

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

3310U60-1



S25-3310U60-1

WEDNESDAY, 4 JUNE 2025 – MORNING

**MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
HIGHER TIER**

1 hour 45 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3.14 or use the π button on your calculator.

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

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	5	
3.	3	
4.	9	
5.	10	
6.	3	
7.	9	
8.	11	
9.	16	
10.	5	
11.	6	
Total	80	

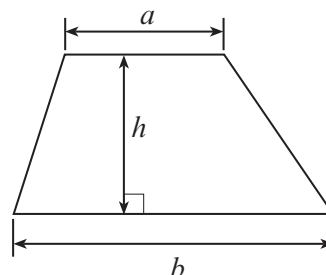
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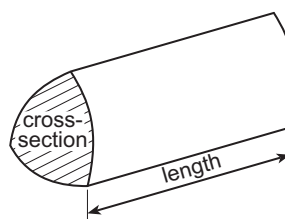
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Formula List – Higher Tier

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

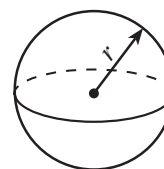


Volume of prism = area of cross-section $\times$ length



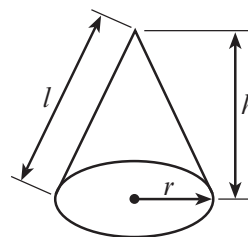
Volume of sphere $= \frac{4}{3} \pi r^3$

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



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

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

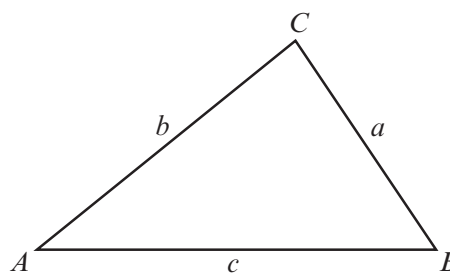


In any triangle ABC

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.



1. Nina sells flowers.

She wants to display her flowers.
She buys two glass vases from a website.
The two vases are different shapes.



Cuboid



Cylinder

Diagrams not drawn to scale

Each vase can hold 1648 cm^3 of water when it is full.

The vase in the shape of a cuboid has a height of 20.6 cm .
The radius of the base of the cylindrical vase is 6 cm .

The website states that both of these vases have the same height.
Is the website correct?
You must show all your working.

[3]

The website is correct

☐

The website is incorrect

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



Elfed goes to the park to exercise.

Yesterday he ran 10 km and then walked a further 4 km.
Elfed ran for 45 minutes and walked for 1 hour.

What was Elfed's overall average speed for his exercise in the park yesterday?
Give your answer in km/h.
You must show all your working.

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3. Bethan bought a house in January 2000 for £30 000.

In the first 10 years, her house increased in value each year by 6% of its previous year's value.
In the following 15 years, her house increased in value each year by 11% of its previous year's value.

Calculate the value of Bethan's house in January 2025.

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4. 100 people took part in a fundraising event last Saturday and Sunday. They raised money for charity by working towards some fitness targets.

- (a) The target for Saturday was to achieve a mean of 6500 steps per person.

The results for Saturday are shown in the table below.



Number of steps	Number of people
3001 to 5000	22
5001 to 7000	30
7001 to 9000	42
9001 to 11 000	6

- (i) Calculate an estimate of the mean number of steps per person on Saturday to show that this target was met. [4]

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- (ii) Osian says,

"None of these 100 people recorded more than 10 000 steps on Saturday."

Is this statement certainly true, not true, or is it not possible to tell?

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

Certainly true ☐ Not true ☐ Not possible to tell ☐

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- (b) On Sunday, the 100 people were divided into three groups, A, B and C, based upon their results from the Saturday.
Each group was given a target of a mean number of steps per person.

The targets for groups A, B and C were 8000, 9000 and 10000 steps, respectively.

The table below shows the mean number of steps per person that each group achieved on Sunday.

Group	A	B	C
Mean number of steps per person achieved	5802	9830	12 200

The ratio of the number of people in the different groups was $A : B : C = 18 : 4 : 3$.

- (i) Calculate the overall mean of the number of steps taken per person by these 100 people on Sunday. [3]

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- (ii) The organiser says,

**"A fabulous result on Sunday! Two of the three groups met their target.
This means that two-thirds of the targets given were met."**

Give a reason why this could be seen as a misrepresentation of the outcome of Sunday's fundraising event. [1]

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5. Gwilym is giving a talk about the amount of food that was wasted in 2019. He has found some details of food waste in 2019.

