

# Calculus

## Chapter 6: Applications of Integrals

### Lesson 4: Work

#### Question #1

Reference Q.639

Find the work done when a constant force of 100 N is applied to move an object from  $x = 3.0 \text{ m}$  to  $7.0 \text{ m}$ .

#### Question #2

Reference Q.640

Find the work done when a non-constant force of  $F(x) = \frac{200}{x^2}$  N is used to move an object from  $x = 1.0 \text{ m}$  to  $5.0 \text{ m}$

#### Question #3

Reference Q.641

A spring is 10 cm long when not stretched. If it takes 60 N to stretch it from its resting position of 10cm to a position of 25 cm, how much work is done to stretch it that far?

#### Question #4

Reference Q.642

A spring whose natural length of 22.0cm is stretched to 27.2cm in length. What is the work done if the spring constant is  $6.0 \frac{\text{N}}{\text{m}}$ ?

#### Question #7

Reference Q.9261

A cylindrical tank of water has a radius of 2.0 m and a height of 6.0 m and is empty. How much work does a pump have to do to pump all of the water up and out of the tank? (the density of water is  $1000 \text{ kg/m}^3$ )

#### Question #8

Reference Q.9260

A spring is 10 cm long when not stretched. If it takes 20 N to stretch it from its resting position of 10 cm to a position of 15 cm, how much work is done to stretch it that far?

#### Question #5

Reference Q.643

A cylindrical tank of 22.1m high with radius 12.2m is filled to 10m high with water. How much work must be done to pump all the water out of the tank?

(density of water is  $1000 \text{ kg/m}^3$ )

#### Question #6

Reference Q.644

A bucket that leaks weighs 20 N when empty. It is lifted from the ground at a constant rate to a position 10m above the ground. The bucket starts with approximately 60 N of water, but it leaks constantly so that it just becomes empty at the moment it reaches the top. Find the amount of work done:

- lifting the water alone
- lifting the bucket alone
- both together.

#### Question #9

Reference Q.9259

Find the work done when a non-constant force of  $F(x) = \frac{30}{x^3}$  N is used to move an object from  $x = 1.0 \text{ m}$  to  $4.0 \text{ m}$

#### Question #10

Reference Q.9258

Find the work done when a constant force of 20 N is applied to move an object from  $x = 5.0 \text{ m}$  to  $8.0 \text{ m}$ .