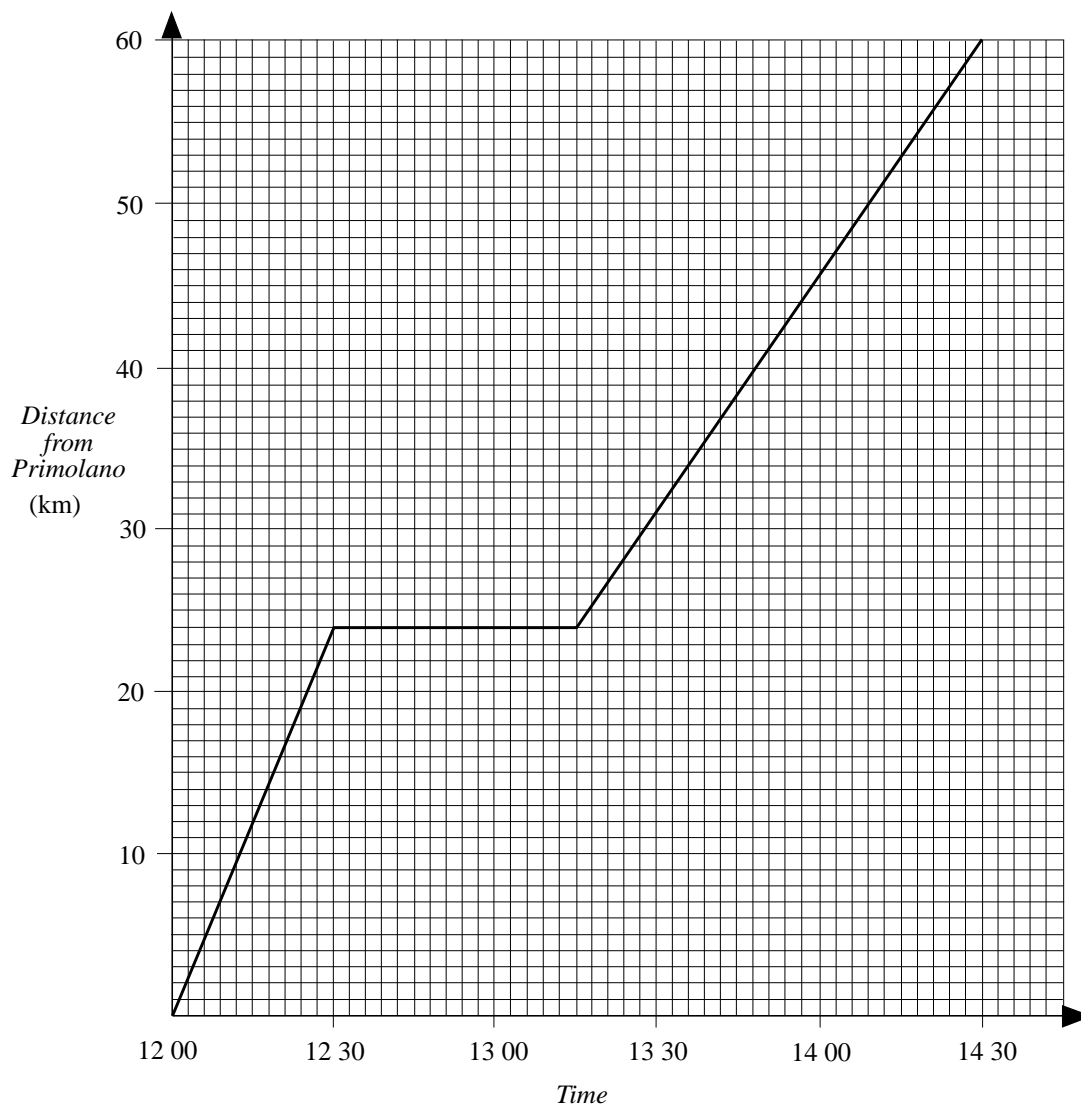


UNIT 17 *Using Graphs***Revision Test 17.1***ONE HOUR*

1. Sofia drives from Primolano to Trento, leaving at 12 00 noon. She stops at Borgo for lunch before continuing her journey. The graph drawn below represents her journey.

