

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Algebra

Plotting linear real-life graphs and sketching graphs of water flows
v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments

Information

- The marks for questions are shown in brackets

Advice

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

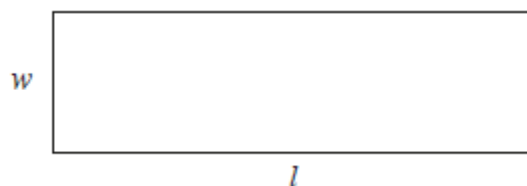
For questions 1 to 4 you must **NOT** use a calculator.



Q1.

In this question all lengths are in centimetres.
A rectangle has length l and width w .

Not drawn accurately

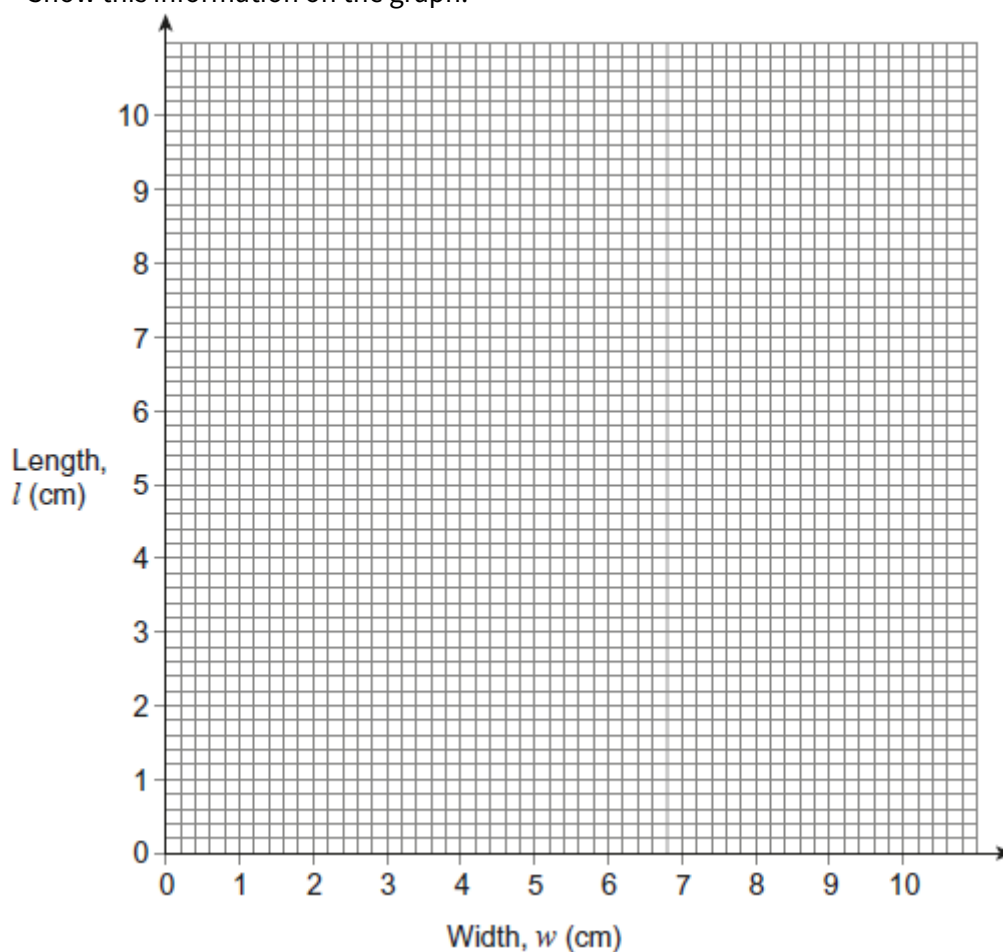


- (a) w and l are such that

$$l \leq w \leq 9$$

$$w + l = 10$$

Show this information on the graph.



(2)

- (b) Use the graph, or otherwise, to work out the value of w when $l = 3w$

You **must** show your working.

Answer _____

(2)

(Total 4 marks)

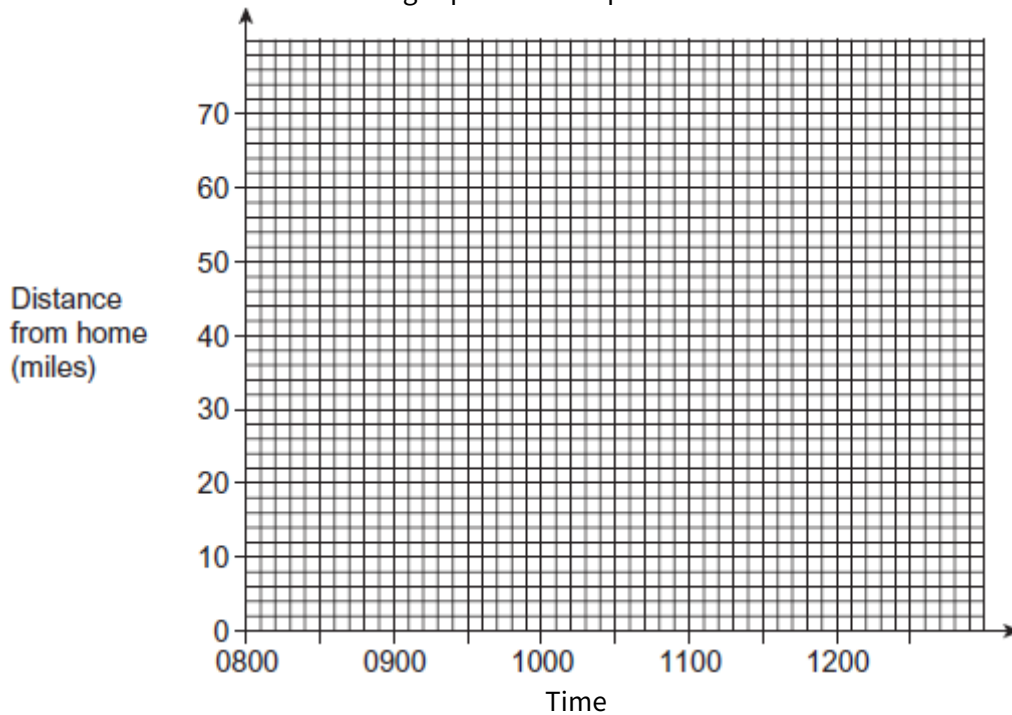
Q2.

