ipdae INSTITUTE FOR THE PROFESSIONAL DEVELOPMENT OF ADULT EDUCATORS

Module: Mathematics

Lesson Title: Make That Shot!

Standards for the Lesson

Florida Adult Basic Education Mathematics Standards
Develop an understanding of ratio concepts and use ratio reasoning to solve problems. (CCR.MA.8.3.1) Develop an understanding of statistical variability. (CCR.MA.9.3.1) Summarize and describe distributions. (CCR.MA.9.4.1)

Interpreting the Standards

1 Standards	2 Skills Included in the Standard	3 Concepts Included in the Standard	4 Through a Particular Context	5 Cognitive Demand/Levels of Thinking	6 Sample Activity
Develop an understanding of ratio concepts and use ratio reasoning to solve problems. (CCR.MA.8.3.1)	understand use solve	ratio concepts ratio reasoning problems	Real-world statistical documents	DOK 2 DOK 2 DOK 2	Have students determine how to figure the percentage correct of something. Have students use mean, median, and mode to calculate their favorite team's statistics.
Develop an understanding of statistical variability. (CCR.MA.9.3.1)	understand	statistical variability		DOK 2	
Summarize and describe distributions. (CCR.MA.9.4.1)	summarize and describe	distributions		DOK 3	

Objectives of the Lesson

Students will:

- Use class data to calculate percentages
- Participate in a group activity
- Relate activity to NBA stats

- Calculate selected percentages for NBA Finals data

Materials

- Waste baskets
- Waste basket liners
- Official "paper toss" paper
- **Handout A: NBA Player Free-Throw Shooting Statistics - 2014-15**
- **Handout B: Data Worksheet**
- **Handout C: Mean, Median, Mode**
- Sports pages from local newspapers or sports magazines with team or individual statistics

Instructional Plan

Overview

This lesson focuses on the area of statistics and how to calculate percentages in real-world situations. Students will also understand the differences between mean, median, and mode and how to calculate each type of statistic.

Process

Introduce the lesson by asking students the following questions:

- How many of you watch NBA basketball or another professional sport?
- How many of you read the various statistics in the newspapers on certain players or teams?
- How are those statistics used?

Show students a copy of a newspaper page that includes statistics for a sport. If you do not have access to newspaper stats, you may wish to access the Internet NBA Stats at: http://stats.nba.com/ or ESPN Stats at: http://espn.go.com/nba/statistics for an overview. Or you may wish to use **Handout A: NBA Player Free-Throw Shooting Statistics - 2014-15.** Discuss the different types of statistics that are calculated and why they are important.

Share with students that they are going to calculate their own free-throw percentage and see who has the best percentage individually and by team.

Before you divide the group into teams, review with students how to calculate percentage. You will want to model the process for students and then have them calculate a percentage to ensure that they have mastered the skill.

Share with students that: Percent means "per hundred." Writing a number as a percent is a way of comparing the number with 100. Percents are really fractions (or ratios) with a denominator of 100. Any percent may be changed to an equivalent fraction by dropping the percent symbol and writing the number over 100. For example: 42% = 42 parts of 100, which can also be written as 42/100.

Have students look at the free throw percentages on **Handout A: NBA Player Free-Throw Shooting Statistics - 2014-15.** Ask students how many free throws a specific player would have made if he attempted 100 throws. For example, Chris Paul would have made 90 free throws out of 100 attempted throws.

Divide the students into small groups of 3-4 students. Have students complete the following activities, documenting their data on **Handout B: Data Worksheet.** When they have completed Activity 1 and 2, have them calculate individual and team percentages for eighteen shots and determine who had the best free-throw average. Have students share their results with the class.

Activity 1:

- Place baskets 8-9 ft. from a marked foul line.
- Select groups.
- Have each student first practice by throwing a paper ball at the basket three times.
- Now it's time for the competition. Have each team member throw a paper ball at the basket ten times.
- Have each team record the number of hits per team member within the group. A hit occurs when the paper ball goes into the basket. Each team should record their data using **Handout B: Data Worksheet**.
- Have each team calculate individual and team percentages for the ten shots.
- Have teams share their information with the other teams. Check for accuracy.

Activity 2:

- Review or demonstrate how to calculate percentage for eight shots.
- Have each team member throw a paper ball at the basket eight times.
- Have each team record the number of hits per team member within the group. A hit occurs when the paper ball goes into the basket. Each team should record their data using **Handout B: Data Worksheet**.
- Have each team calculate individual and team percentages for the eight shots.
- Have teams share their information with the other teams. Check for accuracy.

Activity 3:

- Have each team combine the number of hits per person for ten shots and eight shots and calculate both individual and team percentages for eighteen shots.
- Determine the highest individual and team percentages.

Sample Debriefing Questions

1. Why are statistics important?
2. What is mean? Median? Mode?
3. How are statistics used in the world of sports?
4. How do you use statistics in your daily life?
5. Do statistics always tell the real story?

Modifications for Different Levels

To provide more rigorous practice, have students calculate the median and mode for each team member and the team as a whole. Before they complete the activity, model for students how to calculate median and mode using the **Handout C: Mean, Median, Mode** and one example from a team member's chart. Have students provide a summary report of the mode, median, and mean scores for their team. Have them then graph the average scores from each team using an appropriate graph format.

