# Penyelesaian Lengkap

## Praktis 6

### Praktis Formatif

**1** (a) $245° = 245° \times \dfrac{\pi \text{ rad}}{180°}$

$= 4.276 \text{ rad}$

(b) $-145° = -145° \times \dfrac{\pi \text{ rad}}{180°}$

$= -2.531 \text{ rad}$

(c) $750° = 750° \times \dfrac{\pi \text{ rad}}{180°}$

$= 13.090 \text{ rad}$

**2** (a) $-0.5\pi \text{ rad} = -0.5\pi \text{ rad} \times \dfrac{180°}{\pi \text{ rad}}$

$= -90°$

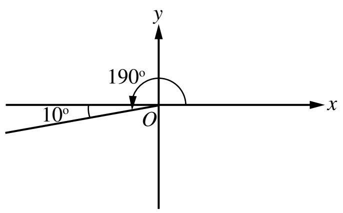
(b) $\dfrac{7}{2}\pi \text{ rad} = \dfrac{7}{2}\pi \text{ rad} \times \dfrac{180°}{\pi \text{ rad}}$

$= 630°$

(c) $1.6 \text{ rad} = 1.6 \text{ rad} \times \dfrac{180°}{\pi \text{ rad}}$

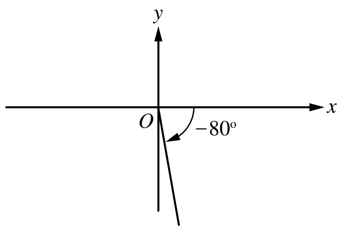
$= 91.7°$

**3** (a) 190°



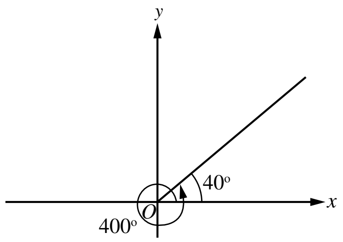

Sudut rujukan/*Reference angle* = 10°

(b) −80°




Sudut rujukan/*Reference angle* = 80°

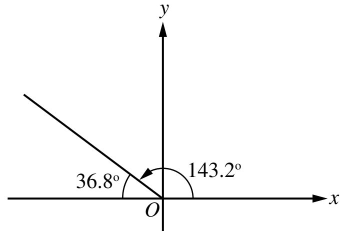
(c) 400°




Sudut rujukan/*Reference angle* = 40°

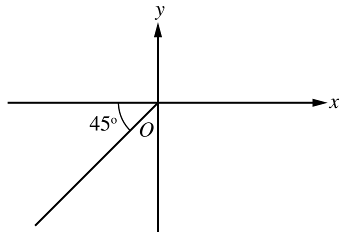
(d) $\dfrac{5}{2} \text{ rad} = \dfrac{5}{2} \text{ rad} \times \dfrac{180°}{\pi \text{ rad}}$

$= 143.2°$



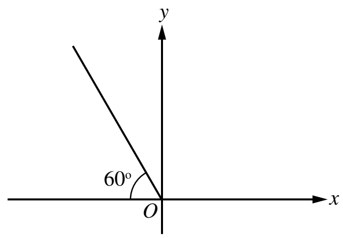

Sudut rujukan/*Reference angle* = 36.8°

**4** (a) 45°, Sukuan/*Quadrant* III



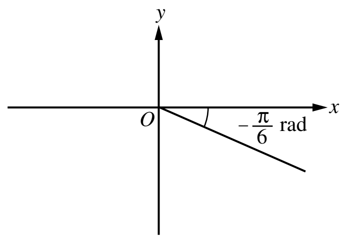

180° + 45° = 225°
225° + 360° = 585°
−(180° − 45°) = −135°
−135° − 360° = −495°

(b) 60°, Sukuan/*Quadrant* II




180° − 60° = 120°
120° + 360° = 480°
−(180° + 60°) = −240°
−240° − 360° = −600°

(c) $\dfrac{\pi}{6}$ rad, Sukuan/*Quadrant* IV



$\left(2\pi - \frac{\pi}{6}\right) = \text{rad} = \frac{11\pi}{6}$ rad

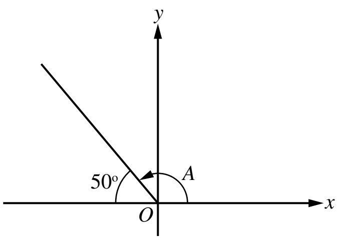
$\left(\frac{11\pi}{6} + 2\pi\right)$ rad $= \frac{23\pi}{6}$ rad

$-\frac{\pi}{6}$ rad

$\left(-\frac{\pi}{6} - 2\pi\right)$ rad $= -\frac{13\pi}{6}$ rad

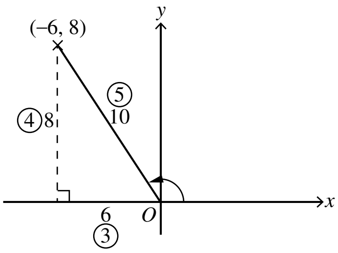
**5** $840° = n(360°) + 120°$
$n = 2$, Sukuan/*Quadrant* II

**6**




$180° - 50° = 130°$
$A = 130°, 130° - 360°$
$= 130°, -230°$

**7** (a)

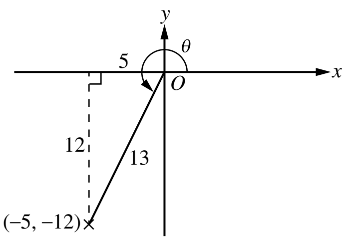



(i) $\sin \theta = \frac{4}{5}$

(ii) kos/*cos* $\theta = -\frac{3}{5}$

(iii) $\tan \theta = -\frac{4}{3}$

(b)

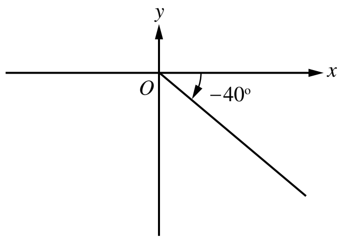



(i) sek/*sec* $\theta = -\frac{13}{5}$

(ii) kosek/*cosec* $\theta = -\frac{13}{12}$

(iii) kot/*cot* $\theta = \frac{5}{12}$

(c)



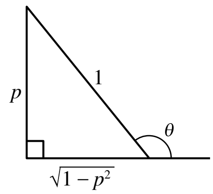

(i) $\sin(-40°) = -\sin 40°$
$= -0.6428$

(ii) kos/*cos* $(-40°) =$ kos $40°$/*cos* $40°$
$= 0.7660$

(iii) kot/*cot* $(-40°) = \frac{1}{\tan(-40°)}$
$= -1.1918$

**8** $\theta$ ialah sudut cakah, maka hanya $\sin \theta$ positif.
*$\theta$ is an obtuse angle, therefore only $\sin \theta$ is positive.*

$\sin \theta = p$ kos/*cos* $\theta = -\sqrt{1 - p^2}$ $\tan \theta = -\frac{p}{\sqrt{1 - p^2}}$



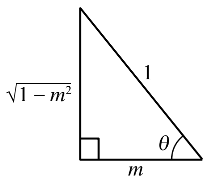

(a) $\tan(-\theta) = -\tan \theta$
$= \frac{p}{\sqrt{1 - p^2}}$

(b) $\sin(-\theta) = -\sin \theta$
$= -p$

(c) sek $(-\theta) = \frac{1}{\text{kos}(-\theta)}$
$= \frac{1}{\text{kos}(\theta)}$
$= -\frac{1}{\sqrt{1 - p^2}}$

*sec* $(-\theta) = \frac{1}{\cos(-\theta)}$
$= \frac{1}{\cos(\theta)}$
$= -\frac{1}{\sqrt{1 - p^2}}$

**9** (a) kos/*cos* $(-\theta) =$ kos/*cos* $\theta$
$= m$




(b) kos/*cos* $(90° - \theta)$
$= \sin \theta$ (sudut pelengkap/*complementary angles*)
$= \sqrt{1 - m^2}$

(c) kos $(180° - \theta)$/*cos* $(180° - \theta)$
$= -$kos $\theta$ (sudut penggenap)
$-$*cos* $\theta$ (*supplementary angle*)
$= -m$

**10** (a) $A = 90° - 47°$
$= 43°$

(b) $20° + A = 90° - 36°$
$A = 54° - 20°$
$= 34°$

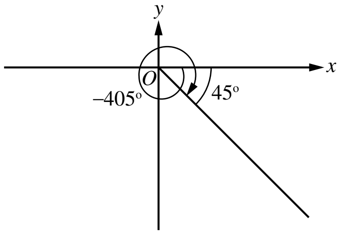
(c) $A - 25° = 90° - 15°$
$A = 75° + 25°$
$= 100°$

