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GCSE MATHEMATICS

AQA | Edexcel | OCR | WJEC

(Level 6)

Velocity-Time Graphs

Please write clearly in block capitals

Forename:
Surname:

Materials

For this paper you must have:
- mathematical instruments

You must ***not*** use a calculator.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

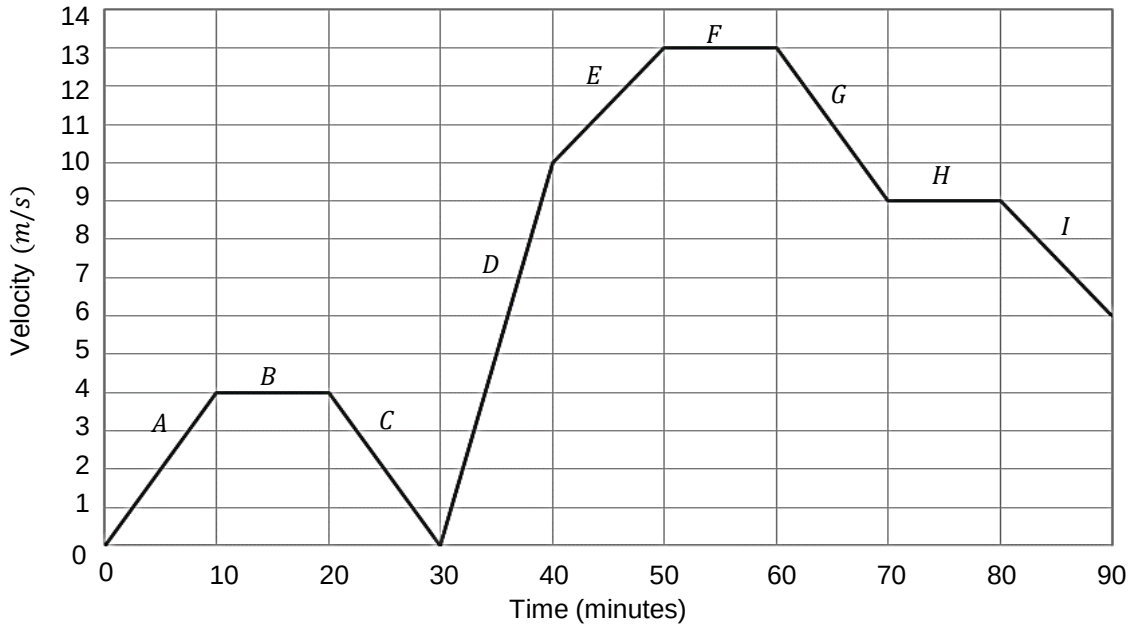
Information

- The marks for questions are shown in brackets.
- You may ask for graph paper, tracing paper and more answer paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.

1 Anna's car journey is shown on the velocity-time graph below. *(Level 5)*



For each statement, give the time or time period of the graph which satisfies this condition.

1(a) Identify one section where Anna is accelerating?

[1 mark]

1(b) When is Anna's velocity is constant ?

[1 mark]

1(c) Anna has the greatest acceleration?

