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National 5 Maths
Mean and Standard Deviation

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THE SCREEN

A frozen food company uses machines to pack sprouts into bags.

A sample of six bags is taken from Machine A and the number of sprouts in each bag is counted.

The results are shown below.

23	19	21	20	19	24

(a) Calculate the mean and standard deviation of this sample.   **3**

(b) Another sample of six bags is taken from Machine B.

    This sample has a mean of 19 and a standard deviation of 2·3.

    Write down two valid comparisons between the samples.   **2**

Answers:

(a)   Mean = 21

        Standard deviation = 2.1

(b)   Machine A, on average, packs more sprouts into a bag.

        The number of sprouts packed in a bag by Machine A is more consistent.

        (or equivalent statements)

A runner has recorded her times, in seconds, for six different laps of a running track.

$$53 \quad 57 \quad 58 \quad 60 \quad 55 \quad 56$$

(a) (i) Calculate the mean of these lap times.
  Show clearly all your working. 1

  (ii) Calculate the standard deviation of these lap times.
  Show clearly all your working. 3

(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. 1

Answers:

  (a) (i) 56.5

   (ii) 2.4

  (b) No, because her standard deviation has increased (or equivalent reason).

The standard deviation of 1, 2, 2, 2, 8 is equal to $\sqrt{a}$.

Find the value of a.   **3**

Answer:

8

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. **4**

(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. **2**

Answers:

(a)   Mean = 13 minutes

Standard deviation = 5.7 minutes (approximately)

(b)   On average, Sophie's waiting times were longer.

Sophie's waiting times were more consistent.

(or equivalent statements)

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:

$$1 \quad 4 \quad 6 \quad 3 \quad 6$$

In its simplest form, the standard deviation of these ratings can be written as $\dfrac{a\sqrt{b}}{2}$.

Find the values of a and b. **4**

Answers:

$a = 3$
$b = 2$

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.   **4**

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.   **2**

Answers:

(a)   Mean = 126

           Standard deviation = 4.05 (approx.)

(b)   On average, the number of customers was higher on Saturday.

           The number of customers was less varied on Saturday.

           (or equivalent statements)

A company operates a bus route from the city centre to the airport.

The number of passengers on six of its buses on a Monday was

32   27   34   29   31   33.

(a) Calculate the mean and standard deviation of the number of passengers.   **4**

(b) The mean number of passengers the following Saturday was 28 and the standard deviation was 3·2.

Make two valid comments comparing the number of passengers on each bus on Monday and Saturday.   **2**

Answers:

(a)   Mean = 31

Standard deviation = 2.6 (approx.)

(b)   On average, there were more passengers on Monday.

The number of passengers was more consistent on Monday.

(or equivalent statements)

A school netball team recorded the number of sit-ups each player completed in a minute.

The numbers for the seven players were:

29   27   24   31   22   19   30

(a) Calculate the mean and standard deviation of the numbers of sit-ups.   **4**

Some players in the school's hockey team also recorded the number of sit-ups they completed in a minute.

Their numbers gave a mean of 29 and a standard deviation of 3.2.

(b) Make two valid comments comparing the numbers of sit-ups of the players in the netball team and the hockey team.   **2**

Answers:

(a)   Mean = 26

Standard deviation = 4.47

(b)   On average, the hockey team recorded a higher number of sit-ups.

The hockey team's numbers of sit-ups were more consistent.

(or equivalent statements)