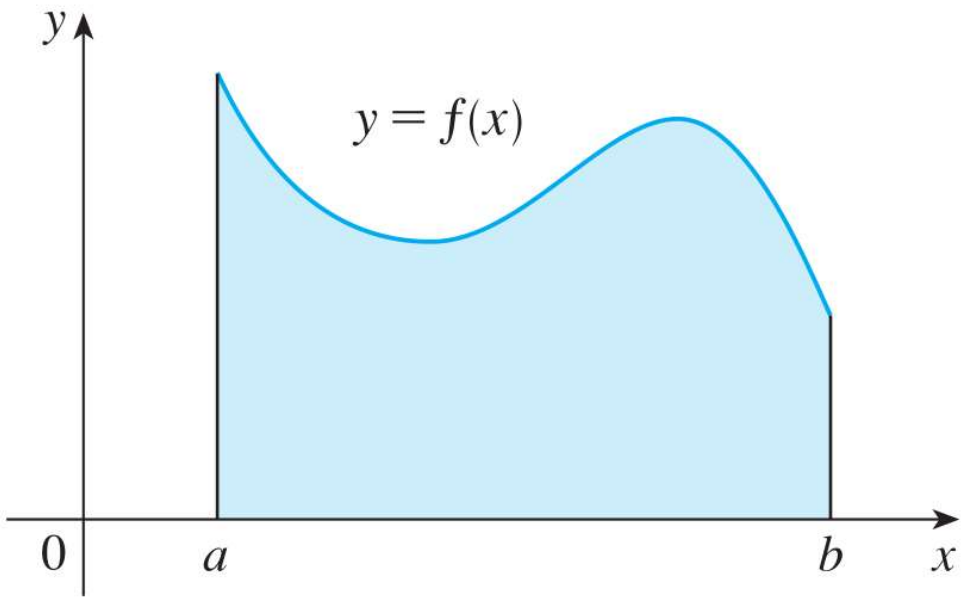
Daily Quiz

- Go to Socrative.com and complete the quiz.
- Room Name: HONG5824
- Use your full name.

6.6 Work

- Work = Force x Distance.
- If force is a function that changes with respect to distance, then work can be thought of as the area under the curve.



$$W = \int_a^b f(x)\, dx$$

6.6 Work

When a particle is located a distance x feet from the origin, a force of x^2+2x pounds acts on it. How much work is done in moving it from $x = 1$ to $x = 3$?

6.6 Work

Hooke's Law states that the force required to maintain a spring stretched x units beyond its natural length is proportional to x:

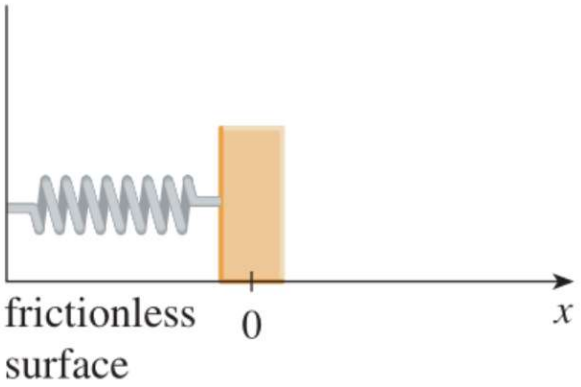
$$f(x) = kx$$

where k is a positive constant called the **spring constant**.

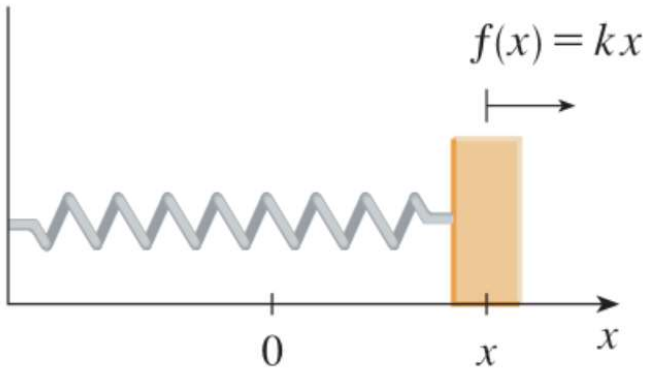
If the spring's natural location is not at the origin, then the equation becomes

$$f(x) = k(x - x_0)$$

where x_0 is the natural location of the spring.



