

GCSE
3310U50-1

MATHEMATICS – NUMERACY
UNIT 1: NON – CALCULATOR
HIGHER TIER

TUESDAY, 5 NOVEMBER 2019
– MORNING

1 hour 45 minutes
(plus your additional
time allowance)

**THE USE OF A
CALCULATOR IS NOT
PERMITTED IN THIS
EXAMINATION**

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	2	
2.	8	
3.	6	
4.	8	
5.	6	
6.	7	
7.	5	
8.	11	
9.	14	
10.	8	
11.	5	
Total	80	

Surname:	
First name(s):	
Centre Number:	
Candidate Number:	0

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

ITEMS INCLUDED WITH QUESTION PAPER

A separate Formula Booklet.

A separate Diagram Booklet.

A spare Diagram Booklet.

Models for Question 9 (c), Question 10 and Question 11.

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball – point pen, black felt tip or your usual method.

Write your name, centre number and candidate number in the spaces on the front cover.

Answer ALL questions.

Write your answers in the spaces provided.

If you run out of space, use the additional pages at the back of the booklet.

Question numbers must be given for all work written on the additional page(s).

Take π as 3.14

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part – question.

In question 4, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

1. **Catrin considers the data she needs to collect to find out if people are happy with their bank.**

Catrin includes the following questions in her questionnaire.

Write down one set of possible groups that could be used as answer options for each of these questions.

Catrin's first question is:

Question 1: How old are you?

Groups:

continued on the next page . . .

(Turn over)

Question 1 continued

Catrin's second question is:

**Question 2: If you have a bank account,
how happy are you with your bank?**

Groups:

[2 marks]

(Turn over)

2. Look at the diagram for Question 2 in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

Sioned and Rhodri are making a kite.

A diagram of the kite they are making is shown.

In the diagram,

AC and DB are the diagonals of the kite.

$AE = 22$ cm,

$EC = 28$ cm and

$DE = 20$ cm.

- (a) Rhodri makes a statement about their kite being able to fly in strong wind,

“The length of the long diagonal must be at least 120% of the length of the short diagonal.”

Assuming Rhodri is correct, should their kite be able to fly in strong wind?

You must show all your working.

continued on the next page . . .

(Turn over)

Question 2 continued

2. (b) Sioned says,

**“The best length for the tail
on a kite depends on the area
of the kite.”**

Sioned refers to the table below that she
has seen on the internet.

Area of the kite, A	Best length for the tail
$A < 500 \text{ cm}^2$	2 m
$500 \text{ cm}^2 \leq A < 900 \text{ cm}^2$	2.4 m
$900 \text{ cm}^2 \leq A < 1200 \text{ cm}^2$	3.1 m
$1200 \text{ cm}^2 \leq A$	3.5 m

Work out the best length of tail for
Sioned and Rhodri's kite.

You must show all your working.

(Turn over)

3. (a) An old recipe is given below.

ARRABIATA PASTA SAUCE
Serves 4 people

1 onion
2 × 0.88 lb tins of tomatoes
3 chillies

How many KILOGRAMS of tinned tomatoes are needed to make Arrabiata pasta sauce to serve 20 people?

(Turn over)

[3 marks]

3. (b) A pasta factory in Italy produces 5 km of spaghetti per day.
How many centimetres of spaghetti will this factory produce in 7 days?
Give your answer in standard form.

[3 marks]

(Turn over)

4. IN THIS QUESTION, YOU WILL BE ASSESSED ON THE QUALITY OF YOUR ORGANISATION, COMMUNICATION AND ACCURACY IN WRITING.

Look at the table for Question 4 in the separate Diagram Booklet. The table gives information about tax rates.

Agata is paid in pesos.

The tax rates are shown in the table.

Agata's total earnings before tax are 600 000 pesos.

Calculate how much tax Agata is due to pay. You must show all your working.

Agata's total tax bill _____ pesos

[6 marks + 2 marks OCW]

5. (a) Gwilym is stacking 6 boxes in his garage.

The height of his garage is 2.5 m,
correct to the nearest 10 cm.

5 of Gwilym's boxes each have a height
of 40 cm, correct to the nearest 10 cm.

The other box has a height of 55 cm,
correct to the nearest 5 cm.

Calculate the maximum possible
gap between the stack of 6 boxes and
the garage ceiling.

[4 marks]

continued on the next page . . .

(Turn over)

[2 marks]

(Turn over)

- 6. Look at the diagrams for Question 6 in the separate Diagram Booklet. There are two diagrams, Diagram 1 and Diagram 2.**

On 1st July every year, TREFOR estate agents record the time from when a phone rings to when it is answered.

The time taken to answer the phone is recorded in seconds.

TREFOR displays the data for their agents to see.

Diagram 1 displays the data for 1st July 2018.

Diagram 2 displays the data for 1st July 2019.

Use the diagrams to answer the following questions.

continued on the next page . . .

Question 6 continued

6. (a) What is the range of times taken to answer the phone for 1st July 2018?

Circle your answer.

100 seconds	80 seconds	60 seconds	110 seconds	105 seconds
------------------------	-----------------------	-----------------------	------------------------	------------------------

[1 mark]

- (b) What is the maximum possible range of times taken to answer the phone for 1st July 2019?

Circle your answer.

90 seconds	110 seconds	80 seconds	60 seconds	85 seconds
-----------------------	------------------------	-----------------------	-----------------------	-----------------------

[1 mark]
(Turn over)

Question 6 continued

6. (c) The manager of TREFOR estate agents claims that there has been an improvement in the median time taken to answer the phone from 1st July 2018 to 1st July 2019.

Is this true?

Yes No

You must show all your working.

[2 marks]
(Turn over)

Question 6 continued

6. (d) Complete the following statements.

**(i) 'On 1st July 2018,
75% of the phone calls were
answered within**

_____ seconds.'

[1 mark]

**(ii) 'On 1st July 2019,
75% of the phone calls were
answered within**

_____ seconds.'

[2 marks]

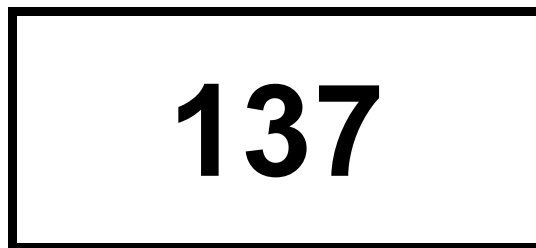
(Turn over)

7. Mr Aston lives at 137 Ffordd Uchel.

He is ordering some new signs for his house and for his gatepost from a website.

Look at the diagram below.

The diagram is NOT drawn to scale.



All the signs available on the website are MATHEMATICALLY SIMILAR.

He selects a rectangular sign for the front of his house.

It has a length of 42 cm and a height of 24 cm.

The digits 1, 3 and 7 on the sign are all 18 cm high.

The rectangular sign Mr Aston is considering for his gatepost has a height of 20 cm.

continued on the next page . . .

(Turn over)

[3 marks]

(Turn over)

8. A boat company runs trips from Tenby to Caldey Island every day during the summer.

The company wants to provide services suited to its passengers. On one day, the company recorded the ages of its passengers.

Look at the table for Question 8 in the separate Diagram Booklet.

The table shows the **FREQUENCY DENSITIES** of the different age groups recorded.

(a) Calculate an estimate of the **PERCENTAGE** of passengers who were aged **60** or more.

Question 8 continued

8. (c) Next week, the boat company will give out a questionnaire.

The questionnaire will be given to a random sample of passengers from the first 40 passengers who board the boat.

Use the following list of random numbers to select a sample of 6 passengers from these 40 passengers.

You must start with the first number in the list.

Explain clearly how you are using the numbers to select the sample.

4120 0558 8945 9111 7539

5286 6020 3730 5032 9937

(Turn over)

Passengers chosen

_____	_____	_____
_____	_____	_____

[3 marks]

(Turn over)

9. Look at the diagram for Question 9 in the separate Diagram Booklet.

The diagram is a velocity – time graph.

The velocity – time graph shows the velocity of an aircraft for the first 20 seconds of take – off.

(a) Calculate an estimate of the acceleration of the aircraft at time 16 seconds.

[3 marks]

continued on the next page . . .

(Turn over)

Distance is _____ MILES

[5 marks]

continued on the next page . . .

(Turn over)

Question 9 continued

9. (c) Ask for the model for Question 9 (c).

The model is NOT made to scale.

The aircraft carries cargo.

One customer wants to use the aircraft to transport a new product that is to be packaged in cuboid boxes, as shown in the model.

The boxes will meet the following conditions:

- The boxes will be of width 8 cm and length 10 cm.
- The length of the diagonal AB will be 14 cm.

Calculate the height of a box.

Give your answer in the form $a\sqrt{b}$ cm,

where a and b are integers, and b is as small as possible.

continued on the next page . . .

(Turn over)

10. Ask for the model for Question 10.

The model is NOT made to scale.

