Distance-Time Graph

LO: Draw, use and interpret distance-time graphs.

TASK

MENTAL MATH

1) Distance = 130 miles
Speed = ? mph
Time = 2 hours

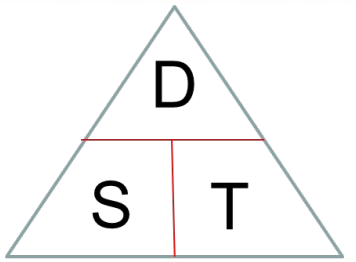
$$\text{Speed} = \frac{130\text{miles}}{2\text{hours}} = 65\text{mph}$$

2) Distance = ? kilometres
Speed = 13 km/h
Time = 3 hours

Distance = 13km/h x 3hours
= 39km

3) Distance = 48 m
Speed = 4 m/s
Time = ? seconds

$$\text{Time} = \frac{48\text{m}}{4\text{m/s}} = 12\text{seconds}$$



$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

EXTENSION

1) Distance = 60 miles
Speed = ? mph
Time = 30 minutes

$$\text{Speed} = \frac{60\text{miles}}{0.5\text{hour}} = 120\text{mph}$$

2) Distance = 20 km
Speed = ? km/h
Time = 15 minutes

$$\text{Speed} = \frac{20\text{km}}{0.25\text{hour}} = 80\text{km/h}$$

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03:00

STARTER

Joseph travelled from his home to his friend's house 15 km away.
Joseph stayed for some time and then returns home.

Here is the distance-time graph

(a) At what time did Joseph leave home?

14:10 .....
(1)

(b) How far was Joseph from home at 14:30?

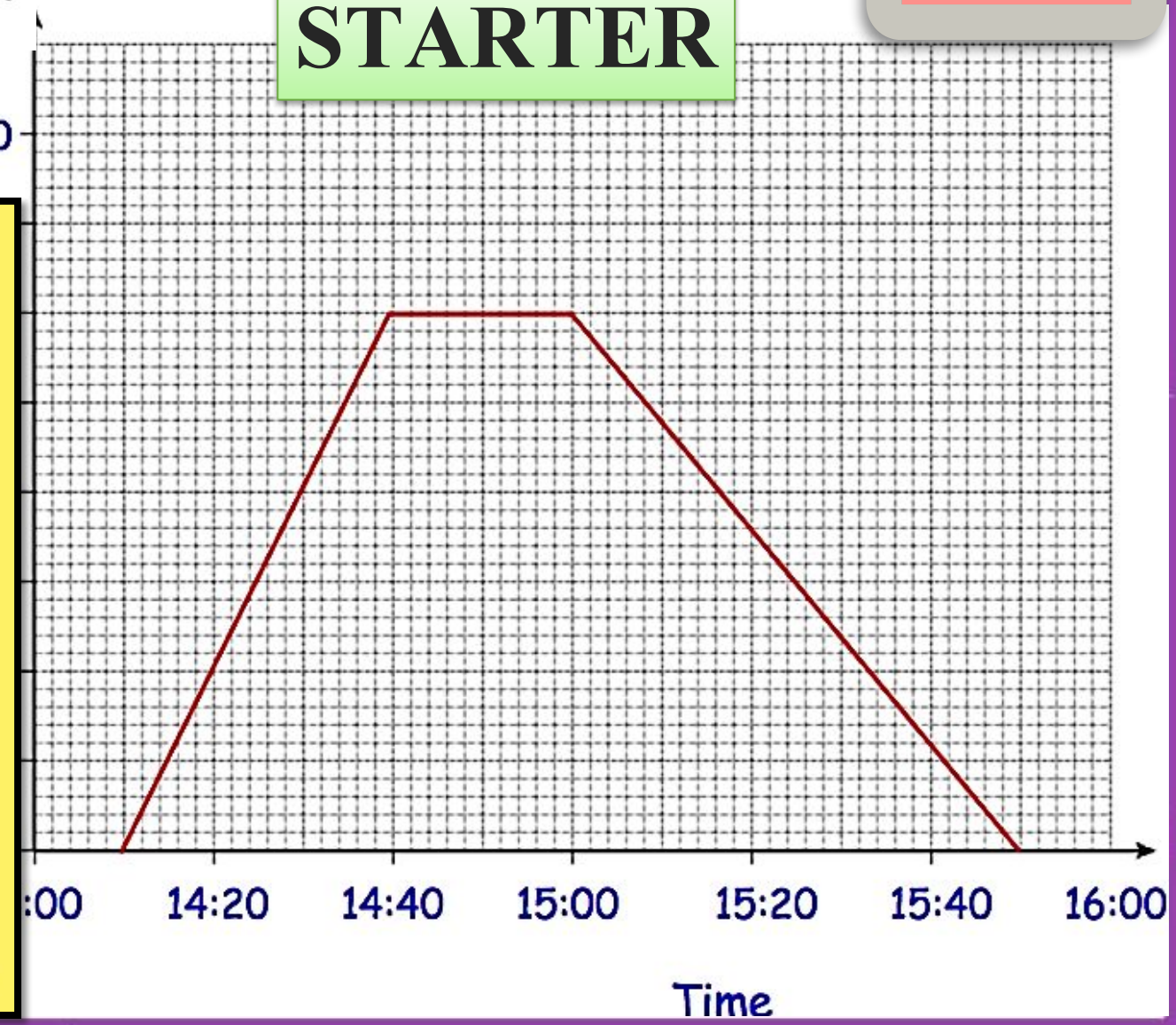
10 .....km
(1)

