{\left(\frac{\sqrt{3}}{2} \right)^2} + (1)^2 + \frac{1}{\left(\frac{1}{2} \right)}$ $= \frac{4}{3} + 1 + 2$ $= \frac{13}{3}$ OR $\operatorname{cosec}^2 60^\circ + \tan^2 45^\circ + \sec 60^\circ$ $= \frac{1}{\sin^2 60^\circ} + \tan^2 45^\circ + \frac{1}{\cos 60^\circ}$ $= \left(\frac{2}{\sqrt{3}} \right)^2 + (1)^2 + 2$ $= \frac{13}{3}$	$\checkmark \frac{1}{\sin^2 60^\circ}$ $\checkmark \frac{1}{\cos 60^\circ}$ $\checkmark \frac{\sqrt{3}}{2}$ $\checkmark 1$ $\checkmark \frac{1}{2}$ $\checkmark \text{ Answer}$ $\checkmark \frac{1}{\sin^2 60^\circ} \quad \checkmark \frac{1}{\cos 60^\circ}$ $\checkmark \frac{2}{\sqrt{3}}$ $\checkmark 1$ $\checkmark 2$ $\checkmark \text{ Answer}$	(6) (6)

4.3	$2 \tan(\theta - 45^\circ) = 1$ $\tan(\theta - 45^\circ) = \frac{1}{2}$ $\theta - 45^\circ = 26,57^\circ$ $\theta = 71,57^\circ$ 	$\checkmark \tan(\theta - 45^\circ) = \frac{1}{2}$ $\checkmark \theta - 45^\circ = 26,57^\circ$ $\checkmark \text{ Answer}$	(3)
[20]			

2025 Limpopo June Paper 2 Q 2

2.1	$\frac{3 \cos 120^\circ}{\sin 150^\circ - \cos 80^\circ}$ $= -4,596266659$ $= -4,60$ 	$\checkmark -4,596266659$ $\checkmark -4,60$	(2)
2.2.1	$4 \sin \theta = 2,1$ $\sin \theta = \frac{2,1}{4}$ $\theta = \sin^{-1}(0,525)$ $\theta = 31,66824325^\circ$ $\theta = 31,7^\circ$	$\checkmark \sin \theta = \frac{2,1}{4}$ $\checkmark \theta = 31,7^\circ$	(2)
2.2.2	$\cos(\theta + 15^\circ) = 0,845$ $\theta + 15^\circ = \cos^{-1}(0,845)$ $\theta + 15^\circ = 32,32806412^\circ$ $\theta = 32,32806412^\circ - 15^\circ$ $\theta = 17,3^\circ$	$\checkmark \theta + 15^\circ = \cos^{-1}(0,845)$ $\checkmark \theta = 17,3^\circ$	(2)
2.3	$\sin 0^\circ + \cos^2 60^\circ + \sqrt{2} \cos 45^\circ$ $= 0 + \left(\frac{1}{2}\right)^2 + \sqrt{2} \times \frac{\sqrt{2}}{2}$ $= \frac{1}{4} + 1$ $= \frac{1+4}{4}$ $= \frac{5}{4}$	$\checkmark 0$ $\checkmark \left(\frac{1}{2}\right)^2$ $\checkmark \frac{\sqrt{2}}{2}$ $\checkmark \frac{5}{4}$	(4)

2.4

$$x \cdot \cot 60^\circ = \frac{\sin 50^\circ \cdot \sin 30^\circ \cdot \csc 50^\circ}{\cot 45^\circ}$$

$$x \cdot \cot 60^\circ = \frac{\sin 30^\circ}{\cot 45^\circ}$$

$$x \cdot \left(\frac{1}{\sqrt{3}} \right) = \frac{1}{1}$$

$$x \left(\frac{1}{\sqrt{3}} \times \sqrt{3} \right) = \frac{1}{1} \times \sqrt{3}$$

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



$$\checkmark \frac{1}{\sqrt{3}}$$

$$\checkmark \frac{1}{2}$$

$$\checkmark 1$$

$$\checkmark \frac{1}{2} \times \sqrt{3}$$

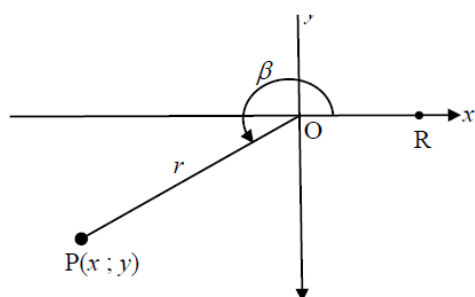
$$\checkmark \frac{\sqrt{3}}{2}$$

(5)