Dan leaves home at 0800.

He drives 60 miles from home in the first 90 minutes.

He stops for 30 minutes.

He then drives home at an average speed of 50 mph.



(a) Draw a distance-time graph to show Dan's journey.

(3)

(b) A TV programme starts at 1130.

Does Dan get home in time for the start?

Show how you decide.

(1)

(Total 4 marks)

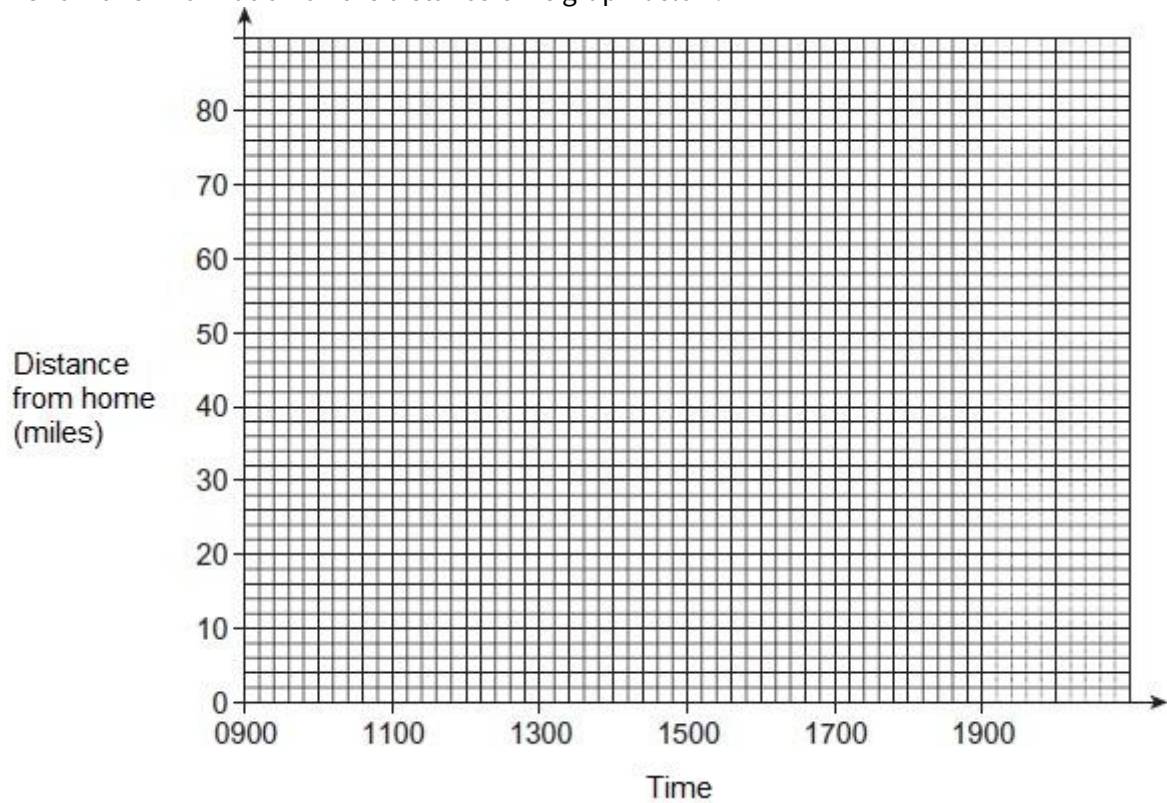
Q3.

Josh drove to a meeting and then back home.

The meeting was 80 miles from his home.

- Josh left home at 9 am
- He arrived at the meeting after 2 hours
- He left for home $4\frac{1}{2}$ hours later
- He drove 30 miles in half an hour
- He then stopped for 1 hour
- He arrived home $1\frac{1}{2}$ hours later.

Show this information on the distance-time graph below.



(Total 4 marks)

Q4.

Two trains, *A* and *B*, travel from Derby to York.
Both trains travel at a constant speed.
Here is the timetable for the trains.

