



**THIRD SPACE
LEARNING**

Math Intervention Pack

Calculating mean and median

Grade 6

How To Use This Resource

1. Title Slide

Use this slide to activate prior knowledge needed for lesson. Students should be encouraged to initially attempt the question presented independently.

2. Prior Learning

Use this slide to review the knowledge that will be required to be successful in this lesson. If students feel confident on the prior learning section of the Title Slide then this slide can be skipped

3. Let's Learn

Use this slide to introduce the concept. Tutors should work with the student to explore the concept together, usually using diagrams to support understanding.

4. Follow Me + Your Turn

The tutor should work through the follow me slide, modeling the process and explaining their thinking out loud.

Students should use the your turn slide as an opportunity to work through a question similar to the follow me questions. They should apply the method modeled by the tutor in the follow me slide. Students should be encouraged to explain their thinking out loud.

5. You Do

Students should work through a range of questions that build in complexity.

Tutors can offer support but students should initially be encouraged to attempt these questions independently.

6. Go Further

Use this slide to allow students to apply their understanding to a more challenging question in an unfamiliar context.

How To Use This Resource

7. Support for Slides

The support slide is used to support students during the lesson. In the tutor notes, there will be guidance as to when to use the support slide.

8. Check Your Understanding

Tutors should use this slide to assess the student's knowledge and whether or not they have mastered the concept within the lesson.

Standard

6.SP.B.5c - Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Key Mathematical Ideas

1. Find the median of a data set.
2. Calculate the mean of a data set.

Overview

Terminology:

- **Mean:** The sum of the numbers in a set of data divided by the number of pieces of data; usually called “average”; arithmetic mean.
- **Median:** The number in the middle of a set of data when the data was arranged in order.

2.2) Sentence stems:

- The first step to solve is...
- The second step to solve is...

Overview

Common Misconceptions

Common Misconceptions	Tutoring Strategies	Checks for Understanding
Confusing the terms median and mean.	Highlight each term as it appears in the slides and repeatedly talk about or ask questions using the terms median and mean.	Ask students... <ul style="list-style-type: none">• What is the median?• What is the mean?• How are the median and mean similar and different?

Title Slide

If students...

get both sections correct:

- start at You do
- miss the learning goal section only:
 - start at Let's Learn
- miss the prior learning section:
 - start at Prior Learning

Prior Learning

If stuck...

After writing all decimals out to the hundredths position, encourage students to think about the values like money.

- If stuck on the place value chart, use the number line first, instead of comparing to it once the numbers have been ordered.

Let's Learn

If stuck

- Use a calculator to perform any calculations - performing the operations is not the focus of this lesson.

Questions

- a) Why do we need to put the data set in order first? (If the data set is not in order, it will be hard to tell what the middle value is.)
- b) How much of the data is below the median? (Half - since the median is in the middle of the data.)
- b) How much of the data is above the median? (Half - since the median is in the middle of the data.)
- d) How is the mean different from the median? (The median is the center value. The mean is calculated by sharing all the values equally.)

Watch out for

- Students who don't write all instances of a data point - for example, writing 10 once.
-

Answers

- a) 5, 10, 10, 12, 16, 20, 20, 25
- b) Median = 14
- c) 118
- d) 14.75

Follow me

Modeling prompts

- First follow the steps to find the median.
- Then consider how the median does or does not represent that data. (Most of the data points are 0-3, which are represented by the median. However, the data point of 15 is quite far away.)
- Follow the steps to calculate the mean.
- Then consider how the mean does or does not represent that data. (Most of the data points are 0-3, which are represented by the mean of 2.85. However, the data point of 15 is quite far away.)

Answers

- 1a) 0, 0, 0, 1, 1, 2, 2, 2, 3, 3, 3, 5, 15
- 1b) 2
- 2a) 37
- b) 2.85 (2dp)

Your turn

If stuck

- Use similar guidance given in the Modeling prompts.
- Use a calculator to perform any calculations - performing the operations is not the focus of this lesson.

Questions

- 3a) Why do we need to put the data set in order first? (If the data set is not in order, it will be hard to tell what the middle value is.)
- 3b) How much of the data is below the median? (Half - since the median is in the middle of the data.)
- 3b) How does the median summarize the data set? (All of the data points are 2-12, which are represented by the median of 5.)
- 4a) How is the mean different from the median? (The median is the center value. The mean is calculated by sharing all the values equally.)
- 4b) Why is the mean not the same as any of the data points? (The mean is the data points evenly shared and the adding, then dividing that calculates the mean does not lead to a number that is a data point.)
- 4b) How does the mean summarize the data set? (All of the data points are 2-12, which are represented by the mean of 6.4. The mean is a little higher since the data points 11 and 12 are a little bigger.)

Watch out for

- Students who don't write all instances of a data point - for example, writing 5 once instead of three times in 3a.

Answers

- 3a) 2, 3, 3, 4, 4, 5, 5, 5, 7, 7, 8, 9, 11, 11, 12
- b) 5
- 4a) 96
- b) 6.4

You do

If stuck

- Use a calculator to perform any calculations - performing the operations is not the focus of this lesson.
- Complete Support slide together to use a model to calculate the mean in 1b.

