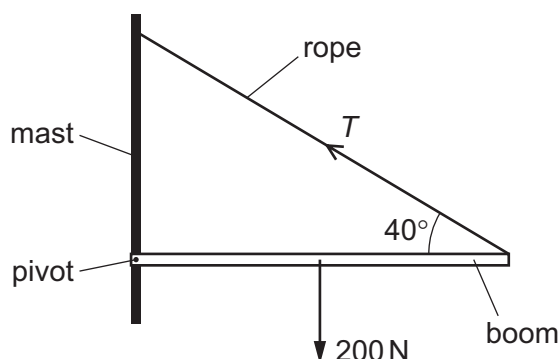


- 12** Two parts of a sailing boat are the mast and the boom. The mast is a vertical rigid beam and the boom is a horizontal rigid beam. One end of the boom is attached to the mast by a pivot. The other end of the boom is connected to the mast by a rope, as shown.



The rope is at an angle of  $40^\circ$  to the horizontal and exerts a tension force  $T$  on the boom. The weight of the boom is 200 N. The mass of the boom is uniformly distributed along its length. The boom is in equilibrium.

What is the magnitude of  $T$ ?

- A** 130 N                      **B** 160 N                      **C** 260 N                      **D** 310 N
- 13** Full-fat milk is made up of fat-free milk mixed with fat.

A volume of  $1.000 \times 10^{-3} \text{ m}^3$  of full-fat milk has a mass of 1.035 kg. It contains 4.00% fat by volume.

The density of fat-free milk is  $1.040 \times 10^3 \text{ kg m}^{-3}$ .

What is the density of fat?

- A**  $1.25 \times 10^2 \text{ kg m}^{-3}$   
**B**  $9.15 \times 10^2 \text{ kg m}^{-3}$   
**C**  $9.28 \times 10^2 \text{ kg m}^{-3}$   
**D**  $1.16 \times 10^3 \text{ kg m}^{-3}$
- 14** Which expression for pressure is correct?
- A** force per unit area  
**B** mass per unit area  
**C** mass per unit volume  
**D** weight per unit volume