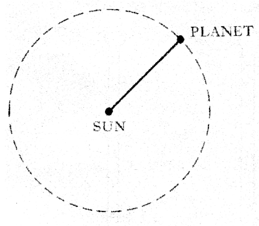
17. Distance, Speed & Time and Graphs

Calculations

1. a) A driver travels from A to B, a distance of x miles at a constant speed of 75 kilometres per hour.
Find the time taken for the journey in terms of x. 1 KU

b) The time for the journey from B to A is $\frac{x}{50}$ hours
Hence calculate the driver's average speed for the whole journey. 4 RE

2. A planet takes 88 days to travel round the Sun.
The approximate path of the planet round the Sun is a circle with diameter 1.2×10^7 kilometres.



Find the speed of the planet as it travels round the Sun.

Give your answer in kilometres per hour, correct to 2 significant figures. 4 KU

3. The planet Pluto is at a distance of 5.9×10^9 kilometres from the Sun and the speed of light is 3.0×10^5 kilometres per second.

Calculate, to the nearest half hour, the time taken for light from the Sun to reach Pluto. 4 KU

4. The planet Mars is at a distance of 2.3×10^8 kilometres from the Sun.
The speed of light is 3.0×10^5 km per second.

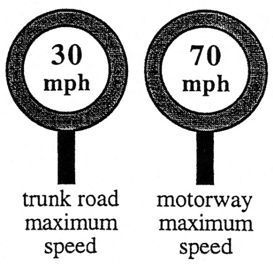
How long does it take light from the Sun to reach Mars ?
Give your answer to the nearest minute. 3 KU

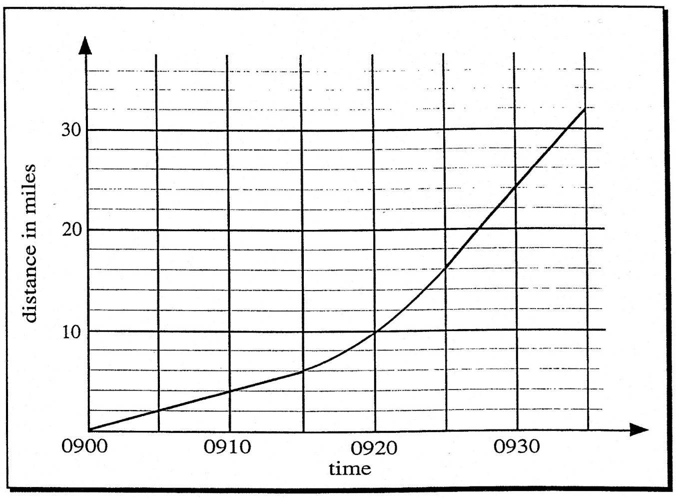
5. Jennifer is driving to work.

Part of her journey is on a trunk road.

At 0915 she joins the motorway.

The graph shows her journey.





a) Calculate Jennifer's average speed along the trunk road. 2 KU

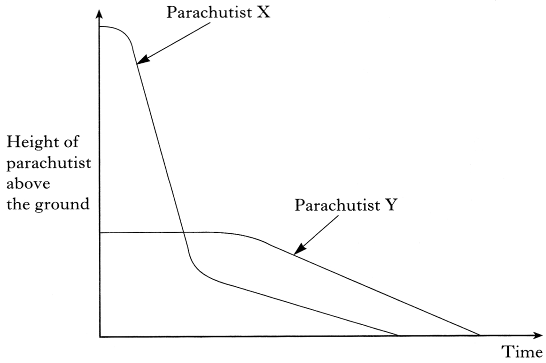
b) Explain what the graph indicates is happening between 0915 and 0925. 1 RE

c) Where on her way to work, did Jennifer appear to break the speed limit ?

(Give a reason for your answer) 3 RE

Graphs & Interpretation

1. Two parachutists, X and Y, jump from two separate aircrafts at different times.

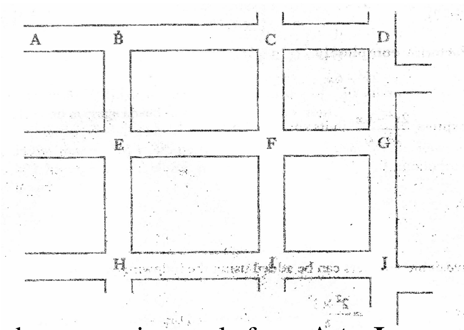


The graph shows how their height above the ground changes over a period of time.

a) Which parachutist jumped first ? 1 RE

b) Which parachutist did not open his parachute immediately after jumping ?
Explain your answer clearly. 2 RE

2. The diagram opposite shows part of the street plan of a town.



Vehicles can travel in both directions along each street.