At the beginning levels of ABE Mathematics, provide students with calculators to assist them in determining percentages or averages. Teach them the steps for determining percentage by modeling the process and then having them practice the steps before they complete the activity.

Handout A: NBA Player Free-Throw Shooting Statistics - 2014-15

Retrieved from the World Wide Web at: http://espn.go.com/nba/statistics/player/_/stat/free-throws/sort/freeThrowPct

Free Throw Percentage Leaders - Qualified

					PER GAME		TOTAL		
RK	PLAYER	TEAM	GP	PPG	FTM	FTA	FTM	FTA	FT%
1	Stephen Curry, PG	GS	80	23.8	3.9	4.2	308	337	.914
2	Jodie Meeks, SG	DET	60	11.1	2.4	2.7	145	160	.906
3	J.J. Redick, SG	LAC	78	16.4	2.3	2.6	183	203	.901
4	Jamal Crawford, SG	LAC	64	15.8	3.5	3.9	227	252	.901
5	Chris Paul, PG	LAC	82	19.1	3.5	3.9	289	321	.900
6	Danilo Gallinari, SF	DEN	59	12.4	2.9	3.2	171	191	.895
7	Nick Young, SF	LAL	42	13.4	3.1	3.5	132	148	.892
8	Dirk Nowitzki, PF	DAL	77	17.3	3.3	3.8	255	289	.882
9	Jarrett Jack, PG	BKN	80	12.0	2.5	2.8	200	227	.881
10	Kevin Martin, SG	MIN	39	20.0	4.4	4.9	170	193	.881
					PER GAME		TOTAL		
RK	PLAYER	TEAM	GP	PPG	FTM	FTA	FTM	FTA	FT%
11	Klay Thompson, SG	GS	77	21.7	2.9	3.3	225	256	.879
12	Brandon Knight, PG	MIL/PHX	63	17.0	3.1	3.5	195	223	.874
13	Mo Williams, PG	MIN/CHA	68	14.2	2.4	2.8	163	187	.872
14	D.J. Augustin, PG	DET/OKC	82	9.5	2.2	2.5	178	205	.868
15	Isaiah Thomas, PG	BOS/PHX	67	16.4	4.5	5.2	302	348	.868
16	James Harden, SG	HOU	81	27.4	8.8	10.2	715	824	.868
17	Damian Lillard, PG	POR	82	21.0	4.2	4.9	344	398	.864
18	Kyrie Irving, PG	CLE	75	21.7	4.2	4.9	315	365	.863
19	Jeff Teague, PG	ATL	73	15.9	3.8	4.4	275	319	.862
20	Louis Williams, SG	TOR	80	15.5	4.3	4.9	340	395	.861

Handout B: Data Worksheet

Calculate the free throw percentage. To do so, divide the number of free throws made by the number of free throws attempted. You will then need to transform that number into a percentage by moving the decimal point two places to the right. It's also customary to round free throw percentage of to the nearest tenth of a percentage.

Trial 1 – 10 shots per team member

Name of Team Member	Free Throws Attempted	Free Throws Made	Free Throw Percentage

Our team's free throw percentage is: _____

Trial 2 – 8 shots per team member

Name of Team Member	Free Throws Attempted	Free Throws Made	Free Throw Percentage

Our team's free throw percentage is: _____

Putting It All Together

The member on our team with the best overall free throw average is _____ with an average of _____.

Our team's overall free throw percentage is: _____

Handout C: Mean, Median, Mode

The mean, median, and mode are types of averages. The table below shows how to calculate the mean, median, and mode for two sets of data. Set A contains the numbers 2, 2, 3, 5, 5, 7, 8 and Set B contains the numbers 2, 3, 3, 4, 6, 7.

Measure	Set A 2, 2, 3, 5, 5, 7, 8	Set B 2, 3, 3, 4, 6, 7
Mean To find the mean, you need to add up all the data, and then divide this total by the number of values in the data.	Adding the numbers up gives: 2 + 2 + 3 + 5 + 5 + 7 + 8 = 32 There are 7 values, so you divide the total by 7: 32 ÷ 7 = 4.57… So, the mean is 4.56 (rounded to two decimal points)	Adding the numbers up gives: 2 + 3 + 3 + 4 + 6 + 7 = 25 There are 6 values, so you divide the total by 6: 25 ÷ 7 = 4.166... So, the mean is 4.17 (rounded to two decimal points)
Median To find the median, you need to put the values in order and then find the middle value. If there are two values in the middle, then you find the mean of these two values.	The numbers in order: 2, 2, 3, (5), 5, 7, 8 The middle value is marked in brackets, and it is 4. So the median is 5.	The numbers in order: 2, 3, (3, 4), 6, 7 This time there are two values in the middle. They have put in brackets. The median is found by calculating the mean of these two values: (3 + 4) ÷2 = 3.5 So the median is 3.5.
Mode The mode is the value which appears the most often in the data. It is possible to have more than one mode if there is more than one value which appears the most.	The data values are: 2, 2, 3, 5, 5, 7, 8 The values which appear most often are 2 and 5. They both appear more times than any of the other data values. So, the modes are 2 and 5.	The data values are: 2, 3, 3, 4, 6, 7 The value which appears most often is. They both appear more times than any of the other data values. So, the mode is 3.