

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

3310U60-1



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

THURSDAY, 9 MAY 2019 – MORNING

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 continuation page at the back of the booklet. Question numbers must be given for the work written on the continuation page.  
Take  $\pi$  as 3.14 or use the  $\pi$  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 3(a), 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.	8	
3.	13	
4.	9	
5.	7	
6.	5	
7.	10	
8.	11	
9.	7	
10.	7	
<b>Total</b>	<b>80</b>	

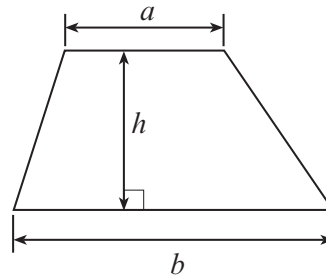
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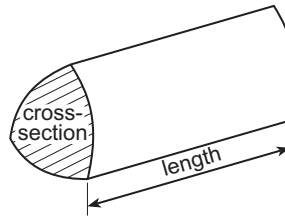
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### Formula List - Higher Tier

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

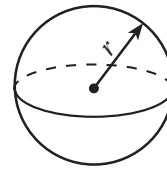


**Volume of prism** = area of cross-section  $\times$  length



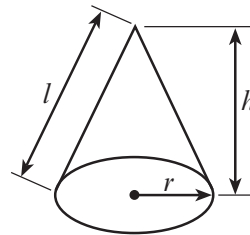
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

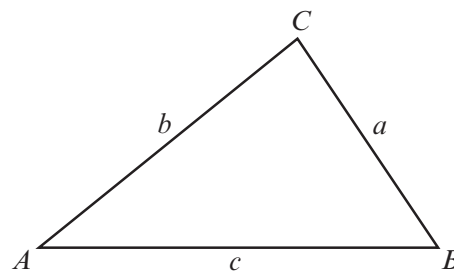


**In any triangle ABC**

**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.





2. (a) (i) The internal measurements of a tin of baked beans are:
- radius 3.6 cm,
  - height 9.3 cm.



Calculate the internal volume of the tin.

[2]

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- (ii) Every  $1 \text{ cm}^3$  of baked beans in a tin has a mass of 1 g.  
 A portion of baked beans is  $\frac{1}{2}$  a tin.  
 What is the mass of a portion of baked beans?

[1]

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A portion of baked beans has a mass of ..... g

- (b) A mathematically similar tin of baked beans has a radius of 4.2 cm.



*Diagram not drawn to scale*

Calculate the height of the larger tin of beans.

[2]

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(b) Delyth invested £500 in a saver bank account 20 years ago. She did not withdraw money or make any other payments into this account. The bank paid 2.2% compound interest per annum during the first 5 years. Compound interest at 1.6% per annum was paid for the remaining 15 years.

Delyth closes the account after 20 years.  
How much money should she receive?

[4]

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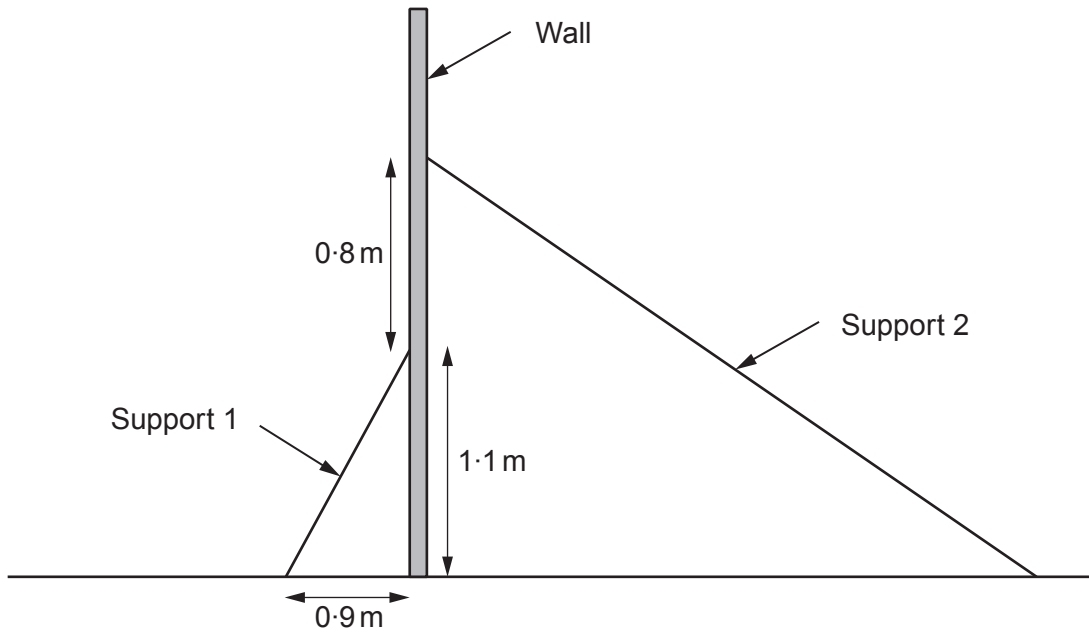
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4. Mr Jakob notices a crack in a vertical wall which stands on horizontal ground.



