1a
$$_{\mathsf{i}}$$
  $_{2\pi}$ 

ii 
$$4\pi$$

iii 
$$-4\pi$$

$$\mathsf{b} \; \mathsf{i} \quad \; 2\pi \pm \frac{2\pi}{3} = \frac{4\pi}{3}, \frac{8\pi}{3}$$

ii 
$$4\pi \pm \frac{2\pi}{3} = \frac{14\pi}{3}, \frac{10\pi}{3}$$

iii 
$$-4\pi\pmrac{2\pi}{3}=-rac{14\pi}{3},-rac{10\pi}{3}$$

2 a 
$$2n\pi\pmrac{\pi}{6}$$
,  $n\in\mathbb{Z}$ 

$$\mathsf{b} = rac{2n\pi}{3} + rac{\pi}{9} \, \mathsf{or} \, rac{2n\pi}{3} + rac{2\pi}{9}$$
 ,  $n \in \mathbb{Z}$ 

c 
$$n\pi+rac{\pi}{3}$$
 ,  $n\in\mathbb{Z}$ 

3 a 
$$\sin x = 0.5$$

$$x = 2n\pi + \sin^{-1}(0.5) \text{ or} \ (2n+1)\pi - \sin^{-1}(0.5) \ = 2n\pi + \frac{\pi}{6} \text{ or } (2n+1)\pi - \frac{\pi}{6} \ = \frac{12n\pi}{6} + \frac{\pi}{6} \text{ or } \frac{6(2n+1)\pi}{6} - \frac{\pi}{6} \ = \frac{(12n+1)\pi}{6} \text{ or } \frac{(12n+5)\pi}{6}$$

$$x=rac{(12n+1)\pi}{6}$$
 or  $rac{(12n+5)\pi}{6}$ 

When 
$$n=0,\;x=rac{\pi}{6}$$
 or  $rac{5\pi}{6}.$ 

$$b \quad \cos 2x = \frac{\sqrt{3}}{2}$$

$$2x=2n\pi\pmrac{\pi}{6}$$

$$x=rac{2n\pi}{2}\pmrac{\pi}{12} 
onumber \ =rac{12n\pi\pm\pi}{12}$$

$$=\frac{(12n\pm1)\pi}{12}$$

$$x=rac{(12n\pm1)\pi}{12}$$

When 
$$n=0, \; x=\pm \frac{\pi}{12}$$

When 
$$n=1, \ x=\frac{11\pi}{12} \ {
m or} \ x=\frac{13\pi}{12}$$

Hence 
$$x=\frac{\pi}{12},\frac{11\pi}{12}$$

$$an2x=-rac{3}{\sqrt{3}}=-\sqrt{3} \,\,\,x=rac{(3n-1)\pi}{6}$$
 $x=n\pi-rac{\pi}{3}$ 

$$egin{aligned} x &= n\pi - rac{\pi}{3} \ &= rac{3n\pi - \pi}{6} \ &= rac{(3n-1)\pi}{6} \end{aligned}$$

When 
$$n=1,\;x=rac{\pi}{3}$$

When 
$$n=2,\;x=rac{5\pi}{6}$$

Hence 
$$x = \frac{\pi}{3}, \ \frac{5\pi}{6}$$
.

4 
$$\frac{-11\pi}{6}$$
,  $\frac{-7\pi}{6}$ ,  $\frac{\pi}{6}$ ,  $\frac{5\pi}{6}$ 

5 
$$\frac{-\pi}{3}$$
,  $\frac{\pi}{3}$ ,  $\frac{5\pi}{3}$ 

C

**6** a 
$$x=n\pi-rac{\pi}{6}$$
 or  $x=n\pi-rac{\pi}{2}$  ,  $n\in\mathbb{Z}$ 

b 
$$x=rac{n\pi}{2}-rac{\pi}{12}$$
 ,  $n\in\mathbb{Z}$ 

$${f c}$$
  $x=2n\pi+rac{5\pi}{6}$  or  $x=2n\pi-rac{\pi}{2}$  ,  $n\in\mathbb{Z}$ 

7 
$$\cos\!\left(2x+rac{\pi}{4}
ight)=rac{\sqrt{2}}{2}=rac{1}{\sqrt{2}}$$

$$2x+rac{\pi}{4}=2n\pi\pmrac{\pi}{4}$$

$$2x=2n\pi-rac{4}{4}\pmrac{\pi}{4}$$

$$=2n\pi \text{ or } 2n\pi -\frac{\pi}{2}$$

$$x=n\pi ext{ or } x=rac{(4n-1)\pi}{4}$$

$$=-rac{5\pi}{4},\ -\pi,\ -rac{\pi}{4},0,\ rac{3\pi}{4},$$

$$\pi, \; rac{\pi}{4}$$
8  $anigg(rac{\pi}{6}-3xigg)=rac{1}{\sqrt{3}}$ 

$$rac{\pi}{6}-3x=n\pi+rac{\pi}{6}$$

$$-2x=n\pi$$

$$x=-rac{n\pi}{3}$$

This is equivalent to  $x=rac{n\pi}{3}$  where  $n\in Z.$ 

$$x=-\pi,\;-rac{2\pi}{3},\;-rac{\pi}{3},0$$

$$\sin 4\pi x = \frac{\sqrt{3}}{2}$$

$$4\pi x = 2n\pi - \frac{\pi}{3}$$

$$= \frac{6n\pi - \pi}{3}$$

$$= \frac{(6n-1)\pi}{3}$$
or  $4\pi x = (2n+1)\pi - \frac{\pi}{3}$ 

$$= \frac{6n\pi + 3\pi + \pi}{4}$$

$$= \frac{(6n+4)\pi}{3}$$

$$x = \frac{6n-1}{12} \text{ or } \frac{3n+2}{6}$$

$$x = -\frac{2}{3}, -\frac{7}{12}, -\frac{1}{6}, -\frac{1}{12}, \frac{1}{3}, \frac{5}{12}, \frac{5}{6}, \frac{11}{12}$$