| Name | Date started | Target end date |
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**WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack**

Foundation statistical diagrams: bar charts, pictograms, pie charts and line graphs — drawing them accurately from a frequency table and reading

REVISE
.wales

# F3.09 — Bar charts, pictograms, pie charts & line graphs

## *Spec 4.2.1, 4.2.2, 4.2.3 — Unit 3 (calculator allowed)*

*Foundation statistical diagrams: bar charts, pictograms, pie charts and line graphs — drawing them accurately from a frequency table and reading values from a given chart. Sourced from legacy WJEC GCSE Mathematics-Numeracy Foundation papers (3300U10/U20) and accessible content from Intermediate papers (3300U30/U40), organised for revision under the 2025 spec.*

2025 SPECIFICATION

### Estimated time for entire question pack: ~1 hours 16 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (51 marks across 23 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

### ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

### INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

*A calculator is allowed on every question in this pack (Unit 3 is the calculator-allowed paper).*

# Bar charts, pictograms, pie charts & line graphs — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 3: calculator-allowed.

## Bar charts & pictograms 4.2.1

- Draw bar charts with equal widths and gaps.
- Construct pictograms with a clear key.
- Read values from given diagrams.

## Pie charts 4.2.2

- Use angle = (freq ÷ total) × 360°.
- Total angles = 360°.
- Read off frequencies given a pie chart and total.

## Line graphs 4.2.3

- Plot time-series data accurately.
- Join consecutive points with straight lines.
- Read intermediate values where appropriate.

## Exam strategy 4.2

- Label axes and add a title.
- Use a protractor and sharp pencil for pie charts.
- Check angles sum to 360° before colouring.


Crib sheet »

# Bar charts, pictograms, pie charts & line graphs in one page

Quick-reference notes — revisit before each question. Don’t use during the questions.

### Bar chart

Bars equal width, gaps between bars.

Height = frequency. Label both axes; title the chart.

### Pictogram

One symbol represents a set number of items.

**Key** must state what one symbol stands for.

Half a symbol = half the value.

### Pie chart angles

$$\text{angle} = (\text{frequency} \div \text{total}) \times 360°$$

Angles must add up to 360°.

### Reading a pie chart

$$\text{frequency} = (\text{angle} \div 360) \times \text{total}$$

If you don’t know the total, you can only give a fraction or percentage.

### Line graph

Used for data changing over time.

Points joined with straight lines. Read intermediate values carefully.

### Common traps

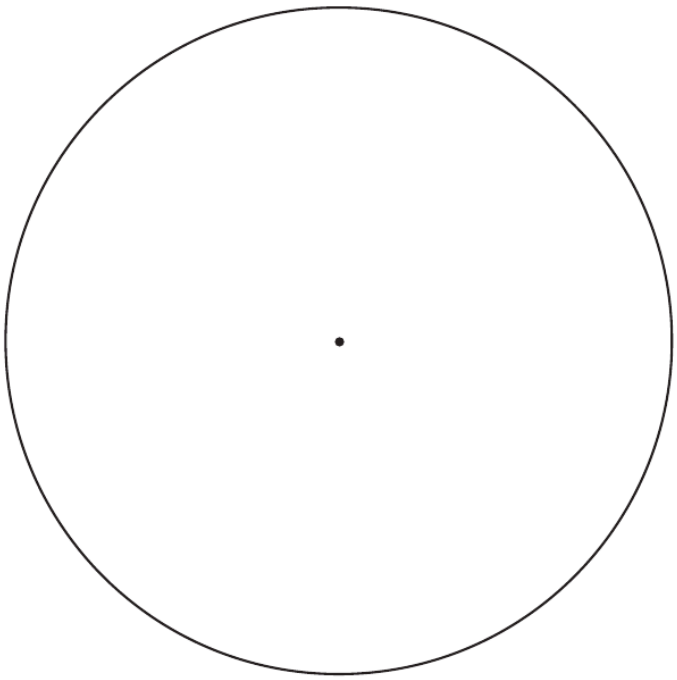
- Pie chart angles not totalling 360°.
- Bar chart with unequal-width bars.
- Pictogram missing a key.

Examiner only

**3.** One day, Gwyn was asleep for 8 hours and awake for the remaining hours.

Draw an accurate pie chart to illustrate this information. [4]

Pie chart showing Gwyn's sleeping and waking hours.



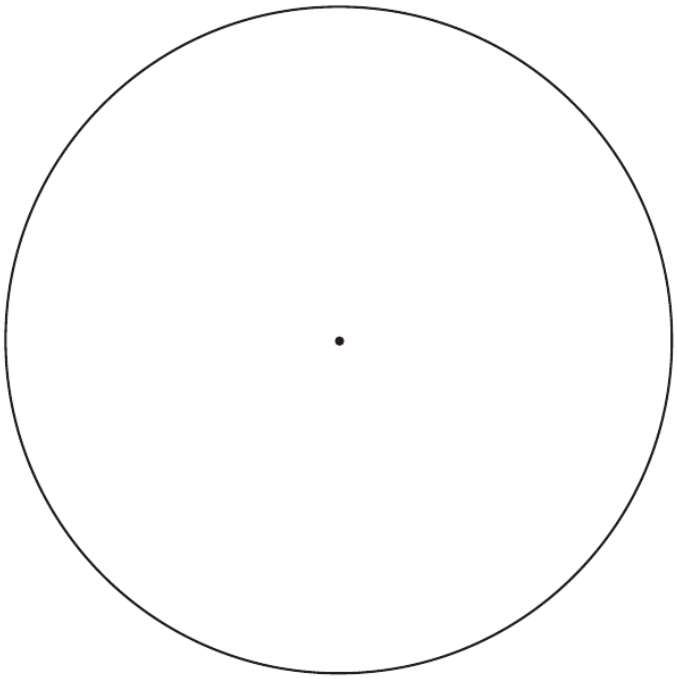
*Space for working:*

Examiner only

**11.** One day, Gwyn was asleep for 8 hours and awake for the remaining hours.

Draw an accurate pie chart to illustrate this information. [4]

