Trigonometry Revision

1. Solve these equations for $0\,° \leq x \leq 360°$
   a. $4 \sin x = 3$
   b. $5 \tan x - 1 = 9$
   c. $6 \cos x + 5 = 8$
   d. $8 \sin(x + 20) = 5$
   e. $10 - 3 \cos x = 9$
   f. $9 \sin(x - 15) = -4$
2. In the following equations find all the values of θ between0 °and 360°
   a. $\cos \theta = 0.776$
   b. $\sin 2\theta = -0.364$
   c. $\tan 3\theta = 1.988$
   d. $\cos \frac{\theta}{2} = -0.379$
   e. $\tan \frac{\theta}{2} = -1.030$
   f. $\sin \frac{3\theta}{2} = 0.664$
3. Solve the following equations for $0 \leq x \leq 2\pi$
   a. $3 \tan x + 2 = 5$
   b. $\sin(x - \frac{\pi}{6}) = \frac{\sqrt{3}}{2}$
   c. $\sin 2x = \frac{1}{2}$
   d. $6 \cos 3x - 3 = 0$
   e. $7 - 2 \tan 4x = 13$
   f. $10 \cos \frac{x}{3} = 1$
4. Solve $6 \cos 30\, x - 3 = 0$ for $0\,° \leq x \leq 24°$
5. Solve $3 \tan x = \sqrt{27}$ for $-180\,° \leq x \leq 180°$
6. Solve $5 + 2 \cos\left(3\theta - \frac{\pi}{4}\right) = 6$ for $-\pi \leq x \leq \pi$
7. Simplify
   a. $\frac{sin^{3}\theta + sin\theta cos^2\theta}{cos\theta}$
   b. $\frac{1+cos\theta}{sin\theta} + \frac{sin\theta}{1+cos\theta}$
8. Prove the identity $\frac{sin\theta}{tan\theta(1-cos\theta)} = \frac{cos\theta}{1-cos\theta}$
9. Express $4cos^2x - sin^2x$ in terms of $cosx$
10. Express in terms of $sin\theta$
   a. $sin^2\theta - cos^2\theta$
   b. $2cos^2\theta - 4sin\theta$
11. Prove $\frac{sin^4\theta}{tan\theta} = sin\theta cos\theta - sin\theta cos^3\theta$

12. Prove the following identities

a. $cos^5\theta = cos\theta - 2sin^2\theta cos\theta + cos\theta sin^4\theta$

b. $(4sin\theta + 3cos\theta)^2 + (3sin\theta - 4cos\theta)^2 = 25$

c. $tan^2A - tan^2B = \frac{sin^2A - sin^2B}{cos^2Acos^2B}$

13. Show that $(1 + sin\theta + cos\theta)^2 = 2(1 + sin\theta)(1 + cos\theta)$

14. Prove

a. $tan\theta = \sqrt{\frac{sin^2\theta}{1-sin^2\theta}}$

b. $\frac{1-sin^2\theta}{tan\theta} = \frac{cos^3\theta}{sin\theta}$

c. $\frac{sin^2\theta}{1-cos\theta} = 1 + cos\theta$

d. $(2 - cos^2\theta)^2 - 4sin^2\theta = cos^4\theta$

15.

a. Express $2cosx - sin^2x$ in the form $(\cos x + p)^2 + q$, stating the values of p and q

b. Use your answer to part (a) to find the maximum and minimum values of $2cosx - sin^2x$

16. Use the identity $sin^2x+cos^2x = 1$to prove that $\frac{1+sinxcosx}{cos^2x} = tan^2x + tanx + 1$

17. Use the identity you proved in part (a) to find minimum values of $\frac{1+sinxcosx}{cos^2x}$

18. Solve $\sqrt{3}sinx - cosx = 0$ for $0 \leq x \leq 2\pi$

19. Solve the equation $2cos^2x = 1 - sinx$ for $0° \leq x \leq 360°$

20. Solve the equation $sin^2(2x - 60°) = 0.6$ for $0° \leq x \leq 180°$

21. Solve the equations for $0° \leq \theta \leq 360°$

a. $cos^2\theta - sin^2\theta = 0$

b. $2cos^2\theta + sin\theta = 1$

c. $3sin^2\theta = cos^2\theta$

d. $cos^2\theta - 4sin^2\theta = 1$

e. $1 + sin\theta cos^2\theta = sin\theta$

f. $6\sin(\theta + 70)° - 5\cos(\theta + 70)° = 0$

g. $3cos2\theta = 4sin2\theta$

h. $2sin\theta = 3tan\theta$

22. Solve the equation $sin\theta + 5cos\theta = 3sin\theta$ for $0 \leq x \leq 2\pi$

23.

a. Simplify $\frac{6-6cos^2\theta}{2sin\theta}$

b. Hence solve the equation $6 - 6cos^2\theta = 3sin\theta$ for $0 \leq x \leq 2\pi$

24. Solve the equation $tan^3\theta - tan^2\theta - 2tan\theta = 0$ for $0° \leq x \leq 180°$