

Trig Functions Memo

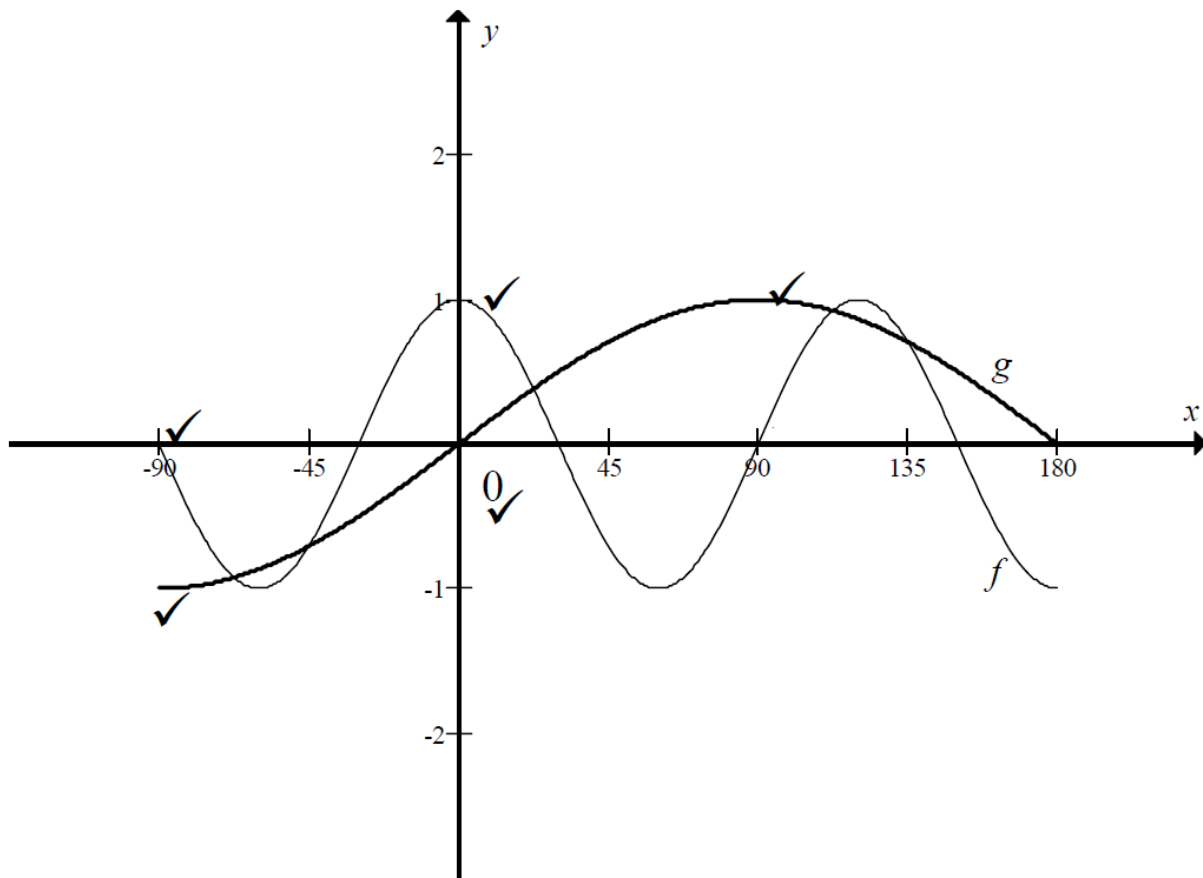
2015 Gauteng Preliminary Paper 2 Q 7

7.1	$\sin(60^\circ - \theta) = 1$ $60^\circ - \theta = 90^\circ$ $\theta = -30^\circ$ ✓ (1)	$\checkmark \theta = -30^\circ$ (1)
7.2	$\text{period / periode} = \frac{360^\circ}{2}$ $= 180^\circ$ ✓ (1)	$\checkmark 180^\circ$ (1)
7.3	$-2 \leq y \leq 0$ ✓ of / or $[-2; 0]$ (1)	$\checkmark -2 \leq y \leq 0$ (1)
7.4	$45^\circ < x < 135^\circ$ ✓ or/or $150^\circ < x \leq 180^\circ$ ✓ ✓ (3)	$\checkmark 45^\circ$ and 135° $\checkmark 150^\circ$ and 180° $\checkmark$ ALL inequalities correct <i>ALLE ongelykhede korrek</i> <i>Subtract 1 mark for extra intervals</i> <i>Trek 1 punt af vir ekstra intervalle</i> (3)