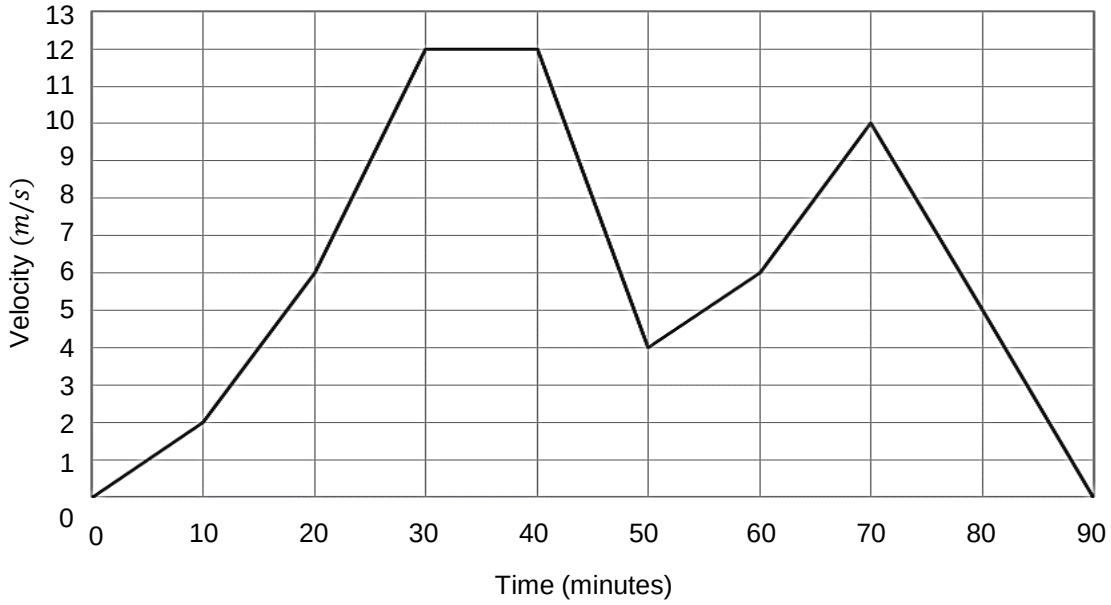
[1 mark]

1(d) In which two sections does Anna have the same acceleration

[1 mark]

4

2 The velocity-time graph below shows Brian's daily journey. *(Level 6)*



2(a) Calculate Brian's largest positive acceleration over the course of the journey?

Give your answer in m/s.

[2 marks]

Answer _____

2(b) **Estimate** the total distance travelled by Brian over the course of the journey.

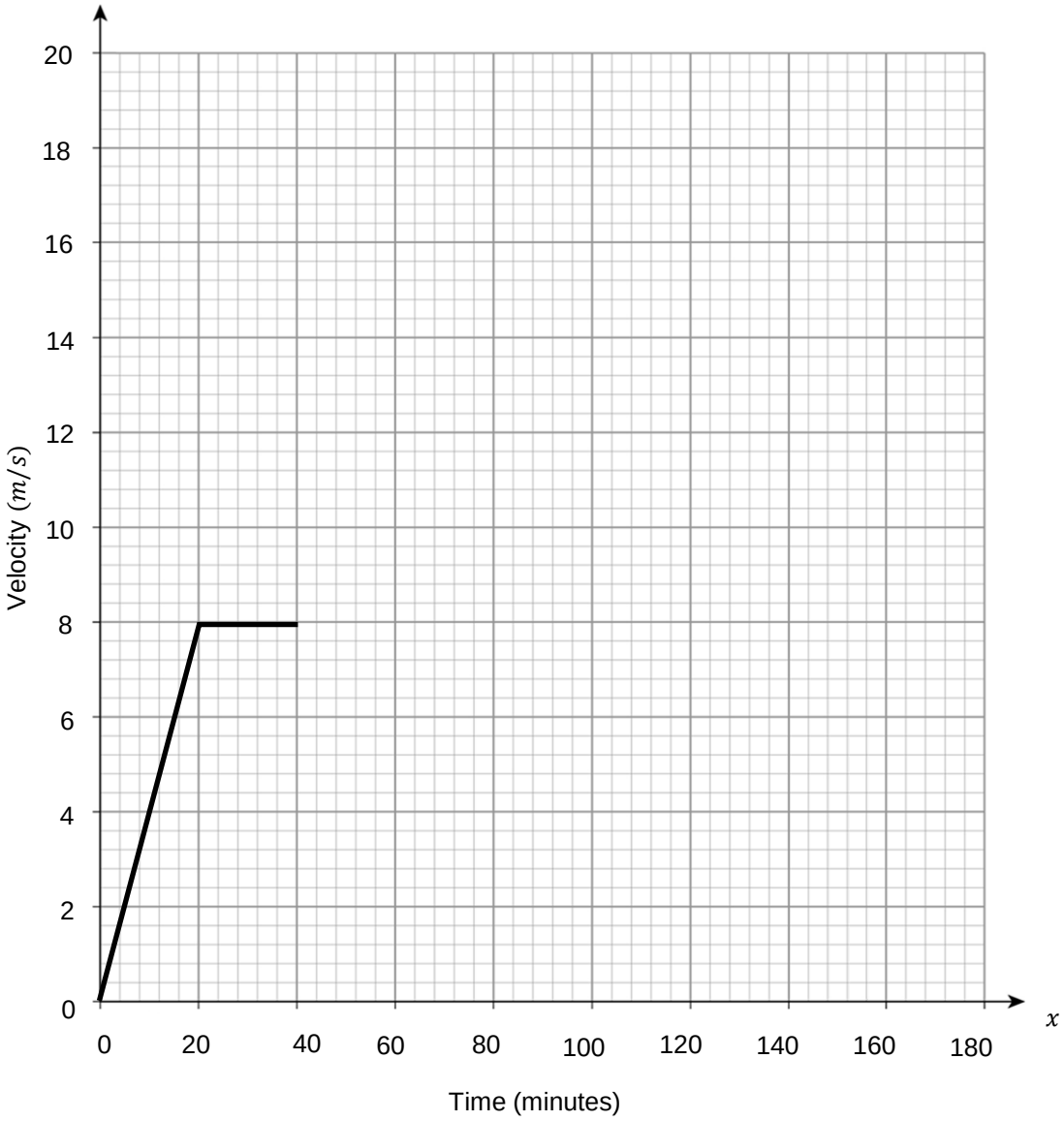
[5 marks]