As a vehicle travels on the straight parts of any street, it can reach the maximum speed.

The speed is always reduced on the bends.

The graph in figure 2 shows how the speed of a vehicle changes as it travels from **A to J**.

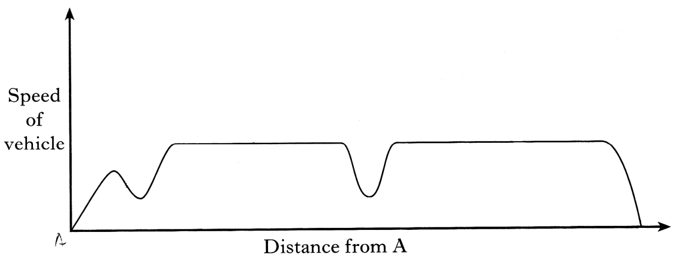
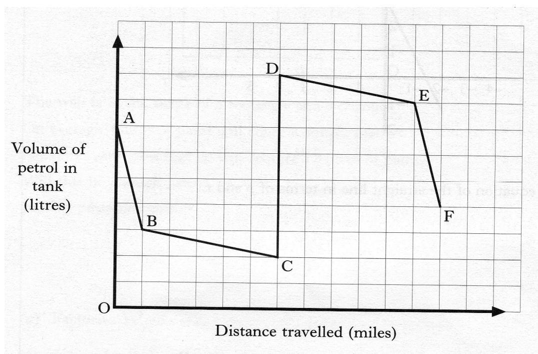


figure 2

a) What route did the vehicle travel? Use the letters from figure 1 to indicate this route. 2 RE

b) Another vehicle took the route A, B, C, F, G and J. Sketch a graph to show how the speed of this vehicle changes during the journey. 3 RE

3. The graph shows the volume of petrol in a car's tank during a journey.



a) Explain the significance of CD. 1 RE

The journey involves driving through towns and along motorways.

In the towns the car uses more petrol per mile than on the motorways.

b) Which two parts of the graph show driving on motorways?
Explain your answer clearly. 2 RE

This is a question from 1990 and would probably be considered to be too long for today's examination. However, it is good practice to attempt it.

4. The gate G of a country park lies on a 400 metre stretch of road which runs in a north-south direction.

See Figure 1.

A car leaves the park, travels northwards with increasing speed, and reaches the end of the stretch of road 24 seconds later.
A motor-cycle leaves the park at the same time as the car and also travels northwards.

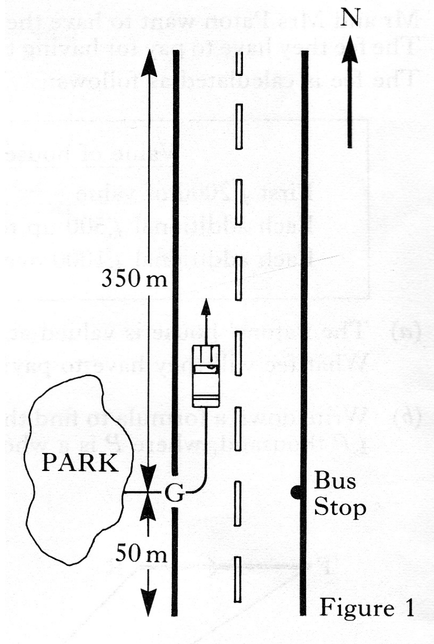


Figure 1

The progress of the two vehicles is shown on the graph below, Figure 2.

