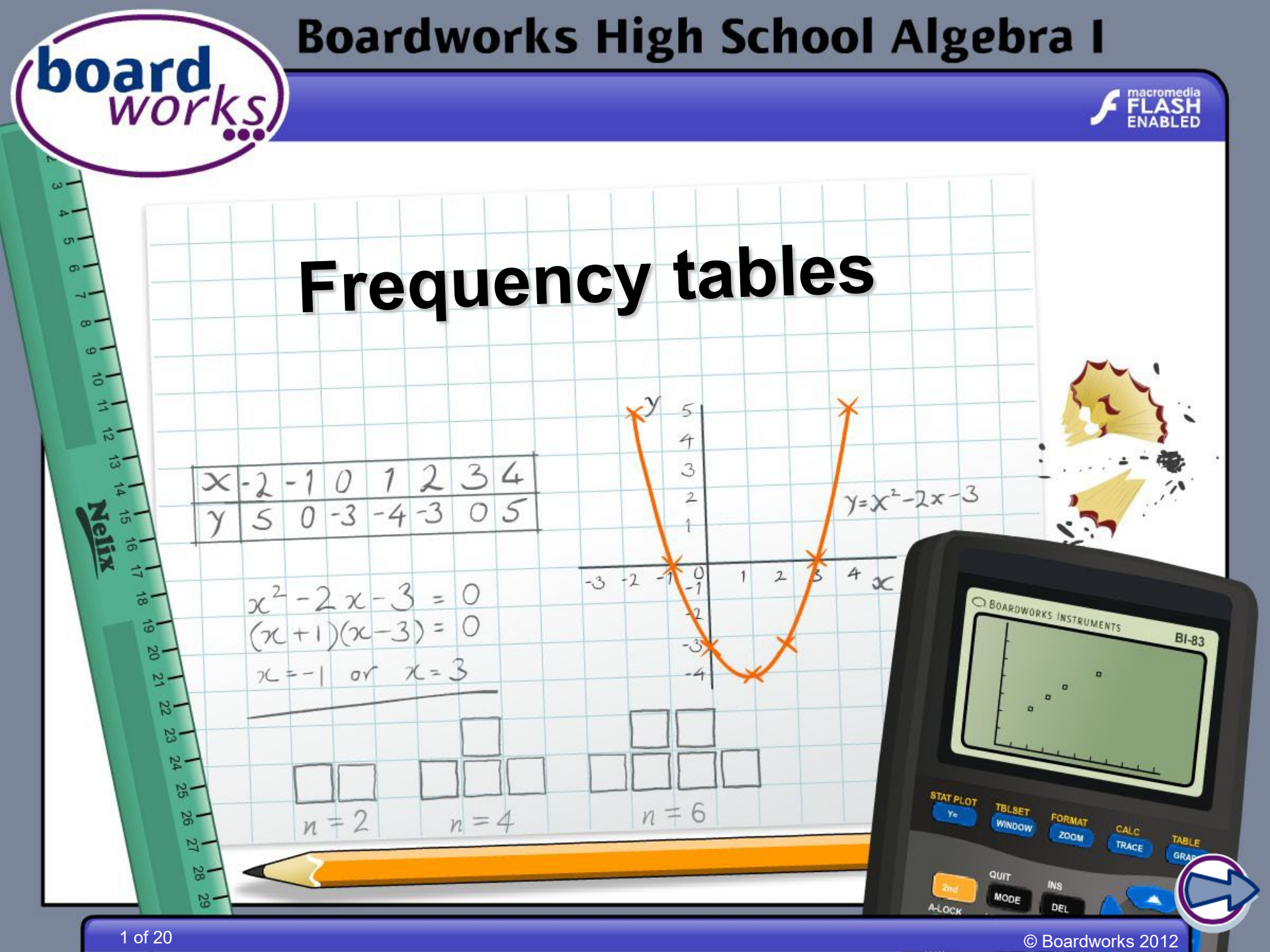
Frequency tables



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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.

They 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.

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Survey results

Jamilia carries out a survey to find out how many sports the students in her school do.