(c) How long did Joseph spend at his friend's hou

20 .....minutes
(1)

(d) How far did Joseph travel in total?

30 .....km
(1)



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GCSE/iGCSE Assessment Objective Specification – Foundation/Higher

A14 plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration

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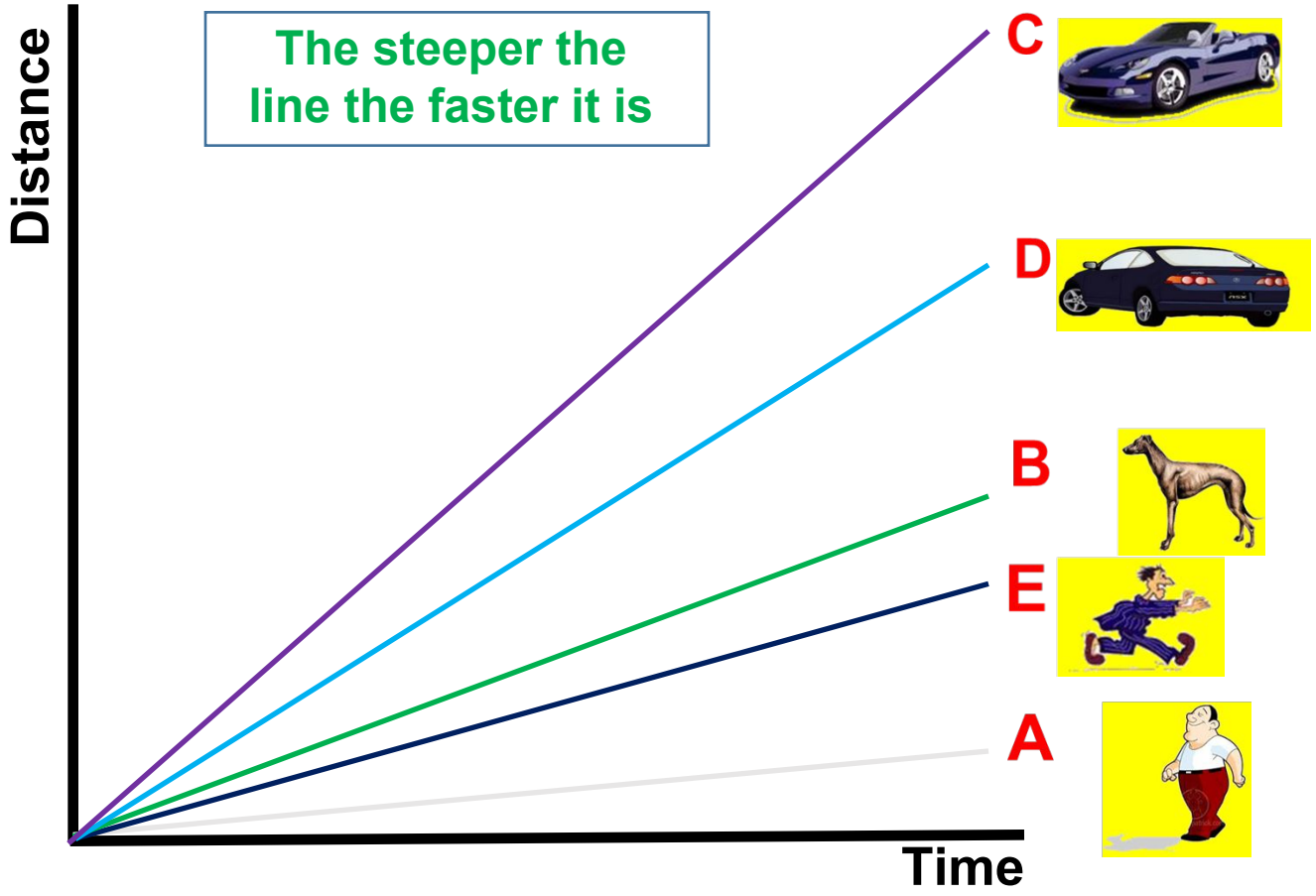
INTRODUCTION

Mini-Plenary

MATCH THE PICTURES WITH THEIR RESPECTIVE GRAPHS

What connections can you make?

