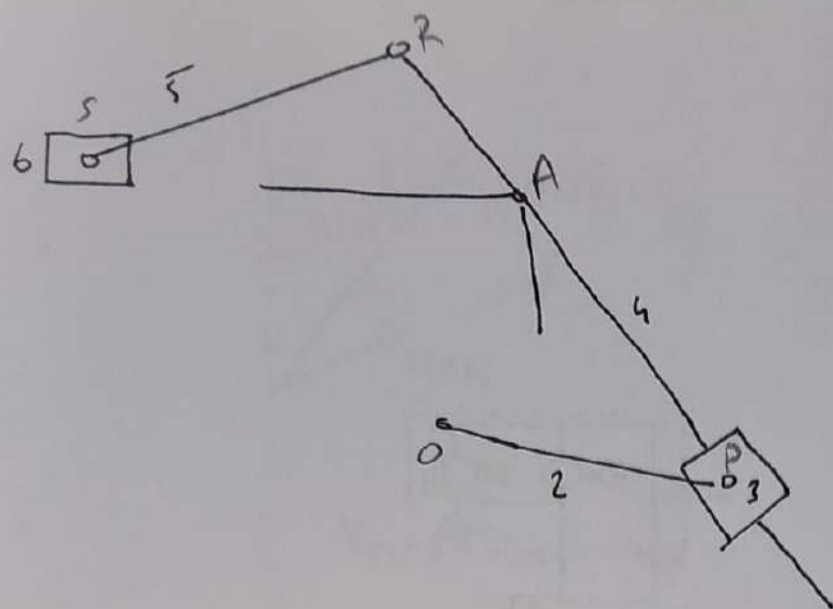Figure below shows the configuration of a Whitworth Quick Return Mechanism. The lengths of the fixed link OA and the crank OP are 200 mm and 350 mm respectively. Other lengths are: AR = 200 mm and RS = 400 mm. Find the velocity of the ram using I-Center method when the crank makes an angle of 120° with the fixed link and rotates at 10 rad/sec.

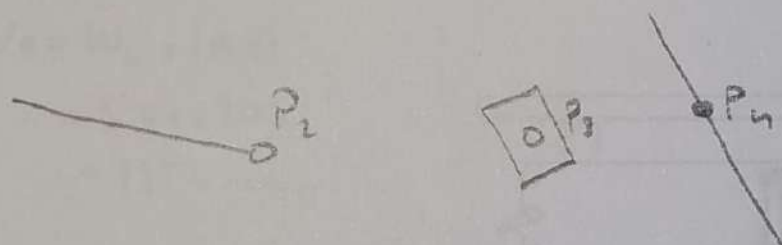Let's find the velocity of P_2

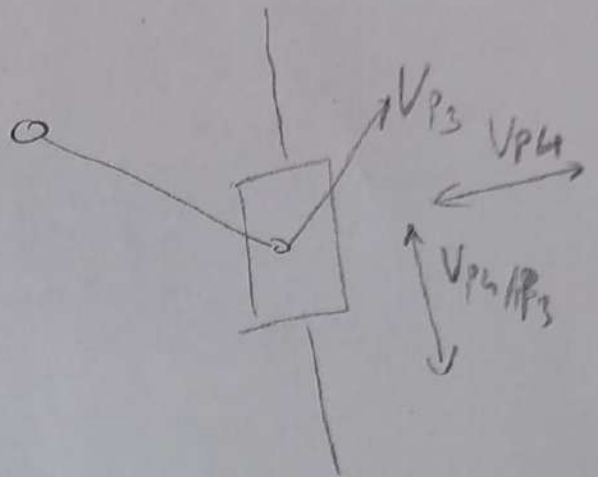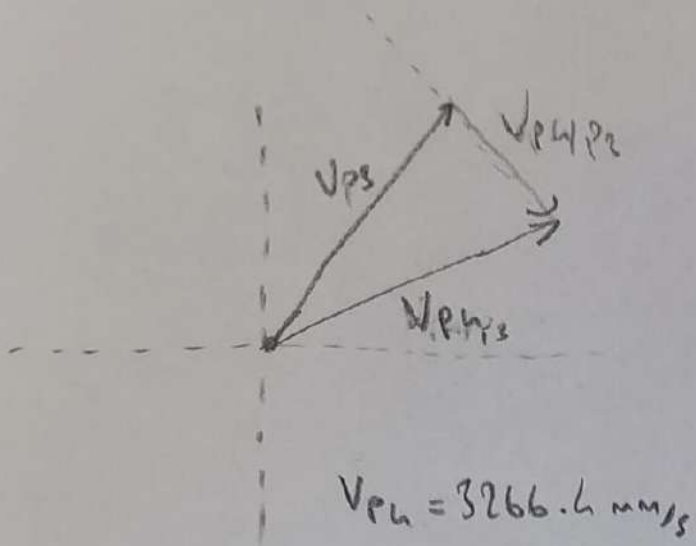$$V_{P2} = W_2 |OP_2|$$

