

# Merit 231 WS 11

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## Study Skill: Interleaved Practice

Research suggests that when you mix your practice of related skills rather than blocking one skill at a time, your recall, accuracy, and critical thinking are improved. In one study of math students, test scores for interleaved learners were 25% higher than the scores for blocked learners just days after the last lesson. A month after the last lesson, scores were 75% higher than blocked learners.

Source: <https://www.scientificamerican.com/article/the-interleaving-effect-mixing-it-up-boosts-learning/>

### Question 1

Why do you think interleaved practice makes students so much more successful?

### Question 2

How can you use interleaved practice in your studying and homework, ahead of the next exam?

## Hydrostatic Force Derivation

### Problem 1

Consider a vertical plate submerged underwater.

(a)

Write an expression for the hydrostatic pressure at  $d$  meters below the surface, where  $\rho$  is the density of water and  $g$  is acceleration due to gravity.

(b)

Write an expression for the hydrostatic force in terms of pressure and area. Considering part (a), is the hydrostatic force constant on the whole plate?

(c)

On an infinitesimally small horizontal strip, we can assume that the depth  $d$  is constant. If the strip has length  $l(y)$  and height  $\Delta y$ , write formulas for the area of the strip, the pressure exerted, and the force exerted.

(d)

Write the force on the whole plate in terms of an integral. You can leave  $d, \rho, g, l(y)$  in your expression.

## Practice Problems

### Problem 1

Determine the hydrostatic force on a triangular plate with base width 4m and height 6m, submerged vertically so that the base of the triangle is at the water's surface and the rest of the triangle is below. Draw a picture as part of your solution.

## Problem 2

Find the hydrostatic force on a circular plate of radius 6m, submerged vertically where the topmost point of the plate is 3m below the surface. Draw a picture as part of your solution. (Hint: use the formula for a chord of a circle).

## Challenge Problem

Find the hydrostatic force on a washer of outer radius 5 and inner radius 3, submerged vertically 6m below the surface.