

You have one week to complete this. What you hand in should be your best work, and you must attempt every question.

If you are stuck then please either consult notes or textbooks, attend a workshop, or ask your teacher.

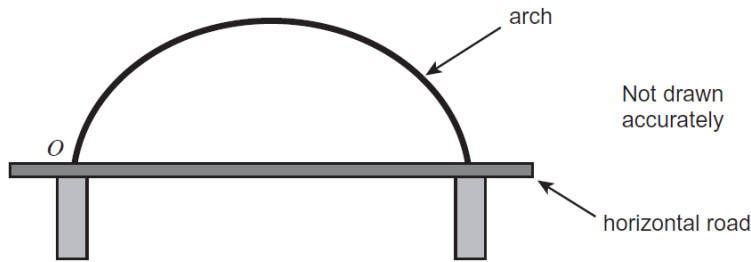
You may need to refer to the formula book, found [here](#):



or financial information, found [here](#):



1) The diagram shows a bridge with an arch.



O is a point where the arch meets the road.

The equation of the arch is modelled by the equation $y = 3x - 0.06x^2$

x is the horizontal distance along the road from O , in metres.

y is the vertical height of the arch above the road, in metres.

(a) Complete this table of values for $y = 3x - 0.06x^2$

[2 marks]

(b) Draw the graph of $y = 3x - 0.06x^2$ for values of x from 0 to 50

[2 marks]

(c) What is the greatest vertical height of the arch above the road?

[1 mark]

2) The amount of money $£M$ in a savings account, at time t days after an account is opened, is given by

$$M = 3800e^{0.00012t}$$

(a) Write down the initial amount of money in the account.

[1 mark]

(b) Find how long it takes for the amount of money in the account to reach £3820

[4 marks]

(c) Find M when $t = 365$. Hence or otherwise find the AER for the savings account to three significant figures.

[3 marks]

(d) Sketch the graph of M against t .

[2 marks]

3) An exponential curve is given by the following equation:

$$y = 50e^{-x}$$

(a) What is the gradient when $y = 15$?

[1 mark]

(b) What is the gradient when $x = 1$?

[1 mark]

4) A survey of females' incomes, in various regions of the UK, was carried out. The table summarises the females' incomes for London and the North.

(a) Draw, on the grid given on the answer sheet, a cumulative frequency curve of the incomes of the females in London. (3 marks)

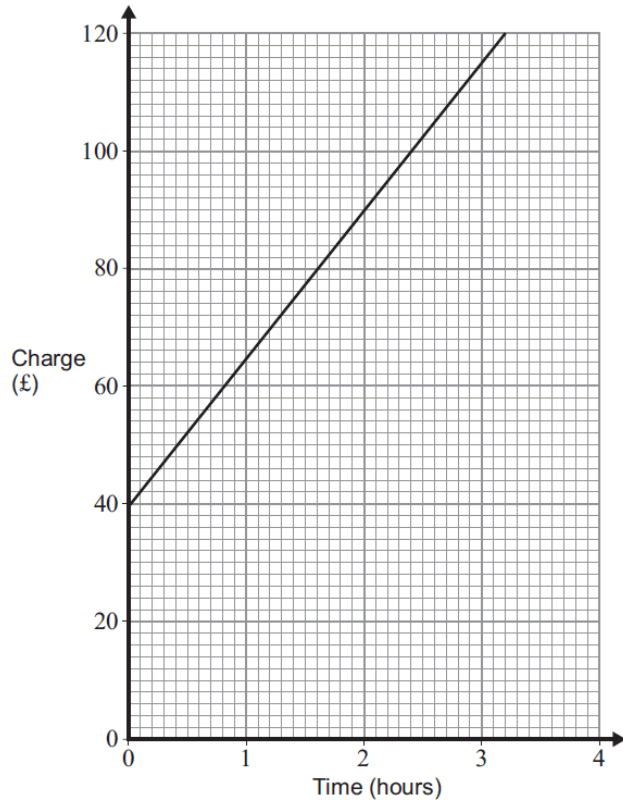
(b) Use your graph to estimate the median and the interquartile range of the incomes of the females in London. (3 marks)

(c) The box and whisker plot of the incomes of the females from the North is plotted on the answer sheet.

