Counting and statistics - Reasoning test 4

Name: _____ Date: _____

10 questions | 51 marks | 70 minutes

Explain methods, reverse calculations and challenge misleading conclusions. Supplied normal values may be used without further tables.

Use a graphics calculator or appropriate digital tool for labelled tasks.

1. A code has 3 letters chosen from A-E, followed by 2 digits 0-9. Repetition is allowed. [5 marks]

(a) Count the codes. [2 marks]

(b) How many codes have different letters and different digits? [3 marks]

2. Six cards show the letters B,A,N,A,N,A. [6 marks]

(a) Count distinct rows of all six cards. [3 marks]

(b) Count distinct rows that begin and end with A. [3 marks]

3. A club has n members. It can choose a president and a different secretary in 56 ways. [5 marks]

(a) Form an equation and find n. [3 marks]

(b) How many unordered pairs can be chosen from the club? [2 marks]

4. Consider $(x-2)^5$. [5 marks]

(a) Find the coefficient of x^2. [3 marks]

(b) Without expanding, find the sum of its coefficients. [2 marks]

5. A sports survey asks only spectators at a basketball final whether the school should build another basketball court. [5 marks]

(a) Explain why the sample may be biased. [2 marks]

(b) Would selecting a random 100 spectators solve the population-coverage problem? Explain. [3 marks]

6. A sample of 8 has mean 12. Seven observed values sum to 77. [4 marks]

(a) Find the missing observation. [2 marks]

(b) If 19 is replaced by 3, find the new mean and describe the direction of change. [2 marks]

7. Data A are 0,2,4,6,8,10,12,14. Data B are 0,2,4,5,9,10,12,14. [6 marks]

(a) Find the five-number summary of each using median-of-halves. [3 marks]

(b) Do these equal summaries guarantee equal standard deviations? Explain. [3 marks]

8. A set of measurements has sample mean 18°C and s = 2°C. A new scale reports F=1.8C+32. [5 marks]

(a) Find the new mean. [2 marks]

(b) Find the new standard deviation and explain why 32 does not affect it. [3 marks]

9. X is normally modelled with mean 75 and sd 10. Supplied $\Phi(1.2)=0.88493$, $\Phi(-0.8)=0.21186$. [5 marks]

(a) Find $P(67<X<87)$. [3 marks]

(b) Find the expected number outside this interval in a sample of 200. [2 marks]

10. A normal model has 10th percentile 41.03 and 90th percentile 58.97. The relevant standard-normal cutoffs are ± 1.28155. [5 marks]

(a) Find the mean. [2 marks]

(b) Estimate the standard deviation. [3 marks]