Questions

- 1a) How do you find the median? (Put the numbers in order and find the middle number.)
- 1b) How do you calculate the mean? (Add all the data points together and divide by the number of data points.)
- 1b) Why are the median and mean the same? (If we look at the data set in order, the data points are perfectly balanced around 3. There are two 2s and two 4s, which are both one away from the median. There is also a 1 and 5, which are both two away from the median.)
- 2b) Why is the mean not the same as any of the data points? (The mean is the data points evenly shared and the adding, then dividing that calculates the mean does not lead to a number that is a data point.)
- 2b) How is the mean different from the median? (The median is the center value. The mean is calculated by sharing all the values equally.)
- 3a) Why is the median not in the data set? (Since the data set has an even number, we have to go in between two data points, to a number that is not a data point.)

Watch out for

- Students who don't write all instances of a data point - for example, writing 25 once instead of twice times in 2a.
- Students who make decimal calculation errors.

Answers

- 1a) 3, b) $24 \div 8 = 3$
- 2a) 10, b) $145 \div 12 = 12.1$
- 3a) 3.45, b) $27.7 \div 8 = 3.4625$

Go further

If stuck

- Use a calculator to perform any calculations - performing the operations is not the focus of this lesson.

Questions

- b) How do the new data points impact the median? (Both a and b's median increases by two data points to 7, since the new data points were larger than the median.)
- b) How do the new data points impact the mean? (The mean from a almost doubled since the added data points were much larger than the others. The mean from b increased only a little, since the new data points were only a little bigger than the previous mean.)

Watch out for

- Students who are not paying attention to where the new data points are added and how this impacts the median and mean - this is the purpose of this slide.

Answers

- a) Median = 6, Mean = 9.76 (1dp)
- b) Median = 6 , Mean = 6.59 (1dp)

Support for Slide(s)

If stuck

- Complete the model with the student, explaining how moving each part balances out the number of squares in each stack.

Questions

- What happened when we shared the data points equally? (Each stack was 3 squares high.)
- How does the model show the procedure for the mean? (It shows sharing all the squares, 24, between 8 different stacks, where each stack represents one data point.)

Answers

- a) $2 + 5 + 1 + 4 + 2 + 4 + 3 + 3 = 24$
- b) $24 \div 8 = 3$

Assessment question:

Correct answer:

- a. 128.5
- b. 127.875

Today you will learn about

Calculating mean and median



Learning Goal

Find the median and mean of the data set.
Data set: 22, 34, 33, 29, 15, 18, 40, 21, 31, 32

a Median:

b Mean:

Prior Learning

Order the decimals from least to greatest.
2.03, 3.1, 2.2, 3.0, 2.8, 2.7, 3.05

..... ' ' ' ' ' '

Prior learning

Before we can calculate the mean and median, we need to know how to **order rational numbers**.

We use place value to order rational numbers.

2.03, 3.1, 2.2, 3.0, 2.8, 2.7, 3.05

a Write each number above in the place value chart.

O	$\frac{1}{10}$	$\frac{1}{100}$

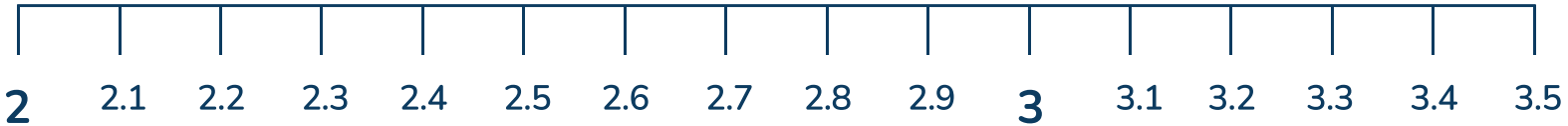
O	$\frac{1}{10}$	$\frac{1}{100}$

b Compare each place value position (largest to smallest).

c Use the comparison to order the numbers.

.....,,,,,,

Look at the order on a number line...



Let's learn

We can use the **median** or **mean** to summarize a data set by its center.

Data set (travel time to school - minutes): 5, 10, 16, 20, 25, 20, 10, 12

The median is the middle number of a data set.

- a First, put the data set in order from least to greatest.

.....,,,,,,,

- b Then find the middle data point.

For an even numbered data set, there are two data points in the middle.
The value in the exact middle of those two numbers is the median.



The mean is often called the average and is calculated by equally sharing the data points.

- c First, add up all the data points.

Sum of the data points:

- d Then, divide by the total number of data points.

..... ÷ =



Follow me



- 1

Find the median of the data set below.

Total number of pets:

0, 5, 3, 2, 2, 1, 0, 3, 1, 2, 15, 0, 3

a

First, put the data set in order from least to greatest.

.....

b

Then find the middle data point.
- 2

Find the mean of the data set above.

a

First, add up all the data points.

Sum of the data points:

b

Then, divide by the total number of data points.