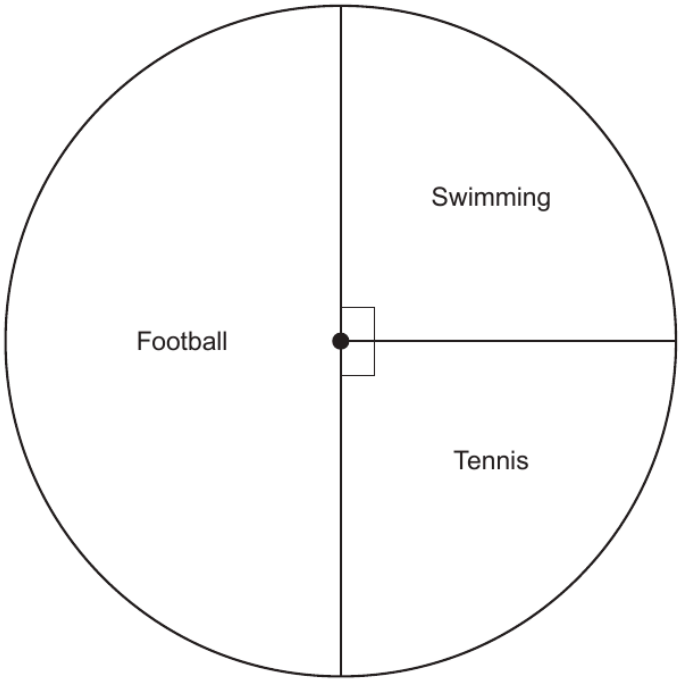
Pie chart showing Gwyn's sleeping and waking hours.



*Space for working:*

Examiner only

**6.** The pie chart below shows the favourite sport of 60 people.




*(a)* Which is the modal sport? [1]

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*(b)* One person is chosen at random.

What is the probability that this person said swimming is their favourite sport? [1]

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*(c)* How many people said tennis is their favourite sport? [2]

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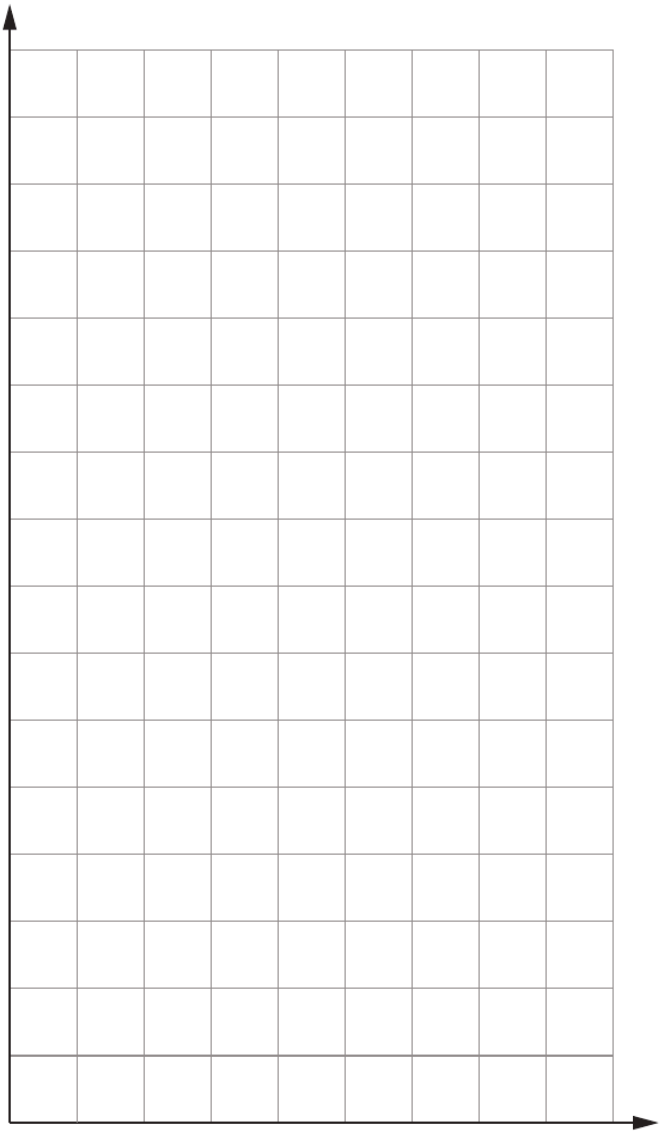
Examiner only

*(d)* Draw a bar chart to display the favourite sports of the 60 people.
Use the grid below. [3]



*Space for working:*

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Examiner only

**9.** *(a)* Express 60 out of 300 as a percentage. [2]

Answer is ..... %

*(b)* Some people were asked a question.

40% of the people answered 'Yes'.
A sketch of a pie chart showing this information is shown below.

Calculate the size of angle $x$ so that the pie chart can be drawn accurately. [2]

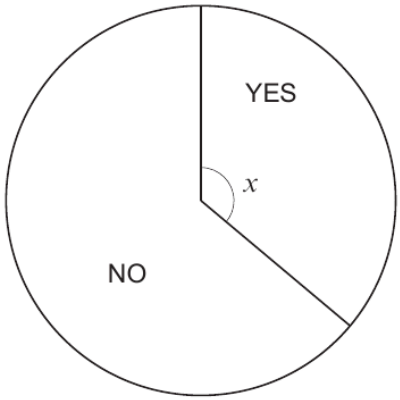


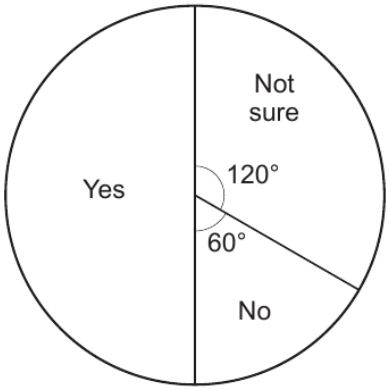

*Diagram not drawn to scale*

$x$ = ..... °

Examiner only

**4.** 300 students were asked if they would like to change their school's dinner menu.

The pie chart below shows how they answered.




