

YJC/1/11

Distance travelled per lap is in AP:

$$a_1 = 50, d = 2 \times 1 = 2.$$

Given total distance travelled > 1500

$$\frac{n}{2} [2(50) + (n-1)2] > 1500$$

$$n^2 + 49n - 1500 > 0$$

$$(n + 70.33)(n - 21.33) > 0$$

$$n < -70.33 \text{ or } n > 21.33$$

Since $n \in \mathbb{Z}^+$, least $n = 22$

Time taken per lap is in GP:

$$a_1 = 20, r = 1.15$$

Required least time taken

$$= \frac{20((1.15)^{22} - 1)}{1.15 - 1}$$

$$\approx 2752.6 \text{ s}$$

$$\approx 46 \text{ min}$$

$$\frac{20((1.15)^n - 1)}{1.15 - 1} \geq 900$$

$$(1.15)^n \geq 7.75$$

$$n \geq \frac{\ln 7.75}{\ln 1.15}$$

$$n \geq 14.65$$

Number of complete laps = 14

$$S_{14} = \frac{20((1.15)^{14} - 1)}{1.15 - 1}$$

$$= 810.094 \text{ s}$$

He needs to run for another $900 - 810.094 = 89.906 \text{ s}$

$$\text{Distance } T_{15} = 50 + (15-1)2 = 78$$

$$\frac{89.906}{20(1.15)^{14}} \times 78 = 49.555$$

Jai is running towards fix point S and at a distance $78 - 49.555 \approx \underline{28.4 \text{ m}}$ away from S .

TPJC/1/8

8(i) [2m]	$100 + (15 - 1)50 = 800 \text{ m}$
8(ii) [3m]	$S_A = \frac{n}{2}[2(100) + (n - 1)50] = 25n(3 + n)$ $25n(3 + n) \geq 10000$ <p>Using G.C, $n \leq -21.6$ (rejected $\because n > 0$) or $n \geq 18.6$ Least number of stages = 19</p>
8(iii) [2m]	$50(1.2)^{14} = 642 \text{ m}$
8(iv) [3m]	$S_B = \frac{50(1.2^n - 1)}{1.2 - 1} = 250(1.2^n - 1)$ $S_B > S_A$ <p>Using G.C, $n \geq 22.1$ Least number of stages = 23</p>
8(v) [1m]	When $n = 23$, $S_B - S_A = 1361.8 = 1362 \text{ m}$ (nearest whole no.)