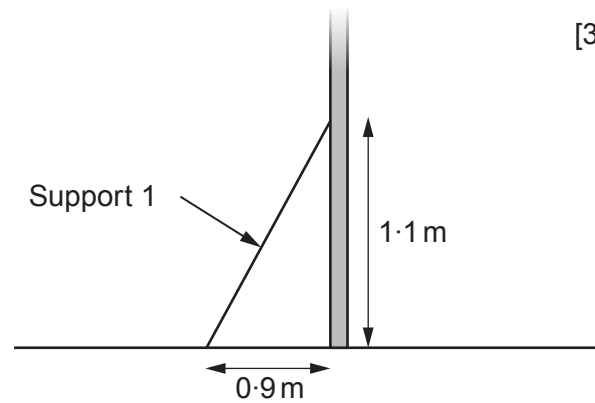
- (a) Mr Jakob fixes two temporary supports against the wall, as shown in the diagram below.



*Diagram not drawn to scale*

- (i) Calculate the length of Support 1.

[3]



*Diagram not drawn to scale*

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(ii) The length of Support 2 is 2.6 m.  
Calculate the angle between the horizontal ground and Support 2. [3]

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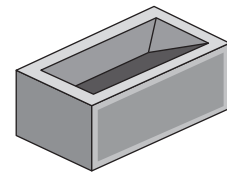
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(b) Mr Jakob gets a quote of £516 for rebuilding his wall.

The quote includes:

- 8 hours' labour costs at £22.50 per hour,
- a 20% discount off the cost of the bricks.



Calculate the cost of the bricks before the discount. [3]

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5. (a) *Kenworth Electrical* specialises in wiring new houses. The monthly wages of all *Kenworth Electrical* employees are summarised in the frequency table below.

Monthly wage, £ $x$	Frequency
$1800 \leq x < 2000$	64
$2000 \leq x < 2100$	50
$2100 \leq x < 2400$	2
$2400 \leq x < 5800$	0
$5800 \leq x < 7800$	4

- (i) In which group does the median monthly wage lie?  
Circle your answer.

[1]

$1800 \leq x < 2000$

$2000 \leq x < 2100$

$2100 \leq x < 2400$

$2400 \leq x < 5800$

$5800 \leq x < 7800$

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- (ii) Alysia is an accountant working for *Kenworth Electrical*. She knows the exact wage of each employee.

Alysia says,

It would be misleading to use the mean monthly wage as an average.

Explain why Alysia has reached this conclusion.

[1]

