

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

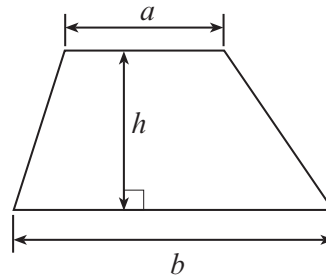
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	8	
3.	13	
4.	9	
5.	7	
6.	5	
7.	10	
8.	11	
9.	7	
10.	7	
Total	80	



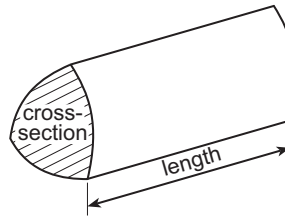
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Formula List - Higher Tier

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

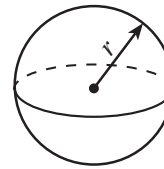


Volume of prism = area of cross-section \times length



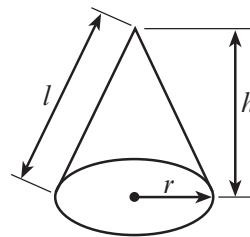
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

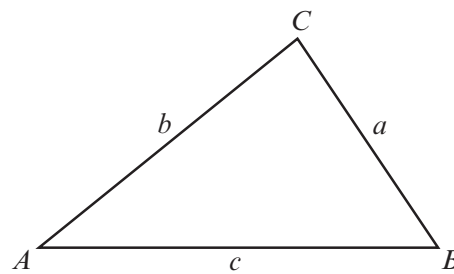


In any triangle ABC

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)

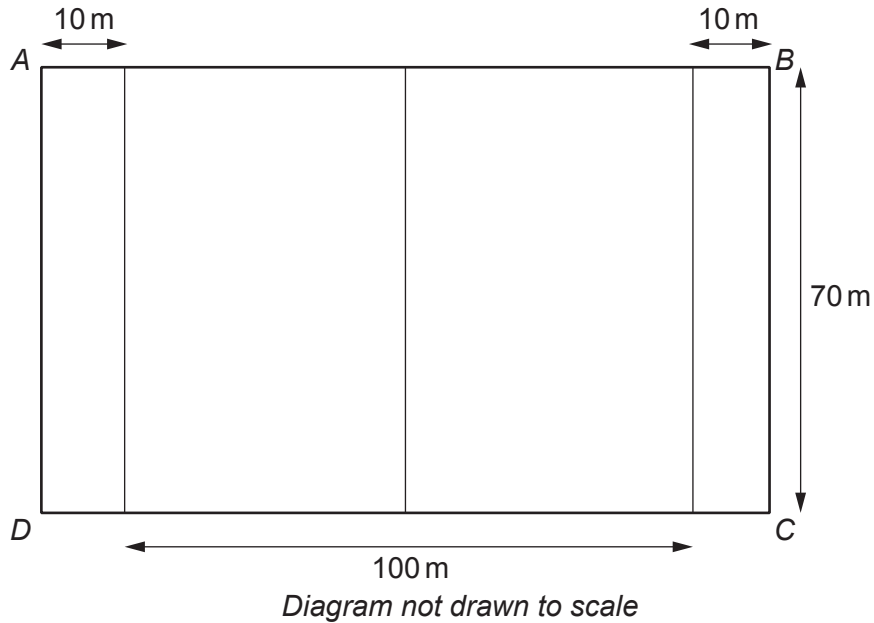
AER, as a decimal, is calculated using the formula $\left(1 + \frac{i}{n}\right)^n - 1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.



1.



Wales are to play Ireland in an international rugby match.
The rugby pitch at the stadium is measured.
On the diagram below, each measurement is given **correct to the nearest 10 centimetres**.



What is the least possible length of AB ?
Give your answer in metres.
You must show all your working.

[3]

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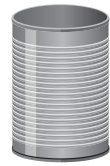
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2. (a) (i) The internal measurements of a tin of baked beans are:
- radius 3.6 cm,
 - height 9.3 cm.