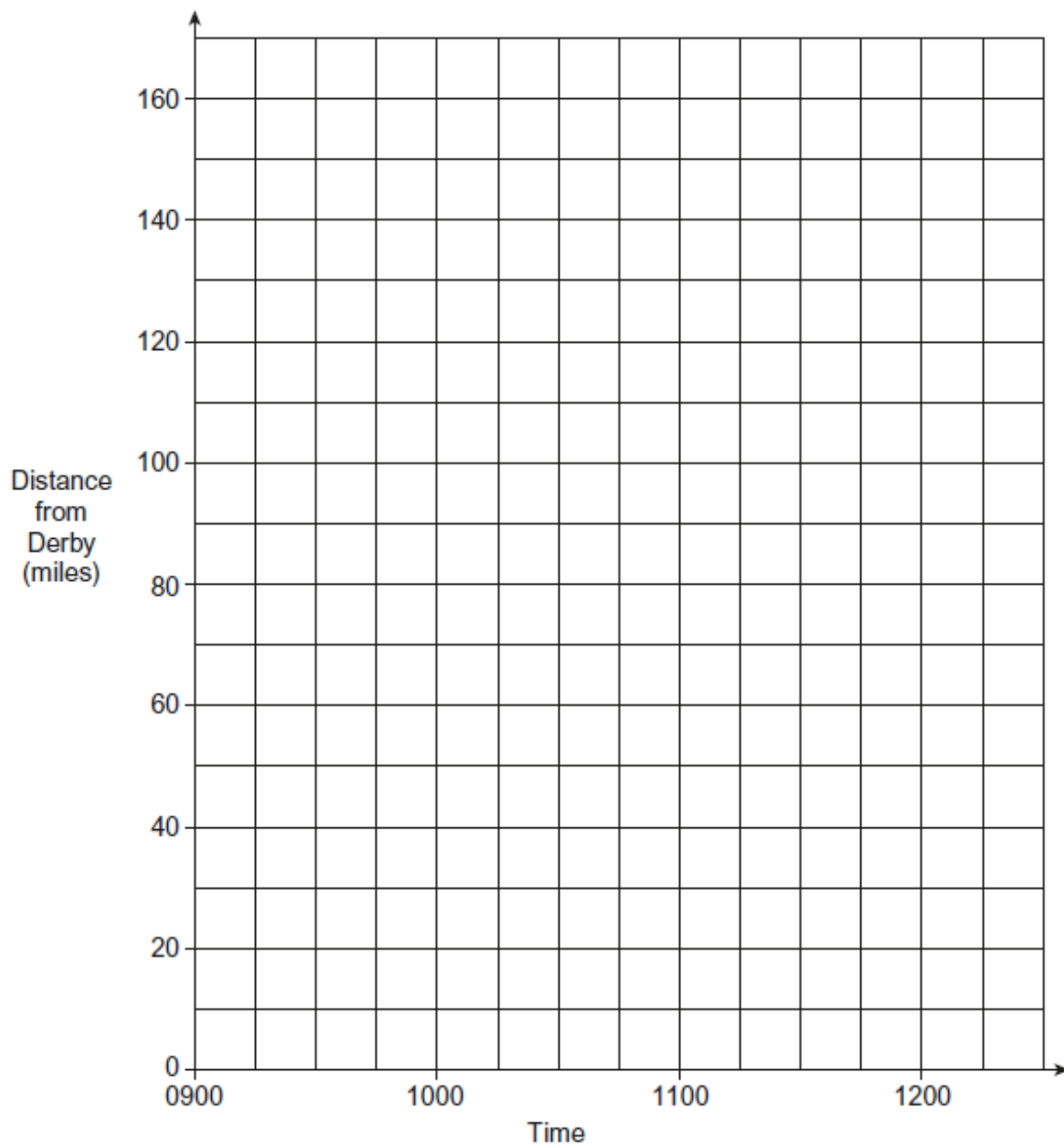
	Train <i>A</i>	Train <i>B</i>
Leave Derby	0900	1030
Arrive York	1100	1200

- (a) Train *A* travels at 60 mph
On the grid below, draw the distance-time graph for Train *A*.

(1)

- (b) On the grid below, draw the distance-time graph for Train *B*.

(1)



- (c) Use your graph to work out the speed of Train *B*.

Answer _____ mph

(1)

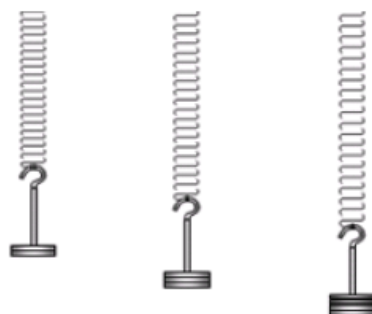
(Total 3 marks)

For the rest of the questions, you may use a calculator.



Q5.