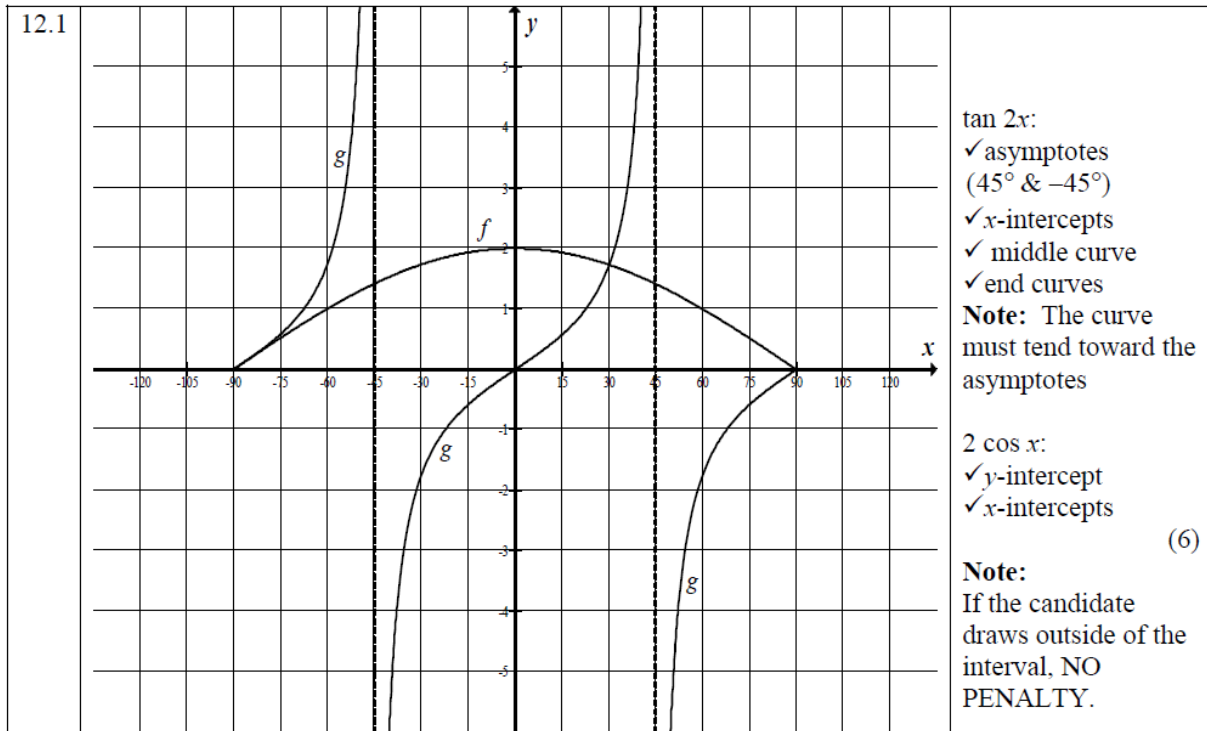
2017 March Paper 2 Q 5

5.1	$a = -1$ $b = 2$	✓ answer ✓ answer (2)
5.2	$f(3x) = -\sin 3x$ Period of $f(3x) = \frac{360^\circ}{3}$ $= 120^\circ$ Answer only: Full marks	✓ $\frac{360^\circ}{3}$ ✓ answer (2)
5.3	$x \in [90^\circ ; 135^\circ) \cup \{180^\circ\}$ OR/OF $90^\circ \leq x < 135^\circ \text{ or } x = 180^\circ$	✓ 90° and 135° in interval form ✓ 180° as single value ✓ correct brackets (3) ✓ 90° and 135° in interval form ✓ 180° as single value ✓ correct inequalities (3)