The steeper the line the faster it is



A

B

C

D

E

Key Concept

LO: Draw, use and interpret distance-time graphs.

INTRODUCTION

What connections can you make with the picture above and the real world?

At this speed, how far would I travel in 1 hour?

30 miles

At this speed, how far would I travel in 2 hours?

30 x 2 = **60 miles**

At this speed, how far would I travel in $\frac{1}{2}$ hour?

Two lots of 30 minutes in an hour

15 miles

At this speed, how far would I travel in 20 minutes?

Three lots of 20 minutes in an hour

10 miles

At this speed, how far would I travel in 10 minutes?

Six lots of 10 minutes in an hour

5 miles

Key Concept

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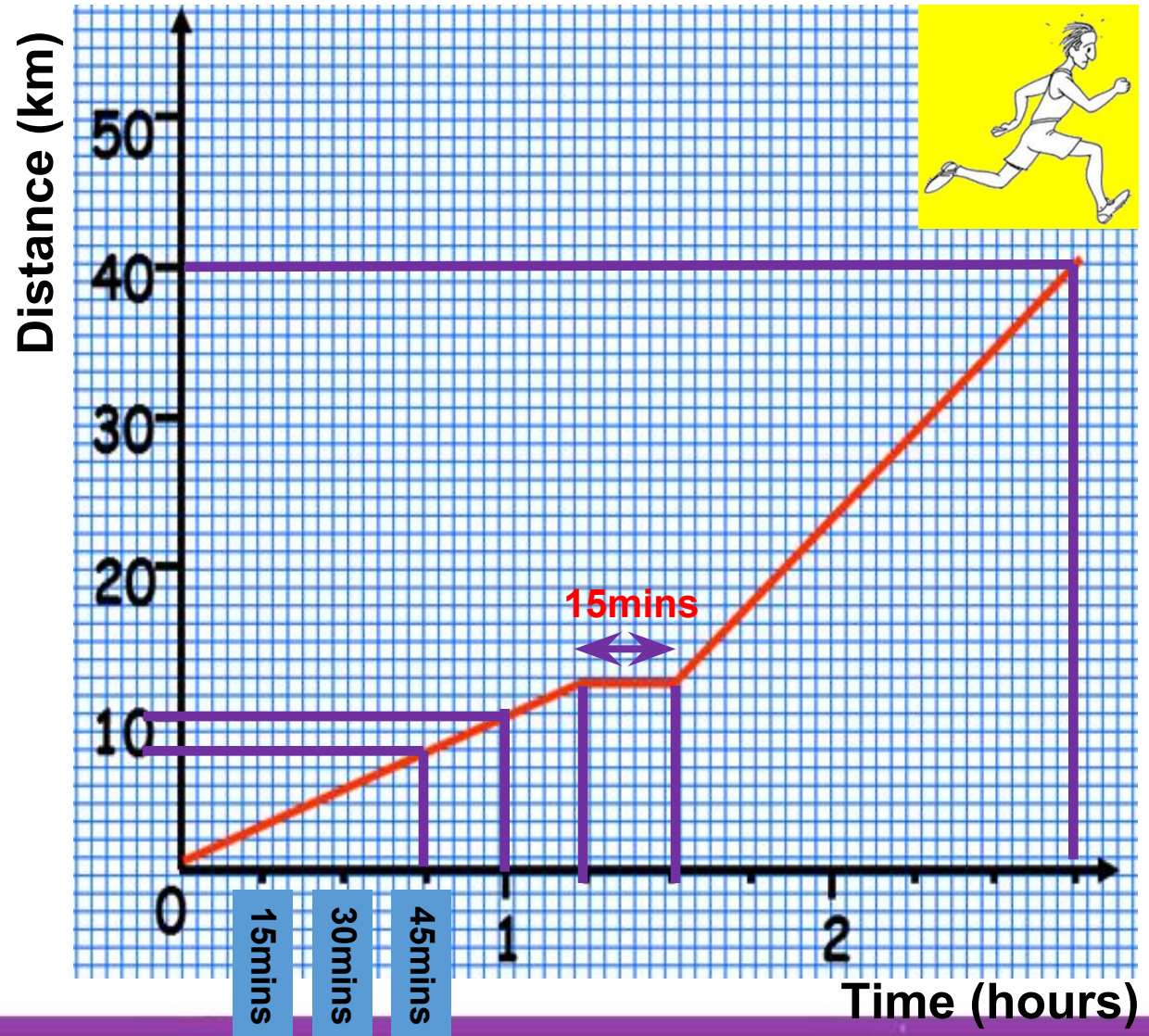


At this speed, how far would I travel in $\frac{1}{2}$ hour?

