Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3310U40-1

A22-3310U40-1

THURSDAY, 10 NOVEMBER 2022 – MORNING

MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

1 hour 45 minutes

ADDITIONAL MATERIALS

A calculator will be required for 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 or use the π button on your calculator.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**14**	
3.	**8**	
4.	**9**	
5.	**9**	
6.	**12**	
7.	**13**	
8.	**8**	
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 **2**(a), the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

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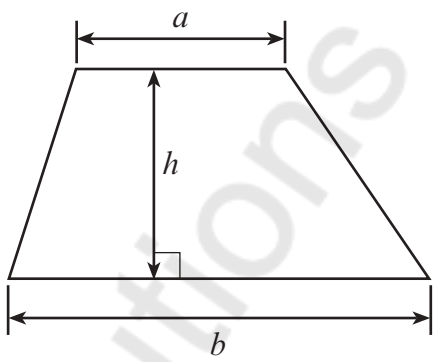
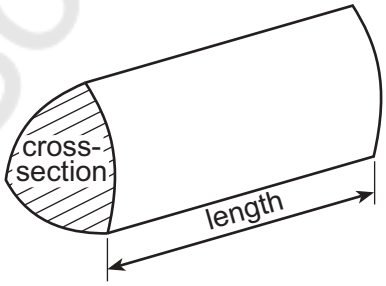
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



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Examiner only

1. (a) The Royal National Lifeboat Institution (RNLI) bought a new lifeboat.
The lifeboat was funded as follows:

- 2% from government sources
- 94% from donations
- 4% from other sources.

The new lifeboat cost £2.2 million.

How much of the cost of this lifeboat was funded from government sources?
Write your answer in figures only. [3]

2% × 2,200,000

⇒ 44,000

£ 44000

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(b) 1800 medals were awarded to RNLI crew members in recent years.
The distribution of the medals is shown accurately in the pie chart below.

Lifeboats

(i) What fraction of the medals awarded were bronze?
Circle your answer. [1]

$\frac{135}{360}$ $\frac{245}{360}$ $\frac{65}{360}$ $\frac{115}{360}$ $\frac{75}{360}$

(ii) How many gold medals were awarded?
You must show all your working. [3]

$1800 \times \frac{20 (\pm 2^\circ)}{360}$

$= 100 \pm 2^\circ$ gold medals

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

Iwan recorded his gas usage for a week.
His meter reading was 21 345 kWh at the start of the week.
His meter reading was 21 640 kWh at the end of the week.

Gas costs 7.2p per kWh.
VAT at 5% is payable on the cost of any gas used.

Calculate the total cost of Iwan's gas for the week.
You must show all your working. [5 + 2 OCW]

Gas used = 21640 − 21345
= 295 kwh
Cost = 295 × £0.072 = £21.24

VAT = 5% × £21.24 = £1.06
Total cost = £21.24 + £1.06
= £22.30

Examiner only

(b) For the first 7 days of October, the mean daily outside temperature at midday where Iwan lives was 13·2°C.
The temperatures at midday for the next 2 days of October were 12·2°C and 12·4°C.

Calculate the total of the temperatures for the first 7 days.
Hence, calculate the mean midday temperature for the first 9 days of October.
You must show all your working. [4]

$13.2 \times 7 = 92.4°C$

Total for 9 days $= 92.4 + 12.2 + 12.4$
$= 117.0°C$

Mean $= 117.0 \div 9 = 13.0°C$

The mean midday temperature for the first 9 days of October was 13.0 °C

(c) The plan of the streets where Iwan lives is shown below.

