Pick up and read a copy of a recent Eugene Register Guard article.

Your tests will be returned tomorrow.

Chapter 2

volunteers to read p. 90

- ESSENTIAL QUESTION *Where do I stand?*
- PACING **7 days**

Chapter 2: Modeling Distributions of Data

2.1 Describing Location in a Distribution	2 Days
2.2 Density Curves and Normal Distributions	3 Days
Review, FRAPPY!, and Test	2 Days

Next Test
- Thur. Sept. 27th

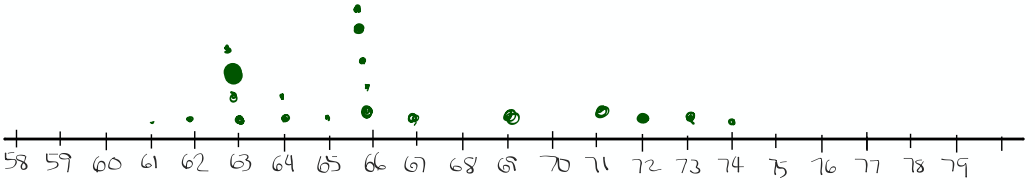
By the end of this section, you should be able to:

- ✓FIND and INTERPRET the percentile of an individual value within a distribution of data.
- ✓ESTIMATE percentiles and individual values using a cumulative relative frequency graph.
- ✓FIND and INTERPRET the standardized score (*z*-score) of an individual value within a distribution of data.

Where do I Stand?

- ✓ Recall your height in inches
- ✓ Make a Human Dot Plot
- ✓ I will make a copy on the board as a reference.

$\frac{9}{20} = 45\%$



Heights (~~cm~~ in)

There are two common ways of describing the location/position of an individual value in a distribution

Percentiles and Z-Scores

2. What percent of the class have heights less than yours? This percentile is one way to measure your location in the distribution of heights.

3. What is a **percentile**?

In general

A percentile describes the location in a distribution (like quartiles)

Exact definition

An individual's percentile is the percent of values in a distribution that are less than the individual's data value.

A percentile for our distribution of heights is the proportion of students who are shorter than yo
(You already answered this above)

Calculate the mean and standard deviation of the class's distribution of heights from the dot plot. Confirm with your classmates.

$\bar{x} = 66.2$ inches $\quad s = 3.76$ inches

Does your own height fall above or below the mean?

How far above or below the mean is it?

How many standard deviations above or below is it?

(This standardized score, also called a Z-Score, is another way to measure your location in the class's distribution of heights)

$$\frac{72 - 66.2}{3.76} = 1.54 \text{ std. deviations above the mean}$$

- How many standard deviations are you away from the mean?

  How did you calcute this?

- What is your Z-score for your height?

  how did you calculate this?

  0

- What is your Z-score? -0.5

  What does it mean? -0.5

Move on to question 5

5. The stemplot below shows the number of wins for each of the 30 Major League Baseball teams in 2016.

5	9
6	
6	8 8 8 8 9 9
7	1 3 4
7	5 8 8 9
8	1 4 4
8	6 6 7 7 9 9
9	1 3 4
9	5 5
10	3

Key: 9|1 = 91 wins

FIX

(a) Find the percentile for the Detroit Tigers, who had 86 wins.

$\frac{17}{30} = .57$

So the Tigers are at the 57th percentile.

Note: there are ~~3~~ 2 teams with 86 wins, all at the 57th percentile.

(b) The number of wins for the Texas Rangers is at the 90th percentile of the distribution. Interpret this value in context. How many wins did the Texas Rangers have in 2016?

90% of the teams have a number of wins less than the Texas Rangers.

$(.90)(30) = 27$

So the number of wins for the Rangers was greater than 27 of the 30 teams.

The Rangers had 95 wins in the 2016 season.

6. Macy, a 3 year old female is 100 cm tall.
Brody, her 12 year old brother, if 158 ?
Who is taller?

According to the CDC, the heights of three-year-old females have a mean of 94.5 cm and a standard deviation of 4 cm. The mean height for 12-year-olds males is 149 cm with a standard deviation of 9 cm.

Macy $\frac{100 - 94.5}{4} = 1.375$

Macy is 1.375 std. deviations above the mean

Brody $\frac{158 - 149}{9} = 1$

Brody is 1 std dev above the mean

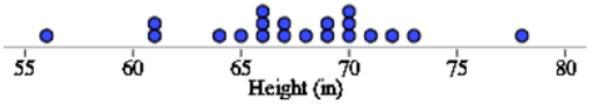
Is being in a high Percentile always a good thing?