The model represents a party hat.

Nicola makes party hats for young children.

The hats are in the shape of cones.

Nicola's design is a cone, with a diameter of 15 cm and a slant height of 20 cm.

(a) Look at the diagram for Question 10 (a) in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

Nicola makes the hats by folding pieces of card that are in the shape of sectors of a circle.

The hats are formed when the straight edges meet.

Calculate the sector angle Nicola uses in her design.

[4 marks]

continued on the next page . . .

(Turn over)

Question 10 continued

10. (b) Nicola also makes party hats for adults. They are made from pieces of card that are sectors of a circle, with **RADIUS 24 cm** and sector angle **150°**

Nicola cuts each sector of a circle from a sheet of rectangular card that measures **24 cm by 50 cm**.

Calculate the area of card that is wasted from each rectangular sheet.

Give your answer in terms of **π** in its simplest form.

(Turn over)

11. Ask for the model for Question 11.

The model is NOT made to scale.

The model is a square – based pyramid joined to a cuboid.

A company makes steel solids that each have a mass of 1 kg.

One of their solids is a square – based pyramid joined to a cuboid as shown in the model.

The base edges of the pyramid are of length 5 cm, and the height of the cuboid is 4 cm.

The density of the steel used by the company is 8 g/cm^3

The complete solid has a mass of 1 kg.

Calculate the vertical height of the pyramid.

END OF PAPER

TOTAL 80 MARKS

(Turn over)

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HIGHER TIER

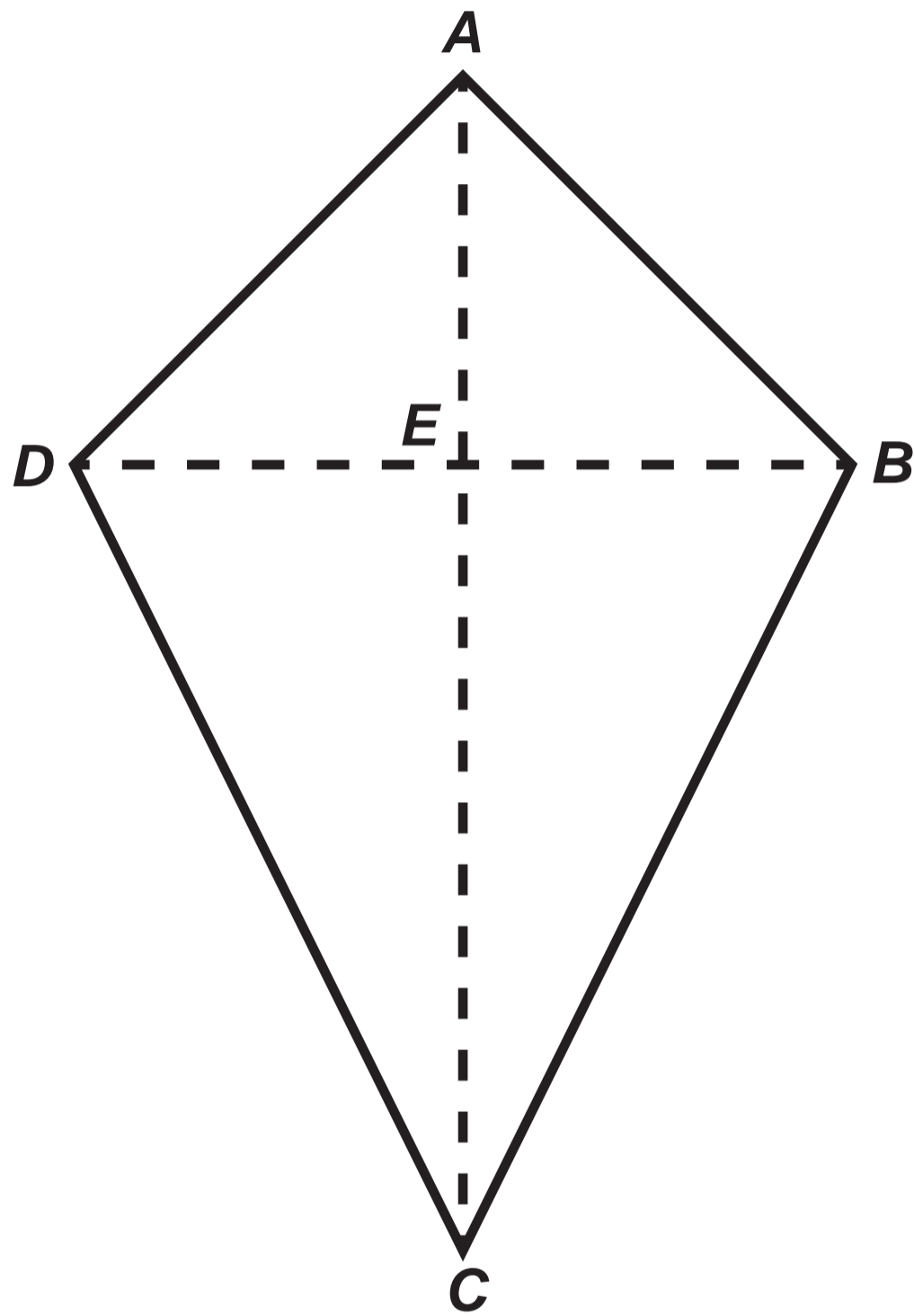
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Diagram Booklet

Surname:	
First name(s):	
Centre Number:	
Candidate Number:	0

Question 2

Diagram NOT drawn to scale



Question 4
Table

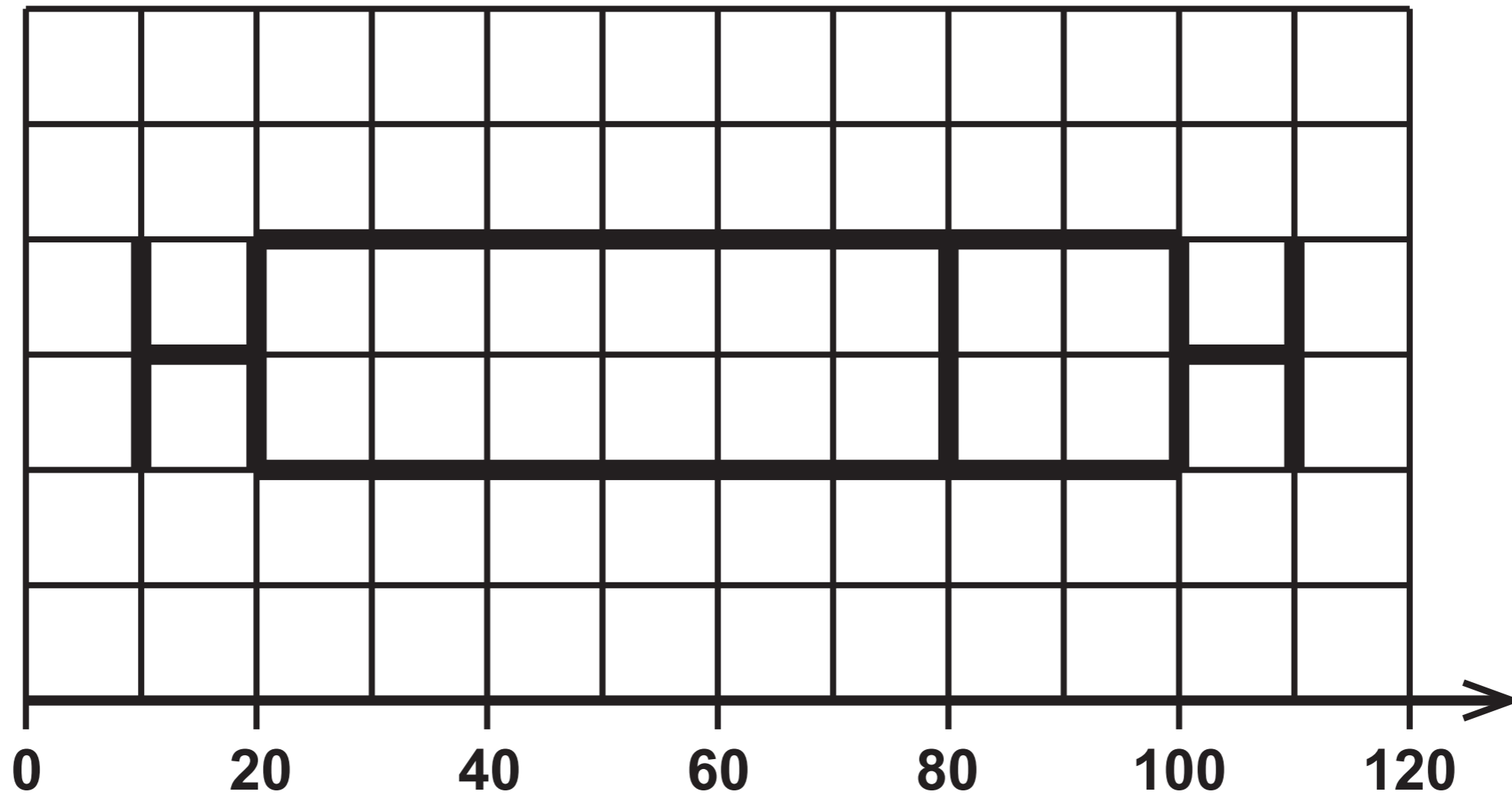
BAND	TAXABLE INCOME	TAX RATE
Personal allowance	Up to 200 000 pesos	0%
Standard rate	200 000 pesos to 500 000 pesos	10%
Further rate	Over 500 000 pesos	35%

