

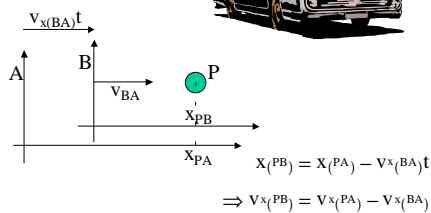
## Problems Class 1

- If  $\mathbf{a} = (1,2,3)$  and  $\mathbf{b} = (3,0,-1)$  determine:
  - The magnitudes of  $\mathbf{a}$  and  $\mathbf{b}$ .
  - The sum of  $\mathbf{a}$  and  $\mathbf{b}$ .
  - The vector given by  $2\mathbf{a} - 3\mathbf{b}$ .
  - The scalar product of  $\mathbf{a}$  and  $\mathbf{b}$ .
  - The vector product of  $\mathbf{a}$  and  $\mathbf{b}$ .
- What is the angle between vectors  $\mathbf{a}$  and  $\mathbf{b}$ ?

## Problems Class 1

- A coach is passing a football field at a speed of 30mph. One of the footballers kicks the ball along the ground at an angle of  $90^\circ$  to the road and a speed of  $10\text{ms}^{-1}$ . From the perspective of the coaches passengers, what angle does the path of the football make with respect to the road if the ball is travelling away from the road?

### Relative Motion



## Problems Class 1

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- The driver of a low slung racing car (low centre of gravity, assume c. of g. at road level) wishes to stop the car in as short a distance as possible. Should she brake so that the wheels lock, or so that they just continue rotating? If  $\mu_k = 0.6$  and  $\mu_s = 0.7$  between the tyres and the road, what is the difference in stopping distance from 130mph in the two cases?