2008 November Paper 1 Q 8.2



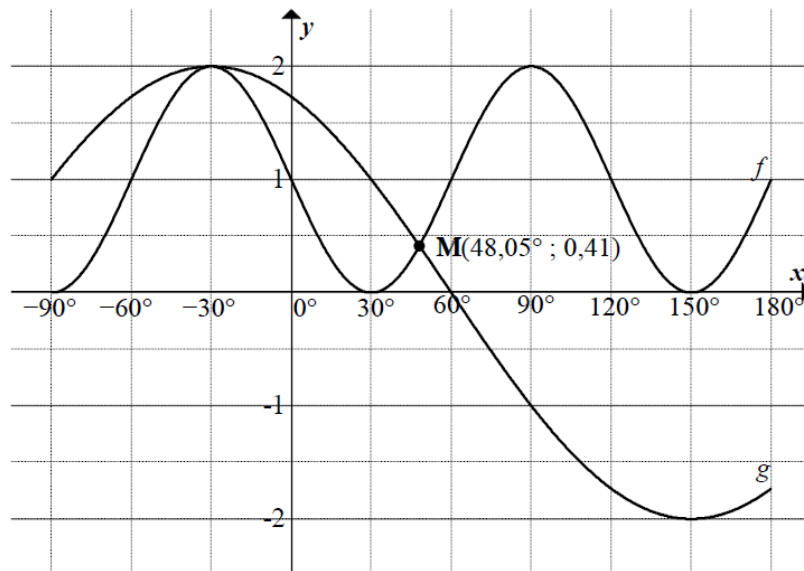
2010 November Paper 2 Q 12.1



2024 Eastern Cape November Paper 1 Q 6

QUESTION 6 / VRAAG 6			
6.1	Period is / Periode is 360°	✓ answer/ antwoord	(1)
6.2	$y \in [0; 2]$ or/of $0 \leq y \leq 2$	✓ correct interval/ korrekte interval ✓ correct notation/ korrekte notasie	(2)
6.3	$h(x) = \cos(60^\circ + x + 30^\circ) + 1$ $= \cos(90^\circ + x) + 1$ $= -\sin x + 1$	✓ $\cos(90^\circ + x)$ ✓ $-\sin x$	(2)
6.4		$h(x)$ ✓ x-intercept/ afsnit ✓ y-intercept/ y-afsnit ✓ correct shape/ korrekte vorm	(3)
6.5.1	$x = 150^\circ$	✓ answer/ antwoord	(1)
6.5.2	$60^\circ \leq x \leq 150^\circ$	✓ correct interval/ korrekte interval ✓ correct notation/ korrekte notasie	(2)
6.5.3	$x = 30^\circ$	✓ answer/ antwoord	(1)
			[12]

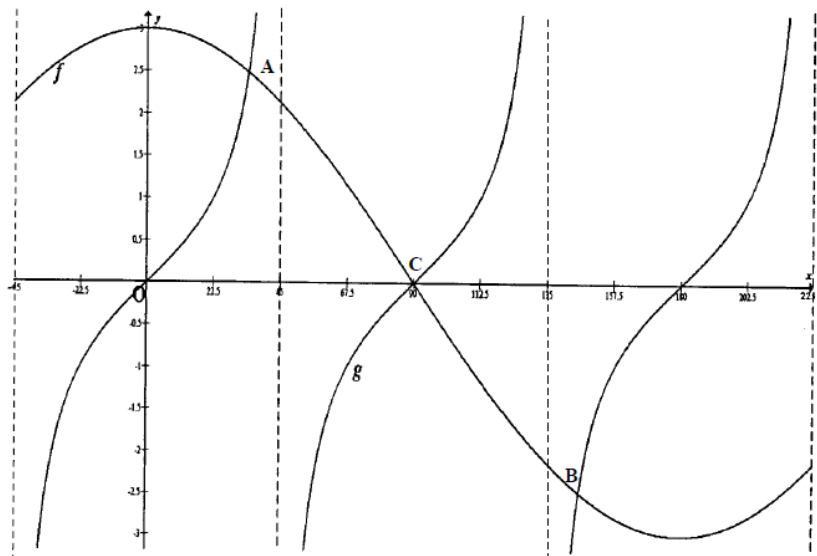
2022 Gauteng November Paper 2 Q 6



6.1	$A = 2$	✓ Answer	(1)
6.2	120°	✓ Answer	(1)
6.3	$a = -1$ $b = 3$ $p = 30^\circ$	✓ a ✓ b ✓ p	(3)
6.4	6.4.1 $-90^\circ \leq x < 60^\circ$	✓ Interval	(1)
	6.4.2 $x = -30^\circ$ or $48,05^\circ \leq x \leq 180^\circ$	✓ Interval ✓ $x = -30^\circ$	(2)
	6.4.3 $60^\circ < x < 150^\circ$ or $150^\circ < x \leq 180^\circ$	✓ 60° and 180° ✓ Not incl. 150° but incl. 180°	(2)
6.5	$t = -30^\circ + k \cdot 360^\circ ; k \in \mathbb{Z}$	✓✓ $t = -30^\circ$ ✓ $k \cdot 360^\circ$	(3)
			[13]

2018 KwaZulu Natal Preliminary Paper 2 Q 6

6.1



- ✓ A shape of f
- ✓ A shape of g
- ✓✓ A A asymptotes
- ✓ A x -intercepts of f
- ✓ A Turning points of f
- ✓ A x -intercepts of g

- ✓ A 3 intersection points

(8)

6.2	the graphs intersect at A, B and C. At A we have $x = 34^\circ$, at C we have $x = 90^\circ$ and by using symmetry we get at B, $x = 180^\circ - 34^\circ = 146^\circ$.	✓ A using symmetry ✓ A answer Answer only full marks	(2) [10]
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2014 Higher Grade Paper 2 Q 4

