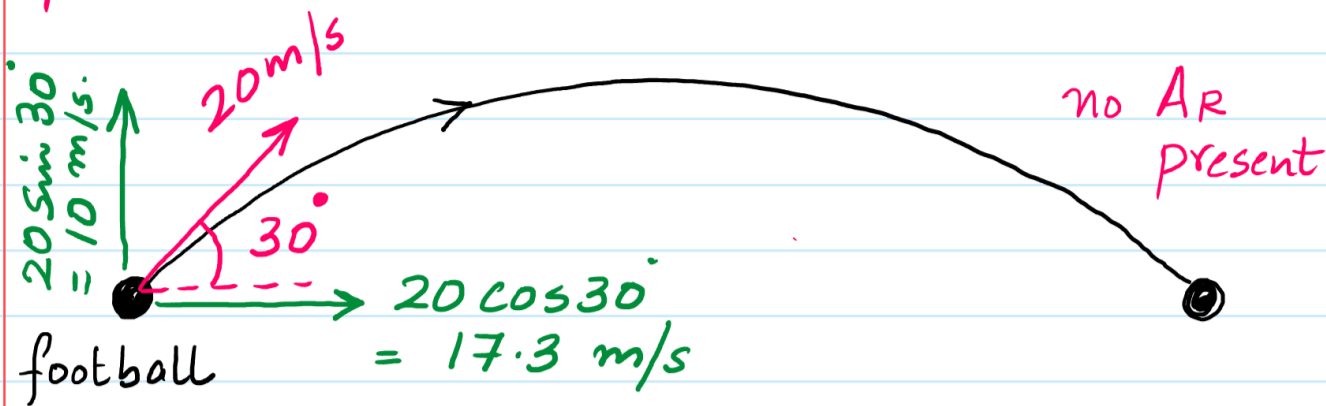


# PROJECTILE MOTION

## Continuation of Kinematics

20 October 2020 09:21

• A projectile motion is one in which an object performs "two dimensional motion" i.e. it moves in the horizontal plane as well as in the vertical plane. as shown.



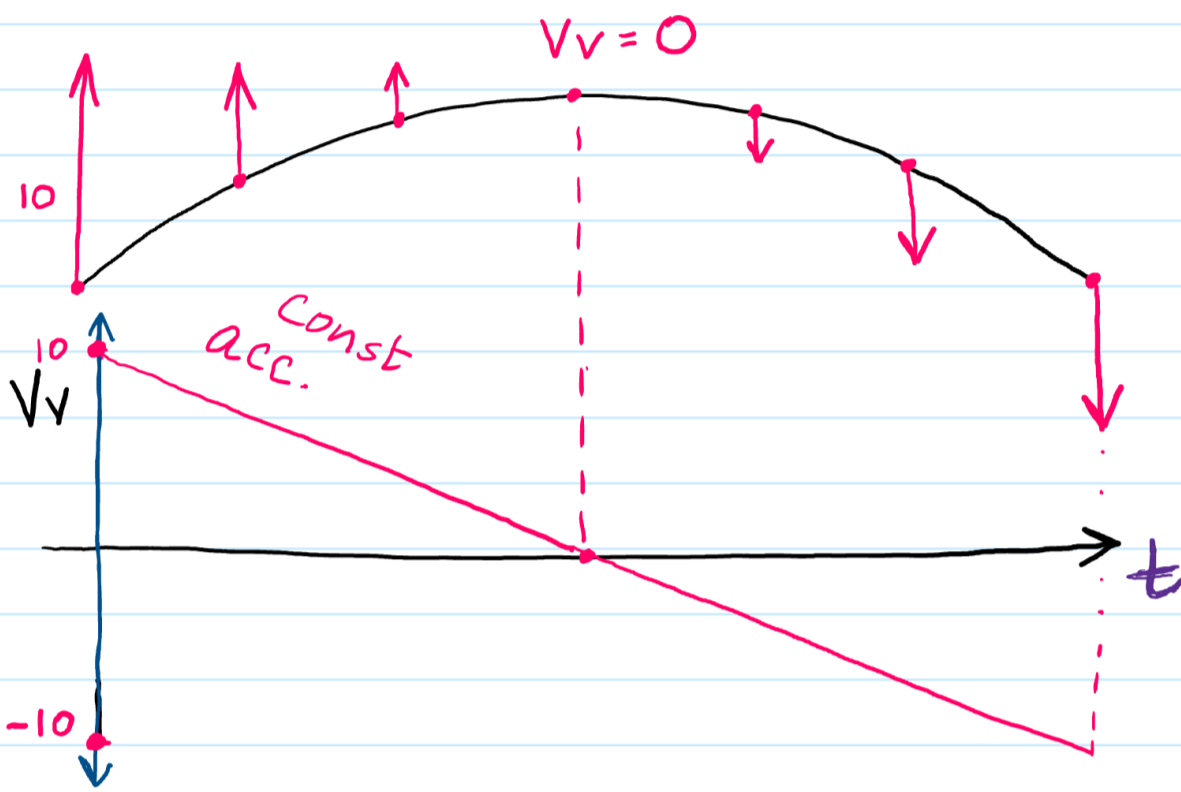
(i) Find the horizontal component of the initial velocity.

