| Surname | Centre Number | Candidate Number |
|---|---|---|
| First name(s) | | 0 |

# GCSE

3310U40-1

S24-3310U40-1

**MONDAY, 3 JUNE 2024 – MORNING**

# MATHEMATICS – NUMERACY
## UNIT 2: CALCULATOR-ALLOWED
## INTERMEDIATE 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** 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 all work written on the additional page.

Take $\pi$ as 3·14 or use the $\pi$ button on your calculator.

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| **1.** | **4** | |
| **2.** | **11** | |
| **3.** | **7** | |
| **4.** | **7** | |
| **5.** | **11** | |
| **6.** | **7** | |
| **7.** | **8** | |
| **8.** | **12** | |
| **9.** | **13** | |
| **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 **3**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

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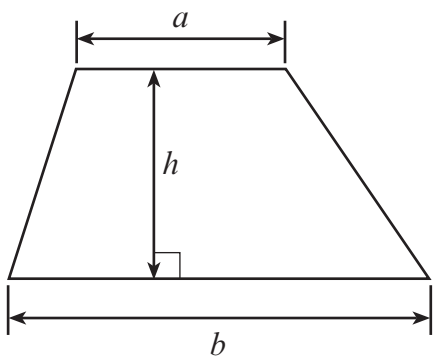
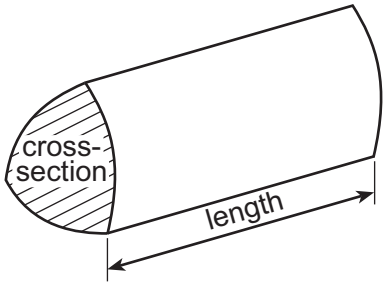
## Formula List – Intermediate Tier

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




**Volume of prism** = area of cross-section × length



Examiner only

**1.** Shiona is saving to pay for a holiday.
She has 13 weeks to save £510 to pay for her holiday.

Shiona already has savings of £95.
In the first week, she knows she can save £70.

She plans to save equal amounts of money in each of the remaining weeks.

How much does Shiona need to save in each of the remaining weeks so that she can pay for her holiday?
You must show all your working. [4]

Examiner only

**2.** Idris flies from Cardiff to Faro, in Portugal.

(a) The actual flying time is 133 minutes.
The plane flies at an average speed of 8 miles per minute.

(i) Calculate the flying distance between Cardiff and Faro.
Give your answer in miles. [2]

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(ii) Calculate the plane's average speed in **miles per hour**. [2]

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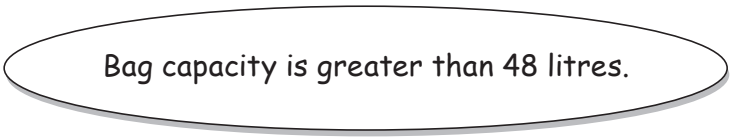
(b) Idris takes a cabin bag on board his flight.
His bag measures 55 cm by 40 cm by 23 cm.
The label on his cabin bag says,




Is this label correct?

Yes ☐ No ☐

You must show all your working and give a reason for your answer. [3]

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Examiner only

(c) Idris looks out of the aeroplane window.
He notices a village below.
Idris takes a photograph of the village to try to work out where he is.
From the photograph, he draws a sketch including some parallel streets.

His sketch is shown below.