8km

His speed for the first hour?

10km

How long did he stop for?

15mins

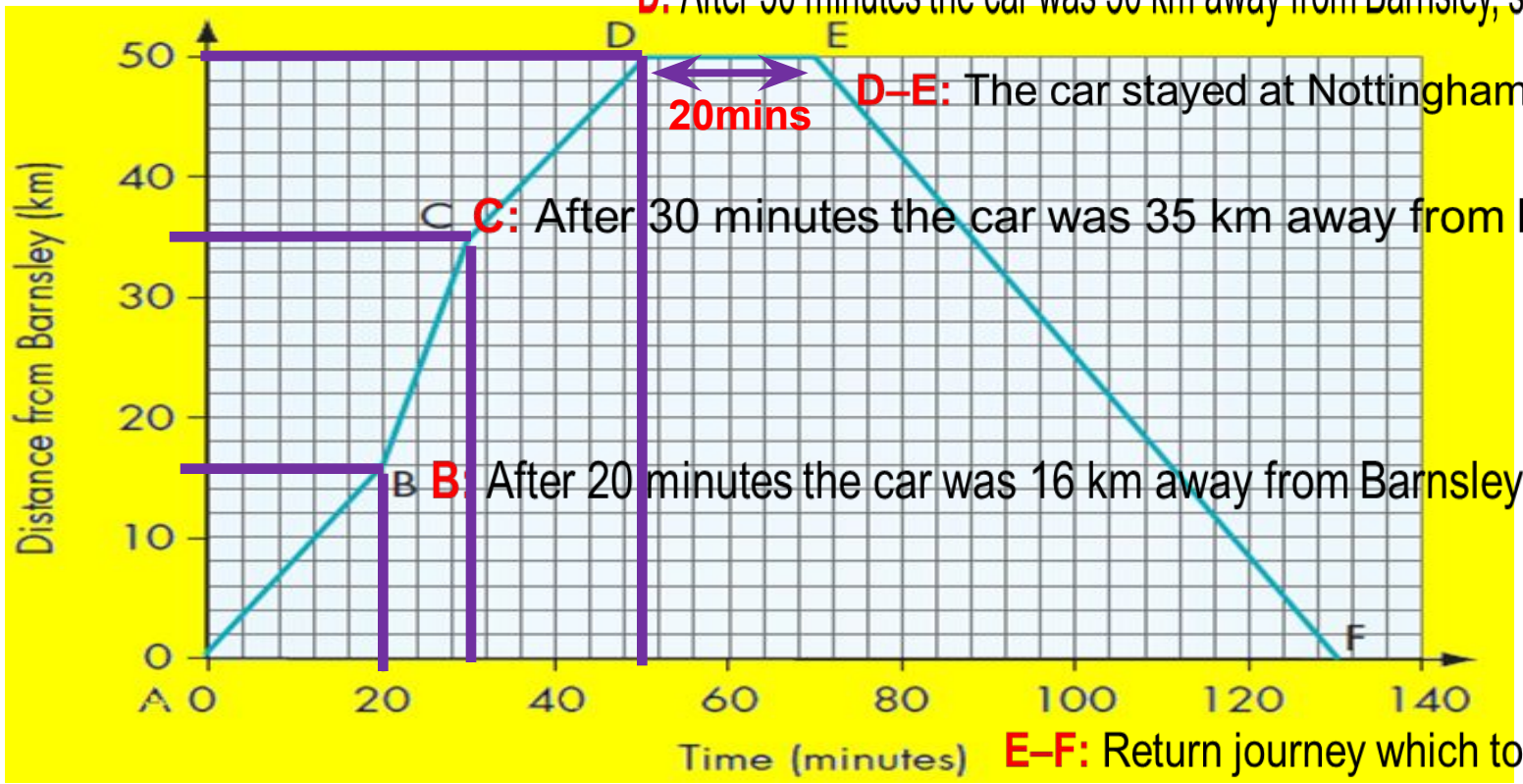
How long did it take him to run 40km?

2hours 45mins

My Turn

LO: Draw, use and interpret distance-time graphs.

The distance–time graph below represents a car journey from Barnsley to Nottingham, a distance of 50 km, and back again.



(a) What can you say about points B, C and D?

