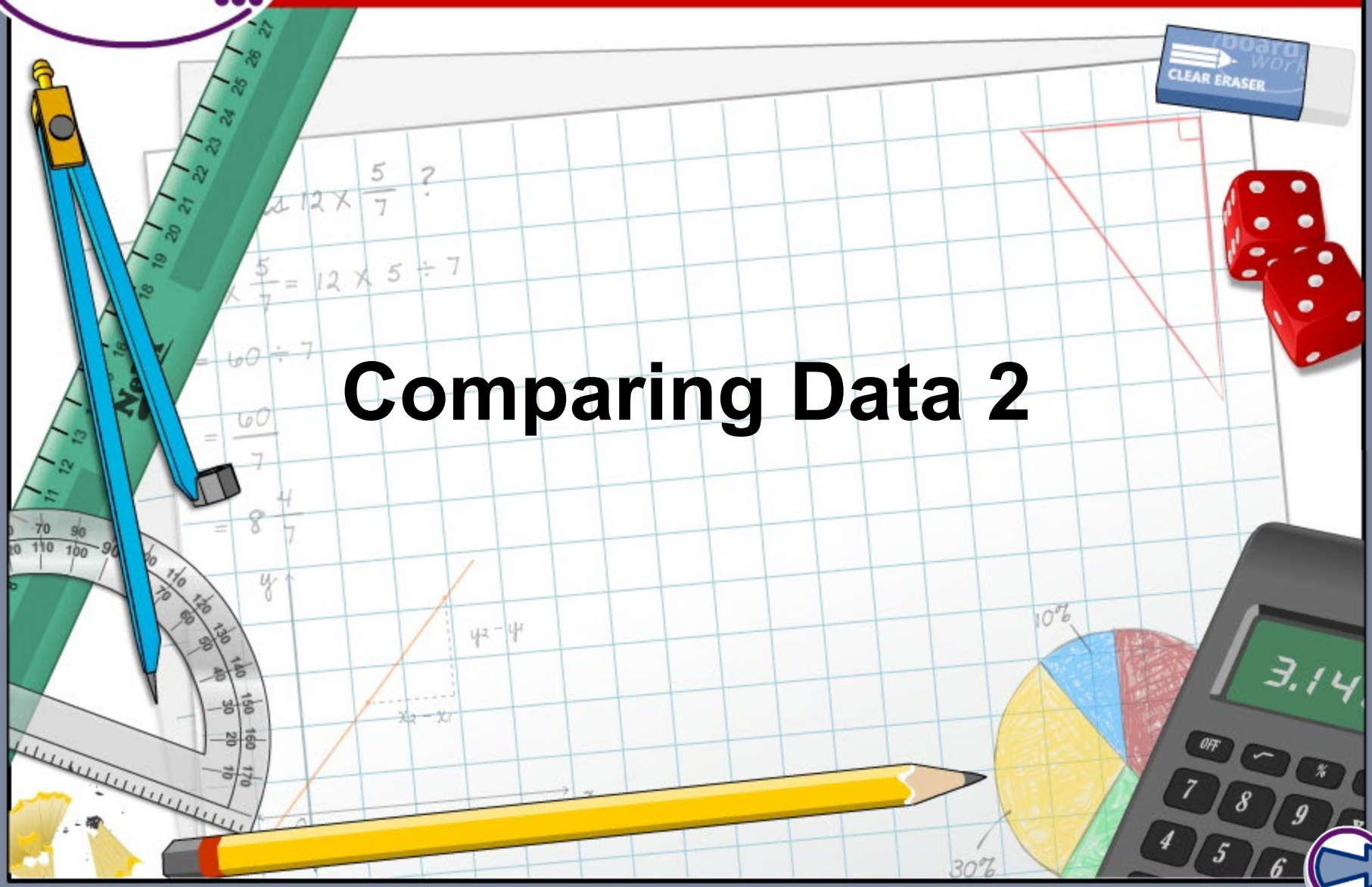


Comparing Data 2

Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Data collection

How well do students perform in math if they take it as the last class of the day?

Ms. Clarke wanted to analyze the performance of all students who fit this description, but she couldn't take data from all of them.

Why might Ms. Clarke be unable to collect data from all relevant students?

What could Ms. Clarke do instead?

Random sampling

A **random sample** is a sample in which each individual in the population has an equal chance of being chosen.

A **population** is the entire group of objects or individuals considered for a survey.

A random sample allows you to analyze a smaller group of data. It is not the same as the population, but it allows you to make estimates and predictions.

Data from a random sample

Ms. Clarke calculated that 220 students took math as the last class of the day. For the sample, she decided to randomly select 9 of the students' scores on a math exam.

82	94	70	75	84	90	84	80	92

What is the population size of the sample?

How should the data be organized?

How could the data be analyzed?

Data analysis

Let's revisit Ms. Clarke's question: how well do students perform in math if they take it as the last class of the day?

