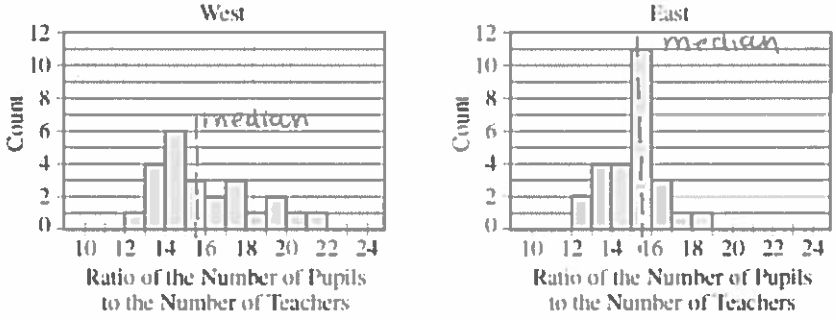
AP STATISTICS
CH 4 WARM UP #2

NAME: key
DATE:_____ PERIOD:_____

2011 Form B FRQ 1

Records are kept by each state in the United States on the number of pupils enrolled in public schools and the number of teachers employed by public schools for each school year. From these records, the ratio of the number of pupils to the number of teachers (P-T ratio) can be calculated for each state. The histograms below show the P-T ratio for every state during the 2001–2002 school year. The histogram on the left displays the ratios for the 24 states that are west of the Mississippi River, and the histogram on the right displays the ratios for the 26 states that are east of the Mississippi River.



(a) Describe how you would use the histograms to estimate the median P-T ratio for each group (west and east) of states. Then use this procedure to estimate the median of the west group and the median of the east group.

From the histogram, cumulative frequencies for the two groups are shown below

Interval	W	E
12-13	1	2
13-14	1+4=5	2+4=6
14-15	1+4+6=11	2+4+4=10
15-16	1+4+6+3=14	2+4+4+11=21

The median is the value with half of the P-T ratios at or below it and half of the values at or above it. For n observations in a group, use $\frac{n+1}{2}$ to find the position of the median in the ordered list of observations. For states west of mississippi (n=24) the median falls between the 12th and 13th value in the ordered list, and both the 12th and 13th values fall in the interval 15-16. For states east of mississippi (n=26) the median falls between the 13th and 14th value in the ordered list, and both of these values also fall in the interval 15-16.

Thus, the median P-T ratio for both groups is at least 15 students per teacher and at most 16 students per teacher.

(b) Write a few sentences comparing the distributions of P-T ratios for states in the two groups (west and east) during the 2001–2002 school year.

Both distributions of pupil-teacher ratios are centered around 15. The west distribution is more spread out (more variable) than the East distribution. The west distribution is skewed right, while the East distribution is fairly symmetric.

(c) Using your answers in parts (a) and (b), explain how you think the mean P-T ratio during the 2001–2002 school year will compare for the two groups (west and east).

The right skew of the west distribution means that the mean will be greater than the median (greater than 15). Since the East distribution is fairly symmetric, its mean and median will be similar (around 15). Therefore the west mean will be higher than the East mean.