

Name

ANSWERS

Class



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Speed, distance and time

(9 – 1) Topic booklet

Foundation

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- If the question is a 1F question you are not allowed to use a calculator.
- If the question is a 2F or a 3F question, you may use a calculator to help you answer.

Information

- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

- 9 Ruth left her home at 9 am and walked to the library.
She got to the library at 10 30 am.
Ruth walked at a speed of 4 mph.

(a) Work out the distance Ruth walked.

$$4 \times 1\frac{1}{2}$$
$$\frac{4}{1} \times \frac{3}{2} = \frac{12}{2} = 6$$

6 miles
(2)

Ruth got to the library at 10 30 am.
She stayed at the library for 50 minutes.
Then she walked home.

Ruth took $1\frac{1}{4}$ hours to walk home.

(b) At what time did Ruth get home?

$$10:30 \xrightarrow{+50\text{mins}} 11:20 \xrightarrow{+1\text{h } 15\text{min}} 12:35$$

12:35
.....

(2)

9 Emily drives 186 miles in 3 hours.

(a) What is her average speed?

$$\frac{186}{3} = 62$$



62

mph

(2)

Sarah drives at an average speed of 58 mph for 4 hours.

(b) How many miles does Sarah drive?

$$58 \times 4 = 232$$

232

miles

(2)

11 (a) Write 196 minutes in hours and minutes.

$$\begin{aligned} 60 &= 1 \text{ hour} \\ 120 &= 2 \text{ hours} \\ 180 &= 3 \text{ hours} \end{aligned}$$



..... 3 hours 16 minutes
(2)

A train travels x miles in 2 hours.

(b) Write down an expression, in terms of x , for the average speed of the train.

..... $\frac{x}{2}$ miles per hour
(1)

November 2021 – Paper 3F

(Total for Question 11 is 3 marks)

12 A car travels at an average speed of 37 miles per hour for 3 hours.

Work out the distance that the car travels in the 3 hours.



$$37 \times 3 = 111$$

..... 111 miles

November 2023 – Paper 2F

(Total for Question 12 is 2 marks)

14 Jenny drives from London to Swindon at an average speed of 54 miles per hour.

She drives for $1\frac{1}{2}$ hours.

(a) Work out the distance from London to Swindon.

$$54 \times 1\frac{1}{2}$$
$$= \frac{54}{1} \times \frac{3}{2} = \frac{162}{2}$$

81

miles

(2)

November 2022 – 1F

(Total for Question 14 is 2 marks)

14 On Monday, Lizzie cycled 36 kilometres in 3 hours.

(a) Work out Lizzie's average speed.

$$\frac{36}{3}$$

12

kilometres per hour

(2)



On Tuesday, Lizzie cycled 36 kilometres at an average speed of 16 kilometres per hour.

Lizzie says that the total time she cycled on Monday and Tuesday was less than 5 hours 20 minutes.

(b) Is Lizzie correct?

You must show how you get your answer.

$$\frac{36}{16} = 2\frac{1}{4} = 2 \text{ hours } 15 \text{ minutes}$$

Yes Lizzie is correct

$$2 \text{ h } 15 \text{ min} < 2 \text{ hours } 20 \text{ mins}$$

(3)

June 2024 – Paper 2F

(Total for Question 14 is 5 marks)

16 Paulo drives at an average speed of 56 km/h for 1 hour 45 minutes.

Work out the distance Paulo drives.



$$56 \times 1\frac{3}{4} = 98$$

98 km

June 2023 – Paper 2F

(Total for Question 16 is 3 marks)

16 A sprinter runs a distance of 200 metres in 25 seconds.

Work out the average speed of the sprinter.



$$\frac{200}{25}$$

8 m/s

Specimen 2 – Paper 2F

(Total for Question 16 is 1 mark)

16 Savio leaves his home at 07 30 to drive to work.

He drives a distance of 50 miles.

