

Big tournament statistics for IB Maths SL and HL: answers

IB Math Revision · IB Maths SL and HL (AA and AI) · Teacher answers and notes

The starter is non-calculator. A GDC is needed for the main activity.

Teacher notes

- Every number in this pack is made up for the lesson; say so when you show it.
- Task A (d) is the key discussion: correlation within the data does not license prediction outside it.
- Ask the class what the Poisson model assumes about goals (independent, at a constant rate) and whether that is realistic.

Starter

1. **5**
 - $25 \div 5 = 5$
2. **5.5**
 - In order: 1, 3, 4, 7, 8, 9. The median is $(4 + 7) \div 2 = 5.5$.
3. **7**
 - $18 - 11 = 7$
4. **Strong and negative**
 - $|-0.9|$ is close to 1, and the sign is negative.

Task A: Shots and goals

- a. **14.6 and 5**
 - $146 \div 10 = 14.6$ and $50 \div 10 = 5$
- b. **$r = 0.989$: strong positive correlation**
 - GDC: $r = 0.98894...$
- c. **$y = 0.499x - 2.29$; about 5.70 goals**
 - GDC: $y = 0.49898...x - 2.2851...$
 - $0.49898... \times 16 - 2.2851... = 5.698...$
- d. **Extrapolation**
 - 40 is far outside the data (8 to 22 shots), so the linear pattern may not hold there.

Task B: Goals per match

- a. **Mean 2.275; SD 1.45**
 - Total goals: $0 + 9 + 22 + 24 + 20 + 10 + 6 = 91$, so the mean is $91/40 = 2.275$.
 - GDC: $\sigma = 1.4489...$
- b. **4.11**
 - $P(X = 0) = e^{-2.275} = 0.1027...$
 - $40 \times 0.1027... = 4.11$ (observed: 4)

c. **0.196; the data give $8/40 = 0.2$**

- $P(X \geq 4) = 1 - P(X \leq 3) = 0.1955\dots$
- Observed: $(5 + 2 + 1)/40 = 0.2$. The model fits well.

Task C: The 100 m final

a. **0.0912**

- GDC normal cdf: 0.09121...

b. **9.95 s**

- Inverse normal: $P(T < t) = 0.05$ gives $t = 9.953\dots$

c. **0.535**

- $1 - (1 - 0.09121\dots)^8 = 0.5347\dots$

Extension

1. **0.152**

- The total is $Po(3 \times 2.275) = Po(6.825)$.
- $P(Y = 6) = e^{-6.825} \times 6.825^6/6! = 0.1524\dots$

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