**11** (a) sek $(-405°) =$ sek $(-45°)$ $\quad$ *sec* $(-405°) =$ *sec* $(-45°)$

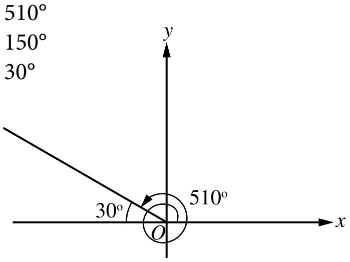
$= \dfrac{1}{\text{kos}\,(-45°)}$ $\quad$ $= \dfrac{1}{cos\,(-45°)}$

$= \dfrac{1}{\text{kos}\,(45°)}$ $\quad$ $= \dfrac{1}{cos\,(45°)}$

$= \sqrt{2}$ $\quad$ $= \sqrt{2}$




(b) $\sin\left(\dfrac{17\pi}{6}\right) = \sin 510°$
$= \sin 150°$
$= \sin 30°$
$= \dfrac{1}{2}$




(c) kot 1 140° $\quad$ *cot* 1 140°
= kot [3(360°) + 60°] $\quad$ = *cot* [3(360°) + 60°]
= kot 60° $\quad$ = *cot* 60°

$= \dfrac{1}{\tan\,(60°)}$ $\quad$ $= \dfrac{1}{tan\,(60°)}$

$= \dfrac{1}{\sqrt{3}}$ $\quad$ $= \dfrac{1}{\sqrt{3}}$

**12** (a) kos/*cos* $A = \dfrac{\sin A}{\tan A}$
$= \dfrac{0.7547}{1.150}$
$= 0.6563$

(b) sek $A = \dfrac{1}{\text{kos}\,A}$

*sec* $A = \dfrac{1}{cos\,A}$

$= \dfrac{1}{0.6563}$
$= 1.5237$

**13** (a) 2 sin 390° kot 225° – sin 90° kos 0
2 *sin* 390° *cot* 225° – *sin* 90° *cos* 0

$= 2 \sin 30° \dfrac{1}{\tan 225°} - (1)(1)$

$= 2\left(\dfrac{1}{2}\right)\left(\dfrac{1}{\tan 45°}\right) - 1$

$= 1 - 1$
$= 0$

(b) $\dfrac{\text{kot } 60° + \tan\,(-120°)}{\text{kos}^2\, 45°}$

$\dfrac{cot\ 60° + tan\,(-120°)}{cos^2\, 45°}$

$= \dfrac{\dfrac{1}{\tan 60°} + \tan 60°}{\left(\dfrac{1}{\sqrt{2}}\right)^2}$

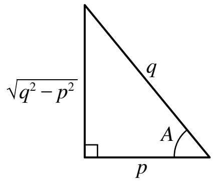
$= \left(\dfrac{1}{\sqrt{3}} + \sqrt{3}\right) \div \dfrac{1}{2}$

$= \left(\dfrac{1+3}{\sqrt{3}}\right) \times 2$

$= \dfrac{8\sqrt{3}}{3}$

**14** kos/*cos* $A = \dfrac{p}{q}$, Sukuan/*Quadrant* IV

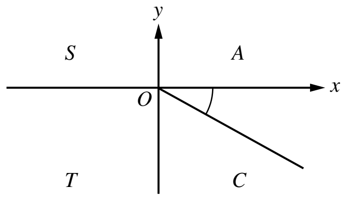
$\sin A = -\dfrac{\sqrt{q^2 - p^2}}{q}$ $\quad$ $\tan A = -\dfrac{\sqrt{q^2 - p^2}}{p}$




(a) $\sin(-A) = -\sin A$
$= \dfrac{\sqrt{q^2 - p^2}}{q}$

(b) $\tan A = -\dfrac{\sqrt{q^2 - p^2}}{p}$

**15** sek/*sec* $A = p$ $\quad$ $\sin B = -q$

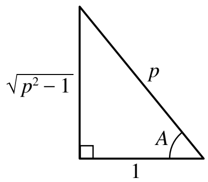



$\dfrac{1}{\text{kos}/cos\ A} = p$

kos/*cos* $A = \dfrac{1}{p}$

$\sin A = -\dfrac{\sqrt{p^2 - 1}}{p}$

$\tan A = -\sqrt{p^2 - 1}$




(a) $\sin A + \sin B = \left(-\dfrac{\sqrt{p^2 - 1}}{p}\right) + (-q)$

$= -\left(\dfrac{\sqrt{p^2 - 1} + pq}{p}\right)$

(b) kosek$^2$ $B$ – kot $A$
*cosec*$^2$ $B$ – *cot* $A$

$= \dfrac{1}{\sin^2 B} - \dfrac{1}{\tan A}$

$$= \frac{1}{(-q)^2} - \frac{1}{-\sqrt{p^2-1}}$$
$$= \frac{\sqrt{p^2-1} + q^2}{q^2\sqrt{p^2-1}}$$

**16**

| **Fungsi/*Function*** | (i) | (ii) | (iii) | (iv) | (v) |
|---|---|---|---|---|---|
| (a) $y = 3 \sin x - 1$ | 3 | 1 | 360° | $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$ | – |
| (b) $y = \text{kos } x + 2$<br>$y = \cos x + 2$ | 1 | 1 | 360° | $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$ | – |
| (c) $y = -3 \text{ kos } 2x + 4$<br>$y = -3 \cos 2x + 4$ | 3 | 2 | 180° | $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$ | – |
| (e) $y = 2 - 3 \tan 2x$ | – | 4 | 90 | $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$ | 45°, 135°, 225°, 315° |

