Year 12 Extension 1	Trigonometric Functions Assignment	Date Due:

1. Convert: (a) $\frac{3\pi}{2}$ into degrees (b) 50° into radians, correct to 2 decimal places

2. Find the exact value of: (a) $\cos\frac{11\pi}{2}$ (b) $\tan\left(-\frac{3\pi}{2}\right)$

3. Solve for $0 \le \theta \le 2\pi$: (a) $\sin x = \frac{1}{\sqrt{2}}$ (b) $\cos 2x = \frac{1}{2}$

4. Find the length of the arc formed if an angle of $\frac{\pi}{4}$ is subtended at the centre of the circle with radius 5 m.

5. The area of a circle is 450 cm^2. Find in degrees and minutes, the angle subtended at the centre of the circle by a 2.7 cm arc.

6. The area of the sector of a circle that is subtended by an angle of $\frac{\pi}{3}$ at the centre is 6π m^2. Find the radius of the circle.

7. (a) One the same number plane, sketch the curves $y = 3\sin x$ and $y = \cos 2x$ for $0 \le \theta \le 2\pi$
   (b) How many solutions are there for $3\sin x = \cos 2x$ in this domain?

8. Find the values of: (a) $\lim_{x \to 0} \frac{\sin 3x}{x}$ (b) $\lim_{x \to 0} \frac{4x}{\tan 3x}$

9. Differentiate: (a) $x^3\cos 2x$ (b) $\frac{3x}{\sin x}$ (c) $\sqrt{\tan 2x}$

10. Find the primitive function of: (a) $\sin(2x + 3)$ (b) $1 - \cos 3x$ (c) $\sec^2 2x - \sin 4x$

11. Evaluate the following: (a) $\int_0^1 \left(\cos\frac{\pi}{2}x\right) dx$ (b) $\int_0^{\frac{\pi}{2}} (\sin x + \cos x) dx$

12. Find the area of the curve $y = 2\cos 3x$ between $x = 0$ and $x = \frac{\pi}{6}$.

13. Differentiate $\tan^3 x$ and hence find $\int_0^{\frac{\pi}{4}} \tan^2 x \sec^2 x \, dx$.

14. The range of a shell fired from a gun having an angle of elevation of θradians is given by $R = \frac{V^2}{g}\sin 2\theta$ where V and g are constants. For what angle of elevation will the range be a maximum? (Hint: you must first find $\frac{dR}{d\theta}$).