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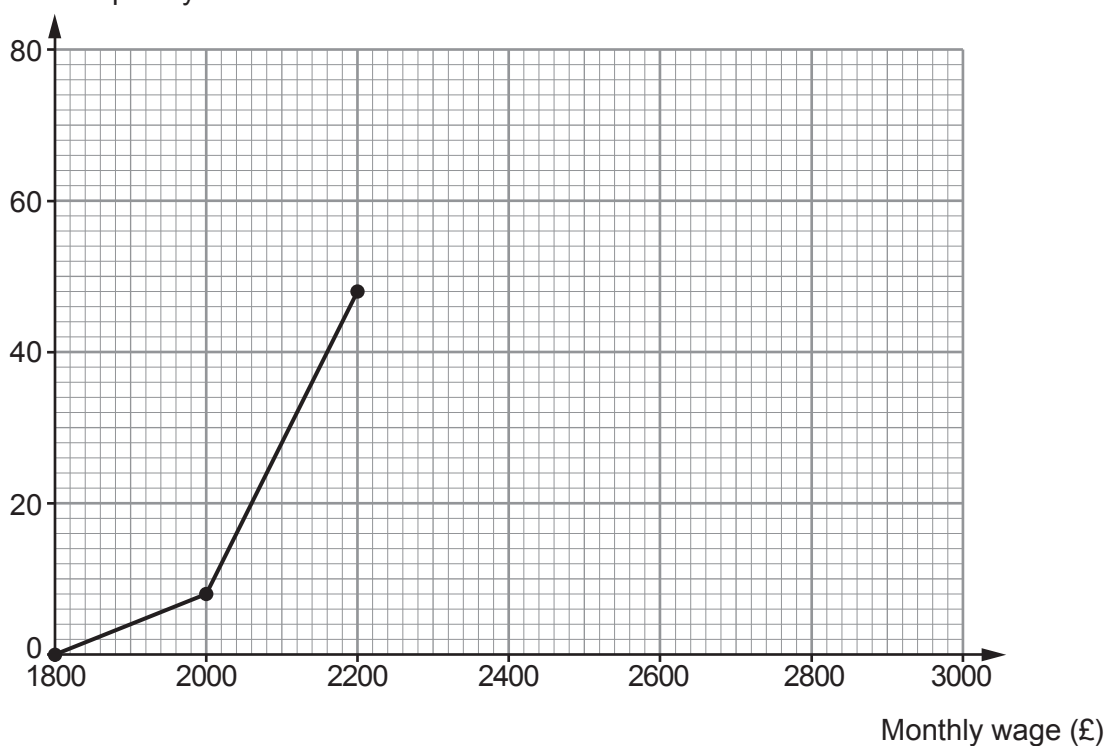


- (b) *Maesteg Electrical* also specialises in wiring new houses. The monthly wages of all *Maesteg Electrical* employees are summarised in the frequency table below.

Monthly wage, £ $x$	Frequency
$1800 \leq x < 2000$	8
$2000 \leq x < 2200$	40
$2200 \leq x < 2400$	24
$2400 \leq x < 3000$	8

- (i) Use the frequency table to complete the following cumulative frequency diagram to display the monthly wages of all *Maesteg Electrical* employees. [2]

Cumulative frequency



Use the cumulative frequency diagram to answer each of the following questions.

- (ii) Which of the following is the best estimate for the median monthly wage of *Maesteg Electrical* employees?  
Circle your answer. [1]

£2100

£2160

£2200

£2360

£3000

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- (iii) Calculate an estimate of the percentage of *Maesteg Electrical* employees who have a monthly wage of less than £2050. You must show all your working. [2]