2012 Exemplar Paper 2 Q 5

5.1.1	$5 \cos x = 3$ $\cos x = \frac{3}{5}$ $x = \cos^{-1}\left(\frac{3}{5}\right)$ $x = 53,1^\circ$	$\checkmark \cos x = \frac{3}{5}$ $\checkmark$ answer (2)
5.1.2	$\tan 2x = 1,19$ $2x = \tan^{-1}(1,19)$ $2x = 49,95845.....^\circ$ $x = 25^\circ$	$\checkmark \checkmark 2x = 49,958....^\circ$ $\checkmark$ answer (3)
5.1.3	$4 \sec x - 3 = 5$ $4 \sec x = 8$ $\sec x = 2$ $\frac{1}{\sec x} = \frac{1}{2}$ $\cos x = \frac{1}{2}$ $x = \cos^{-1}\left(\frac{1}{2}\right)$ $x = 60^\circ$	$\checkmark \sec x = 2$ $\checkmark$ inverting both sides $\checkmark \cos x$ $\checkmark$ answer (4)
5.2.1	$\hat{JKD} = 8^\circ$ alternate angles	$\checkmark$ answer (1)
5.2.2	$\tan 8^\circ = \frac{5}{DK}$ $DK = \frac{5}{\tan 8^\circ}$ $DK = 35,57684..... \text{ km}$ $DK = 35\,577 \text{ m}$	$\checkmark \tan 8^\circ = \frac{5}{DK}$ $\checkmark DK = \frac{5}{\tan 8^\circ}$ $\checkmark$ answer (3)
5.2.3	$DS = 35,58 - 8 = 27,58 \text{ km}$	$\checkmark$ answer (1)
5.2.4	$\tan \hat{DSJ} = \frac{5}{27,58}$ $\hat{DSJ} = \tan^{-1}\left(\frac{5}{27,58}\right)$ $\hat{DSJ} = 10,3^\circ$	$\checkmark \tan \hat{DSJ} = \frac{5}{27,58}$ $\checkmark$ answer (2) [16]

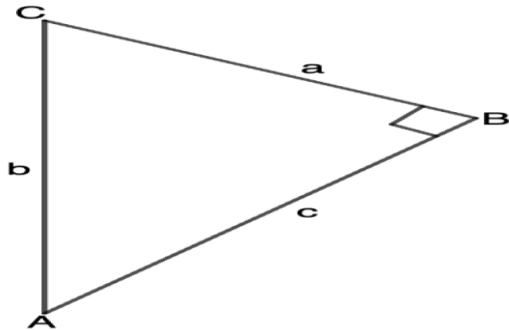
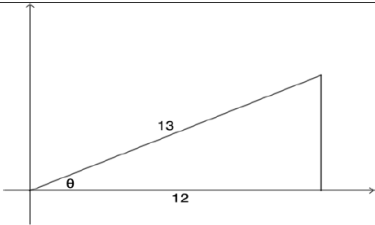
2015 November Paper 2 Q 5



5.1.1	$x = -15$ $r = 17$ $x^2 + y^2 = r^2$ $(-15)^2 + y^2 = 17^2$ $y^2 = 64$ $y = -8$	✓ x-value/waarde ✓ r-value/waarde ✓ using/gebruik Pyth ✓ y-value/waarde (4)
5.1.2(a)	$\sin \beta = -\frac{8}{17}$	✓ answer/antw (1)
5.1.2(b)	$\cos^2 30^\circ \cdot \tan \beta$ $= \left(\frac{\sqrt{3}}{2}\right)^2 \cdot \frac{-8}{-15}$ $= \frac{3}{4} \times \frac{8}{15}$ $= \frac{2}{5}$	✓ $\frac{\sqrt{3}}{2}$ ✓ $\frac{-8}{-15}$ ✓ answer/antw (3)
5.1.3	$\hat{R}\hat{O}P = 180^\circ + 28,07^\circ$ $= 208,07^\circ$	✓ ref/verw $\angle$ ✓ answer/antw (2)
5.2.1	$\tan x = 2,22$ $x = 65,75^\circ$	✓✓ answer/antw (2)
5.2.2	$\sec(x + 10^\circ) = 5,759$ $\cos(x + 10^\circ) = 0,173... \quad \text{OR/OF} \quad \cos(x + 10^\circ) = \frac{1}{5,759}$ $x + 10^\circ = 80,0^\circ$ $x = 70,0^\circ$	✓ $\cos(x + 10^\circ) = \frac{1}{5,759}$ ✓ ref/verw $\angle$ ✓ answer/antw (3)
5.2.3	$\frac{\sin x}{0,2} - 2 = 1,24$ $\frac{\sin x}{0,2} = 3,24$ $\sin x = 0,648$ $x = 40,39^\circ$	 ✓ addition/optelling ✓ multipl/vermenigv ✓ answer/antw (3)

