Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3310U30-1

A22-3310U30-1

TUESDAY, 8 NOVEMBER 2022 – MORNING

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

1 hour 45 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the additional page at the back of the booklet. Question numbers must be given for the work written on the additional page.

Take π as 3·14.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**11**	
2.	**4**	
3.	**5**	
4.	**15**	
5.	**18**	
6.	**13**	
7.	**8**	
8.	**6**	
Total	**80**	

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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 **1**(a), the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

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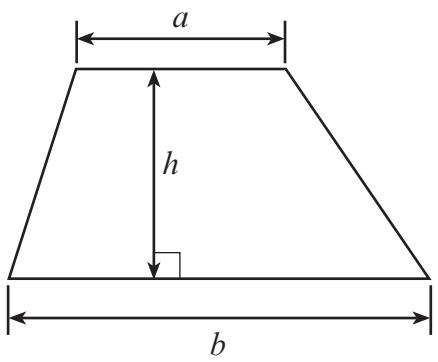
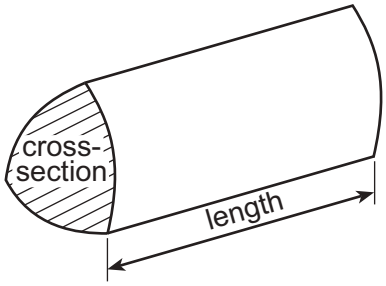
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



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Examiner only

1. Rosie is printing two different rectangular pictures of her dog.
The small picture has a height of 10 cm and a width of 5 cm.
The large picture has a height of 40 cm and a width of 15 cm.

Pictures not to scale

(a) *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

The small picture costs £2 to print.

Each 1 cm^2 of the small picture costs the same to print as each 1 cm^2 of the large picture.

Calculate the cost of printing the large picture.
You must show all your working. [6 + 2 OCW]

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(b) To make a frame, it costs 40p for each centimetre of the total distance around the outside of the picture.

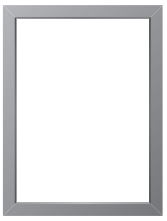

Diagram not drawn to scale

Calculate the cost of making a frame for the **small** picture. [3]

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Cost of making a frame for the **small** picture is .....

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2.

Tram timetable from Kemp Station to Rowe Place

Trams leave the station:

- every 12 minutes from 8 a.m. until 10 a.m.
- every 20 minutes from 10 a.m. until late.

It takes 22 minutes from Kemp Station to Rowe Place.

(a) At what time does the first tram after 20:30 leave Kemp Station?
Circle your answer. [1]

20:50 20:40 21:00 20:36 20:42

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(b) Nesta looks at the timetable shown above.
She decides to take the latest possible tram from Kemp Station to be at Rowe Place by 10:15 a.m.

At what time will Nesta's tram arrive at Rowe Place?
You must show all your working. [3]

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3. (a) Martina is going to buy some milk to make pancakes.

Small
500 ml for 40p

Medium
1200 ml for £1.20

Large
2000 ml for £2.50

Which size carton of milk offers the best value for money?
You must show all your working. [3]

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(b) Martina's pancake recipe is as follows.

Pancake recipe – Makes 12 pancakes
100 g flour
2 eggs
300 ml milk

Calculate the quantity of milk needed to make 30 pancakes. [2]

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Milk: ..... ml

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4. (a) Jenny is planning to sow grass seed in her garden.
The plan for her garden is shown below.

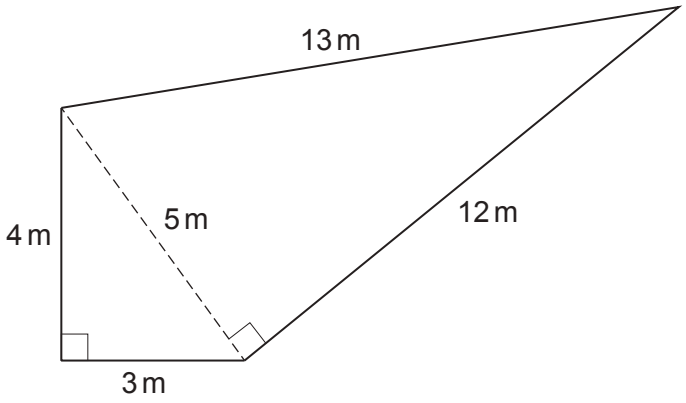

Diagram not drawn to scale

Grass seed to cover 1 m^2 costs 30p.
Calculate how much it will cost Jenny to buy the grass seed she needs. [4]

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(b) (i) Jenny's neighbour, Hubert, has a quote from a gardener to landscape his garden.
The gardener will charge a total of £175, excluding VAT.
This total charge includes £55 for plants.
The remainder of the charge is for labour.

