1. The table gives information about the selling price and the mileages of 8 used cars.

Selling price (to the nearest £500)		Mileage (to the nearest 1000 miles)		d	d^2
11 000	3	78 000	2	1	1
8500	6	65 000	3	3	9
9500	4	39 000	5	1	1
7000	7	34 000	6	1	1
12 500	2	23 000	7	5	25
5000	8	105 000	1	7	49
9000	5	48 000	4	1	1
14 000	1	20 000	8	7	49
					136

(*a*) Calculate Spearman's coefficient of rank correlation for this information.

$$1 - \frac{6\sum d^2}{n(n^2-1)}$$

$$1 - \frac{6(136)}{8(8^2-1)}$$

$$= -0.619 \text{ (3sf)}$$

−0.619

(4)

(*b*) (i) Interpret the correlation between the selling price and the mileage of these used cars.

as Milage increases so selling price decreases

(ii) Comment on the strength of the correlation.

It is quite a strong correlation → close to −1 (perfect correlation) than to 0 (no correlation)

(2)

(Total for Question 1 is 6 marks)

2. Mrs Smith and Mrs Patel ranked the work of 8 students.
The table gives information about their ranks.

Student	Rank (Mrs Smith)	Rank (Mrs Patel)	d	d^2
A	4	6	2	4
B	8	4	4	16
C	1	3	2	4
D	6	1	5	25
E	2	7	5	25
F	7	8	1	1
G	3	2	1	1
H	5	5	0	0
				76

(i) Calculate Spearman's coefficient of rank correlation for this information.

$$1 - \frac{6\Sigma d^2}{n(n^2-1)}$$

$$1 - \frac{6(76)}{8(8^2-1)}$$

$$= 0.095 \ (3sf)$$

0.095

(ii) Interpret your answer.

There does not seem to be a relationship between the Ranks of Mrs Smith & Mrs Patel

(Total for Question 2 is 4 marks)

3. The table gives information about the heights, in cm, of ten athletes and their positions in a throwing competition.

Athlete	Height (cm)	Position	Rank Height	d	d^2
A	112	8	10	2	4
B	114	9	9	0	0
C	123	7	8	1	1
D	128	5	7	2	4
E	134	10	6	4	16
F	146	3	5	2	4
G	148	4	4	0	0
H	151	6	3	3	9
I	154	1	2	1	1
J	158	2	1	1	1
					40

(*a*) Work out Spearman's rank correlation coefficient for these data.

You may use the blank columns in the table to help with your calculations.

$$1 - \frac{6\Sigma d^2}{n(n^2-1)}$$

$$1 - \frac{6(40)}{10(10^2-1)}$$

$$= 0.758 \text{ (3sf)}$$

0.758

(3)

(*b*) Interpret your answer to part (*a*).

As the athletes height increases their position increases (positive correlation)

(1)

(Total for Question 3 is 4 marks)

4. Dr Farah collected some information about the Body Mass Index (BMI) and the finishing position in a marathon for each of ten male adults.

The table shows this information.

Adult	BMI	Finishing position	Rank of BMI	d	d^2
A	18.4	3	10	7	49
B	19.5	2	9	7	49
C	19.8	1	8	7	49
D	20.5	6	7	1	1
E	21.2	4	6	2	4
F	22.5	5	5	0	0
G	23.7	9	4	5	25
H	25.3	10	3	7	49
I	26.7	7	2	5	25
J	29.3	8	1	7	49
					300

(*a*) Calculate Spearman's coefficient of rank correlation for this information.

You may use the columns in the table to help with your calculations.

$$1 - \frac{6(300)}{10(10^2 - 1)}$$

-0.818 (3sf)

(3)

(*b*) (i) Describe the correlation.

negative.

(ii) Interpret the correlation in the context of the information in the table.

People with a higher BMI took longer to complete the race.

(2)

(Total for Question 4 is 5 marks)

5 8 people were in a cake baking competition.

Judge X and Judge Y each put the cakes in rank order.

Rank 1 is for the best cake.

Here are the results.

Cake	Judge X	Judge Y	d	d^2
A	1	5	4	16
B	6	8	2	4
C	2	4	2	4
D	5	2	3	9
E	4	1	3	9
F	3	7	4	16
G	7	6	1	1
H	8	3	5	25
				84

(*a*) Work our Spearman's coefficient of rank correlation for the information in the table.
You may use the blank columns in the table to help you with your calculations.

$$1 - \frac{6\Sigma d^2}{n(n^2-1)}$$

$$1 - \frac{6(84)}{8(8^2-1)} = 0$$

0

(3)

(*b*) Interpret your answer to part (*a*).

There is no relationship between the rank of judge X and judge Y

(1)

(Total for Question 5 is 4 marks)