20 Minutes, Closed Book, Closed Notes,
- Please show all work on the front of the quiz sheets (work on the back will not be considered);
- Please clearly indicate your final answers and put them in the boxes or figures provided;
- For credit, you must show calculations that support your answers.

A frame consists of two members that are pin connected at point C. The frame is pin supported at points A and D as shown. Member CD is in the shape of a quarter circle. Due to the horizontal load applied at point B:
1. (8 points) Draw a **Free Body Diagram of member CD** in the box below. For full credit, show all known and unknown forces, relevant dimensions, and clearly indicate the direction of each force.

![Diagram of a Free Body Diagram of member CD](image)
2. (8 points) Draw a Free Body Diagram of member ABC in the box below. For full credit, show all known and unknown forces, relevant dimensions, and clearly indicate the direction of each force.
3. (9 points) If the frame is in equilibrium, find the forces acting on member ABC. Please place your final answers on the figure below. Clearly indicate the direction and magnitude of each force. Your answer should include the appropriate units.

\[ \Sigma F_\text{MA} = 0 \]

\[ -(8 \text{ kN})(3 \text{ m}) + \frac{1}{\sqrt{2}} F_{\text{CD}} (2 \text{ m}) + \frac{1}{\sqrt{2}} F_{\text{CD}} (6 \text{ m}) = 0 \]

\[ 8 \frac{F_{\text{CD}}}{\sqrt{2}} = 24 \]

\[ F_{\text{CD}} = \frac{24 \sqrt{2}}{8} = 3 \sqrt{2} \text{ kN} \]

\[ F_{\text{CD}} = 4.24 \text{ kN} \]

\[ \Sigma F_x = 0 \]

\[ 8 \text{ kN} - \frac{1}{\sqrt{2}} F_{\text{CD}} + A_x = 0 \]

\[ A_x = -5 \text{ kN} \]

\[ \Sigma F_y = 0 \]

\[ A_y + \frac{1}{\sqrt{2}} F_{\text{CD}} = 0 \]

\[ A_y + \frac{1}{\sqrt{2}} (3 \sqrt{2}) = 0 \]

\[ A_y = -3 \text{ kN} \]