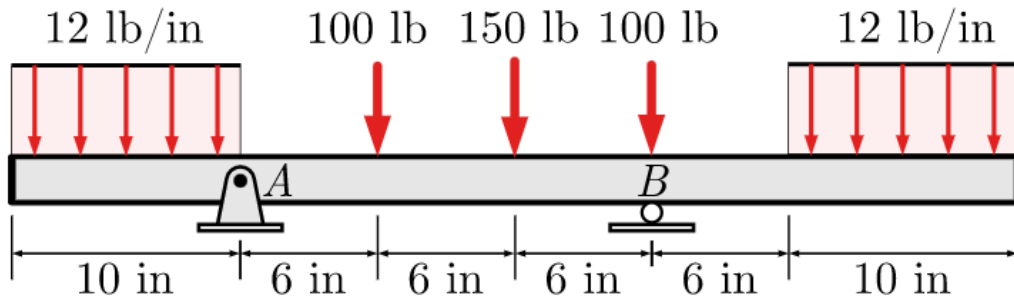


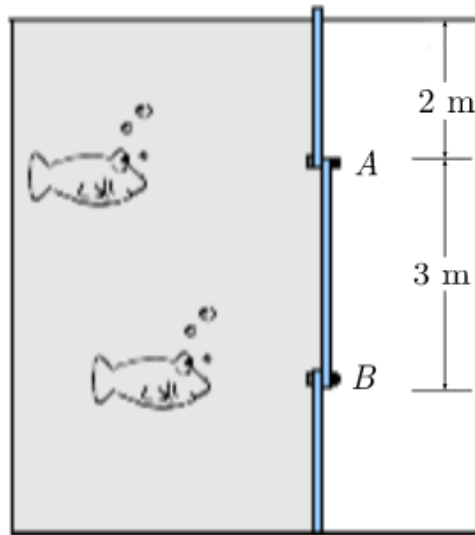
Unless otherwise mentioned, these problems should be solvable using a basic calculator. Practice clear communication by showing all work (free body diagrams, algebra, etc). This will be required to receive full credit on any graded problems.

1. Find the reactions at the supports for the beam shown.



2. An aquarium tank has a $3\text{ m} \times 1.5\text{ m}$ window AB for viewing the inhabitants. The tank contains water with a density $\rho = 1000\text{ kg/m}^3$.

Find the force of the water on the window, and the location of the equivalent point load.

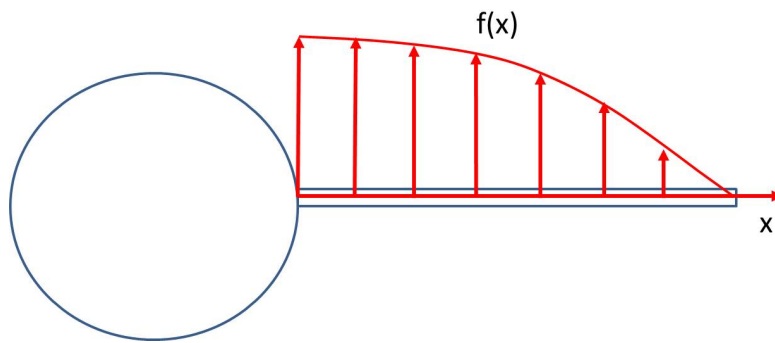


3. The lift force generated on an aircraft wing is distributed along the span of the wing. Generally the distributed force is larger near the body of the aircraft and decreases toward the wingtip. A simple diagram showing the aircraft body (viewed from the front) and one wing is shown below. Treat the wing as rigidly attached to the aircraft body and assume the distributed lift force is given by an elliptical profile for $x \leq 3\text{m}$:

$$f(x) = \sqrt{9 - x^2} \text{ N/m}$$

Find:

- (a) The magnitude and location of the resultant of the distributed load.
- (b) The support reaction applied by the aircraft body on the aircraft wing at $x = 0$.



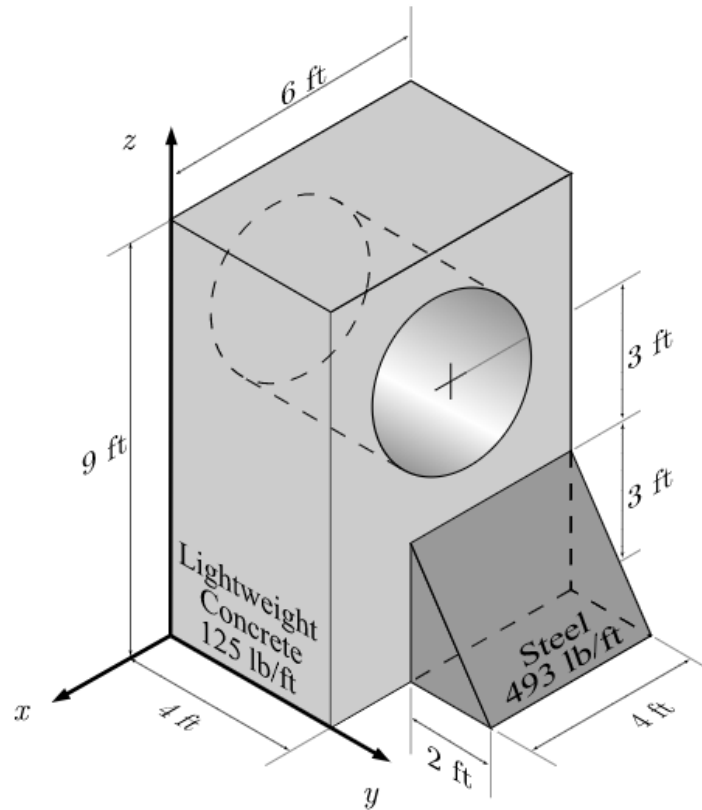
Simplified diagram of wing loading.

4. A composite solid consists of a rectangular block of lightweight concrete and a triangular wedge of steel with dimensions as shown. The rectangular block has a 2 ft radius circular hole, centered and drilled through its full depth, perpendicular to the front and back faces.

Assume:

- $\gamma_C = 125\text{ lb/ft}^3$
- $\gamma_S = 493\text{ lb/ft}^3$

Find the center of mass of this composite solid.



5. Book problems:

- (a) 5.76
- (b) 5.97
- (c) 5.111

Additional Practice Problems: 5.73, 5.74, 5.86, 5.102, 5.109

The quiz problem will not be selected from these additional practice problems. However, these exercises contain important elements of the course and similar problems may appear on the exam.