1998

1 (b) Car A, moving with uniform acceleration $\frac{3b}{20}$ m/s^2 passes a point p with speed $9u$. m/s. Three seconds later Car B, moving with uniform acceleration $\frac{2b}{9}$ m/s^2 passes the same point with speed $5u$. m/s. B overtakes A when their speeds are 6.5 m/s and 5.4 m/s respectively.

Find (i) the value of u and the value of b
(ii) the distance travelled from p until overtaking occurs.

(i) Car A $(5.4)^2 = 81u^2 + \frac{3bs}{10}$ — 10

Car B $(6.5)^2 = 25u^2 + \frac{4bs}{9}$ — 10

$291.6 = 810u^2 + 3bs$

$380.25 = 225u^2 + 4bs$

$\Rightarrow u = 0.1$ m/s

Car A $5.4 = 0.9 + \frac{3bt}{20}$

Car B $6.5 = 0.5 + \frac{2b(t-3)}{9}$

$\Rightarrow b = 1$ (and $t = 30$)

(ii) Car A $291.6 = 810(0.1)^2 + 3(1)s$

$\Rightarrow s = 94.5\ m$ — 5

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