Savio thinks he drives at an average speed of 40 miles per hour.

(a) If Savio is correct, at what time will he arrive at work?

$$\frac{50}{40} = \frac{5}{4} = 1\frac{1}{4} \\ = 1 \text{ hour } 15 \text{ minutes}$$

08:45

(3)

In fact, Savio's average speed was greater than 40 miles per hour.

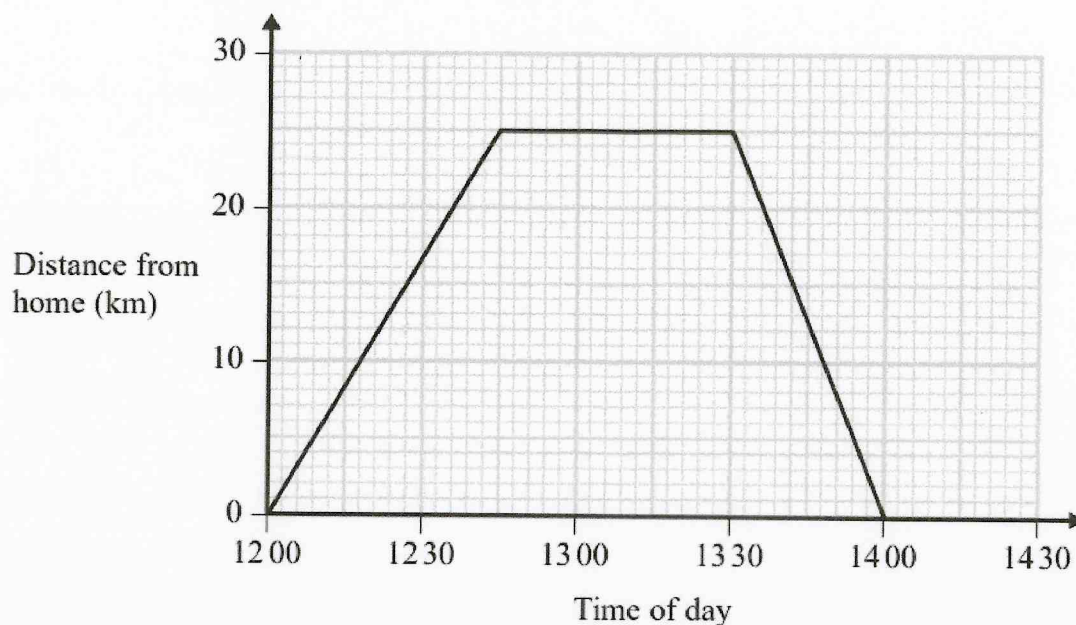
(b) How does this affect your answer to part (a)?

Yes, he will arrive earlier than 08:45

(1)

- 16 Steve drove from his home to his friend's house.
He stayed at his friend's house and then drove home.

Here is Steve's travel graph.



- (a) For how many minutes did Steve stay at his friend's house?

45 minutes
(1)

- (b) What was Steve's average speed on his journey home?

$$\frac{25}{\frac{1}{2}} = 25 \div \frac{1}{2}$$

$$= \frac{25}{1} \div \frac{1}{2}$$

50 km/h
(2)

- 20 Olly drove 56 km from Liverpool to Manchester.
He then drove 61 km from Manchester to Sheffield.

$$75 \text{ mins} = 1\frac{1}{4} \text{ h}$$



Olly's average speed from Liverpool to Manchester was 70 km/h.
Olly took 75 minutes to drive from Manchester to Sheffield.

- (a) Work out Olly's average speed for his total drive from Liverpool to Sheffield.

$L \rightarrow M$

$$\frac{56}{70} = \frac{4}{5} = 48 \text{ minutes}$$

$M \rightarrow S$

$$\frac{61}{1\frac{1}{4}} = 48.8 \text{ km/h}$$

$L \rightarrow S$

$$\frac{117 \text{ km}}{\frac{4}{5} + 1\frac{1}{4}} = 57.07$$

57

km/h

(4)

Janie drove from Barnsley to York.