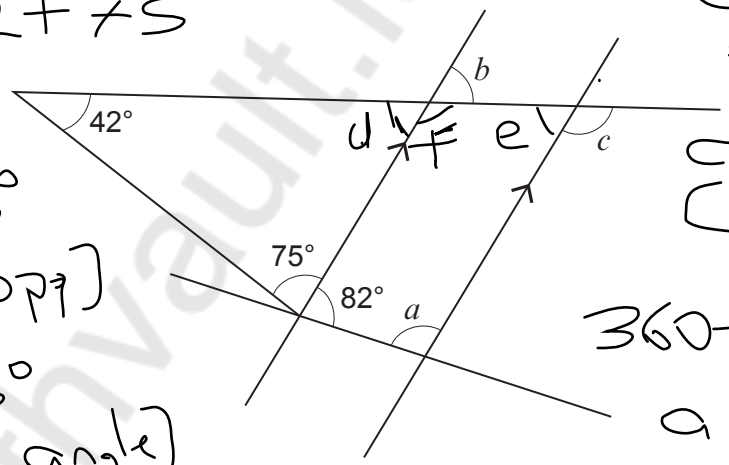

Diagram not drawn to scale

$180 = d + 42 + 75$
$d = 63$

$d = b = 63°$
[Vertically opp]

$b = e = 63°$
[Alternate angle]

$c = 180 - 63$
$= 117°$

$c = f = 117$
[Corr. angle]

$360 - 82 - 63 - 117$
$a = 98°$

Find the size of each of the angles a, b and c. [3]

$a =$ 98 ° $b =$ 63 ° $c =$ 117 °

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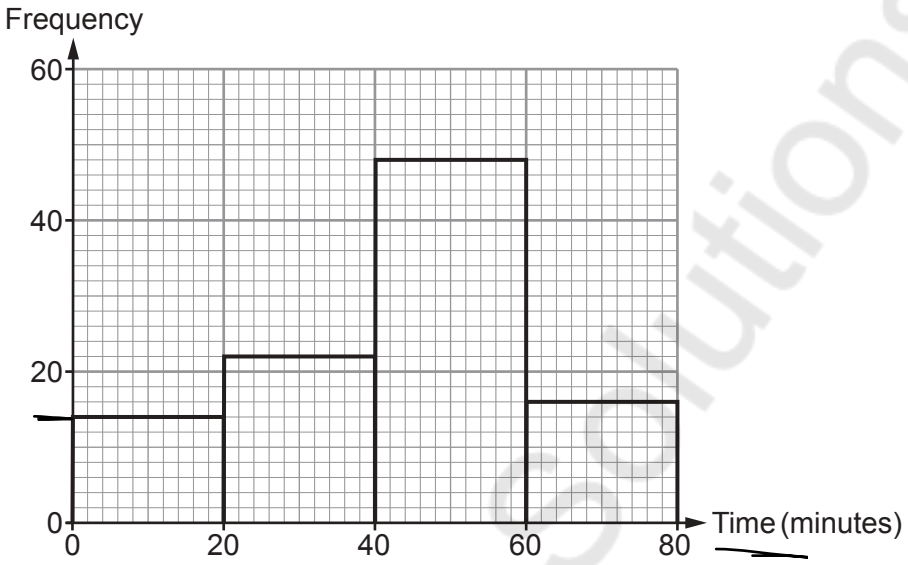
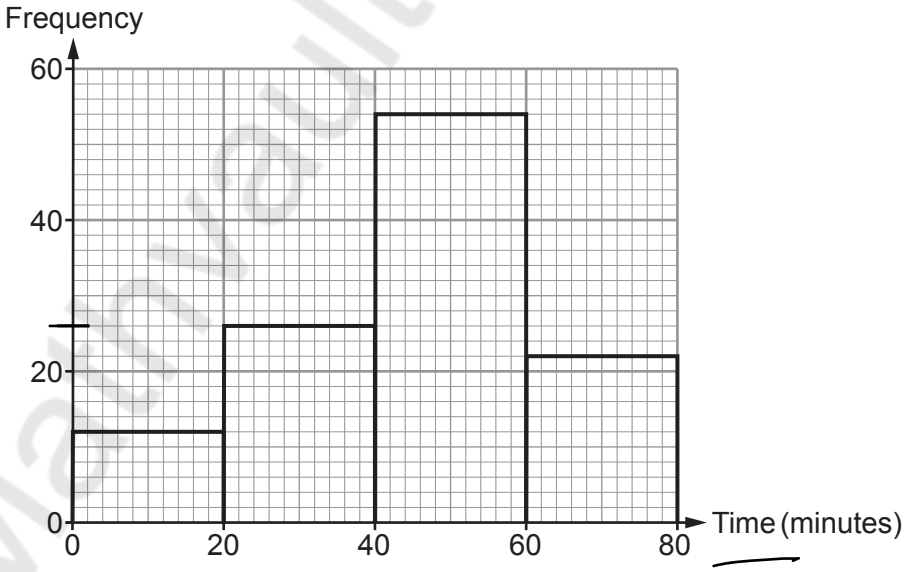
3. The frequency diagrams below show the lengths of time that men and women spent training in the gym on Friday.