Country	Total food waste in kilograms	Population
China	91 646 213 000	1 440 000 000
France	5 522 358 000	65 400 000
United Kingdom	5 199 825 000	67 600 000

- (a) (i) The population data seems to be given correct to a certain number of significant figures.
To how many significant figures does the data seem to be given?
Circle your answer. [1]

Three One Ten Eight Two

- (ii) Use the data from the table above to complete the following statements.
You must show all your working. [4]

'On average, a person in France produced kilograms of food waste.

This was times the average amount of food waste per person in China.'

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- (b) The area of the United Kingdom is $242\,500\text{ km}^2$.
Use this information and the information in the table on the previous page to answer the following questions about 2019.

(i) What was the population density of the UK? [2]

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..... people per km^2

(ii) What was the average food waste per km^2 in the UK?
Give your answer in **tonnes**. [3]

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6. A builder wants to put a ladder safely against a wall. The builder should follow the '4 up, 1 out' rule. This means that, for every 4 units of height up the wall that the top of the ladder reaches, the base of the ladder should be 1 unit away from the wall.

The diagram below shows a ladder placed safely against a vertical wall.

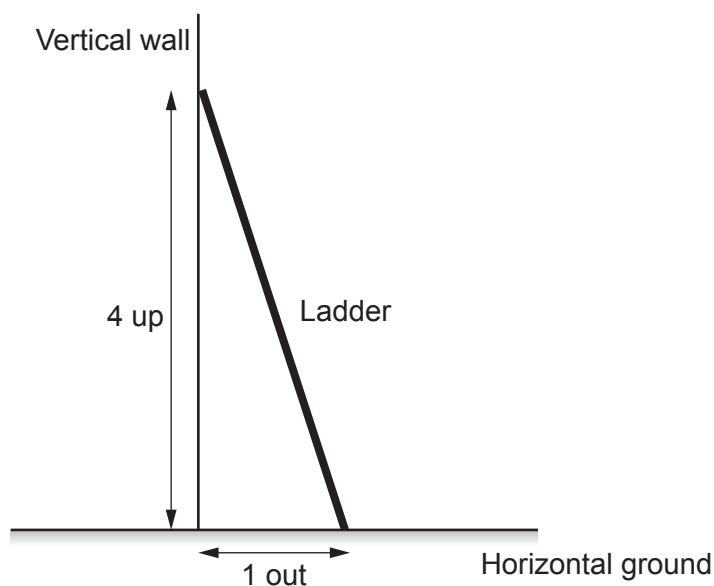
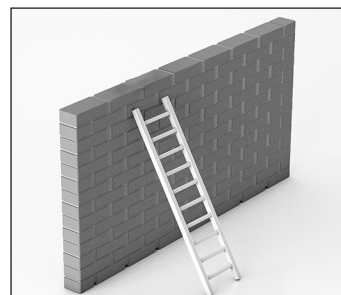


Diagram not drawn to scale

Calculate the angle between the horizontal ground and the ladder.

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7. Dyfan has two different 25g bars of chocolate, a Chocodusk bar and a Luxury Dark bar. The Chocodusk bar has a lower cocoa content than the Luxury Dark bar.

(a) The nutritional information from these bars of chocolate is given below.



Chocodusk bar: lower cocoa content	
	Per 25g bar
Saturated fat	6.6 g
Sugar	7.1 g
Protein	3.5 g
Salt	0.01 g

Luxury Dark bar: higher cocoa content	
	Per 25g bar
Saturated fat	7.7 g
Sugar	3.5 g
Protein	2.9 g
Salt	0.09 g

- (i) Complete the following statement.

[1]

'The amount of salt in the Luxury Dark bar is % of the amount of salt in the Chocodusk bar.'

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- (ii) Dyfan eats 20g of the Luxury Dark bar.

Calculate the percentage of the Chocodusk bar that gives Dyfan the same amount of saturated fat.

You must show all your working.

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[5]



8. (a) A hot air balloon is initially descending at a speed of 3 m/s.
A passenger drops their phone out of the balloon.
The phone accelerates due to gravity at a rate of 9.8 m/s^2 , and hits the ground with a speed of 50 m/s.

The speed, $v \text{ m/s}$, of the phone when it hits the ground is given by the formula,

$$v = \sqrt{u^2 + 2gh}$$

where:

u is the initial speed of the phone,

g is the acceleration due to gravity,

h is the height above the ground from which the phone was dropped.

Use the formula to calculate the height from which the phone was dropped.