Calculate the internal volume of the tin.

[2]

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- (ii) Every 1 cm³ 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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(c) In a portion of baked beans there is:

- 1.85 g of salt,
- 11.7 g of sugar.

For women, the recommended daily allowance of:

- salt is 6 g,
- sugar is 90 g.

Consider a portion of baked beans.

Is it salt or sugar that provides the greater proportion of the recommended daily allowance for women?

You must show all your working.

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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?

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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.

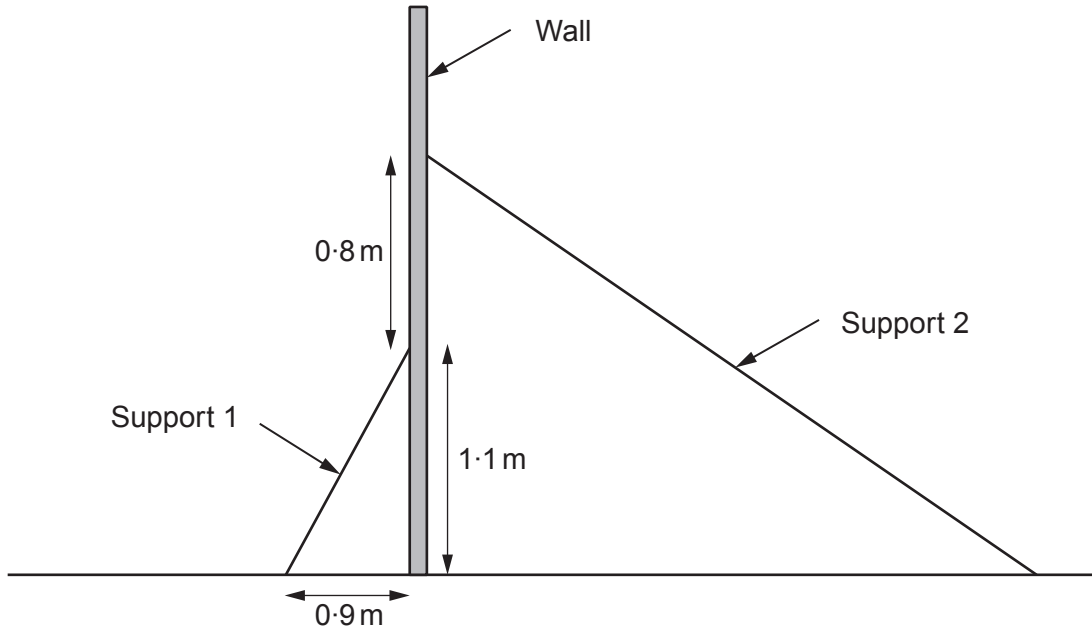


Diagram not drawn to scale

(i) Calculate the length of Support 1.

[3]

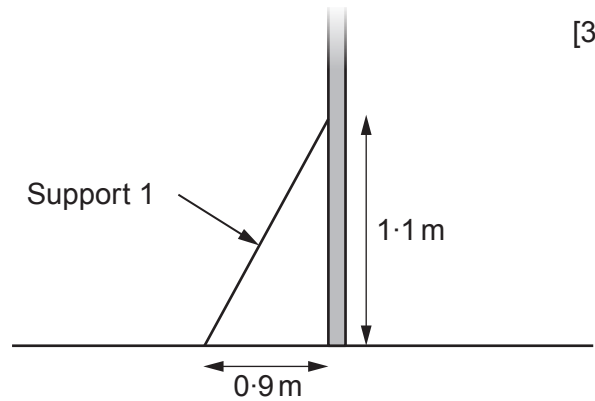


Diagram not drawn to scale

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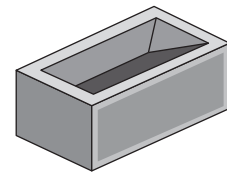
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(b) Mr Jakob gets a quote of £516 for rebuilding his wall.

