

## Circles and Stars

Circles and Stars is a game that gives children a visual interpretation of multiplication and repeated addition. The game also helps students see multiplication as the combining of equal-size groups that can be represented with a multiplication equation.

### Materials Needed:

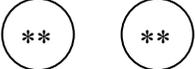
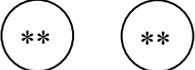
- One six sided die or a spinner for each pair of children
- Game Recording Sheet per player

### Directions:

This game can be introduced to the entire class. Use modeling and questioning to ensure understanding.

1. Each player should record his/her name and partner's name in the top left corner of the player's recording sheet. At the end of the game, each player will total his/her total stars for each round and record the total in the top left box. Record partner's score and record the difference between the two scores.

### Circle and Stars Recording Sheet

Jack's total _____			
Partner's total _____			
Difference _____	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <math>2 + 2 + 2 + 2 = 8</math>  <math>4 \times 2 = 8</math> </div>		

2. Players take turns. This game can be played with 2 to 4 players.
3. Player One rolls the die and draws the corresponding number of circles at the top of the round one box on the top row of the recording sheet. If the player rolls a 4, the player will draw 4 circles

## **Circles and Stars (continued)**

4. Player Two rolls the die and draws the corresponding number of circles in the round one box on his/her recording sheet. If player two rolls a 1, the player will draw 1 circle.
5. Player One rolls the die a second time and draws the corresponding number of stars in each circle. (An option may be to draw Xs which are easier to draw.) If a player rolls a 2, the player will draw 2 stars in each circle. (See Player One's (Jack) recording sheet.) Player records both the addition and multiplication equation for each round. Many students will need to record both equations to move them from repeated addition to multiplication. Later, they might just record for multiplication.
6. Player 2 rolls a second time and draws the corresponding number of stars on his/her recording sheet. Player 2 records equations.
7. Both players repeat these steps until all boxes are filled.
8. Each player finds the total number of stars on his/her game sheet. Players need to check each other's work.
9. Each player records own score plus partner's score. Find the difference and record.

### **1. Teacher poses questions for students to discuss in small groups and whole class?**

- What is the fewest number of stars you can get in one round? Explain.
- What is the greater number of stars you can get in one round? Explain.
- What other observations did you make as you were playing this game? Explain.
- What numbers did you represent in different ways? Compare with your partner. Explain.
- I have a die that has a 0. What would you do if your first roll was a zero? Explain.
- What would you do if your first roll was a 5 and your second roll was a zero? Explain.

## Circles and Stars (continued)

### 2. **Class Data Chart** (Prepare before lesson.)

Teacher should list all numbers 1-36 on a chart using column format. (Thirty six is the largest product possible product using two (1-6) dice.

#### **Show the class the Circle and Stars Data Chart.**

Teacher selects one student and the student's recording sheet. Teacher and student model how to use tally marks to record the student's scores for each round on the Class Data Chart. Tell students they are to play more games of Circles and Stars. As students complete their recording sheet, ask students to make tally marks on the class chart to show the number of stars he/she had for each **round**. Suggest that if one partner reads each score, the other partner can record tally marks on the Class Data Chart. Encourage students to play many games.

### **3. Discuss the data**

After all students have played several games and recorded their products for each round on the class chart, elicit students in conversations about the data. Ask: "Why did I write the numbers 1-36 on the chart?"

- Are there numbers that are impossible using a (1-6) die? Explain.
- Why do some numbers have more tally marks than other numbers? Explain.
- What are the ways to get 2 as an answer? Ways for 6? Ways for 12? (Students might think about this with a partner or in small groups. Record equations.)
- Which number(s) 1-36 has the most combinations using two 1-6 dice? What numbers can I skip count by to say this number? (Relate numbers on dice to factors in multiplication equations.
- *You can skip count by both factors and land on the number which is the product.* Is this always true? Ask students to test this idea. Some may want to test larger numbers.
- Is there a product that can only be represented one way? Why? Explain.
- What other observations do you notice about the data?

## Circles and Stars (continued)

- How might this data be useful for thinking about multiplication combinations (facts)?

### Variation:

- Each player makes a Circles and Stars booklet. Each student needs one sheet of unlined paper.
- The paper is folded into 4 equal parts. Students can cut and staple to make a small booklet.
- Student writes title as *Jack's Book of Circles and Stars*.
- Each booklet is used for one game so each page is a separate round.
- Students write an addition equation and a multiplication equation for each round. (Later, students can write the multiplication equation and related division equation.)
- After the last round is played, each player finds the total number of stars for the game (booklet). The player with the most stars wins.

### Extension:

- Play the game using a 1-9 die or 0-9 spinner.
- Players record multiplication and the related division fact followed by an explanation.
  - $4 \times 2 = 8$       4 circles with 2 stars in each circle
  - $8 \div 2 = 4$       8 stars divided into 4 groups    There are 2 stars in each group.

Adapted from *Math by All Mean; Multiplication Grade 3* by Marilyn Burns

# Circles and Stars Recording Sheet

Name \_\_\_\_\_ Date \_\_\_\_\_

<b>Players</b>  total ____  (Partner's total __  Difference _____	<b>Round 1</b>	<b>Round 2</b>	<b>Round 3</b>
<b>Round 4</b>	<b>Round 5</b>	<b>Round 6</b>	<b>Round 7</b>

Total Number of Stars \_\_\_\_\_

## Circles and Stars - Data Collection

- |     |     |
|-----|-----|
| 1.  | 19. |
| 2.  | 20. |
| 3.  | 21. |
| 4.  | 22. |
| 5.  | 23. |
| 6.  | 24. |
| 7.  | 25. |
| 8.  | 26. |
| 9.  | 27. |
| 10. | 28. |
| 11. | 29. |
| 12. | 30. |
| 13. | 31. |
| 14. | 32. |
| 15. | 33. |
| 16. | 34. |
| 17. | 35. |
| 18. | 36. |