$$\sin\theta = \frac{y}{r} = \frac{\text{opp}}{\text{hyp}} \qquad \cos\theta = \frac{x}{r} = \frac{\text{adj}}{\text{hyp}} \qquad \tan\theta = \frac{y}{x} = \frac{\text{opp}}{\text{adj}}$$

$$\csc\theta = \frac{1}{\sin\theta} \qquad \sec\theta = \frac{1}{\cos\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

Basic identities
(Memorize these!)

$$\sin^2\theta + \cos^2\theta = 1$$
$$1 + \tan^2\theta = \sec^2\theta$$
$$1 + \cot^2\theta = \csc^2\theta$$

Pythagorean identities (Memorize these!)

$$\sin(A+B) = \sin A\cos B + \cos A\sin B$$
$$\sin(A-B) = \sin A\cos B - \cos A\sin B$$
$$\cos(A+B) = \cos A\cos B - \sin A\sin B$$
$$\cos(A-B) = \cos A\cos B + \sin A\sin B$$
$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$$
$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$$

Sum and Difference identities
(Memorize at least the sine and cosine sum and difference identities. You can obtain tan(A+B) by dividing sin(A+B) by cos(A+B), and likewise for tan(A-B), if you forget the tangent identities.)

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

Double angle identities
(Memorize at least the sine and cosine double angle identities. You can obtain $\tan 2\theta$ by dividing $\sin 2\theta$ by $\cos 2\theta$ if you forget the tangent identity, or you can replace A and B with θ in the tan(A+B) formula to derive the $\tan 2\theta$ identity.)

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

Formulas for reducing powers
(Memorize the sine and cosine formulas for reducing powers. You can obtain $\tan^2\theta$ by dividing $\sin^2\theta$ by $\cos^2\theta$.)

$$\sin^2(\text{an angle}) = \frac{1 - \cos(\text{twice the angle})}{2}$$
$$\cos^2(\text{an angle}) = \frac{1 + \cos(\text{twice the angle})}{2}$$

$$\sin\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{2}}$$
$$\cos\frac{\theta}{2} = \pm\sqrt{\frac{1+\cos\theta}{2}}$$
$$\tan\frac{\theta}{2} = \frac{\sin\theta}{1+\cos\theta} = \frac{1-\cos\theta}{\sin\theta} = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$$

Half angle identities
(Memorize the sine and cosine identity and at least one version of the tangent identity. You can derive them from the formulas for reducing powers if you forget them.)

$$\sin(\theta+2\pi k) = \sin\theta$$
$$\cos(\theta+2\pi k) = \cos\theta$$
$$\tan(\theta+\pi k) = \tan\theta$$
$$\cot(\theta+\pi k) = \cot\theta$$
$$\csc(\theta+2\pi k) = \csc\theta$$
$$\sec(\theta+2\pi k) = \sec\theta$$

Periodic identities (Memorize/understand these.)

$$\sin\left(\frac{\pi}{2}-\theta\right) = \cos\theta$$
$$\cos\left(\frac{\pi}{2}-\theta\right) = \sin\theta$$
$$\tan\left(\frac{\pi}{2}-\theta\right) = \cot\theta$$
$$\cot\left(\frac{\pi}{2}-\theta\right) = \tan\theta$$
$$\csc\left(\frac{\pi}{2}-\theta\right) = \sec\theta$$
$$\sec\left(\frac{\pi}{2}-\theta\right) = \csc\theta$$

Co-function identities (Know these, too.)

$$\sin A\sin B = \frac{1}{2}\left[\cos(A-B)-\cos(A+B)\right]$$
$$\cos A\cos B = \frac{1}{2}\left[\cos(A-B)+\cos(A+B)\right]$$
$$\sin A\cos B = \frac{1}{2}\left[\sin(A-B)+\sin(A+B)\right]$$

Product-Sum formulas
(You do not have to memorize these, but you should learn how to apply them.)