Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Foundation averages from grouped frequency tables: estimating the mean using class midpoints, identifying the modal class, and finding the class conta

REVISE
.wales

F3.12 — Mean, modal class & median group from grouped data

Spec 4.2.9, 4.2.11, 4.2.13, 4.2.14, 4.2.15, 4.2.16 — Unit 3 (calculator allowed)

Foundation averages from grouped frequency tables: estimating the mean using class midpoints, identifying the modal class, and finding the class containing the median. 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: ~52 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (35 marks across 12 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).

Mean, modal class & median group from grouped data — what the new spec asks

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

Estimated mean 4.4.4

- Use midpoints as representative values.
- Calculate Σfx and Σf.
- State the answer as an *estimated* mean.

Modal class 4.4.5

- Identify the class with the highest frequency.
- State it as an interval, not a single value.
- Recognise there can be more than one modal class.

Median class 4.4.6

- Find median position from total frequency.
- Use cumulative frequency to locate the class.
- Give the interval containing the median.

Exam strategy 4.4

- Show midpoint and fx columns.
- Round estimated mean to 1 d.p. unless told otherwise.
- Use the word ‘estimated’ for grouped-data mean.

Crib sheet »

Mean, modal class & median group from grouped data in one page

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

Midpoint of a class

$$\text{midpoint} = (\text{lower} + \text{upper}) \div 2$$

$0<x\leq10 \Rightarrow$ midpoint = 5.

Estimated mean

$$\text{mean} \approx \Sigma(\text{midpoint} \times \text{f}) \div \Sigma\text{f}$$

It's an *estimate* because exact values are lost in grouping.

Working it out

1. Add a midpoint column.
2. Add midpoint × frequency column.
3. Mean = sum of column ÷ total frequency.

Modal class

Class with the **highest frequency**.

Not a single value — an interval like $10<x\leq20$.

Median class

Find median position: n/2 (or (n+1)/2).

Add cumulative frequencies until you reach that position — that's the median class.

Common traps

- Saying 'mean = 5' when the answer should be 'estimated mean = 5'.
- Using the lower bound instead of midpoint.
- Forgetting to total Σf.

Examiner only

11. *(a)* A biased coin is thrown 100 times.
The number of heads thrown is recorded after 20 throws, 40 throws, 60 throws, 80 throws and 100 throws.

Some of the results are recorded in the relative frequency table below.

Complete the table. [2]

Number of throws	20	40	60	80	100
Number of heads	11	18	24	30	
Relative frequency	0·55	0·45		0·375	0·37

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Examiner only

(b)

5 7 8 11 14 17 17 19 26 28

The sum of the ten numbers shown above is 152.
The numbers are displayed in the grouped frequency table shown below.

Number	0 - 9	10 - 19	20 - 29
Frequency	3	5	2

Consider the estimated mean calculated from the table and the actual mean of the ten numbers.
Calculate the difference between these two values.
You must show all your working. [5]

Examiner only

13. *(a)* Which one of the following options describes $2x + 5y$?
Circle your answer. [1]

an equation a formula an expression

an inequality none of these

(b) Which one of the following options describes $3x - 2 = 7$?
Circle your answer. [1]

an equation a formula an expression

an inequality none of these

14. Data for different values of t are shown in the table below.

t	Frequency
$0 \leqslant t < 5$	8
$5 \leqslant t < 10$	0
$10 \leqslant t < 15$	7
$15 \leqslant t < 20$	5

Calculate an estimate for the mean value of t. [4]

Examiner only

4. Thirty numbers are recorded in the grouped frequency table below.

Group	1 to 20	21 to 40	41 to 60	61 to 80	81 to 100
Frequency	3	8	7	6	6

It is decided that the same thirty numbers should be recorded in a table with larger group widths.

This new table is shown below, but only one frequency has been given.

Group	1 to 30	31 to 60	61 to 90
Frequency			12

(a) What is the smallest possible frequency of the 1 to 30 group? [1]

.....