Complete the table below to show the number of students who gave each answer. [3]

| Answer | Yes | No | Not sure |
|---|---|---|---|
| Number of students | | | |

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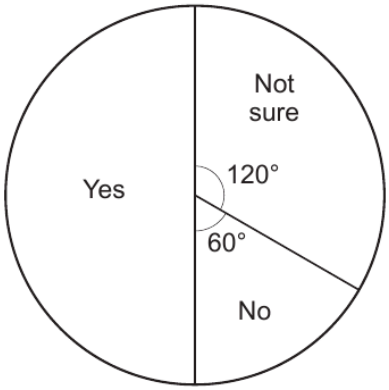
Examiner only

**16.** 300 students were asked if they would like to change their school's dinner menu.

The pie chart below shows how they answered.



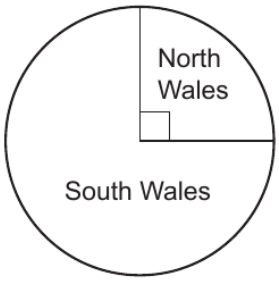

Complete the table below to show the number of students who gave each answer. [3]

| Answer | Yes | No | Not sure |
|---|---|---|---|
| Number of students | | | |

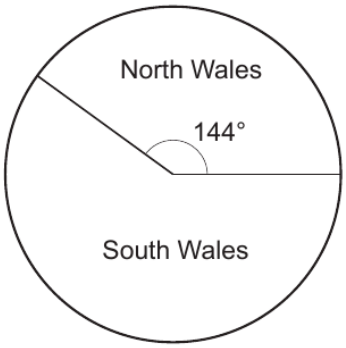
Examiner only

**11.** A company has two sites.
One is in North Wales and the other is in South Wales.

The pie charts below show the distribution of its 96 part-time staff and its 150 full-time staff.




96 part-time staff




150 full-time staff

A person is chosen at random from the company's 246 staff members.
What is the probability that this person works at the site in North Wales? [4]

Examiner only

**2.** Calculate the value of $7p + 6q$ when $p = -9{\cdot}2$ and $q = 4{\cdot}7$. [2]

Examiner only

**3.** (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]

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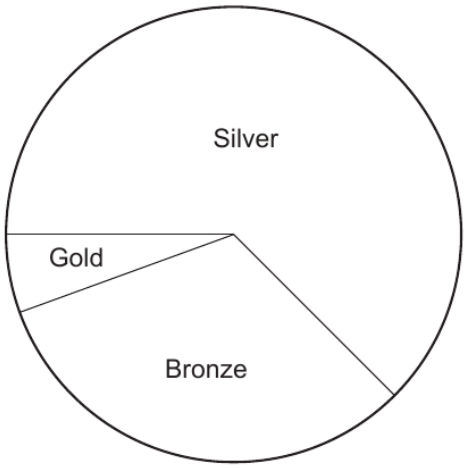
Examiner only

(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]

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

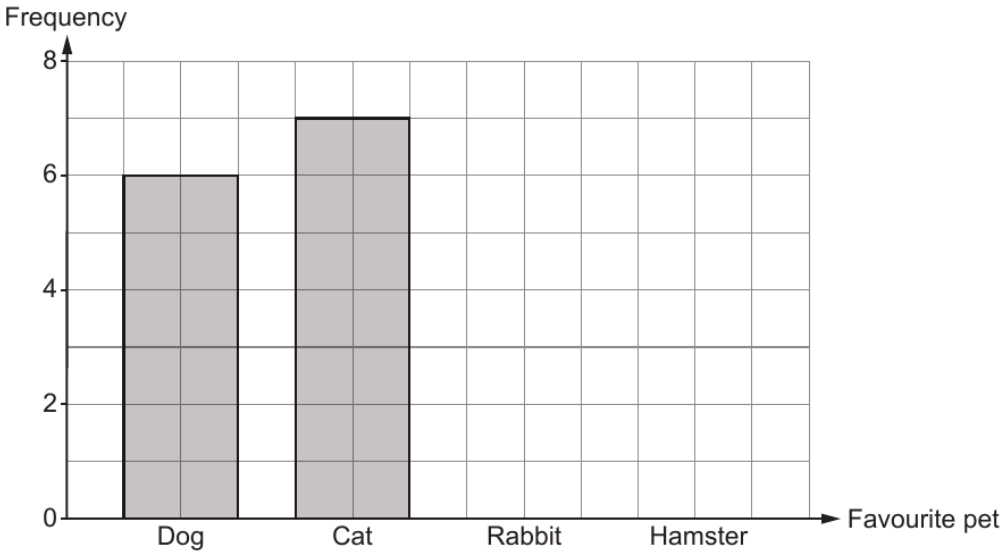
(ii) How many gold medals were awarded?
You must show all your working. [3]

Examiner only

**6.** The 22 pupils in a class were asked, "What is your favourite pet?"
The pets chosen by the pupils were dog, cat, rabbit and hamster.
Some of the results are shown in the bar chart below.

9 pupils in the class chose either rabbit or hamster.
The **modal** pet is rabbit.

(a) Complete the bar chart by drawing the two missing bars. [2]




(b) One of these pupils is chosen at random.
What is the probability that this pupil's favourite pet is a cat? [2]

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.