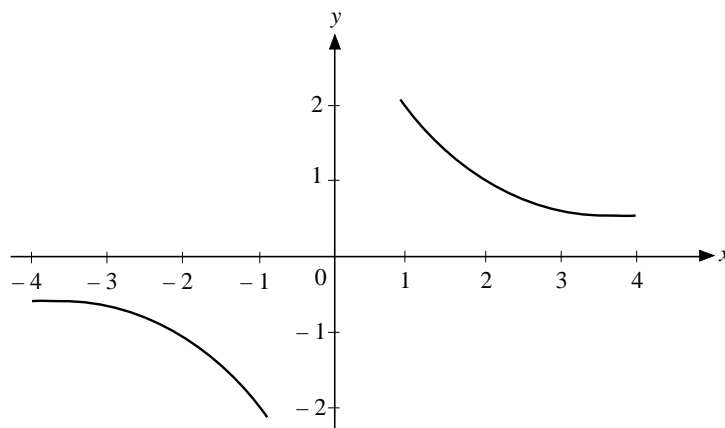


Use the graph to find:

- | | |
|---|----------|
| (a) the distance from Primolano to Trento. | (1 mark) |
| (b) the distance from Borgo to Trento. | (1 mark) |
| (c) how long she stopped for lunch. | (1 mark) |
| (d) at which stage of her journey her average speed was greatest. | (1 mark) |

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2. The function $y = f(x)$ when $f(x) = \frac{2}{x}$ is illustrated below.



On separate grids, with $-2 \leq x \leq 2$, sketch the following functions:

- (a) $y = f(x) + 1$ (2 marks)
- (b) $y = f(x - 1)$ (2 marks)
- (c) $y = f\left(\frac{1}{x}\right)$ (2 marks)
3. The table shows the value of the function $f(x) = (x - 2)^2 + 4$, where $-3 \leq x \leq 4$, for various values of x .

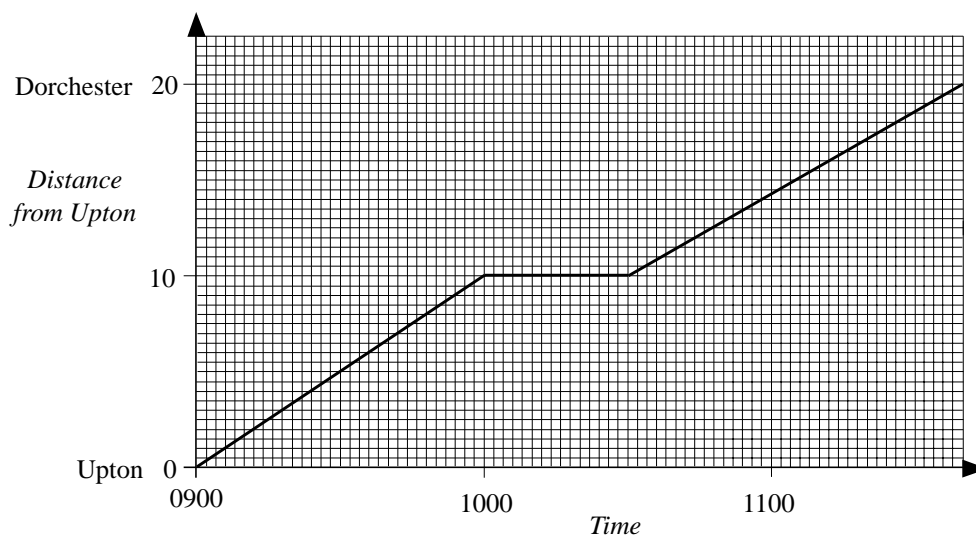
x	3	2	1	0	1	2	3	4
$f(x)$	29	20	13	8	5	4	5	8

- (a) Draw the graph of $y = f(x)$, using x -axis from -4 to 4 and y -axis from 0 to 30 . (2 marks)
- (b) On the same axes, draw the graph of $y = x^2$. (1 mark)
- (c) Describe how the graph of $y = (x - 2)^2 + 4$ can be obtained from the graph of $y = x^2$ by a transformation. (2 marks)
- State clearly what this transformation is.