Janie's average speed from Barnsley to Leeds was 80 km/h.
Her average speed from Leeds to York was 60 km/h.

Janie says that the average speed from Barnsley to York can be found by working out the mean of 80 km/h and 60 km/h.

- (b) If Janie is correct, what does this tell you about the two parts of Janie's journey?

The time must be the same.

(1)

22 A cycle race across America is 3069.25 miles in length. $\xrightarrow{3000 \text{ miles}}$

Juan knows his average speed for his previous races is 15.12 miles per hour. $\xrightarrow{15 \text{ mph}}$
For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.

$$15 \text{ mph} \times 8 \text{ hours} = 120 \text{ miles a day}$$

$$\frac{3000}{120} = \frac{300}{12} = \frac{150}{6} = 25 \text{ days}$$

25

(3)

Juan trains for the race.

The average speed he can cycle at increases.

It is now 16.27 miles per hour.

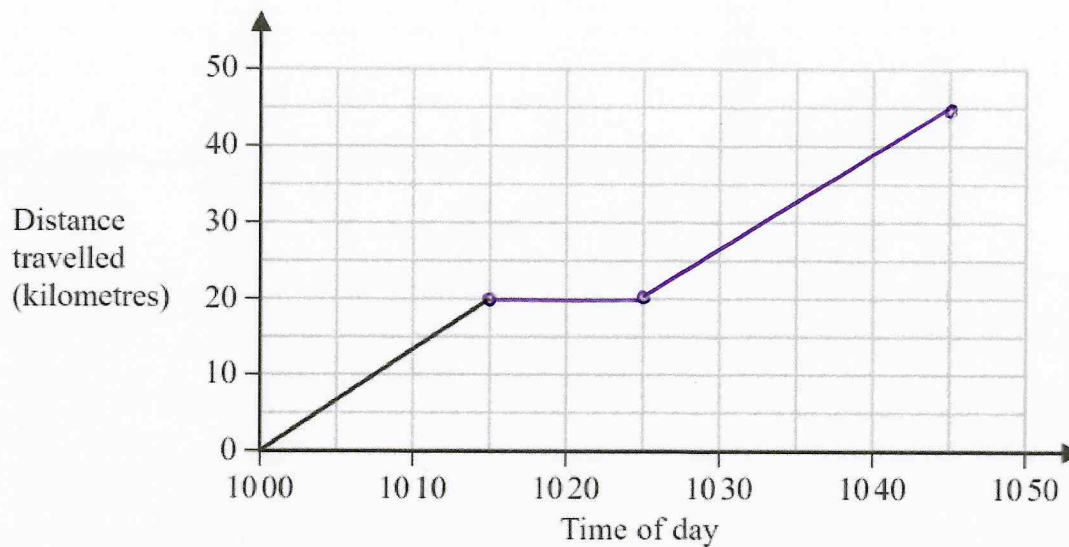
(b) How does this affect your answer to part (a)?

The faster he cycles, the fewer days it would take.

(1)

23 Sam drives his car on a journey.

Here is the travel graph for the first 15 minutes of his journey.



$$15 \text{ mins} = \frac{1}{4}$$

(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

$$\frac{20}{\frac{1}{4}} = 20 \div \frac{1}{4}$$

$$= \frac{20}{1} \div \frac{1}{4}$$

$$\underline{\quad 80 \quad} \text{ km/h}$$

(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

(b) On the grid, complete the travel graph for Sam's journey.

$$20 \text{ minutes} = \frac{1}{3}$$

$$75 \times \frac{1}{3}$$

$$= \frac{75}{1} \times \frac{1}{3} = \frac{75}{3} = 25 \text{ km}$$

(3)

- 24 Andy cycles a distance of 30 km at an average speed of 24 km/h.
He then runs a distance of 12 km at an average speed of 8 km/h.