Answer _____

7

3 Using the information below, complete the velocity-time diagram for Celica's journey. *(Level 6)*

[4 marks]



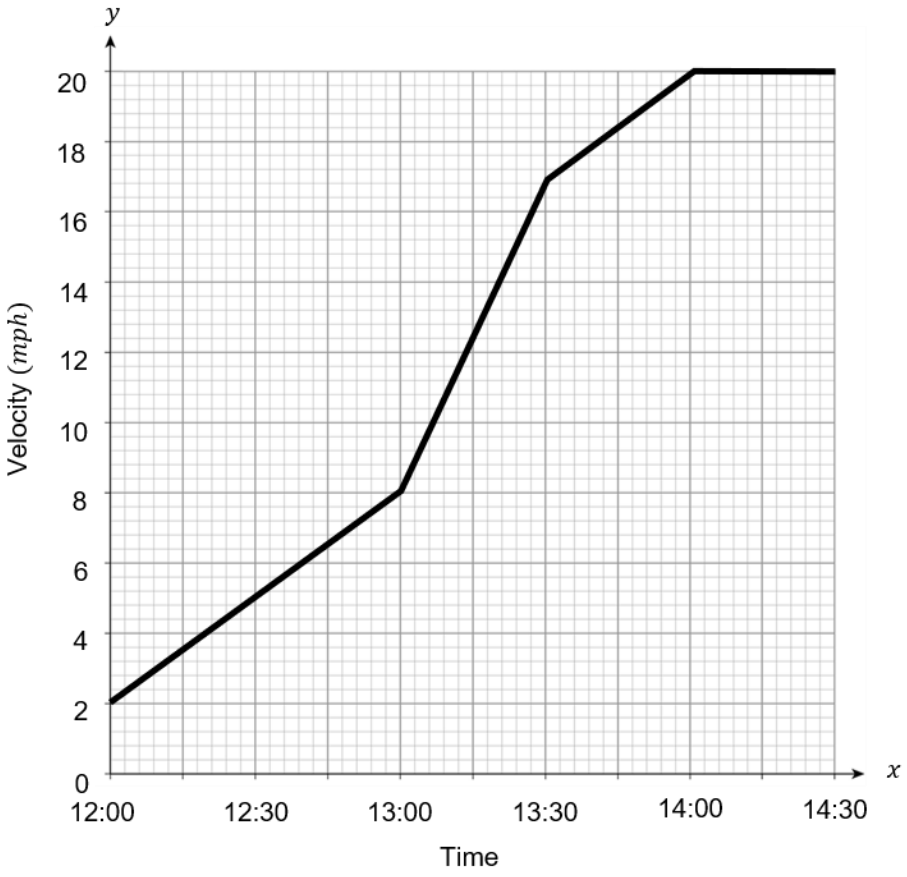
- By the 60-minute mark, Celica has travelled 24 km in total
- After this she increases velocity at a constant rate, to 14 m/s, over 40 minutes.
- She then maintains her velocity for 20 minutes before decelerating for 60 minutes at the same constant rate as her acceleration between 60-100 minutes.