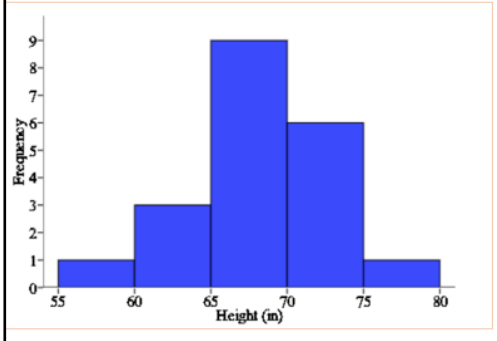
Note: Percentiles are boundaries so you can't be in a percentile.

Not if you're talking about cholesterol levels for males!!!

Cumulative Frequencies and Graphs

7. The dotplot below represents a random sample of the heights of 20 AP Stats students to the nearest inch.

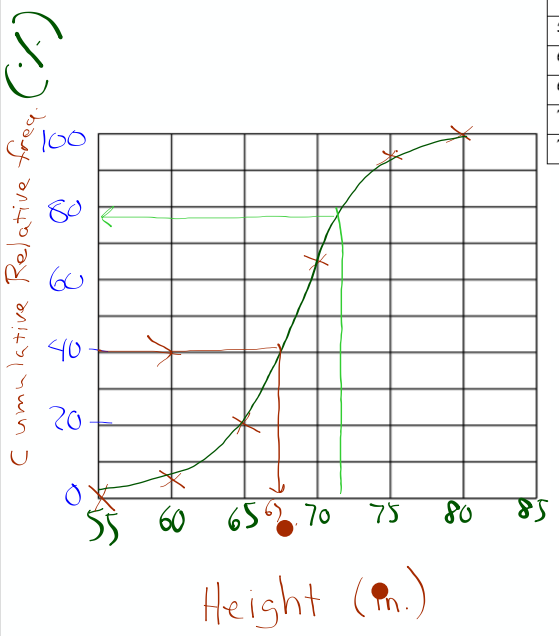




Height	Frequency	Relative Frequency	Cumulative Relative Freq.
55-59	1	$\frac{1}{20}$ = 5%	5%
60-64	3	15%	20%
65-69	9	45%	
70-74	6	30%	
75-79	1	5%	
	20		

Height	Frequency	Relative Frequency	Cumulative Relative Freq.
55-59	1	1/20 5%	5
60-64	3	3/20 15%	20
65-69	9	9/20 45%	65
70-74	6	6/20 30%	95
75-79	1	1/20 5%	100

(59, 5) (64, 20) (69, 65)



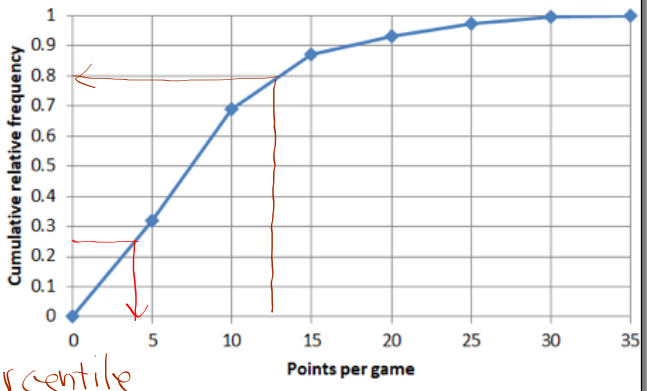
9. Mr. Cedarlund is 72 inches tall. Use the Relative Cumulative Frequency to estimate and interpret the percentile he is at.

Mr. C's height is at the 77th percentile

10. Estimate and interpret the 40th percentile.

40% of the group is shorter than 67 in

11. Here is a cumulative relative frequency graph showing the distribution of points scored per game for the 486 NBA players in 2016–2017.



a) Pau Gasol scored 12.4 points per game. What percentile is he at? Interpret this value.

Pau is at the 80th percentile
So 80% of the players score less than 12.4 ppg.

b) What is the 25th percentile for this distribution? What is another name for this value?

4 points first quartile

Standardized Scores (Z-Scores)

Macy, a 3-year-old female is 100 cm tall. Brody, her 12-year-old brother is 158 cm tall. Obviously, Brody is taller than Macy—but who is taller, relatively speaking? That is, relative to other kids of the same ages, who is taller?

According to the CDC, the heights of three-year-old females have a mean of 94.5 cm and a standard deviation of 4 cm. The mean height for 12-year-olds males is 149 cm with a standard deviation of 9 cm.

Think: About how far above average are they? Brody is farther above average than Macy in an absolute sense. But, when compared to a "typical" deviation from the mean, Macy is actually _____. Use this example to derive z-score formula.