(a) Natural position of spring



(b) Stretched position of spring

6.6 Work

A force of 40 N is required to hold a spring that has been stretched from its natural length of 10 cm to a length of 15 cm. How much work is done in stretching the spring from 15 cm to 18 cm?

6.6 Work (Choosing a coordinate system)

A 200-lb cable is 100 ft long and hangs vertically from the top of a tall building. How much work is required to lift the cable to the top of the building?

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6.6 Work

A chain lying on the ground is 10 m long and its mass is 80 kg. How much work is required to raise one end of the chain to a height of 6 m?

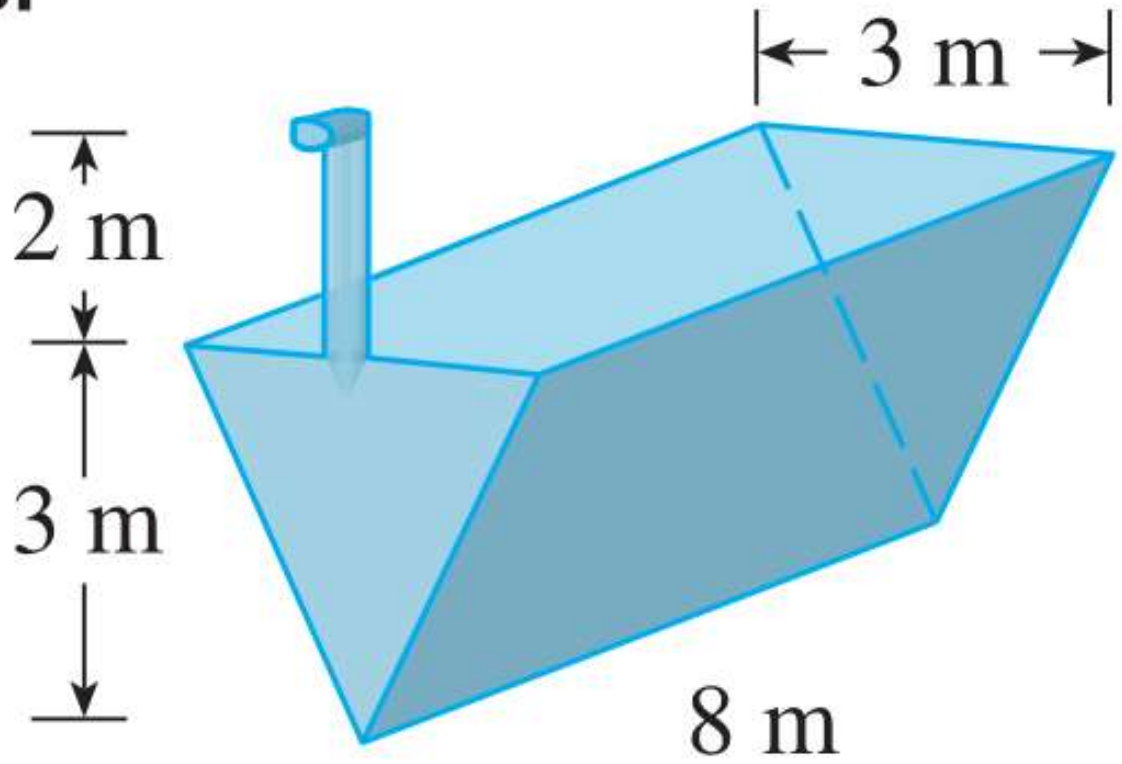
6.6 Work

A tank has the shape of an inverted circular cone with height 10 m and base radius 4 m. It is filled with water to a height of 8 m. Find the work required to empty the tank by pumping all of the water to the top of the tank. (The density of water is 1000 kg/m^3.)

