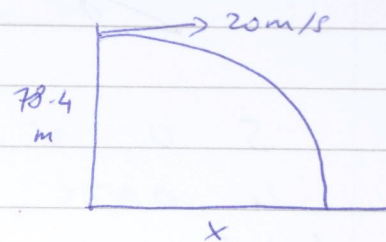


Projectiles : Ex 12A, P281

①

(→)	S	U	V	A	T
	x	20		0	?
					4

(↓)	S	U	V	A	T
	78.4	0		9.8	?



$$S = ut + \frac{1}{2}at^2 \Rightarrow 78.4 = 0 + \frac{1}{2} \times 9.8 t^2$$

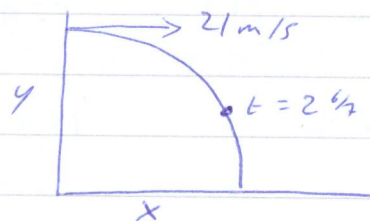
$$\Rightarrow t = 4s$$

$$S = ut + \frac{1}{2}at^2 \Rightarrow x = 20 \times 4 + 0 = 80m$$

②

(→)	S	U	V	A	T
	x	21		0	$2\frac{4}{7}$

(↓)	S	U	V	A	T
	y	0		9.8	$2\frac{4}{7}$



$$\text{So } S = ut + \frac{1}{2}at^2 \Rightarrow x = 21 \left(2\frac{4}{7}\right) + 0 = 60$$

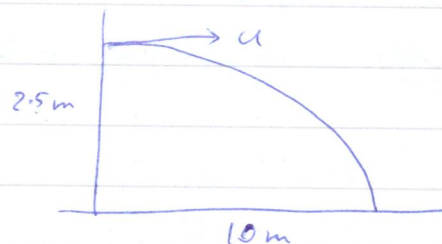
$$y = 0 + \frac{1}{2}(9.8)\left(2\frac{4}{7}\right)^2 = 40$$

Shortest distance from point of projection : $\sqrt{60^2 + 40^2} = 72.11m$

③

(→)	S	U	V	A	T
	10	?		0	?
					✓

(↓)	S	U	V	A	T
	2.5	0		9.8	?



$$s = ut + \frac{1}{2} at^2 \Rightarrow 2.5 = 0 + \frac{1}{2} \times 9.8 t^2$$

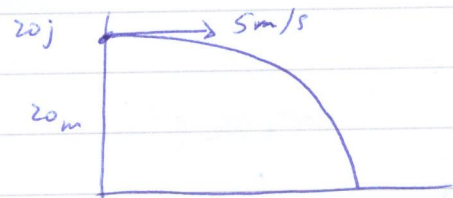
$$\Rightarrow t = 0.714286$$

$$s = ut + \frac{1}{2} at^2 \Rightarrow 10 = 0.714286 u + 0$$

$$\Rightarrow u = 14 \text{ m/s}$$

(4) $\begin{matrix} \text{---} & S & U & V & A & T \\ & x & 5 & & 0 & 1 \end{matrix}$

(↓) $\begin{matrix} S & U & V & A & T \\ y & 0 & & 9.8 & 1 \end{matrix}$



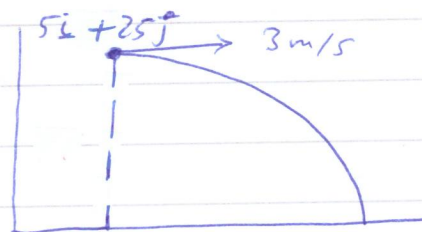
$$\text{---} \Rightarrow s = ut + \frac{1}{2} at^2 \Rightarrow x = 5 + 0 = 5$$

$$\downarrow \Rightarrow s = \dots \Rightarrow y = 0 + \frac{1}{2} \times 9.8 = 4.9$$

So $\underline{p} = 20\hat{j} + 5\hat{i} - 4.9\hat{j}$ (since ball has fallen from $20\hat{j}$)
 $= 5\hat{i} + 15.1\hat{j} \checkmark$