QUESTION 4		[20]
4.1.1	$a = -2 \checkmark A \checkmark A$ (2)	1A sign 1A value
4.1.2	$b = 45^\circ \checkmark A$ (1)	1A value
4.1.3	$c = 1 \checkmark A$ (1)	1A value
4.2	$y \in [-2 ; 2] \checkmark A$ OR $-2 \leq y \leq 2$ (1)	1A interval
4.3	$x_Q = 180^\circ - 28,68^\circ \checkmark A$ $= 151,32^\circ$ $\checkmark M$ $y_Q = -2 \sin 151,32^\circ = -0,96 \checkmark CA$ OR $\checkmark M$ $y_Q = \cos(151,32^\circ + 45^\circ) = -0,96 \checkmark CA$ $Q(151,32^\circ ; -0,96)$ (3)	1A obtuse angle 1M substit. for y_Q 1CA value for y_Q
4.4	$h(x) = \cos(x + 75^\circ) \checkmark CA \checkmark A$ (2)	1CA (see Q 4.1.2) 1A correct equation
4.5.1	$f(x) > g(x) \checkmark A$ $x \in (-28,68^\circ ; 151,32^\circ) \checkmark CA \checkmark CA \checkmark A$ OR $-28,68^\circ < x < 151,32^\circ$ $\checkmark CA$ (4)	1A simplification 2CA end points 1A correct notation
4.5.2	$\checkmark A$ $\checkmark CA$ $x \in [-135^\circ ; 0^\circ]$ or $x \in [45^\circ ; 180^\circ] \checkmark CA \checkmark A$ OR $-135^\circ \leq x \leq 0^\circ$ or $45^\circ \leq x \leq 180^\circ$ (4)	1CA interval 1A correct notation 1CA interval 1A correct notation
4.5.3	$x \in (-90^\circ ; -45^\circ) \checkmark A \checkmark A$ OR $-90^\circ < x < -45^\circ$ (2)	1A end values 1A correct notation

2016 Gauteng Preliminary Paper 2 Q 6.3

6.3.1	$y \in [-2; 2]$ OR / OF $-2 \leq y \leq 2$	✓ $y \in [-2; 2]$ (1)
6.3.2		✓ x-intercepts ✓ y-intercept ✓ shape (3)
6.3.3	360°	✓ 360° (1)
6.3.4	$-120^\circ < x < 60^\circ$ OR / OF $x \in (-120^\circ; 60^\circ)$	✓ $-120^\circ < x$ ✓ $x < 60^\circ$ (2)
6.3.5	$-30^\circ < x < 90^\circ$ OR / OF $x \in (-30^\circ; 90^\circ)$ Brackets/ Inequality signs have to be correct.	✓ $-30^\circ < x$ ✓ $x < 90^\circ$ (2)

2022 Gauteng November Paper 2 Q 6

6.1	$A = 2$	✓ Answer	(1)
6.2	120°	✓ Answer	(1)
6.3	$a = -1$ $b = 3$ $p = 30^\circ$	✓ a ✓ b ✓ p	(3)
6.4	6.4.1	$-90^\circ \leq x < 60^\circ$	✓ Interval (1)
	6.4.2	$x = -30^\circ$ or $48,05^\circ \leq x \leq 180^\circ$	✓ Interval ✓ $x = -30^\circ$ (2)
	6.4.3	$60^\circ < x < 150^\circ$ or $150^\circ < x \leq 180^\circ$	✓ 60° and 180° ✓ Not incl. 150° but incl. 180° (2)

2018 Free State Preliminary Paper 2 Q 8

8.1	$a = 1$ $b = 2$ $c = 2$ $d = 1$	✓ $a = 1$ ✓ $b = 2$ ✓ $c = 2$ ✓ $d = 1$ (4)
8.2	$P(21,44^\circ; 0,73)$	✓ correct substitution (2)
8.3.1	$x = 90^\circ$	✓ 90° (1)
8.3.2	$x \in [45^\circ; 135^\circ]$ OR $45^\circ \leq x \leq 135^\circ$	✓ 45° and 135° ✓ Notation (2)