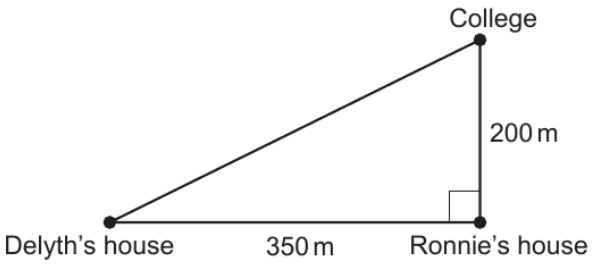



*Diagram not drawn to scale*

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]

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]

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

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Estimate of the mean distance travelled by these 35 students is ..... 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]

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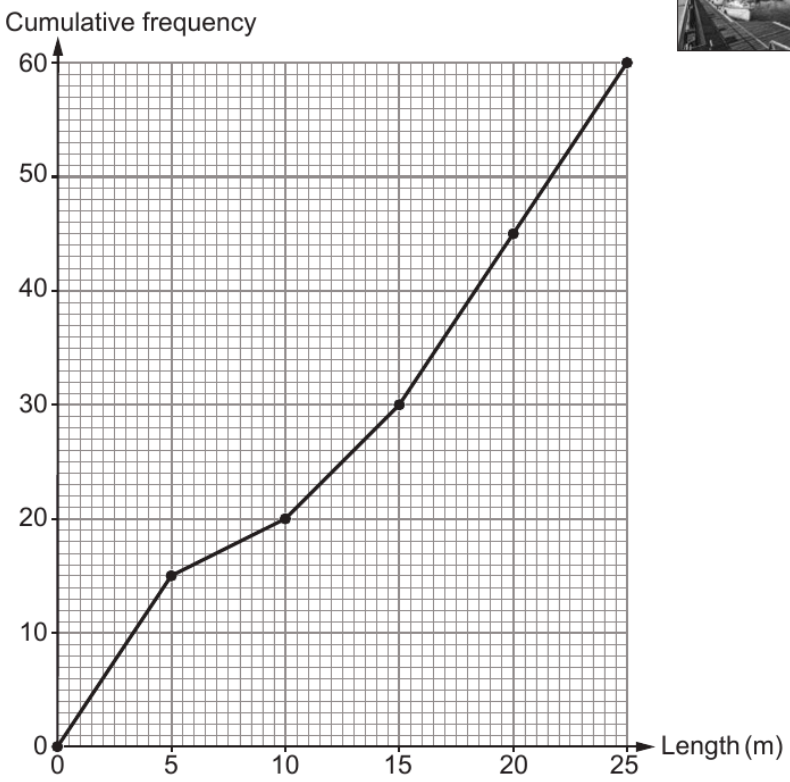
| Student | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Position in the list | 2nd | ..... | ..... | ..... | ..... | ..... | ..... |

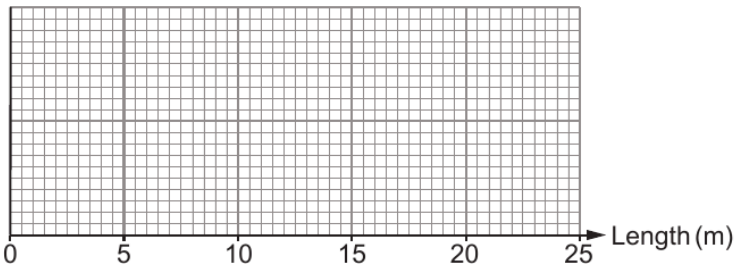
Examiner only

**7.** (a) The lengths of the 60 yachts in Eog Marina were measured.
The results are shown in the cumulative frequency diagram below.




The shortest yacht has a length of 3 m.
The longest yacht has a length of 22 m.

Use the information above to complete a box-and-whisker diagram on the graph paper below. [3]

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Examiner only

(b) The lengths of the 68 yachts in Clwyd Marina were measured.

For these yachts:
- the lower quartile of their lengths is 10 m
- 25% have lengths greater than 18 m
- the median length is 11·6 m.

(i) Calculate how many of the yachts in Clwyd Marina have lengths greater than 10 m. [2]

..... yachts

(ii) In which marina, Eog or Clwyd, is the interquartile range of the lengths of the yachts greater?

Eog Marina ☐ Clwyd Marina ☐

You must show all your working. [2]

(iii) In which marina is the longest yacht?

Eog Marina ☐ Clwyd Marina ☐ Can't tell ☐

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

Examiner only

**13.** Laura puts 90 counters in a bag.
Each counter is red or blue or yellow.

Laura wants to draw a pie chart to show the number of counters of each colour.
The table below shows some of the information that she needs.

| | Number of counters | Pie chart angle |
|---|---|---|
| Red | 25 | ..... |
| Blue | ..... | 180° |
| Yellow | ..... | ..... |
| | Total = 90 | |

(a) Complete the table.
You must show all your working. [5]

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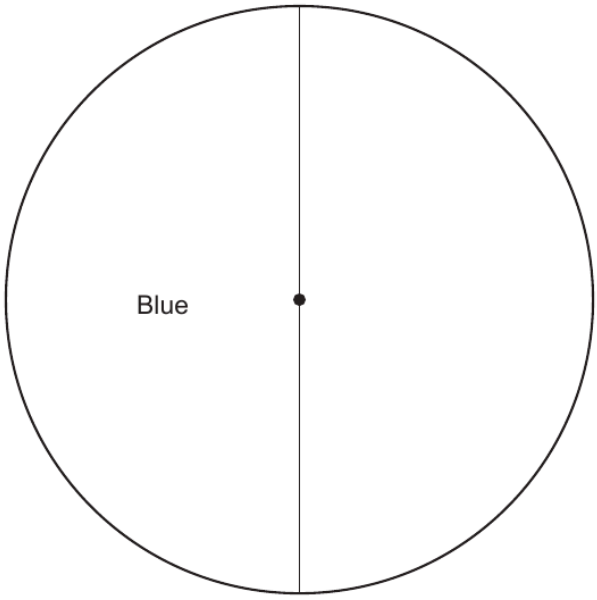
Examiner only