She lists the responses in her notepad.

It is not easy to see patterns or trends in the data.

0, 0, 1, 0, 2, 4, 3, 0, 2, 1, 2, 4,
6, 3, 2, 5, 3, 0, 2, 1, 0, 0, 2, 4,
2, 0, 1, 3, 0, 1, 3, 0, 1, 2, 1, 4, 0,
4, 1, 5, 0, 1, 2, 1, 3, 0, 2, 2, 0, 4,
0, 3, 0, 1, 3, 1, 2, 4, 1, 0, 6, 5, 1,
2, 1, 0, 2, 3, 0, 2, 1, 4, 4, 0, 3, 1

How could Jamilia use a table to make the results easier to read?

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Discrete data in frequency tables

Jamilia decides to write all the possible results in one column of a table and record how often they occur. This is called a **frequency table**.

0, 0, 1, 0, 2, 4, 3, 0, 2, 1, 2, 4,
6, 3, 2, 5, 3, 0, 2, 1, 0, 0, 2, 4,
2, 0, 1, 3, 0, 1, 3, 0, 1, 2, 1, 4, 0,
4, 1, 5, 0, 1, 2, 1, 3, 0, 2, 2, 0, 4,
0, 3, 0, 1, 3, 1, 2, 4, 1, 0, 6, 5, 1,
2, 1, 0, 2, 3, 0, 2, 1, 4, 4, 0, 3, 1

number of sports played	frequency
0	20
1	17
2	15
3	10
4	9
5	3
6	2

Use the list to fill in the frequency table for Jamilia.

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Calculating the mean

How can you find the mean number of sports?

$$\frac{\sum(\text{data value} \times \text{frequency})}{\text{Total frequency}}$$

Multiply each data value by its frequency.

Add these values together.

Divide the sum by the total frequency.

numbers of sports played	frequency	number of sports × frequency	
0	20	0 × 20	= 0
1	17	1 × 17	= 17
2	15	2 × 15	= 30
3	10	3 × 10	= 30
4	9	4 × 9	= 36
5	3	5 × 3	= 15
6	2	6 × 2	= 12
TOTAL	76		140

$$\text{mean} = \frac{140}{76}$$

= 2 sports

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Continuous data

Here are the race times in seconds from a downhill race event.

88.4	91.5	92.1	93.3	93.9	94.7	95.0	95.3	95.5
95.6	95.6	96.3	96.5	96.9	97.0	97.0	97.0	97.3
97.4	97.4	97.7	97.8	98.0	98.2	98.2	98.4	98.4
98.5	98.9	99.0	99.1	99.6	99.6	99.8	100.0	100.6
100.6	101.1	101.4	101.4	101.5	101.6	101.6	101.8	101.9
102.1	102.5	102.6	102.7	103.1	103.1	103.1	104.1	105.0
105.2	105.6	105.6	105.7	105.8	105.9			

Putting these into a frequency table as they are will not be helpful.

Instead we can group the times into **intervals**.

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Notation for class intervals

Louise decides to create her own groups and draws a table with class intervals that she thinks fit the race data.

What is wrong with this table?

How should the class intervals be written down?

How can your knowledge of inequalities help you to create better class intervals?

Times in seconds	Frequency
85 – 90	
90 – 95	
95 – 100	
100 – 105	
105 – 110	

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Intervals

88.4	91.5	92.1	93.3	93.9	94.7	95.0	95.3	95.5
95.6	95.6	96.3	96.5	96.9	97.0	97.0	97.0	97.3
97.4	97.4	97.7	97.8	98.0	98.2	98.2	98.4	98.4
98.5	98.9	99.0	99.1	99.6	99.6	99.8	100.0	100.6
100.6	101.1	101.4	101.4	101.5	101.6	101.6	101.8	101.9
102.1	102.5	102.6	102.7	103.1	103.1	103.1	104.1	105.0
105.2	105.6	105.6	105.7	105.8	105.9			

Use the original data from the race to complete the frequency table to show the number of times in each interval.

time in seconds	frequency
$85 \leq t < 90$	**1**
$90 \leq t < 95$	**5**
$95 \leq t < 100$	**28**
$100 \leq t < 105$	**19**
$105 \leq t < 110$	**7**

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Notation for class intervals

Complete the notations for class intervals

Time in seconds		
85 – 90 but not including		$85 \leq t < 90$
90 – 95 but not including		
95 – 100 but not including		
100 – 105 but not including		
105 – 110 but not including		$105 \leq t < 110$
	95	

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Inequalities recap

$0 <$ ____ ≤ 0.5

Match the numbers at the bottom to the correct intervals.