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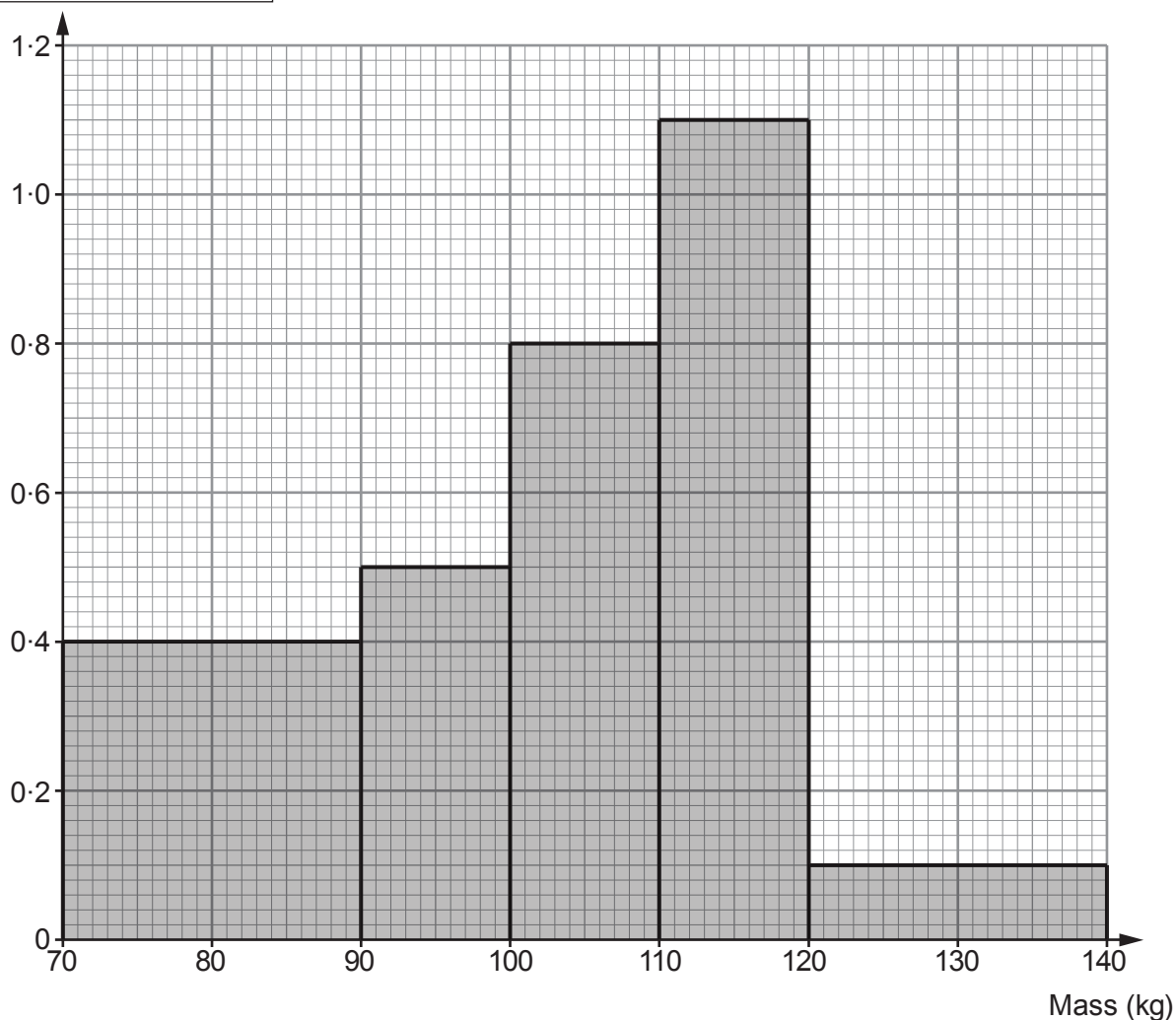
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7. The masses of the players in the men's 2017-2018 Wales rugby squad are shown in the histogram below.  
The squad consisted of 34 players.

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- (a) The label is missing on the vertical axis. What should the label be?  
Circle your answer.

[1]

Frequency

Number of players

Density

Cumulative frequency

Frequency density





(b) Ben says,

"The histogram shows that the mass of the heaviest member of the squad was double the mass of the lightest member of the squad."

Is Ben correct?

Yes

No

You cannot tell

You must give a reason for your choice.

[1]

Reason: .....  
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(c) The *Forwards* were the heaviest players in the squad.

The lightest *Forward* had a mass of 104 kg.

Calculate the **maximum** possible number of *Forwards* there could have been in the squad.

You must show all your working.

[3]

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(d) To make a comparison with other teams, the coach wanted to know the mean mass of all the players in the squad.

Use the histogram to calculate an estimate of the mean mass of all the players in the squad.

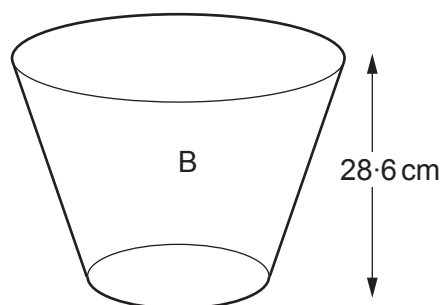
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(b) Bucket B is shown below. It is mathematically similar to Bucket A.



*Diagram not drawn to scale*

Calculate the number of **gallons** Bucket B can hold when full.

[6]

Remember:

1 gallon = 8 pints

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