I don't have an easy way to draw a moment so I used the broken arrow with two heads to show the moment (often you will see a couple drawn this way).

Summing forces in the y-direction and isolating the y-component of B.

\[ B := \frac{900 \text{N}}{\sin(45\text{deg})} = 1272.79 \text{ N} \]

Summing forces in the x-direction and isolating Ax.

\[ A_x := B \cdot \cos(45\text{deg}) = 900 \text{ N} \]

Summing moments about B and isolating the MB.

\[ M_B := -1 \cdot m \cdot 900 \text{N} - 600 \cdot N \cdot m + 2 \cdot m \cdot \cos(45\text{deg}) \cdot A_x = -227.208 \text{ N} \cdot m \]

I had originally assumed that the reactive moment at B was clockwise but when I get a negative answer, it means that my assumption was wrong and that the reactive moment at B from the collar is actually counterclockwise.
There is a bit of a trick to doing this problem. If you read the problem carefully, it makes the statement that the disk at D is about to move up the slope. At the point just before it moves, it will lose contact with the horizontal surface at B so there will be no normal force there. This reduces the problem to three unknowns (which unlike class can be solved).

\[
\sum F_x = 0 \\
\frac{4}{5} N_A - P = 0 \\
\sum F_y = 0 \\
\frac{3}{5} N_A - 200lb - 100lb + N_C = 0
\]

To develop the third expression we can utilize the fact the any force vector can be moved along its line of action to take the moment. We can move the normal at A (NA) to the center of the disk at D and take the moments about the center of E to solve for NA.

\[
\sum M_{aboutE} = 0 \\
-(0.5 ft)\left(\frac{4}{5} N_A\right) - (2.5 ft)\left(\frac{3}{5} N_A\right) + (2.5 ft)(200lb) = 0 \\
N_A := \frac{2.5ft \cdot 200lbf}{(0.5ft \cdot \frac{4}{5} + 2.5ft \cdot \frac{3}{5})} = 263.16 \text{ lbf} \\
P := \frac{4}{5} \cdot N_A = 210.53 \text{ lbf}
\]
In order to find \( B_x \), we have to know how much the spring was extended when \( \theta \) was increased from 0 to 15 degrees. To do that, we need a bit of trig. Consider if we look at a similar system oriented along the \( x \) axis.

\[
d_{\text{unstretched}} := 300 \text{mm} \cdot \sin(60^\circ) = 259.81 \text{ mm}
\]

When \( \theta \) is increased to 15 degrees, then the 60 degree angle is decreased by 15 degrees also to 45 degrees so the distance is decreased by the amount that the spring is stretched.

\[
d_{\text{stretched}} := 300 \text{mm} \cdot \sin(45^\circ) = 212.13 \text{ mm}
\]

So the spring is stretched by the difference in the unstretched and stretched distances.

\[
s := d_{\text{unstretched}} - d_{\text{stretched}} = 47.68 \text{ mm}
\]

\[
k := \frac{2 \text{ kN}}{\text{m}} \quad F_{\text{spring}} := k \cdot s = 95.35 \text{ N}
\]

Now summing the moments about \( A \).

\[
F := \frac{300 \text{mm} \cdot F_{\text{spring}} \sin(45^\circ)}{400 \text{mm}} = 50.57 \text{ N}
\]
\[A_x := F_{spring} + F \cdot \sin(15\text{deg}) = 108.44 \text{ N}\]

\[A_y := F \cdot \cos(15\text{deg}) = 48.84 \text{ N}\]
I had originally assumed that the reactive moment at B was clockwise but when I get a negative