Time spent training – Men



Time spent training – Women



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(a) Freddie says he spent exactly 1 hour 25 minutes training in the gym on Friday.
Explain how you know that Freddie is not telling the truth. [1]

1hr 25min = 85min

Graph ends at 80mins

(b) How many men spent less than 20 minutes training in the gym on Friday?
Circle your answer. [1]

12 (14) 54 6 20

(c) How many women spent less than 40 minutes training in the gym on Friday?
Circle your answer. [1]

14 26 34 (38) 76

(d) Gwen says,

"A greater **proportion** of women than men spent between 40 and 60 minutes training in the gym on Friday."

Is Gwen's statement true or false?

True ☐ False ☑

You must show all your working to support your answer. [5]

M
Total = 100
Max = 48

48 ÷ 100
= 0.48

W
Total = 114
Max = 54

54 ÷ 114
= 0.47

Examiner only

4. Lena flew from Havana Airport in Cuba to Gatwick Airport in the UK. She then drove home from Gatwick Airport.

(a) When it is 09:40 in Havana, it is 14:40 on the same day in Gatwick.

It took 9 hours 15 minutes to fly from Havana to Gatwick.
Lena's flight left Havana on Monday at 17:40 local Havana time.

On what day and at what time did this flight arrive in Gatwick?
Give your answer in UK time. [4]

Departure: Mon 17:40 Havana

+ 9h 15m = 02:55 Tue (Havana)
+ 5hrs = 07:55 Tuesday

Day Tuesday Time 07:55

(b) Lena lives 80 miles from Gatwick Airport.
The first 20 miles of Lena's journey home from the airport took 1 hour.
The average speed for the remaining 60 miles of her journey was 40 mph.

(i) Calculate the time taken for the remaining part of her journey. [2]

60 miles ÷ 40 mph = 1.5 hours

= 90 mins

(ii) Calculate the average speed, in mph, of Lena's 80-mile journey home from the airport. [3]

Total time: 1hrs + 90mins
= 2.5hrs

Avg speed = 80 ÷ 2.5
= 32 mph

Average speed 32 mph

Examiner only

5. (a) Last year, Viktor's total income before tax was 28 000 euros.

The tax bands, taxable income and tax rates for last year were as follows:

Band	Taxable income	Tax rate
Personal allowance	Up to 10 000 euros	0%
Basic rate	10 000 euros to 25 000 euros	22%
Higher rate	Over 25 000 euros	35%

Viktor has already paid 3600 euros towards his income tax bill for last year.
Calculate how much income tax Viktor still owes.
You must show all your working. [7]

Basic: £15,000 × 22% = £3,300

Higher: £3,000 × 35% = £1,050

Total = £4,350

Owed = £4,350 − £3,600
= £750

(b) When Viktor paid 3600 euros towards his bill, the exchange rate was £1 = 1.11 euros.
How much was 3600 euros in pounds?
Give your answer correct to the nearest penny. [2]

3600 ÷ 1.11 = 3243.24

£ 3243.24

Examiner only

6. Delyth and Ronnie are both students at the local college.

(a) Their houses and the college are all joined by straight roads, as shown in the diagram.

