FURTHER TRIGONOMETRY - REVISION (Cambridge)

1 Express the following angles in radians.

a $90°$ **b** $45°$ **c** $30°$ **d** $60°$

e $120°$ **f** $150°$ **g** $135°$ **h** $225°$

i $360°$ **j** $300°$ **k** $270°$ **l** $210°$

2 Express the following angles in degrees.

a π **b** 2π **c** 4π **d** $\frac{\pi}{2}$

e $\frac{\pi}{3}$ **f** $\frac{\pi}{4}$ **g** $\frac{2\pi}{3}$ **h** $\frac{5\pi}{6}$

i $\frac{3\pi}{4}$ **j** $\frac{3\pi}{2}$ **k** $\frac{4\pi}{3}$ **l** $\frac{7\pi}{4}$

m $\frac{11\pi}{6}$

5 Find the exact value of:

a $\sin\frac{\pi}{6}$ **b** $\sin\frac{\pi}{4}$ **c** $\cos\frac{\pi}{6}$ **d** $\tan\frac{\pi}{3}$

e $\tan\frac{3\pi}{4}$ **f** $\cos\frac{5\pi}{3}$ **g** $\sin\frac{5\pi}{4}$ **h** $\tan\frac{7\pi}{6}$

7 Express these angles in radians in terms of π:

a $20°$ **b** $22.5°$ **c** $36°$ **d** $100°$ **e** $112.5°$ **f** $252°$

8 Express these angles in degrees:

a $\frac{\pi}{12}$ **b** $\frac{2\pi}{5}$ **c** $\frac{20\pi}{9}$ **d** $\frac{11\pi}{8}$ **e** $\frac{17\pi}{10}$ **f** $\frac{23\pi}{15}$

9 **a** Find the complement of $\frac{\pi}{6}$.

b Find the supplement of $\frac{\pi}{6}$.

10 Two angles of a triangle are $\frac{\pi}{3}$ and $\frac{2\pi}{9}$. Find, in radians, the third angle.

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1 Find, in radians, the acute angle θ that satisfies each equation.

a $\tan\theta = 1$ **b** $\sin\theta = \frac{1}{2}$ **c** $\cos\theta = \frac{1}{\sqrt{2}}$

d $\tan\theta = \frac{1}{\sqrt{3}}$ **e** $\sin\theta = \frac{\sqrt{3}}{2}$ **f** $\cos\theta = \frac{1}{2}$

3 Solve these equations for x over the domain $0 \leq x \leq 2\pi$:

a $\sin x = \frac{1}{2}$ **b** $\cos x = -\frac{1}{2}$ **c** $\tan x = -1$ **d** $\sin x = 1$

e $2\cos x = \sqrt{3}$ **f** $\sqrt{3}\tan x = 1$ **g** $\cos x + 1 = 0$ **h** $\sqrt{2}\sin x + 1 = 0$

4 Solve each equation for $0 \leq \theta \leq 2\pi$. Remember that a positive number has two square roots.

a $\sin^2\theta = 1$ **b** $\tan^2\theta = 1$ **c** $\cos^2\theta = \frac{1}{4}$ **d** $\cos^2\theta = \frac{3}{4}$

5 Consider the equation $\cos^2\theta - \cos\theta = 0$, for $0 \leq \theta \leq 2\pi$.

a Write the equation as a quadratic equation in u by letting $u = \cos\theta$.

b Solve the quadratic equation for u.

c Hence find the values of θ that satisfy the original equation.

6 Consider the equation $\tan^2\theta - \tan\theta - 2 = 0$, for $0 \leq \theta \leq 2\pi$.

a Write the equation as a quadratic equation in u by letting $u = \tan\theta$.

b Solve the quadratic equation for u.

c Hence find the values of θ that satisfy the original equation. Give the solutions correct to two decimal places where necessary.

7 Solve these equations for $0 \leq \theta \leq 2\pi$, by transforming each equation into a quadratic equation in u. Give your solutions correct to two decimal places where necessary.

a $\tan^2\theta + \tan\theta = 0$ (Let $u = \tan\theta$.)

b $2\sin^2\theta - \sin\theta = 0$ (Let $u = \sin\theta$.)

g $3\sin^2\theta + 8\sin\theta - 3 = 0$

h $3\cos^2\theta - 8\cos\theta - 3 = 0$

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9 Use the trigonometric identities from Chapter 5 to transform each equation so that it only involves one trigonometric function. Then solve it for $0 \leq x \leq 2\pi$. Give solutions correct to two decimal places where necessary.

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

b $\sec^2 x - 2\tan x - 4 = 0$