Turn over for next question

4

4 Diane goes out cycling for a 150-minute journey. *(Level 6)*

Her progress is displayed in the velocity-time graph below.



She looks at the graph and makes a calculation. She states,

"My acceleration from $12{:}00\ to\ 13{:}30$ was a constant $10\ \text{miles/hour}^2$".

4(a) What is wrong with her statement?

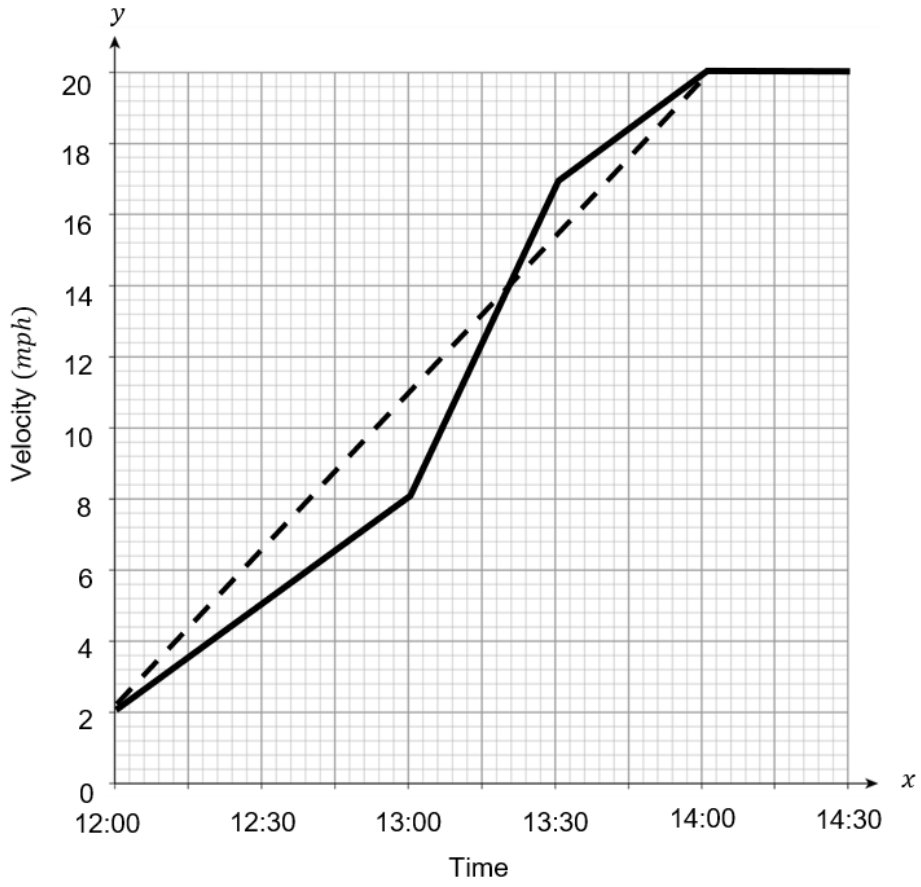
[2 marks]

4(b) What has she actually calculated?