6.6 Work

A tank is full of water. Find the work required to pump the water out of the spout.

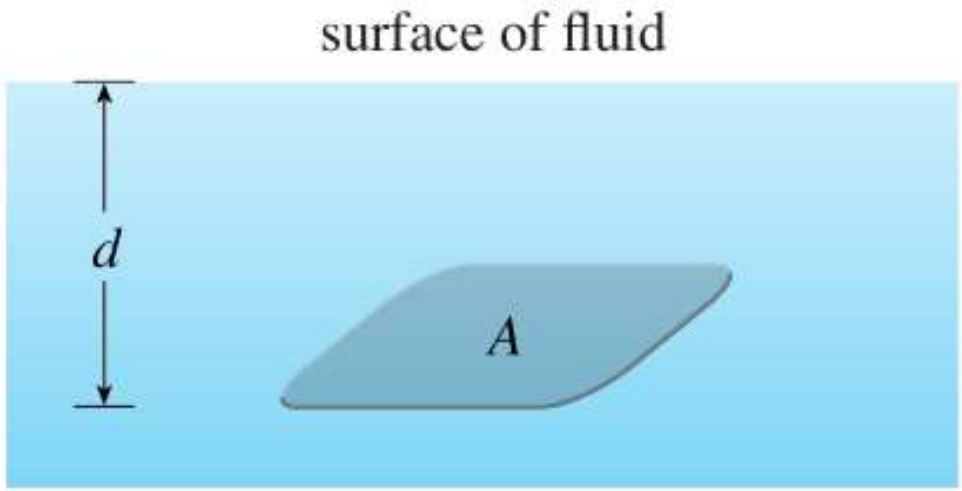
19.



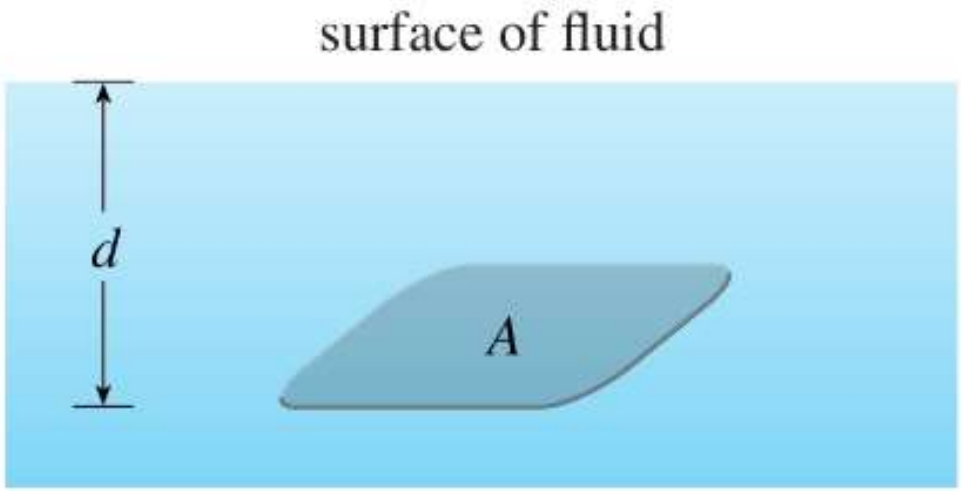
6.6 Hydrostatic Pressure and Force

- Why do you feel more pressure as you dive deeper?
- Answer: There's more water above you weighing you down as you dive deeper.