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4. The distance from Upton to Dorchester is 20 miles.

The diagram shows the distance-time graph of a cyclist travelling from Upton to Dorchester.



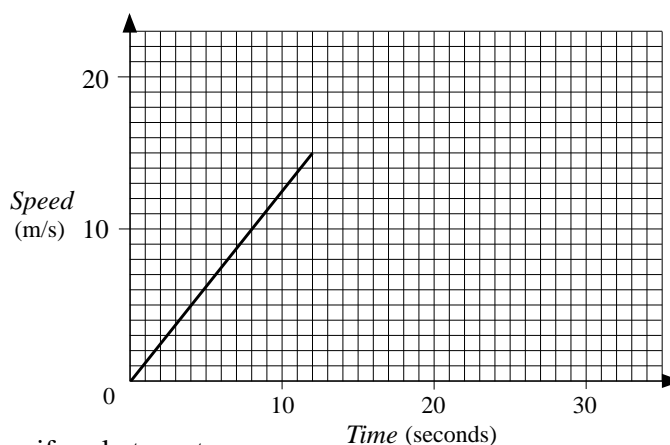
At 0940 a motorist leaves Dorchester to travel to Upton along the same road as the cyclist. The motorist travels at an average speed of 40 mph.

- (a) On a copy of the diagram draw the distance-time graph of the motorist. (2 marks)
 (b) At what time did the motorist pass the cyclist? (2 marks)

5. The speed-time graph shows the first part of the journey of a tube train travelling between two underground stations.

From rest, the train accelerates uniformly for 12 seconds until it reaches a speed of 15 metres per second.

It then maintains this speed for a further 12 seconds before slowing uniformly to rest.