[1 mark]

3

Diane looks again at her velocity-time graph and makes a calculation of the distance she covered.



She calculates the distance covered using the dashed line to estimate her change in velocity between 12:00 and 14:00.

She states, “From 14:00 to 14:30 my acceleration was zero, so I can estimate the total distance covered on my journey by using the area of a trapezium”

$$\text{Distance} = \frac{2(2 + 20)}{2} = 22 \text{ miles}$$

4(c) Why is her estimate incorrect, and what is the correct estimate for her distance covered?

[2 marks]

Answer _____

Question continues on next page

2

4(d) Is your estimate an underestimate or an overestimate?

Give a reason for your answer.

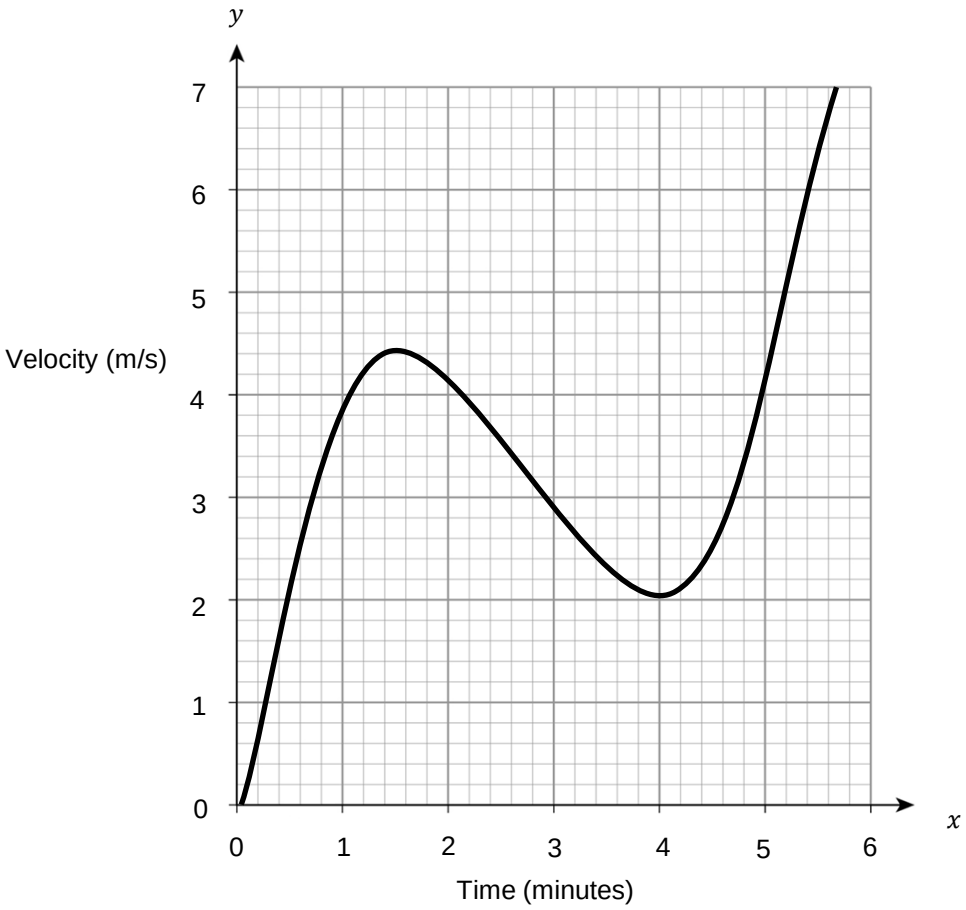
[2 marks]

4(e) How could Diane make a more accurate estimate of the distance she travelled overall?

[1 mark]

3

5 The following is a velocity time graph over the course of 6 minutes. *(Level 6)*



5(a) Estimate the distance covered in the first 4 minutes.

