

1. 56 students were given a test out of 40 marks. The teacher used the following box and whisker plot to represent the marks of the students.

(a) Write down

- (i) the median mark;
- (ii) the 75th percentile mark;
- (iii) the range of marks.

(4)

(b) Estimate the number of students who achieved a mark greater than 32.

(2)

(Total 6 marks)

2. The weights of 90 students in a school were recorded. The information is displayed in the following table.

Weight (kg)	Number of students
$40 \leq w < 50$	7
$50 \leq w < 60$	28
$60 \leq w < 70$	35
$70 \leq w < 80$	20

(a) Write down the mid interval value for the interval $50 \leq w < 60$.

(1)

(b) Use your graphic display calculator to find an estimate for

- (i) the mean weight;
- (ii) the standard deviation.

(3)

(c) Find the weight that is 3 standard deviations below the mean.

(2)

(Total 6 marks)

3. A survey was carried out in a group of 200 people. They were asked whether they smoke or not. The collected information was organized in the following table.

	Smoker	Non-smoker
Male	60	40
Female	30	70

One person from this group is chosen at random.

- (a) Write down the probability that this person is a smoker. (2)
- (b) Write down the probability that this person is male given that they are a smoker. (2)
- (c) Find the probability that this person is a smoker or is male. (2)

(Total 6 marks)

4. Consider the universal set $U = \{x \mid 3 < x < 13\}$, and the subsets $A = \{\text{multiples of 3}\}$ and $B = \{4, 6, 12\}$.

- (a) List the elements of the following sets.
 - (i) A
 - (ii) $A \cap B'$ (2)
- (b) Write down one element of $(A \cap B)'$. (2)
- (c) One of the statements in the table below is false. Indicate with an **X** which statement is false. Give a reason for your answer.

$n(A \cap B) = 4$	
$15 \in A'$	
$A \cap A \cap B$	

(2)
(Total 6 marks)

5. 100 students are asked what they had for breakfast on a particular morning. There were three choices: cereal (X), bread (Y) and fruit (Z). It is found that

10 students had all three
 17 students had bread and fruit only
 15 students had cereal and fruit only
 12 students had cereal and bread only
 13 students had only bread
 8 students had only cereal
 9 students had only fruit

- (a) Represent this information on a Venn diagram. (4)
- (b) Find the number of students who had none of the three choices for breakfast. (2)
- (c) Write down the percentage of students who had fruit for breakfast. (2)
- (d) Describe in words what the students in the set $X \cap Y'$ had for breakfast. (2)
- (e) Find the probability that a student had **at least** two of the three choices for breakfast.

(2)

- (f) Two students are chosen at random. Find the probability that both students had all three choices for breakfast.

(3)

(Total 15 marks)

6. The same 100 students are also asked how many meals on average they have per day. The data collected is organized in the following table.

3 or fewer meals per day	4 or 5 meals per day	More than 5 meals per day	Total	
Male	15	25	15	55
Female	12	20	13	45
Total	27	45	28	100

A χ^2 test is carried out at the 5 % level of significance.

- (a) Write down the null hypothesis, H_0 , for this test.

(1)

- (b) Write down the number of degrees of freedom for this test.

(1)

- (c) Write down the critical value for this test.

(1)

- (d) Show that the expected number of females that have more than 5 meals per day is 13, correct to the nearest integer.

(2)

- (e) Use your graphic display calculator to find the χ^2_{calc} for this data.

(2)

- (f) Decide whether H_0 must be accepted. Justify your answer.

(2)

(Total 9 marks)