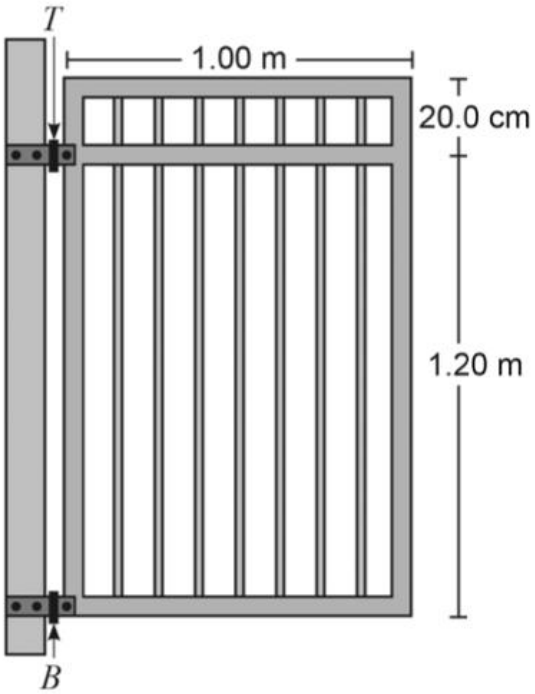
Question 17 **(14 marks)**

A uniform garden gate is attached to its support by two hinges (T and B). The top hinge (T) is fixed 20.0 cm below the top of the gate and the bottom hinge is fixed to the bottom of the gate. The gate has a mass of 25.7 kg. It is 1.00 m wide and 1.40 m tall.



Note: The top hinge takes all of the vertical weight force of the gate. The bottom hinge keeps the gate lined up correctly.

(a) By taking moments around B, calculate the horizontal component of the reaction force of T on the gate. Include a direction in your answer. (5 marks)

Answer: _____ N Direction: _____

(b) Calculate the overall reaction force of T on the gate. Include an angle to the horizontal in your answer. If you could not obtain an answer to part (a), use 1.40×10^2 N. (5 marks)

Answer: _____ N at _____ ° to the horizontal

(c) Discuss how the angle in part (b) would be affected if the top hinge was fixed at the top of the gate. Include a mathematical expression in your answer. (4 marks)