

## Answer on Question #48648, Physics, Other

A submarine is shaped as a long cylinder, which has a radius  $oa\ r = 1.26m$  and a length of  $L = 13.2m$ . The submarine is able to produce a Max Thrust of 16,000 N. If the submarine turned the corner at terminal velocity (10.8 m/s), (following a circular path with radius of curvature  $R = 120m$  at constant elevation), what would the perceived increase in gravity be for those inside the submarine?

### Solution:

Perceived gravity is just the definition of weight in the submarine frame of reference.

$$g_p = a_r$$

Centripetal acceleration is part of moving in a circular path. Centripetal acceleration points toward the center of the circular path of the submarine, but is felt by passengers as a force pushing them to the outer edge of the circular path.

The equation for centripetal acceleration is:

$$a_r = \frac{v^2}{r}$$

Where  $a_r$  is centripetal acceleration,  $v$  is velocity in meters per second, and  $r$  is the radius of the circle in meters.

Thus,

$$g_p = \frac{10.8^2}{120} = 0.972 \text{ m/s}^2$$

**Answer:**  $g_p = 0.972 \text{ m/s}^2$ .