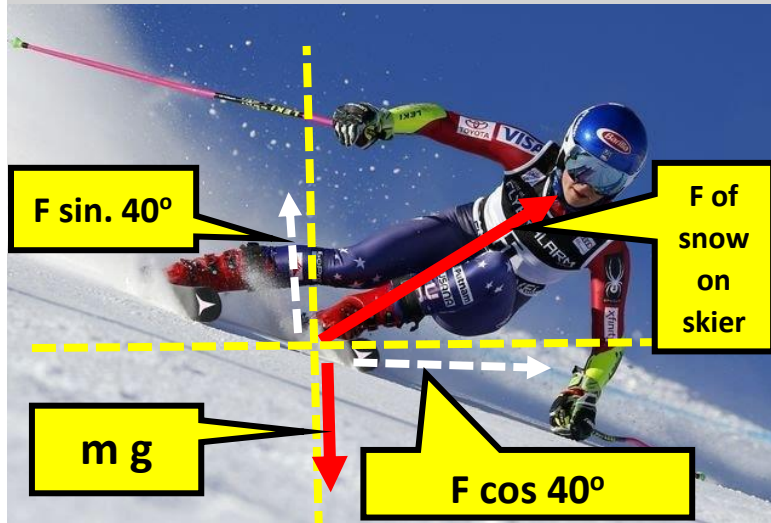


CENTRIPETAL FORCE

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Shiffrin Wins Parallel Slalom for France's Courchevel Double Slalom



FIS Rules on Giant Slalom Turn radius below:

slalom skis can have a minimum turn radius of 27 meters, or roughly 89 feet, and a minimum height of 185 centimeters, or about 6 feet.

The rule for next season calls for a straighter turn radius minimum of 35 meters (scaled back from 40).

The new minimum height will be 195 centimeters.

(Reuters) - World Cup leader Mikaela Shiffrin edged past Slovak Petra Vlhova to win the women's parallel slalom event at France's Courchevel on Wednesday and make it two victories in two days. The in-form American had grabbed the giant slalom title on Tuesday with a dominant performance and looks on course for more glory in February's Pyeongchang Olympics to add to her gold medal at Sochi 2014. The 22-year-old slalom specialist was pushed in the quarter-finals and last four by Austria's Ricarda Haaser and Italian Irene Curtoni respectively. She had to work even harder in the final, shaking off the Slovak by four hundredths of a second to clinch her 35th World Cup victory. Shiffrin earned her first career World Cup win in downhill at Canada's Lake Louise earlier this month and also won the slalom for the second year in a row at Killington in Vermont. The Pyeongchang Olympics in South Korea run from Feb. 9-25.

INTRODUCTION: The goal of this application is to find the speed Shiffrin is skiing around the **89 foot radius** turns as she skies to Giant Slalom victory. To make the turns she needs a centripetal force toward the center of turn center. From the graphic above that centripetal force is **$F \cos. 40^\circ = m v^2 / R$ (eq.1)** The angle of her body relative to the horizontal is 40° . This centripetal force **MUST** exist to produce the centripetal acceleration of v^2/R . Accelerations come from forces: This fact comes from Newton's second law: $F_{NET} = m a$ Vertically there is no acceleration and thus vertical forces must add up to zero. The vertical forces acting on Shiffrin are thus $0 = F \sin. 40^\circ = m g$ (eq.2) see above graphic). FIS(International Federation of Skiing) rules on Radius of turns = $R = 89$ feet. $g = 32$ ft./s.² Equation 2 divided to equation 1 yields:

$$\tan.40^\circ = gr/v^2$$

QUESTIONS: (a) Find speed V Shiffrin is skiing around the the 89 ft. = R turns?, (b) Convert her speed in ft./s. to mph?

HINTS: 60 mph = 88 ft./s

ANSWERS: (a) $v = \sim 58,26$ ft./s. , (b) $v = \sim 39.7$ mph **COMMENT:** Speed about turn radius is plausible.