The gardener says it will take 8 hours to landscape Hubert's garden.
Calculate how much per hour the gardener is charging for labour. [2]

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(ii) VAT at 20% is payable on the charge of £175.
Calculate the total charge of the landscaping, including the VAT. [3]

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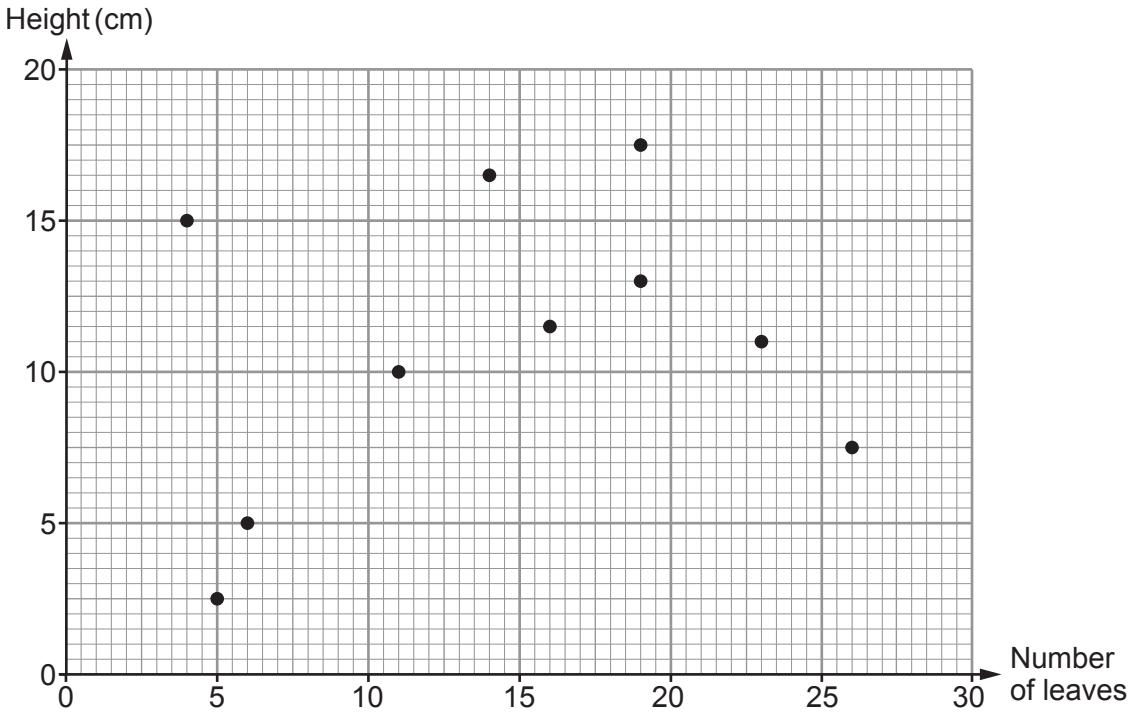
(c) The following summer, Hubert picked 10 different flowers from his garden.
He measured the height of each flower.
He also counted the number of leaves on each flower.
Here are his results.



(i) Is it possible to estimate the number of leaves on a flower of height 6 cm?

Yes ☐ No ☐

You must give a reason for your answer. [1]

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(ii) How tall is the flower with the greatest number of leaves?
Circle your answer. [1]

26 cm 2·5 cm 7·5 cm 5 cm 17·5 cm

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(iii) There are two flowers that each have 19 leaves.
Calculate the difference in the heights of these two flowers.
You must show all your working. [2]

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Difference in the heights is ..... cm

(iv) Calculate the percentage of the flowers that have **fewer than 23 leaves**. [2]

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..... % of the flowers have **fewer than 23 leaves**.