(5) $\begin{matrix} \text{---} & S & U & V & A & T \\ & x & 3 & & 0 & 2 \end{matrix}$

(↓) $\begin{matrix} S & U & V & A & T \\ y & 0 & & 9.8 & 2 \end{matrix}$



$$\text{---} \Rightarrow s = ut + \frac{1}{2} at^2 \Rightarrow x = 3 \times 2 + 0 = 6 \text{ m}$$

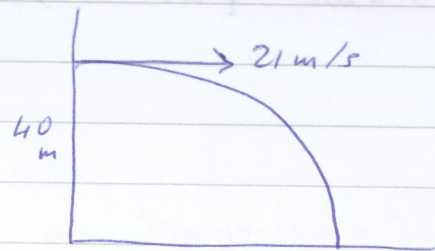
$$y = 0 + \frac{1}{2} \times 9.8 \times 4 = 19.6 \text{ m}$$

So $\underline{p} = 5\hat{i} + 25\hat{j} + 6\hat{i} - 19.6\hat{j} = 11\hat{i} + 5.4\hat{j}$

⑥

(→)	S	U	V	A	T
	x	21	0	?	

(↓)	S	U	V	A	T
	40	0	9.8	?	



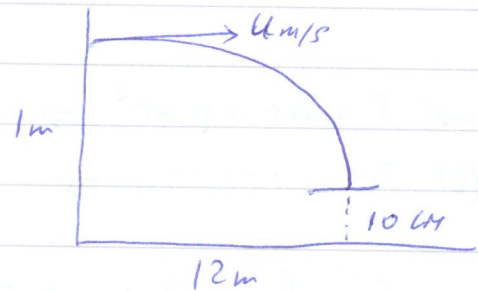
(↓) $S = ut + \frac{1}{2} at^2 \Rightarrow 40 = 0 + \frac{1}{2} 9.8 t^2$
 $\Rightarrow t = 2.857 s$

(→) $S = ut + \frac{1}{2} at^2 \Rightarrow x = 21 \times 2.857 + 0 = 60 m$

⑦

(→)	S	U	V	A	T
	12	?	0	?	

(↓)	S	U	V	A	T
	0.9	0	9.8	?	



(↓): $S = ut + \frac{1}{2} at^2 \Rightarrow 0.9 = 0 + \frac{1}{2} 9.8 t^2$
 $\Rightarrow t = 0.42857$

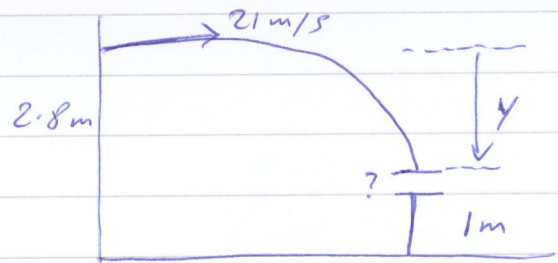
(→): $S = ut + \frac{1}{2} at^2 \Rightarrow 12 = u(0.42857) + 0$
 $\Rightarrow u = 28 m/s$

⑧

*9

$$\begin{array}{cccccc} (\rightarrow) & S & U & V & A & T \\ & 12 & 21 & & 0 & ? \end{array}$$

$$\begin{array}{cccccc} (\downarrow) & S & U & V & A & T \\ & y & 0 & & 9.8 & ? \end{array}$$



$$\begin{aligned} (\rightarrow): S &= ut + \frac{1}{2} at^2 \Rightarrow 12 = 21t + 0 \\ &\Rightarrow t = 12/21 \end{aligned}$$

$$\begin{aligned} (\downarrow): S &= ut + \frac{1}{2} at^2 \Rightarrow y = 0 + \frac{1}{2} 9.8 t^2 \\ &\Rightarrow y = 1.6 \end{aligned}$$

So $2.8 - 1.6 = 1.2$, \therefore ball clears Net by 0.2 m

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