6.6 Hydrostatic Pressure and Force



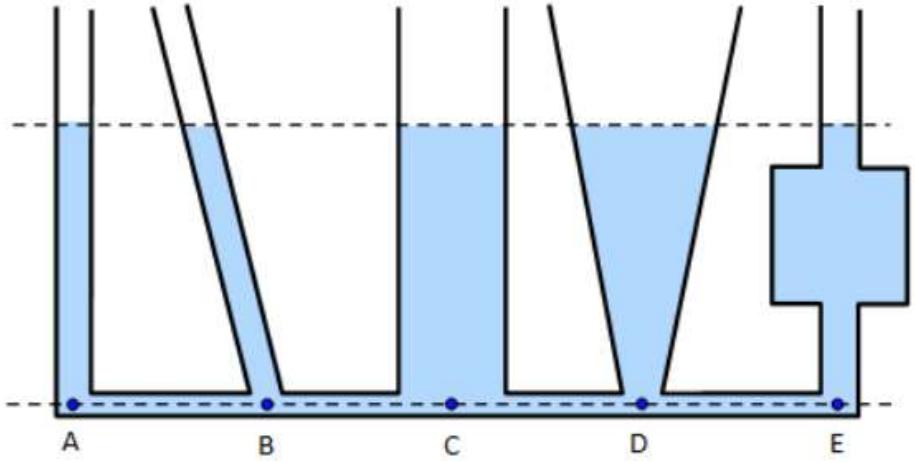
6.6 Hydrostatic Pressure and Force



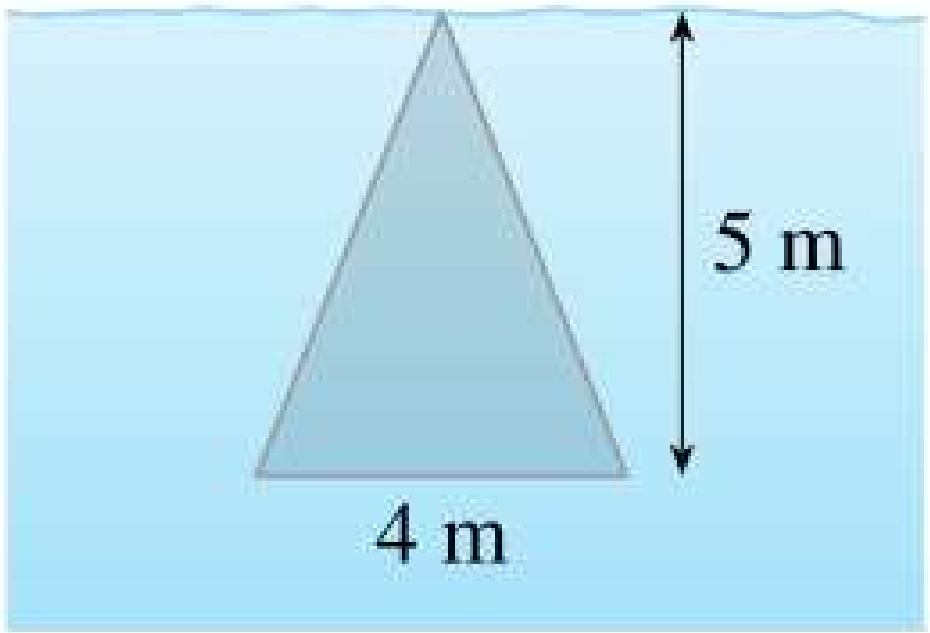
$$P = \frac{F}{A} = \rho g d$$

6.6 Hydrostatic Pressure and Force

At any point in a liquid the pressure is the same in ALL directions. The pressure of a liquid is the same at any given depth below the surface regardless of the shape of the container.



Note: If the water level was different for each shape, then the bottom points would have different pressures.

6.6 Hydrostatic Pressure and Force

A triangle with base 4 m and height 5 m is submerged vertically in water so that the tip is even with the surface. Express the hydrostatic force against one side of the plate as an integral.