

HW 6.7

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la) $90^\circ + 45^\circ$
 $180^\circ + 45^\circ$

b) $180^\circ + 45^\circ$
 $270^\circ - 45^\circ$

c) $30^\circ + 90^\circ$
 $60^\circ + 60^\circ$
 $180^\circ - 60^\circ$

d) $180^\circ + 60^\circ$
 $270^\circ - 30^\circ$

e) $90^\circ + 60^\circ$
 $180^\circ - 30^\circ$

f) $30^\circ + 180^\circ$
 $270^\circ - 60^\circ$

g) $30^\circ + 270^\circ$
 $300^\circ + 60^\circ$
 $360^\circ - 60^\circ$

h) $30^\circ + 300^\circ$
 $60^\circ + 270^\circ$
 $360^\circ - 30^\circ$

i) $45^\circ + 270^\circ$
 $360^\circ - 45^\circ$

j) $60^\circ + 180^\circ$
 $270^\circ - 30^\circ$

2a) $\sin(90+30) = \sin 90 \cdot \cos 30 + \sin 30 \cdot \cos 90$
 $= 1 \cdot \frac{\sqrt{3}}{2} + \frac{1}{2} \cdot 0$
 $= \frac{1+\sqrt{3}}{2}$

b) $\cos(180+45) = \cos 180 \cdot \cos 45 - \sin 180 \cdot \sin 45$
 $= -1 \cdot \frac{1}{\sqrt{2}} - 0 \cdot \frac{1}{\sqrt{2}}$
 $= -\frac{1}{\sqrt{2}}$

c) $\sin(360-60) = \sin 360 \cdot \cos 60 - \cos 360 \cdot \sin 60$
 $= 0 \cdot \frac{1}{2} - 1 \cdot \frac{\sqrt{3}}{2}$
 $= -\frac{\sqrt{3}}{2}$

d) $\sin(30+180) = \sin 30 \cdot \cos 180 + \sin 180 \cdot \cos 30$
 $= \frac{1}{2} \cdot -1 + 0 \cdot \frac{\sqrt{3}}{2}$
 $= -\frac{1}{2}$

e) $0 \cdot \frac{1}{2} + -1 \cdot \frac{\sqrt{3}}{2}$
 $= -\frac{\sqrt{3}}{2}$

f) $0 \cdot \frac{1}{2} - 1 \cdot \frac{\sqrt{3}}{2}$
 $= \frac{\sqrt{3}}{2}$

g) $1 \cdot \frac{1}{\sqrt{2}} + 0 \cdot \frac{1}{\sqrt{2}}$
 $= \frac{1}{\sqrt{2}}$

h) $0 \cdot \frac{1}{2} + -1 \cdot \frac{\sqrt{3}}{2}$
 $= -\frac{\sqrt{3}}{2}$

i) $-1 \cdot \frac{1}{2} + 0 \cdot \frac{\sqrt{3}}{2}$
 $= -\frac{1}{2}$

j) $1 \cdot \frac{1}{2} + 0 \cdot \frac{\sqrt{3}}{2}$
 $= \frac{1}{2}$

3a) $= \cos(120) = \cos(90+30)$
 $= \cos 90 \cos 30 - \sin 90 \sin 30$
 $= 0 \cdot \frac{\sqrt{3}}{2} - 1 \cdot \frac{1}{2}$
 $= -\frac{1}{2}$

b) $-\frac{1}{\sqrt{2}}$

c) $\frac{1}{2}$

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$\sin a = \frac{3}{5}$

$\sin b = \frac{2}{5}$

$\sin(a+b) = -\frac{1}{5}$

$\cos a = \frac{4}{5}$

$\cos b = -\frac{3}{5}$

$\sin(a-b) = -\frac{13}{25}$

5) $\sin a = \frac{2}{3}$ $\cos a = -\frac{\sqrt{5}}{3}$
 $\sin b = -\frac{\sqrt{7}}{4}$ $\cos b = -\frac{3}{4}$