(b) What is the greatest possible frequency of the 31 to 60 group? [1]

.....

Examiner only

13. Thirty numbers are recorded in the grouped frequency table below.

Group	1 to 20	21 to 40	41 to 60	61 to 80	81 to 100
Frequency	3	8	7	6	6

It is decided that the same thirty numbers should be recorded in a table with larger group widths.

This new table is shown below, but only one frequency has been given.

Group	1 to 30	31 to 60	61 to 90
Frequency			12

(a) What is the smallest possible frequency of the 1 to 30 group? [1]

.....

(b) What is the greatest possible frequency of the 31 to 60 group? [1]

.....

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.

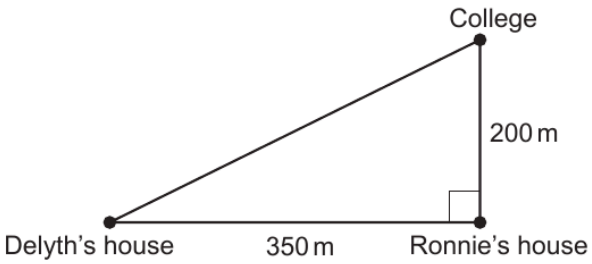

Diagram not drawn to scale

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

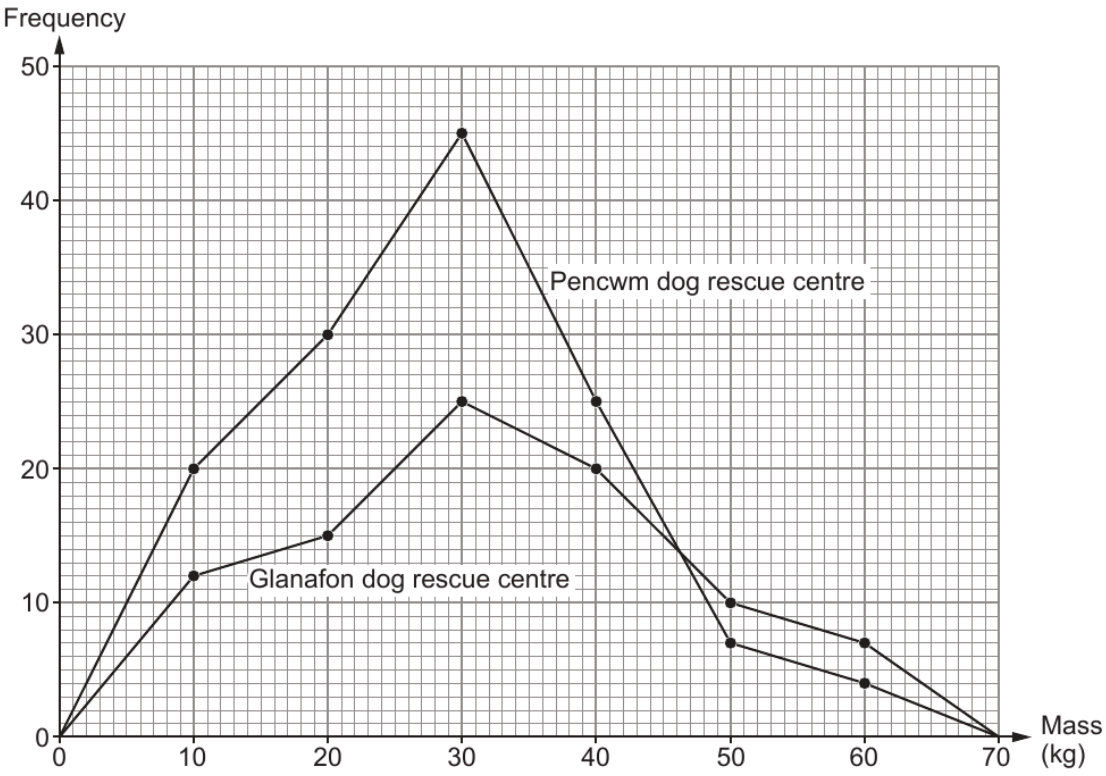
6. Glanafon and Pencwm dog rescue centres take in unwanted dogs.