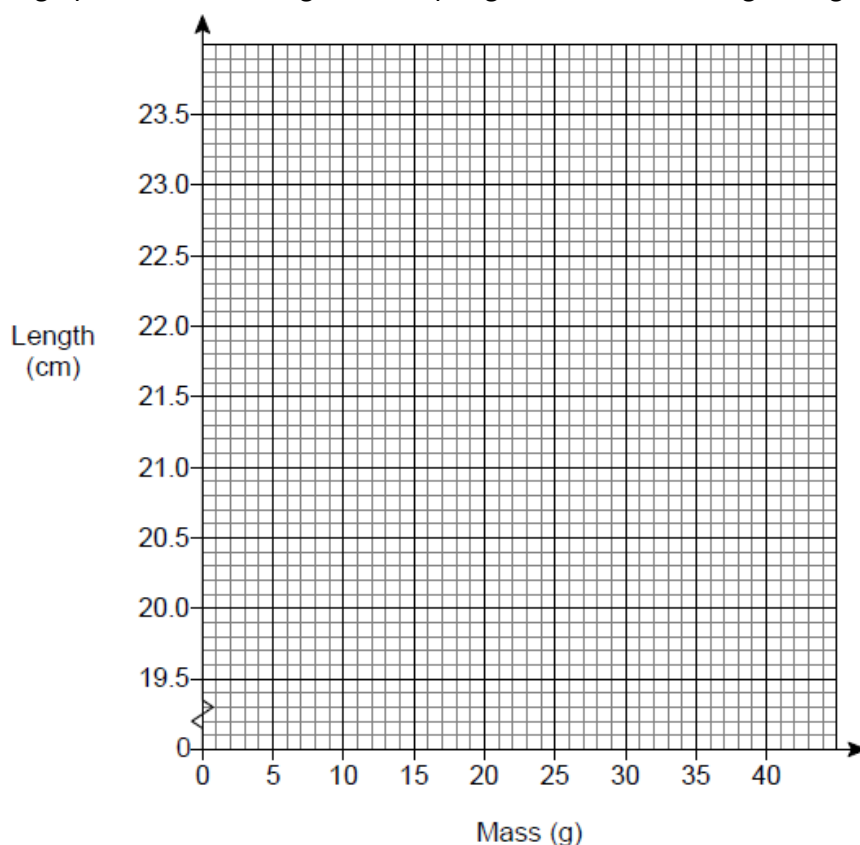
In an experiment, different masses are hung on a spring.



The length of the spring is measured for each mass.

Mass (g)	10	20	30	40
Length (cm)	20.8	21.6	22.4	23.2

(a) Draw a graph to show the length of the spring for masses from 10 g to 40 g



(b) Estimate the length of the spring with no mass hung on it. (2)

Answer _____ cm

(c) How much longer is the spring with a 35 g mass than with a 15 g mass? (1)

Answer _____ cm

(2)

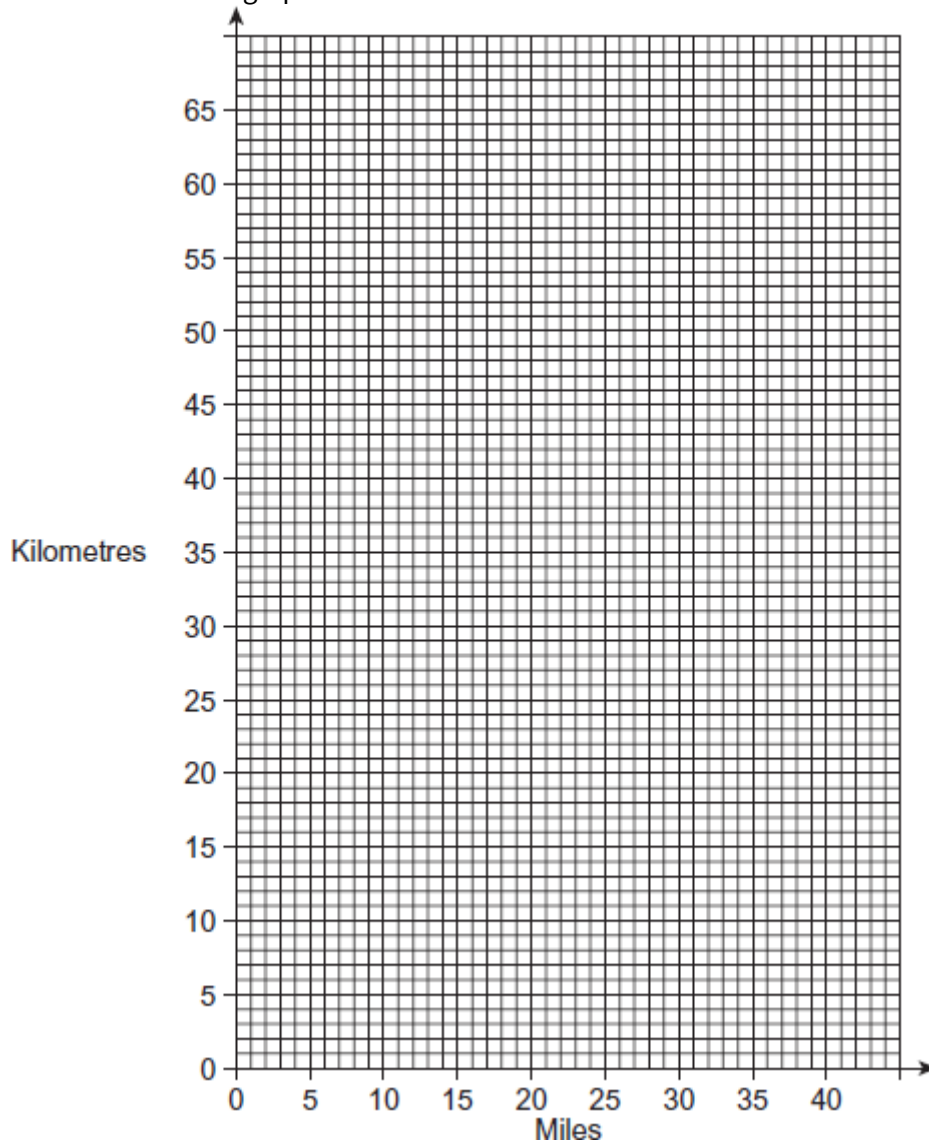
(Total 5 marks)

Q6.

(a)

Miles	0	20	40
Kilometres	0	32	64

Draw the conversion graph for miles and kilometres.



(b) Convert 35 miles to kilometres.