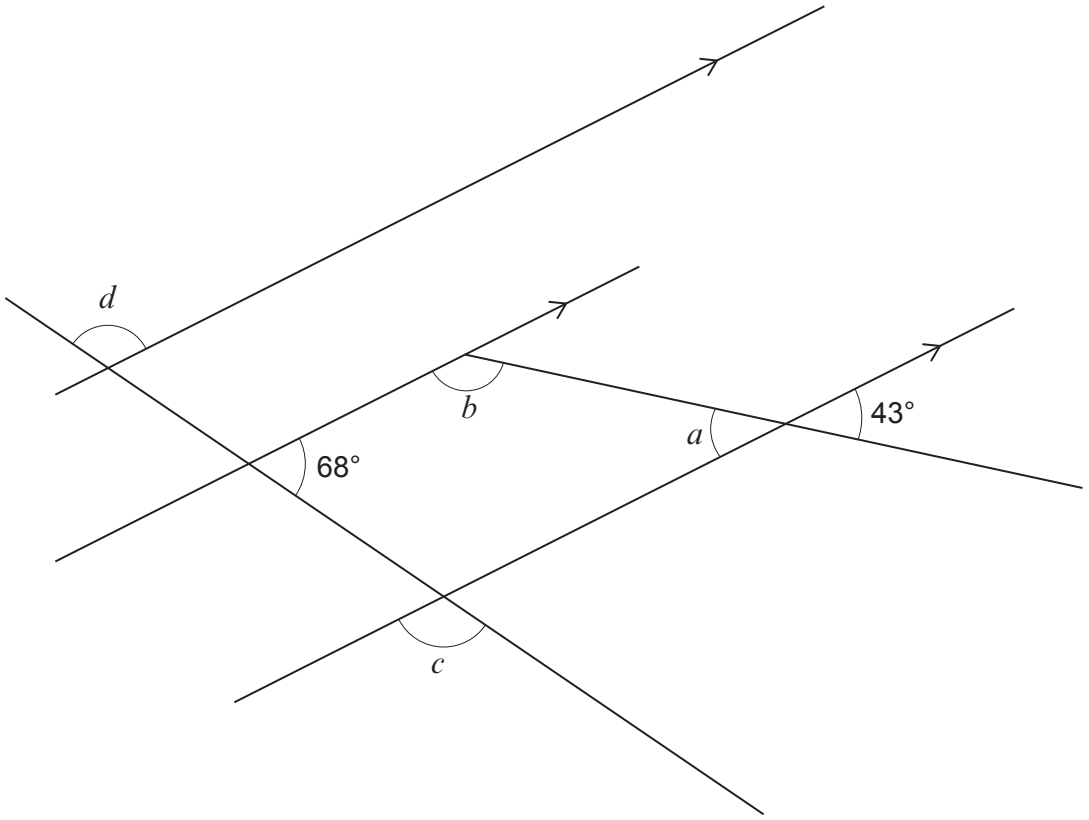


*Diagram not drawn to scale*

Find the size of each of the angles $a$, $b$, $c$ and $d$. [4]

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$a$ = ..... ° $b$ = ..... ° $c$ = ..... ° $d$ = ..... °

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

Gracie decides to buy a new ZX31 camera.
On the internet, she sees advertisements for the camera she wants.

| *Camera Fox* | *US Camera Geek* | *Sure Camera* |
|---|---|---|
| ZX31 camera £62.95<br>+<br>£3.90 delivery | ZX31 camera $81.20<br>with<br>FREE international delivery | ZX31 camera special offer.<br>Usual price £75<br>NOW 14% discount<br>AND free delivery |

Gracie knows that the exchange rate is £1 = $1.25.

She wants to buy the ZX31 camera that is the best value for money.

Which of the advertisements offers the best option for Gracie?
You must show all your working. [5 + 2 OCW]

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Examiner only

**4.** During the 30 days in the month of September, Andras used 138 $m^3$ of gas.
The cost of this gas was 12p per kWh.

The formula used to calculate the number of kWh for the gas used is as follows:

Number of kWh = number of $m^3$ of gas $\times$ 39·5 $\times$ 1·02264 $\div$ 3·6

The standing charge was 32p per day.
VAT at 5% was payable on the sum of the cost of the gas used and the standing charge.

Calculate Andras's gas bill for September.
You must show all your working. [7]

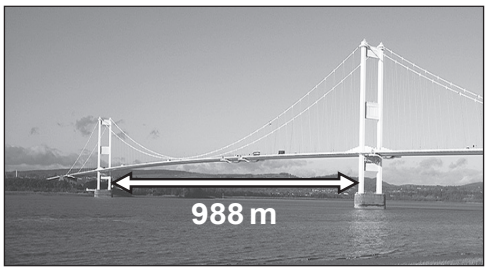
Examiner only

**5.** The Severn Bridge was built in 1966 to allow vehicles to travel between England and Wales.

The bridge has a width of 23 m and a total length of 1600 m.
The section of the bridge between the two towers is 988 m long.

