National 5 Statistics

Solutions can be found from the school maths website

(http://www.dunblanehighschool.org.uk/maths/course/national-5/nat-5-past-papers/)

1. 01 P2

The price, in pence per litre, of petrol at 10 city garages is shown below.

84·2	84·4	85·1	83·9	81·0
84·2	85·6	85·2	84·9	84·8

(*a*) Calculate the mean and standard deviation of these prices.

(*b*) In 10 rural garages, the petrol prices had a mean of 88·8 and a standard deviation of 2·4.

How do the rural prices compare with the city prices?

2. 01 P1

A furniture maker investigates the delivery times, in days, of two local wood companies and obtains the following data.

Company	*Minimum*	*Maximum*	*Lower Quartile*	*Median*	*Upper Quartile*
Timberplan	16	56	34	38	45
Allwoods	18	53	22	36	49

(*a*) Draw an appropriate statistical diagram to illustrate these two sets of data.

(*b*) Given that consistency of delivery is the most important factor, which company should the furniture maker use? Give a reason for your answer.

3. 02 P1

Fifteen medical centres each **handed out** a questionnaire to fifty patients.

The numbers who replied to each centre are shown below.

11	19	22	25	25
29	31	34	36	38
40	46	49	50	50

Also, they each **posted** the questionnaire to another fifty patients.

The numbers who replied to each centre are shown below.

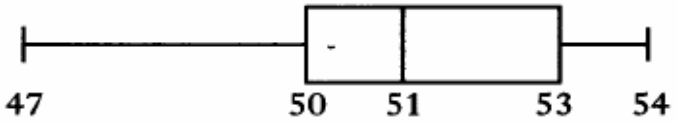
15	15	21	22	23
25	26	31	33	34
37	39	41	46	46

Draw an appropriate statistical diagram to compare these two sets of data.

4. 03 P1

A random check is carried out on the contents of a number of matchboxes.

A summary of the results is shown in the boxplot below.



What percentage of matchboxes contains fewer than 50 matches?

5. 03 P2

Fiona checks out the price of a litre of milk in several shops.

The prices in pence are:

49 44 41 52 47 43.

(*a*) Find the mean price of a litre of milk.

(*b*) Find the standard deviation of the prices.

(*c*) Fiona also checks out the price of a kilogram of sugar in the same shops and finds that the standard deviation of the prices is 2·6.

Make one valid comparison between the two sets of prices.

6. 04 P1

5. **The average monthly temperature in a holiday resort was recorded in degrees Celsius (°C).**

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Average Temperature (°C)	1	8	8	10	15	22	23	24	20	14	9	4

Draw a suitable statistical diagram to illustrate the median and the quartiles of this data.

7. 04 P2

Bottles of juice should contain 50 millilitres.

The contents of 7 bottles are checked in a random sample.

The actual volumes in millilitres are as shown below.

52, 50, 51, 49, 52, 53, 50

Calculate the mean and standard deviation of the sample.

8. 05 P2

The running times in minutes, of 6 television programmes are:

77 91 84 71 79 75.

Calculate the mean and standard deviation of these times.

9. 06 P2

(*a*) The pulse rates, in beats per minute, of 6 adults in a hospital waiting area are:

68 73 86 72 82 78.

Calculate the mean and standard deviation of this data.

(*b*) 6 children in the same waiting area have a mean pulse rate of 89·6 beats per minute and a standard deviation of 5·4.

Make **two** valid comparisons between the children's pulse rates and those of the adults.

10. 07 P2	(*a*) During his lunch hour, Luke records the number of birds that visit his bird-table. The numbers recorded last week were: 28 32 14 19 18 26 31. Find the mean and standard deviation for this data. (*b*) Over the same period, Luke's friend, Erin also recorded the number of birds visiting her bird-table. Erin's recordings have a mean of 25 and a standard deviation of 5. Make **two** valid comparisons between the friends' recordings.
11. 09 P2	Tom looked at the cost of 10 different flights to New York. He calculated that the mean cost was £360 and the standard deviation was £74. A tax of £12 is then added to each flight Write down the new mean and standard deviation.
12. 10 P2	A machine is used to put drawing pins into boxes. A sample of 8 boxes is taken and the number of drawing pins in each is counted. The results are shown below: 102 102 101 98 99 101 103 102 (*a*) Calculate the mean and standard deviation of this sample. (*b*) A sample of 8 boxes is taken from another machine. This sample has a mean of 103 and a standard deviation of 2·1. Write down two valid comparisons between the samples.

13. 12 P2

Before training, athletes were tested on how many sit-ups they could do in one minute.