We can answer this question by looking at the center of the data. Here is the data, placed in order:

70	75	80	82	84	84	90	92	94

What is the **median**? **84**

What is the **mode**? **84**

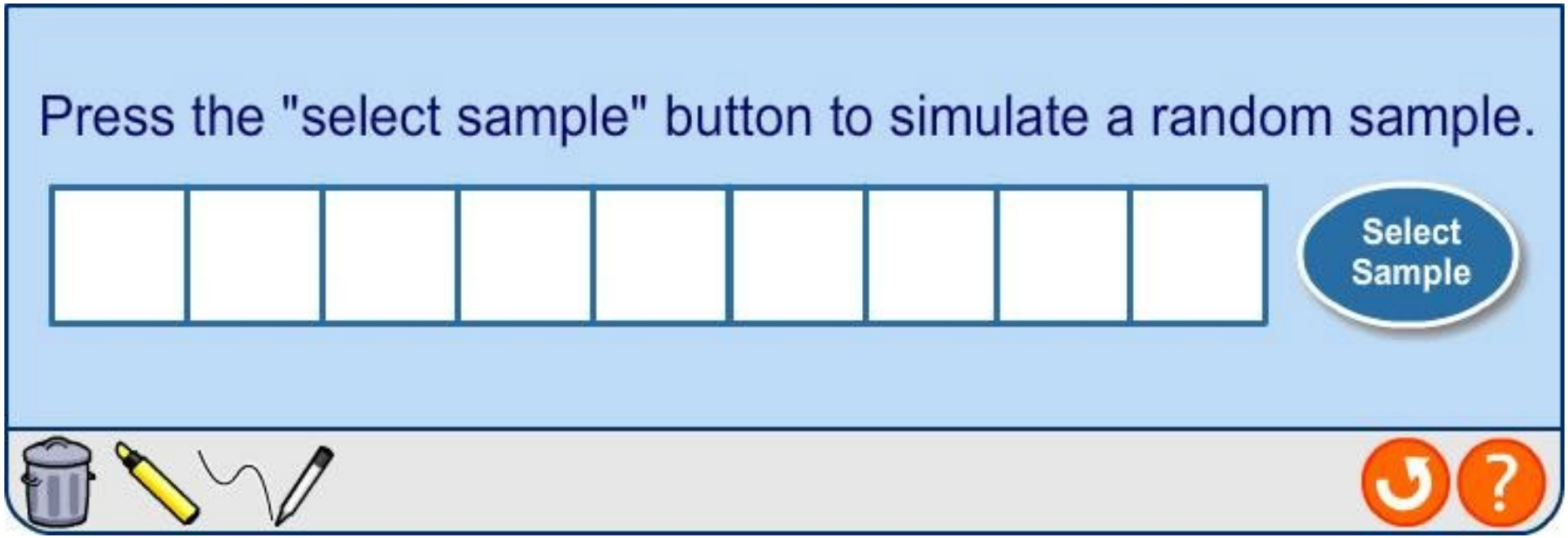
What is the **mean**? **83.4**

What is the answer to Ms. Clarke's question?

Taking multiple samples

When taking a random sample, it is good mathematical practice to take multiple samples.

Why should we take more than one sample?



Calculate the mean for each data sample.
Is the mean always the same?

Ms. Clarke's question

Ms. Clarke took three random samples from her students:

sample number	mean
1	83.4
2	85.0
3	82.3

Describe the difference in the means.

How does this affect your answer to Ms. Clarke's question?

Math in the morning

Ms. Clarke decided to extend her question to compare students who took math as the last class of the day with those who took math as the first class of the day.

Ms. Clarke collected random samples of exam grades for students who took math as their first class of the day.

She could then see if there was a statistical difference in the means between the two groups.

What predictions do you have about the data?

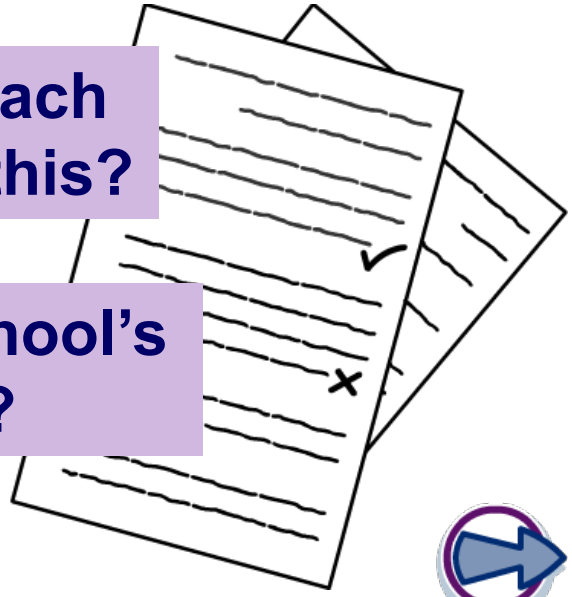
Comparing the classes

Here are the random sample means for both groups.

sample number	math first class	math last class
1	87.9	83.4
2	89.2	85.0
3	86.9	82.3

What do you notice about the means of each group, and what can you conclude from this?