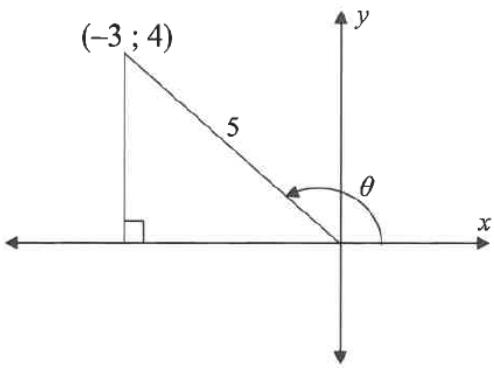
[18]

2024 North West November Paper 2 Q 4

QUESTION 4			
			
4.1.1	$\sin A = \frac{a}{b}$	✓ answer	(1)
4.1.2	$\cot C = \frac{a}{c}$	✓ answer	(1)
4.1.3	$\hat{C} = 40^\circ$ – sum of $\angle$'s of a Δ . $\cot C = \frac{a}{c}$ $\cot 40^\circ = \frac{5}{c}$ $c = \frac{5}{\cot 40^\circ}$ $c = 4.20$	✓ S/R ✓ sub ✓ $c = 4.20$	(3)
4.2.1	$13 \cos \theta = 12$ $\cos \theta = \frac{12}{13}$ $r^2 = x^2 + y^2$ $(13)^2 = (12)^2 + y^2$ $5 = y$ $\sin \theta = \frac{5}{13}$	 ✓ $\cos \theta = \frac{12}{13}$ ✓ diagram ✓ $5 = y$ ✓ $\sin \theta = \frac{5}{13}$	(4)
4.2.2	$\tan \theta - \operatorname{cosec}^2 \theta$ $= \left(\frac{5}{12} - \left(\frac{13}{5} \right)^2 \right)$ $= -\frac{1903}{300} = -6,34$	✓ $\frac{5}{12}$ ✓ $\frac{13}{5}$ ✓ answer	(3)

4.3	$\operatorname{cosec} 60^{\circ} \cdot \cot 30^{\circ} + \cos 45^{\circ} \cdot \operatorname{cosec} 45^{\circ}.$ $= \frac{2}{\sqrt{3}} \cdot \sqrt{3} + \frac{1}{\sqrt{2}} \cdot \sqrt{2}$ $= 2 + 1$ $= 3$	$\checkmark \frac{2}{\sqrt{3}}$ $\checkmark \sqrt{3}$ $\checkmark \frac{1}{\sqrt{2}}$ $\checkmark \sqrt{2}$ $\checkmark 3$
4.4	$3 + \sec x = 5$ $\sec x = 2$ $\frac{1}{\cos x} = 2$ $\cos x = \frac{1}{2}$ $x = \cos^{-1}\left(\frac{1}{2}\right)$ $x = 60$	$\checkmark \sec x = 2$ $\checkmark \frac{1}{\cos x} = 2$ $\checkmark x = 60$
		[20]

2017 November Paper 2 Q 4

4.1.1 (a)	$4 \cot \theta + 3 = 0$ $\cot \theta = -\frac{3}{4}$  $\cos \theta = -\frac{3}{5}$	$\checkmark \cot \theta = -\frac{3}{4}$ $\checkmark$ diagram $\checkmark r = 5$ $\checkmark \cos \theta = -\frac{3}{5}$ (4)
4.1.1 (b)	$\frac{3 \sin \theta \sec \theta}{\tan \theta}$ $= 3 \left(\frac{\left(\frac{4}{5} \right) \left(-\frac{5}{3} \right)}{-\frac{4}{3}} \right)$ $= 3$	$\checkmark \frac{4}{5}$ $\checkmark -\frac{5}{3}$ $\checkmark -\frac{4}{3}$ $\checkmark$ answ./antw. (4)
4.1.2	$LHS = \left(\frac{4}{5} \right)^2 - 1$ $= -\frac{9}{25}$ $RHS = -\left(\frac{3}{5} \right)^2$ $= -\frac{9}{25}$ $\therefore \sin^2 \theta - 1 = -\cos^2 \theta.$	$\checkmark$ subst./verv. $\checkmark$ answ./antw. $\checkmark$ answ./antw. (3)
4.2	$\cos 30^\circ \tan 60^\circ + \operatorname{cosec}^2 45^\circ \sin^2 60^\circ$ $= \frac{\sqrt{3}}{2} \times \sqrt{3} + \left(\frac{2}{\sqrt{2}} \right)^2 \times \left(\frac{\sqrt{3}}{2} \right)^2$ $= \frac{3}{2} + \frac{4}{2} \times \frac{3}{4}$ $= \frac{3}{2} + \frac{3}{2}$ $= 3$	$\checkmark$ any 2 ratios correct / enige twee verhoudings korrek $\checkmark$ other 2 ratios correct / ander twee verhoudings korrek $\checkmark$ answ./antw. (3)