The mass of each dog in the two dog rescue centres was recorded.

Groups of width 10 kg were used:

$5\,\text{kg} \leqslant \text{mass} < 15\,\text{kg}, \quad 15\,\text{kg} \leqslant \text{mass} < 25\,\text{kg}, \quad \ldots, \quad 55\,\text{kg} \leqslant \text{mass} < 65\,\text{kg}$

The results are shown in the frequency polygons below.



(a) Doreen, Rory and Muzhir look at these frequency polygons.

(i) Doreen says,

"The modal group of the masses of dogs in each dog rescue centre is the same."

Is Doreen correct?

Yes ☐ No ☐ Can't tell ☐

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

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Examiner only

(ii) Rory says,

"28 of the dogs in Pencwm each have a mass of 18 kg."

Is Rory correct?

Yes ☐ No ☐ Can't tell ☐

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

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(iii) Muzhir says,

"There is a higher proportion of dogs that are heavier than 35 kg in Glanafon than in Pencwm."

Without doing any calculations, decide if Muzhir is correct.

Correct ☐ Incorrect ☐ Can't tell ☐

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

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(b) The estimate of the mean mass of the dogs in Glanafon was 32·5 kg.
How much less was the estimate of the mean mass of the dogs in Pencwm?
You must show all your working. [5]

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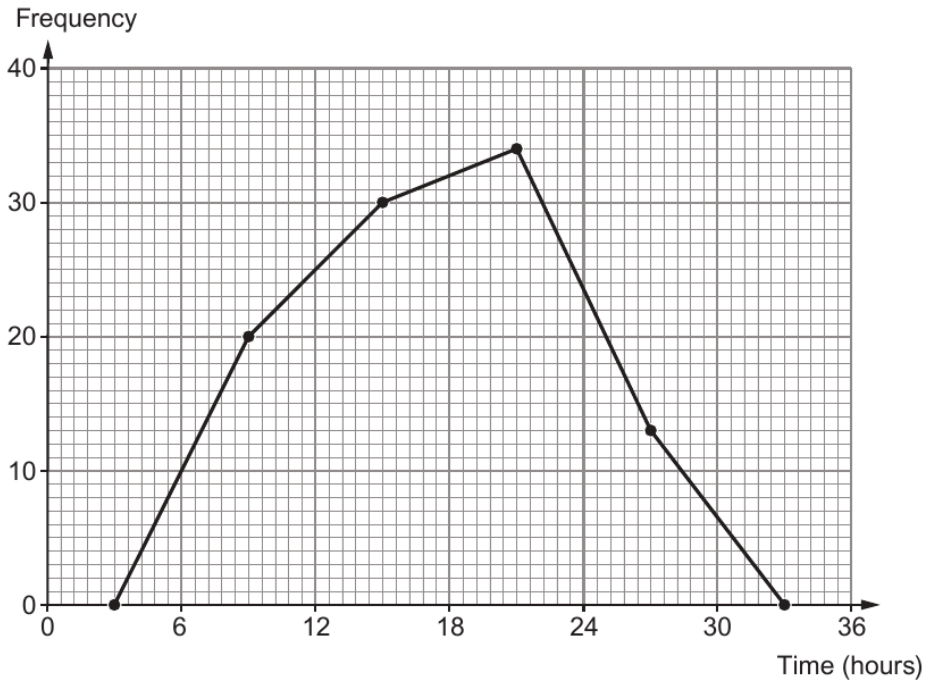
Estimate of the mean mass of the dogs in Pencwm is ..... kg less than in Glanafon.

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

(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]

(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]

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]

(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]

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.

