

5. A class of students had a sudoku competition. The time taken for each student to complete the sudoku was recorded to the nearest minute and the results are summarised in the table below.

Time	Mid-point, x	Frequency, f
2 - 8	5	2
9 - 12		7
13 - 15	14	5
16 - 18	17	8
19 - 22	20.5	4
23 - 30	26.5	4

(You may use $\sum fx^2 = 8603.75$)

- (a) Write down the mid-point for the 9 - 12 interval. (1)
- (b) Use linear interpolation to estimate the median time taken by the students. (2)
- (c) Estimate the mean and standard deviation of the times taken by the students. (5)

The teacher suggested that a normal distribution could be used to model the times taken by the students to complete the sudoku.

- (d) Give a reason to support the use of a normal distribution in this case. (1)

On another occasion the teacher calculated the quartiles for the times taken by the students to complete a different sudoku and found

$$Q_1 = 8.5 \quad Q_2 = 13.0 \quad Q_3 = 21.0$$

- (e) Describe, giving a reason, the skewness of the times on this occasion. (2)



Question 5 continued

Lined area for writing answers to Question 5 continued. The area contains 30 horizontal lines.

(Total 11 marks)

Q5	



6. Jake and Kamil are sometimes late for school.
The events J and K are defined as follows

J = the event that Jake is late for school
 K = the event that Kamil is late for school

$P(J) = 0.25$, $P(J \cap K) = 0.15$ and $P(J' \cap K') = 0.7$

On a randomly selected day, find the probability that

- (a) at least one of Jake or Kamil are late for school, (1)

- (b) Kamil is late for school. (2)

Given that Jake is late for school,

- (c) find the probability that Kamil is late. (3)

The teacher suspects that Jake being late for school and Kamil being late for school are linked in some way.

- (d) Determine whether or not J and K are statistically independent. (2)

- (e) Comment on the teacher's suspicion in the light of your calculation in (d). (1)



Question 6 continued

Lined area for writing the answer to Question 6. The page contains 25 horizontal lines.



7. A teacher took a random sample of 8 children from a class. For each child the teacher recorded the length of their left foot, f cm, and their height, h cm. The results are given in the table below.

f	23	26	23	22	27	24	20	21
h	135	144	134	136	140	134	130	132

(You may use $\sum f = 186$ $\sum h = 1085$ $S_{ff} = 39.5$ $S_{hh} = 139.875$ $\sum fh = 25291$)

- (a) Calculate S_{fh} (2)
- (b) Find the equation of the regression line of h on f in the form $h = a + bf$.
Give the value of a and the value of b correct to 3 significant figures. (5)
- (c) Use your equation to estimate the height of a child with a left foot length of 25 cm. (2)
- (d) Comment on the reliability of your estimate in (c), giving a reason for your answer. (2)

The left foot length of the teacher is 25 cm.

- (e) Give a reason why the equation in (b) should not be used to estimate the teacher's height. (1)



8. A spinner is designed so that the score S is given by the following probability distribution.

s	0	1	2	4	5
$P(S = s)$	p	0.25	0.25	0.20	0.20

- (a) Find the value of p . (2)
- (b) Find $E(S)$. (2)
- (c) Show that $E(S^2) = 9.45$ (2)
- (d) Find $\text{Var}(S)$. (2)

Tom and Jess play a game with this spinner. The spinner is spun repeatedly and S counters are awarded on the outcome of each spin. If S is even then Tom receives the counters and if S is odd then Jess receives them. The first player to collect 10 or more counters is the winner.

- (e) Find the probability that Jess wins after 2 spins. (2)
- (f) Find the probability that Tom wins after exactly 3 spins. (4)
- (g) Find the probability that Jess wins after exactly 3 spins. (3)



