

Estimation station and class survey for A Level Maths: answers

A Level Math Revision · A Level Maths (Year 12 and Year 13) · Teacher answers and notes

The starter is non-calculator. A calculator with statistics functions is needed.

Teacher notes

- Estimation station: set up four or five stations (a desk to measure, a jar of counters, a corridor, a book's thickness, a minute with eyes closed). Students write an estimate first, then measure. Being wrong is the point: celebrate the closest estimate and the best reasoning, not just the right answer, and agree a class norm that a reasoned wrong answer is a good start.
- Class survey: the data in the tasks are made up, so the answers can be checked. Then collect your own class's anonymous data on the board (a show of hands for travel-time groups, hand spans written on sticky notes with no names) and repeat the calculations. Nothing is stored on the site.
- Task B, question 3 is Year 13 content; with a Year 12 class, stop after the regression line and come back to it later.

Starter

1. About 400

- $4^2 \times 25 = 400$

2. 25%

- $6/24 \times 100 = 25\%$

3. 8

- $96 \div 12 = 8$

Task A: Estimation station

a. Mean 200; standard deviation 36.3

- $\Sigma x = 1000$, $\Sigma x^2 = 206\,600$
- $\sigma = \sqrt{(206\,600 \div 5 - 200^2)} = \sqrt{1320} = 36.3$

b. 62.475 m²

- $24.5 \times 2.55 = 62.475$

Task B: Class survey: correlation and regression

a. $r = 0.977$

- From the calculator: $r = 0.97725\dots$

b. $s = 0.181h - 10.3$; 20.1 cm

- $s = 0.180952\dots h - 10.3095\dots$
- At $h = 168$: 20.09...

c. Reject H_0 : there is evidence of positive correlation

- $H_0: \rho = 0$, $H_1: \rho > 0$
- $0.977 > 0.6215$, so reject H_0 : there is evidence that taller students have wider hand spans.

Task C: Travel times

a. **Mean 17.8 minutes; standard deviation 9.6 minutes**

- Midpoints 5, 15, 25, 35
- Mean = $445 \div 25 = 17.8$
- $\sigma = \sqrt{409 - 17.8^2} = \sqrt{92.16} = 9.6$

b. **17.2 minutes**

- The median is the 12.5th value, in $10 < t \leq 20$.
- $10 + (12.5 - 6)/9 \times 10 = 17.2$

Extension

1. **$r = 0.977$ (unchanged); $s = 0.181h - 9.81$**

- Adding a constant to every s does not change r (coding).
- The intercept goes up by 0.5: $-10.3095... + 0.5 = -9.81$

Every question is original and every answer was recomputed by computer before publishing.