5. (a) Malik has two orchards.
He has apple trees and pear trees in his north orchard.
He has pear trees and cherry trees in his west orchard.

In the north orchard,
- Malik has a total of 35 trees
- number of apple trees : number of pear trees = 4 : 3.

In the west orchard,
- Malik has twice as many **pear** trees as he has **pear** trees in the north orchard
- number of pear trees : number of cherry trees = 5 : 11.

How many **cherry** trees does Malik have?
You must show all your working. [5]

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(b) Malik's crop of apples this year has a total mass of 5280 pounds.
He makes apple juice from $\frac{1}{6}$ of the mass of his apple crop.
Malik makes 2 litres of apple juice from every 5 kg of apples.

Calculate the number of litres of apple juice Malik makes. [6]

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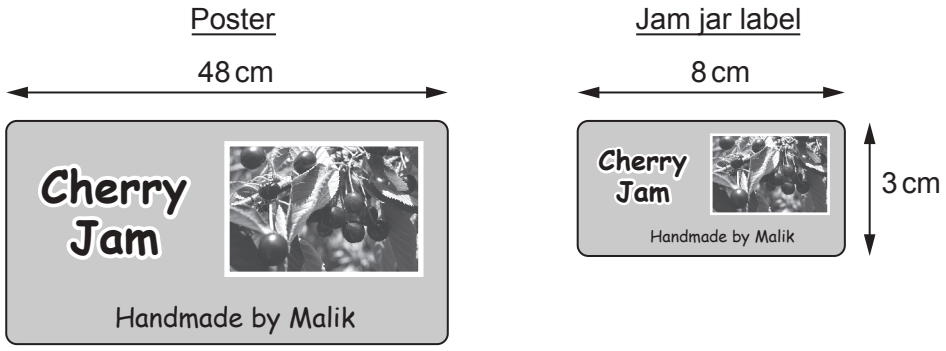
(c) Malik makes cherry jam using some of the fruit from his trees.

(i) He makes and sells 200 jars of cherry jam.

It costs him £94 for all the ingredients to make the jam.
Malik pays 23p for each jam jar he uses.
He sells each jar of jam for £1.60.

Calculate the profit Malik makes from selling his 200 jars of jam. [5]

(ii) Malik makes a poster to advertise his jam.
He also makes labels for the jars.
The poster and the labels are mathematically similar.



Diagrams not drawn to scale

Calculate the height of the poster. [2]

