corrective action. An excellent process to use in this scenario is called the 3 Ps: Perceive, Process, and Perform.

The Perceive, Process, Perform (3P) model for ADM offers a simple, practical, and systematic approach that can be used during all phases of flight. *[Figure 5-3]* To use it, the pilot will:

- Perceive the given set of circumstances for a flight.
- Process by evaluating their impact on flight safety.
- Perform by implementing the best course of action.

Examine a pilot flying into a canyon. Many pilots fail to see the difference between a valley and a canyon. Most valleys can be characterized as depressions with a predominant direction. A canyon is also a valley, but it is a very deep valley bordered by cliffs. One can infer that making a turn across a valley will be over rising terrain whose slope is shallow. A canyon, however, is bordered by vertical walls. Additionally, valleys are typically wider than canyons. However, before proceeding it is important to understand the relationship between rate of turn and turn radius.

Rate of Turn

The rate of turn (ROT) is the number of degrees (expressed in degrees per second) of heading change that an aircraft makes. The ROT can be determined by taking the constant of 1,091, multiplying it by the tangent of any bank angle and dividing that product by a given airspeed in knots as illustrated in *Figure 5-4*. If the airspeed is increased and the ROT desired is to be constant, the angle of bank must be increased; otherwise, the ROT decreases. Likewise, if the airspeed is held constant, an aircraft's ROT increases if the bank angle is increased. The formula in *Figures 5-4* through *5-6* depicts the relationship between bank angle and airspeed as they affect the ROT.

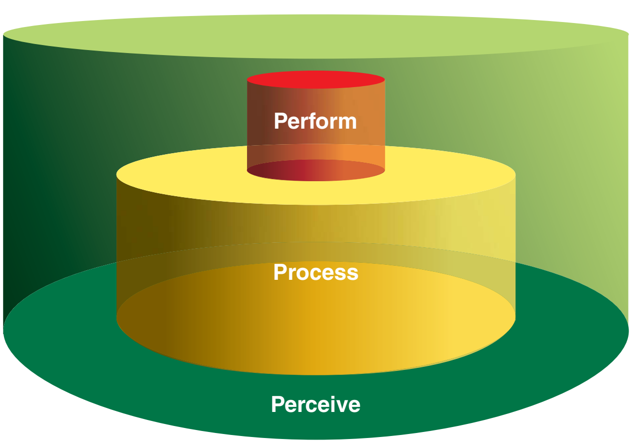

Figure 5-3. *The 3P model: Perceive, Process, and Perform.*

$$\text{ROT} = \frac{\text{1,091 x tangent of the bank angle}}{\text{airspeed (in knots)}}$$

Example The rate of turn for an aircraft in a coordinated turn of 30° and traveling at 120 knots would have a ROT as follows.

$$\text{ROT} = \frac{\text{1,091 x tangent of } 30^\circ}{\text{120 knots}}$$

$$\text{ROT} = \frac{\text{1,091 x 0.5773 (tangent of } 30^\circ)}{\text{120 knots}}$$

ROT = 5.25 degrees per second

Figure 5-4. *Rate of turn for a given airspeed (knots, TAS) and bank angle.*

NOTE: All airspeeds discussed in this section are true airspeed (TAS).

Airspeed significantly affects an aircraft's ROT. If airspeed is increased, the ROT is reduced if using the same angle of bank used at the lower speed. Therefore, if airspeed is increased as illustrated in *Figure 5-5,* it can be inferred that the angle of bank must be increased in order to achieve the same ROT achieved in *Figure 5-6.*

What does this mean on a practicable side? If a given airspeed and bank angle produces a specific ROT, additional conclusions can be made. Knowing the ROT is a given number of degrees of change per second, the number of seconds it takes to travel 360° (a circle) can be determined by simple division. For example, if moving at 120 knots with a 30° bank angle, the ROT is 5.25° per second and it takes 68.6 seconds (360° divided by 5.25 = 68.6 seconds) to make a complete circle. Likewise, if flying at 240 knots TAS and using a 30° angle of bank, the ROT is only about 2.63° per second and it takes about 137 seconds to complete a 360° circle. Looking at the formula, any increase in airspeed is directly proportional to the time the aircraft takes to travel an arc.

Example Suppose we were to increase the speed to 240 knots, what is the rate of turn? Using the same formula from above we see that:

$$\text{ROT} = \frac{\text{1,091 x tangent of } 30^\circ}{\text{240 knots}}$$

ROT = 2.62 degrees per second

An increase in speed causes a decrease in the rate of turn when using the same bank angle.

Figure 5-5. *Rate of turn when increasing speed.*