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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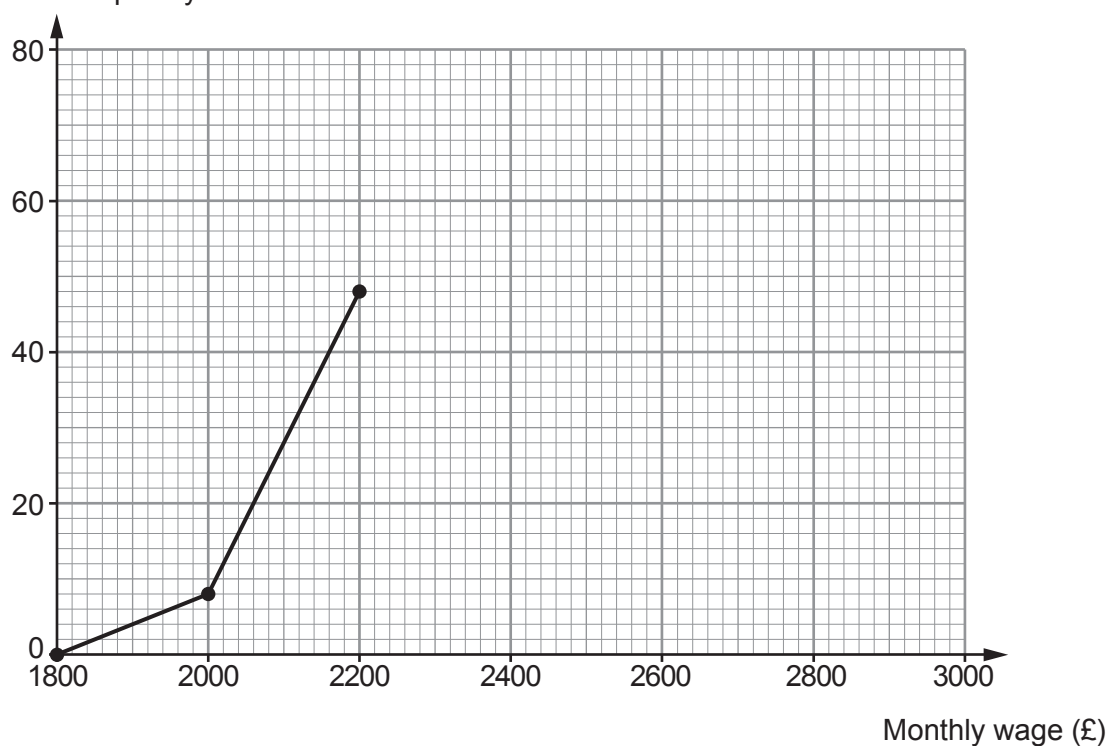


- (b) *Maesteg Electrical* also specialises in wiring new houses. The monthly wages of all *Maesteg Electrical* employees are summarised in the frequency table below.

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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6. Simon has some money to invest in a savings account. Two banks have sent him details of their *Special 1-Year Saver* accounts. He plans to make only one payment into the account and not withdraw any money during the year.

Morgannwg Bank
0.41% interest paid every month

Banc Gwynedd
Nominal annual rate of 4.92 %
Interest paid every 3 months

What is the difference between the AERs that the two accounts are offering?
Give your answer as a percentage correct to 2 decimal places.

