7.3 Justifying a Claim About a Population Mean Based on a Confidence Interval

Name: _____ Class: _____ Date: _____ **Total: 18 marks**

KEY WORDS claim • population mean • plausible • individual • confidence level • convincing evidence

Objective

Build the skills to answer exam questions on **justifying a claim about a mean from a confidence interval** .

You must be able to:

- decide whether a claimed value of μ is plausible
- explain how the confidence level changes the conclusion
- avoid common mistakes in interpreting an interval for a mean

1 Key knowledge and worked examples

Is the claimed mean plausible?

idea	rule
inside	a claimed value inside the interval is plausible
outside	a claimed value outside the interval is not plausible: there is convincing evidence against it

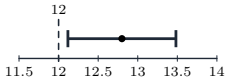
Worked example. A 95% interval for the mean mass of a farm's eggs is (58.2, 61.0) g. A claim of 62 g is not plausible, because 62 lies above the interval.

Answer shapes: say where the claimed value lies, then give the decision about the claim in context.

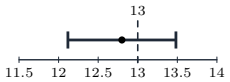
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2 Practice

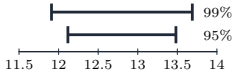
2.1 A 95% interval for μ is (12.1, 13.5). Decide whether the claim $\mu = 12$ is plausible. [2]



2.2 For the same interval, decide whether the claim $\mu = 13$ is plausible. [2]



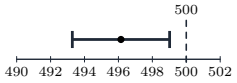
2.3 Explain whether a 99% interval from the same sample could include 12. [2]



3 Exam-style questions

3.1 Boxes of a cereal are labelled 500 g. A 95% confidence interval for the mean mass of all the boxes is (493.2, 499.1) g.

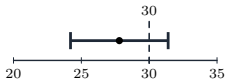
(a) Interpret the interval. [2]



(b) Explain whether there is convincing evidence that the mean mass is less than 500 g. [2]

3.2 From a random sample of 30 workers in a city, a 95% confidence interval for the mean commute time is (24.1, 31.5) minutes.

(a) Interpret the interval. [2]



(b) A report says the mean commute is 30 minutes. Explain whether the interval supports this. [2]

(c) Explain whether a 90% interval from the same data would be wider or narrower. [2]

(d) A student says: "95% of the city's workers commute for between 24.1 and 31.5 minutes." Explain the mistake. [2]

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Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

not plausible; 12 is below the interval

2.2

plausible; 13 is inside the interval

2.3

yes, it could; a 99% interval is wider, so it may reach below 12.1 to include 12

3.1

(a) we are 95% confident that the interval from 493.2 to 499.1 g; captures the true mean mass of all the boxes

(b) yes; every value in the interval is below 500, so a mean of 500 g is not plausible

3.2

(a) we are 95% confident that the interval from 24.1 to 31.5 minutes; captures the true mean commute time of all workers in the city

(b) yes, 30 is plausible; it lies inside the interval

(c) narrower; a lower confidence level uses a smaller t^*, so the margin of error is smaller

(d) the interval estimates the **mean** commute time; individual commutes vary much more, so many workers commute for less than 24.1 or more than 31.5 minutes

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