Press **start** to begin.

start

3 | 0.5 | 1

S C

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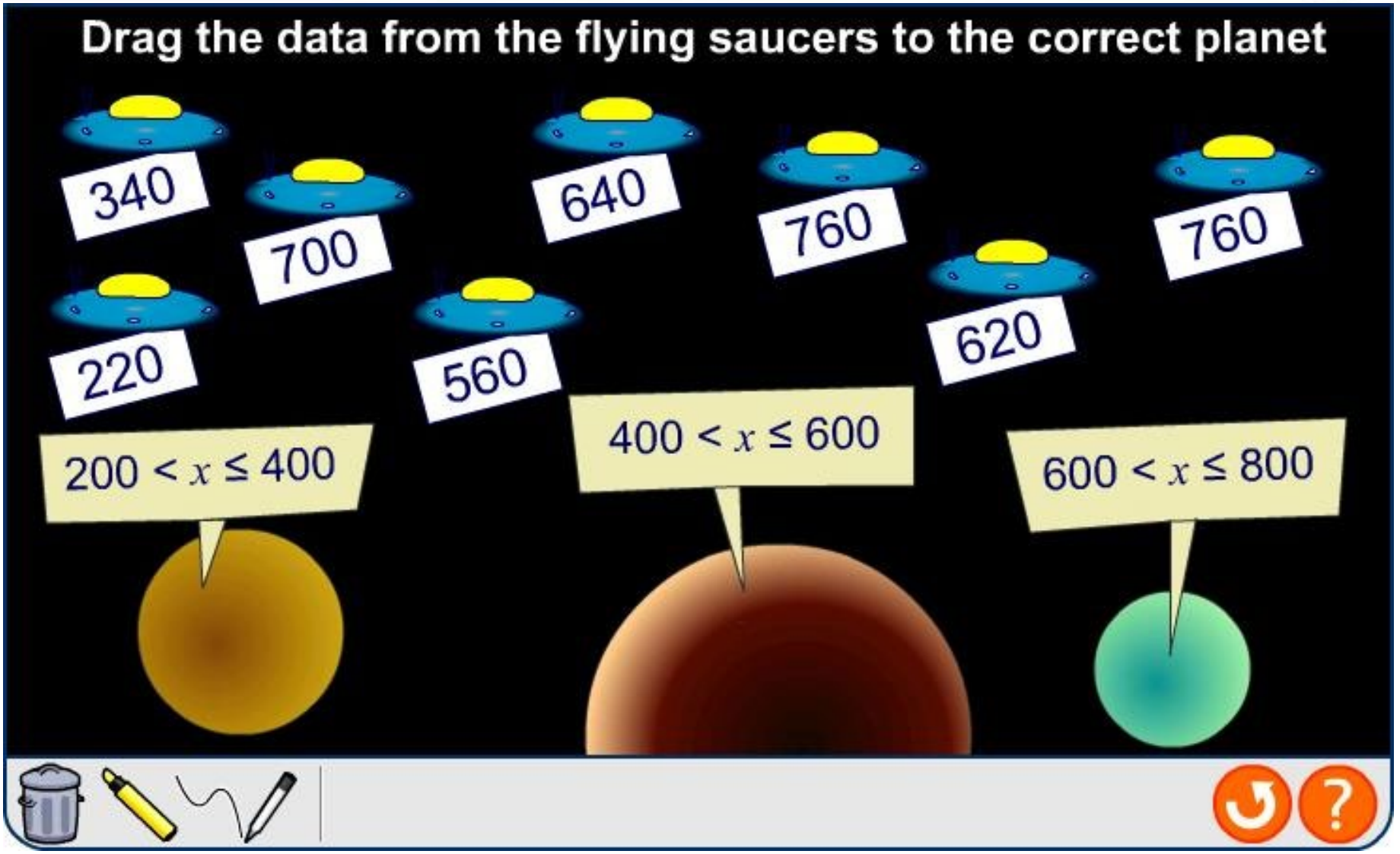
Notation for class intervals



