*This practice plan was created by **Taren Long**, a math teacher and coach at Chesapeake Public Charter School. Taren created numerous free resources for MATHCOUNTS coaches in her role as the 2020-2021 DoD STEM Ambassador for MATHCOUNTS. Find more resources and information at **dodstem.us**.*

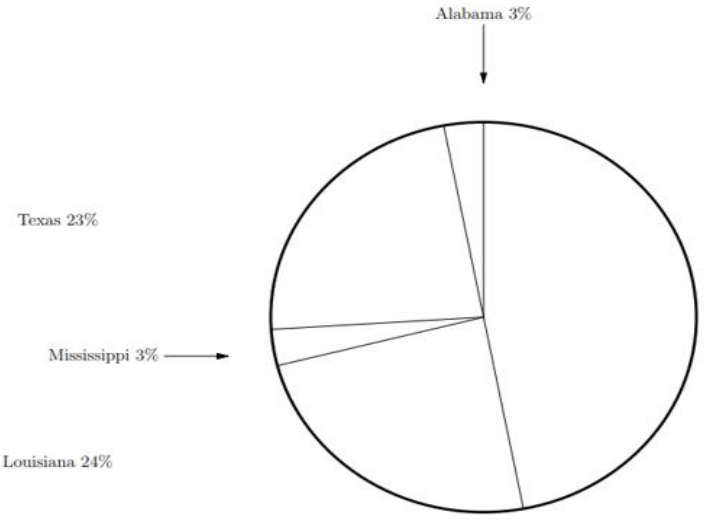
Data Displays

Warm-Up!

Coach instructions:
Give students around 5-7 minutes to go through the warm-up problems.

Try these problems before watching the lesson.

1. The circle graph shows the percentage of miles of the Gulf of Mexico coastline by state in the U.S. The total number of miles is 1631. What is the number of miles of Gulf coastline for Mississippi? Express your answer to the nearest ten.



Mississippi has 3% of the coastline of the Gulf of Mexico, and 3% of 1631, rounded to the nearest 10, is 50.

2. A standard six-sided die was rolled repeatedly. The frequency table below shows how many times each number was rolled. What is the mean of the 20 numbers rolled? Express your answer as a decimal to the nearest hundredth.

Numbers	1	2	3	4	5	6
Times rolled	4	4	3	4	2	3

The mean of the numbers is $\frac{4(1)+4(2)+3(3)+4(4)+2(5)+3(6)}{20}=\frac{65}{20}=3\frac{1}{4}=3.25$ **.**

3. The graph shows the results when 100 teachers reported the number of years they have been teaching. What percent of these teachers have been teaching more than 5 years but no more than 15 years?

The second and third columns in the histogram represent teachers who have been teaching for 6-10 and 11-15 years, respectively. The 6-10 column is 25 units (teachers) high, and the 11-15 is 15. 25 + 15 = 40. Since there are 100 teachers total, 40/100 = 40%.

4. A frequency distribution of the scores for Mr. Sampson's algebra class is shown. What percent of the class received a score in the 60-69% range?

Test Scores	Frequencies
90% – 100%	IIII
80% – 89%	IIII IIII
70% – 79%	IIII II
60% – 69%	IIII I
Below 60%	II

The frequency table uses tallies to mark the number of students who scored in each range. The 60-69% range has 5 tallies, which means 5 students scored in that range. Counting up all of the tallies, we see there are 25 students in the class total. 5/25 = 20%.

5. The stem-and-leaf plot shows the number of minutes and seconds of one ride on each of the 17 top-rated roller coasters in the world. In the stem-and-leaf plot, 2 | 20 represents 2 minutes, 20 seconds, which is the same as 140 seconds. What is the median of this data set? Express your answer in seconds.

0	28	28	50		
1	00	02			
2	20	25	35	43	45
3	00	00	00	30	36
4	00	00			

Since the stem-and-leaf plot contains times for 17 coasters, and they are already arranged from least to greatest, the 9th data point is the median. Going across each row from left to right, the 9th value is in the third row, 2 | 43. In this problem, 2 | 43 means the length of the median coaster of the 17 top-rated coasters is 2 minutes, 43 seconds, or 163 seconds.

