



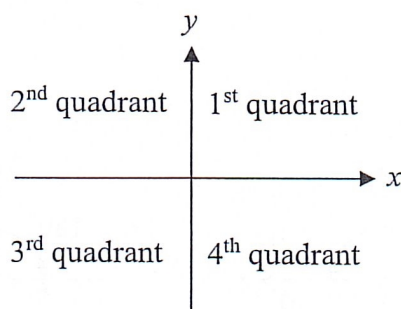
Name: _____ () Class: _____ Date: _____

MA304.2.1 – The Four Quadrants

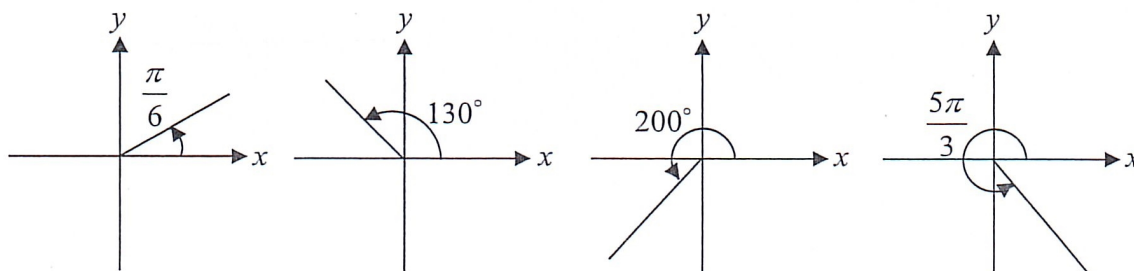
At the end of this unit, you should be able to

- understand how angles are measured in trigonometry
- understand and find basic angles

If we look at the standard x - y plane, the plane is divided into four regions, and we call them **quadrants**.

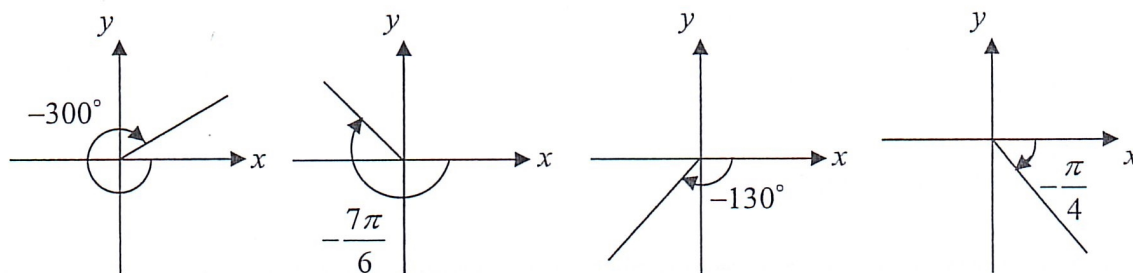


For a given coordinate of a point in the plane, we can assign an angle from the origin to the point to denote the directional position of this point. This angle is always measured from the positive x -axis, in an anticlockwise sense:

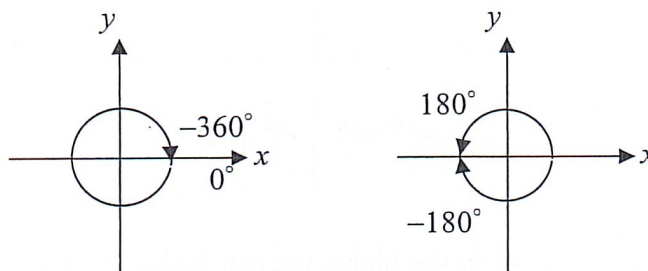


Notice this is different from bearings, which we will encounter later.

We can also measure angles in the opposite directions as follows, but they would be negative:



All the angles are **modulo** 360° (or 2π). In other words, we can go around the origin as many rounds as we like, but eventually we can always write the angle as one of a 'simpler' angle within the range $0^\circ \leq \theta < 360^\circ$ (notice that $360^\circ = 0^\circ \bmod 360^\circ$). Alternatively, we can choose to describe the quadrant with angles such as $-360^\circ < \theta \leq 0^\circ$, or even $-180^\circ < \theta \leq 180^\circ$.



E1. Rewrite the following angles into the respective domain indicated in the square brackets:

(a) 420° $[0^\circ \leq \theta < 360^\circ]$

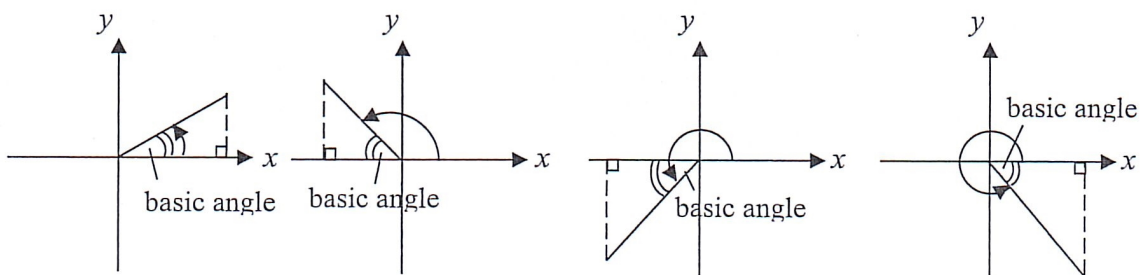
(b) $-\frac{2\pi}{9}$ $[0 \leq \theta < 2\pi]$

(c) 240° $[-180^\circ < \theta \leq 180^\circ]$

(d) $\frac{14\pi}{3}$ $[-\pi < \theta \leq \pi]$ and $[0 \leq \theta < 2\pi]$

(e) -435° $[-360^\circ < \theta \leq 0^\circ]$ and $[0^\circ \leq \theta < 360^\circ]$

For any angle in any of the four quadrants, whether positive or negative, there is a **basic angle** for it. From the basic angle, we can then form a basic right-angled triangle. This angle is always made between the hypotenuse and the **horizontal** axis.



Now, understanding trigonometric ratios of angles in all the four quadrants can then be reduced to understanding trigonometric ratios of acute angles, since all the basic angles are acute.