Free Body Diagram Procedure Comparison - Particle vs Rigid Body

Particle Free Body Diagram	Rigid Body Free Body Diagram
1. Draw the particle	1. Draw the rigid body
2. Draw a coordinate system	2. Draw a coordinate system
3. Indicate all known forces acting on the particle with magnitude and direction clearly labeled.	3. Indicate all known forces and moments acting on the body with magnitude and direction clearly labeled.
4. Indicate all unknown forces acting on the particle with labels and indicate their assumed direction.	4. Indicate all unknown forces and moments acting on the body and indicate their assumed direction.
5. Label all relevant angles and dimensions. Label all relevant points.	5. Label all relevant angles and dimensions. Label all relevant points.

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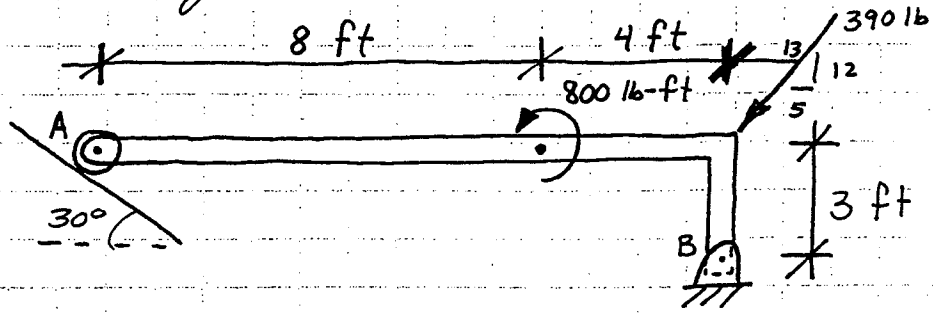
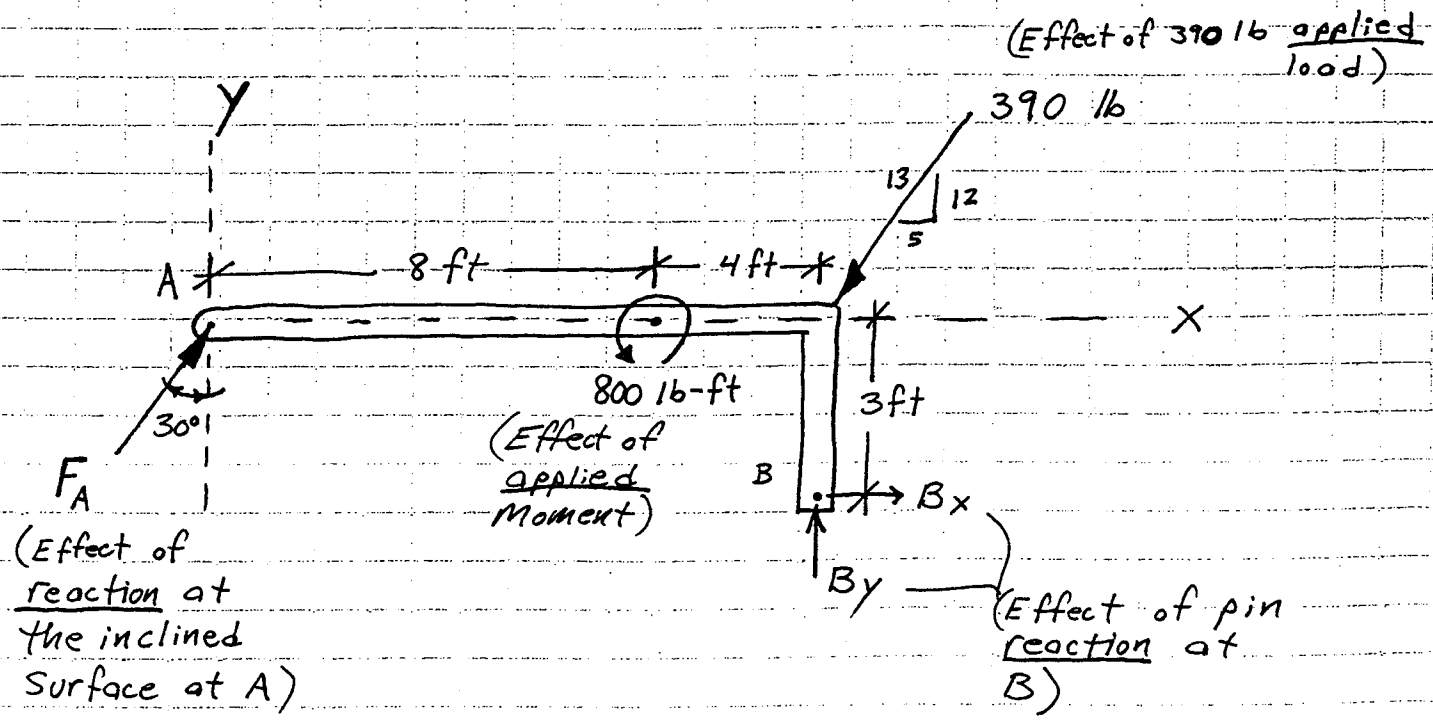
5-2 Draw the free-body diagram of member AB, which is supported by a roller at A and a pin at B. Explain the significance of each force on the diagram.