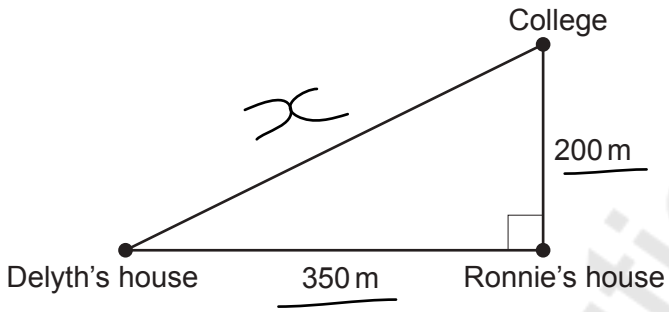

Diagram not drawn to scale

Delyth usually walks directly to college.
Calculate how much further Delyth has to walk if she passes Ronnie's house on her way to college. [5]

$x^2 = 200^2 + 350^2$

$x^2 = 162500$

$x = \sqrt{162500}$

$= 403.11\text{m}$

Extra distance $= 200 + 350 - 403.1$

$= 146.887$

$\approx 147\text{m}$

Examiner only

(b) 35 students were asked how far they travelled to the college.
The results are recorded in the table below.

Distance, d (metres)	Frequency
$100 < d \leqslant 200$	9
$200 < d \leqslant 1000$	10
$1000 < d \leqslant 3000$	15
$3000 < d \leqslant 7000$	1

(i) Ronnie is one of these 35 students.
He walks 200 m directly to college.

Does Ronnie travel further than the median distance travelled by these 35 students?

Yes ☐ No ☑ Can't tell ☐

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

Median is more than 200m away

(ii) Calculate an estimate of the mean distance these 35 students travelled to the college. [4]

Midpoint: 150, 600, 2000, 5000

Mean: $(9\times150)+(10\times600)+(15\times2000)+(1\times5000) = 1210$ m

$\Rightarrow$ 1210 m

Estimate of the mean distance travelled by these 35 students is 1210 m

Examiner only

(c) There are 140 students who travel by bus to and from college.

Delyth wants to find out why these students do not walk to college.
She has decided to use a systematic sampling method to select 7 of these students to form a discussion group.

The names of all the 140 students are in a list.
Delyth has randomly selected the 2nd student in the list to join the discussion group.

Complete the table below to give the positions in the list of the 7 students selected to join the discussion group. [2]

$140 \div 7 = 20$

Student	1	2	3	4	5	6	7
Position in the list	2nd	22	42	62	82	102	122

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7. (a) 10 years ago, Matteo bought a car for £4500.
His car depreciated in value by 20% in the **first** year.
In each of the following years, his car depreciated by 14% of its previous year's value.

Show that the value of Matteo's car is now less than £950.

You must show all your working. [3]

Yr 1: £4500 × 0.8 = £3,600
× 0.86^9 = £926.38

(b) Matteo's car insurance has increased by 25% from the amount he paid last year.
His car insurance is £750 this year.

Calculate the amount Matteo paid for his car insurance last year. [2]

£750 ÷ 1.25 = £600

Matteo paid £ 600 for his car insurance last year.

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(c) The diagram below shows the front of Matteo's garage.

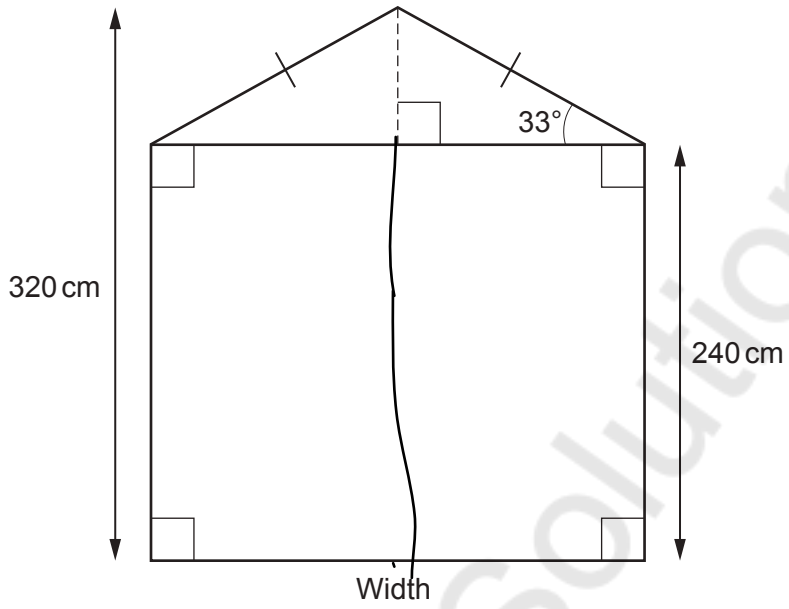

Diagram not drawn to scale

Calculate the width of Matteo's garage. [5]