[2 marks]

Answer _____

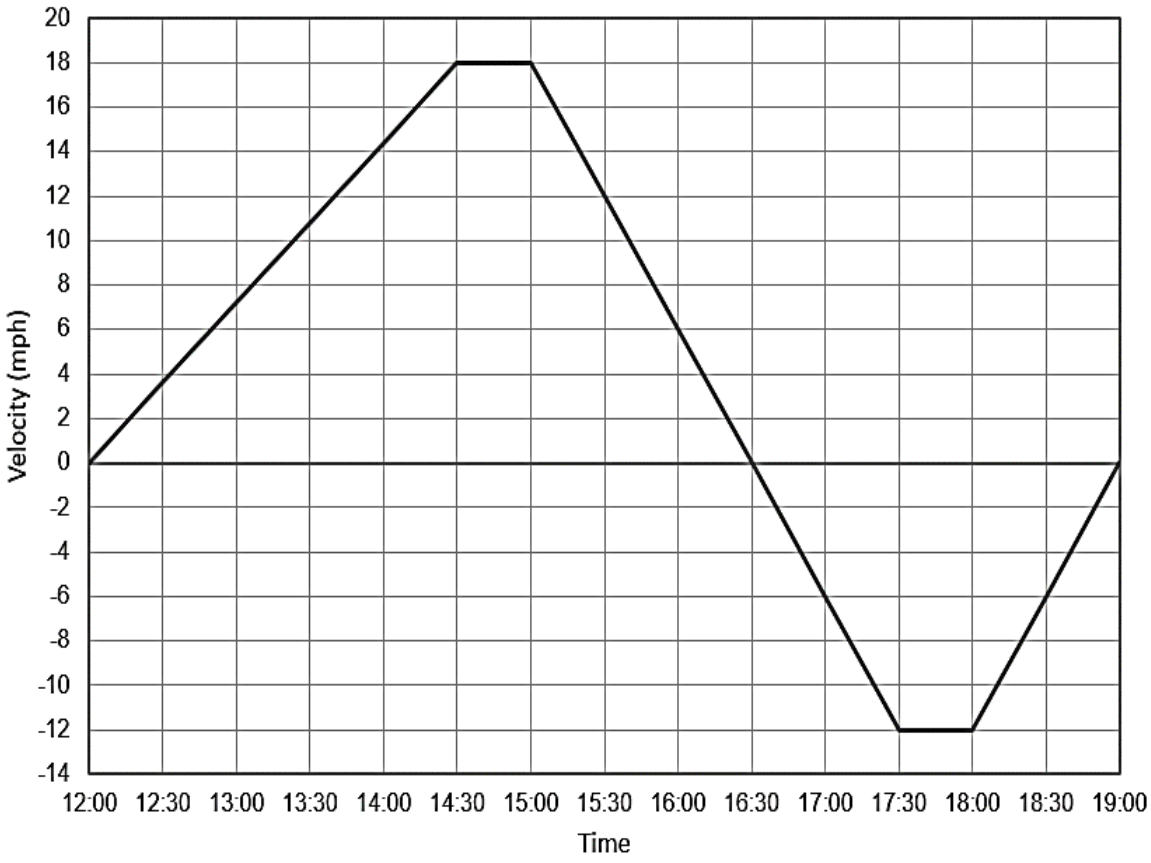
5(b) Would your estimate be an underestimate or overestimate?

[1 mark]

Turn over for next question

3

6 Erika takes a bike ride, first travelling to the shops, arriving at 16:30, then travelling to a friend's house to arriving at 19:00. *(Level 6)*



6(a) What does the velocity from 16:30 onwards represent?

[1 mark]

Question continues on next page

1

6(b) Calculate the overall distance travelled by Erika.

[3 marks]

Answer _____

6(c) Comment on the difference between your answer and the distance between Erika and her friend's house?

[1 mark]

4

END