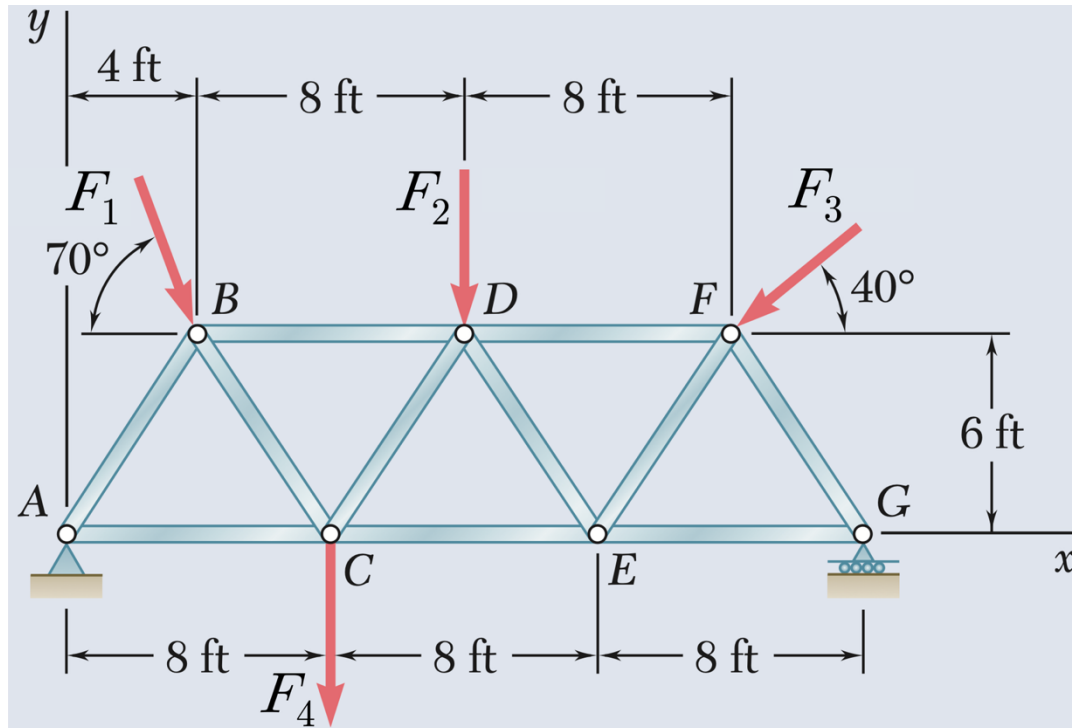


Quiz 3

for the ENS161 B5-1 and B6 classes offered in A.Y. 2025-2026 S1

Instructions. Express desired quantities in SI units. Vector directions must be in degrees measured counterclockwise from the positive x-axis. Indicate clockwise moments, downward forces, and leftward forces as negative values. Present your final answers rounded to five (5) decimal places for non-integer values, and with five (5) zeros after the decimal point for integer values.



Problem 1. A truss is modelled as being supported at A by a pin and at G by a roller. For B5-1, take F_1 , F_2 , F_3 , and F_4 to be 810, 420, 610, and 30 newtons, respectively. For B6, take F_1 , F_2 , F_3 , and F_4 to be 1.62, 0.84, 1.22, and 0.06 kilonewtons, respectively.

Replace the loading by an equivalent force-couple system. Compute:

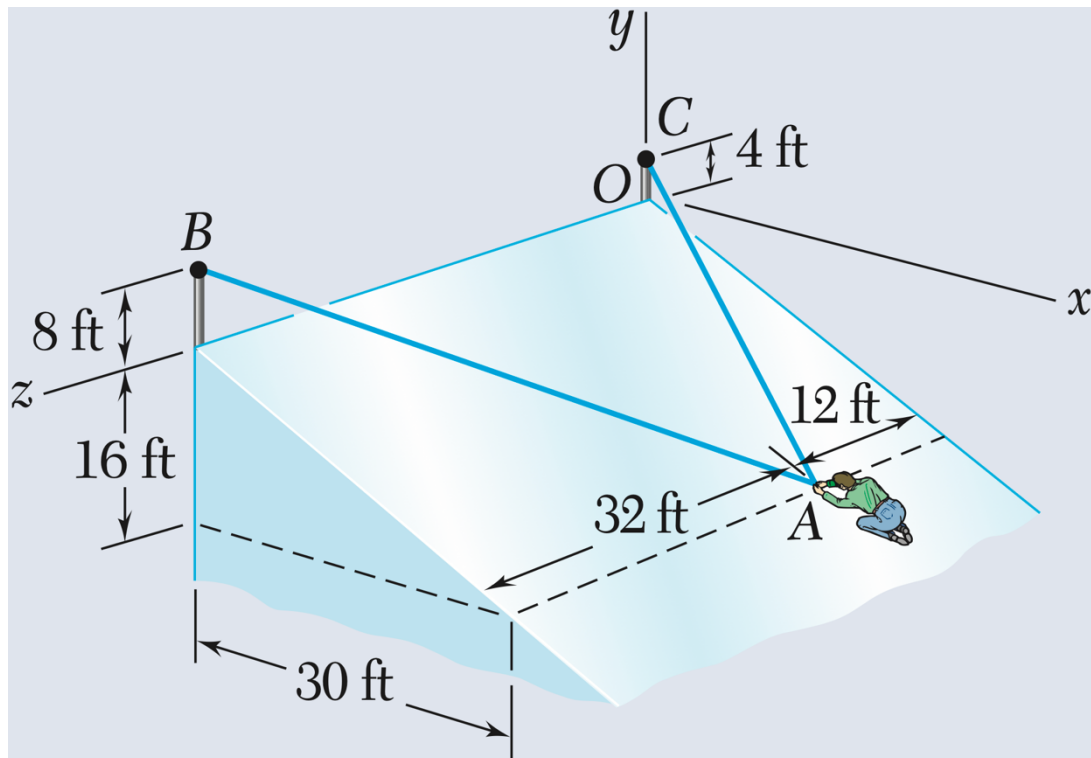
- (5 points) the force and the couple moment if the equivalent system is placed at C; and
- (5 points) the force and the couple moment if the equivalent system is placed at E.

Replace the loading by a single-force equivalent. Determine where the force

- (5 points) the force intersects the line joining A and G, relative to A; and
- (5 points) the force intersects the line joining B and F, relative to F.

Analyzing the truss under static equilibrium, the pin is often represented by a horizontal force A_h and a vertical force A_v , and the roller by a vertical force G_v . Determine:

- (1 point) A_h ,
- (1 point) A_v , and
- (1 point) G_v .



Problem 2. A person uses two ropes AB and AC to remain still on an icy, sloped surface. Let the person weigh 75 kg for B5-1 and 57 for B6.

Determine:

- (2 points) the tension in rope AB ;
- (2 points) the tension in rope AC ;
- (3 points) the force exerted by the surface on the person;
- (2 points) the moment of the person's weight about the line joining B and O ;
- (3 points) the moment about the line joining B and O , caused by the force exerted by the surface on the person.