The tarmac road surface is 0·035 m thick.

The cables from the towers to support the road are made from 18 000 miles of wire.




(a) What fraction of the total length of the bridge is the section between the two towers? Give your fraction in its simplest form. [2]

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(b) Calculate the length of the wire used to make the cables in **kilometres**. [2]

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Examiner only

(c) The cost of tarmac is £250 per $m^3$.

Calculate the cost of the volume of tarmac needed to resurface the total length of the Severn Bridge. [3]

(d) Some of the tolls charged for a car to enter Wales are given in the table below.

| Year | 2004 | 2009 | 2014 | 2019 |
|---|---|---|---|---|
| Toll for a car | £4.60 | £5.40 | £6.40 | FREE |

In which of the following 5-year periods was there the greatest percentage increase in the toll?

2004 to 2009 2009 to 2014 2014 to 2019

State the percentage increase for this 5-year period.
You must show all your working. [4]

The greatest percentage increase in the toll was in the period ..... to ..... .

The percentage increase was .....

Examiner only

**6.** (a) A survey was carried out to find the total time people took to read the book 'Wales is a Celtic Country'.
The results are shown in the frequency polygon below.


(i) Which is the modal group?
Circle your answer. [1]

18 to 24 hours  21 hours  12 to 18 hours  34 hours  30 to 36 hours

(ii) How many people took part in the survey?
Circle your answer. [1]

34  30  33  97  108

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Examiner only

(iii) How many of the people in the survey took 24 hours or more to read this book? Circle your answer. [1]

13 34 47 24 84

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(iv) Did any of the people in the survey take less than 6 hours to read this book?

Yes ☐ No ☐ Can't tell ☐

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

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(b) Four books are placed in a stack.

The thickness of each of the books is as follows:

22 mm 25 mm 29 mm 31 mm

The thickness of each book is measured **correct to the nearest mm**.

Show that the total height of the stack of these four books cannot be more than 109 mm. [3]

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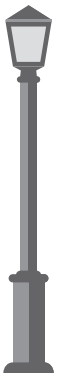
**7.** (a)

Remember:

1 kilowatt (kW) = 1000 watts (W)



There are 8 street lights in Ffordd Alwyn.
Each light is fitted with an 80 watt light bulb.

Each of the 8 street lights is usually on from 6 p.m. to 6 a.m.

It costs 32.4p per hour for each **kilowatt** of electricity used.

How much would be saved **per week** if the 8 street lights were only on from 7 p.m. to 5 a.m.?
Give your answer in pounds, correct to the nearest penny.
You must show all your working. [5]

Examiner only

(b) A lamp post is vertical and stands on horizontal ground.
The angle of elevation of the top of the lamp post is 68° when measured from a point 3·3 m from the centre of the base of the lamp post.

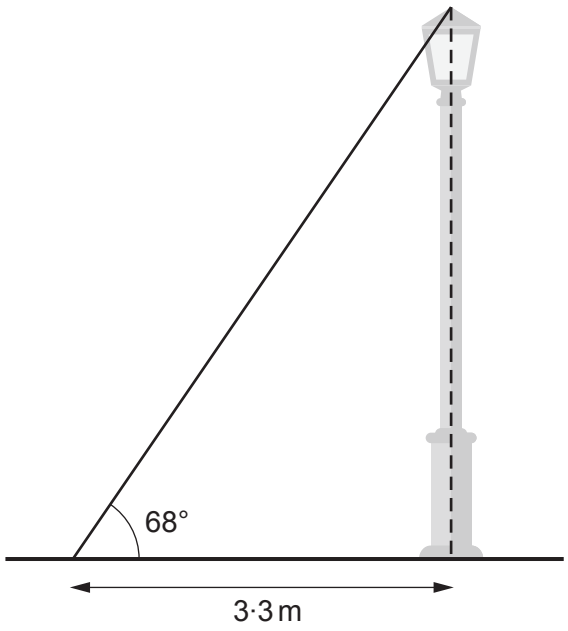



*Diagram not drawn to scale*

Calculate the height of the lamp post. [3]