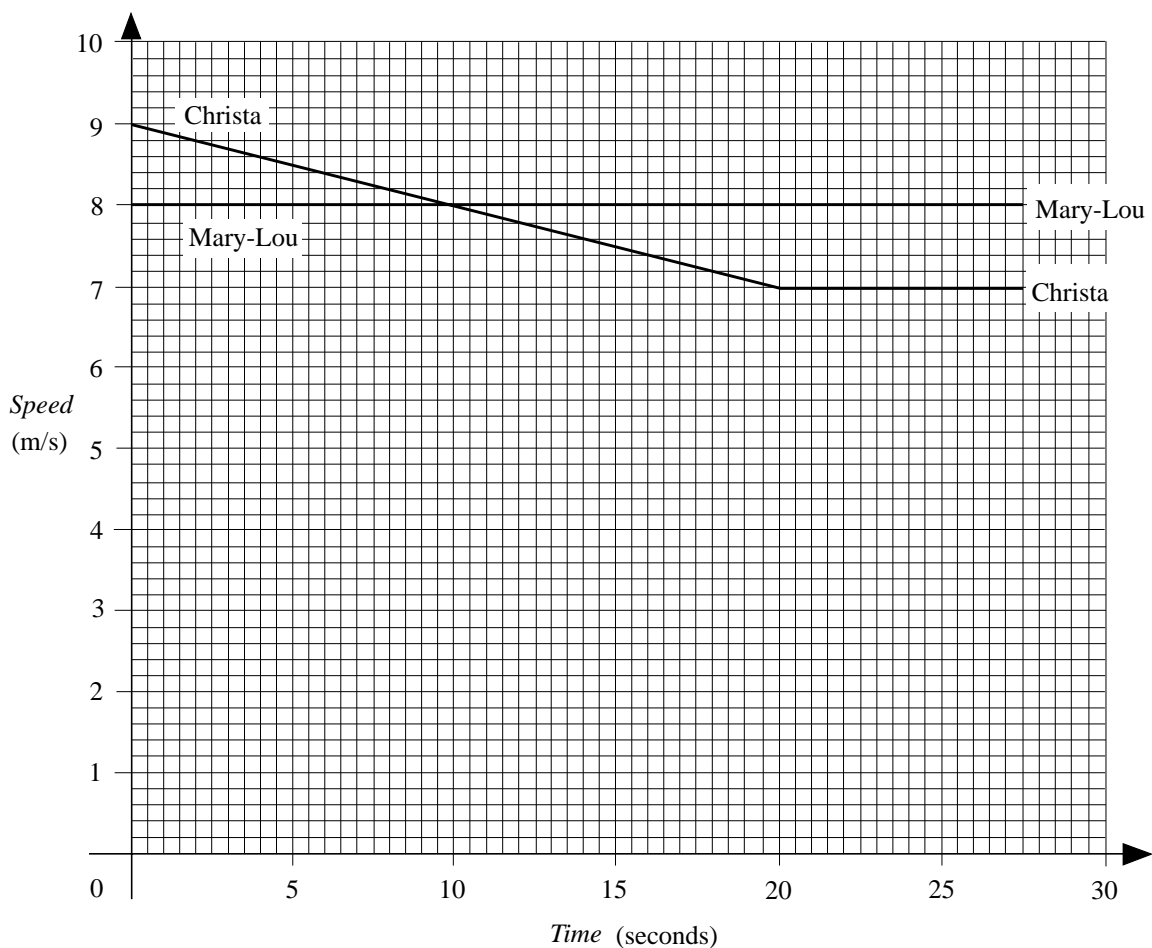


The train takes a total of 30 seconds to travel from one station to the next.

- (a) Complete the speed-time graph. (3 marks)
 (b) Calculate the rate at which the train slows down. (3 marks)
 (c) Use your graph to calculate, in metres, the distance between these stations. (4 marks)

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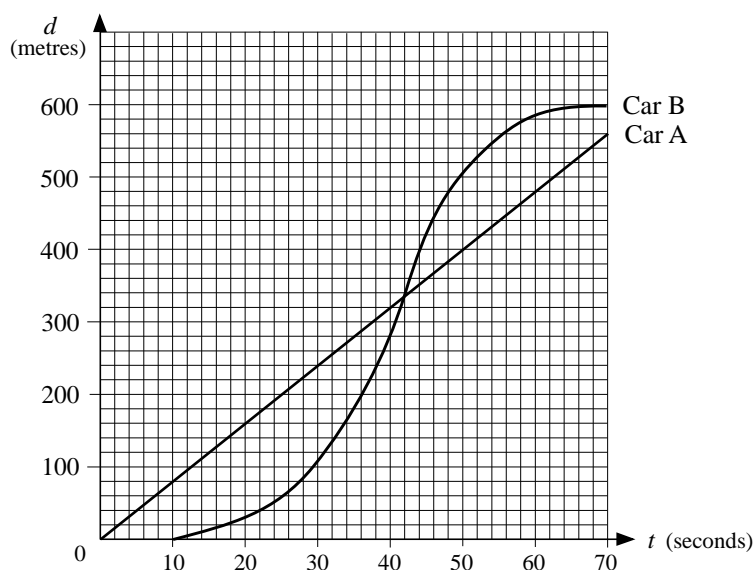
6. The diagram shows the speed-time graphs for two runners in a 200 m race.



- (a) Calculate the distance travelled by each of the runners during the first 10 seconds. (4 marks)
- (b) Which runner was in the lead 10 seconds after the start? (1 mark)
- (c) (i) How many seconds after the start did one runner overtake the other? (1 mark)
(ii) Explain how you arrived at your answer to part (c) (i). (2 marks)
- (d) How do the graphs show which of the two runners won the race? (2 marks)
- (e) Describe the tactics used by each runner as shown by the graphs. (3 marks)

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7.



The diagram shows the distance-time graph of two cars, A and B, travelling along the same stretch of road.