Write down **two** comparisons between the females' incomes in London and those in the North. (3 marks)

5)

The labour charge for a plumber for each job is illustrated in the graph below.



The labour charge is made up of a fixed call-out fee plus an amount for the time the job lasts. This second amount is based on a rate-per-hour.

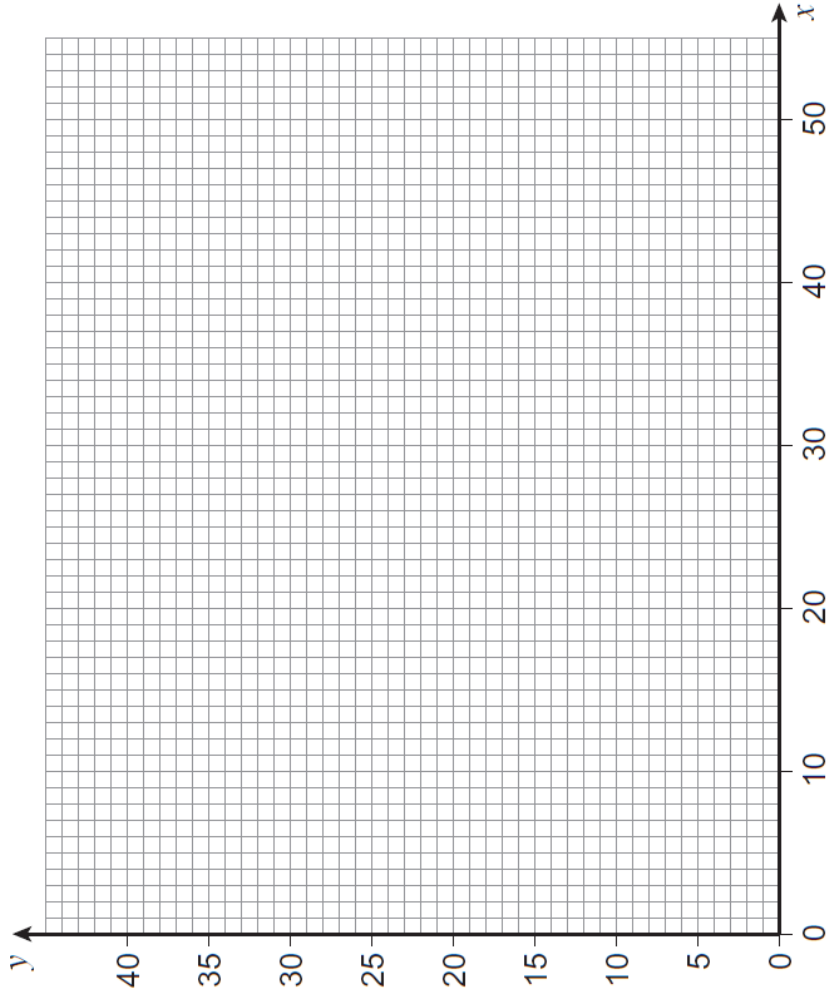
- (a) How much is the call-out fee? [1 mark]
- (b) What is the plumber's rate per hour? [1 mark]
- (c) Use your answers to parts (a) and (b) to write an equation for the total charge, $\pounds C$, in terms of the number of hours, h , the job lasts. [1 mark]
- (d) Use your answer to part (c) to calculate how much the plumber would charge for a job lasting $5\frac{1}{2}$ hours. [3 marks]
- (e) The plumber sends a customer a bill for $\pounds 252.50$.

How many hours did the plumber take to complete the work?

