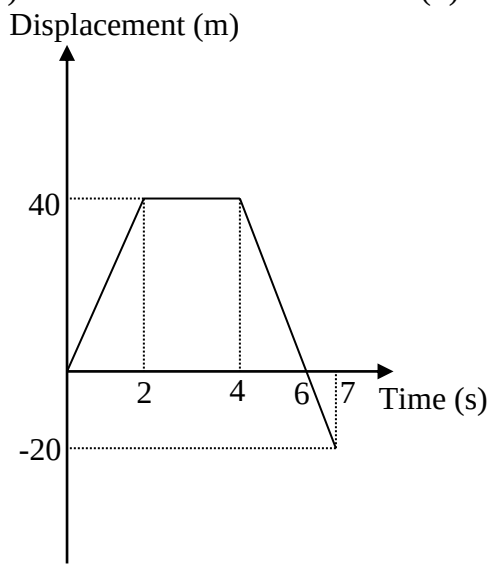
Section 1: Displacement and distance

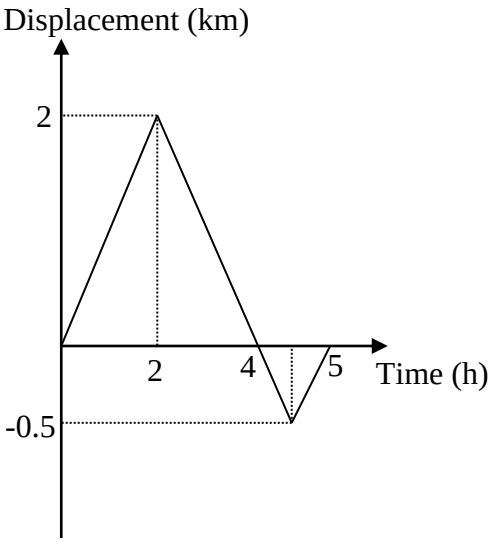
Exercise level 1

1. For the following displacement-time graphs calculate the total overall displacement and the total distance travelled.

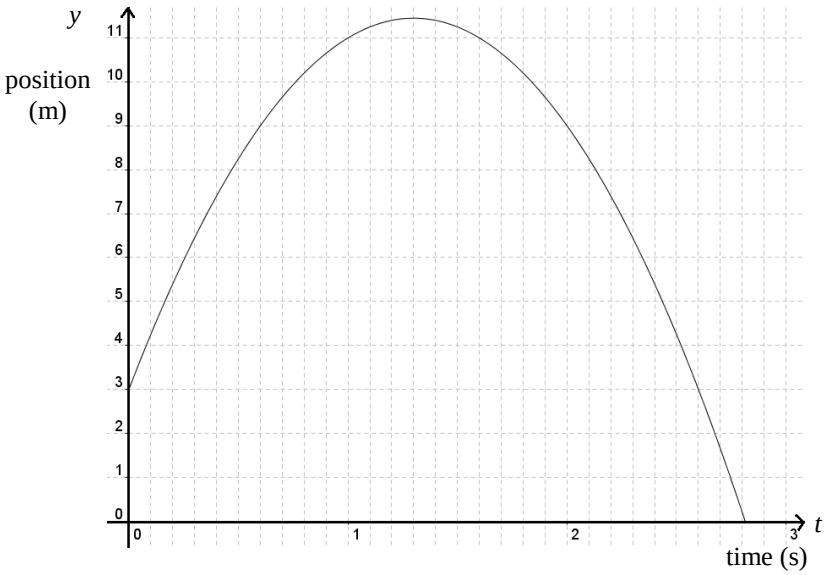
(i)



(ii)



2. A ball is thrown vertically upwards from a platform so that its position y m at time t s is as shown in the graph.



(i) What is the initial starting position of the ball?
(ii) Write down the displacement of the ball relative to its starting position at $t = 1$.
(iii) When does the ball next have the same displacement?
(iv) At what time is the ball at its maximum height?
(v) Write down the displacement of the ball relative to its starting position at $t = 2.8$.
(vi) What is the total distance travelled by the ball during the motion?

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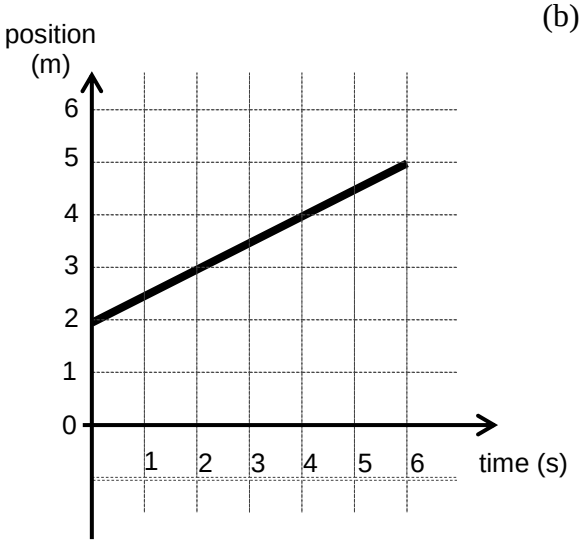
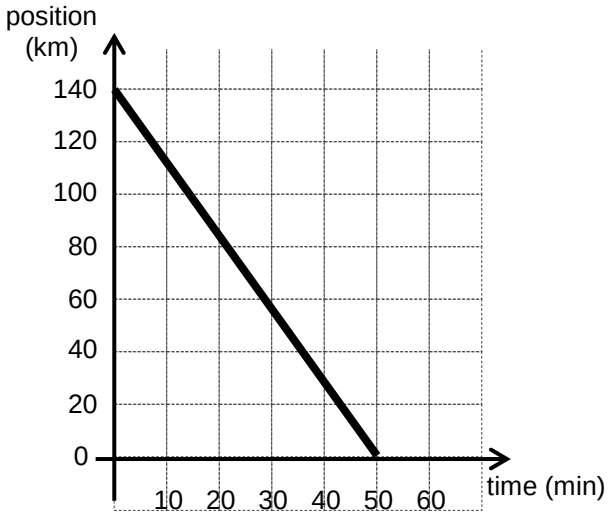
3. For each of the following journeys find:
   (i) The initial and final positions
   (ii) The total displacement
   (iii) The total distance travelled
   (iv) The velocity and speed for each part of the journey
   (v) The average velocity for the whole journey
   (vi) The average speed for the whole journey