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Difference in AERs = %



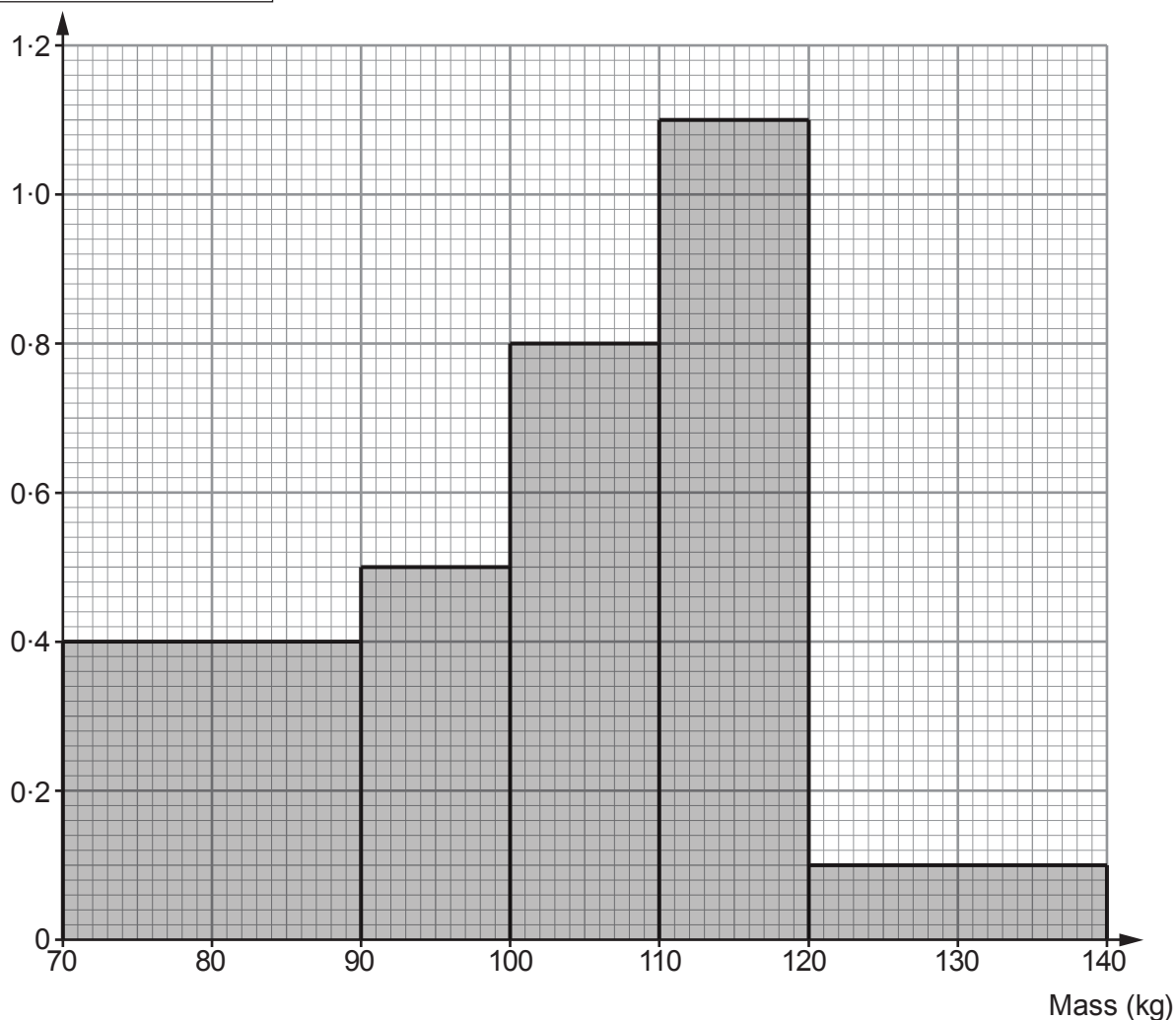
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7. The masses of the players in the men's 2017-2018 Wales rugby squad are shown in the histogram below.
The squad consisted of 34 players.

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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.

[5]

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8. A company makes buckets in two sizes. Both sizes are in the shape of a frustum of a cone. Bucket A has the dimensions shown in the diagram below.

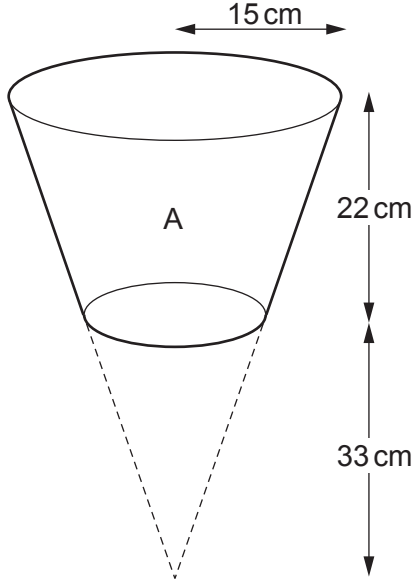


Diagram not drawn to scale

(a) Show that:

- the radius of the base of the bucket is 9 cm,
- the volume of the bucket is $3234\pi\text{ cm}^3$.