Examiner only

**8.** (a) 50 people living by the sea were asked how often they went for a walk along the sea wall each week.

The results were as follows:

| Number of walks each week | Frequency |
|---|---|
| 0 to 2 | 8 |
| 3 to 5 | 12 |
| 6 to 8 | 20 |
| 9 to 13 | 4 |
| 14 to 18 | 6 |

Calculate an estimate of the mean number of walks per person each week. [4]

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(b) High tide in the morning is, on average, 35 minutes later each day.
The morning high tide on 3rd March was at 08:03.
At what time was the morning high tide on 1st March? [1]

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Examiner only

(c) A new concrete sea-defence wall is to be built.
The sea-defence wall will have a uniform cross-section.
A sketch of the new wall is shown below.

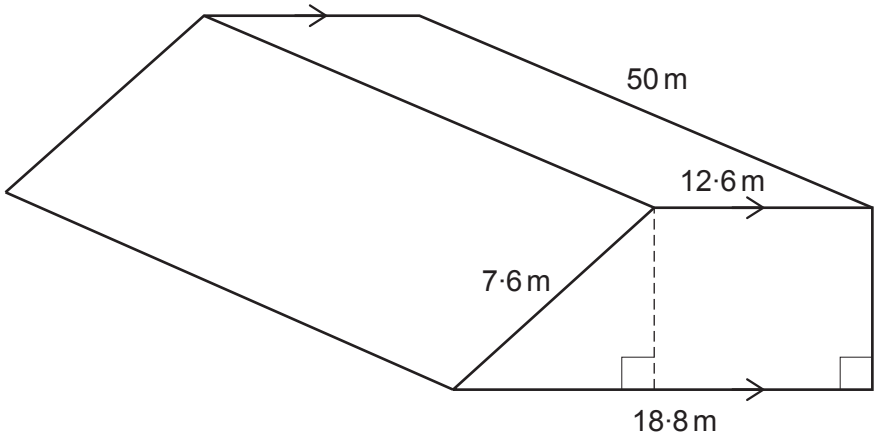


*Diagram not drawn to scale*

Calculate the volume of concrete needed to make this new sea-defence wall.
You must show all your working. [7]

Examiner only

**9.** (a) A volcano is an opening in the Earth's crust, through which molten lava, hot ash and gases escape into the air.

(i) An estimated 500 000 000 people live near active volcanoes.
What is 500 000 000 written in standard form? [1]

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(ii) The teragram is a unit of mass.
1 teragram = $10^9$ kg

Last year, a volcano released a total of 140 teragrams of carbon dioxide in 300 days.

Calculate the average number of kilograms of carbon dioxide that were released by this volcano **per hour**.
Give your answer correct to 3 significant figures.
You must show all your working. [5]

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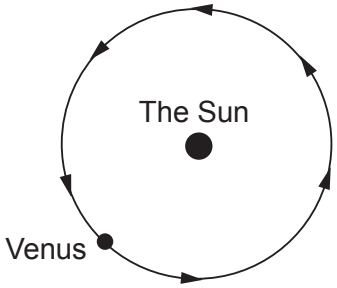
Examiner only

(b) (i) The planet Venus orbits the Sun.
Its orbit can be considered to be circular.




The distance between Venus and the Sun is $1{\cdot}08 \times 10^8$ km.

Venus orbits the Sun once every 224·7 days.

Calculate the distance Venus travels in 1 day.
Give your answer in standard form. [4]

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(ii) The surface area of Venus is 460 234 320 $km^2$.
The surface of Venus is wrinkled-volcanic, smooth-volcanic or **non**-volcanic.
The areas of these three different types of surface are in the ratio 7 : 1 : 2.

| Wrinkled-volcanic : Smooth-volcanic : Non-volcanic = 7 : 1 : 2 |
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Calculate the total surface area of Venus that **is** volcanic.
You must show all your working. [3]

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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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