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-
- Your turn
-
- 3

Find the median of the data set below.

Total books read this month:

3, 4, 9, 11, 3, 7, 12, 11, 5, 7, 8, 4, 5, 5, 2

a

First, put the data set in order from least to greatest.

.....

b

Then find the middle data point.

4

Find the mean of the data set above.

a

First, add up all the data points.

Sum of the data points:

b

Then, divide by the total number of data points.

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You do

Find the median and mean of each data set.

- 1 Number of siblings:
2, 5, 1, 4, 2, 4, 3, 3

a Median:

b Mean:

- 2 Ages of giraffes in the zoo in years:
6, 11, 18, 25, 4, 9, 25, 26, 2, 2, 17

a Median:

b Mean:

- 3 Weights of new born kittens in ounces:
3.4, 3.5, 3.3, 3.4, 3.5, 3.5, 3.7, 3.4

a Median:

b Mean:

What happens to the median and mean when data points are added?

Let's look back at a data set from earlier.

Total books read this month: 3, 4, 9, 11, 3, 7, 12, 11, 5, 7, 8, 4, 5, 5, 2

Median: 2, 3, 3, 4, 4, 5, 5, 5, 7, 7, 8, 9, 11, 11, 12

Mean: $3 + 4 + 9 + 11 + 3 + 7 + 12 + 11 + 5 + 7 + 8 + 4 + 5 + 5 + 2$
 $= 96$
 $96 \div 15 = 6.4$

- a Add 30 and 40 to the data set and recalculate the median and mean.

Median:

Mean:

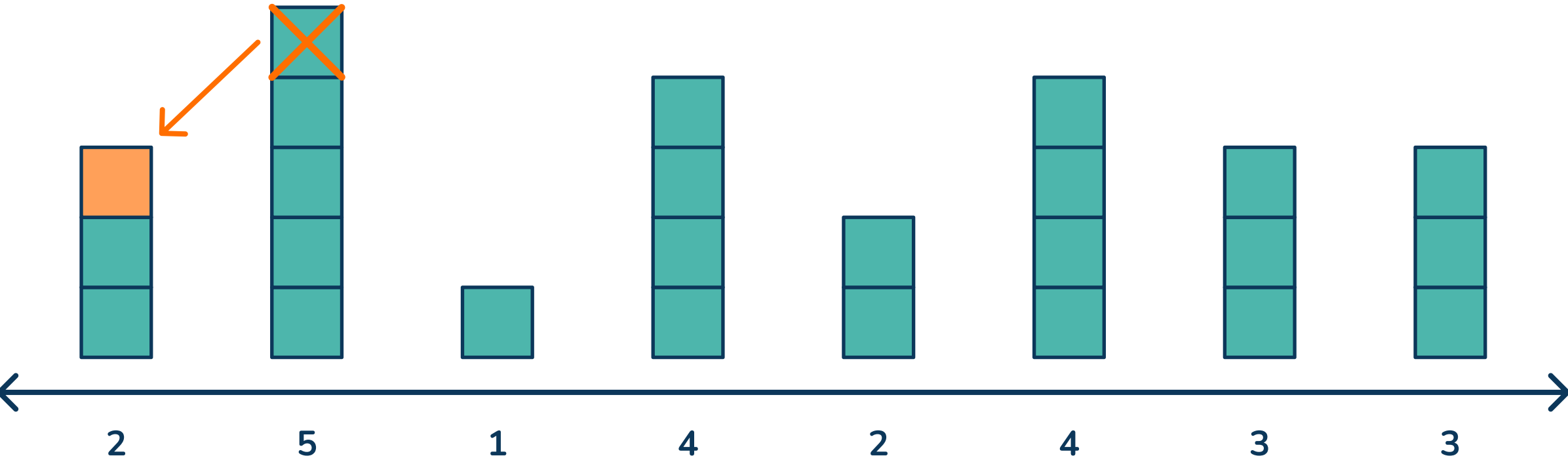
- b Add 8 and 8 to the data set (instead of 30 and 40) and recalculate the median and mean.

Median:

Mean:

The mean (or average) can also be thought of as a balancing point.

Data set (number of siblings): 2, 5, 1, 4, 2, 4, 3, 3
Balance out the data by moving squares (each representing 1) around until all the columns are equal.



Notice how the procedure for the mean is connected to the balance model.

- a First, add up all the data points.
Sum of the data points:
- b Then, divide by the total number of data points.

..... ÷ =

Check your understanding

Find the median and mean of: 120, 145, 112, 134, 121, 133, 134, 124

a Median:

b Mean:

Why do I need to try this question on my own first?

- To show your tutor what you understand
- To give you more practice
- To show your teacher how you are doing



Do you have a group of students who need a boost in math?

Each student could receive personalized lessons every week from our specialist one-on-one math tutors.




- ✓ Differentiated instruction for each student
- ✓ Aligned to your state's standards
- ✓ Scaffolded learning to close gaps

“We just had our first session and it went great! The kids really liked it and felt like they were learning! One even said he finally felt like math was making sense.”



Michelle Craig, Instructional Coach,
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