Answer _____ km

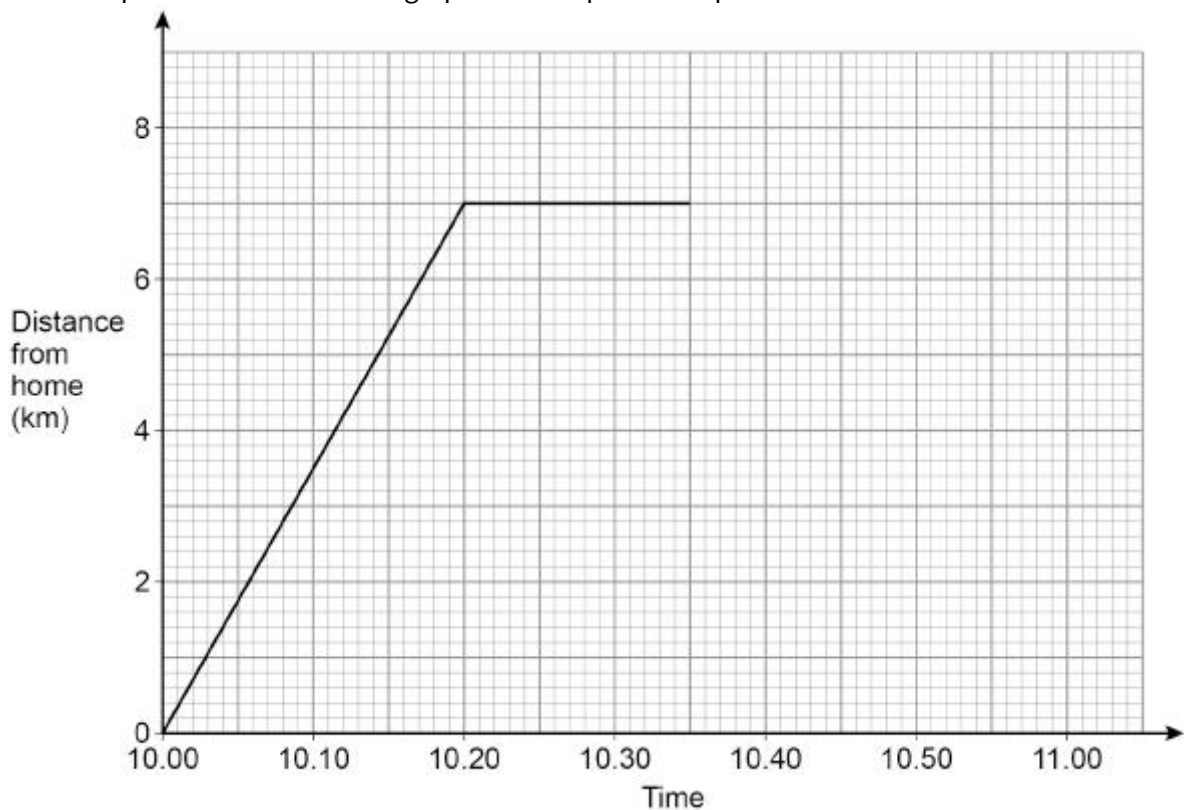
(c) Convert 24 kilometres to miles.

Answer _____ miles

(Total 4 marks)

Q7.

Scarlett leaves home at 10.00 to cycle to the supermarket.
Here is part of a distance-time graph of her trip to the supermarket.



- (a) She arrives at the supermarket at 10.20
How far is the supermarket from her home?

Answer _____ km

(1)

- (b) She leaves the supermarket at 10.35
How long does she stay at the supermarket?

Answer _____ minutes

(1)

- (c) Scarlett cycles home at a constant speed using the same route.
It takes her 3 minutes longer than her journey to the supermarket.
Complete the distance-time graph.

(2)

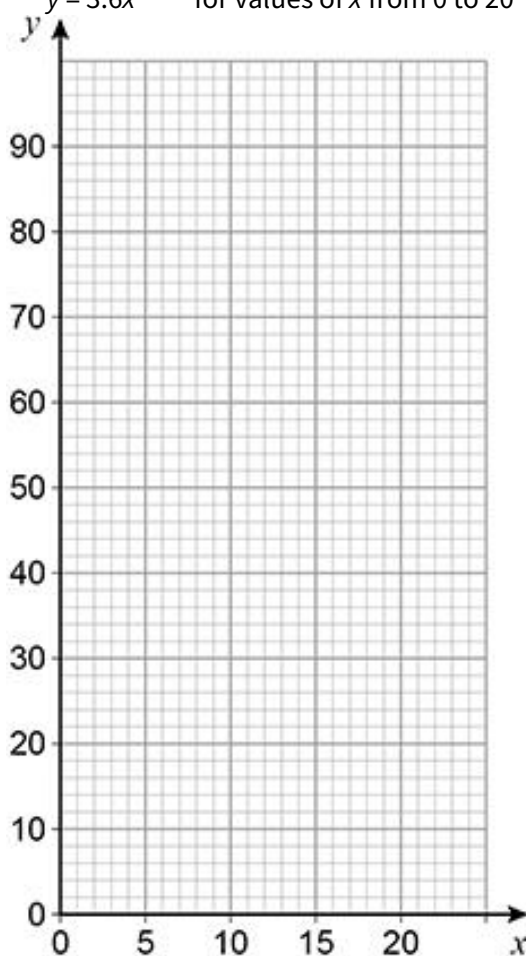
(Total 4 marks)

Q8.

