LessonTitle: Number Tricks and Algebra Pre 5a.1

Utah State Core Standard and Indicators Content Standards 1-2 Process Standards 1-5

Summary

In this lesson, students figure out why a number trick works. They represent the numbers in the trick using boxes and circles and then a variable and numbers. This representation leads them to an understanding of the trick. They write and simplify algebraic expressions to help understand the trick.

Enduring Understanding	Essential Questions
Algebra helps us represent and understand problems.	How does algebra help us represent and understand problems? How do we use algebra to help us work efficiently?

Skill Focus	Vocabulary Focus
• Variable expressions • Simplifying expressions, combining like terms, using the distributive property.	

Assessment

Several activities which follow this lesson on the web site are excellent assessments.

Materials

Launch

Try the trick. Why?

Explore

Follow the worksheet for representing the trick.

Summarize

Be certain to formalize the skills they used, simplifying expressions, combining like terms, distributive property, problem solving. Then focus on the essential question—what is your answer to the essential question?

Apply

Practice

Go on to 5a.2 simplifying expressions, and then to lessons 5b.0 to 5b.2—don't leave out 5b.2 Picture Frames!

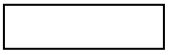
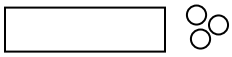
Pre 5a.1 Number Tricks and Algebra

1) Try this number trick.

- Pick a number between 1 and 20.
- Add 3
- Double your answer
- Subtract 4
- Divide by 2
- Subtract the original number
- What is your answer? _____ What is your neighbor's answer? _____

2) Try it again. What is the reason for this answer? What is the trick? Do you have any conjectures--that is, ideas which might give us the reason for the trick?

3) Try this.

- Represent your number in a box. 
- Draw a picture to represent adding three. 
- Draw a picture to represent doubling this amount.
- Rearrange the picture—put the boxes together and the circles together.
- Subtract four. Draw the picture
- Divide by 2. Draw the picture
- Subtract the original number. Draw what's left.

4) Now try to explain why the trick works.

5) Try using Algebra to show why the trick works. Instead of drawing a box, use a letter (you might choose n for number).

- Represent your number. n
- Add three. Write this expression. n + 3
- Double this amount. Write the expression.
- Rearrange your expression—sort of like putting the boxes together and the circles together.
- Subtract four. Write the expression. Then simplify the expression.
- Divide by 2. Write the expression. Then simplify the expression.
- Subtract the original number. Write the expression. Simplify the expression.

6) Did algebra help you understand the trick? If so, explain how.

7)What is algebra? How does this number trick help you to understand algebra?

Simplifying Expressions

Simplify the following expressions if possible.

1) 3 dimes + 10 pennies + 5 nickels + 2 dimes

2) 6 bananas + 4 pears – 3 bananas

3) A drive of 3 miles north, 5 miles west, 2 miles north, 3 miles west

4) 8 no votes, 9 yes votes, 10 no votes, 17 yes votes, 20 no votes

5) 6 hot dogs, 4 polish sausage, 6 hamburgers, 2 hot dogs

6) Board game moves 3 steps left, 8 steps forward, 6 steps right, 7 steps back, 6 steps right

7) A climb of 3’, a fall of 5’, a climb of 10’, a fall of 6’

8) $1/3 + 3/4 + 1/2$

9) $7y + 9 + 3y + 5$

10) $5m + 2p – 3mp$

11) $8x + 7z – 5x + 9z – 6y$

12) $6 + 5c – 8c – 20 + 23c – 10$