Question 6

Diagram 1

1st July 2018

Time taken to answer the phone in seconds



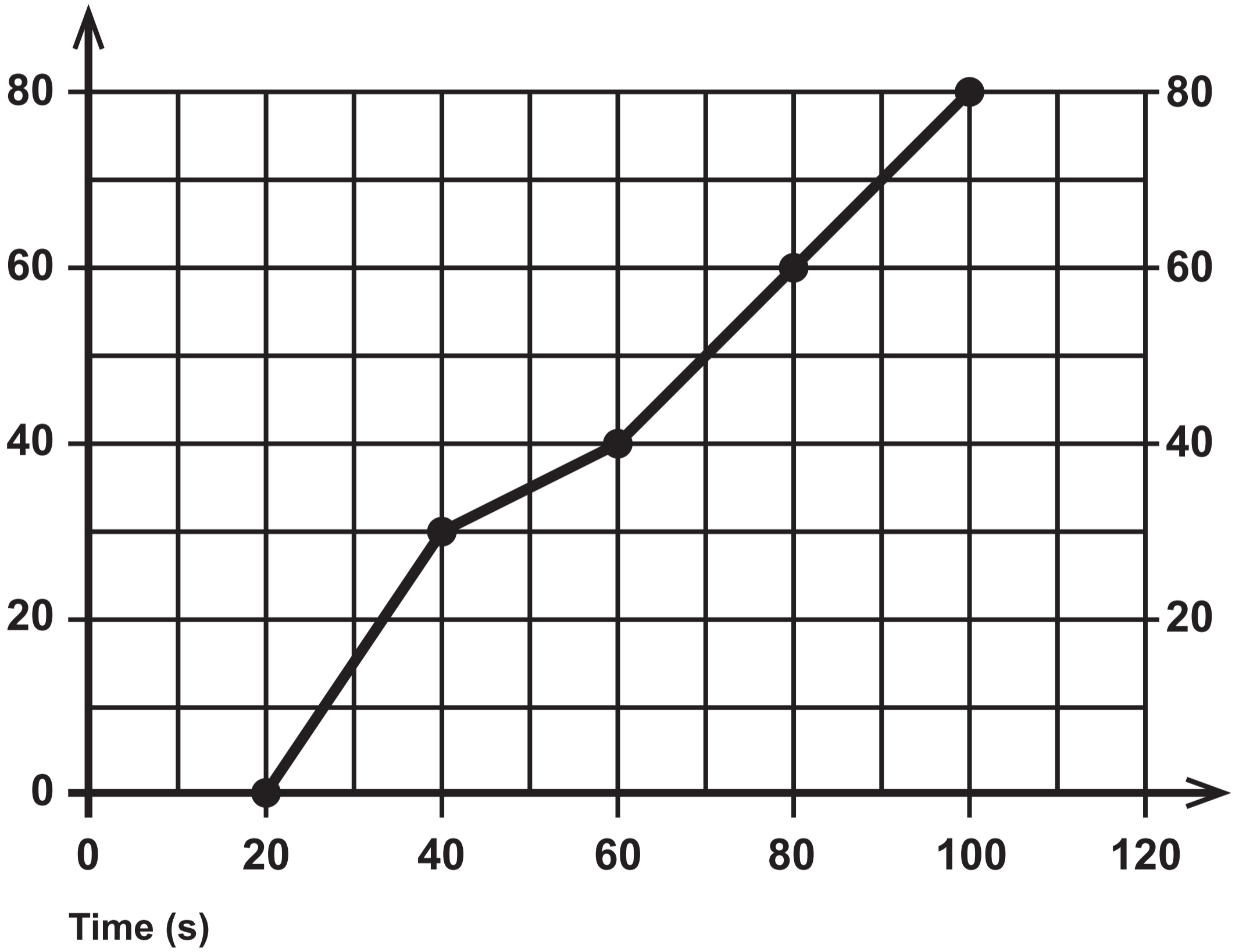
Question 6

Diagram 2

1st July 2019

Time taken to answer the phone in seconds

Cumulative frequency

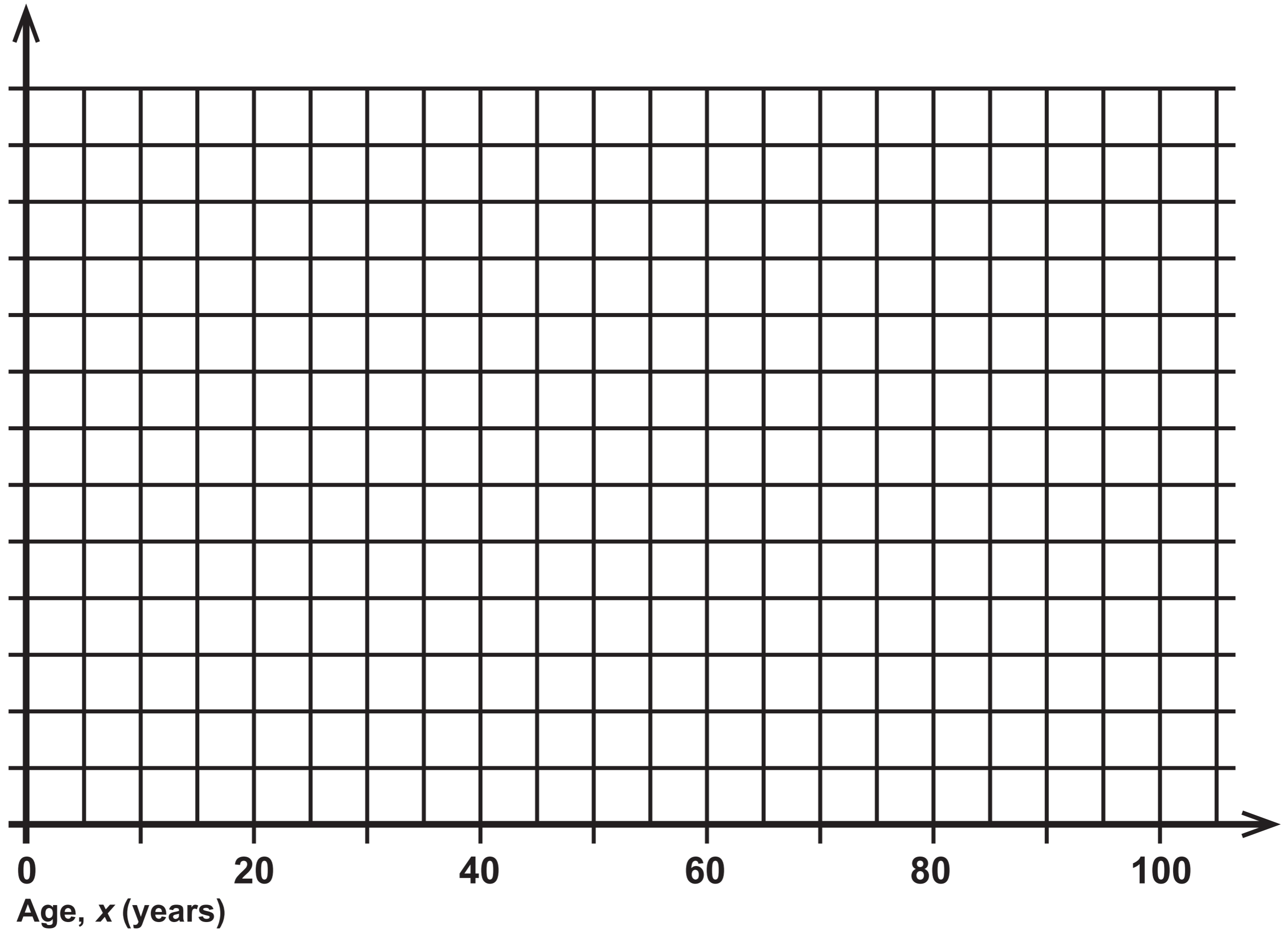


Question 8

Table

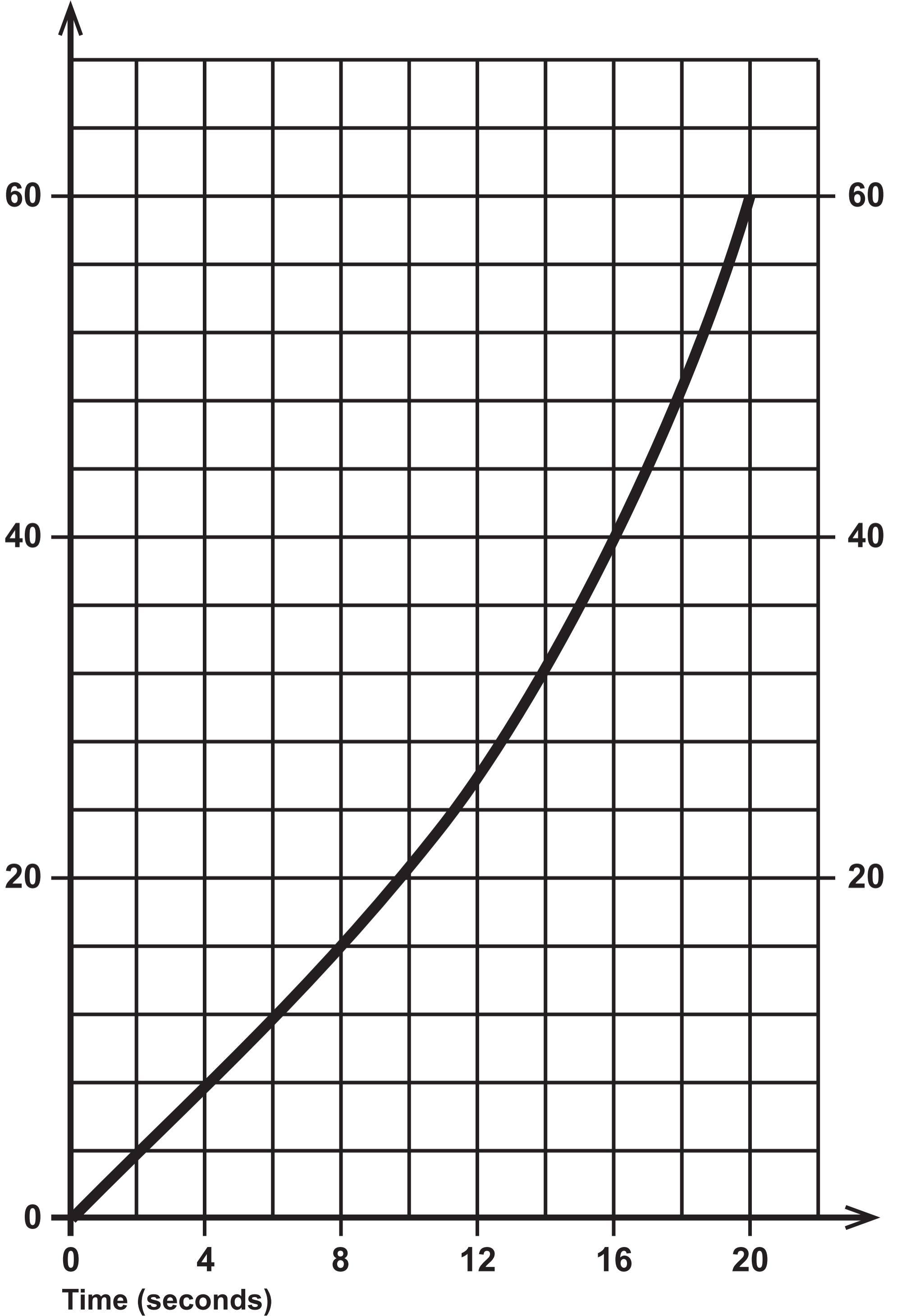
Age, X (years)	Frequency density
$0 \leq x < 20$	1.8
$20 \leq x < 35$	2.4
$35 \leq x < 50$	2