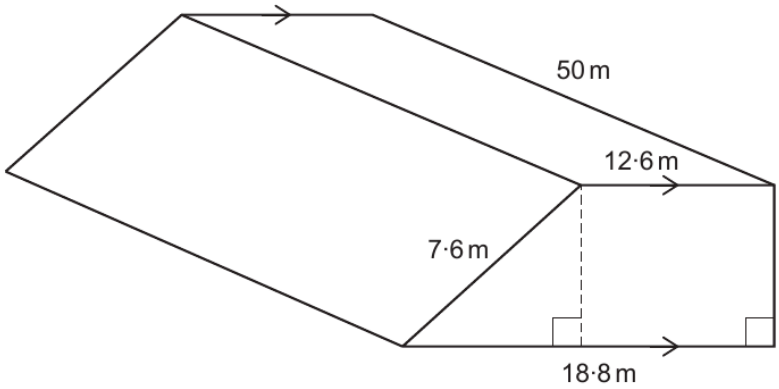


Diagram not drawn to scale

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

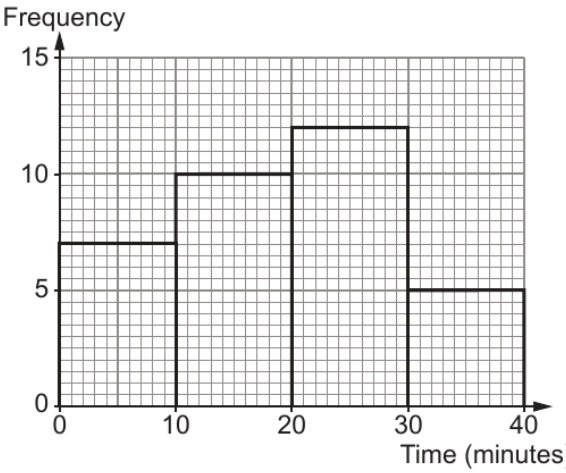
Examiner only

4. Miss Hughes asked her class of Year 9 pupils and her class of Year 10 pupils how many minutes they each spent on their mathematics homework last weekend.

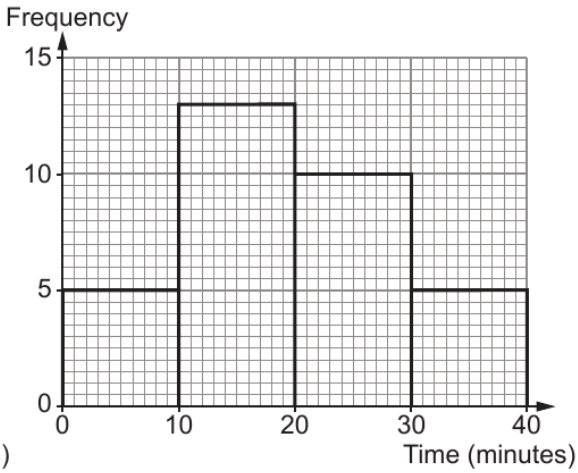
The frequency diagrams below show the results.
The groups used are as follows:

$0 \leqslant \text{time} < 10, \quad 10 \leqslant \text{time} < 20, \quad 20 \leqslant \text{time} < 30 \quad \text{and} \quad 30 \leqslant \text{time} < 40.$

Year 9



Year 10



(a) What is the modal group of the times for the Year 9 pupils? [1]

.....

(b) How many of the Year 10 pupils spent 20 minutes or more on their mathematics homework last weekend? [1]

.....

(c) Did any of the Year 10 pupils spend **no** time on their mathematics homework last weekend?

