



<p>Grades 7-8 (A) 9-12 (S)</p> <p>Duration: 15-25 min</p> <p>Tools: one 9 pcs or 16 pcs Set</p> <p>Group work</p> <p>Keywords: Exponent, Exponent identities, nth root, Operations</p>	<p>304 - Secret Base</p>  <p><b>MATHS / NUMBERS</b></p>	 <p><b>TEACHER</b> Logifaces</p> <p>2019-1-HU01-KA201-0612722019-1</p>
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**DESCRIPTION**

1. Students form pairs within groups of 4. Each pair takes a Logifaces piece, and thinks of a secret number.

LEVEL 1: The secret number is a natural number up to 5.

LEVEL 2: The secret number is a one digit natural number or integer.

LEVEL 3: The secret number can be any real number. See 'Prior knowledge' and 'Recommendations' for the description of Levels.

2. Each pair takes a Logifaces piece. The teacher says: "Check the three heights of your Logifaces piece, raise your secret number to the power of each height, and multiply the three results" (e.g. if your secret number is 7, and the heights are 1, 2 and 2, then calculate  $7^1 \times 7^2 \times 7^2 = 16\ 807$ )

3. Each pair gives their Logifaces piece and their final result (eg. 16 807) to the other pair in their group.

4. Each pair guesses the secret number of the other pair.

5. Steps 1-4 can be repeated 1-3 times. Meanwhile, teachers can give hints and input if needed, they can also suggest students to think of more complicated or special secret numbers.

6. Whole class discussion: discussing, summarising and formalising strategies, discussing different types of secret numbers (e.g. negative) and special secret numbers (e.g. 0 and 1).

**SOLUTIONS / EXAMPLES**

Students use the identity:  $a^k \times a^m = a^{k+m}$ . They need to experiment with their calculator to find the correct base (secret number), or they can use the nth root if they have already learned them.

**PRIOR KNOWLEDGE**

LEVEL 1 Exponents                      LEVEL 2 Exponent identities                      LEVEL 3 nth root

**RECOMMENDATIONS / COMMENTS**

The exercise can be used on different levels:

LEVEL 1            practise exponents, discover the identity

LEVEL 2            (a) practise the identity (b) prepare the nth root

LEVEL 3            practise the nth root

Variations: Other identities can also be used, e.g.  $(a^k)^m = a^{km}$ . Raise your secret number to the power of one height, then the result to the second height, and then the result to the third height, e.g.  $((7^1)^2)^2$

Variation to practise another exponent identity: exercise [305 - Secret Exponent](#).