$50 \leq x < 70$	1.5
$70 \leq x < 100$	0.6

Question 8 (b)



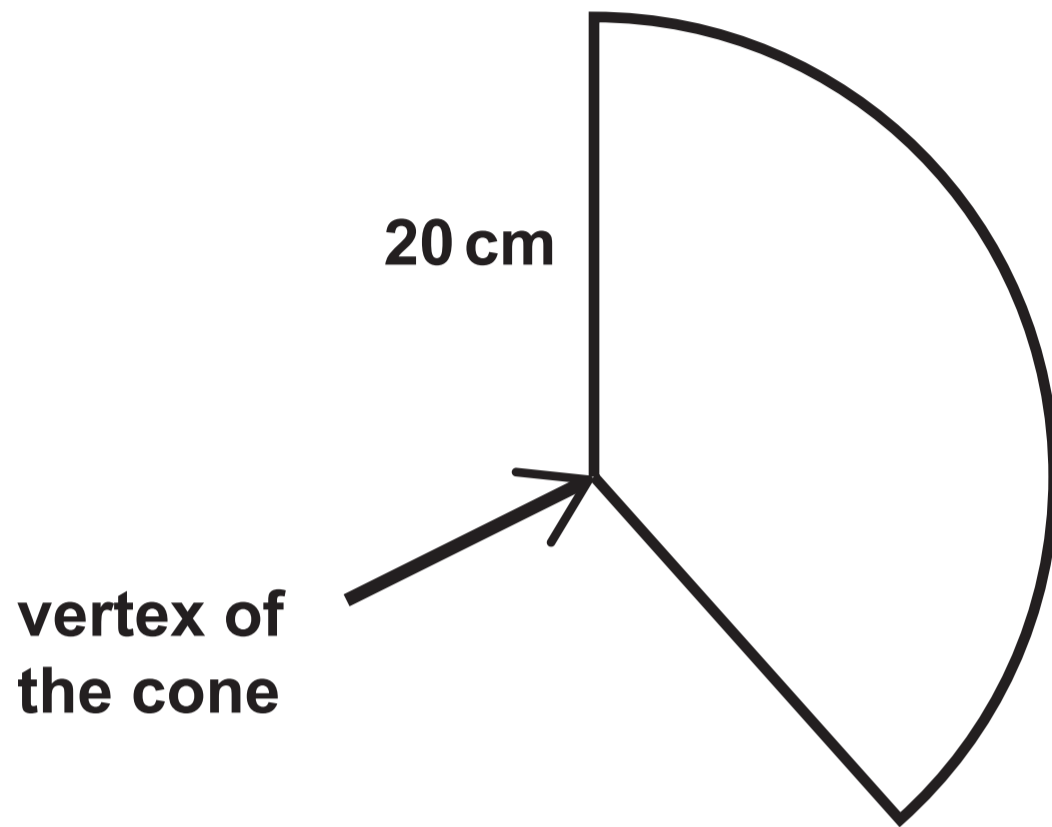
Question 9

Velocity (m/s)



Question 10 (a)

Diagram NOT drawn to scale



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MATHEMATICS – NUMERACY

UNIT 1: NON – CALCULATOR

HIGHER TIER

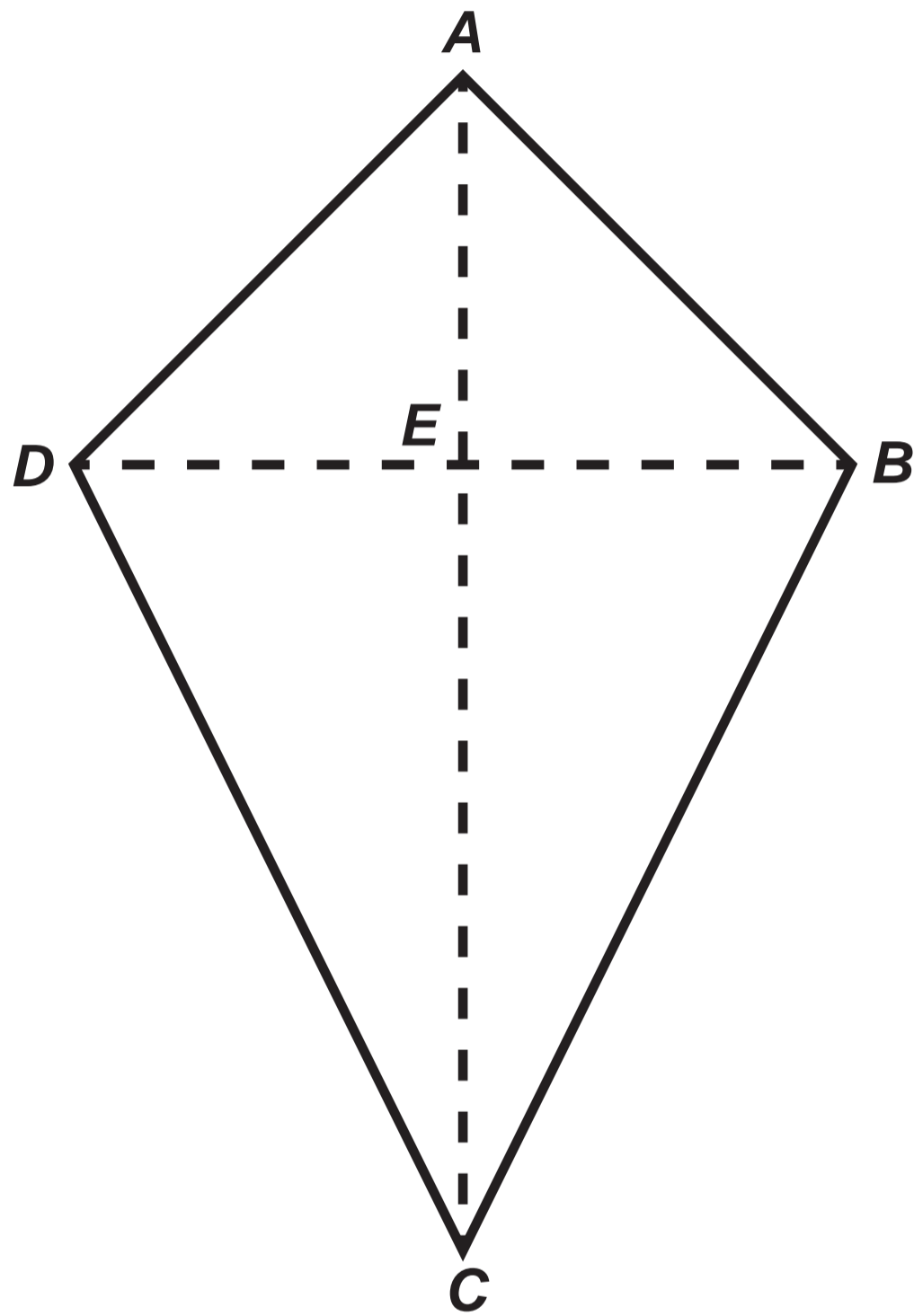
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Spare Diagram Booklet

