Answer on Question 58118, Physics, Mechanics, Relativity

Question:

12. A string of natural length L extends to a new length L' under tensile force F. If Hooke's law applies, the work done in stretching the spring is

a) $\frac{1}{2}FL$

b) $\frac{1}{2}FL'$

c) $\frac{1}{2}F(L - L')$

d) $F(L - L')$

Solution:

Let's first find the spring constant from the Hooke's law:

$$F = kx = k(L - L'),$$

here, F is the force acting on the spring, k is the spring constant, $x = (L - L')$ is the elongation of the spring.

Then, the spring constant will be:

$$k = \frac{F}{x} = \frac{F}{(L - L')}.$$

By the definition, the work done in stretching the spring is:

$$Work_{spring} = \frac{1}{2}kx^2 = \frac{1}{2}\frac{F}{(L - L')}(L - L')^2 = \frac{1}{2}F(L - L').$$

Answer:

c) $\frac{1}{2}F(L - L')$

13. The molecules of a liquid are held together by what type of forces?

a) cohesive forces

b) adhesive forces

c) viscosity

d) surface tension forces

Solution:

The molecules of a liquid are held together by cohesive forces. Also, these forces are responsible for the phenomenon of surface tension. In the bulk of the liquid, each molecule is pulled equally in every direction by neighboring liquid molecules, resulting in a net force of zero. The molecules at the surface do not have the same molecules on all sides of them and therefore are pulled inwards. This creates some internal pressure and forces liquid surfaces to contract to the minimal area. **Answer:**

a) cohesive forces

14. Which of these is correct about viscosity?

a) it increases with increase in temperature

b) it varies with the relative velocity of the surfaces in contact

c) it is does not vary from one liquid to another

d) both viscous force and upthrust act upwards

Solution:

Since the viscosity is proportional to the relative velocity between the two surfaces, the correct answer is b) it varies with the relative velocity of the surfaces in contact.

Answer:

b) it varies with the relative velocity of the surfaces in contact