$\cos(a+b) = \frac{2\sqrt{7}+3\sqrt{5}}{12}$

$\cos(a-b) = \frac{3\sqrt{7}-2\sqrt{5}}{12}$

6) $\tan a = -\frac{5}{7}$

$\tan b = -\frac{5}{6}$

$\sin(a+b) = \frac{65\sqrt{74561}}{4514}$

$\sin a = \frac{5}{\sqrt{74}}$

$\sin b = \frac{5}{\sqrt{61}}$

$\cos(a+b) = -\frac{17\sqrt{74561}}{4514}$

$\cos a = \frac{7}{\sqrt{74}}$

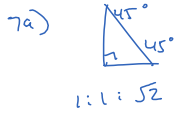
$\cos b = \frac{6}{\sqrt{61}}$

$\dots = \cos(10+x)$

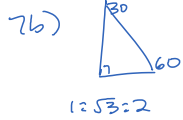
$$\cos a = \frac{\sqrt{74}}{\sqrt{74}}$$

$$\cos b = \frac{361}{\sqrt{61}}$$

$$\cos(a+b) = \frac{-\dots}{4514}$$



$$45 - 38 = 7^\circ$$



$$\frac{1}{2} = \cos(10+x)$$

$$60 - 10 = 50^\circ$$

8) $\sin 2x = 2 \sin x \cos x$

$$\hookrightarrow \sin(x+x) = (\sin x)(\cos x) + (\sin x)(\cos x)$$

9) $\cos 2x = (\cos x)(\cos x) - (\sin x)(\sin x)$

$$2 \cos^2 x - 1 = \cos^2 x - \sin^2 x$$

$$\cos^2 x - 1 = -\sin^2 x$$

$$\left(\frac{A}{H}\right)^2 + \left(\frac{O}{H}\right)^2 = 1 \rightarrow \frac{H^2}{H^2} = 1$$

10) $\cos(2x) = (\cos x)(\cos x) - (\sin x)(\sin x)$

$$\cos(2x) = (\cos x)^2 - (\sin x)^2$$

$$1 = \cos^2 x + \sin^2 x$$

$$\cos(2x) = 1 - \sin^2 x - \sin^2 x = 1 - 2\sin^2 x$$

11) $\sin(45+x) = (\sin 45)(\cos x) + (\sin x)(\cos 45)$

$$\sin(45+x) = \frac{\sqrt{2}}{2}(\cos x) + \frac{\sqrt{2}}{2}(\sin x)$$

$$\left. \begin{aligned} \sin(45-x) &= (\sin 45)(\cos x) - (\sin x)(\cos 45) \\ &= \frac{\sqrt{2}}{2}(\cos x) - \frac{\sqrt{2}}{2}(\sin x) \end{aligned} \right\}$$

$$\frac{\sqrt{2}}{2}(\cos x) + \frac{\sqrt{2}}{2}(\sin x) + \frac{\sqrt{2}}{2}(\cos x) - \frac{\sqrt{2}}{2}(\sin x) = \sin(45+x) + \sin(45-x)$$

$$\hookrightarrow \sqrt{2}(\cos x) = \sin(45+x) + \sin(45-x)$$

12) $a = 30+x$ $b = 30-x$

$$\cos(a+b) \rightarrow \cos((30+x) + (30-x)) \rightarrow \cos(60) \rightarrow \frac{1}{2}$$

13) $\sin a = \frac{1}{3}$

$$\cos a = \frac{\sqrt{8}}{3}$$

$$\sin(2a) = \sin(a+a) = \left(\frac{1}{3} \cdot \frac{\sqrt{8}}{3}\right)^2 = \left(\frac{\sqrt{8}}{9}\right)^2 = \frac{8}{81}$$



14) $\cos(x+90) = (\cos x)(\cos 90) - (\sin x)(\sin 90)$

$$\hookrightarrow \boxed{-2 \sin(x)}$$