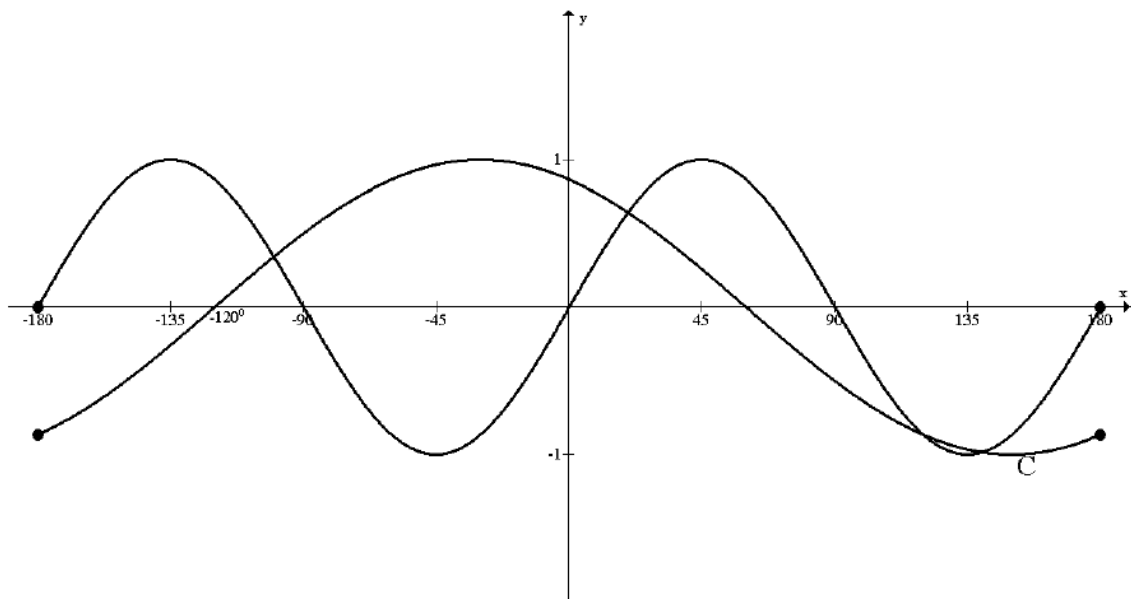
2011 November Paper 2 Q 10

10.1	$f(225^\circ) = 2$ $\therefore a \tan 225^\circ = 2 \quad \therefore a = 2$ $g(0) = 4$ $\therefore b \cos 0^\circ = 4 \quad \therefore b = 4$ Answer only: Full marks	$\checkmark$ substitution $\checkmark a = 2$ $\checkmark$ substitution $\checkmark b = 4$
10.2	Minimum value of $g(x) + 2 = -4 + 2 = -2$ Answer only: Full marks	$\checkmark -4$ $\checkmark -2$
10.3	Period $= \frac{180^\circ}{\frac{1}{2}} = 360^\circ$ Answer only: Full marks	$\checkmark \frac{180^\circ}{\frac{1}{2}}$ $\checkmark 360^\circ$
10.4	At P $f(\theta) = g(\theta)$ $2 \tan \theta = 4 \cos \theta$ for $180^\circ - \theta$: $2 \tan (180^\circ - \theta) = -2 \tan \theta$ and $4 \cos (180^\circ - \theta) = -4 \cos \theta$ $2 \tan \theta = 4 \cos \theta$ at P $\therefore -2 \tan \theta = -4 \cos \theta$ $\therefore 2 \tan (180^\circ - \theta) = 4 \cos (180^\circ - \theta)$ at Q OR $2 \tan \theta = 4 \cos \theta$ $\frac{\sin \theta}{\cos \theta} = 2 \cos \theta$ $\sin \theta = 2 \cos^2 \theta$ $= 2(1 - \sin^2 \theta)$	$\checkmark 2 \tan \theta = 4 \cos \theta$ $\checkmark 2 \tan (180^\circ - \theta) = -2 \tan \theta$ $\checkmark 4 \cos (180^\circ - \theta) = -4 \cos \theta$ $\checkmark 2 \tan (180^\circ - \theta) = 4 \cos (180^\circ - \theta)$
	$2 \sin^2 \theta + \sin \theta - 2 = 0$ $\sin \theta = \frac{-1 \pm \sqrt{1 - 4(2)(-2)}}{4}$ $\sin \theta = 0.78077...$ $\theta = 51.33^\circ$ or 128.67° $\therefore$ the x -coordinate of Q is $180^\circ - x_p$	$\checkmark$ equation $\checkmark \sin \theta = 0.78077...$ $\checkmark 51.33^\circ$ $\checkmark 128.67^\circ$

2018 North West Preliminary Paper 2 Q 6

6.1	$p = 30^\circ$ and / en $q = -\frac{1}{2}$	$\checkmark\checkmark p = 30^\circ$ $\checkmark\checkmark q = -\frac{1}{2}$ (4)
6.2	$x = -150^\circ$ or / of $x = 30^\circ$	$\checkmark -150^\circ$ $\checkmark 30^\circ$ (2)
6.3	The graph of f must be translated 60° to the left / Die grafiek van f moet 60° na links getransleer word. OR/OF The graph of f must be translated 120° to the right and then be reflected about the x-axis/ Die grafiek van f moet 120° na regs getransleer word en dan in die x-as gereflekteer word.	$\checkmark\checkmark 60^\circ$ to the left/na links (2) $\checkmark 120^\circ$ right/regs $\checkmark$ reflect about x -axis/reflekteer in die x -as.

