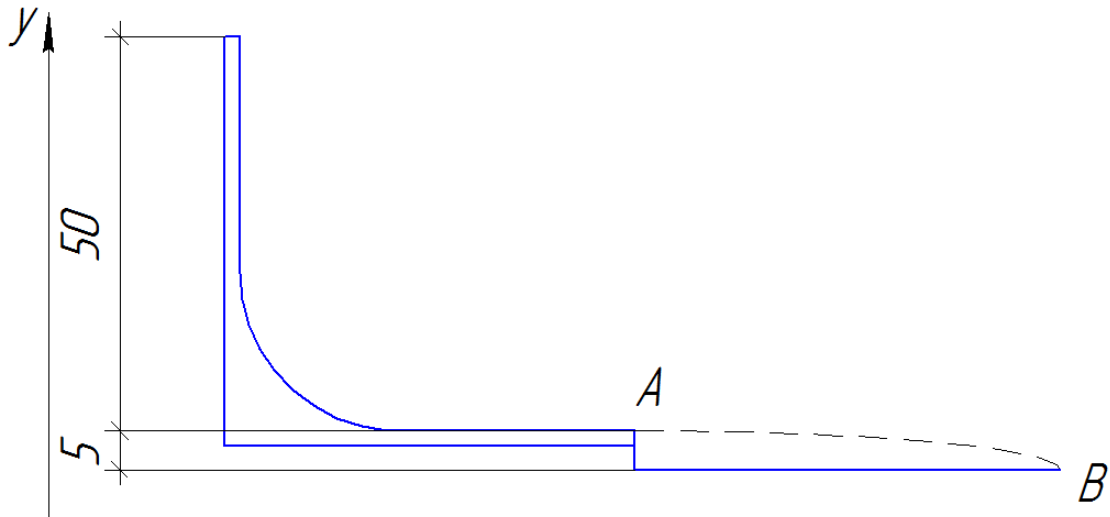**Task:**

A ski jumper launches from a ski jump that is oriented parallel to a hill. The jump has a vertical drop of 50 m and the coefficient of friction μ between the skier and the jump is 0.05. The launch point is 5 m above the hill and there is a small lip at the bottom of the jump so that the skier launches horizontally. How long in seconds is the skier in flight?

Solution:

$$v_{A_y} = 0$$

$$v_{B_y} = v_{A_y} - gt = -gt$$

$$y_B - y_A = \frac{v_{B_y}^2 - v_{A_y}^2}{-2g} = \frac{v_{B_y}^2}{-2g} = -5\ m$$

$$v_{B_y}^2 = 10g\ m$$

$$v_{B_y} = -\sqrt{10g\ m}$$

$$-\sqrt{10g\ m} = -gt$$

$$t = \sqrt{\frac{10}{g}\ m} \approx \sqrt{\frac{10}{9.81\frac{m}{s^2}}\ m} = \sqrt{\frac{10}{9.81}}\ s \approx 1.019\ s$$

Answer:

$$t \approx 1.019\ s$$