1. Define (a) work of a force on a body, (b) work of a moment on a body, (c) location of displacement center of a body.

2. A 20-ft ladder weighing 100 lb with its center of gravity at its midpoint G is kept from sliding by a 16-lb horizontal force P acting at its end B as shown. Neglecting friction forces at supports A and B, determine the distance x.

1. (a) Work of a force on a body is equal to the force on the body times the displacement of the body in the direction of the force. (b) Work of a moment on a body is equal to the moment on the body times the angular displacement of the body in the direction of the moment. (c) The displacement center of a body is located at the point of intersection of two straight lines that are drawn through two different points of the body and are perpendicular to the virtual displacement vectors of those two points, respectively.

2. **Step 1:** Draw the FBD of the ladder.

   **Step 2:** Draw the VDD of the ladder with a strategy, which allows the unknown parameter x, but no other unknowns, to be involved in the total virtual work done.

   **Step 3:** Refer to the FBD and VDD to set \( \delta U = 0 \) to obtain

   \[
   100 \left( \frac{x}{2} \delta \theta \right) + 16 \left( -\sqrt{400 - x^2} \delta \theta \right) = 0 \quad x = 6.0955 \quad x = 6.10 \text{ ft}
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