A *z*-score tells us how many standard deviations from the mean an observation falls, and in what direction.

If *x* is an observation from a distribution that has known mean and standard deviation, the **standardized score** of *x* is:

$$z = \frac{value - mean}{standard\ deviation}$$

A standardized score is often called a ***z*-score**.

Measuring Position: *z*-Scores

Jenny earned a score of 86 on h... ean is 80 and the st... et her stand...

CAUTION:

Do not interpret the z-score as a distance "away" from the mean. Always indicate if the value is greater than (above) or less than (below) the mean.

...test score is 0.99 standard deviations above the class mean of 80.

12. What. Another baseball example? In 2016, the mean number of wins for teams in Major League Baseball was 81 wins with a standard deviation of 10.7 wins.

(a) The Chicago Cubs broke the Curse of the Billy Goat by winning the World Series in 2016. Find and interpret the z-score for the Chicago Cubs, who had 103 wins in 2016.

$$Z = \frac{103 - 81}{10.7} = 2.06$$

So 103 wins was 2.06 std. dev. above mean

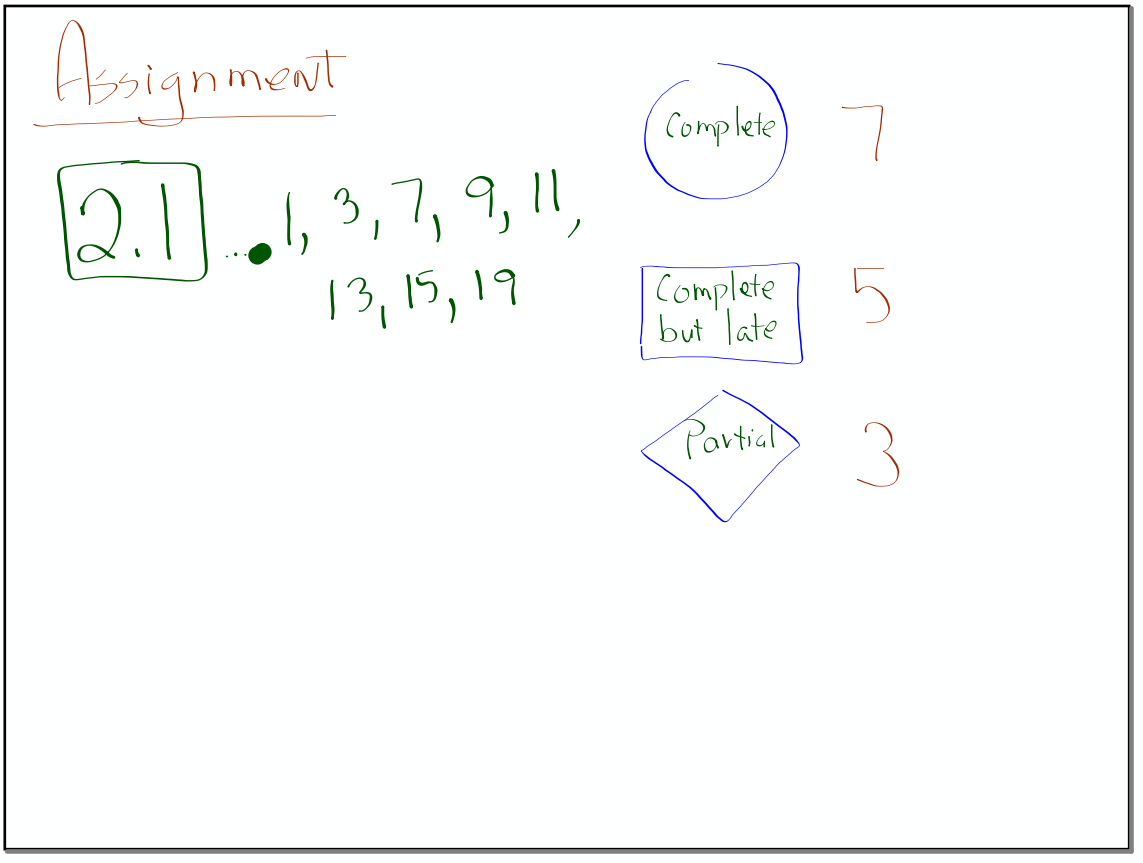
(b) The Chicago White Sox had a z-score of 20.28. Find the number of wins for the Chicago White Sox for 2016.

$$-.28 = \frac{\text{Value} - 81}{10.7}$$

Value = 78

The Chi Sox had 78 wins in 2016.

13. *Is being 10 above average is a big deal?*


Assignment
2.1
1, 3, 7, 9, 11, 13, 15, 19
Complete
7
Complete but late
5
Partial
3