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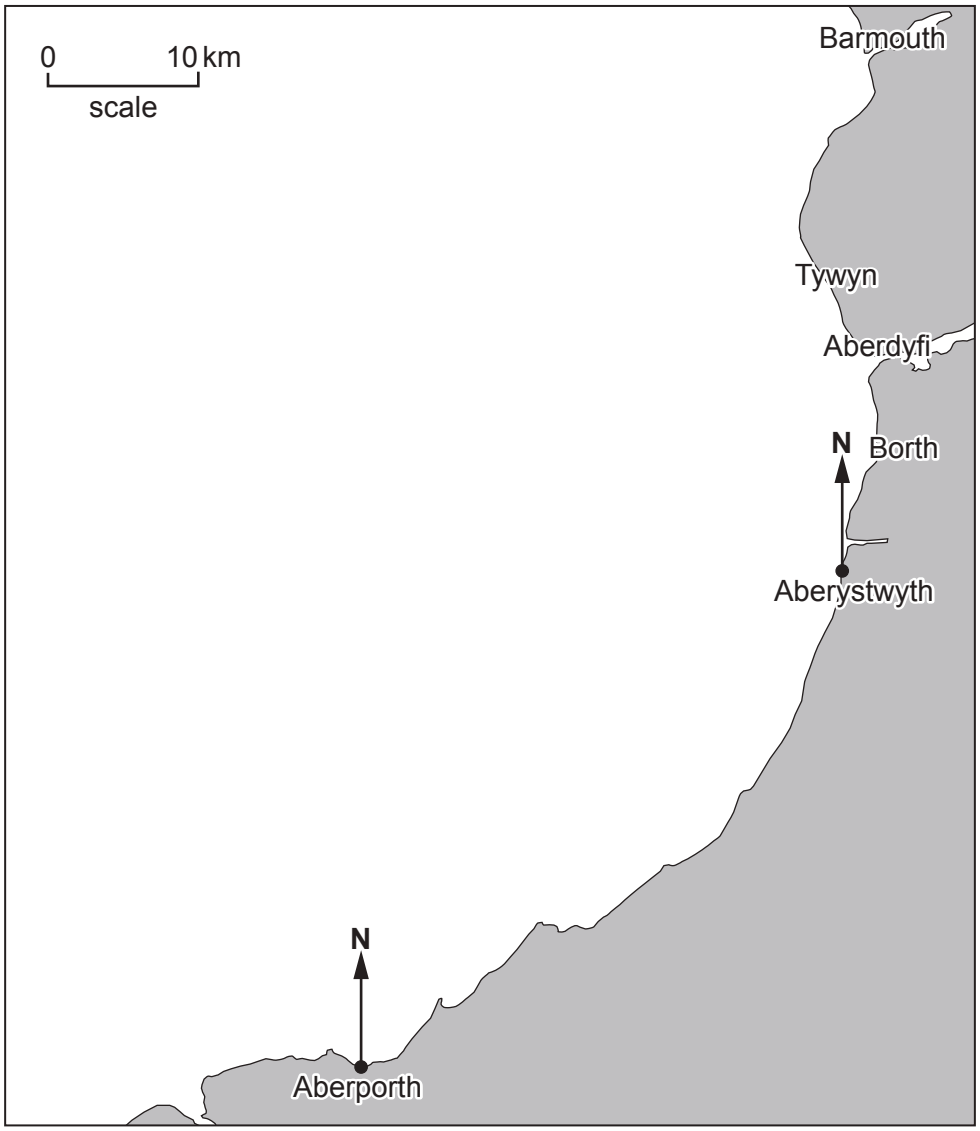
6. Whales are sometimes spotted in the Irish Sea, off the west coast of Wales.

A minke whale was spotted on a bearing of:

- 010° from Aberporth
- 280° from Aberystwyth.



(a) Scientists decide to search for other whales in the Irish Sea.
The search area is the region within 20 km of the position where the minke whale was spotted.

Using the scale given, show this search area on the map above. [4]

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(b) This minke whale has a length of 20 feet.

Remember: 1 inch ≈ 2·5 cm, 1 foot = 12 inches

Use these facts to complete the following statement. [3]

The minke whale has a length of ..... metres.

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(c) The brain of a minke whale has 12·8 billion neocortical neurons.
A female human brain has 19 billion neocortical neurons.

Remember: 1 billion = 1000 million

(i) Calculate an **estimate** for the number of neurons in a minke whale brain expressed as a percentage of the number of neurons in a female human brain.
You must show all your working. [2]

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Approximately ..... %

(ii) 10% of all neocortical neurons are lost over a human lifespan.
Calculate the number of neocortical neurons in a female human brain at the end of a lifespan.
Give your answer in standard form. [4]