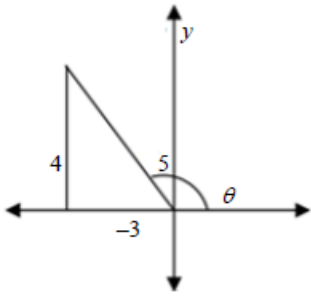
DEPARTMENT OF BASIC
EDUCATION
PRIVATE BAG 4869, PRETORIA 0001
2017 -11- 08
PROVED MARKING GUIDELINE
PUBLIC EXAMINATION

4.3	$\frac{4}{3} \sin \theta = \cos 37^\circ$ $\sin \theta = \frac{3(0,79863551)}{4}$ $\theta = 36,8^\circ$	✓ multiplying by/ <i>vermenigvuldig met</i> $\frac{3}{4}$ ✓ answ./antw. (2)
		[16]

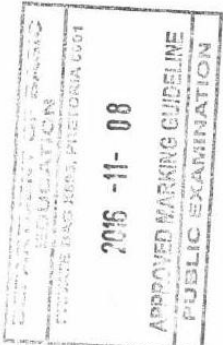
2022 Gauteng November Paper 2 Q 4

QUESTION/ VRAAG	Suggested solution/ Voorgestelde oplossing	Explanation/ Verduideliking	Punte/ Marks
4.1	4.1.1	$\cos(x + y)$ $= \cos(66,4^\circ + 114,7^\circ)$ $= \cos(181,1^\circ)$ $= -1,00$	✓ substitution/vervanging ✓ answer/antwoord (2)
	4.1.2	$2 \sin x$ $= 2 \sin(66,4^\circ)$ $= 1,83$	✓ substitution/vervanging ✓ answer/antwoord (2)
	4.1.3	$\operatorname{cosec} x$ $\frac{1}{\sin(66,4^\circ)}$ $= 1,09$	✓ correct substitution/ <i>korrekte vervanging</i> ✓ answer/antwoord (2)
4.2	4.2.1	$\sin \theta + 0,38 = 1$ $\sin \theta = 0,62$ $\theta = 38,3^\circ$ Penalise 1 mark for incorrect rounding off/ <i>Penaliseer 1 punt vir verkeerde afronding</i>	✓ 0,62 ✓ answer/antwoord (2)
	4.2.2	$2 \cot 2\theta = 3$ $2 \cot 2\theta = \frac{3}{2}$ $2\theta = \tan^{-1}\left(\frac{2}{3}\right)$ $2\theta = 33,69 \dots^\circ$ $\theta = 16,8^\circ$	✓ $\frac{3}{2}$ ✓ $\tan^{-1}\left(\frac{2}{3}\right)$ OR/OF $2\theta = 33,69 \dots^\circ$ ✓ answer/antwoord (3)
	4.2.3	$2 \cos(3\theta - 60^\circ) = 1,71$ $\cos(3\theta - 60^\circ) = 0,855$ $3\theta - 60^\circ = 31,24 \dots^\circ$ $3\theta = 91,24 \dots^\circ$ $\theta = 30,4^\circ$	✓ 0,855 ✓ $3\theta - 60^\circ = 31,24^\circ$ ✓ $3\theta = 91,24^\circ$ ✓ answer/antwoord (4)
			[15]