**17** (a) $y = \text{kos } 3x - \frac{1}{2}$

$y = \cos 3x - \frac{1}{2}$

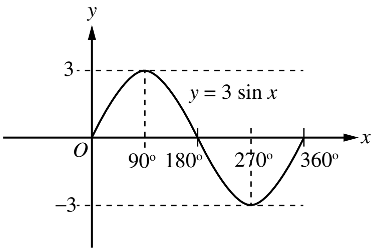
(b) $y = |2 \sin 2x| - 1$

(c) $y = -|\tan 2x| + 2$

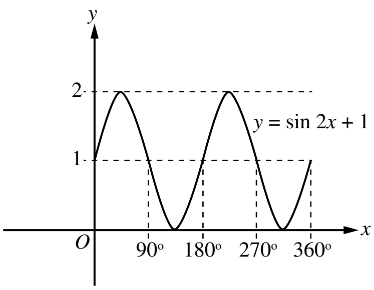
(d) $y = 2 \text{ kos } x$

$y = 2 \cos x$

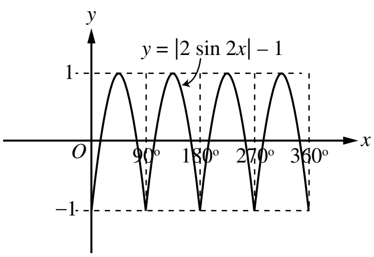
**18** (a) $y = 3 \sin x$



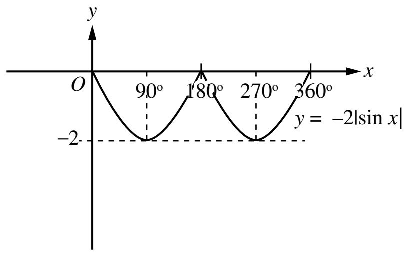

(b) $y = \sin 2x + 1$




(c) $y = |2 \sin 2x| - 1$

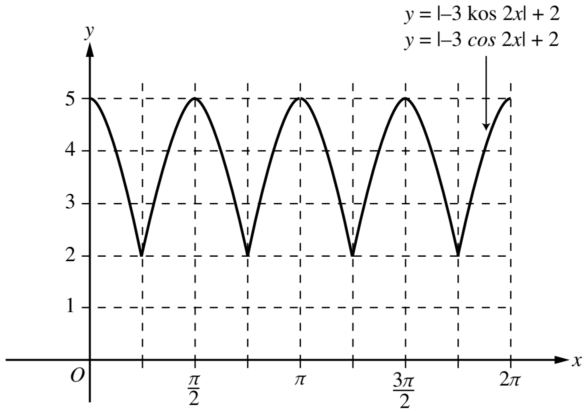



(d) $y = -2\,|\sin x|$

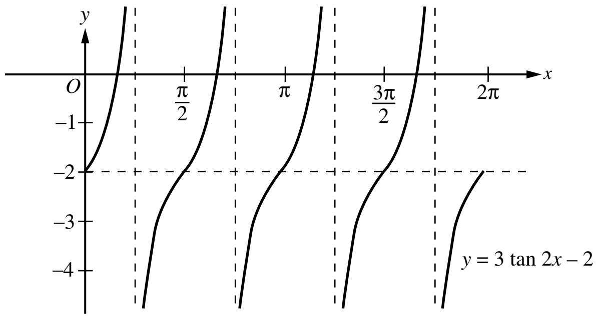



(e) $y = |-3 \text{ kos } 2x| + 2$

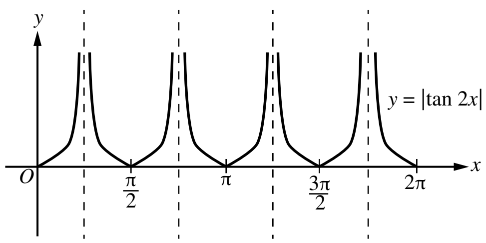
$y = |-3 \cos 2x| + 2$



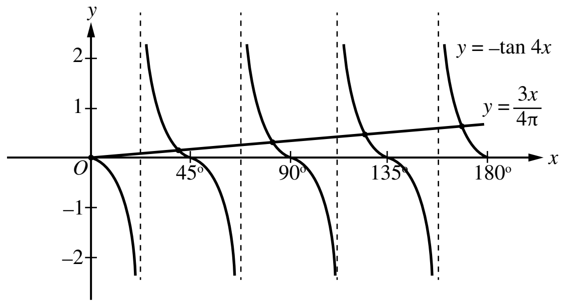

(f) $y = 3 \tan 2x - 2$




(g) $y = |\tan 2x|$



**19**




$\dfrac{3x}{\pi} = -4 \tan 4x$

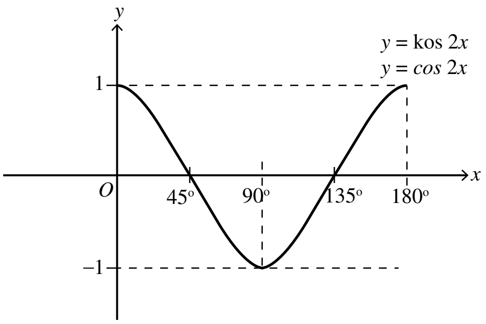
$\dfrac{3x}{4\pi} = -\tan 4x$

$y = \dfrac{3x}{4\pi}$

| $x$ | 0 | $\pi$ |
|---|---|---|
| $y$ | 0 | 0.75 |

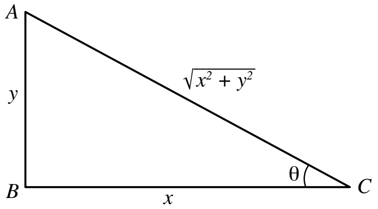
Bilangan penyelesaian/*Number of solutions* = 5

**20**




Julat/*Range* = $45° < x < 135°$

**21**




$\sin\theta = \dfrac{y}{\sqrt{x^2+y^2}}$   kosek/*cosec* $\theta = \dfrac{\sqrt{x^2+y^2}}{y}$

kosek/*cos* $\theta = \dfrac{x}{\sqrt{x^2+y^2}}$   sek/*sec* $\theta = \dfrac{\sqrt{x^2+y^2}}{x}$

$\tan\theta = \dfrac{y}{x}$   kot/*cot* $\theta = \dfrac{x}{y}$

(a) $\sin^2\theta + \text{kos}^2\theta/\cot^2\theta = \left(\dfrac{y}{\sqrt{x^2+y^2}}\right)^2 + \left(\dfrac{x}{\sqrt{x^2+y^2}}\right)^2$

$= \dfrac{y^2+x^2}{x^2+y^2}$

$= 1$ (Terbukti/*Proven*)

(b) $1 + \tan^2\theta = 1 + \left(\dfrac{y}{x}\right)^2$

$= \left(\dfrac{x^2+y^2}{x^2}\right)$

$= \left(\dfrac{\sqrt{x^2+y^2}}{x}\right)^2$

$= \text{sek}^2/\sec^2\theta$ (Terbukti/*Proven*)

(c) $1 + \text{kot}^2\theta/\cot^2\theta = 1 + \left(\dfrac{x}{y}\right)^2$

$= \left(\dfrac{y^2+x^2}{y^2}\right)$

$= \left(\dfrac{\sqrt{x^2+y^2}}{y}\right)^2$

$= \text{kosek}^2\theta/\text{cosec}^2\theta$ (Terbukti/*Proven*)

**22** (a) (sek 35° – tan 35°)(sek 35° + tan 35°)

$= \text{sek}^2 35° - \tan^2 35°$

(*sec* 35° – *tan* 35°)(*sec* 35° + *tan* 35°) = $sec^2 35° - tan^2 35°$

$= 1 + \tan^2 35° - \tan^2 35°$

$= 1$

(b) $\text{kosek}^2(410°) - \text{kot}^2(410°) = 1 + \text{kot}^2(410°) - \text{kot}^2(410°) = 1$

$cosec^2(410°) - cot^2(410°) = 1 + cot^2(410°) - cot^2(410°)$

$= 1$

**23** (a) kot $x$ (kot $x$ – tan $x$)   *cot x (cot x – tan x)*

$= \text{kot}^2 x - \text{kot}\, x \tan x$   $= cot^2 x - cot\, x\, tan\, x$

$= \text{kosek}^2 x - 1 - 1$   $= cosec^2 x - 1 - 1$

$= \text{kosek}^2 x - 2$   $= cosec^2 x - 2$

(b) (sek $x$ – tan $x$)(kosek $x$ + 1)

$= \left(\dfrac{1}{\text{kos}\,x} - \dfrac{\sin x}{\text{kos}\,x}\right)\left(\dfrac{1}{\sin x} + 1\right)$

$= \left(\dfrac{1-\sin x}{\text{kos}\,x}\right)\left(\dfrac{1+\sin x}{\sin x}\right)$

$= \dfrac{1-\sin^2 x}{\text{kos}\,x \sin x}$

$= \dfrac{\text{kos}^2 x}{\text{kos}\,x \sin x}$

$= \dfrac{\text{kos}\,x}{\sin x}$

$= \text{kot}\,x$

(*sec x – tan x*)(*cosec x* + 1)

$= \left(\dfrac{1}{cos\,x} - \dfrac{sin\,x}{cos\,x}\right)\left(\dfrac{1}{sin\,x} + 1\right)$

$= \left(\dfrac{1-sin\,x}{cos\,x}\right)\left(\dfrac{1+sin\,x}{sin\,x}\right)$

$= \dfrac{1-sin^2 x}{cos\,x\,sin\,x}$

$= \dfrac{cos^2 x}{cos\,x\,sin\,x}$

$= \dfrac{cos\,x}{sin\,x}$

$= cot\,x$

(c) $\text{kot}^2 x - \text{kos}^2 x$

$= \dfrac{\text{kos}^2 x}{\sin^2 x} - \text{kos}^2 x$

$= \dfrac{\text{kos}^2 x - \text{kos}^2 x \sin^2 x}{\sin^2 x}$

$= \dfrac{\text{kos}^2 x(1 - \sin^2 x)}{\sin^2 x}$
$= \text{kot}^2 x \,\text{kos}^2 x$
*$\cot^2 x - \cos^2 x$*
$= \dfrac{\cos^2 x}{\sin^2 x} - \cos^2 x$
$= \dfrac{\cos^2 x - \cos^2 x \sin^2 x}{\sin^2 x}$
$= \dfrac{\cos^2 x(1 - \sin^2 x)}{\sin^2 x}$
$= \cot^2 x \cos^2 x$

(d) $(\text{kosek } x - \text{kot } x)^2$
$= \left(\dfrac{1}{\sin x} - \dfrac{\text{kos } x}{\sin x}\right)^2$
$= \dfrac{(1 - \text{kos } x)^2}{\sin^2 x}$
$= \dfrac{(1 - \text{kos } x)^2}{1 - \text{kos}^2 x}$
$= \dfrac{(1 - \text{kos } x)^2}{(1 - \text{kos } x)(1 + \text{kos } x)}$
$= \dfrac{1 - \text{kos } x}{1 + \text{kos } x}$

*$(\text{cosec } x - \cot x)^2$*
$= \left(\dfrac{1}{\sin x} - \dfrac{\cos x}{\sin x}\right)^2$
$= \dfrac{(1 - \cos x)^2}{\sin^2 x}$
$= \dfrac{(1 - \cos x)^2}{1 - \cos^2 x}$
$= \dfrac{(1 - \cos x)^2}{(1 - \cos x)(1 + \cos x)}$
$= \dfrac{1 - \cos x}{1 + \cos x}$

