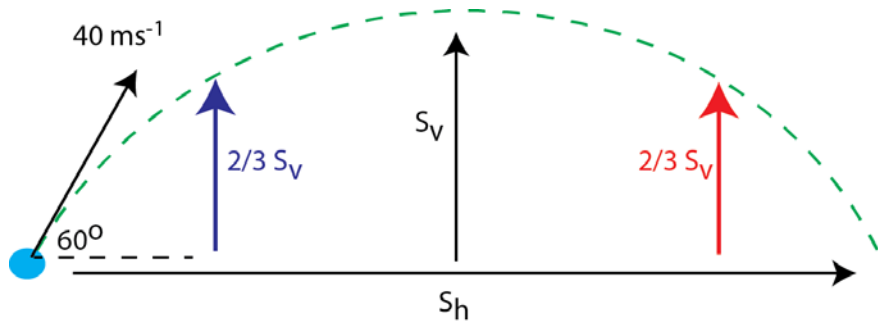


A golfer chips a golf ball with a velocity of 40 ms^{-1} and 60° above the horizontal.



The vertical acceleration of the ball should be taken as -9.8 ms^{-2} , where the minus sign indicates the directional nature of acceleration. Remember to respect the directional nature of the relevant velocities. Also remember to ignore the fact the ball is moving to the right when you are calculating vertical motion problems and ignore the fact it is rising and falling when you are calculating horizontal motion problems. (Mr Rosenberg)

Vertical motion of ball:

(A)

- i) Calculate the ball's initial vertical velocity. **Ans: 34.6 m/s**
- ii) Calculate the time taken for the ball to reach its highest point. **Ans: 3.5 s**
- iii) Calculate the maximum vertical displacement of the ball. **Ans: 61.1 m**
- iv) Calculate the time taken for the whole flight. **Ans: 7.0 s**

(B)

- i) Calculate ball's vertical velocity when its vertical displacement is $2/3$ of its maximum displacement as shown by the blue vector on the diagram. **Ans: 20 m/s**
- ii) How long does the ball to reach the height in question (B) i). **Ans: 1.5 s**
- iii) Calculate the time it takes the ball to reach the point where its vertical displacement is $2/3$ of its maximum displacement as shown by the red vector on the diagram. **Ans: 5.5 s**
- iv) Calculate the vertical velocity of the ball when it is at the position calculated in (B) iii). **Ans: -20 m/s**

Horizontal motion of ball:

(C)

- i) Calculate the horizontal velocity of the ball. **Ans: 20 m/s**
- ii) Calculate the horizontal displacement of the ball for the whole flight. **Ans: 140 m**

Vertical and Horizontal motion of ball:

(D)

- i) Calculate the velocity of the ball when its vertical displacement is shown by the blue vector. **Ans: 28.3 m/s 45° above horizontal to the right.**
- ii) Calculate the velocity of the ball when its vertical displacement is shown by the red vector. **Ans: 28.3 m/s 45° below horizontal to the right.**