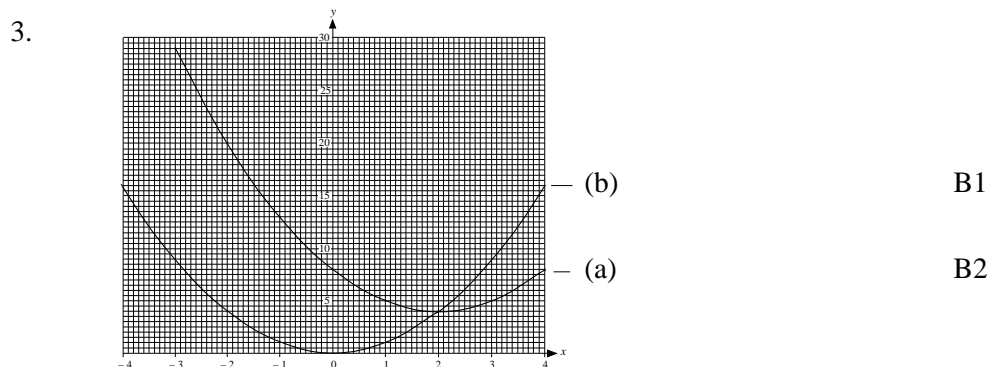
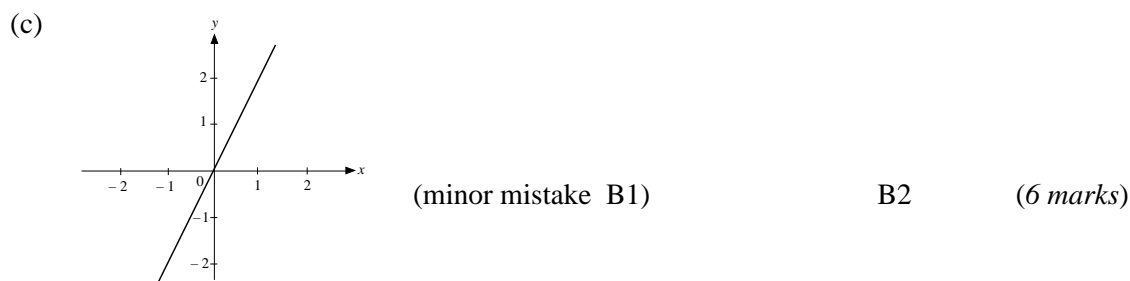
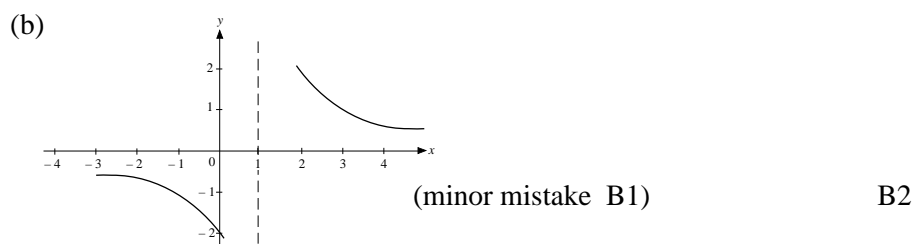
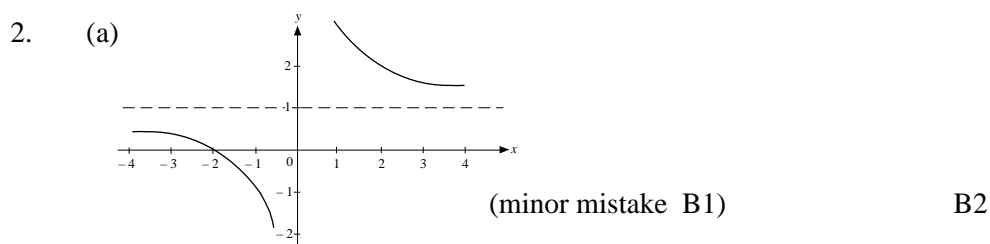
Car A starts at time $t = 0$ and travels at a constant speed.