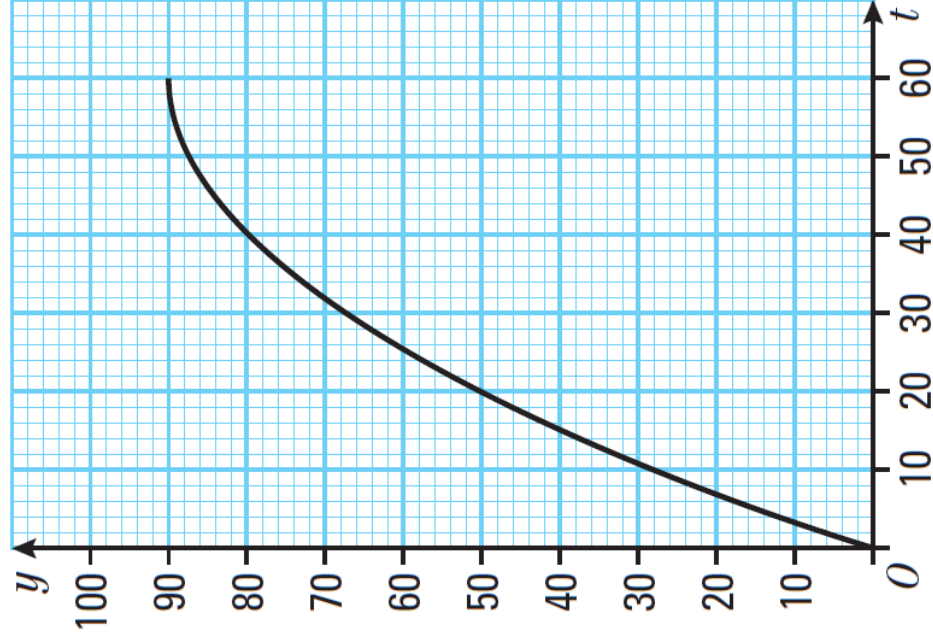
[3 marks]

- 6) The graph shows the distance, y m, that a car has travelled during t seconds.
- Calculate an estimate of the speed of the car at $t = 20$.
 - Calculate the average speed of the car between $t = 10$ and $t = 50$.
- 7) When buying a drum kit costing $\pounds 342$, Makeda considers two different lenders.
- (a) The first lender requires Makeda to pay a single amount of $\pounds 400$ at the end of two years.
- Calculate the APR charged by this lender.
- Give the value of the APR as a percentage. [4 marks]
- (b) The second lender charges an APR of 14% and it requires two equal repayments, one at the end of the first year and the second repayment at the end of the second year.
- Calculate the amount of each repayment. [3 marks]
- 8) Nikita earned $\pounds 4075$ per month and had a tax-free allowance of $\pounds 10\,000$.
- (a) Calculate Nikita's taxable income. [3 marks]
- (b) Calculate the amount of income tax which Nikita paid in the year. [5 marks]

1)



