



PTC Education Program

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The slide contains a list of license details and two images. The first image shows three USB license keys: one white, one blue, and one blue with a red smiley face. The second image shows a purple 3D printed mug with a white lid, illuminated by a spotlight.

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**ENGINEERING PROBLEMS: Statics: Reactions**

**Introduction**  
This worksheet can be used to find the reactions of a simply supported beam with a point load, uniform distributed load, and an applied moment.

**Statement**  
A simply supported beam of length, L, is supporting a point load, P, a uniform load, w, and an applied moment, M. Find the reactions.

**Parameters**

Beam length:	$L = 20 \text{ ft}$
Uniform load intensity:	$w = 40 \frac{\text{lb}}{\text{ft}}$
Uniform load location:	$x_U = 5 \text{ ft}$
Uniform load length:	$l_U = 10 \text{ ft}$
Point Load:	$P = 500 \text{ lbf}$
Point load location:	$x_P = 5 \text{ ft}$
Applied Moment:	$M = 100 \text{ lbf}\cdot\text{ft}$
Moment location:	$x_M = 10 \text{ ft}$

Note: If there is no uniform load, point load, or applied moment, then set those parameters equal to zero (i.e.,  $P = 0 \text{ lbf}$ ).

**Solution**  
The reactions are found by summation of moments about support A to find reaction B,  $R_B$ , and summation of forces in the y direction to find reaction A,  $R_A$ .

Summation of moments about support A:  

$$\Sigma M_A = R_B L + M - P x_P - w l_U \left( x_U + \frac{l_U}{2} \right) = 0 \quad R_B = \frac{w l_U \left( x_U + \frac{l_U}{2} \right) + P x_P - M}{L} \quad R_B = 520 \text{ lbf}$$

Summation of forces in the y direction:  

$$\Sigma F_y = R_A + R_B - P - w l_U = 0 \quad R_A = w l_U + P - R_B \quad R_A = 580 \text{ lbf}$$



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