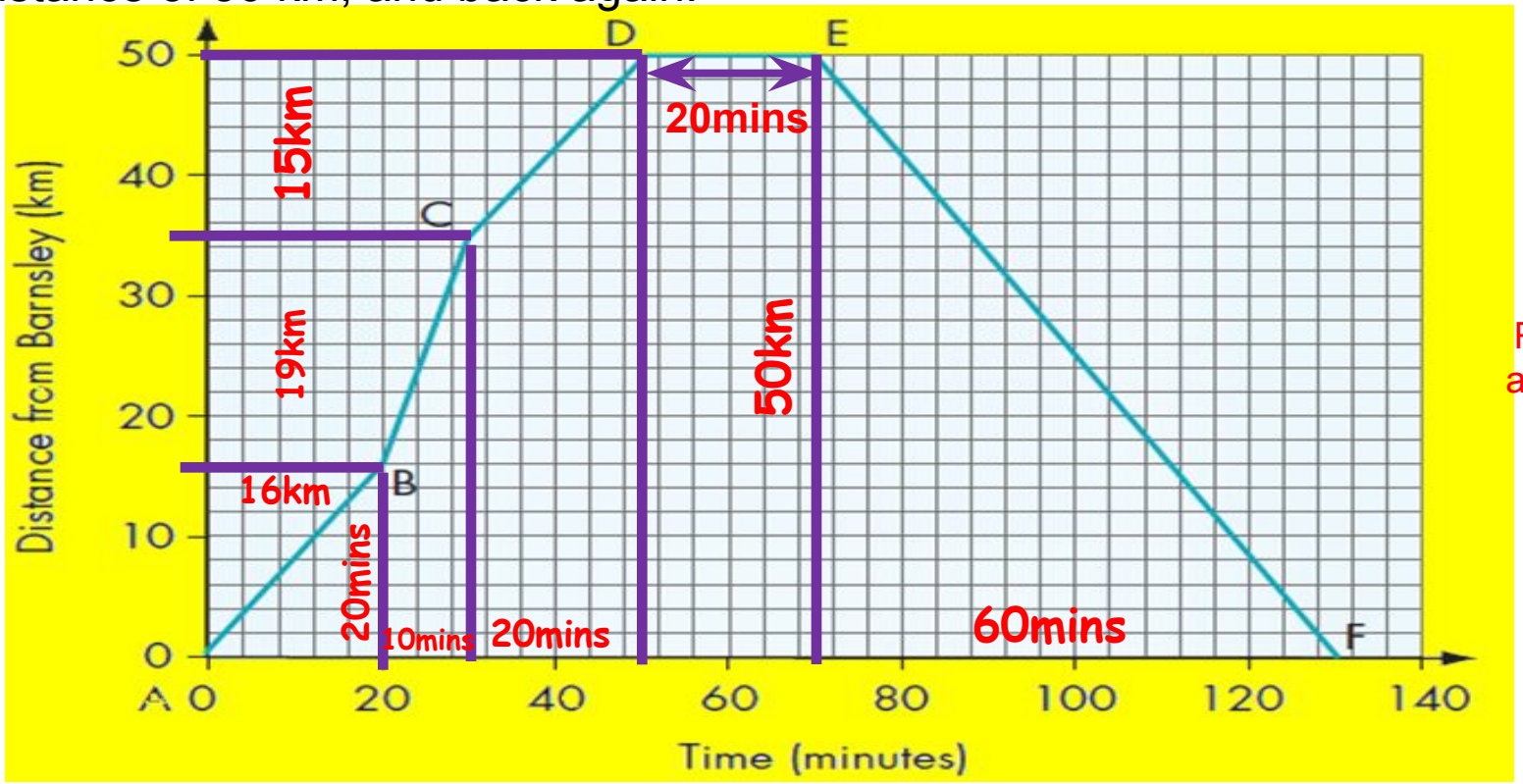
(b) What can you say about the journey from D to F?

(c) Work out the average speed for each of the five stages of the journey.

Your Turn- Group

LO: Draw, use and interpret distance-time graphs.

The distance–time graph below represents a car journey from Barnsley to Nottingham, a distance of 50 km, and back again.



D-E
Represents a stop for 20 minutes

(c) Work out the average speed for each of the five stages of the journey.

A-B
20mins = 16km
60mins = 48km
48km/h

B-C
10mins = 19km
60mins =114km
114km/h

C-D
20mins = 15km
60mins = 45km
45km/h

E-F
60mins = 50km
50km/h

Core Task

LO: Draw, use and interpret distance-time graphs.

TASK 1

1) Paul was travelling in his car to a meeting. This distance–time graph illustrates his journey.