$\frac{1}{2}$ width $= \frac{80}{\tan 33^\circ}$

Width $= 2 \times (80 \div \tan 33^\circ)$

$= 246.1$ cm

Examiner only

(d) The length of Matteo's car is 400 cm, correct to the **nearest 10 cm**.
The length of his garage is 550 cm, correct to the **nearest 10 cm**.

When Matteo parks his car, he leaves exactly 70 cm between the car and the back wall of the garage.

Calculate the maximum length of the space between Matteo's car and the garage door.
[3]

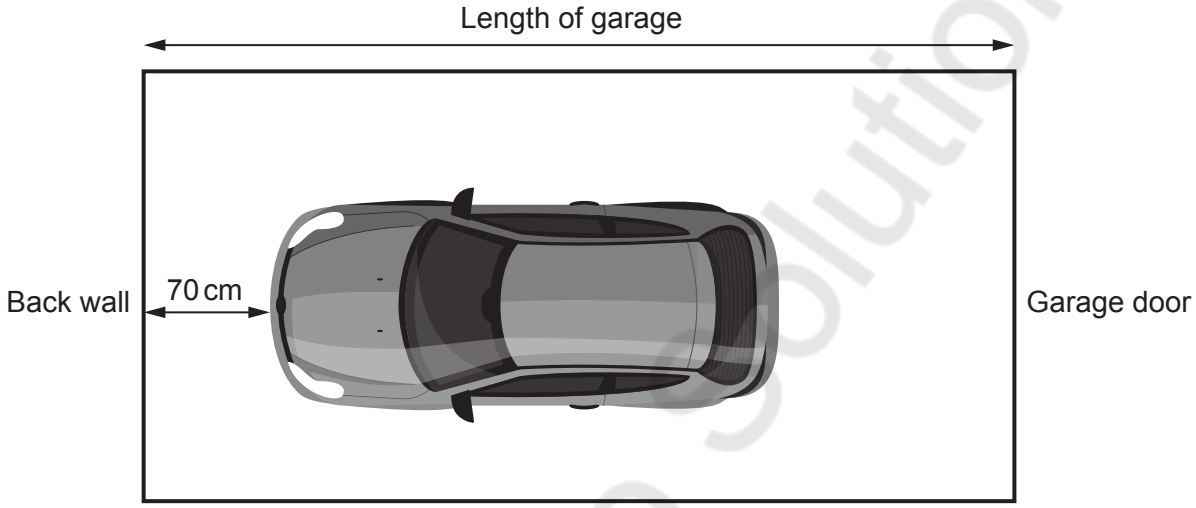

Diagram not drawn to scale

Garage = 555 cm

Car = 395 cm

Gap = 70 cm

Rem. space = 555 − (395 + 70)

= 90 cm

Examiner only

8. (a) The population of Barbados in 1644 was said to be 30 000.

By 1964, the population of Barbados had increased by 682%.
From 1964 to 2014, the population of Barbados increased by a further 20%.

Calculate the population of Barbados in 2014.
You must show all your working. [3]

1964: 30,000 × 7.82 = 234,600

2014: 234,600 × 1.2 = 281,520

(b) The area of Barbados is 432 km^2.
The population of Barbados in September 2019 was 287 106.

Calculate the population density of Barbados in September 2019.
Give your answer correct to 2 significant figures. [3]

287106 ÷ 432 = 660 people/km^2

(c) The density of some of the sand in Barbados is 1442 kg/m^3.
Express this density in g/cm^3. [2]

1442 kg/m^3 = 1.442 g/cm^3
(Divide by 1000)

END OF PAPER

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

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