Here is a formula.

$$y = 3.6x$$

- (a) Draw the graph of $y = 3.6x$ for values of x from 0 to 20



(2)

In the formula $y = 3.6x$

y is speed in kilometres per hour (km/h)

x is speed in metres per second (m/s)

- (b) Convert 50 km/h to m/s

Give your answer to the nearest whole number.

Answer _____ m/s

(1)

- (c) Convert 30 m/s to miles per hour.

Use 1 mile per hour = 1.61 km/h

Answer _____ miles per hour

(3)

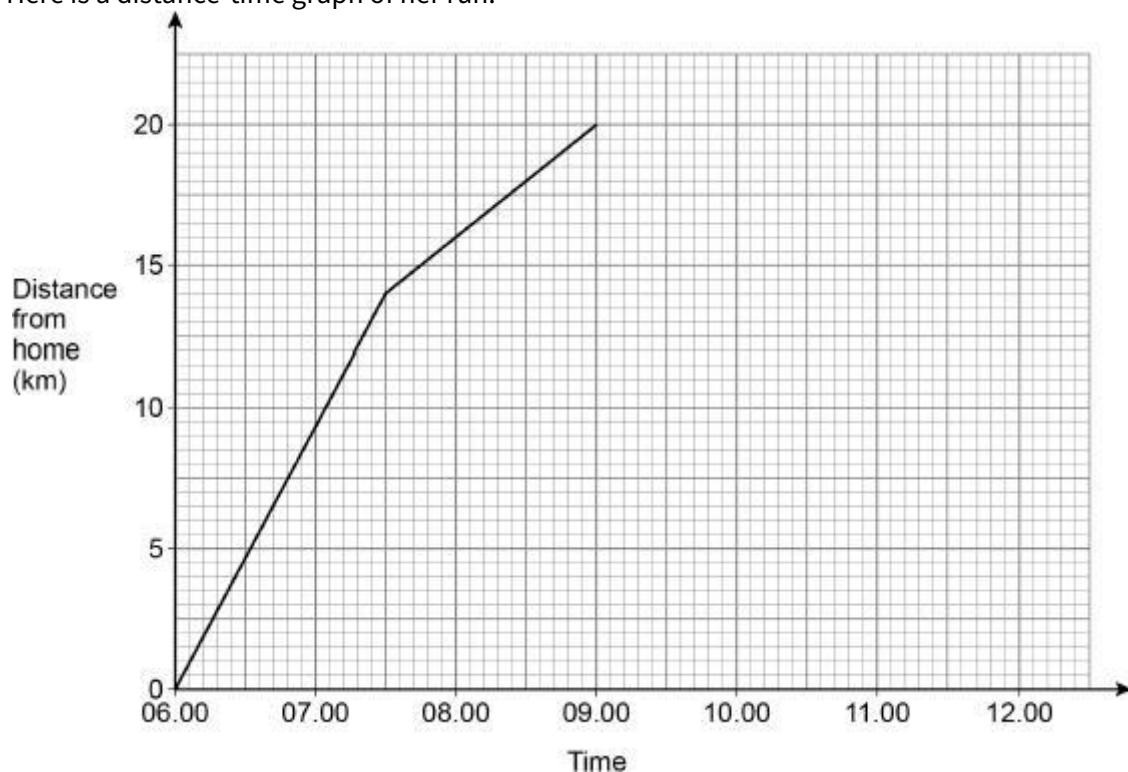
(Total 6 marks)

Q9.

Jenny leaves home at 06.00

She runs for 3 hours.

Here is a distance-time graph of her run.



- (a) How far from home is she after 3 hours?

Answer _____ km

(1)

- (b) For the next hour she rests.

She then gets a bus home.

She arrives home at 11.30

Complete the distance-time graph.

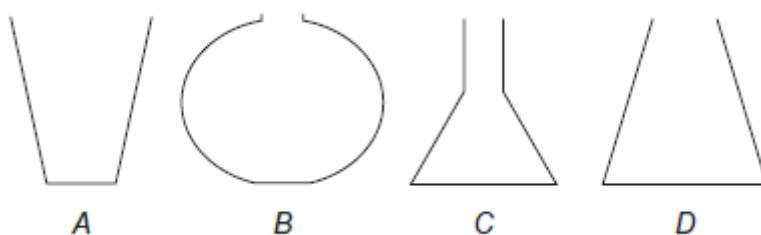
Assume the bus travels at a constant speed.

(2)

(Total 3 marks)

Q10.

Four empty containers are shown.

