4 A cyclist travels along a straight road with constant acceleration. He passes through points A, B and C. The cyclist takes 2 seconds to travel along each of the sections AB and BC and passes through B with speed $4.5 \, \text{m s}^{-1}$. The distance AB is $\frac{4}{5}$ of the distance BC.

(a) Find the acceleration of the cyclist. [5]

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(b) Find AC. [2]

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4 A particle A, moving along a straight horizontal track with constant speed $8\,\text{m}\,\text{s}^{-1}$, passes a fixed point O. Four seconds later, another particle B passes O, moving along a parallel track in the same direction as A. Particle B has speed $20\,\text{m}\,\text{s}^{-1}$ when it passes O and has a constant deceleration of $2\,\text{m}\,\text{s}^{-2}$. B comes to rest when it returns to O.

(a) Find expressions, in terms of t, for the displacement from O of each particle t seconds after B passes O. [3]

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(b) Find the values of t when the particles are the same distance from O.   [3]

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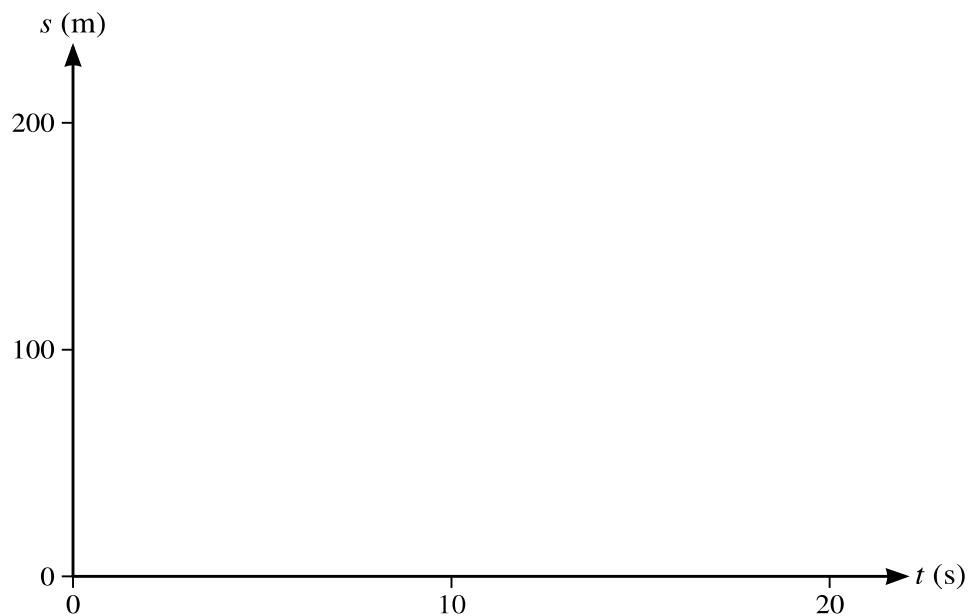
(c) On the given axes, sketch the displacement-time graphs for both particles, for values of t from 0 to 20.   [3]

4 A particle *P* travels in the positive direction along a straight line with constant acceleration. *P* travels a distance of 52 m during the 2nd second of its motion and a distance of 64 m during the 4th second of its motion.

(a) Find the initial speed and the acceleration of *P*. [5]

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(b) Find the distance travelled by P during the first 10 seconds of its motion. [2]

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