(e) $\text{kosek } x - \text{kot } x$
$= \dfrac{1}{\sin x} - \dfrac{\text{kos } x}{\sin x}$
$= \dfrac{1 - \text{kos } x}{\sin x}$
$= \dfrac{(1 - \text{kos } x) \sin x}{\sin^2 x}$
$= \dfrac{(1 - \text{kos } x) \sin x}{1 - \text{kos}^2 x}$
$= \dfrac{(1 - \text{kos } x) \sin x}{(1 + \text{kos } x)(1 - \text{kos } x)}$
$= \dfrac{\sin x}{1 + \text{kos } x}$

*$\text{cosec } x - \cot x$*
$= \dfrac{1}{\sin x} - \dfrac{\cos x}{\sin x}$
$= \dfrac{1 - \cos x}{\sin x}$
$= \dfrac{(1 - \cos x) \sin x}{\sin^2 x}$
$= \dfrac{(1 - \cos x) \sin x}{1 - \cos^2 x}$
$= \dfrac{(1 - \cos x) \sin x}{(1 + \cos x)(1 - \cos x)}$
$= \dfrac{\sin x}{1 + \cos x}$

(f) $(\sin x + \text{kos } x)(1 - \sin x \text{ kos } x)$
$= \sin x - \sin^2 x \text{ kos } x + \text{kos } x - \sin x \text{ kos}^2 x$
$= \sin x (1 - \text{kos}^2 x) + \text{kos } x (1 - \sin^2 x)$
$= \sin x (\sin^2 x) + \text{kos } x (\text{kos}^2 x)$
$= \sin^3 x + \text{kos}^3 x$
*$(\sin x + \cos x)(1 - \sin x \cos x)$*
$= \sin x - \sin^2 x \cos x + \cos x - \sin x \cos^2 x$
$= \sin x (1 - \cos^2 x) + \cos x (1 - \sin^2 x)$
$= \sin x (\sin^2 x) + \cos x (\cos^2 x)$
$= \sin^3 x + \cos^3 x$

**24** (a) $\text{kos}^2 A$
*$\cos^2 A$*
$= 1 - \sin^2 x$
$= 1 - p^2$

(b) $\text{sek}^2 A \text{ kosek}^2$
$= \dfrac{1}{\text{kos}^2 x}\left(\dfrac{1}{\sin^2 x}\right)$
$= \dfrac{1}{p^2(1 - p^2)}$

*$\sec^2 A \text{ cosec}^2 A$*
$= \dfrac{1}{\cos^2 x}\left(\dfrac{1}{\sin^2 x}\right)$
$= \dfrac{1}{p^2(1 - p^2)}$

**25** $\sin^2 x + 4 \text{ kos } x + 2$
$= 1 - \text{kos}^2 x + 4 \text{ kos } x + 2$
$= 3 - (\text{kos}^2 x - 4 \text{ kos } x)$
$= 3 - [(\text{kos } x - 2)^2 - 4]$
$= 3 - (\text{kos } x - 2)^2 + 4$
$= 7 - (\text{kos } x - 2)^2$

*$\sin^2 x + 4 \cos x + 2$*
$= 1 - \cos^2 + 4 \cos x + 2$
$= 3 - (\cos^2 - 4 \cos x)$
$= 3 - [(\cos x - 2)^2 - 4]$
$= 3 - (\cos x - 2)^2 + 4$
$= 7 - (\cos x - 2)^2$

Diketahui bahawa $-1 \leqslant \text{kos } x \leqslant 1$.
*It is known that $-1 \leqslant \cos x \leqslant 1$.*
Minimum: $\sin^2 x + 4$ kos/*cos* $x + 2$
$= 7 - (-1 - 2)^2$
$= 7 - 9$
$= -2$
Maksimum/*Maximum*: $\sin^2 x + 4$ kos/*cos* $x + 2$
$= 7 - (1 - 2)^2$
$= 7 - 1$
$= 6$

**26** $(3 + 2 \sin x)^2 + (3 - 2 \sin x)^2 + 8 \text{ kos}^2 x$
$= 9 + 12 \sin x + 4 \sin^2 x + 9 - 12 \sin x + 4 \sin^2 x + 8 \text{ kos}^2 x$
$= 18 + 8 \sin^2 x + 8 \text{ kos}^2 x$
$= 18 + 8(\sin^2 x + \text{kos}^2 x)$
$= 18 + 8$
$= 26$
*$(3 + 2 \sin x)^2 + (3 - 2 \sin x)^2 + 8 \cos^2 x$*
$= 9 + 12 \sin x + 4 \sin^2 x + 9 - 12 \sin x + 4 \sin^2 x + 8 \cos^2 x$
$= 18 + 8 \sin^2 x + 8 \cos^2 x$
$= 18 + 8(\sin^2 x + \cos^2 x)$
$= 18 + 8$
$= 26$

**27** (a) $\sin 75° = \sin (30° + 45)$
$= \sin 30° \text{ kos } 45° + \sin 45° \text{ kos } 30°$
*$\sin 30° \cos 45° + \sin 45° \cos 30°$*
$= \dfrac{1}{2}\left(\dfrac{1}{\sqrt{2}}\right) + \dfrac{1}{\sqrt{2}}\left(\dfrac{\sqrt{3}}{2}\right)$
$= \dfrac{1 + \sqrt{3}}{2\sqrt{2}}$

(b) kos 105°/*cos* 105°
$= \text{kos } (60° + 45°)/\cos (60° + 45°)$
$= \text{kos } 60° \text{ kos } 45° - \sin 60° \sin 45°$
*$\cos 60° \cos 45° - \sin 60° \sin 45°$*
$= \dfrac{1}{2}\left(\dfrac{1}{\sqrt{2}}\right) - \dfrac{\sqrt{3}}{2}\left(\dfrac{1}{\sqrt{2}}\right)$
$= \dfrac{1 - \sqrt{3}}{2\sqrt{2}}$

(c) $\tan 210° = \tan (180° + 30°)$
$= \dfrac{\tan 180° + \tan 30°}{1 - \tan 180° \tan 30°}$
$= \dfrac{0 + \dfrac{1}{\sqrt{3}}}{1 - 0\left(\dfrac{1}{\sqrt{3}}\right)}$
$= \dfrac{1}{\sqrt{3}}$

(d) kos 15°
$= \text{kos } (60° - 45°)$
$= \text{kos } 60° \text{ kos } 45° + \sin 60° \sin 45°$
$= \dfrac{1}{2}\left(\dfrac{1}{\sqrt{2}}\right) + \dfrac{\sqrt{3}}{2}\left(\dfrac{1}{\sqrt{2}}\right)$

$= \frac{1 + \sqrt{3}}{2\sqrt{2}}$

*cos* 15°

$= cos\ (60° - 45°)$

$= cos\ 60°\ cos\ 45° + sin\ 60°\ sin\ 45°$

$= \frac{1}{2}\left(\frac{1}{\sqrt{2}}\right) + \frac{\sqrt{3}}{2}\left(\frac{1}{\sqrt{2}}\right)$

$= \frac{1 + \sqrt{3}}{2\sqrt{2}}$

(e) $\sin(-15°) = \sin(45° - 60°)$

$= \sin 45° \text{ kos } 60° - \sin 60° \text{ kos } 45°$

*sin* 45° *cos* 60° – *sin* 45° *cos* 60°

$= \frac{1}{\sqrt{2}}\left(\frac{1}{2}\right) - \frac{\sqrt{3}}{2}\left(\frac{1}{\sqrt{2}}\right)$

$= \frac{1 - \sqrt{3}}{2\sqrt{2}}$

(f) $\tan 300° = \tan(360° - 60°)$

$= \frac{\tan 360° - \tan 60°}{1 + \tan 360° \tan 60°}$

$= \frac{0 - \sqrt{3}}{1 + 0(\sqrt{3})}$

$= -\sqrt{3}$

**28** (a) sin 39° kos/*cos* 21° + sin 21° kos/*cos* 39°

$= \sin(39° + 21°)$

$= \sin 60°$

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

(b) kos 190° kos 125° – sin 190° sin 125°

= kos (190° + 125°)

= kos (315°)

= kos 45°

$= \frac{1}{\sqrt{2}}$

*cos* 190° *cos* 125° – *sin* 190° *sin* 125°

= *cos* (190° + 125°)

= *cos* 315°

= *cos* 45°

$= \frac{1}{\sqrt{2}}$

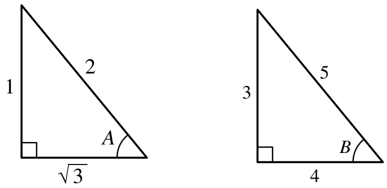
(c) $\frac{\tan 100° + \tan 140°}{1 - \tan 100° \tan 140°} = \tan(100° + 140°)$