2022 Eastern Cape November Paper 1 Q 8

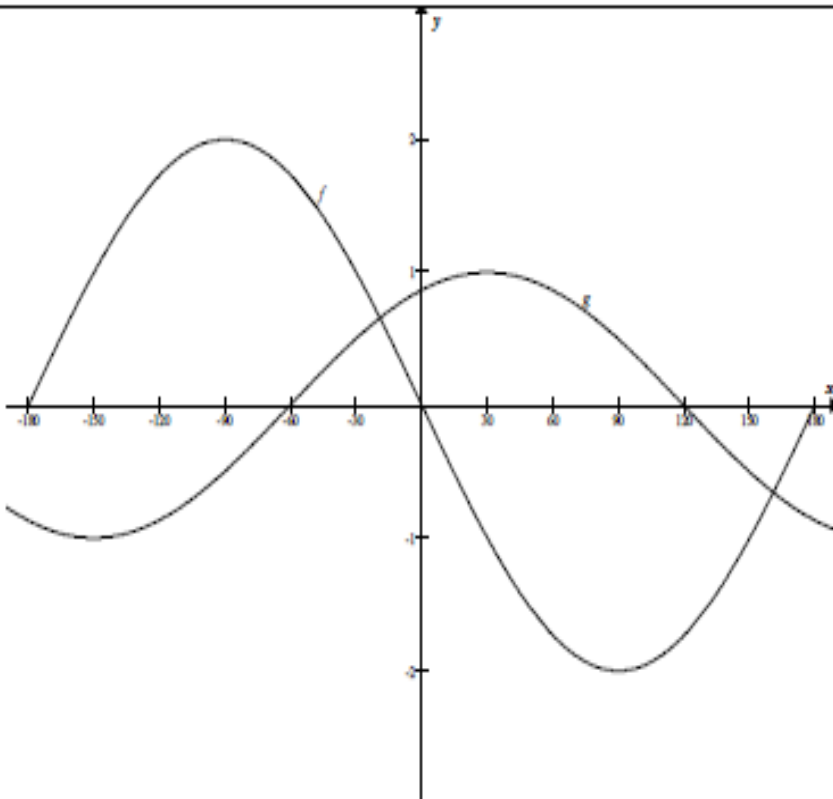


8.1	$a = 2 \quad b = -30^\circ$	✓ for/vir a ✓ for/vir b	(2)
8.2	$C(150^\circ; -1)$	✓ for/vir 150° ✓ for/vir -1	(2)
8.3	$-120^\circ \leq x \leq -90^\circ$	✓ for/vir -120° ✓ for/vir -90° ✓ for correct notation vir korrekte notasie	(3)
8.4	$f(x) = \sin 2(x - 30^\circ)$	✓ for correct answer vir korrekte antwoord	(1)
			[8]

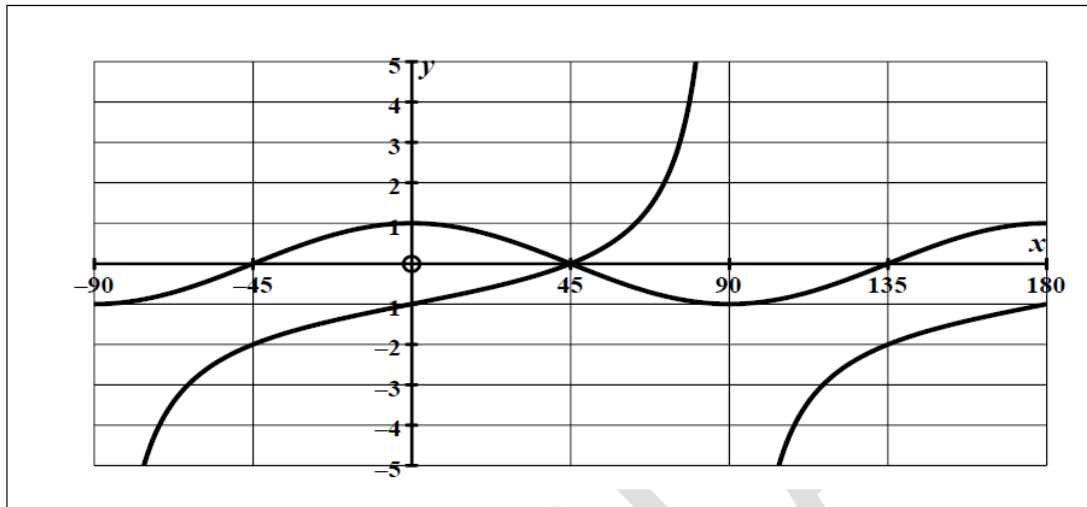
2015 Eastern Cape November Paper 2 Q 7

QUESTION/VRAG 7: [12]		
7.1		<i>f</i> ✓ asymptotes / <i>asimptote</i> ✓ min value / <i>min waarde</i> ✓ max value / <i>maks waarde</i> <i>g</i> ✓ $(-45^\circ; -1)$ ✓ $(45^\circ; 1)$ ✓ $(135^\circ; -1)$
7.2	$x \in (-45; 0) \cup (45; 90) \cup (135; 180)$	✓ -45 ✓ 45 ✓ 0 ✓ 90 ✓ 135 ✓ 180
7.3	90°	✓ answer / <i>antwoord</i>

QUESTION 12

12.1	Period = 360°	✓ answer (1)
12.2	Amplitude = $\frac{1}{2}$	✓✓ answer (2)
12.3		✓ shape ✓ x intercepts ✓ amplitude (3)
12.4	2 solutions	✓ answer (1)
12.5	$-60^\circ \leq x \leq 120^\circ$ or $x \in [-60^\circ; 120^\circ]$	✓ $-60^\circ; 120^\circ$ ✓ notation (2)
12.6	$-90^\circ < x < 30^\circ$ or $x \in (-90^\circ; 30^\circ)$	✓✓ $-90^\circ; 30^\circ$ ✓ notation (3) [12]