- (a)
 - (i) Find the speed of car A in metres per second. (2 marks)
 - (ii) What is the speed in kilometres per hour? (2 marks)
- (b) Car B starts 10 seconds later, accelerates and then slows down before coming to rest when $t = 70$. How far have the cars travelled when B overtakes A? (1 mark)
- (c) By drawing tangents, or otherwise, estimate the two values of t when the cars are travelling at the same speed. (3 marks)

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Answers

1. (a) 60 km B1
 (b) $60 - 24 = 36$ km B1
 (c) 45 minutes B1
 (d) The journey from Primolano to Borgo. B1 (4 marks)

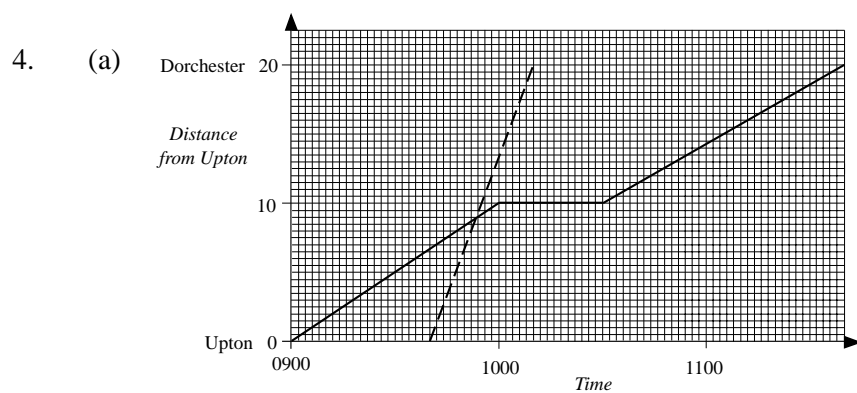


- (c) Let $y = f(x) = x^2$, then the required transformation is

$$y = f(x - 2) + 4$$
 B2 (5 marks)
 (i.e. move 2 units in +ve x direction and 4 units in +ve y direction)

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Answers

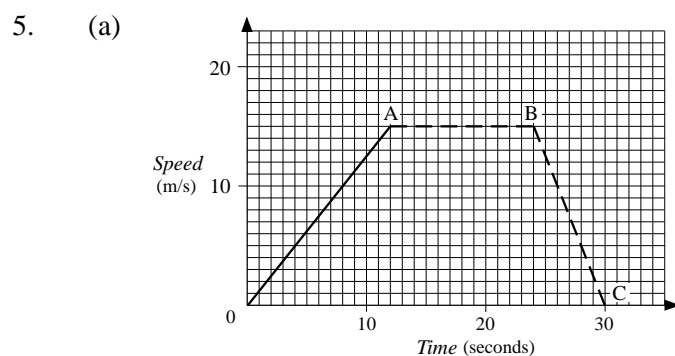


B2

(b) Approximately 09.55

B2

(4 marks)



AB

B1

BC

B2

(b) Deceleration = $\frac{15}{6}$
 $= 2.5 \text{ m/s}^2$

M2

A1

(c) Distance = $\frac{1}{2} \times 12 \times 15$
 $+ 12 \times 15$
 $+ \frac{1}{2} \times 6 \times 15$
 $= 315 \text{ m}$

B1

B1

B1

B1

(10 marks)

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Answers

6. (a) May-Lou: $8 \times 10 = 80$ m M1 A1
- Christa: $\frac{(8 + 9)}{2} \times 10$ M1
- $= 85$ m A1
- (b) Christa B1
- (c) (i) 20 seconds B1
- (ii) The areas under each graph are the same B2
(and equal to 160 m)
- (d) May-Lou: as after 20 seconds, when B1
they are equal, she continues to run faster. B1
- (e) Christa starts off at top speed at 9 m/s, slowing B1
down until reaching 7 m/s, which she maintains till the end. B1
- May-Lou maintains a constant speed of 8 m/s throughout. B1 (13 marks)
7. (a) (i) $\text{Speed} = \frac{400}{50}$ M1
- $= 8$ m/s A1
- (ii) $8 \times \frac{3600}{1000} = 28.8$ km/hour M1 A1
- (b) About 330 metres B1
- (c) About 26 seconds and 55 seconds (allow ± 1) M1 A1 A1 (8 marks)

(TOTAL MARKS 50)