# Sweet Sixteen

Sweet Sixteen can be played collaboratively or in solitaire form for students in grades 3-9. It focuses on developing computational fluency and flexibility and understanding the relationship between all four operations, exponents and order of operations.

**Original source:** Box Cars and One-Eyed Jacks

**Materials needed:**

1) 2 regular dice (1-6)
2) Deck of cards (A=1, J=11, Q=12, K=0)
3) paper/pencil, chalkboard or whiteboard

**Instructions for playing:**
The goal of the game is to have the lowest number of cards left.

1) Turn over sixteen cards (face-up) in a four by four array.
2) Roll two die (or spinners) and add numbers together to create your target number for the game. All equations created must equal the target number.
3) Using 2, 3, 4, or 5 cards over at a time, you create equations to equal your target number using combinations of addition, subtraction, multiplication, division and exponents. As you do the mental math, pick up the cards you are using and put them to the side and record the corresponding equation.
    a. For example, if I roll two dice (5 and 3), then the target number is 8. I can choose a 2 and 4 from my sixteen cards and record 2 x4 =8.
    b. For my next way to make 8, I choose a 2, 3 and an Ace. I record $3^2 - 1 = 8$.
    c. Another round I choose a 6 and a 5 to add to 11 and then a Jack to divide by 11 and then add a 7, recording the equation (6+5) ÷ 11 + 7 = 8. I add the brackets/parenthesis to clarify order of operations.
4) Continue making your target number with 2-5 cards at a time and recording the equations until all the cards have been used or you can no longer make the target number.

After a game, the teacher can ask questions to promote thinking, computational fluency and flexibility and reflection such as:

a. If this _____ was the target number, what different cards would you hope were available to you? What numbers would be challenging to use?
b. What different ways can you use a King and an Ace to make equations?
c. What strategies might you use to play this game? Would you plan out possible equations before beginning? Start with trying to use four or five cards at a time?

**BC Mathematics Curricular Content and Competencies:**

- computational fluency develops from a strong sense of number
- addition and subtraction facts to 20
- relationship between addition and subtraction
- multiplication and division facts to 100
- relationship between multiplication and division
- order of operations
- exponents
- develop mental math strategies
- develop, demonstrate and apply mathematical understanding through play
- use mathematical vocabulary and language
- explain and justify mathematical ideas and decisions
- connect mathematical concepts to each other