$= \tan 240°$

$= \tan 60°$

$= \sqrt{3}$

**29** (a)




sin (*A* + *B*) = sin *A* kos *B* + sin *B* kos *A*

*sin* (*A* + *B*) = *sin A cos B* + *sin B cos A*

$= \frac{1}{2}\left(\frac{4}{5}\right) + \frac{3}{5}\left(\frac{\sqrt{3}}{2}\right)$

$= \frac{4 + 3\sqrt{3}}{10}$

(b) kos (*A* + *B*) = kos *A* kos *B* – sin *A* sin *B*

*cos* (*A* + *B*) = *cos A cos B* – *sin A sin B*

$= \frac{\sqrt{3}}{2}\left(\frac{4}{5}\right) - \frac{1}{2}\left(\frac{3}{5}\right)$

$= \frac{4\sqrt{3} - 3}{10}$

(c) $\tan(B - A) = \frac{\tan B - \tan A}{1 + \tan B \tan A}$

$= \left(\frac{3}{4} - \frac{1}{\sqrt{3}}\right) \div \left[1 + \frac{3}{4}\left(\frac{1}{\sqrt{3}}\right)\right]$

$= \frac{3\sqrt{3} - 4}{4\sqrt{3}} \times \frac{4\sqrt{3}}{4\sqrt{3} + 3}$

$= \frac{3\sqrt{3} - 4}{4\sqrt{3} + 3}$

$= \frac{(3\sqrt{3} - 4)(4\sqrt{3} - 3)}{16(3) - 9}$

$= \frac{12(3) - 9\sqrt{3} - 16\sqrt{3} + 12}{39}$

$= \frac{48 - 25\sqrt{3}}{39}$

**30** (a) 2 sin 22.5° kos 22.5°

2 *sin* 22.5° *cos* 22.5°

$= \sin 2(22.5°)$

$= \sin 45°$

$= \frac{1}{\sqrt{2}}$

(b) $\text{kos}^2 15° - \sin^2 15°$ | $cos^2 15° - sin^2 15°$

= kos 2(15°) | = *cos* 2(15°)

= kos 30° | = *cos* 30°

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

(c) $1 - 2\sin^2 75°$ | $1 - 2\,sin^2 75°$

= kos 2(75°) | = *cos* 2(75°)

= kos 150° | = *cos* 150°

= – kos 30° | = – *cos* 30°

$= -\frac{\sqrt{3}}{2}$ | $= = -\frac{\sqrt{3}}{2}$

(d) $\frac{2 \tan 165°}{1 - \tan^2 165°} = \tan 2(165°)$

$= \tan 330°$

$= -\tan 30°$

$= -\frac{1}{\sqrt{3}}$

**31** (a) tan *x* – kot *x* | *tan x* – *cot x*

$= \tan x - \frac{1}{\tan x}$ | $= tan\ x - \frac{1}{tan\ x}$

$= \frac{\tan^2 x - 1}{\tan x}$ | $= \frac{tan^2 x - 1}{tan\ x}$

$= \frac{-2(\tan^2 x - 1)}{-2 \tan x}$ | $= \frac{-2(tan^2 x - 1)}{-2\ tan\ x}$

$= \frac{-2(1 - \tan^2 x)}{2 \tan x}$ | $= \frac{-2(1\ tan^2 x)}{2\ tan\ x}$

= – 2 kot 2*x* | = –2 *cot* 2*x*

(b) (2 sin *x* – kosek *x*)(tan 2*x*)

$= \left(2 \sin x - \frac{1}{\sin x}\right)\left(\frac{2 \tan x}{1 - \tan^2 x}\right)$

$= \left(\dfrac{2\sin^2 x - 1}{\sin x}\right)\left(\dfrac{2\sin x}{\text{kos } x}\right) \div \left(1 - \dfrac{\sin^2 x}{\text{kos}^2 x}\right)$

$= \left(\dfrac{2\sin^2 x - 1}{\sin x}\right)\left(\dfrac{2\sin x}{\text{kos } x}\right)\left(\dfrac{\text{kos}^2 x}{\text{kos}^2 x - \sin^2 x}\right)$

$= (2\sin^2 x - 1)\left(\dfrac{2\,\text{kos } x}{\text{kos}^2 x - \sin^2 x}\right)$

$= -(1 - 2\sin^2 x)\left(\dfrac{2\,\text{kos } x}{\text{kos } 2x}\right)$

$= -(\text{kos } 2x)\left(\dfrac{2\,\text{kos } x}{\text{kos } 2x}\right)$

$= -2\,\text{kos } x$

*(2 sin x – cosec x)(tan 2x)*

$= \left(2\sin x - \dfrac{1}{\sin x}\right)\left(\dfrac{2\tan x}{1 - \tan^2 x}\right)$

$= \left(\dfrac{2\sin^2 x - 1}{\sin x}\right)\left(\dfrac{2\sin x}{\cos x}\right) \div \left(1 - \dfrac{\sin^2 x}{\cos^2 x}\right)$

$= \left(\dfrac{2\sin^2 x - 1}{\sin x}\right)\left(\dfrac{2\sin x}{\cos x}\right)\left(\dfrac{\cos^2 x}{\cos^2 x - \sin^2 x}\right)$

$= (2\sin^2 x - 1)\left(\dfrac{2\cos x}{\cos^2 x - \sin^2 x}\right)$

$= -(1 - 2\sin^2 x)\left(\dfrac{2\cos x}{\cos 2x}\right)$

$= -(\cos 2x)\left(\dfrac{2\cos x}{\cos 2x}\right)$

$= -2\cos x$

(c) $\dfrac{1}{\text{sek } x + 1} + \dfrac{1}{\text{sek } x - 1}$

$= \dfrac{\text{sek } x - 1 + \text{sek } x + 1}{\text{sek}^2 x - 1}$

$= \dfrac{2\,\text{sek } x}{\tan^2 x}$

$= \dfrac{2}{\text{kos } x\left(\dfrac{\sin^2 x}{\text{kos}^2 x}\right)}$

$= \dfrac{2}{\sin x\left(\dfrac{\sin x}{\text{kos } x}\right)}$

$= \dfrac{2}{\sin x \tan x}$

$= 2\,\text{kosek } x\,\text{kot } x$

$\dfrac{1}{\sec x + 1} + \dfrac{1}{\sec x - 1}$

$= \dfrac{\sec x - 1 + \sec x + 1}{\sec^2 x - 1}$

$= \dfrac{2\sec x}{\tan^2 x}$

$= \dfrac{2}{\cos x\left(\dfrac{\sin^2 x}{\cos^2 x}\right)}$

$= \dfrac{2}{\sin x\left(\dfrac{\sin x}{\cos x}\right)}$

$= \dfrac{2}{\sin x \tan x}$

$= 2\,\text{cosec } x \cot x$

(d) $\text{kosek } 2x - \tan x$

$= \dfrac{1}{\sin 2x} - \dfrac{\sin x}{\text{kos } x}$

$= \dfrac{1}{2\sin x\,\text{kos } x} - \dfrac{\sin x}{\text{kos } x}$

$= \dfrac{1 - 2\sin^2 x}{2\sin x\,\text{kos } x}$

$= \dfrac{\text{kos } 2x}{\sin 2x}$

$= \text{kot } 2x$

$\text{cosec } 2x - \tan x$

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

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

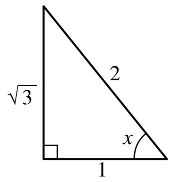
$= \dfrac{1 - 2\sin^2 x}{2\sin x \cos x}$

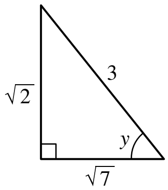
$= \dfrac{\cos 2x}{\sin 2x}$

$= \cot 2x$

**32** (a) Diberi kos $x = -\dfrac{1}{2}$, $\sin y = -\dfrac{\sqrt{2}}{3}$ dan kedua-dua sudut $x$ dan $y$ berada dalam Sukuan III.

*Given* $\cos x = -\dfrac{1}{2}$, $\sin y = -\dfrac{\sqrt{2}}{3}$ *and both angles x and y lie in Quadrant* III.