2021 Gauteng November Paper 2 Q 6
QUESTION 6



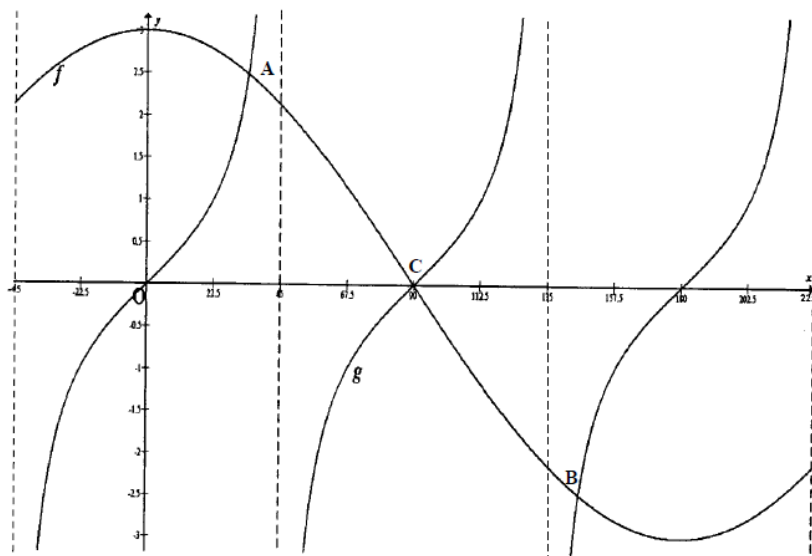
6.1	$f(x) = \tan x - 1$ $g(x) = \cos 2x$		✓ asymptotes ✓ intercepts with axes ✓ shape ✓ period ✓ shape with open dot at $x = -90^\circ$	(5)
6.2	6.2.1	$\cos 2x + 1 = \tan x$ $\therefore \cos 2x = \tan x - 1$ $\therefore x = 45^\circ$	✓ $x = 45^\circ$	(1)
	6.2.2	$2 \cos^2 x = 1$ $\therefore 2 \cos^2 x - 1 = 0$ $\therefore \cos 2x = 0$ $\therefore x = \pm 45^\circ$ or $x = 135^\circ$	✓ $\cos 2x = 0$ ✓ solutions	(2)
	6.2.3	$-90^\circ < x < -45^\circ$ or $90^\circ < x < 135^\circ$	✓ $-90^\circ < x < -45^\circ$ ✓ $90^\circ < x < 135^\circ$	(2)
6.3	$h(x) = \cos 2(x - 30^\circ)$		✓ $h(x) = \cos 2(x - 30^\circ)$	(1)
				[11]

2014 Higher Grade P2 Q 4

QUESTION 4		[20]
4.1.1	$a = -2 \checkmark A \checkmark A$ (2)	1A sign 1A value
4.1.2	$b = 45^\circ \checkmark A$ (1)	1A value
4.1.3	$c = 1 \checkmark A$ (1)	1A value
4.2	$y \in [-2 ; 2] \checkmark A$ OR $-2 \leq y \leq 2$ (1)	1A interval
4.3	$x_Q = 180^\circ - 28,68^\circ \checkmark A$ $= 151,32^\circ$ $y_Q = -2 \sin 151,32^\circ = -0,96 \checkmark CA$ OR $y_Q = \cos(151,32^\circ + 45^\circ) = -0,96 \checkmark CA$ Q (151,32° ; -0,96) (3)	1A obtuse angle 1M substit. for y_Q 1CA value for y_Q
4.4	$h(x) = \cos(x + 75^\circ) \checkmark CA \checkmark A$ (2)	1CA (see Q 4.1.2) 1A correct equation
4.5.1	$f(x) > g(x) \checkmark A$ $x \in (-28,68^\circ ; 151,32^\circ) \checkmark CA \checkmark CA \checkmark A$ OR $-28,68^\circ < x < 151,32^\circ$ $\checkmark CA$ (4)	1A simplification 2CA end points 1A correct notation
4.5.2	$x \in [-135^\circ ; 0^\circ] \checkmark A$ or $x \in [45^\circ ; 180^\circ] \checkmark CA \checkmark A$ OR $-135^\circ \leq x \leq 0^\circ$ or $45^\circ \leq x \leq 180^\circ$ (4)	1CA interval 1A correct notation 1CA interval 1A correct notation
4.5.3	$x \in (-90^\circ ; -45^\circ) \checkmark A \checkmark A$ OR $-90^\circ < x < -45^\circ$ (2)	1A end values 1A correct notation