Surname:	
First name(s):	
Centre Number:	
Candidate Number:	0

Question 2

Diagram NOT drawn to scale



Question 4
Table

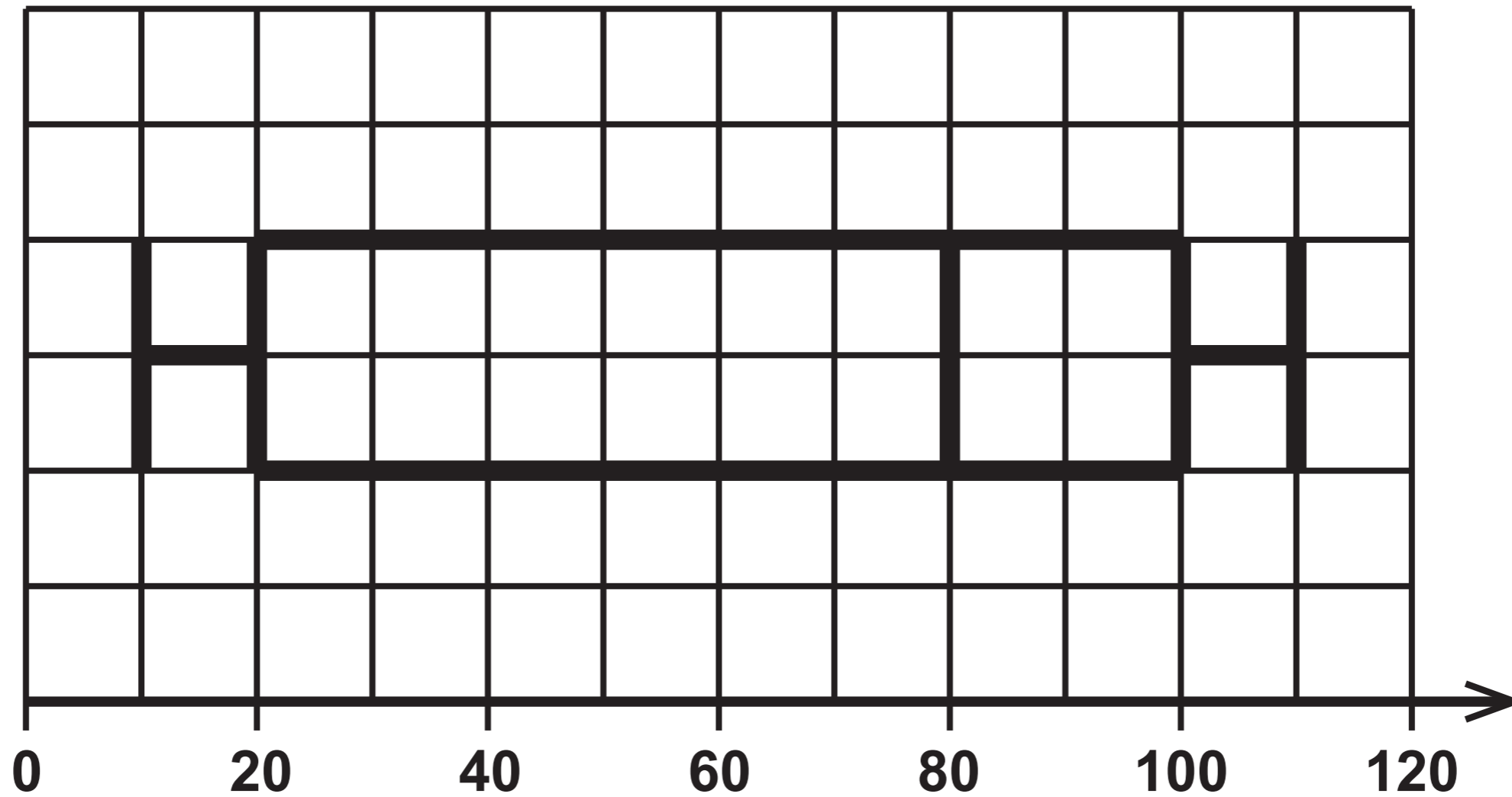
BAND	TAXABLE INCOME	TAX RATE
Personal allowance	Up to 200 000 pesos	0%
Standard rate	200 000 pesos to 500 000 pesos	10%
Further rate	Over 500 000 pesos	35%