2022 Gauteng November Paper 2 Q 5

QUESTION/ VRAAG		Suggested solution/ Voorgestelde oplossing	Explanation/ Verduideliking	Punte/ Marks
5.1	5.1.1	 $y^2 = (5)^2 - (4)^2 \quad \text{Pythagoras; } 90^\circ \angle$ $y^2 = 25 - 16$ $y = -3$ $\tan \theta = -\frac{4}{3}$	✓ diagram ✓ S ✓ $y = -3$ ✓ answer/antwoord	(4)
	5.1.2	$2\cos^2 \theta - 1$ $= 2\left(-\frac{3}{5}\right)^2 - 1$ $= -\frac{7}{25}$	✓ $2\left(-\frac{3}{5}\right)^2 - 1$ ✓ answer/antwoord	(2)
5.2		$\cos 0^\circ + \sin^2 60^\circ + \sqrt{2} \cdot \sec 45^\circ$ $= 1 + \left(\frac{\sqrt{3}}{2}\right)^2 + \sqrt{2} \cdot \frac{2}{\sqrt{2}}$ $3\frac{3}{4} \text{ OR/OF } \frac{15}{4}$	✓ 1 ✓ $\left(\frac{\sqrt{3}}{2}\right)^2$ ✓ $\sqrt{2} \cdot \frac{2}{\sqrt{2}}$ ✓ answer/antwoord	(4)
5.3		Distance/Afstand DB: $\tan 21^\circ = \frac{DB}{30}$ DB = 11,515 ... m Distance/Afstand BC: $\tan 15^\circ = \frac{BC}{30}$ BC = 8,038 ... m $\therefore DC = 11,515 \text{ m} - 8,038 \text{ m}$ $\therefore DC = 3,48$	✓ $\tan 21^\circ = \frac{DB}{30}$ ✓ DB = 11,515 m ✓ $\tan 15^\circ = \frac{BC}{30}$ ✓ BC = 8,038 m ✓ DC = 11,515 m - 8,038 m ✓ answer/antwoord	(6)
				[16]

2016 November Paper 2 Q 4

4.1.1(a)	$\frac{b}{c}$	✓ answer/antwoord (1)
4.1.1(b)	$\frac{a}{b}$	✓ answer/antwoord (1)
4.1.1(c)	$\frac{b}{c}$	✓✓ answer/antwoord 0 or / of 2 marks /punte (2)
4.1.2	$\tan \theta = \frac{a}{b}$ $\tan 50^\circ = \frac{5}{b}$ $\therefore b = \frac{5}{\tan 50^\circ}$ $b = 4,20$	✓ correct subst in ratio/ korr subst in verhouding ✓ b value/waarde (penalise for rounding off only in this question) (afronding word slegs in hierdie vraag gepepenseer) (2)
4.2	$2\operatorname{cosec} 38,2^\circ + \cos 3(146,4^\circ)$ $= 2\left(\frac{1}{\sin 38,2^\circ}\right) + \cos 3(146,4^\circ)$ $= 3,42$	✓ $\left(\frac{1}{\sin 38,2^\circ}\right)$ or/of 2(1,617) or/of 3,234 ✓✓ answer accurate/ antwoord akkuraat [Answer only – full marks] [Slegs antwoord – volpunte] (3)
4.3	$\frac{\sin 45^\circ \cdot \tan^2 60^\circ}{\cos 45^\circ}$ $\frac{\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{1}\right)\left(\frac{\sqrt{3}}{1}\right)}{\frac{1}{\sqrt{2}}}$ $\frac{\frac{3}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{1}$ 3 	✓ $\frac{1}{\sqrt{2}} / \frac{\sqrt{2}}{2}$ ✓ $\frac{\sqrt{3}}{1}$ ✓ $\frac{1}{\sqrt{2}} / \frac{\sqrt{2}}{2}$ (denominator / noemer) ✓ answer/antwoord Answer only/ Slegs antw 0/4 (4)
4.4	$\cos \beta = \frac{3}{5}$ $y^2 = 5^2 - 3^2$	✓ $\cos \beta = \frac{3}{5}$ ✓ application Pyth. Th. toepassing van Pyth. St.

$y = 4$ $\therefore \cot \alpha = \frac{4}{3}$ OR/OF $\cos \beta = \frac{3}{5}$ $\beta = 53,13^\circ$ $\alpha = 36,87^\circ$ $\cot \alpha = \frac{1}{\tan 36,87^\circ} = 1,33$	Or reason/ <i>of rede Pyth</i> ✓ $y = 4$ ✓ answer/ <i>antwoord</i> (4) ✓ $\cos \beta = \frac{3}{5}$ ✓ value of / <i>waarde van</i> β ✓ value of / <i>waarde van</i> α ✓ answer / <i>antw</i> (4) [17]
---	---