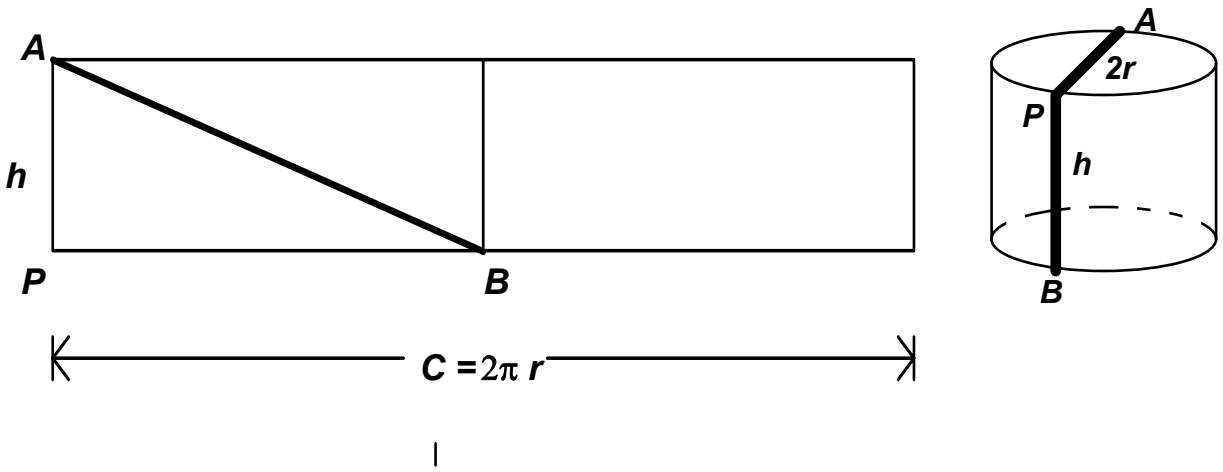
**Addendum**

**Discussion question (Round 1 Question C)**

Under what circumstances is the spiraling distance around the lateral surface of a cylinder shorter than the 'up and over the top' distance?




$\sqrt{h^2 + \pi^2 r^2} < h + 2r$? Squaring both sides,

$$h^2 + \pi^2 r^2 < h^2 + 4hr + 4r^2 \rightarrow \pi^2 r^2 - 4r^2 = (\pi^2 - 4)r^2 < 4hr \rightarrow h > \frac{(\pi^2 - 4)r}{4}$$

Thus, with a radius of 2, the spiral distance is shorter than the 'up and over the top' distance as long as the height is greater than approximately 2.93 .
Since this was not the case in round 1 question C, the answer was simply 1 + 4 = 5.