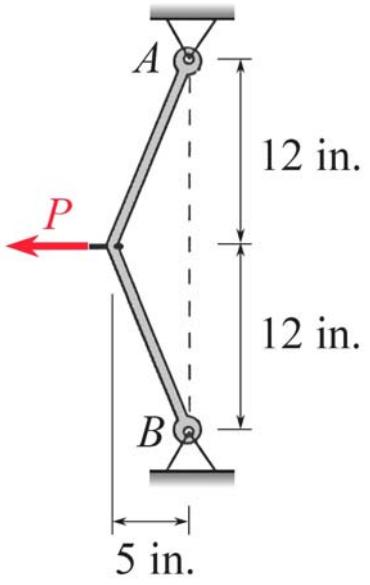
MEEG 2003 Quiz #3.m07.083

1. ③ Describe (*a*) the *parallelogram law*, (*b*) the *triangle rule*, (*c*) a *space diagram*.

2. ⑦ An elastic cord is held in equilibrium by a 118-lb force **P** as shown. When the cord is stretched directly between the supports *A* and *B*, the tension is 101.4 lb. Determine for the cord (*a*) the spring modulus *k*, (*b*) the free length *L*.



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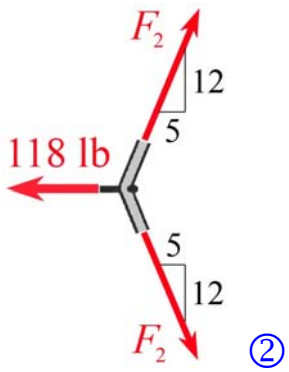
1. (*a*) The *parallelogram law* states that the sum of two vectors is a single vector, called their *resultant*, given by the directed diagonal of a parallelogram if the two sides directed away from the tail of this diagonal are equal to those two vectors. (*b*) The *triangle rule* states that when two vectors are drawn to scale and in tip-to-tail fashion, the vector connecting, and directed from, the tail of the first vector to the tip of the second vector gives the resultant of those two vectors. (*c*) A *space diagram* is a sketch showing the physical and geometrical conditions of a system. ③

2.



②

$P = 118$ lb $\quad F_1 = 101.4$ lb $\quad x_1 = 24 - L \quad x_2 = 26 - L$

$\pm\rightarrow \Sigma F_x = 0: \quad \frac{5}{13} F_2(2) - 118 = 0 \quad F_2 = 153.4$ lb ①

$F_1 = k x_1: \quad 101.4 = k(24 - L)$ ①

$F_2 = k x_2: \quad 153.4 = k(26 - L)$ ①

$k = 26$ lb/in. $\quad L = 20.1$ in. or $k = 312$ lb/ft $\quad L = 1.675$ ft

②