[4]

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- (b) Consider the Earth to be a sphere.

The mass of the Earth is $6.0 \times 10^{24} \text{ kg}$, **correct to 2 significant figures.**

The volume of the Earth is $1.09 \times 10^{21} \text{ m}^3$, **correct to 3 significant figures.**



Calculate the greatest possible density of the Earth.
Give your answer in kg/m^3 .

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(c)

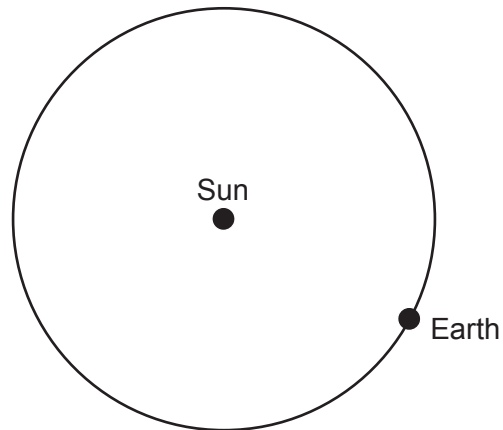


Diagram not drawn to scale

Here are some approximations about the Earth's motion around the Sun.

- The Earth follows a circular path around the Sun.
- The Earth makes 1 complete revolution of the Sun in 365 days.
- The speed of the Earth is 29 700 m/s.

Use these approximations to calculate the radius, in metres, of the Earth's motion around the Sun.

Give your answer in standard form.

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9. NoomAir is a cargo plane company based in Nice. Two of their planes have been hired to deliver cargo to the cities of Rome, Valencia and Tunis.

- (a) (i) One of the planes will fly from Nice to Rome, and then on to Tunis. The pilot knows the following information.
- From Nice, Rome is 470 km on a bearing of 115° .
 - From Nice, Tunis is 805 km on a bearing of 162° .

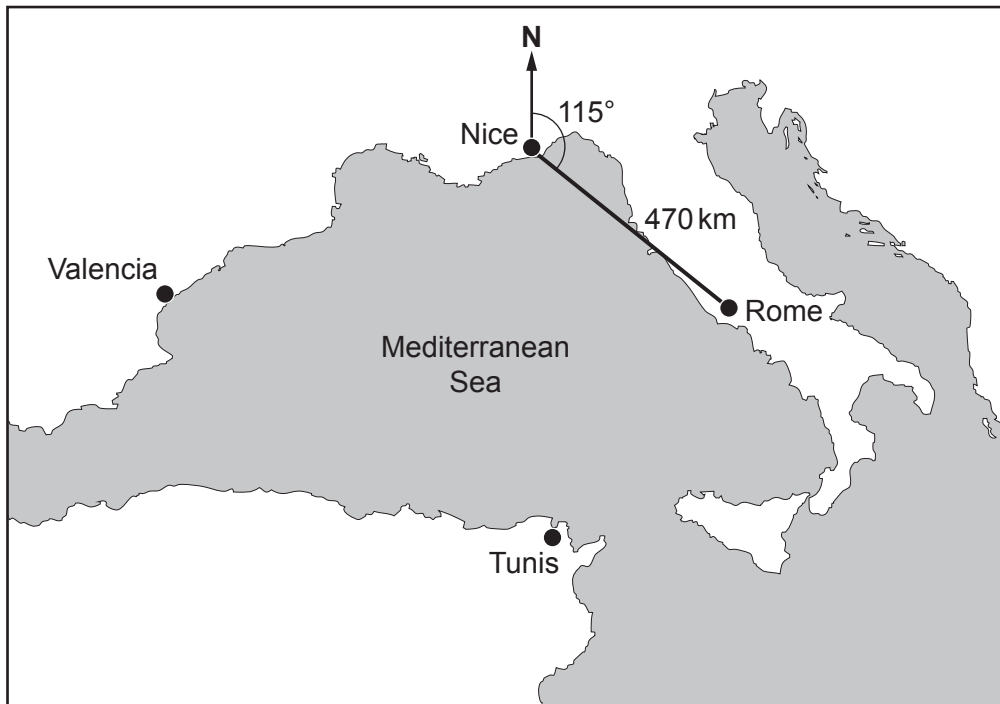


Diagram not drawn to scale

Calculate the distance from Rome to Tunis.

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- (ii) The second plane will fly from Nice to Valencia, and then on to Tunis. The pilot of this plane knows the following information.
- Valencia is on a bearing of 234° from Nice.
 - The distance between Valencia and Tunis is 970 km.