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Grouped data

When data is grouped, the mean has to be estimated instead of being calculated exactly from the data.

Press "**start**" to learn how to do this.

start

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How accurate is the estimated mean?

Enter digits into the empty text fields by pressing in them and typing with the keyboard.

Interval	Frequency f	Mid-point x	xf
$20 \leq t < 22$	7		
$22 \leq t < 24$	9		
$24 \leq t < 26$	13		
$26 \leq t < 28$	29		
$28 \leq t < 30$	0		
$30 \leq t < 32$	25		
TOTAL			

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Two-way frequency tables

Two-way frequency tables are used to examine the relationship between two categories or groups.

For example, Rosa asked two hundred people what type of drink they had in a local coffee house. She recorded the results in this two-way frequency table.

	regular coffee	special hot drink	special cold drink	total
women	10	58	42	110
men	56	10	24	90
total	66	68	66	200

What two categories is Rosa comparing in the table?

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Joint and marginal frequencies

	regular coffee	special hot drink	special cold drink	total
women	10	58	42	110
men	56	10	24	90
total	66	68	66	200

The numbers in the body of the table, shown in **pink**, are called **joint frequencies**.

The totals, shown in **blue**, are called **marginal frequencies**.

What trends do you notice from the table?
List as many as you can and justify each one.

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Relative frequencies

To convert a two-way frequency table to a **relative frequency table** divide each cell in the table by the number of participants.

	regular coffee	special hot drink	special cold drink	total
women	$\frac{10}{200} = 0.05$	$\frac{58}{200} = 0.29$	$\frac{42}{200} = 0.21$	$\frac{110}{200} = 0.55$
men	$\frac{56}{200} = 0.28$	$\frac{10}{200} = 0.05$	$\frac{24}{200} = 0.12$	$\frac{90}{200} = 0.45$
total	$\frac{66}{200} = 0.33$	$\frac{68}{200} = 0.34$	$\frac{66}{200} = 0.33$	$\frac{200}{200} = 1$

What does the number 0.12 in the table signify?

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Rows and columns

Depending on what we want to analyze we can also create **relative frequencies for columns** and **relative frequencies for rows**.

for columns

	regular coffee	special hot drink	special cold drink	total
women	0.15	0.85	0.64	0.55
men	0.85	0.15	0.36	0.45
total	1.00	1.00	1.00	1.00

Every number is divided by the total for that column in the original table.

for rows

	regular coffee	special hot drink	special cold drink	total
women	0.09	0.53	0.38	1.00
men	0.62	0.11	0.27	1.00
total	0.33	0.34	0.33	1.00

Every number is divided by the total for that row in the original table.

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Creating frequency tables

Texting while driving

The divided bar graph shows the results of a survey of student drivers at a large school about how many of them had texted while driving in the past month.

1) Use the graph to create a two-way frequency table.

2) Create a two-way relative frequency of columns table.

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Comparing SAT scores

The school board is investigating whether or not boys and girls perform equally as well on the mathematics portion of the SAT test.

Here is the raw data: 75 girls had scores below 500 and 90 had scores above 500, and 65 boys were below 500 and 70 above.

Use a spreadsheet to display the data in the following ways:

- two-way frequency table
- relative frequency table
- stacked bar chart
- relative frequency of rows

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Quiz

To save money for the junior/senior prom, the advisor proposed having it in the school gym instead of at the usual banquet hall.

A survey was taken and the results are shown in frequency tables.

Look at these opinions about the results and figure out whether they are true or false.

Press "**start**" to begin.

start

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