$$20 \cos 30^\circ = 17.3 \text{ m/s}$$

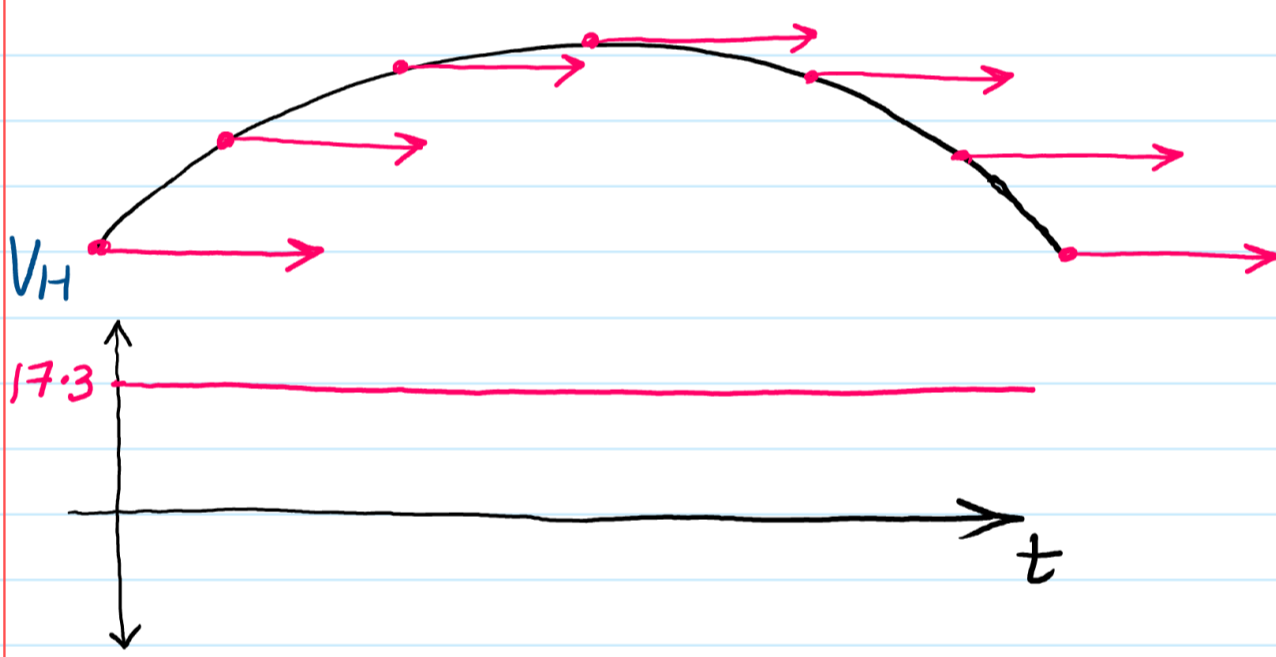
(ii) Find the vertical component of the initial velocity.

$$20 \sin 30^\circ = 10 \text{ m/s}$$

Note: The vertical component of velocity gets influenced by the pull of gravity  $\therefore$  the vertical comp becomes 0 as you reach the highest pt & then it again increases in the opposite direction.

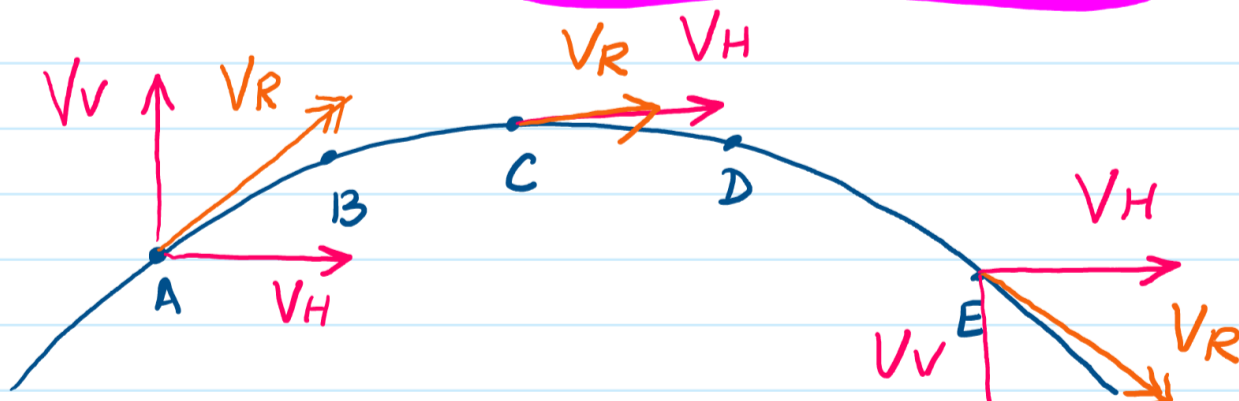


Note: Since acceleration due to gravity acts in the vertical plane  $\therefore$  it does not affect the horizontal motion, hence we can say that the horizontal velocity will remain constant from the start to the end.



- ① Vertical velocity changes continuously
- ② horizontal velocity remains constant
- ③ acc acts only in the vertical plane.

④ If AR is negligible then we can separately apply equations of motion for the vertical & horizontal motion.



Q At which pt is velocity "ZERO"

no point ; only the vertical component of velocity becomes zero at C (horizontal velocity  $\neq$  0)

Q. Mark the direction of acc. at all 5 pts ?

arrow pointing vertically downwards (equal length) at all points

Q Mark the direction of force at all 5 points ?

According to  $F = ma$  ; force and acc follow same direction  $\therefore$  answer same as previous part.

Q How to mark the direction of RESULTANT VELOCITY at point A ?

By constructing a tangent at the relevant points as shown.