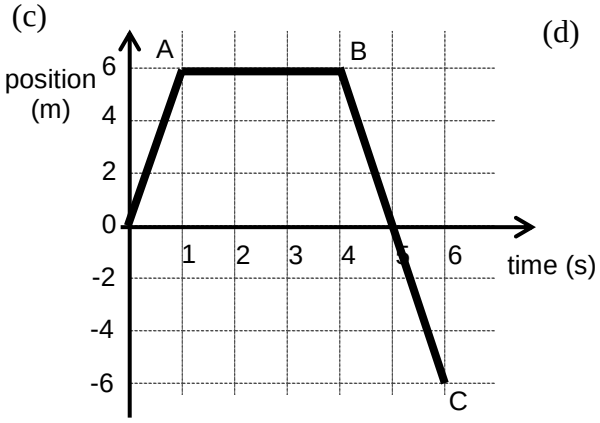
(a)



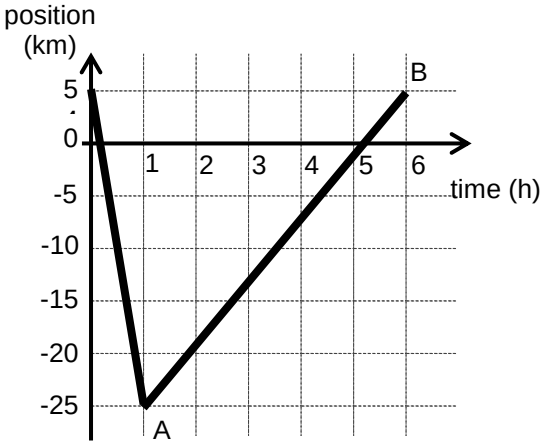
(b)



(c)

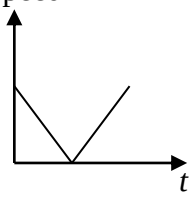


(d)

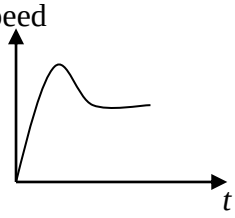


4. Decide which situation is modelled by each of the three speed-time graphs below and sketch the speed-time graph for the situation that is not represented.
   (i) an apple thrown vertically into the air
   (ii) a car moving in congested traffic
   (iii) a ball rolling along the lane in a bowling alley
   (iv) a parachutist after jumping from a stationary hot air balloon

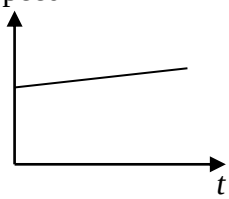
(a) speed



(b) speed



(c) speed



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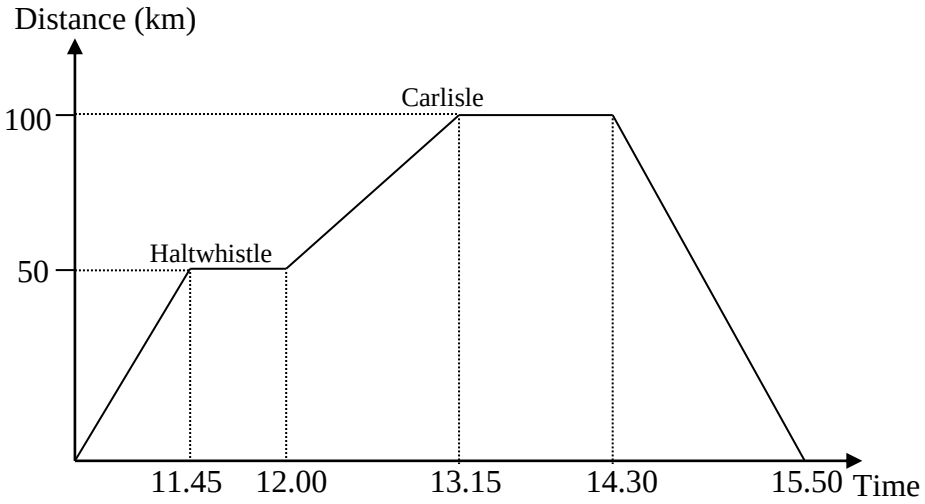
5. The distance time graph below describes a journey from Newcastle to Carlisle and back. The journey started at 11 a.m.
   (i) How far is it from Haltwhistle to Carlisle?
   (ii) Find the average speed from Newcastle to Haltwhistle and from Carlisle to Newcastle.
   (iii) Find the average speed for the whole journey, including the stops.



6. A man walks 500 m due east in 200 seconds and then 150 m due west in 50 seconds. Calculate his average speed and his average velocity for the whole journey.