(i) $\tan 2x = \dfrac{2\tan x}{1 - \tan^2 x}$

$= \dfrac{2\sqrt{3}}{1 - (\sqrt{3})^2}$

$= \dfrac{2\sqrt{3}}{-2}$

$= -\sqrt{3}$

(ii) $\sin \dfrac{x}{2}$

$\text{kos } 2\left(\dfrac{x}{2}\right) = 1 - 2\sin^2\left(\dfrac{x}{2}\right)$

$\sin \dfrac{x}{2} = \sqrt{\dfrac{1 - \text{kos } x}{2}}$

$= \sqrt{\dfrac{1 + \frac{1}{2}}{2}}$

$= \sqrt{\dfrac{3}{4}}$

$= \dfrac{\sqrt{3}}{2}$

$\cos 2\left(\dfrac{x}{2}\right) = 1 - 2\sin^2\left(\dfrac{x}{2}\right)$

$\sin \dfrac{x}{2} = \sqrt{\dfrac{1 - \cos x}{2}}$

$= \sqrt{\dfrac{1 + \frac{1}{2}}{2}}$

$= \sqrt{\dfrac{3}{4}}$

$= \dfrac{\sqrt{3}}{2}$

(b) (i) kos $2x$/*cos* $2x$

$= 2\,\text{kos}^2 x - 1$

$2\cos^2 x - 1$

$= 2\left(\dfrac{7}{13}\right)^2 - 1$

$= -\dfrac{71}{169}$

(ii) kos/*cos* $4x$

$= 2\,\text{kos}^2/\cos^2 (2x) - 1$

$= 2\left(-\dfrac{71}{169}\right)^2 - 1$

$= -\dfrac{18\,479}{28\,561}$

**33** $\dfrac{\text{kos } 2A + 2\sin A - 1}{\text{kos } A - \frac{1}{2}\sin 2A}$

$= \dfrac{1 - 2\sin^2 A + 2\sin A - 1}{\text{kos } A - \frac{1}{2}(2\sin A\,\text{kos } A)}$

$= \dfrac{2\sin A\,(1 - \sin A)}{\text{kos } A\,(1 - \sin A)}$

$= 2\tan A$ (Terbukti/*Proven*)

**34** $\dfrac{\sin (A - B)}{\sin (A + B)} = \dfrac{2}{7}$

$\dfrac{\sin A\,\text{kos } B - \sin B\,\text{kos } A}{\sin A\,\text{kos } B + \sin B\,\text{kos } A} = \dfrac{2}{7},$

$7\sin A\,\text{kos } B - 7\sin B\,\text{kos } A = 2\sin A\,\text{kos } B + 2\sin B\,\text{kos } A$

$$\begin{aligned} 5 \sin A \text{ kos } B &= 9 \sin B \text{ kos } A \\ 5 \tan A &= 9 \tan B \\ \tan A &= \frac{9}{5} \tan B \\ k &= \frac{9}{5} \end{aligned}$$

$$\begin{aligned} 7 \sin A \cos B - 7 \sin B \cos A &= 2 \sin A \cos B + 2 \sin B \cos A \\ 5 \sin A \cos B &= 9 \sin B \cos A \\ 5 \tan A &= 9 \tan B \\ \tan A &= \frac{9}{5} \tan B \\ k &= \frac{9}{5} \end{aligned}$$

**35** $\sin 3(72°)$
$= \sin 216°$
$= \sin (180° + 36°)$
$= \sin 180° \text{ kos } 36° + \sin 36° \text{ kos } 180°$
$\quad \sin 180° \cos 36° + \sin 36° \cos 180°$
$= (0) \text{ kos } 36° + \sin 36° (-1)/(0) \cos 36° + \sin 36° (-1)$
$= -\sin 36°$
$= -\sin 144°$
$= -\sin 2(72°)$
$\therefore \sin 3x = -\sin 2x$ (Terbukti/*Proven*)
$\sin (2x + x) = -2 \sin x \text{ kos } x$
$\sin 2x \text{ kos } x + \sin x \text{ kos } 2x = -2 \sin x \text{ kos } x$

$$\begin{aligned} 2 \sin x \text{ kos}^2 x + \sin x (2 \text{ kos}^2 x - 1) + 2 \sin x \text{ kos } x &= 0 \\ \sin x (2 \text{ kos}^2 x + 2 \text{ kos}^2 x - 1 + 2 \text{ kos } x) &= 0 \\ \sin x (4 \text{ kos}^2 x + 2 \text{ kos } x - 1) &= 0 \\ \sin 72° (4 \text{ kos}^2 72° + 2 \text{ kos } 72° - 1) &= 0 \\ \therefore 4 \text{ kos}^2 72° + 2 \text{ kos } 72° - 1 &= 0 \end{aligned}$$

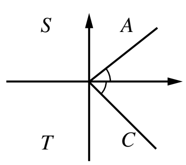
$x = 72°$
$\sin 72° \neq 0$
Biar $y = \text{kos } 72°$
*Let* $y = \cos 72°$

$$\begin{aligned} 4y^2 + 2y - 1 &= 0 \\ y &= \frac{-2 \pm \sqrt{2^2 - 4(4)(-1)}}{2(4)} \\ &= \frac{-2 \pm \sqrt{20}}{8} \\ &= \frac{-2 \pm 2\sqrt{5}}{8} \\ &= \frac{-1 \pm \sqrt{5}}{4} \end{aligned}$$

$\text{kos } 72°/\cos 72° > 0, \therefore \text{kos } 72°/\cos 72° = \dfrac{-1 + \sqrt{5}}{4}$

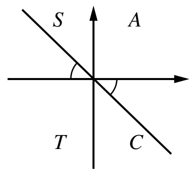
**36** (a) $\text{kos}/\cos 3\theta = 0.7431$
Sudut rujukan/*Reference angle* $= \text{kos}^{-1}/\cos^{-1} 0.7431$
$= 42°$

$$\begin{aligned} 3\theta &= 42°, 360° - 42°, 360° + 42°, 360° + 318°, \\ &\quad 720° + 42°, 720° + 318° \\ &= 42°, 318°, 402°, 678°, 762°, 1\,038° \\ \theta &= 14°, 106°, 134°, 226°, 254°, 346° \end{aligned}$$



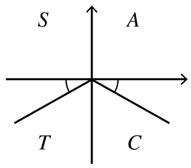

(b) $\tan (\theta + 10°) = -0.8391$
Sudut rujukan/*Reference angle* $= \tan^{-1} 0.8391$
$= 40°$

$$\begin{aligned} \theta + 10° &= 180° - 40°, 360° - 40° \\ &= 140°, 320° \\ \theta &= 130°, 310° \end{aligned}$$



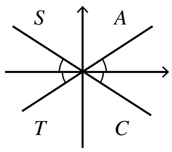

(c) $\sin (2\theta - 5°) = -0.766$
Sudut rujukan/*Reference angle* $= \sin^{-1} 0.766$
$= 50°$

$$\begin{aligned} 2\theta - 5° &= 180° + 50°, 360° - 50° \\ &= 230°, 310° \\ 2\theta &= 235°, 315° \\ \theta &= 117.5°, 157.5° \end{aligned}$$




(d) $\text{sek}^2/\sec^2 (2\theta + 15°) = 5.6$

$$\begin{aligned} \frac{1}{\text{kos}^2/\cos^2 (2\theta + 15°)} &= 5.6 \\ \text{kos}/\cos (2\theta + 15°) &= \pm\sqrt{\frac{1}{5.6}} \\ &= \pm 0.4226 \end{aligned}$$



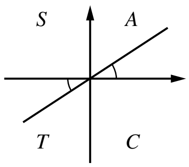

Sudut rujukan/*Reference angle* $= \text{kos}^{-1}/\cos^{-1} 0.4226$
$= 65°$

$$\begin{aligned} 2\theta + 15° &= 65°, 180° - 65°, 180° + 65°, 360° - 65° \\ &= 65°, 115°, 245°, 295° \\ 2\theta &= 50°, 100°, 230°, 280° \\ \theta &= 25°, 50°, 115°, 140° \end{aligned}$$

(e) $\text{kot}/\cot \dfrac{\theta}{2} = 2$

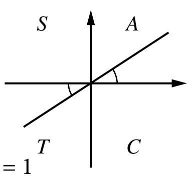
$\tan \dfrac{\theta}{2} = \dfrac{1}{2}$

Sudut rujukan/*Reference angle*
$= \tan^{-1} 0.5$
$= 26.6°$




$$\begin{aligned} \frac{\theta}{2} &= 26.6°, 180° + 26.6° \\ &= 26.6°, 206.6° \\ \theta &= 53.2°, 413.2° \end{aligned}$$

**37** (a) $4 \tan \theta - 2 \tan^2 \theta = \text{sek}^2/\sec^2 \theta$
$4 \tan \theta - 2 \tan^2 \theta = 1 + \tan^2 \theta$
$3 \tan^2 \theta - 4 \tan \theta + 1 = 0$
$(3 \tan \theta - 1)(\tan \theta - 1) = 0$
$\tan \theta = \dfrac{1}{3}$ atau/*or* $\tan \theta = 1$

