MATHEMATICS · GRADES 10-12

Mean and standard deviation

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you sum up a set of numbers with its centre and its spread, like a class average and how far most marks sit from it. The mean tells you where the middle is, and the standard deviation tells you whether the numbers cluster tightly around it or spread out wide. Together they describe a whole set of numbers in two values, which is how a teacher judges a class, how a factory checks quality, or how a coach sees whether a team is consistent or up and down.



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Worked examples

EXAMPLE 1

Q Find the mean of 2, 4, 6.

SOLUTION

Add: $2 + 4 + 6 = 12$

Divide by how many values: $\frac{12}{3}$.

Mean = 4

EXAMPLE 2

Q Find the standard deviation of 2, 4, 6, treating them as the whole population.

SOLUTION

Mean is 4. Squared differences: $(2 - 4)^2 = 4$, $(4 - 4)^2 = 0$, $(6 - 4)^2 = 4$.

Variance = $\frac{(4 + 0 + 4)}{3} = \frac{8}{3}$, about 2.67

Standard deviation = $\sqrt{(8 \div 3)} = \sqrt{2.67}$, about 1.63

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Practice questions

1 Four friends score 1, 2, 3, and 4 goals in a season. What is the mean number of goals?

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2 The mean price of three books is $20. Two of the books cost $10 and $30. What does the third book cost?

A $10

B $20

C $30

D $60

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3 Three quizzes all score 5. One more quiz scores 8. What is the new mean?

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4 Two classes have the same mean mark but different standard deviations. What does the standard deviation measure?

A The most common value

B Spread around the mean

C The middle value

D The total of the values

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5 Two buses carry 0 and 10 passengers. What is the variance of the numbers of passengers?

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6 Three identical boxes each weigh 3 kg. What is the standard deviation of their weights?

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7 Four plants are 8 cm, 9 cm, 11 cm, and 12 cm tall. What is the range of the heights?

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8 **Which set of numbers has the greater standard deviation: 1, 2, 3 or 1, 5, 9?**

- **A** 1, 2, 3
- **B** 1, 5, 9
- **C** They are equal
- **D** Cannot tell

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9 **Three runners finish in 2, 3, and 7 minutes. The slowest runner is removed. What is the mean time of the other two?**

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10 **Two test marks are 0 and 4, treating them as the whole population. What is the standard deviation?**

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ANSWER KEY

1. 2.5

2. $20

3. 5.75

4. Spread around the mean

5. 25

6. 0

7. 4

8. 1, 5, 9

9. 2.5

10. 2

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