



Standardised scores

About 45 minutes Calculator allowed 38 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

A1 Needed today [2 marks] **A2** Last lesson [2 marks]

For 15 members of a gym, x is the age of each. $\sum x = 405$ and $\sum x^2 = 11265$. Work out the mean and the standard deviation of x . Give the standard deviation to 2 decimal places.

Answer

The data on the ages of people at a cinema have mean 69, median 70 and standard deviation 6. Work out the skewness using $3(\text{mean} - \text{median}) \div \text{standard deviation}$, to 2 decimal places, and say whether the skew is positive or negative.

Answer

A3 Maths skill [2 marks] **A4** Maths skill [2 marks]

$a = 70$ and $b = 120$, both correct to the nearest 10. Work out the upper bound of $a + b$.

Answer

Ali has £120. He spends $\frac{3}{4}$ of it on a coat and $\frac{4}{5}$ of what is left on shoes. How much money does he have left?

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

The marks in a test have a mean of 62 and a standard deviation of 8. Ana scored 74. Work out her standardised score, using

$$\text{standardised score} = \frac{\text{value} - \text{mean}}{\text{standard deviation}}.$$

Hint Take the mean away from Ana's mark, then divide by the standard deviation.

B1 [2 marks]

The times taken to finish a quiz have a mean of 45.2 minutes and a standard deviation of 6.4 minutes. Ben took 37.2 minutes. Work out his standardised score.

Answer

EXAMPLE 2

In the long jump, Cara's standardised score is -0.8 compared with the other girls in her year. What does this tell you about her jump?

Hint The sign says above or below the mean. The size says how many standard deviations away.

B2 A dog's mass has a standardised score of 2.1 compared with other dogs of the same breed. What does this tell you about the dog's mass? [2 marks]

EXAMPLE 3

Mo scored 68 in Maths, where the mean was 60 and the standard deviation was 5. He scored 72 in English, where the mean was 65 and the standard deviation was 4. In which subject did he do better, compared with the other students?

Hint Work out a standardised score for each subject, then compare them.

B3 Zara scored 58 in Biology, where the mean was 50 and the standard deviation was 10. She scored 49 in Physics, where the mean was 45 and the standard deviation was 4. In which subject did she do better, compared with the other students? Show your working. [3 marks]

Answer

EXAMPLE 4

In a test with a mean of 70 and a standard deviation of 5, Dev's standardised score was -1.2 . Work out Dev's mark.

Hint $\text{Mark} = \text{mean} + \text{standardised score} \times \text{standard deviation}$.

B4 The masses of some pumpkins have a mean of 140 kg and a standard deviation of 20 kg. One pumpkin has a standardised score of 0.65 . Work out its mass. [2 marks]

Answer

c Practice

C1 In a test with a mean of 70, Freya scored 86. Her standardised score was 2. Work out the standard deviation of the marks. [2 marks]

Answer

C2 Eva and Kai took the same test. Eva's standardised score was -0.5 and Kai's was -1.4 . Who did better? Give a reason. [1 mark]

C3 Sophie scored 54 in History, where the mean was 48 and the standard deviation was 4. She scored 61 in Geography, where the mean was 52 and the standard deviation was 6. Compare how well she did in the two subjects.

[3 marks]

C4 Here are the numbers of goals scored by 5 players in a season.
4, 6, 7, 9, 14
Work out the standardised score for the player who scored 14 goals.

[3 marks]

Answer

D Exam-style questions

D1 Lily's standardised score in French was -0.4 . In Spanish it was -1.1 .
Lily says, "My Spanish score is further from 0, so I did better in Spanish."
Is Lily right? Give a reason.

[3 marks]

D2 Ali runs in two races. In the 100 m race his time was 12.4 seconds; the times of all the runners had a mean of 13.0 seconds and a standard deviation of 0.4 seconds. In the 200 m race his time was 25.9 seconds; the mean was 27.1 seconds and the standard deviation was 1.0 second.

(a) Work out Ali's standardised score in each race.

[3 marks]

Answer 100 m 200 m

(b) In which race did Ali do better, compared with the other runners? Give a reason.

[2 marks]

Total for D2: 5 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 In a test, a mark of 70 has a standardised score of 1.5 and a mark of 46 has a standardised score of -0.5 . [4 marks]

Work out the mark that has a standardised score of 0.25.

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Write each mark as mean + score $\times$ standard deviation. That gives two equations.
- Hint 2** $70 = m + 1.5s$ and $46 = m - 0.5s$. Subtract: $24 = 2s$.
- Hint 3** So $s = 12$ and $m = 52$. Now use the score of 0.25.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can work out a standardised score and say what it means relative to the group. ☐ ☐ ☐

I can compare results in two tests using standardised scores. ☐ ☐ ☐

I can work back from a standardised score to the value. ☐ ☐ ☐