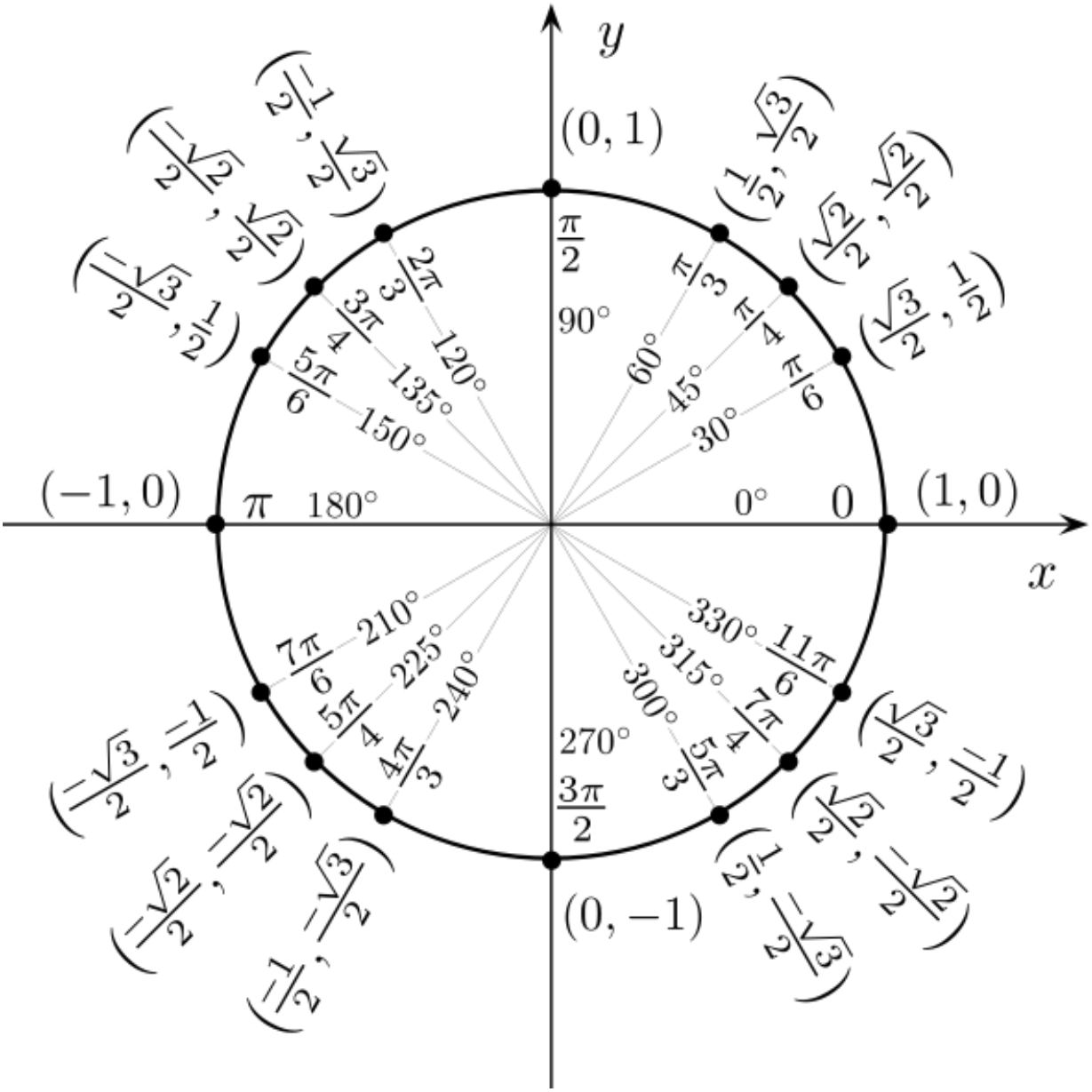
The Unit Circle (Part 2)

These notes are intended as a summary of section 6.3 (p. 487 – 493) in your workbook. You should also read the section for more complete explanations and additional examples.

Unit Circle

In a previous lesson, we drew the unit circle and labelled a number of angles in degrees as well as the coordinates of their terminal points. The image below updates our previous drawing to include the angle measures in radians.



We can use this unit circle to determine exact trigonometric ratios for certain angles between 0 and 2π. To determine the exact trigonometric ratios for angles outside this domain, we use the concept of coterminal angles (as discussed in the previous lesson).

If θ is not one of the "special angles," then we would instead use our calculator to determine the trigonometric ratios.

Note: Your calculator must be set to RADIAN mode when working with angles in radians.

Example 2 (sidebar p. 491)

a) Determine the exact value of $\sin\left(\frac{-13\pi}{6}\right)$.

b) Determine the value of $\cot\left(\frac{12\pi}{5}\right)$ to the nearest hundredth.

Problem Solving with Trigonometry

Example 3 (sidebar p. 492)
An approximate model of the motion of the international space station is that it travels at a speed of 27 600 km/h in a circular orbit at an altitude of 400 km. The radius of Earth is approximately 6400 km.

a) Visualize a line segment joining the space station to the center of Earth. To the nearest tenth of a radian, through which angle will the segment have rotated after 40 min?

b) To the nearest 100 km, what is the straight-line distance between the initial and final positions of the space station?

Example 4 (sidebar p. 493)

a) $P(-4,3)$ is a terminal point of angle θ in standard position. To the nearest tenth of a radian, determine the possible values of θ in the domain $-2\pi \le \theta \le 2\pi$.

b) Given $\cot\theta = -2$; to the nearest tenth of a radian, determine the values of θ in the domain $-2\pi \le \theta \le 2\pi$.

Homework: #6, 9, 10, 12 – 15 in the exercises (p. 494 – 501). Answers on p. 501.