$$= 10 \times 350$$

$$= 3500 \, mm/s$$

P_4 is the contact between slider and bar

$$V_{P2} = V_{P3} \qquad \text{as they are some points.}$$

$$\underline{\underline{V_{P4}}} = \underline{\underline{V_{P3}}} + \underline{\underline{V_{P4/P3}}}$$

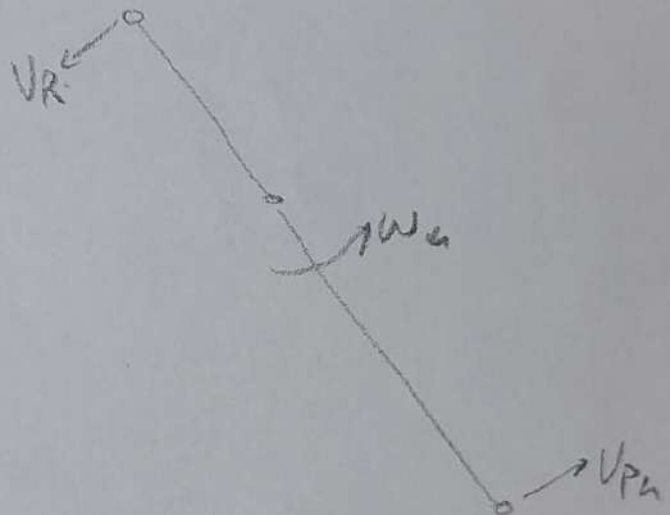P_4 is connected to the ground of point A, so its velocity direction with respect to ground is known.

$V_{P4} = 3266.4 \text{ mm/s}$

$V_{P4} = W_4 \times |AP|$
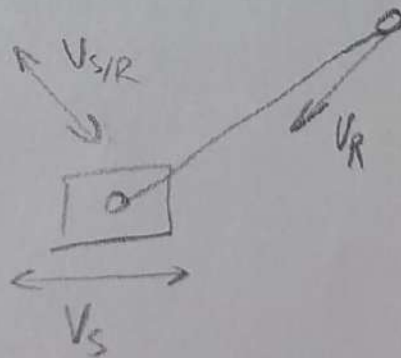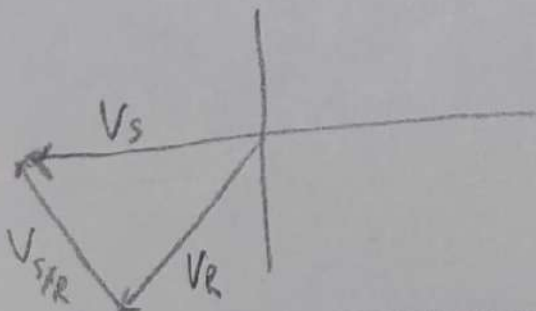
$3266.4 = W_4 \times 482.18$

$W_4 = 6.77 \text{ rad/sec}$

$V_R = W_4 \times |AR|$

$= 6.77 \times 200$

$= 1354 \text{ mm/s}$

$V_S = V_R + V_{S/R}$

$\boxed{V_S = 1413 \text{ mm/s}}$