GCSE MATHEMATICS
AQA | Edexcel | OCR I WJEC

## Velocity-Time Graphs

Please write clearly in block capitals

Forename:

Surname:

## Materials

For this paper you must have:

- mathematical instruments

You can 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.


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(b) When is Anna's velocity is constant?
$\qquad$

1(c) Anna has the greatest acceleration.
$\qquad$

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

2 The velocity-time graph below shows Brian's daily journey.


2(a) Calculate Brian's largest positive acceleration over the course of the journey.
Give your answer in m/s.
$\qquad$
$\qquad$
Answer $\qquad$

2(b) Estimate the total distance travelled by Brian over the course of the journey.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
Answer $\qquad$

3 Using the information below, complete the velocity-time diagram for Celica's journey.


- By the 60 minute mark, Celica has travelled 24 km in total
- After this she increases velocity at a constant rate, to $14 \mathrm{~m} / \mathrm{s}$, 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 Diane goes out cycling for a 150 - minute journey.
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 miles/hour ${ }^{2}$ ".
4(a) What is wrong with her statement?
$\qquad$
$\qquad$

4(b) What has she actually calculated?
$\qquad$
$\qquad$

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?
$\qquad$
$\qquad$
$\qquad$
Answer
Question continues on next page

4(d) Is your estimate an underestimate or an overestimate?
Give a reason for your answer.
$\qquad$
$\qquad$
$\qquad$

4(e) How could Diane make a more accurate estimate of the distance she travelled overall?
$5 \quad$ The following is a velocity time graph over the course of 6 minutes.


5(a) Estimate the distance covered in the first 4 minutes.
$\qquad$
$\qquad$
$\qquad$
Answer $\qquad$

5(b) Would your estimate be an underestimate or overestimate?
[1 mark]
$\qquad$
$\qquad$
Turn over for next question

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 .


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

Question continues on next page