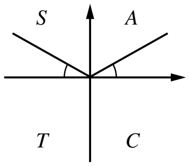



Sudut rujukan/*Reference angle*
$= \tan^{-1} \dfrac{1}{3}, \tan^{-1} 1$
$= 0.3218 \text{ rad}, 0.7854 \text{ rad}$
$\theta = 0.3218 \text{ rad}, 0.7854 \text{ rad}, (\pi + 0.3218) \text{ rad},$
$\quad (\pi + 0.7854) \text{ rad}$
$= 0.3218 \text{ rad}, 0.7854 \text{ rad}, 3.4634 \text{ rad}, 3.927 \text{ rad}$

(b) $2 \sin 2\theta = 3$ kos/*cos* $\theta$

$2 (2 \sin \theta$ kos/*cos* $\theta) - 3$ kos/*cos* $\theta = 0$

kos/*cos* $\theta (4 \sin \theta - 3) = 0$




kos/*cos* $\theta = 0$ atau/*or* $\sin \theta = \frac{3}{4}$

$\theta = 1.5708$ rad, $4.7124$ rad

atau/*or*

$\theta = 0.8481$ rad, $2.2935$ rad

$\theta = 0.8481$ rad, $1.5708$ rad, $2.2935$ rad, $4.7124$ rad

(c) $2$ kos$^2$/*cos*$^2$ $\theta + 5 \sin \theta$ kos/*cos* $\theta = 0$

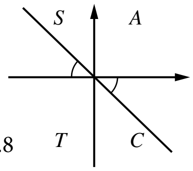
kos/*cos* $\theta (2$ kos/*cos* $\theta + 5 \sin \theta) = 0$

kos/*cos* $\theta = 0$

$\theta = 90°, 270°$

atau/*or*

$5 \sin \theta = -2$ kos/*cos* $\theta$




$\tan \theta = -\frac{2}{5}$

$\theta = 180° - 21.8°, 360° - 21.8$

$= 158.2°, 338.2°$

$\theta = 1.5708$ rad, $2.7611$ rad, $4.7124$ rad, $5.9027$ rad

**38** (a) $\tan 2x$

$= \frac{2 \tan x}{1 - \tan^2 x}$

$= \frac{2p}{1 - p^2}$ (Terbukti/*Proven*)

(b) Biar/*Let* $p = \tan \frac{\pi}{12}$

$\tan 2\left(\frac{\pi}{12}\right) = \frac{2p}{1 - p^2}$

$\tan \frac{\pi}{6} = \frac{2p}{1 - p^2}$

$\frac{1}{\sqrt{3}} = \frac{2p}{1 - p^2}$

$1 - p^2 = 2\sqrt{3}p$

$p^2 + 2\sqrt{3}p - 1 = 0$

$p = \frac{-2\sqrt{3} \pm \sqrt{(-2\sqrt{3})^2 - 4(1)(-1)}}{2(1)}$

$= \frac{-2\sqrt{3} \pm 4}{2}$

$= -\sqrt{3} \pm 2$

$\tan \frac{\pi}{12} > 0$, $\therefore \tan \frac{\pi}{12} = 2 - \sqrt{3}$ (Terbukti/*Proven*)

**39** $2 \sin \left(\frac{\pi z}{4}\right) = 1$

$\sin\left(\frac{\pi z}{4}\right) = \frac{1}{2}$

$0 \leqslant z \leqslant 10$

$0 \leqslant \frac{\pi z}{4} \leqslant \frac{10}{4}\pi$

$0 \leqslant \frac{\pi z}{4} \leqslant 2.5\pi$

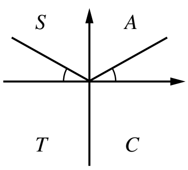
Sudut rujukan/*Reference angle* $= \sin^{-1}\left(\frac{1}{2}\right)$

$= \frac{\pi}{6}$

$\frac{\pi z}{4} = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}$

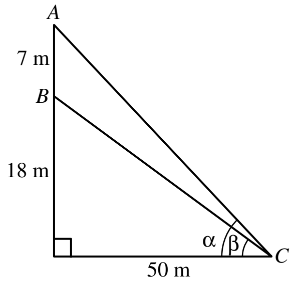
$\frac{z}{4} = \frac{1}{6}, \frac{5}{6}, \frac{13}{6}$

$z = \frac{2}{3}, \frac{10}{3}, \frac{26}{3}$




$= \frac{2}{3}, 3\frac{1}{3}, 8\frac{2}{3}$

**40**




$\tan (\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$

$= \frac{\frac{25}{50} - \frac{18}{50}}{1 + \frac{25}{50}\left(\frac{18}{50}\right)}$

$= \frac{7}{59}$

$\alpha - \beta = \tan^{-1}\left(\frac{7}{59}\right)$

$= 6.8°$

## Praktis Sumatif

### Kertas 1

**1** (a) $\sin (180° + x) = -r$

(b) $s = -\frac{8}{3}$

Kala/*Period* $= \frac{360°}{6}$

$= 60°$

$t = 30°$

**2** $7 \sin^2 x - 4$ kos$^2$/*cos*$^2$ $x = 7 \sin^2 x - 4 (1 - \sin^2 x)$

$= 7 \sin^2 x - 4 + 4 \sin^2 x$

$= 11 \sin^2 x - 4$

$0 \leqslant \sin^2 x \leqslant 1$

$0 \leqslant 11 \sin^2 x \leqslant 11$

$-4 \leqslant 11 \sin^2 x - 4 \leqslant 7$

$-4 \leqslant f(x) \leqslant 7$

**3** (a) (i) $\theta = 360° + 180° + 45°$

$= 585°$

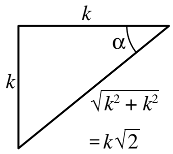
(ii) $2 \sin (-\theta) = -2 \sin \theta$

$= -2 (-\sin \alpha)$

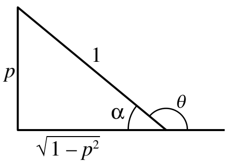
$= -2\left(-\frac{k}{k\sqrt{2}}\right)$

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

$= \sqrt{2}$



(b)




$\sin \theta = p$

$\text{kos } \theta / \cos \theta = -\sqrt{1-p^2}$

$\text{kos } (60° - \theta)$
$= \text{kos } 60° \text{ kos } \theta + \sin 60° \sin \theta$
$= \frac{1}{2}(-\sqrt{1-p^2}) + \frac{\sqrt{3}}{2}p$
$= \frac{\sqrt{3}p - \sqrt{1-p^2}}{2}$

*cos* $(60° - \theta)$
$= \cos 60° \cos \theta + \sin 60° \sin \theta$
$= \frac{1}{2}(-\sqrt{1-p^2}) + \frac{\sqrt{3}}{2}p$
$= \frac{\sqrt{3}p - \sqrt{1-p^2}}{2}$

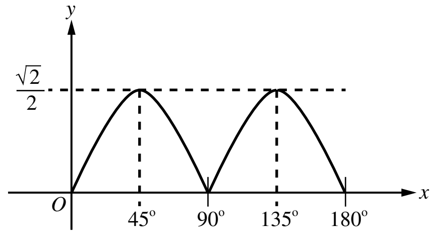
**4** (a) $\text{kos}^4 x + \sin^4 x$
$= (\text{kos}^2 x + \sin^2 x)^2 - 2 \text{ kos}^2 x \sin^2 x$
$= (1)^2 - (2 \sin x \text{ kos } x)(\sin x \text{ kos } x)$
$= 1 - \sin 2x \left(\frac{1}{2}\right)(2 \sin x \text{ kos } x)$
$= 1 - \frac{1}{2}(\sin 2x)(\sin 2x)$
$= 1 - \frac{1}{2}\sin^2 2x$ (Tertunjuk)

$\cos^4 x + \sin^4 x$
$= (\cos^2 x + \sin^2 x)^2 - 2 \cos^2 x \sin^2 x$
$= (1)^2 - (2 \sin x \cos x)(\sin x \cos x)$
$= 1 - \sin 2x \left(\frac{1}{2}\right)(2 \sin x \cos x)$
$= 1 - \frac{1}{2}(\sin 2x)(\sin 2x)$
$= 1 - \frac{1}{2}\sin^2 2x$ (*Shown*)

(b) $y = \sqrt{1 - \text{kos}^4 x - \sin^4 x}$
$= \sqrt{1 - (\text{kos}^4 x + \sin^4 x)}$
$= \sqrt{1 - \left(1 - \frac{1}{2}\sin^2 2x\right)}$
$= \sqrt{1 - 1 + \frac{1}{2}\sin^2 2x}$
$= \sqrt{\frac{1}{2}\sin^2 2x}$
$= \left|\sqrt{\frac{1}{2}} \sin 2x\right|$
$= \left|\frac{\sqrt{2}}{2} \sin 2x\right|$

