Example

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How to Find the Mean

The mean is the **average** of the numbers.

It is easy to calculate: **add up** all the numbers, then **divide by how many** numbers there are.

In other words it is the **sum** divided by the **count**.

Example 1: What is the Mean of these numbers?

- 6, 11, 7
- Add the numbers: **6 + 11 + 7 = 24**
- Divide by *how many* numbers (there are 3 numbers): **24 / 3 = 8**

The Mean is 8

Example 2: Look at these numbers:

3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29

The sum of these numbers is 330

There are fifteen numbers.

The mean is equal to 330 / 15 = 22

The mean of the above numbers is 22

Negative Numbers

How do you handle negative numbers? Adding a negative number is the same as subtracting the number (without the negative). For example 3 + (−2) = 3−2 = 1.

Example 3: Find the mean of these numbers:

3, −7, 5, 13, −2

- The sum of these numbers is **3 − 7 + 5 + 13 − 2 = 12**
- There are **5** numbers.
- The mean is equal to **12 ÷ 5 = 2.4**

The mean of the above numbers is 2.4

Here is how to do it one line:

Mean = *3 − 7 + 5 + 13 − 2***5** = *12***5** = **2.4**

Average weight of a group of chimpanzees

- Chimp 1 weighs 47 kg
- Chimp 2 weighs 60 kg
- Chimp 3 weighs 47 kg
- Chimp 4 weighs 44 kg

- What is the mean of the numbers 8, 9, 13 and 18?

Add the numbers: 8 + 9 + 13 + 18 = 48

Divide by how many numbers (i.e. we added 4 numbers).

Then 48 ÷ 4 = 12.

Sam scored the following grades in his end of year exams:

Subject	Grade
Math	51%
English	62%
Science	70%
Geography	39%
History	81%
Economics	57%

What was his mean grade?

Add the grades: 51 + 62 + 70 + 39 + 81 + 57 = 360

Divide by how many grades (i.e. we added 6 grades)
360 ÷ 6 = 60

So his mean grade was 60%

A booklet has 12 pages with the following numbers of words:
271, 354, 296, 301, 333, 326, 285, 298, 327, 316, 287 and 314

What is the mean number of words per page?

The total number of words
= 271 + 354 + 296 + 301 + 333 + 326 + 285 + 298 + 327 + 316 + 287 + 314
= 3,708

There are 12 pages

The mean number of words per page = 3,708 ÷ 12 = 309

What is the mean of these numbers:

12, -1, 8, 2, -10, 0, -5, 3, 20, -2

The sum of these numbers is
12 + (-1) + 8 + 2 + (-10) + 0 + (-5) + 3 + 20 + (-2)
= 27

There are 10 numbers.

The mean is equal to 27 ÷ 10 = 2.7

The average mark scored by 29 students in a science test was 56%

John was sick, so sat the test late and scored 71%
Including John's, what was the new value of the mean mark?

The mean mark of 29 students = 56, so the total marks of 29 students = 29 × 56 = 1,624

So the total marks of 30 students (including John's) = 1,624 + 71 = 1,695

And the mean for all 30 students = 1,695 ÷ 30 = 56.5

Median Value

The Median is the ***"middle"*** of a sorted list of numbers.

How to Find the Median Value

To find the Median, place the numbers in **value order** and find the **middle**.

Example: find the Median of **12, 3 and 5**

Put them in order:

3, 5, 12

The middle is **5**, so the median is **5**.

Example:

3, 13, 7, 5, 21, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29

When we put those numbers in order we have:

3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 39, 40, 56

There are **fifteen** numbers. Our middle is the **eighth** number:

3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 39, 40, 56

The median value of this set of numbers is **23**.

(It doesn't matter that some numbers are the same in the list.)

Two Numbers in the Middle

BUT, with an **even amount of numbers** things are slightly different.

In that case we find the **middle pair** of numbers, and then find the value that is **half way** between them. This is easily done by adding them together and dividing by two.

Example:

3, 13, 7, 5, 21, 23, 23, 40, 23, 14, 12, 56, 23, 29

When we put those numbers in order we have:

3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 40, 56

There are now **fourteen** numbers and so we don't have just one middle number, we have a **pair of middle numbers**:

3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 40, 56

In this example the middle numbers are **21 and 23**.

To find the value halfway between them, add them together and divide by 2:

21 + 23 = 44
then **44 ÷ 2 = 22**

So the **Median** in this example is **22**.

Where is the Middle?

A quick way to find the middle: **count how many numbers, add 1 then divide by 2**

Example: There are 45 numbers

45 plus 1 is 46, then divide by 2 and we get **23**

So the median is the **23rd number** in the sorted list.

Example: There are 66 numbers

66 plus 1 is 67, then divide by 2 and we get **33.5**

33 and a half? That means that the **33rd and 34th** numbers in the sorted list are the two middle numbers.

So to find the median: add the **33rd and 34th** numbers together and divide by 2.

What is the median of the numbers 4, 2, 11, 6, 2 ?

Put the numbers in order first: 2, 2, **4**, 6, 11

The median is the middle number = 4

What is the median of the numbers 3, 11, 6, 5, 4, 7, 12, 3 and 10 ?

Put the numbers in order first: 3, 3, 4, 5, **6**, 7, 10, 11, 12

The median is the middle number = 6

What is the median of the numbers 4, 2, 11, 6, 2, 9 ?

SOL:

Put the numbers in order first: 2, 2, **4, 6**, 9, 11

There are two numbers in the middle: 4 and 6.

The average of 4 and 6 is (4+6)/2 = 10/2 = 5

So the median is 5

What is the median of the numbers 75, 83, 69, 56, 71, 80, 65, 67, 77 and 44 ?

SOL: Put the numbers in order first: 44, 56, 65, 67, **69, 71**, 75, 77, 80, 83

There are two numbers in the middle: 69 and 71

The average of 69 and 71 is (69 + 71)/2 = 140/2 = 70

So the median is 70

A booklet has 12 pages with the following numbers of words:
271, 354, 296, 301, 333, 326, 285, 298, 327, 316, 287 and 314

What is the median number of words per page?

SOL: Put the numbers of pages in order first: 271, 285, 287, 296, 298, **301, 314**, 316, 326, 327, 333, 354

There are two numbers in the middle: 301 and 314

The average of 301 and 314 is (301 + 314)/2 = 615/2 = 307.5

So the median number of words is 307.5

What extra number must be included with the following list of numbers to decrease the median by 3?

24, 14, 18, 28, 3, 9

SOL:

First put the list of numbers in order:
3, 9, 14, 18, 24, 28

The median of these six numbers is the mean of the two middle numbers = (14 + 18)/2 = 32/2 = 16

If the median is decreased by 3 to 13, then the middle number of the new list of seven numbers must be 13

SOL:

If we try to add 13 we get:
3, 9, 13, 14, 18, 24, 28

But now the median is 14.

So there is no extra number that will decrease the median by 3