Question 6

Diagram 1

1st July 2018

Time taken to answer the phone in seconds



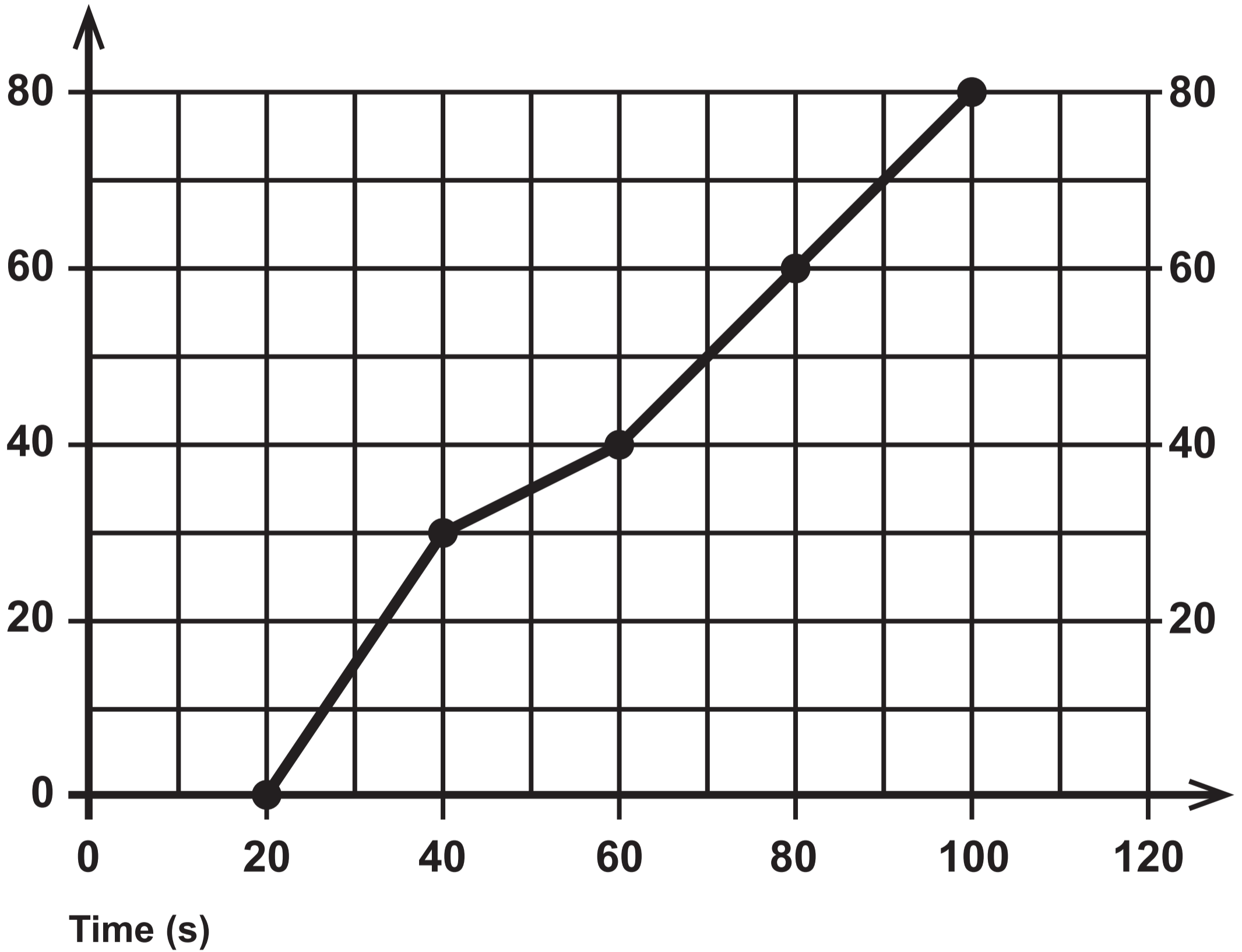
Question 6

Diagram 2

1st July 2019

Time taken to answer the phone in seconds

Cumulative frequency

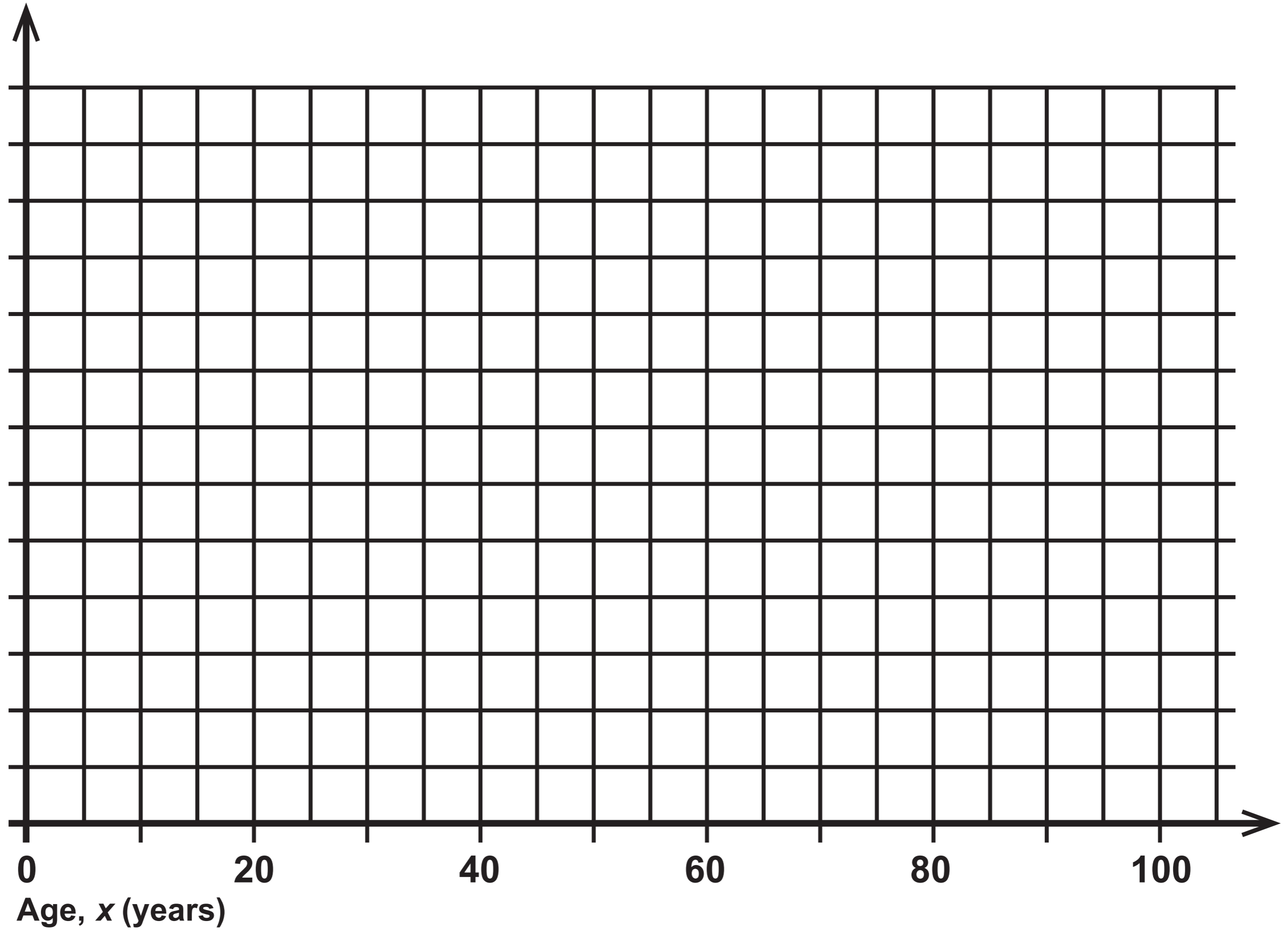


Question 8

Table

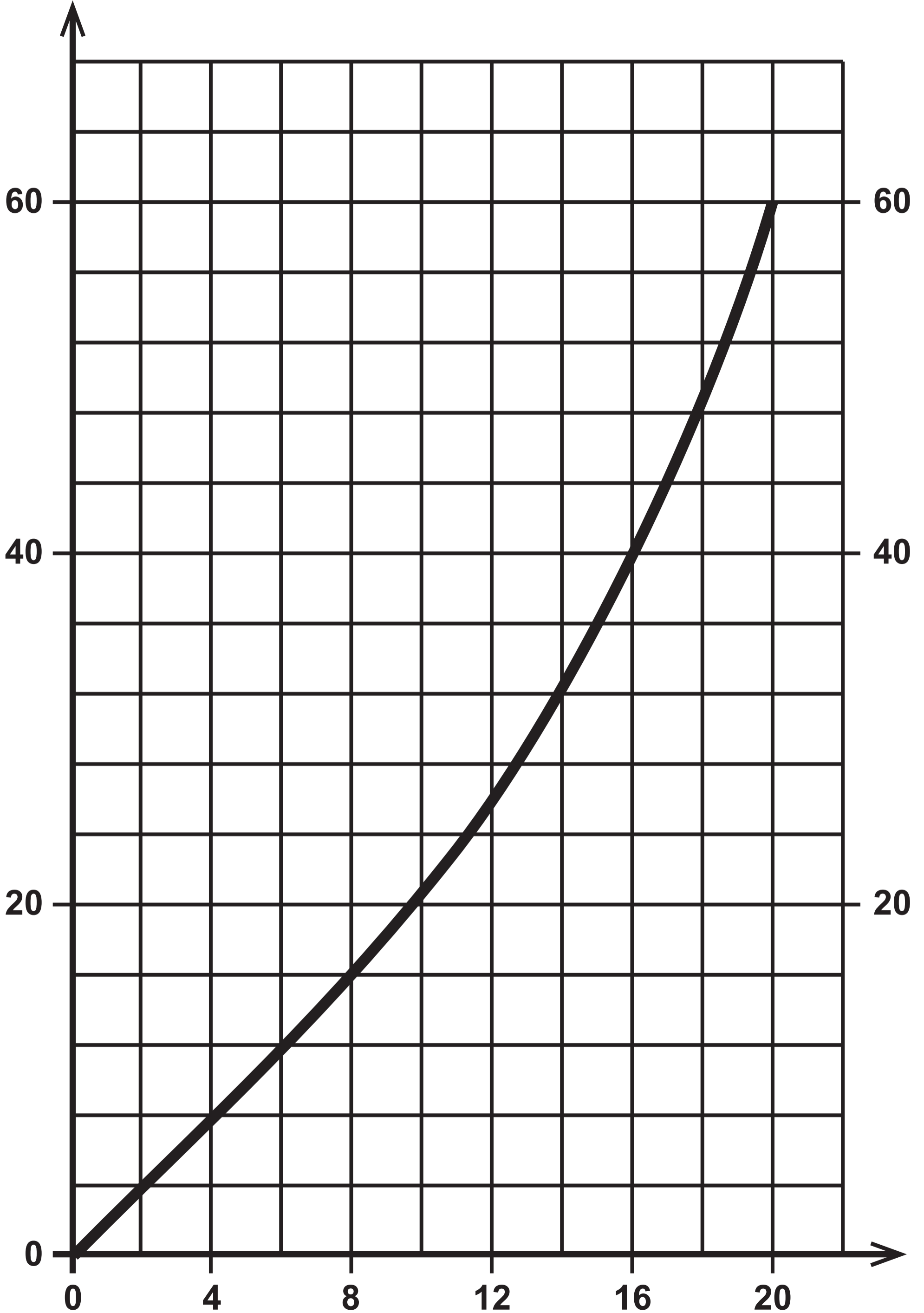
Age, X (years)	Frequency density
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$20 \leq x < 35$	2.4
$35 \leq x < 50$	2
$50 \leq x < 70$	1.5
$70 \leq x < 100$	0.6