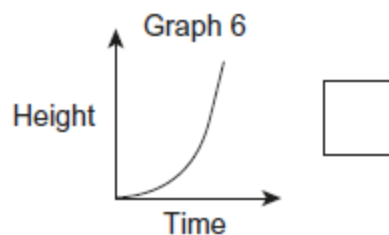
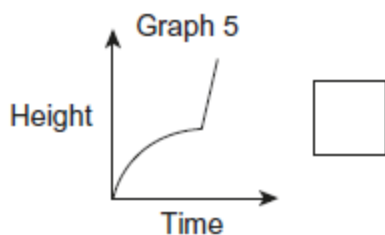
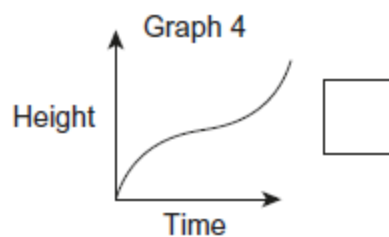
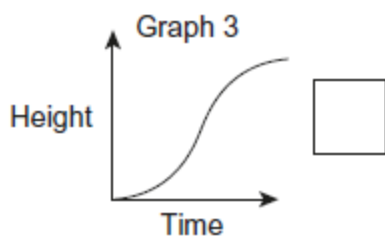
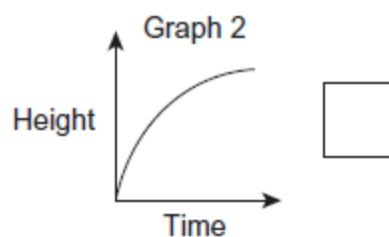
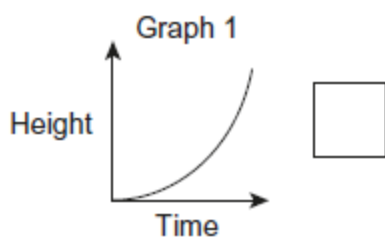


Each container is filled with water at a constant rate.

Opposite are six graphs showing the height of water against time.

Write the letter of each container in the box next to its graph.

Leave the two remaining boxes blank.



(Total 4 marks)

Q11.

Lily goes on a car journey.

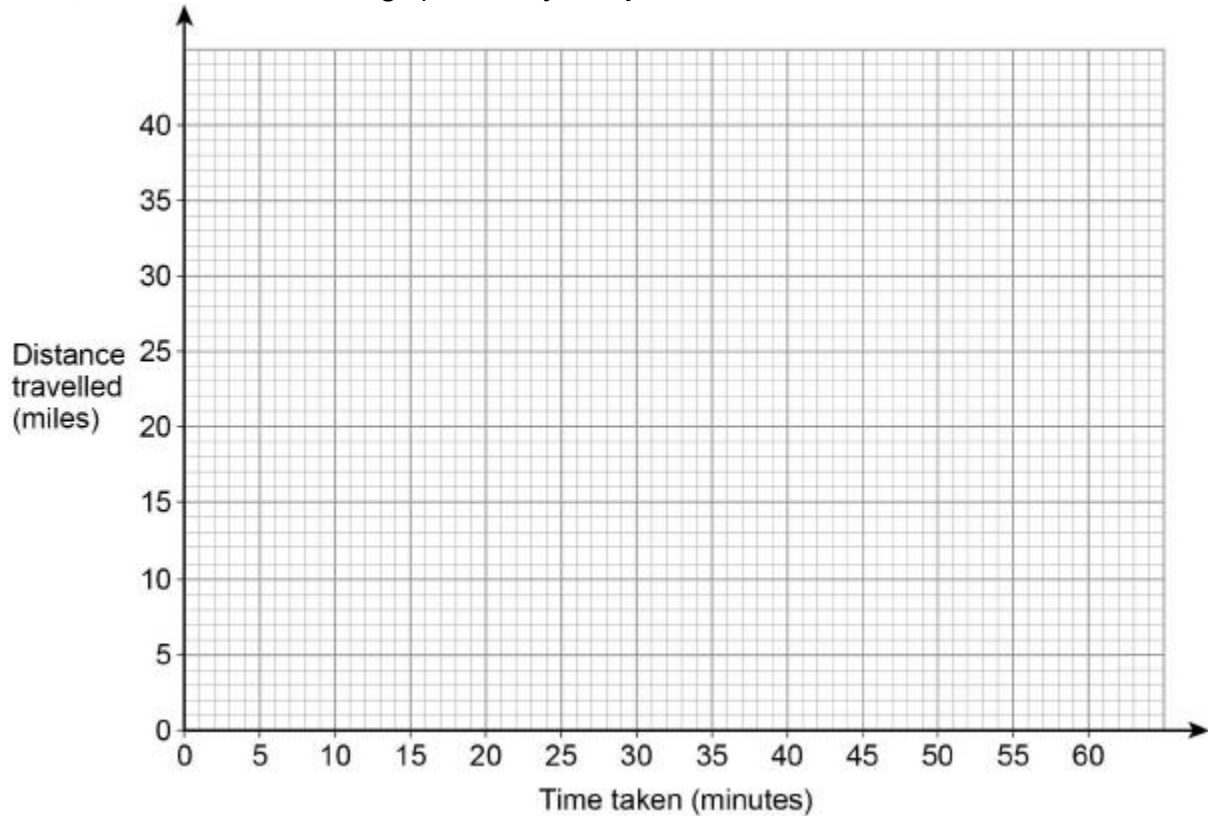
For the first 30 minutes her average speed is 40 miles per hour.

She then stops for 15 minutes.

She then completes the journey at an average speed of 60 miles per hour.

The total journey time is 1 hour.

- (a) Draw a distance-time graph for her journey.



(3)

- (b) Write down the average speed for the total journey.