Work out the total time Andy takes.

Give your answer in hours and minutes.



Cycles

$$\frac{30}{24} = 1\frac{1}{4} = 1 \text{ hour } 15 \text{ minutes}$$

Runs

$$\frac{12}{8} = 1\frac{1}{2} = 1 \text{ hour } 30 \text{ minutes}$$

2 hours 45 minutes

24 A plane travels at a speed of 213 miles per hour. $\rightarrow 200 \text{ mph}$

(a) Work out an estimate for the number of seconds the plane takes to travel 1 mile.

200 miles per hour

200 miles in 60 minutes

200 miles in 3600 seconds

20 miles in 360 seconds

2 miles in 36 seconds

1 mile in 18 seconds

18

seconds

(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

Overestimate as I rounded the distance down.

(1)

- 24 Gary drove from London to Sheffield.
It took him 3 hours at an average speed of 80 km/h.

Lyn drove from London to Sheffield.
She took 5 hours.

Assuming that Lyn
drove along the same roads as Gary
and did not take a break,

- (a) work out Lyn's average speed from London to Sheffield.

Gary $80 \text{ km/h} \times 3 \text{ hours} = 240 \text{ km}$

Lyn $\frac{240 \text{ km}}{5 \text{ hours}} = 48 \text{ kmph}$

48 km/h
(3)

- (b) If Lyn did **not** drive along the same roads as Gary, explain how this could affect your answer to part (a).

The distance would change, so the speed would be different.

(1)

26 Riley travelled by car and by aeroplane.

He travelled 143 miles by car at an average speed of 55 miles per hour.
Riley then travelled for 5 hours and 20 minutes by aeroplane.



Work out, in hours and minutes, Riley's total travelling time.

$$\frac{143}{55} = 2.6 \text{ hours} = 2\frac{3}{5} \text{ hours} = 2 \text{ hours } 36 \text{ mins}$$

$$2 \text{ h } 36 \text{ m} + 5 \text{ h } 20 \text{ m}$$

7 hours 56 minutes

November 2023 – Paper 3F

(Total for Question 26 is 3 marks)

26 Axel and Lethna are driving along a motorway.

They see a road sign.

The road sign shows the distance to Junction 8

It also shows the average time drivers take to get to Junction 8



To Junction 8 30 miles 26 minutes

The speed limit on the motorway is 70 mph.

Lethna says

“We will have to drive faster than the speed limit to drive 30 miles in 26 minutes.”

Is Lethna right?

You must show how you get your answer.

$$30 \div \frac{26}{60} = 69.23 \text{ mph}$$

Lethna is wrong, $69.23 < 70$

- 27 Jessica runs for 15 minutes at an average speed of 6 miles per hour.
She then runs for 40 minutes at an average speed of 9 miles per hour.

It takes Amy 45 minutes to run the same total distance that Jessica runs.

Work out Amy's average speed.

Give your answer in miles per hour.

$$15\text{mins} = \frac{1}{4}$$

$$40\text{mins} = \frac{2}{3}$$



$$45\text{mins} = \frac{3}{4}$$

$$\textcircled{J} \quad 6\text{mph} \times \frac{1}{4} = 1\frac{1}{2} \text{ miles}$$

$$9\text{mph} \times \frac{2}{3} = 6 \text{ miles}$$

$$\textcircled{A} \quad 7.5\text{miles} \div \frac{3}{4} = 10\text{mph}$$

10

..... miles per hour

- 27 Nimer was driving to a hotel.
He looked at his Sat Nav at 13 30



Time	13 30
Distance to destination	65 miles

Nimer arrived at the hotel at 14 48

Work out the average speed of the car from 13 30 to 14 48
You must show all your working.

1 hour 18 minutes

$$\frac{65}{1 \text{ hour } 18 \text{ min}} \rightarrow 65 \div \frac{78}{60} = 50$$

50 mph