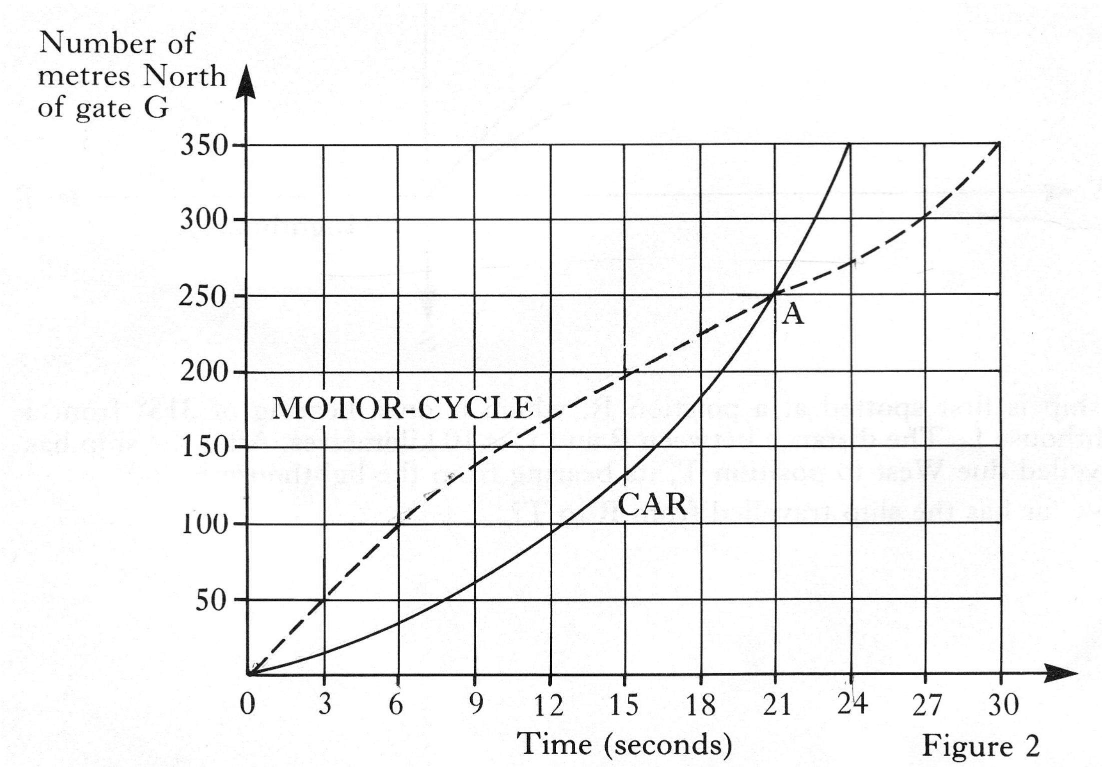


Figure 2

a) Describe the progress of the motor-cycle as it travels along the road, making particular reference to the significance of the point A. 2 RE

4 (continued)

b) The progress of a bus on the same road is also shown on the graph below, Figure 3.

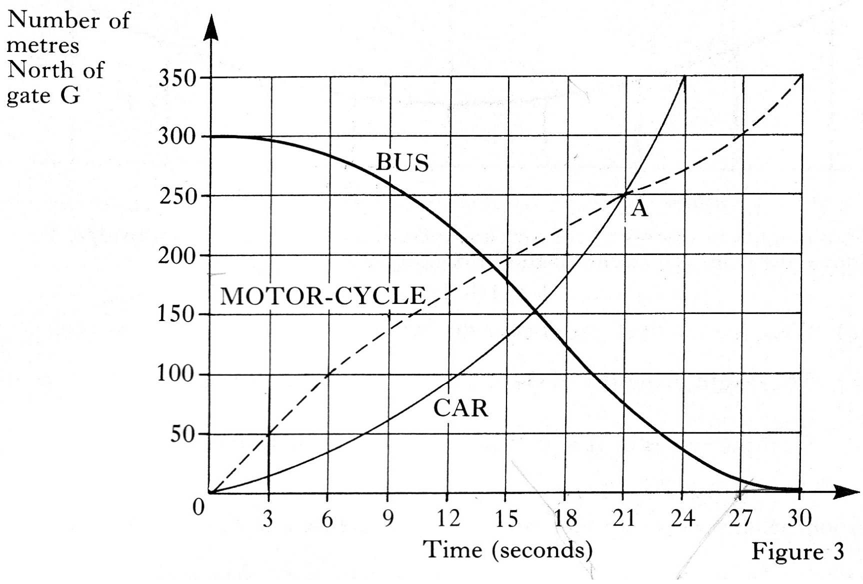


Figure 3

Describe the progress of the bus. 3 RE

c) Some time later, a taxi enters the same road at point T, in Figure 4, and travels southwards at a steady speed.

It reaches the roundabout R after 18 seconds, drives slowly round the roundabout and enters the gate G, 9 seconds later.

Draw a graph of the progress of the taxi. 3 RE

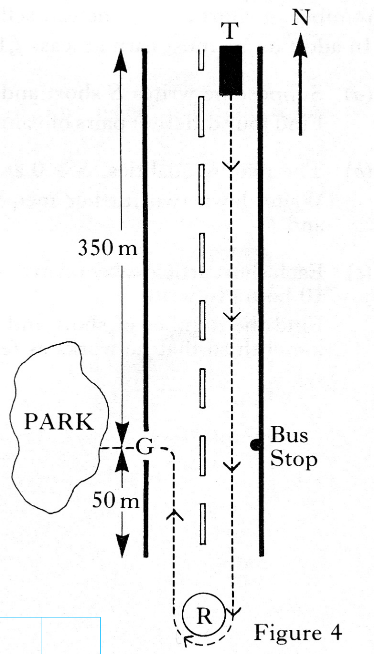


Figure 4