$y = \sqrt{1 - \cos^4 x - \sin^4 x}$
$= \sqrt{1 - (\cos^4 x + \sin^4 x)}$
$= \sqrt{1 - \left(1 - \frac{1}{2}\sin^2 2x\right)}$
$= \sqrt{1 - 1 + \frac{1}{2}\sin^2 2x}$
$= \sqrt{\frac{1}{2}\sin^2 2x}$
$= \left|\sqrt{\frac{1}{2}} \sin 2x\right|$
$= \left|\frac{\sqrt{2}}{2} \sin 2x\right|$

*$y = \sqrt{f(x)}$ sentiasa positif/*is always positive*




**5** (a) $\text{kos } x \text{ kot } x + \sin x$
$= \text{kos } x \left(\frac{\text{kos } x}{\sin x}\right) + \sin x$
$= \frac{\text{kos}^2 x + \sin^2 x}{\sin x}$
$= \frac{1}{\sin x}$
$= \text{kosek } x$

$\cos x \cot x + \sin x$
$= \cos x \left(\frac{\cos x}{\sin x}\right) + \sin x$
$= \frac{\cos^2 x + \sin^2 x}{\sin x}$
$= \frac{1}{\sin x}$
$= \text{cosec } x$

(b) $\text{kos } x \text{ kot } x + \sin x = 4$
$\cos x \cot x + \sin x = 4$
$\frac{1}{\sin x} = 4$
$\sin x = 0.25$
$x = \sin^{-1} 0.25$
$x = 14.5°$

**Kertas 2**

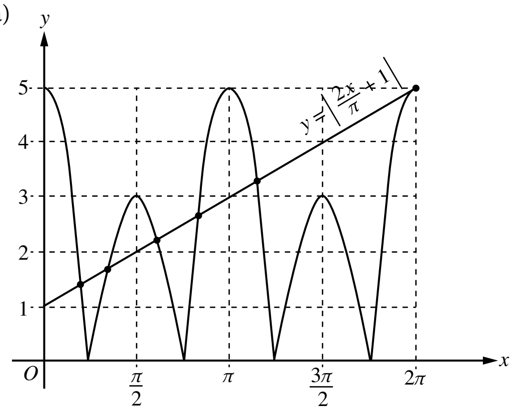
**1** $a = \frac{5+3}{2}$
$= 4$

$\frac{2\pi}{b} = \pi$
$b = 2$

$c = 5 - 4$
$= 1$

$\therefore a = 4, b = 2, c = 1$

(a)




$2\pi \text{ kos } 2x - x = 0$
$4\pi \text{ kos } 2x - 2x = 0$
$4\pi \text{ kos } 2x = 2x$
$4 \text{ kos } 2x = \frac{2x}{\pi}$
$4 \text{ kos } 2x + 1 = \frac{2x}{\pi} + 1$
$|4 \text{ kos } 2x + 1| = \left|\frac{2x}{\pi} + 1\right|$
$y = \left|\frac{2x}{\pi} + 1\right|$

$2\pi \cos 2x - x = 0$
$4\pi \cos 2x - 2x = 0$
$4\pi \cos 2x = 2x$
$4 \cos 2x = \frac{2x}{\pi}$
$4 \cos 2x + 1 = \frac{2x}{\pi} + 1$
$|4 \cos 2x + 1| = \left|\frac{2x}{\pi} + 1\right|$
$y = \left|\frac{2x}{\pi} + 1\right|$

| **x** | 0 | $2\pi$ |
|---|---|---|
| **y** | 1 | 5 |

Bilangan penyelesaian/*Number of solutions* = 6

(b) $0 < k < 3$

**2** (a) $\sin A$ kos/*cos* $A$ (5 $\tan A$ + 2 kot/*cot* $A$)

$= \sin A \text{ kos}/\cos A \left[5\left(\dfrac{\sin A}{\text{kos } A}\right) + 2\left(\dfrac{\text{kos } A}{\sin A}\right)\right]$

$= 5 \sin^2 A + 2 \text{ kos}^2/\cos^2 A$

$= 5 \sin^2 A + 2 (1 - \sin^2 A)$

$= 5 \sin^2 A + 2 - 2 \sin^2 A$

$= 2 + 3 \sin^2 A$

(b) $15 \text{ kos}^2/\cos^2 A + 2 \sin^2 A = 7$

$15 (1 - \sin^2 A) + 2 \sin^2 A = 7$

$15 - 13 \sin^2 A = 7$

$15 - 7 = 13 \sin^2 A$

$13 \sin^2 A = 8 \ldots$ ①

$15 \text{ kos}^2/\cos^2 A + 2 \sin^2 A = 7$

$15 \text{ kos}^2/\cos^2 A + 2 (1 - \text{kos}^2/\cos^2 A) = 7$

$13 \text{ kos}^2/\cos^2 A + 2 = 7$

$13 \text{ kos}^2/\cos^2 A = 7 - 2$

$13 \text{ kos}^2/\cos^2 A = 5 \ldots$ ②

$\dfrac{①}{②} = \dfrac{13 \sin^2 A}{13 \text{ kos}^2/\cos^2 A} = \dfrac{8}{5}$

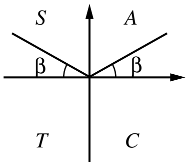
$\therefore \tan^2 A = \dfrac{8}{5}$

$\tan A = \pm\sqrt{\dfrac{8}{5}}$

$\beta = \tan^{-1}\sqrt{\dfrac{8}{5}}$

$= 0.9018$ rad

$A = 0.9018$ rad, $2.2398$ rad

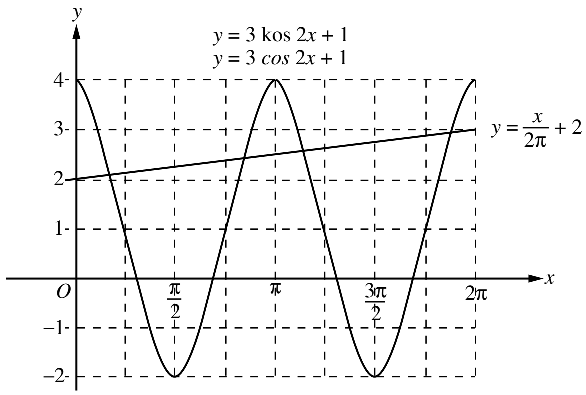



**3** (a) $\text{kos } x \sin^2 x + \text{kos}^3 x$ | $\cos x \sin^2 x + \cos^3 x$

$= \text{kos } x (\sin^2 x + \text{kos}^2 x)$ | $= \cos x (\sin^2 x + \cos^2 x)$

$= \text{kos } x$ | $= \cos x$

(b) (i)




(ii) $3 \text{ kos}/\cos 2x \sin^2 2x + 3 \text{ kos}^3/\cos^3 2x$

$= \dfrac{x}{2\pi} + 1$

$3 \text{ kos}/\cos 2x (\sin^2 2x + \text{kos}^2/\cos^2 2x)$

$= \dfrac{x}{2\pi} + 1$

$3 \text{ kos}/\cos 2x(1) = \dfrac{x}{2\pi} + 1$

$y = \dfrac{x}{2\pi} + 2$

| **x** | 0 | $2\pi$ |
|---|---|---|
| **y** | 2 | 3 |

Bilangan penyelesaian/*Number of solutions* = 4

**4** $P = 180° - (Q + R)$

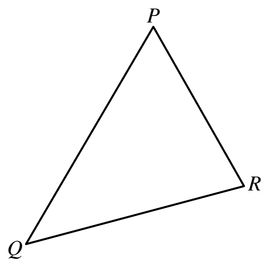
$\tan P = \tan [180° - (Q + R)]$

$= \dfrac{\tan 180° - \tan (Q + R)}{1 + \tan 180° \tan (Q + R)}$

$= -\tan (Q + R)$

$= -\dfrac{\tan Q + \tan R}{1 - \tan Q \tan R}$

$= \dfrac{\tan Q + \tan R}{\tan Q \tan R - 1}$




(a) $2 \tan Q = \dfrac{\tan Q + 3}{3 \tan Q - 1}$

$6 \tan^2 Q - 2 \tan Q - \tan Q - 3 = 0$

$6 \tan^2 Q - 3 \tan Q - 3 = 0$

$2 \tan^2 Q - \tan Q - 1 = 0$

$(\tan Q - 1)(2 \tan Q + 1) = 0$

$\tan Q = 1$ atau/*or* $\tan Q = -\dfrac{1}{2}$

$Q = 45°$ (tolak/*reject*)

(b) $\tan (R - P) = \dfrac{\tan R - \tan P}{1 + \tan R \tan P}$

$= \dfrac{3 - 2(1)}{1 + 3(2)}$

$= \dfrac{1}{7}$