Question 8 (b)



Question 9

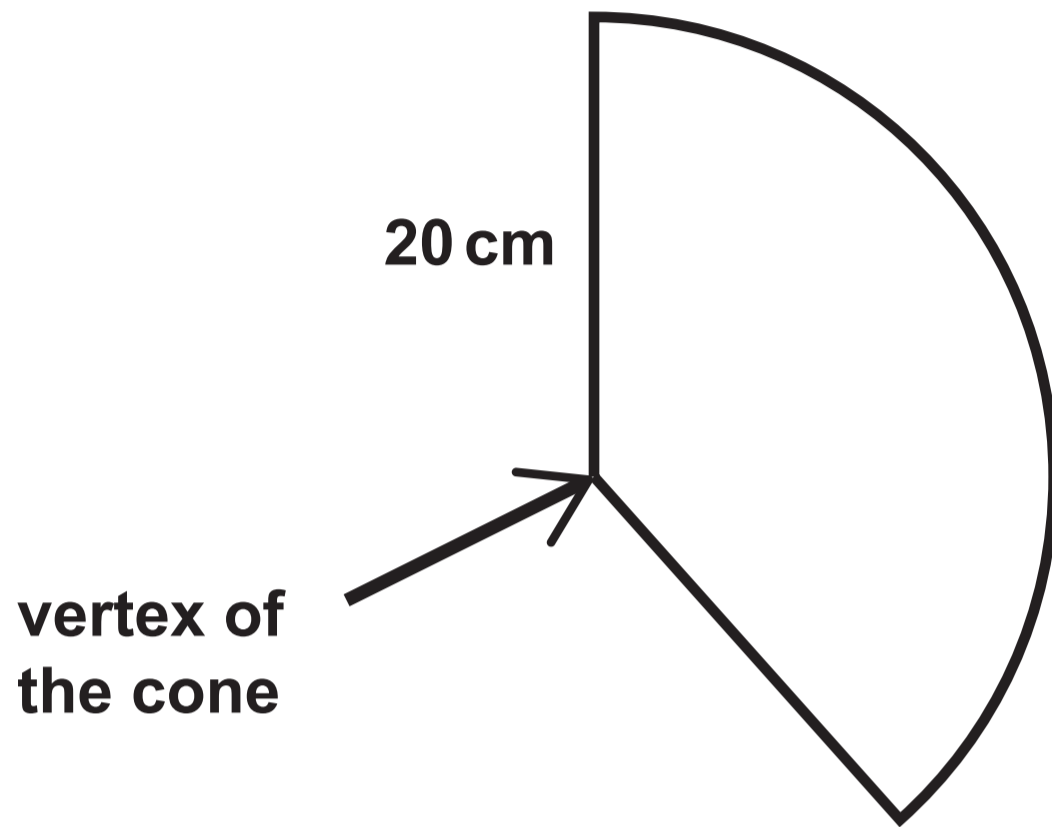
Velocity (m/s)



Time (seconds)

Question 10 (a)

Diagram NOT drawn to scale



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MATHEMATICS
and
NUMERACY**



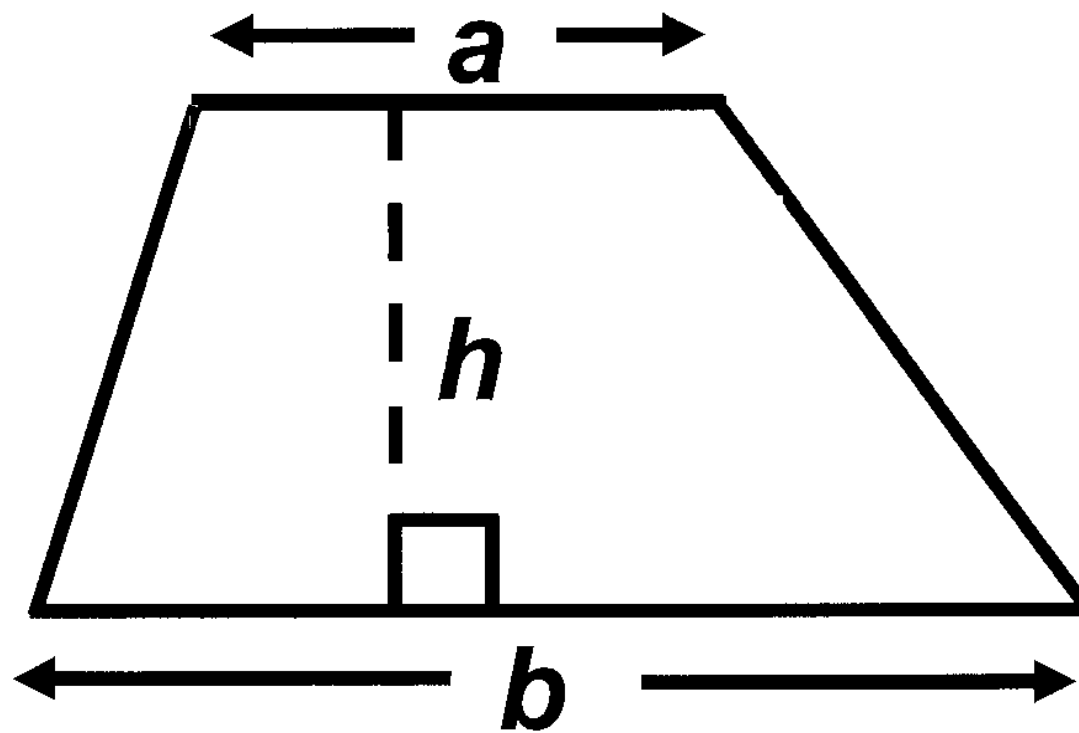
**FORMULA LIST
HIGHER TIER
GCSE**

You must not write on these formula pages.

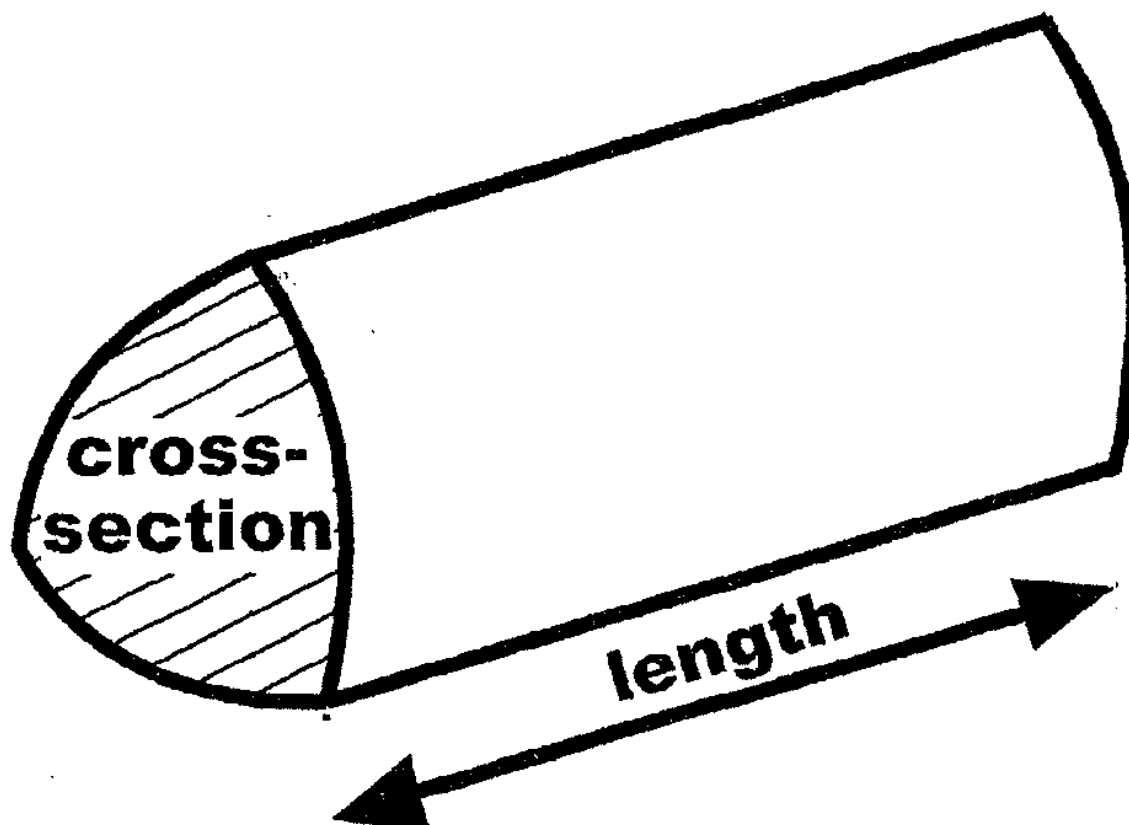
Anything you write on these formula pages will gain NO credit.