(b) Complete the pie chart to show the results. [2]




(c) Laura chooses a counter at random from the bag.
Calculate the probability that this counter is either red or blue. [2]

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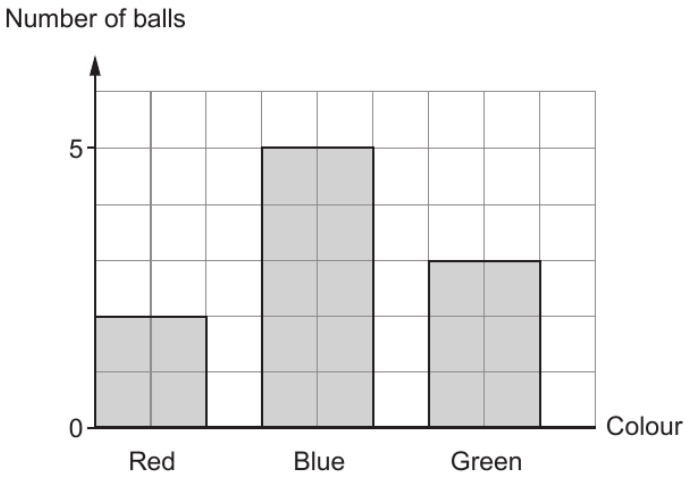
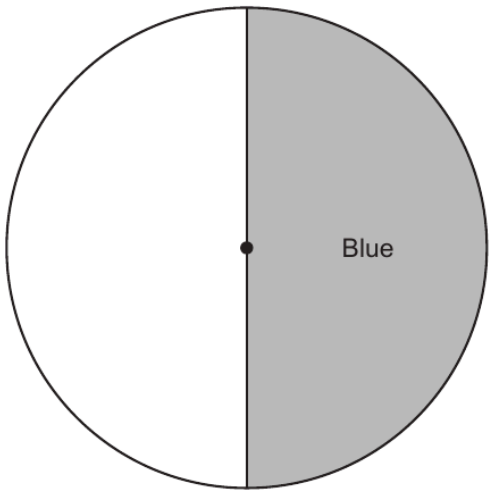
Examiner only

**5.** (a) A box contains different-coloured balls.
Some are red, some are blue and the others are green.

The bar chart shows how many balls of each colour are in the box.




Draw an accurate pie chart to compare the number of coloured balls in the box.
Part of the pie chart has been completed for you. [3]

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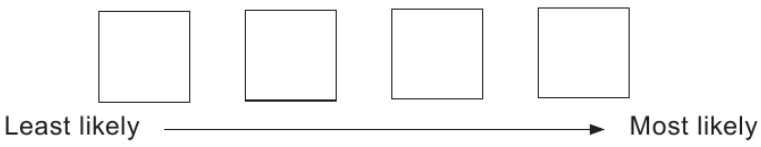
Examiner only

(b) The letters **A**, **B**, **C** and **D** describe four different events.

| Experiment | Event | |
|---|---|---|
| A fair 6-sided dice is thrown. | **A** | 4 is thrown. |
| A fair coin is thrown. | **B** | A tail is thrown. |
| Four cards labelled North, East, South and West are placed in a box. One card is chosen at random. | **C** | North is chosen. |
| Seven cards, each labelled with a different day of the week, are placed in a box. One card is chosen at random. | **D** | Sunday is chosen. |

Using the letters **A**, **B**, **C** and **D**, list the events in the order of how likely they are to happen.
Start with the least likely and end with the most likely. [2]

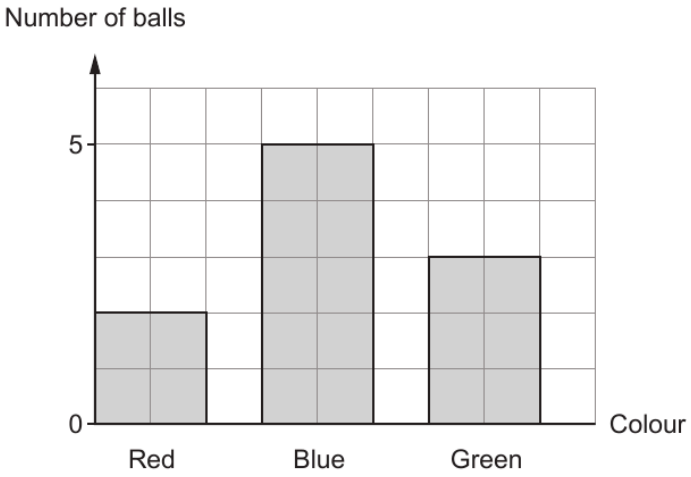




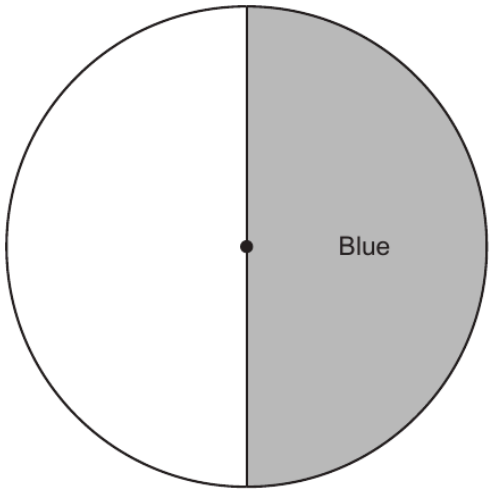
Examiner only

**15.** A box contains different-coloured balls.
Some are red, some are blue and the others are green.

The bar chart shows how many balls of each colour are in the box.