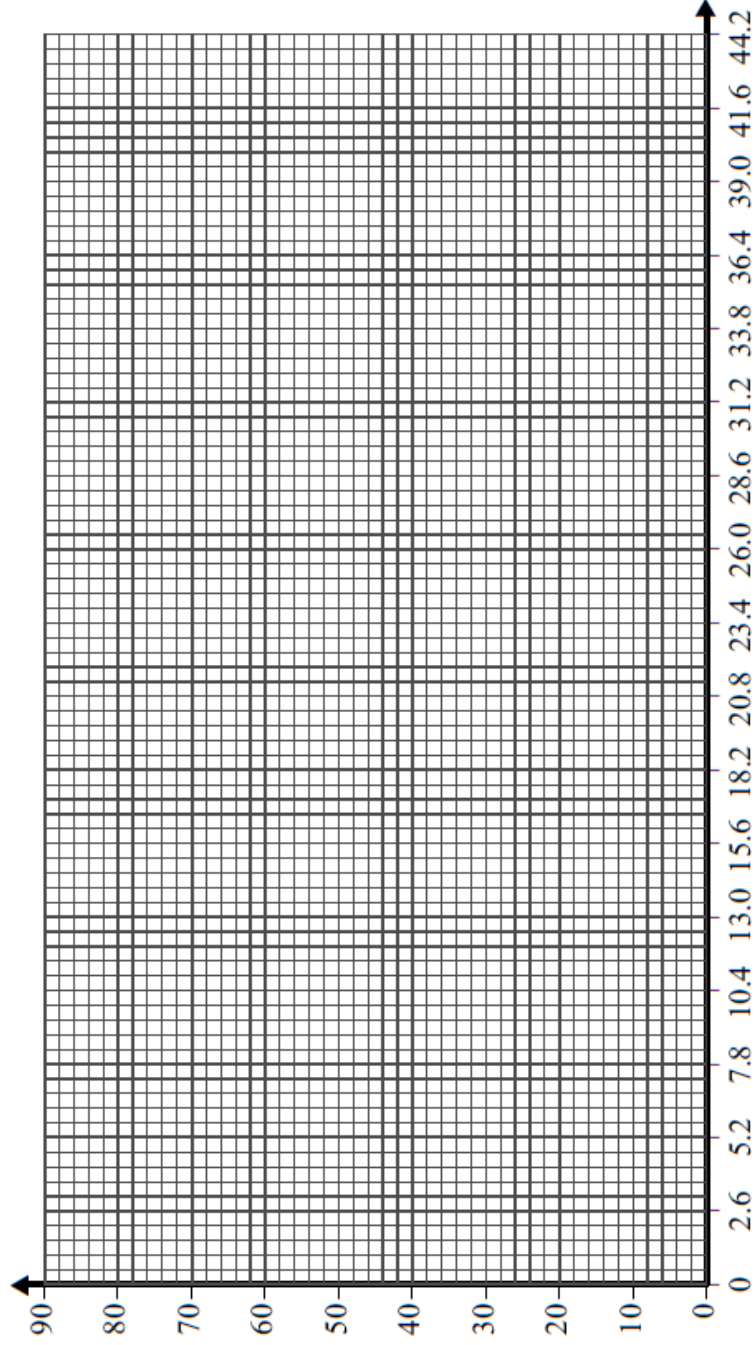
6)



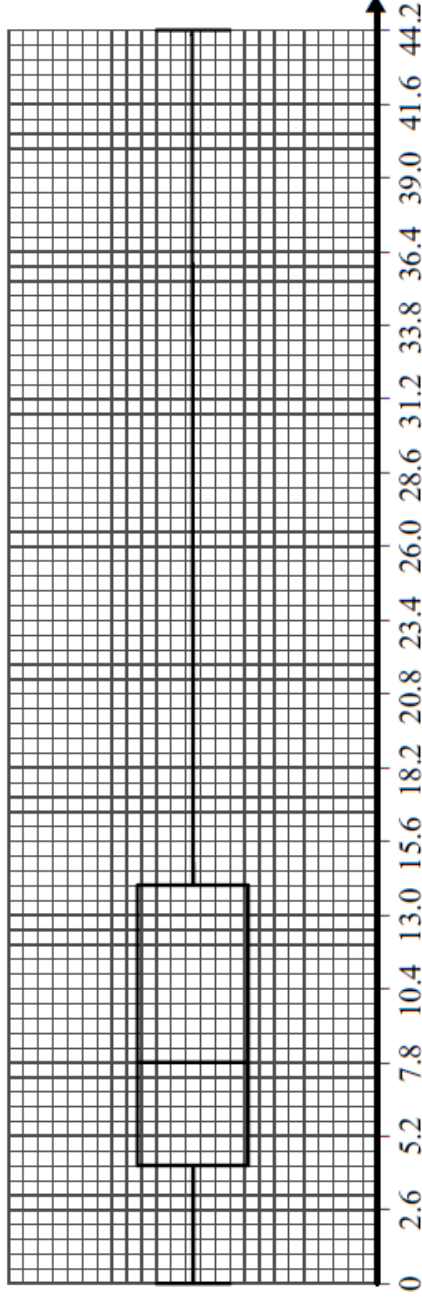
4)

Incomes, w (£)	Number of females in London	Number of females in North
$0 < w \leq 2600$	7	29
$2600 < w \leq 5200$	14	56
$5200 < w \leq 10\,400$	25	64
$10\,400 < w \leq 15\,600$	16	35
$15\,600 < w \leq 20\,800$	8	25
$20\,800 < w \leq 28\,600$	10	15
$28\,600 < w \leq 36\,400$	4	5
$36\,400 < w \leq 44\,200$	4	5

Cumulative frequency **London**



North



Incomes, w (£000s)