Formula List – Higher Tier

Area of trapezium $= \frac{1}{2} (a + b) h$

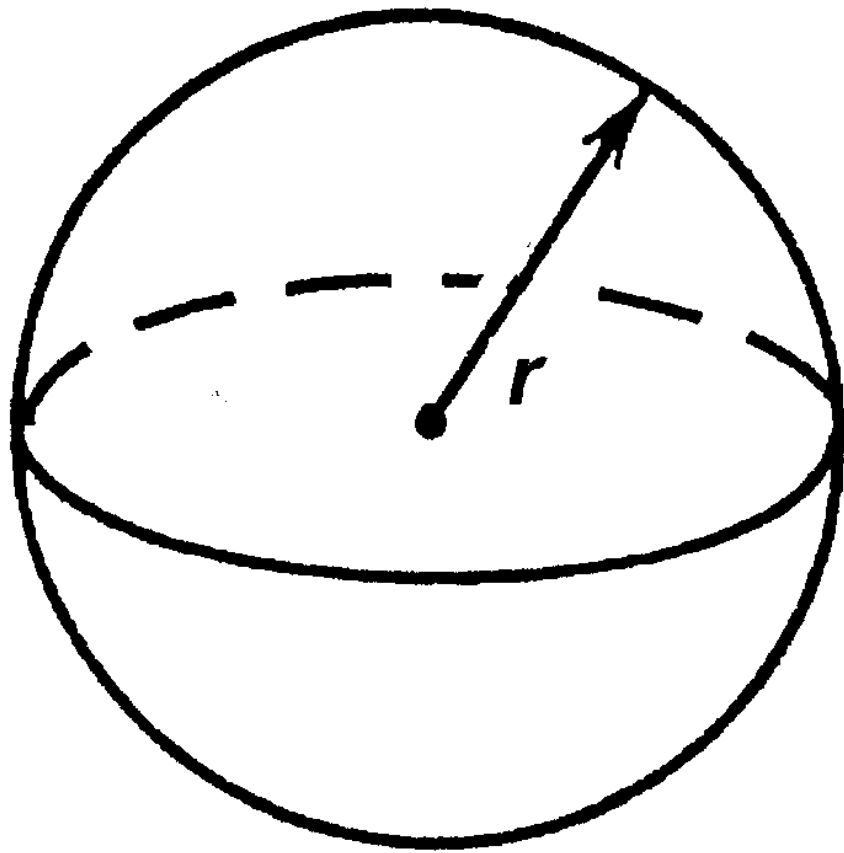


Volume of prism =
area of cross – section \times length



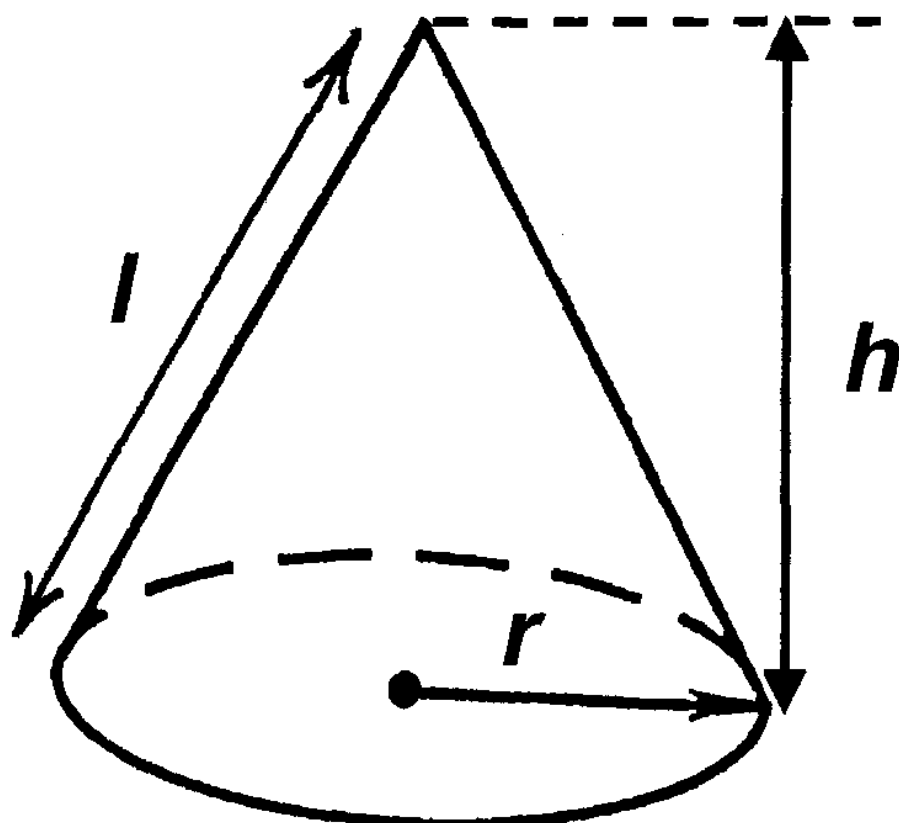
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

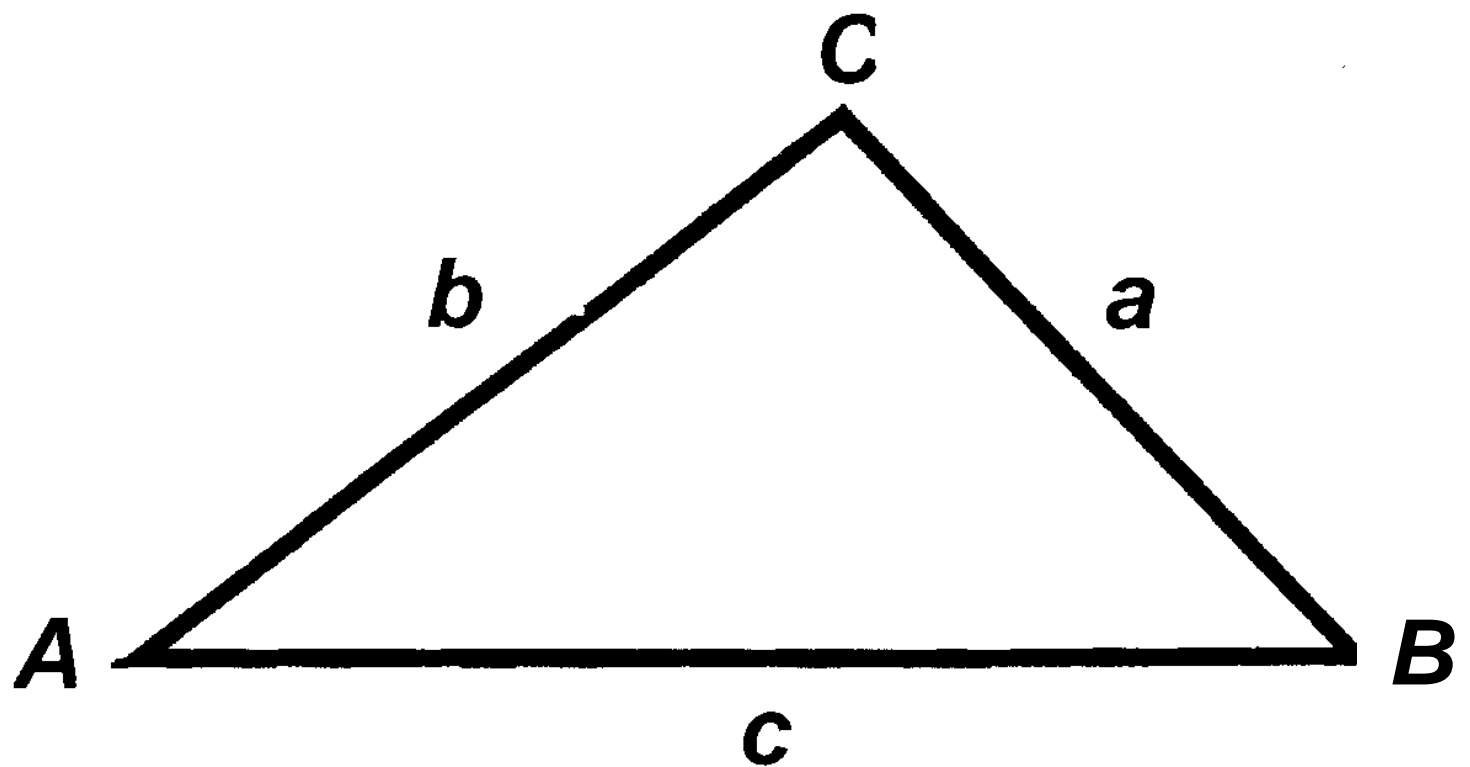


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2} ab \sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula $\left(1 + \frac{i}{n}\right)^n - 1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.