S5 Mathematics (Compulsory Part) Statistics and Probability Practice Paper

S5 | Mathematics (Compulsory Part) | Time: 75 minutes | Total: 100 marks | 24 questions

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Part A Averages and Dispersion (16 marks)

The weekly self-study hours of 8 students are: 12, 15, 9, 18, 14, 20, 11 and 13.

1. Find the mean of the data set. (4 marks)

2. Find the median of the data set. (4 marks)

3. Find the standard deviation, correct to 2 decimal places. (4 marks)

4. Find the range and the inter-quartile range. (4 marks)

Part B Standard Scores and the Normal Distribution (16 marks)

The marks of a test follow approximately a normal distribution with mean 68 and standard deviation 12.

5. A student scores 80. Find the standard score. (4 marks)

6. A student scores 53. Find the standard score. (4 marks)

7. Using the 68-95-99.7 rule, estimate the proportion of students scoring between 56 and 80. (4 marks)

8. There are 400 students. Estimate how many score above 92. (4 marks)

Part C Probability and Conditional Probability (18 marks)

A bag contains 5 red, 3 blue and 2 green balls. There are 10 balls in total, identical except in colour.

9. One ball is drawn at random. Find the probability that it is red. (4 marks)

10. Two balls are drawn without replacement. Find the probability that both are red. (5 marks)

11. Given that the first ball drawn is red, find the probability that the second is also red. (4 marks)

12. Two balls are drawn with replacement. Find the probability of getting at least one green ball. (5 marks)

Part D Permutations and Combinations (16 marks)

Among 7 students, 3 are boys and 4 are girls.

13. In how many ways can 5 of the 7 students be arranged in a row? (4 marks)

14. In how many ways can a group of 3 be chosen from the 7 students? (4 marks)

15. In how many ways can all 7 students be arranged in a row if the 3 boys must stand together? (4 marks)

16. In how many ways can a group of 3 be chosen so that it contains at least one girl? (4 marks)

Part E Binomial Distribution (17 marks)

In a shooting game the hit rate is 0.3 and shots are independent. The player shoots 10 times. Let X be the number of hits.

17. Find P(X = 3). (5 marks)

18. Find the expected value E(X) and the variance Var(X). (4 marks)

19. Find the standard deviation of X, correct to 2 decimal places. (4 marks)

20. Find P(X >= 1). (4 marks)

Part F Linear Regression and Correlation (17 marks)

The weekly study hours x and test scores y of 5 students are: (2, 52), (4, 60), (6, 68), (8, 74), (10, 80).

21. Find the mean of x and the mean of y. (4 marks)

22. Find Sxy, Sxx and Syy. (4 marks)

23. Find the correlation coefficient r (3 decimal places) and describe the strength. (5 marks)

24. Find the regression line y = a + bx and predict the score for 12 study hours. (4 marks)