Yes ☐ No ☐ Can't tell ☐

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

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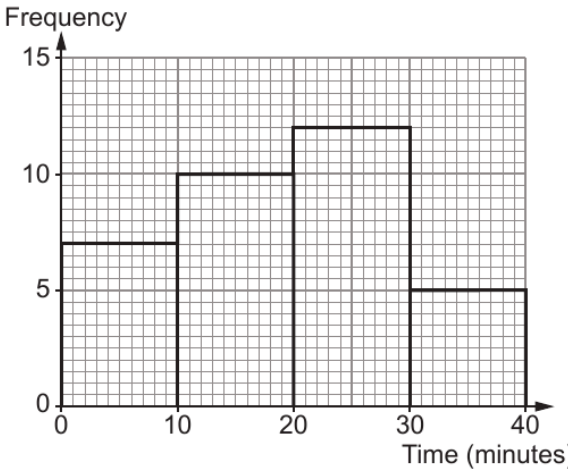
Examiner only

7. Miss Hughes asked her class of Year 9 pupils and her class of Year 10 pupils how many minutes they each spent on their mathematics homework last weekend.

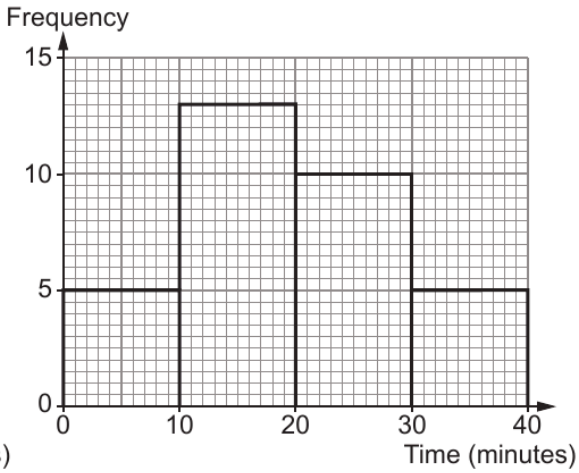
The frequency diagrams below show the results.
The groups used are as follows:

$0 \leqslant \text{time} < 10, \quad 10 \leqslant \text{time} < 20, \quad 20 \leqslant \text{time} < 30 \quad \text{and} \quad 30 \leqslant \text{time} < 40.$

Year 9



Year 10



(a) What is the modal group of the times for the Year 9 pupils? [1]

.....

(b) How many of the Year 10 pupils spent 20 minutes or more on their mathematics homework last weekend? [1]

.....

(c) Did any of the Year 10 pupils spend **no** time on their mathematics homework last weekend?

Yes ☐ No ☐ Can't tell ☐

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

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Examiner only

(d) Delyth calculates the following:

- the fraction of the Year 9 pupils who spent between 30 and 40 minutes on their homework
- the fraction of the Year 10 pupils who spent between 30 and 40 minutes on their homework.

Delyth says,

"These fractions are exactly the same."

Is Delyth correct?

Yes ☐ No ☐

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

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END OF PAPER

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.

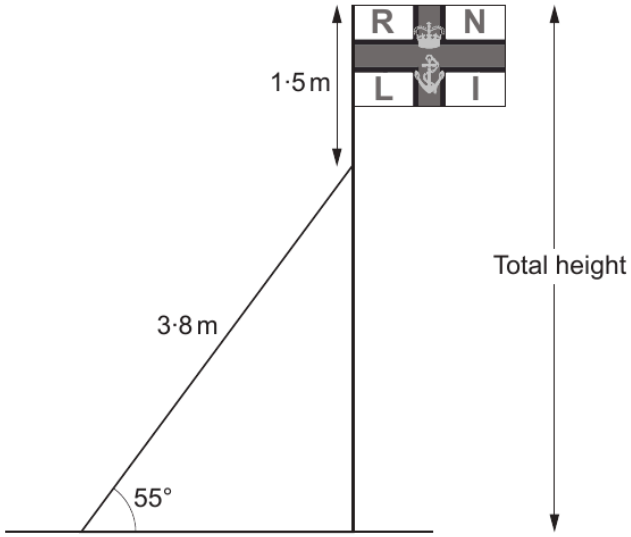

Diagram not drawn to scale

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