(a) How long after he set off did he
i) stop for his break
ii) set off after his break
iii) get to his meeting place?

(b) At what average speed was he travelling:
i) over the first hour
ii) over the second hour
iii) for the last part of his journey?

(c) The meeting was scheduled to start at 10.30 am. What is the latest time he should have left home?

2) A small bus set off from Leeds to pick up Mike and his family. It then went on to pick up Mike's parents and grandparents. It then travelled further, dropping them all off at a hotel. The bus then went on a further 10 km to pick up another party and took them back to Leeds. This distance–time graph illustrates the journey.

(a) How far from Leeds did Mike's parents and grandparents live?

(b) How far from Leeds is the hotel at which they all stayed?

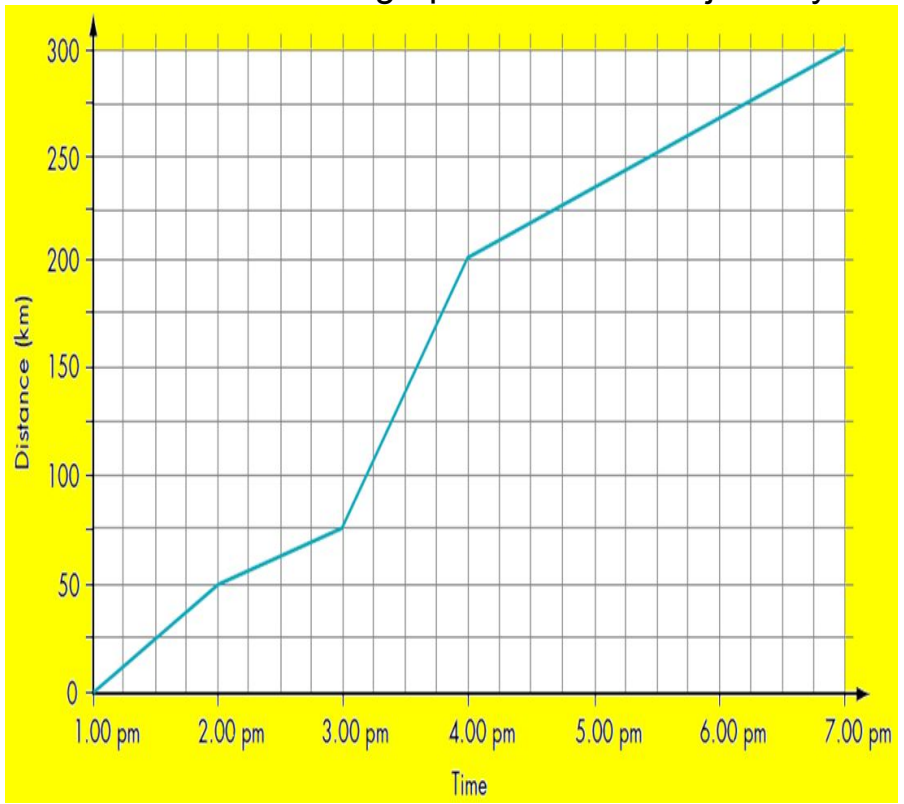
(c) What was the average speed of the bus on its way back to Leeds?

Core Task

LO: Draw, use and interpret distance-time graphs.

TASK 2

1) James was travelling to Cornwall on his holidays. This distance–time graph illustrates his journey.



(a) His greatest speed was on the motorway.

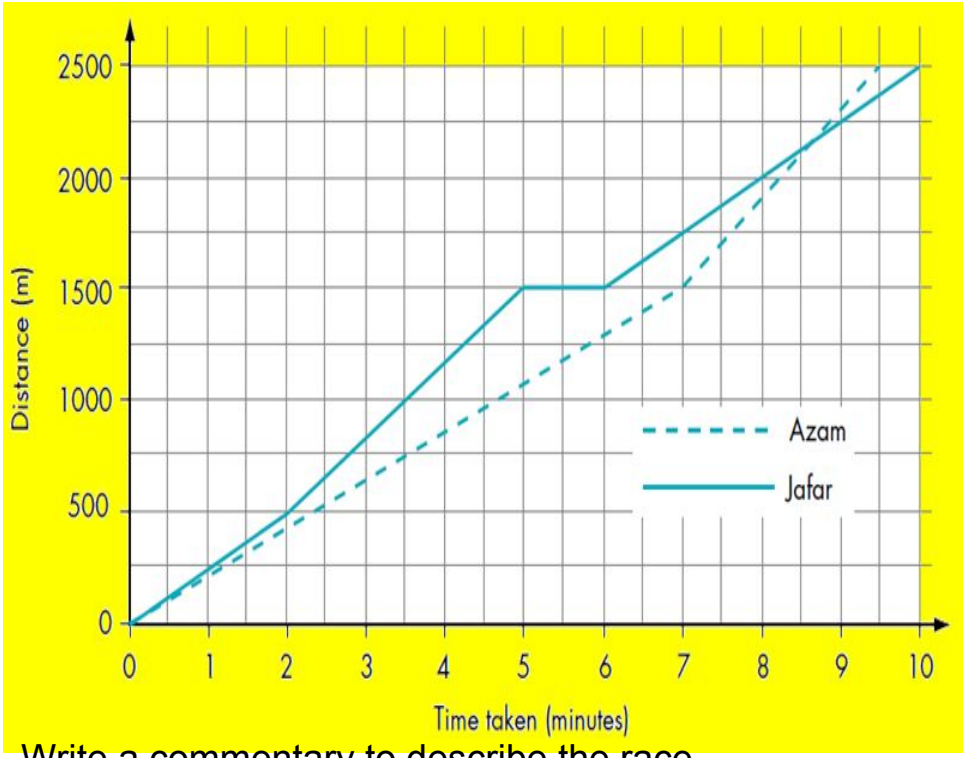
i) How far did he travel along the motorway?