The Problems

Coach instructions: *After students try the warm-up problems, play the video and have them follow along with the solutions.*

Take a look at the following problems and follow along as they are explained in the video.

6. The number of rounds of golf played by each golfer of an amateur golf association is shown in the chart below. What is the average number of rounds played by each player? Express your answer to the nearest whole number.

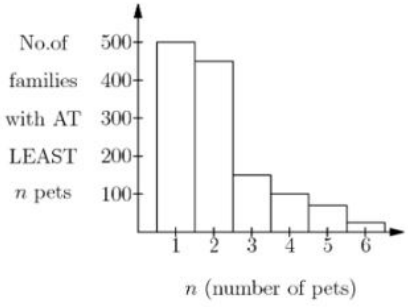
Solution in video. Answer: 3.

7. The chart below was created from the results of a radio station survey. What percent of the males surveyed listen to the station?

	Listened to Station	Did not Listen to Station	Total
Male	39%	13%	52%
Female	29%	19%	48%
Total	68%	32%	100%

Solution in video. Answer: 75%.

8. According to the graph, what is the mode of the number of pets (n) among the families surveyed?



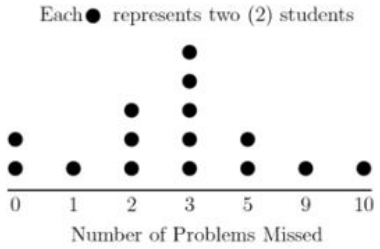
Solution in video. Answer: 2.

Piece It Together

Coach instructions: *After watching the video, give students 10 minutes to try the next three problems.*

Use the skills you practiced in the warm-up and strategies from the video to solve the following problems.

9. Use the histogram to determine the mean number of problems missed on the last mathematics test.



Since each marker represents 2 students, the total number of students is 30, and the mean number of missed problems can be written as $\frac{4(0)+2(1)+6(2)+10(3)+4(5)+2(9)+2(10)}{30} = \frac{102}{30} = 3.4$**.**

10. Mr. Franks gave a final exam worth 200 points. The distribution of scores is shown below in a stem-and-leaf plot. What was the median score on the exam?

11	0	3	9	
12	2			
13	4	4	5	
14	6	7		
15	1	1	2	4
16	7	8		
17	0	4		
18	0	4	4	4
19	5	7		

Counting up the entries on the right, we see there are 23 students in Mr. Franks' class. The median score is the 12th entry from least to greatest, so we count the entries until we arrive at the 5th row, third entry, which is 15 | 2. In the context of this problem, the median score on the 200-point exam was 152.

11. Complete the following two-way frequency table in order to figure out what percent of students who preferred math also prefer team sports.

Completing the data table by filling in the missing information, we see:

	Prefer Team Sports	Prefer Individual Sports	Total
Prefer English	60	**30**	**90**
Prefer Math	**15**	45	**60**
Total	**75**	75	150

Out of the 60 students who prefer math, 15 of them prefer team sports, so the answer is 15/60, or 25%.

Optional Extension

Coach instructions: *Once your students have completed the problems and feel they have a comfortable understanding of the concept, have them consider this paradox!*

To extend your understanding and have a little fun with math, try the following activities.

Simpson's Paradox Exploration

In 1973, University of California, Berkeley released admissions figures that seemed to suggest men were much more likely to be admitted to graduate programs than women.The associate dean of the graduate school was worried they would be sued for gender discrimination, and asked statisticians to investigate.

	Applicants	Admitted
Men	8442	44%
Women	4321	35%

Graduate departments have their own admissions systems, and when they were checked separately, statisticians found they actually *favored* women!

Take a look at the data from the largest departments and see if you can figure out what's going on here. (Hint: Highlight or circle the largest number and percent of applicants accepted for each department.)

Department	Men		Women	
	Applicants	Admitted	Applicants	Admitted
1	**825**	62%	108	**82%**
2	**560**	63%	25	**68%**
3	325	**37%**	**593**	34%
4	**417**	33%	375	**35%**
5	191	**28%**	**393**	24%
6	**373**	6%	341	**7%**

Wrapped your head around that one?

Now try to create your own set of data displays in which overall conclusions seem to form a contradiction.

Overall, women tended to apply to more competitive departments with low rates of admission. Men tended to apply to less competitive departments with high rates of admission.