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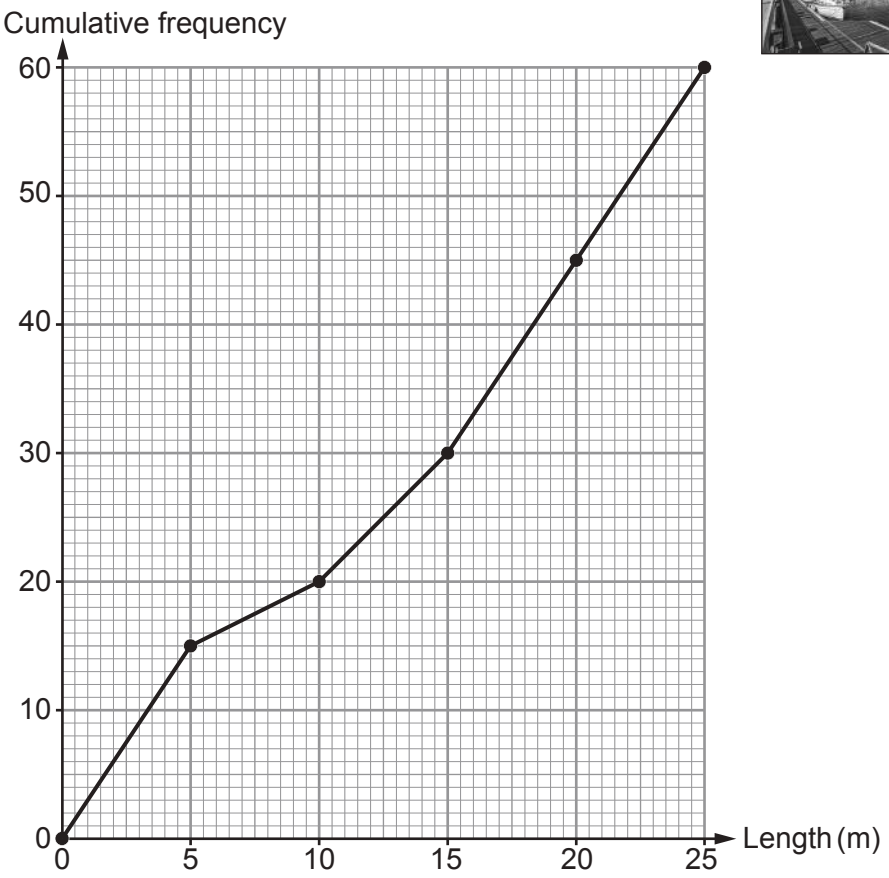
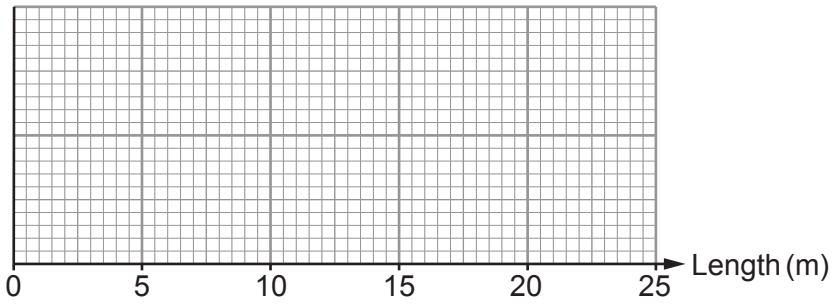
7. (a) The lengths of the 60 yachts in Eog Marina were measured.
The results are shown in the cumulative frequency diagram below.



The shortest yacht has a length of 3 m.
The longest yacht has a length of 22 m.

Use the information above to complete a box-and-whisker diagram on the graph paper below. [3]



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(b) The lengths of the 68 yachts in Clwyd Marina were measured.

For these yachts:
- the lower quartile of their lengths is 10 m
- 25% have lengths greater than 18 m
- the median length is 11·6 m.

(i) Calculate how many of the yachts in Clwyd Marina have lengths greater than 10 m. [2]

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..... yachts

(ii) In which marina, Eog or Clwyd, is the interquartile range of the lengths of the yachts greater?

Eog Marina ☐ Clwyd Marina ☐

You must show all your working. [2]

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(iii) In which marina is the longest yacht?

Eog Marina ☐ Clwyd Marina ☐ Can't tell ☐

You must give a reason for your answer. [1]

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8. Melin is a company that packages flour for sale in supermarkets.
It packages the flour in cylindrical bags.
The area of the cross-section of each of these bags is $25\,cm^2$.

(a) Write down an expression, in terms of π, for **the radius of the base** of each of these bags. [2]

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(b) Each bag has a volume of $500\,cm^3$.

(i) Currently the bags are filled with flour at a rate of $\frac{1}{4}$ of a bag per second.
Complete the following statement. [2]

Melin packages bags of flour at a rate of ..... cm^3 per minute.

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(ii) A new cylindrical bag is designed to have the same capacity and to be more stable.

Melin decides to increase the area of the cross-section of its original bags by 100%.
Calculate the height of this new bag. [2]

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END OF PAPER

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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