ii) What was his average speed on the motorway?

(b) i) When did he travel most slowly?

ii) What was his lowest average speed?

2) Azam and Jafar were having a race. The distance–time graph below illustrates the distances covered.



Write a commentary to describe the race.

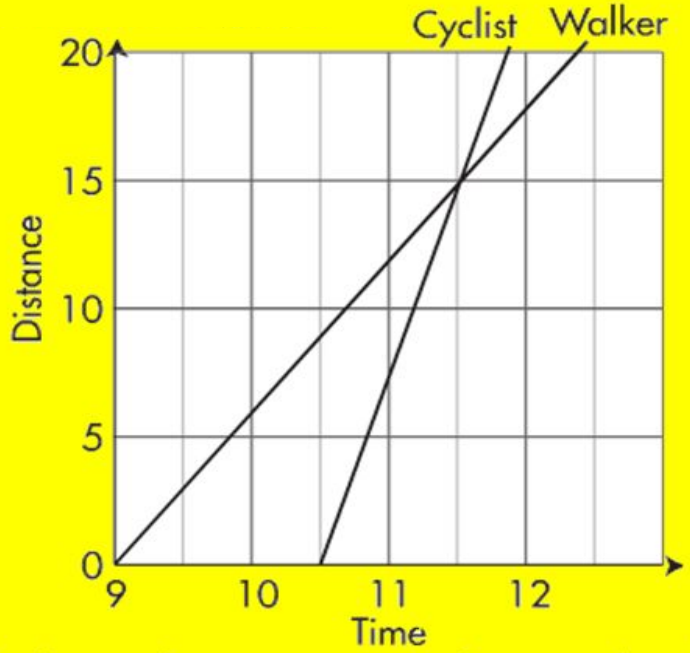
Extension

LO: Draw, use and interpret distance-time graphs.

CHALLENGE

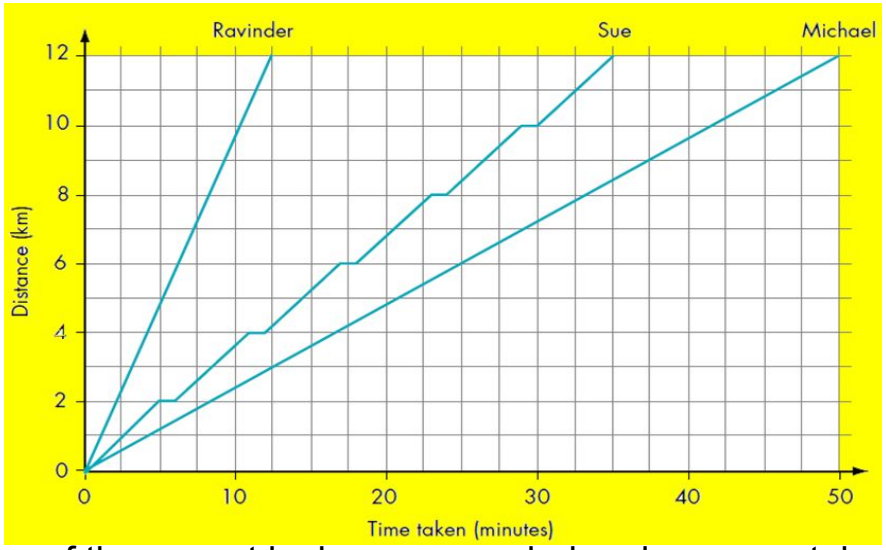
1) A walker sets off at 9.00 am from point P to walk along a trail at a steady pace of 6 km per hour. 90 minutes later, a cyclist sets off from P on the same trail at a steady pace of 15 km per hour.