Calculate the bearing of Tunis from Valencia.

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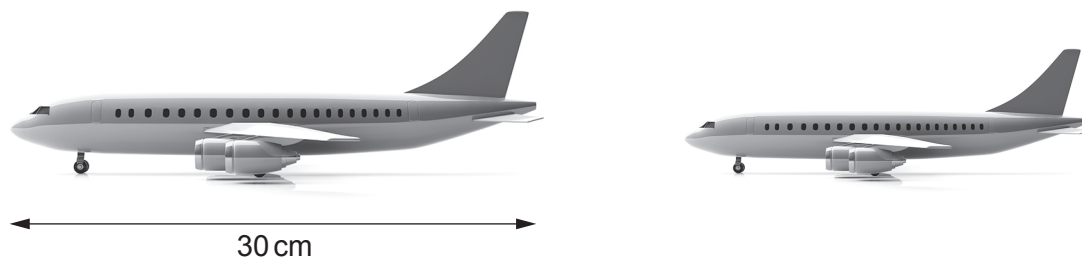
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- (b) NoomAir sells toy replicas of one of its cargo planes.
The two replicas shown below are mathematically similar.



Diagrams not drawn to scale

The volume of a large toy plane is 6 times the volume of a small toy plane.
The length of a large toy plane is 30 cm.
Calculate the length of a small toy plane.

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- (c) NoomAir makes 200 of the large toy planes. It takes a random sample of 5 of these 200 toy planes to check the quality of their production.

The following numbers are taken from a table of random digits.

649	133	016	249	585	520	869	239
489	849	727	133	580	337	182	125
957	755	510	563	017	205	810	119

Use these numbers to choose 5 toy planes from the 200 toy planes.
You must start with the first number in the list.
Describe clearly how you use the numbers to select the sample.

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The numbers of the 5 toy planes in the sample are:

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10. Menna is going to invest £400 in her bank's savings account.
The savings account has a special interest rate for one year only.

The account pays 0.2% interest per month for the first 10 months, and then 1.7% interest per month for the last 2 months of the year.

Calculate the AER the bank should be advertising on the account.
Give your answer as a percentage, correct to 2 decimal places.

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11. Pupils in Ysgol Ddwysaint have designed a new bike shelter.
 It is made of 3 clear plastic sheets.
 The two ends of the shelter are equal in size.
 The back and roof of the shelter are made from one **curved** rectangular sheet that connects the two end sheets.
 The bike shelter is 6 m long.

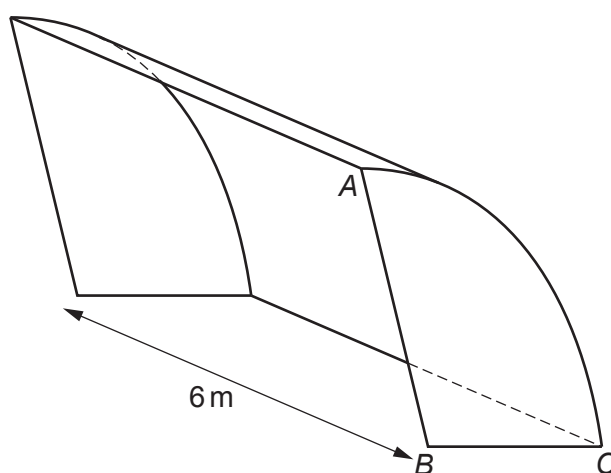


Diagram not drawn to scale

One of the end sheets is shown below.
 AC is an arc of a circle with centre O and radius 2.5 m.
 $BC = 1.4$ m and $\angle AOC = 75^\circ$.

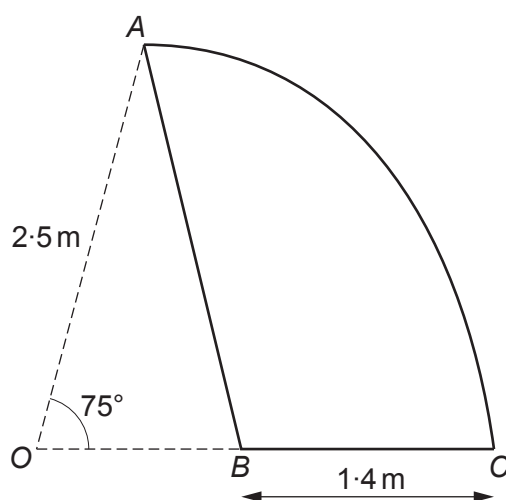


Diagram not drawn to scale



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