2018 KwaZulu Natal Preliminary Paper 2 Q 6

6.1



- ✓ A shape of f
- ✓ A shape of g
- ✓✓ A A asymptotes
- ✓ A x -intercepts of f
- ✓ A Turning points of f
- ✓ A x -intercepts of g

- ✓ A 3 intersection points

(8)

6.2	the graphs intersect at A, B and C. At A we have $x = 34^\circ$, at C we have $x = 90^\circ$ and by using symmetry we get at B, $x = 180^\circ - 34^\circ = 146^\circ$.	✓ A using symmetry ✓ A answer	(2)
		Answer only full marks	[10]

2014 Exemplar Paper 2 Q 6

6.1	$b = \frac{1}{2}$	✓ value of b	(1)
6.2	$A(30^\circ; 1)$	✓ 30° ✓ 1	(2)
6.3	$x = 160^\circ$	✓ $x = 160^\circ$	(1)
6.4	$h(x) = 2\cos(x - 30^\circ) + 1$ $y \in [-1; 3]$ OR $-1 \leq y \leq 3$	✓ critical values ✓ notation	(2)
			[6]

2011 November Paper 2 Q 10

10.1	$f(225^\circ) = 2$ $\therefore a \tan 225^\circ = 2 \quad \therefore a = 2$ $g(0) = 4$ $\therefore b \cos 0^\circ = 4 \quad \therefore b = 4$ Answer only: Full marks	$\checkmark$ substitution $\checkmark a = 2$ $\checkmark$ substitution $\checkmark b = 4$ (4)
10.2	Minimum value of $g(x) + 2 = -4 + 2 = -2$ Answer only: Full marks	$\checkmark -4$ $\checkmark -2$ (2)
10.3	Period = $\frac{180^\circ}{\frac{1}{2}} = 360^\circ$ Answer only: Full marks	$\checkmark \frac{180^\circ}{\frac{1}{2}}$ $\checkmark 360^\circ$ (2)
10.4	At P $f(\theta) = g(\theta)$ $2 \tan \theta = 4 \cos \theta$ for $180^\circ - \theta$: $2 \tan (180^\circ - \theta) = -2 \tan \theta$ and $4 \cos (180^\circ - \theta) = -4 \cos \theta$ $2 \tan \theta = 4 \cos \theta$ at P $\therefore -2 \tan \theta = -4 \cos \theta$ $\therefore 2 \tan (180^\circ - \theta) = 4 \cos (180^\circ - \theta)$ at Q OR $2 \tan \theta = 4 \cos \theta$ $\frac{\sin \theta}{\cos \theta} = 2 \cos \theta$ $\sin \theta = 2 \cos^2 \theta$ $= 2(1 - \sin^2 \theta)$	$\checkmark 2 \tan \theta = 4 \cos \theta$ $\checkmark 2 \tan (180^\circ - \theta) = -2 \tan \theta$ $\checkmark 4 \cos (180^\circ - \theta) = -4 \cos \theta$ $\checkmark 2 \tan (180^\circ - \theta) = 4 \cos (180^\circ - \theta)$ (4)
	$2 \tan \theta = 4 \cos \theta$ $\frac{\sin \theta}{\cos \theta} = 2 \cos \theta$ $\sin \theta = 2 \cos^2 \theta$ $= 2(1 - \sin^2 \theta)$	$\checkmark$ equation

$2 \sin^2 \theta + \sin \theta - 2 = 0$ $\sin \theta = \frac{-1 \pm \sqrt{1 - 4(2)(-2)}}{4}$ $\sin \theta = 0,78077...$ $\theta = 51,33^\circ \text{ or } 128,67^\circ$ $\therefore \text{the } x\text{-coordinate of Q is } 180^\circ - x_p$	$\checkmark \sin \theta = 0,78077...$ $\checkmark 51,33^\circ$ $\checkmark 128,67^\circ \quad (4)$
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2019 Eastern Cape November Paper 2 Q 6

6.1		f $\checkmark$ turning pts/draaipunte $\checkmark$ x-intercepts/x-afsnitte $\checkmark$ y-intercept / y-afsnit g : $\checkmark$ intercepts / afsnitte $\checkmark$ turning pts/draaipunte $\checkmark$ shape / vorm	(6)
6.2.1	$x = 0^\circ$	$\checkmark$ answer/antwoord	(1)
6.2.2	$x \in [-90^\circ; 90^\circ]$ OR/OR $-90^\circ \leq x \leq 90^\circ$	$\checkmark \checkmark$ interval end points / interval eindpunte	(2)
6.2.3	$x \in (0^\circ; 45^\circ)$ OR/OR $0^\circ < x < 45^\circ$ $x \in (135^\circ; 180^\circ)$ OR/OR $135^\circ < x < 180^\circ$	$\checkmark$ answer/antwoord $\checkmark$ answer/antwoord	(2)
6.3	$h(x) = 2\cos(x - 30^\circ)$	$\checkmark$ positive cos / positiewe cos $\checkmark (x - 30^\circ)$	(2)