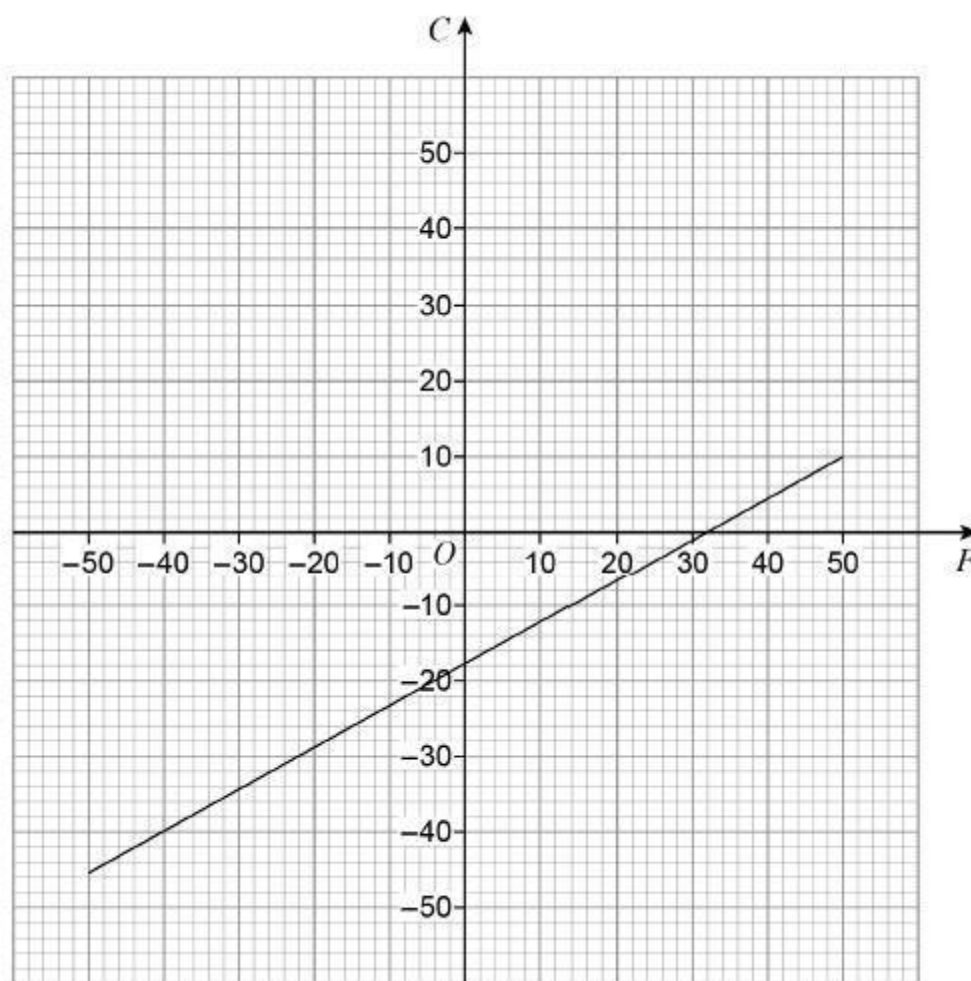
Answer _____ mph

(1)

(Total 4 marks)

Q12.

The graph below is used to convert between temperature in degrees Fahrenheit (F) and temperature in degrees Celsius (C).



- (a) Use the graph to convert 40 degrees Fahrenheit into degrees Celsius.

Answer _____ degrees Celsius

(1)

At one temperature, T ,

the number of degrees Celsius is **double** the number of degrees Fahrenheit.

The graph of $C = 2F$ can be drawn to help find this temperature.

- (b) On the grid opposite, draw the graph of $C = 2F$ for values of F from -25 to 25 .
You may use the table to help you.

F	-25		
C	-50		

(2)

- (c) Use your graph to estimate the value of T .
Give your answer in degrees Celsius.

Answer _____ degrees Celsius

(2)

(Total 5 marks)

Question 13 is **higher** tier only.

Q13.

Below are five sketch graphs that show depth of water against time.
Water is poured into each container at a steady rate.
For each part match the container to its graph opposite.

(a)



Circle your answer.

A

B

C

D

E

(1)

(b)



Circle your answer.

A

B

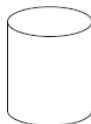
C

D

E

(1)

(c)



Circle your answer.

A

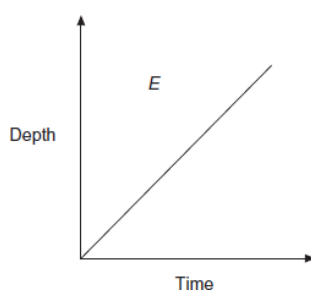
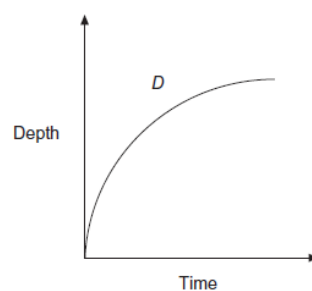
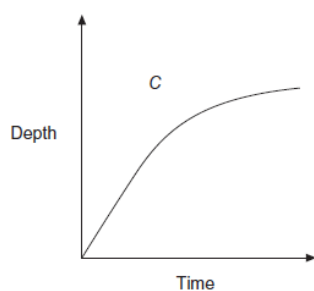
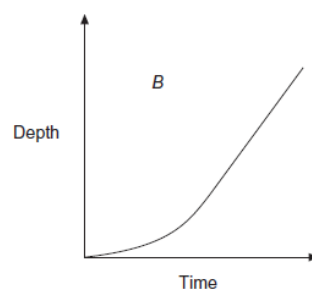
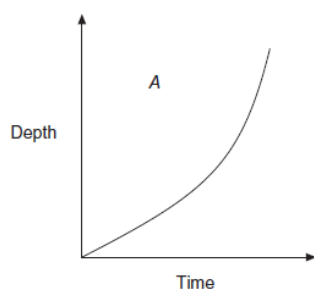
B

C

D

E

(1)



(Total 3 marks)