Draw an accurate pie chart to compare the number of coloured balls in the box.
Part of the pie chart has been completed for you. [3]

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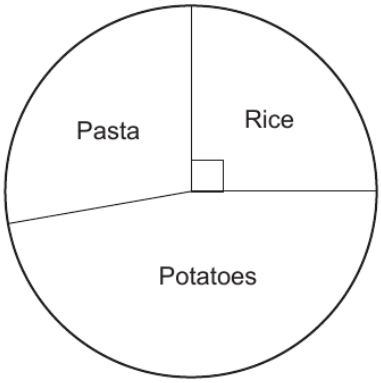
Examiner only

**2.** In a survey, 540 people were asked if they preferred pasta, rice or potatoes.
They were asked to choose just one preference.
The results are displayed in the accurately-drawn pie chart below.




(a) How many people preferred rice? [2]

..... people

(b) The sector for potatoes on the pie chart is to be split.
40% of the people who chose potatoes said they preferred chips.

What will be the size of the angle in the sector for **chips**?
You must show all your working. [3]

..... °

(c) 540 people took part in the survey. $\frac{7}{10}$ of these people were children..
How many people who took part in the survey were **not** children? [2]

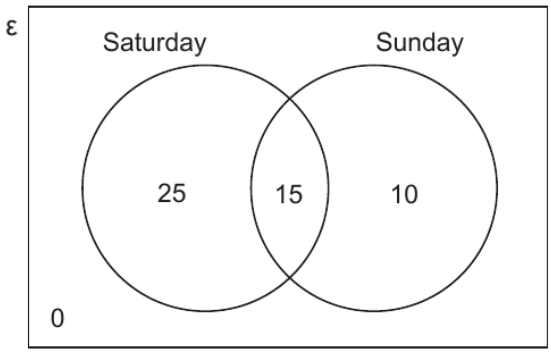
Number of people who were **not** children .....

Examiner only

**5.** Delyth buys 50 tickets for a group of friends to go to a music festival.
The ticket prices are given below.

| Ticket for | Ticket price per person |
|---|---|
| Saturday only | £20 |
| Sunday only | £17 |
| Both days | £28 |

The Venn diagram below shows the number of tickets that Delyth buys.




Calculate the total cost of the 50 tickets.
You must show all your working. [4]

Total cost of the 50 tickets is £ .....

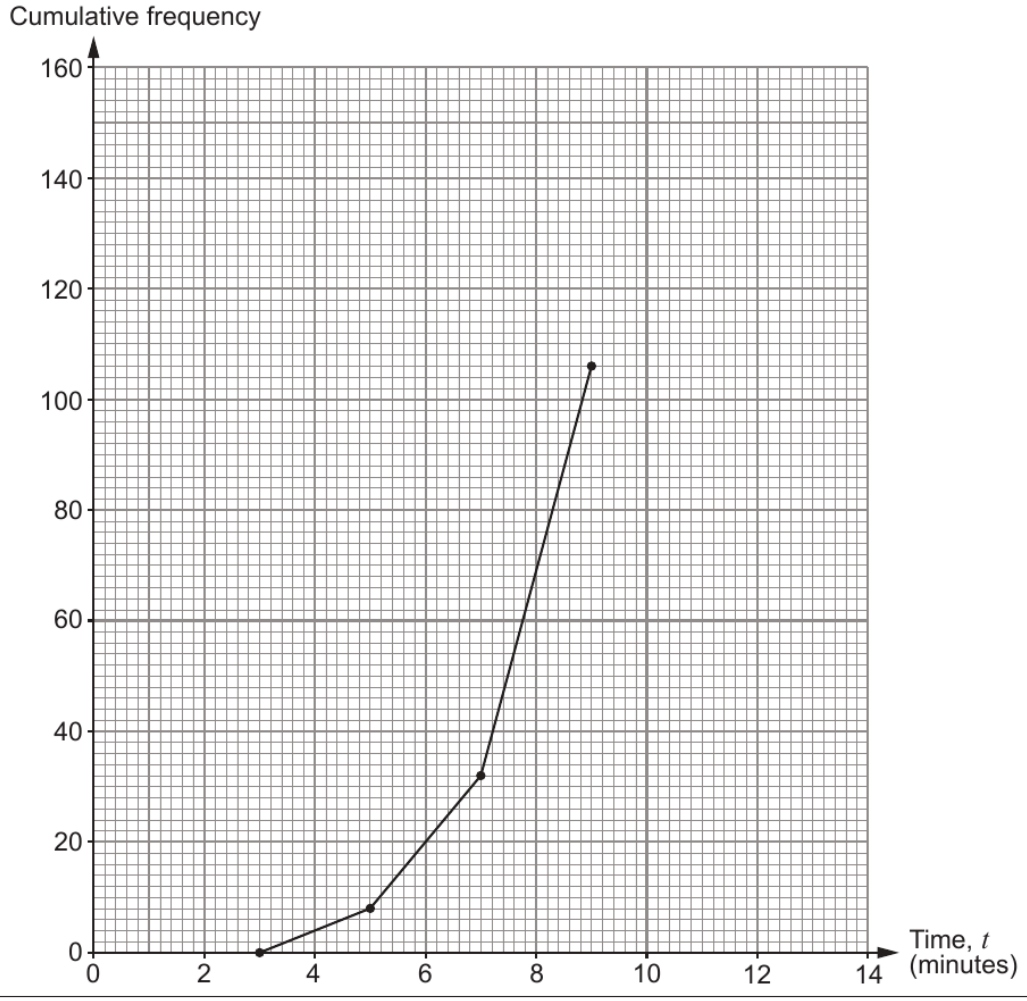
Examiner only

**9.** Giovanni has a takeaway pizza van. He sells whole pizzas and slices of pizza from his van.

(a) For the last 3 days, he has timed how long it takes to complete the food order for each of his customers.
Giovanni recorded his results in the table below.

