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8. Two trams, tram *A* and tram *B*, run on parallel straight horizontal tracks. Initially the two trams are at rest in the depot and level with each other.

At time $t = 0$, tram *A* starts to move. Tram *A* moves with constant acceleration $2\,\text{m s}^{-2}$ for 5 seconds and then continues to move along the track at constant speed.

At time $t = 20$ seconds, tram *B* starts from rest and moves in the same direction as tram *A*. Tram *B* moves with constant acceleration $3\,\text{m s}^{-2}$ for 4 seconds and then continues to move along the track at constant speed.

The trams are modelled as particles.

(a) Sketch, on the same axes, a speed-time graph for the motion of tram *A* and a speed-time graph for the motion of tram *B*, from $t = 0$ to the instant when tram *B* overtakes tram *A*.

(3)

At the instant when the two trams are moving with the same speed, tram *A* is *d* metres in front of tram *B*.

(b) Find the value of *d*.

(5)

(c) Find the distance of the trams from the depot at the instant when tram *B* overtakes tram *A*.

(5)

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Question 8 continued

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Q8

(Total 13 marks)

TOTAL FOR PAPER: 75 MARKS

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