At what time did the cyclist overtake the walker? You may use a graph to help you solve this question.



All methods give the same answer of 11:30 when the cyclist overtakes the walker.

2) Three school friends all set off from school at the same time, 3.45 pm. They all lived 12 km away from the school. The distance–time graph below illustrates their journeys.



One of them went by bus, one cycled and one was taken by car.

(a) i) Explain how you know that Sue used the bus.

ii) Who went by car?

(b) At what time did each friend get home?

(c) i) When the bus was moving, it covered 2 kilometres in 5 minutes. What is this speed in kilometres per hour?

ii) Overall, the bus covered 12 kilometres in 35 minutes. What is this speed in kilometres per hour?

iii) How many stops did the bus make before Sue got home?

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Plenary

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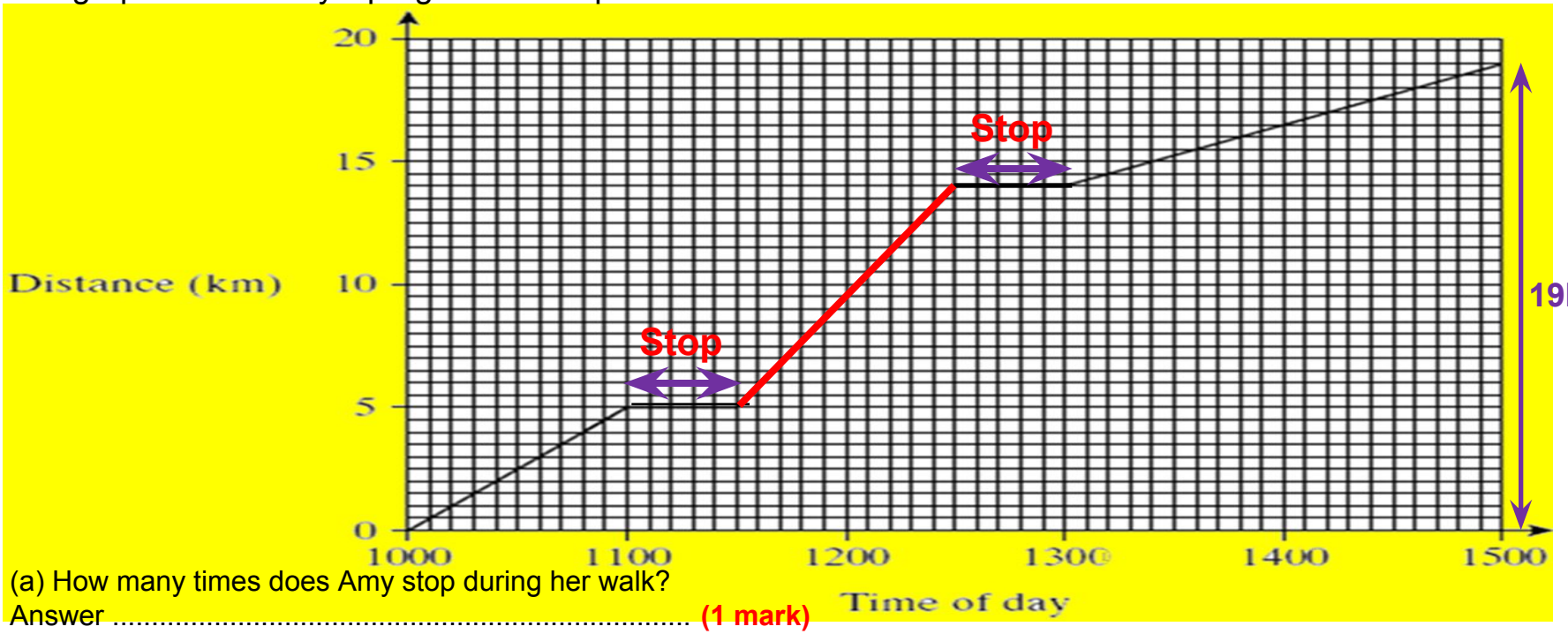
The graph shows Amy's progress on a sponsored walk.



(a) How many times does Amy stop during her walk?

Answer ..... **(1 mark)**

(b) Between which times does Amy walk the fastest? Explain your answer.

Answer .....

Explanation .....

..... **(2 marks)**

(c) Bill sponsors Amy for 20 pence per kilometre.
Kate sponsors Amy for 30 pence per kilometre.
How much should Amy collect altogether from Bill and Kate after her walk?

.....

.....

..... Answer £ ..... **(3 marks)**