(i) Complete the cumulative frequency table **and** the cumulative frequency diagram. [2]

| Time, $t$ (minutes) | Frequency | Cumulative frequency |
|---|---|---|
| $3 < t \leqslant 5$ | 8 | 8 |
| $5 < t \leqslant 7$ | 24 | 32 |
| $7 < t \leqslant 9$ | 74 | 106 |
| $9 < t \leqslant 11$ | 40 | ..... |
| $11 < t \leqslant 13$ | 14 | ..... |



Examiner only

Use your cumulative frequency diagram to give the best estimates for the answers to each of the following questions.

(ii) Find the median time taken to complete a food order. [1]

The median time is ..... minutes.

(iii) Giovanni is concerned that food orders are taking too long to complete.
He says,

"Only 25% of the food orders are completed in under ..... minutes."

Use **one** of the five values below to complete Giovanni's statement. [1]

6·4 6·6 7·2 8 9·6

(iv) Calculate the percentage of orders that were completed in less than 6 minutes. [2]

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(b) For the last 3 days:
- Giovanni spent £180 on ingredients
- he spent £220 on the running costs for the pizza van
- he received a total of £700 from the food orders.

Calculate Giovanni's percentage profit. [3]

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(c) Next year Giovanni intends to charge £8.40 for a basic pizza.
This is an increase of 20% from the current charge.

Calculate how much Giovanni currently charges for a basic pizza. [2]

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Examiner only

**1.** Morgan wants to buy the following items from a shop.

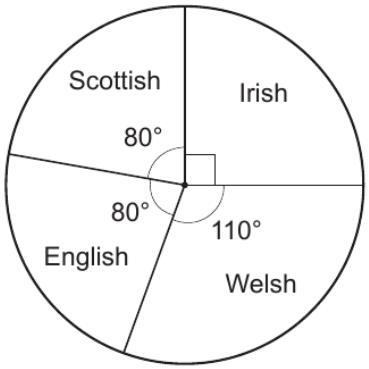

(a) Morgan uses a calculator to find the total cost of the items.

He thinks the total is £112.44.
What mistake has Morgan made? [1]

(b) Morgan pays for all the items with a £20 note.
How much change will he get? [2]

Examiner only

**4.** (a) 7200 spectators at a sports event were asked their nationality.
The results are displayed in the pie chart below.




(i) One third of the Irish spectators were female.
How many female Irish spectators were at the event? [3]

(ii) For the Welsh spectators, the ratio of the number of adults to the number of children was 6 : 5.
How many adult Welsh spectators were at the event?
You must show all your working. [4]

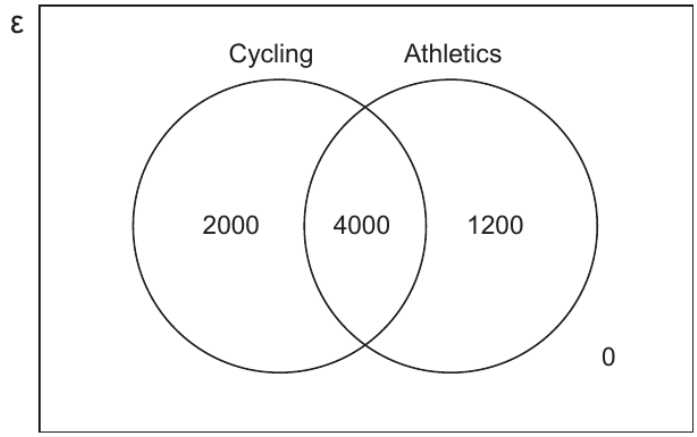
Examiner only

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

The 7200 spectators watched cycling, athletics, or both.
The entrance fees for the events were as follows.

| Events | Entrance fee |
|---|---|
| Cycling only | £25 |
| Athletics only | £30 |
| Joint entry to both cycling and athletics | £40 |

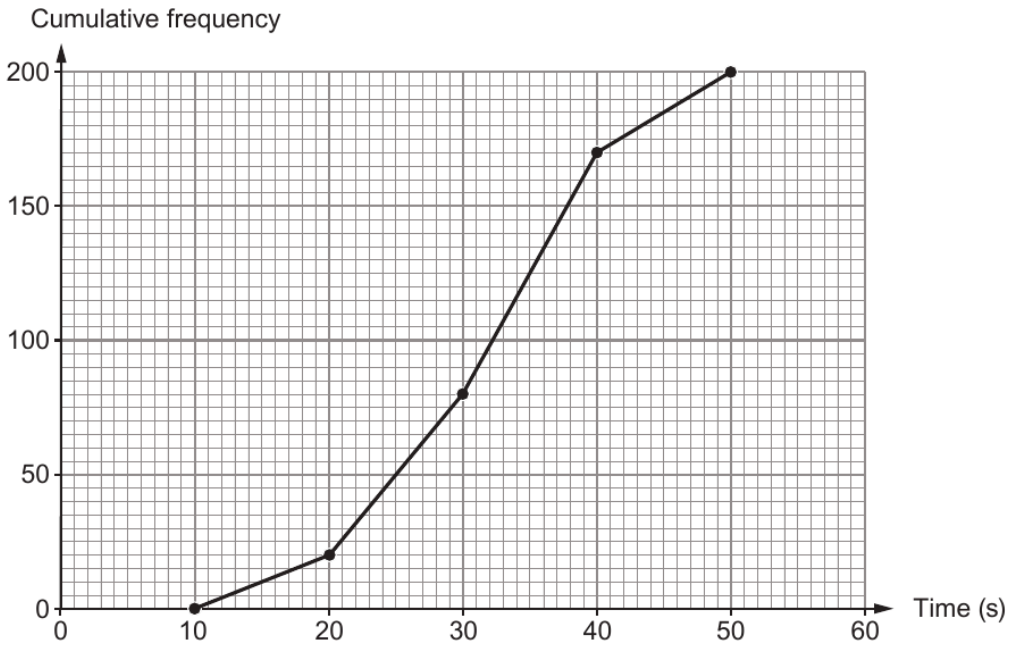
The Venn diagram shows the number of tickets bought for the different events.