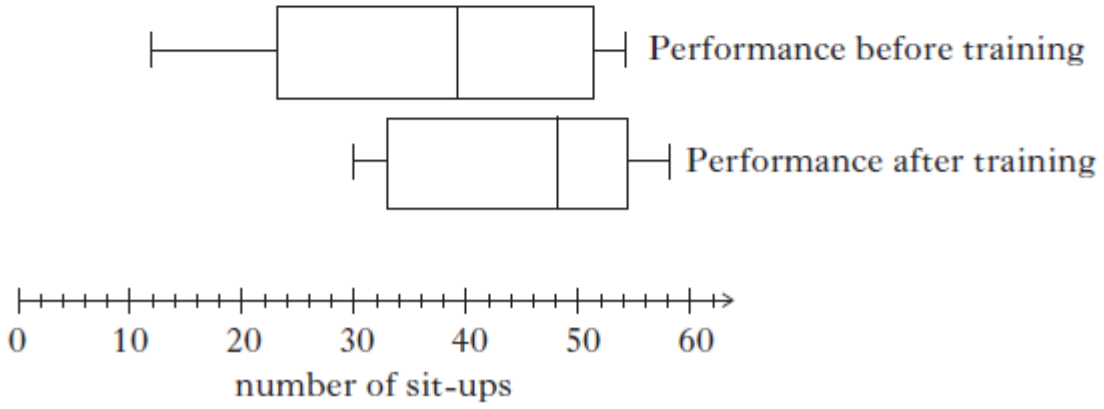
The following information was obtained:

lower quartile (Q_1)	23
median (Q_2)	39
upper quartile (Q_3)	51

(*a*) Calculate the semi-interquartile range.

After training, the athletes were tested again.

Both sets of data are displayed as boxplots.



(*b*) Make **two** valid statements to compare the performances before and after training.

14. 13 P1

A group of people attended a course to help them stop smoking.

The following table shows the statistics before and after the course.

	Mean number of cigarettes smoked per person per day	***Standard deviation***
Before	20·8	8·5
After	9·6	12·0

Make **two** valid comments about these results.

15. 14 P2	A runner has recorded her times, in seconds, for six different laps of a running track. 53 57 58 60 55 56 (a) (i) Calculate the mean of these lap times. Show clearly all your working. (ii) Calculate the standard deviation of these lap times. Show clearly all your working. (b) She changes her training routine hoping to improve her consistency. After this change, she records her times for another six laps. The mean is 55 seconds and the standard deviation 3·2 seconds. Has the new training routine improved her consistency? Give a reason for your answer.
16. 15 P1	The standard deviation of 1, 2, 2, 2, 8 is equal to $\sqrt{a}$. Find the value of a.
17. 15 P1	Ten couples took part in a dance competition. The couples were given a score in each round. The scores in the first round were 16 27 12 18 26 21 27 22 18 17 (a) Calculate the median and semi-interquartile range of these scores. (b) In the second round, the median was 26 and the semi-interquartile range was 2·5. Make two valid comparisons between the scores in the first and second rounds.

18. 16 P2	Jack called his internet provider on six occasions to report connection problems. On each occasion he noted the length of time he had to wait before speaking to an adviser. The times (in minutes) were as follows: 13 16 10 22 5 12 (a) Calculate the mean and standard deviation of these times. (b) Sophie also called the same internet provider, on several occasions, to report connection problems. Her mean waiting time was 15 minutes and the standard deviation was 4·3 minutes. Make two valid comments comparing Sophie's waiting times with Jack's waiting times.
19. 17 P1	The number of calls received by the police was recorded over 10 days. The results are shown below. 198 216 218 230 232 247 248 250 265 267 Find the semi-interquartile range of this data.
20. 17 P1	Gym members are asked to fill out a questionnaire to rate the quality of service provided. They are asked to give a rating on a scale of 1 to 6. The ratings given by five members were as follows: 1 4 6 3 6 In its simplest form, the standard deviation of these ratings can be written as $\frac{a\sqrt{b}}{2}$. Find the values of a and b.

21. 18 P2	A farmers' market took place one weekend. Stallholders were asked to record the number of customers who visited their stall. The number of customers who visited six of the stalls on Saturday were as follows: 120 126 125 131 130 124 (a) Calculate the mean and standard deviation of the number of customers. The mean number of customers who visited these six stalls on Sunday was 117 and the standard deviation was 6·2. (b) Make two valid comments comparing the number of customers who visited these stalls on Saturday and Sunday.
22. 19 P1	The midday temperatures in Grantford were recorded over a nine day period. The temperatures, in °C, were 4 7 4 3 6 10 9 5 3 (a) Calculate the median and semi-interquartile range for these temperatures. Over the same nine day period the midday temperatures in Endoch were also recorded. The median temperature was 8 °C, and the semi-interquartile range was 1·5 °C. (b) Make two valid comments comparing the midday temperatures of Grantford and Endoch during this period.