Solution:



Check list

1. Coordinate system and the body
2. All applied forces and reactions located with appropriate dimensions and angles
3. Label all forces and points.
4. Explain each force

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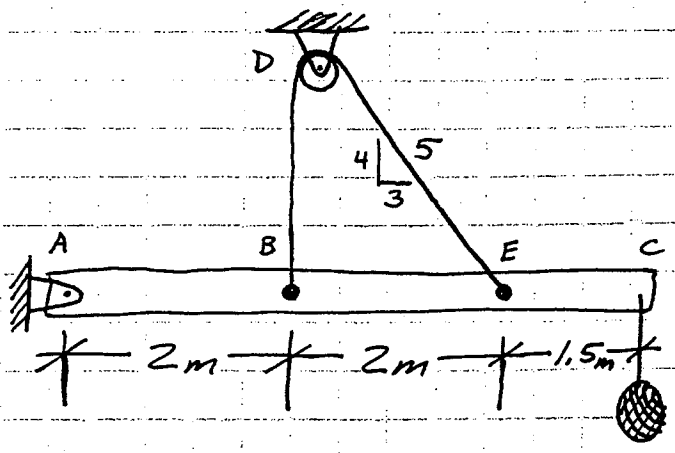
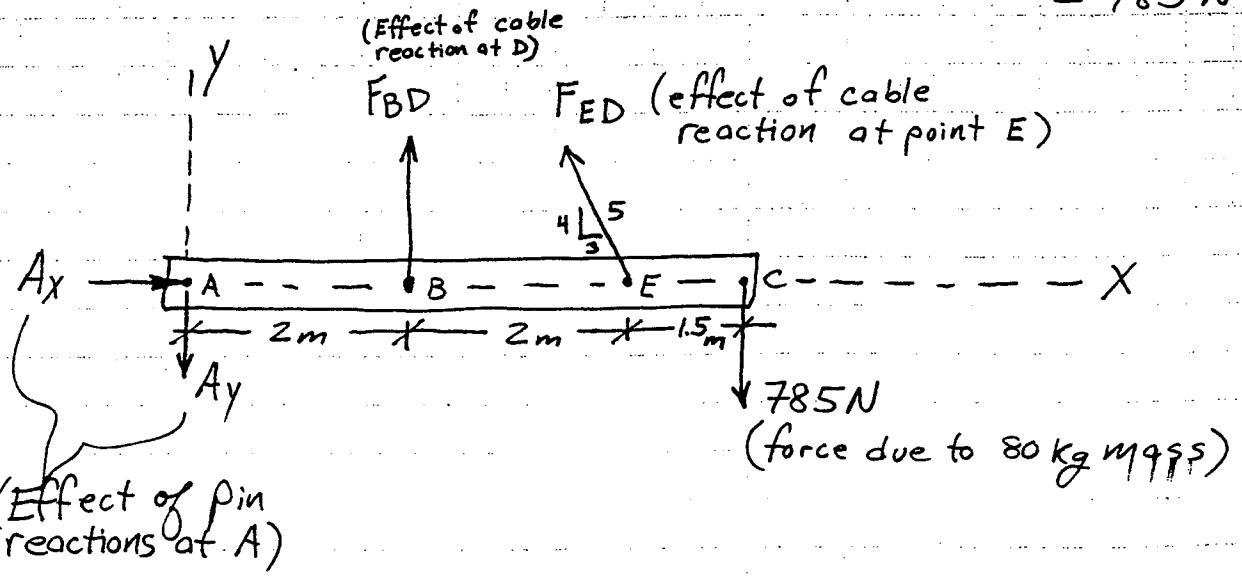
5-4 Draw the FBD of the beam which supports the 80 kg load and is supported by the pin at A and a cable which wraps around the pulley at D. Explain the significance of each force on the diagram. Neglect the thickness of the beam.



$\Rightarrow 80 \times 9.81 = 784.8\ N$
$= 785\ N$

Solution:



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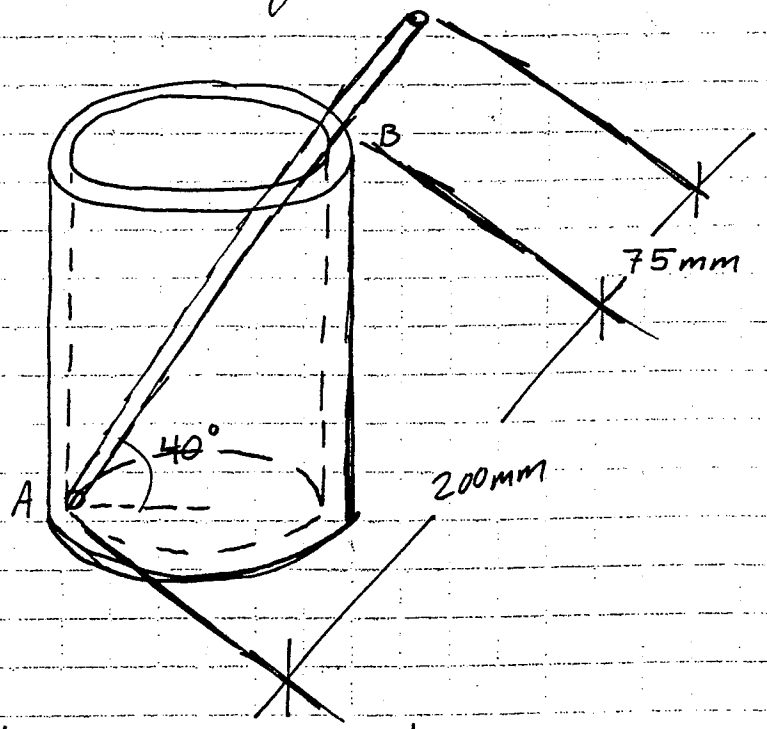
5-6 Draw the FBD of the smooth 20 g rod which rests inside the glass. Explain the significance of each force on the diagram.



Solution:

rod mass 20g = 0.02 kg

$wt = 0.02(9.81) = 0.1962\ N$