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

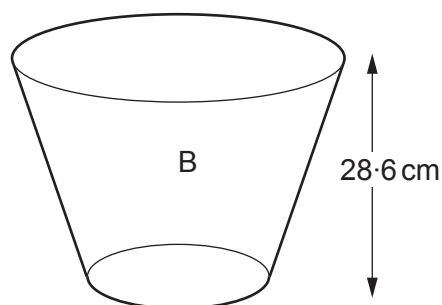


Diagram not drawn to scale

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

[6]

Remember:

1 gallon = 8 pints

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9. *Alpha, Beta* and *Gamma* are three boats.
They receive a weather warning and need to go to the port of Aberwyn.

The following diagram shows the positions of the three boats when the weather warning is received.

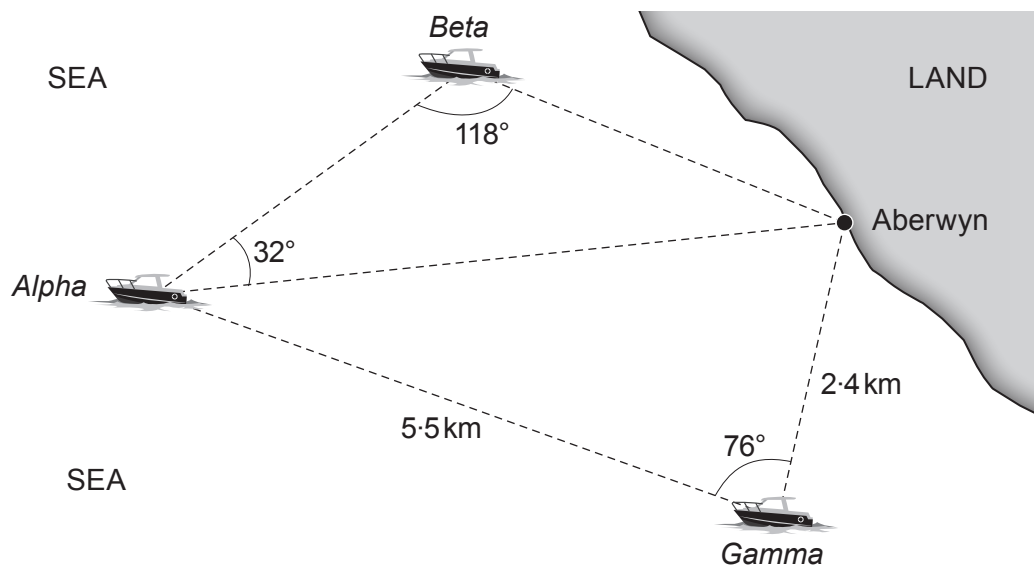


Diagram not drawn to scale

The captains of *Alpha* and *Beta* need to know their distances from Aberwyn in order to find how long it will take them to get to the port.

Calculate the distance of each of the boats *Alpha* and *Beta* from Aberwyn.

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10. Holly wants to buy a new house in Cardiff.
She knows that Land Transaction Tax will be added to the price of the house.

Land Transaction Tax rates are shown below:

- pay nothing on the first £180 000 of the price of the house,
- pay 3.5% on the part of the price of the house that is above £180 000 and up to and including £250 000,
- pay 5% on the part of the price of the house that is above £250 000 and up to and including £400 000.

(a) Show that the Land Transaction Tax payable on a house costing £255 000 is £2700. [2]

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(b) The most Holly can afford to spend, including Land Transaction Tax, is £327 000.

Let x be the highest price of house that Holly can afford.

Write an equation in x and solve it to calculate the highest price of house that Holly can afford. [5]

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