How might your observations affect a school's decision about scheduling math classes?



Does handing in homework affect your math grade?

Mr. Holmes wanted to show his students how to answer this question statistically.

He separated his students into two categories:

- those who had completed all homework assignments
- those who had missing homework assignments.

Mr. Holmes then collected a random sample of math exam grades from students in each category.

Comparing data

The percentage total grade for each student is shown below.

Group A: homework all completed											
94	87	96	95	80	85	83	86	90	82	80	90

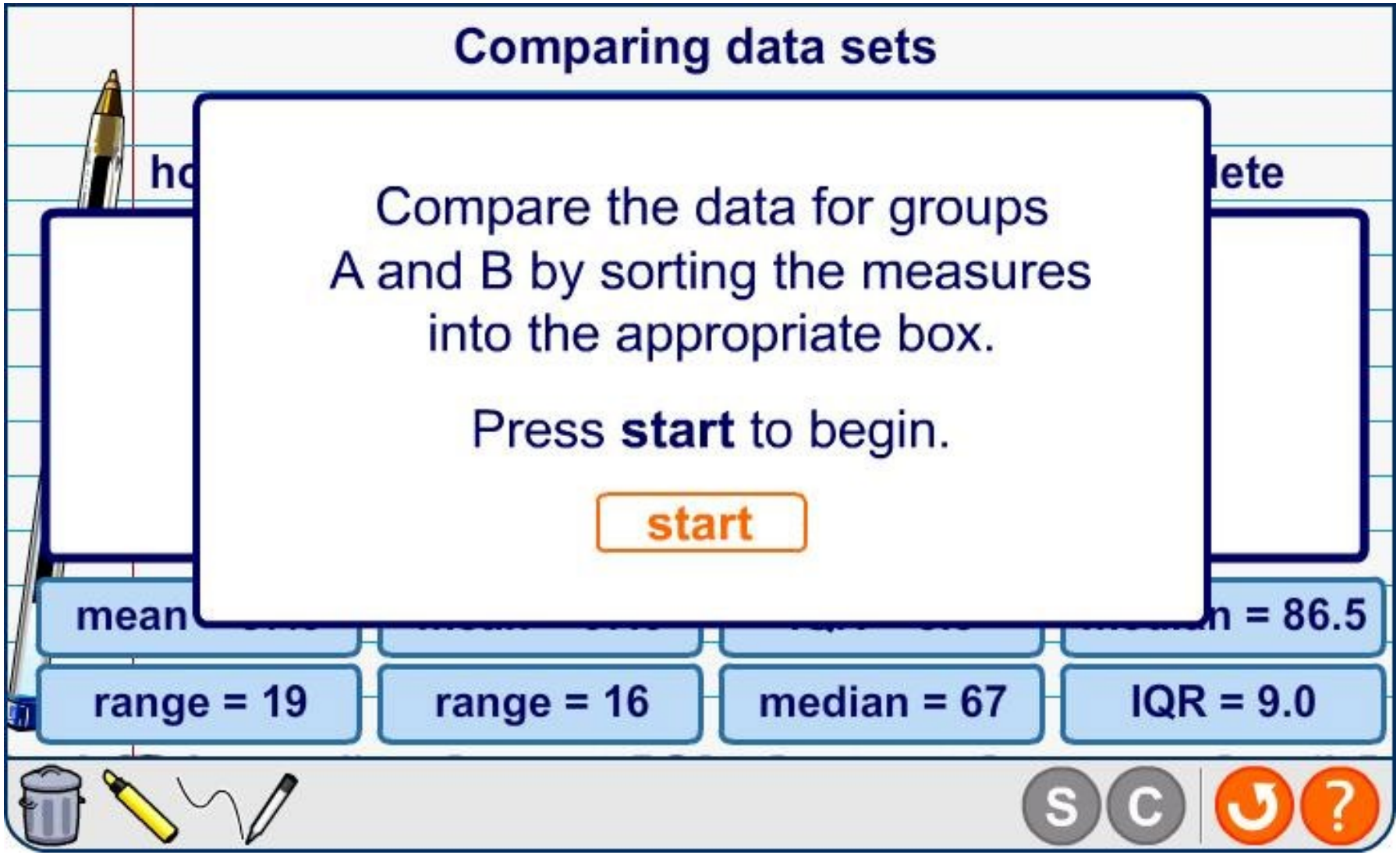
Group B: homework not all completed							
66	64	58	62	74	72	77	68

What do you notice about the two data sets?

What measures would allow you to compare them?

How could you display the data to make comparisons?

Comparing the data sets



Visualizing data using a dot plot

Construct a dot plot of the students' exam scores. What do you notice about the distribution of the data?

Press **start** to begin.

start

	50-54		95-99
Group A			
Group B	66	64	58	62	74	72	77	68

A B