Calculate the total amount taken in entrance fees from the 7200 spectators.
You must show all your working. [3 + 2 OCW]

Examiner only

**8.** (a) On 1st June last year, 200 customers used cash to pay at Shop Lil.
The cumulative frequency diagram represents the time each of these 200 customers waited to be given change at the checkout.




(i) How many of these customers waited between 30 and 50 seconds for their change? [2]

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(ii) Use the graph to estimate the median time these 200 customers waited for their change.
Circle your answer. [1]

24 seconds 32 seconds 38 seconds 80 seconds 100 seconds

(iii) Calculate the fraction of these 200 customers who waited 40 seconds or longer for their change.
Give your answer in its simplest form. [2]

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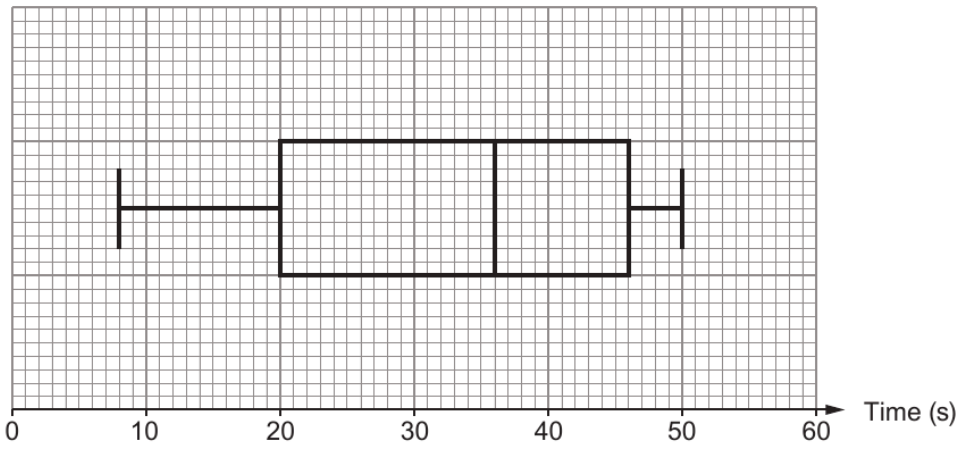
Examiner only

(b) On 1st June this year, the manager at Shop Lil drew a box-and-whisker plot of the times 200 customers waited for their change at the checkout.




Based on the results of these 200 customers, the manager made the following statements. Complete the statements.

(i) "On 1st June this year, 50% of our customers were given their change in ..... seconds or less." [1]

(ii) "On 1st June this year, the interquartile range of the times taken to give customers their change was ..... seconds." [2]

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(c) Consider the 50 customers waiting the **longest** times to get their change on 1st June last year and this year.
Has the speed of giving change at the checkout improved since last year?

Yes ☐ No ☐

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

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Examiner only

**10.** The employees of a company belong to one of three departments: *Management (M)*, *Sales (S)* or *Distribution (D)*.

The diagram below is a sketch of a pie chart.
The diagram shows the proportion of employees working in each of these departments.

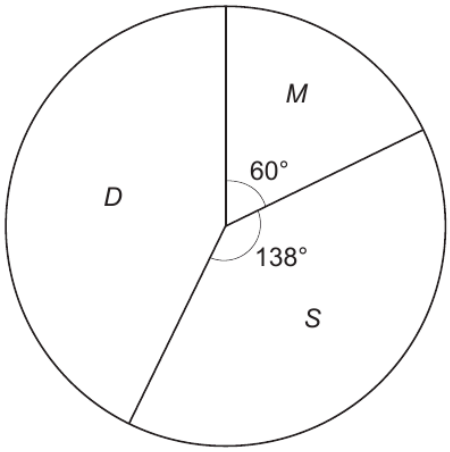


*Diagram not drawn to scale*

An employee is chosen at random.
Calculate the probability that this employee works in the *Distribution* department.
Give your answer as a decimal. [3]

Examiner only

**9.** (a) The base of a flagpole is fixed to horizontal ground.
It is held vertically by a straight rod of length 3·8 m.
The rod is fixed to the ground and to a point 1·5 m from the top of the flagpole.
The flagpole and the rod are shown in the diagram below.

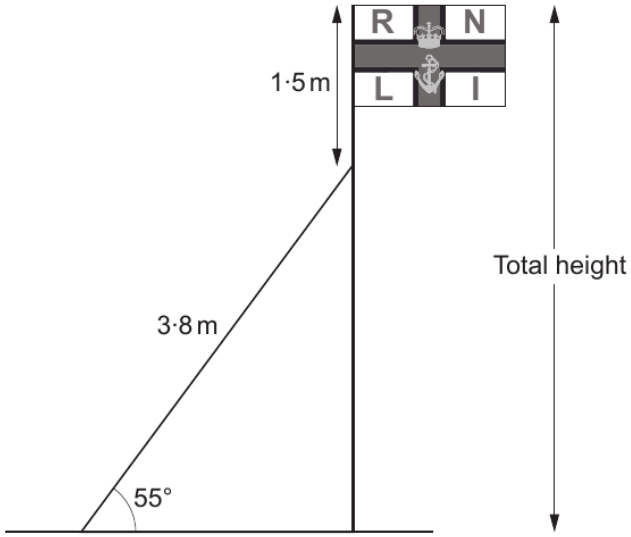


*Diagram not drawn to scale*

Calculate the **total** height of the flagpole.
Give your answer correct to the nearest centimetre. [4]

Examiner only

(b) Mathematically similar large, medium and small flags are made.




*Diagrams not drawn to scale*

(i) Calculate the length of the medium flag. [2]

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Length of the medium flag is ..... cm

(ii) Calculate the height of the small flag. [2]

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Height of the small flag is ..... cm