Grades 5-8 (A), 9 (S)	507 - Build it from Paper	
Duration: 45 min		LOGIFACES METHODOLOGY Erasmus+
Tools: one piece / student, paper, scissors		TEACHER
Individual work		Logifaces
Keywords: Geometry, Similarity	MATHS / TRANSFORMATION	2019-1-HU01-KA201-0612722019-1

DESCRIPTION

Each student selects a Logifaces piece.

LEVEL 1   Students enlarge and reduce the size of the original piece using the standard units. They calculate the measurements for objects with the following scale factors: 2, 10, 20 and ½.
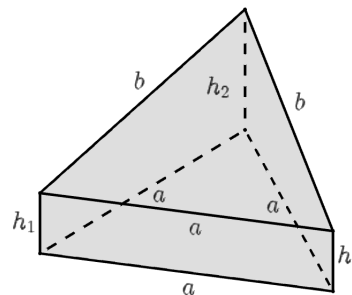
LEVEL 2   Students calculate the surface area and the volume of the pieces with scale factor 2 and ½.

LEVEL 3   Students build a model of an enlarged or reduced piece using paper.
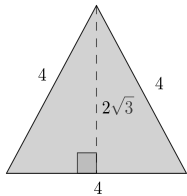
SOLUTIONS / EXAMPLES

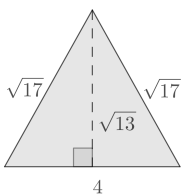LEVEL 1:
Solution for block 112, using the notations of the figure below:

	a	b	h_1	h_2
Block 112:	4	$\sqrt{17}$	1	2
Scale factor 2:	8	$2\sqrt{17}$	2	4
Scale factor 10:	40	$10\sqrt{17}$	10	20
Scale factor 20:	80	$20\sqrt{17}$	20	40
Scale factor $\frac{1}{2}$	2	$\frac{1}{2}\sqrt{17}$	$\frac{1}{2}$	1

LEVEL 2

Triangles	Base	Top
Block 112:	$A = 4\sqrt{3}$	$A = 2\sqrt{13}$
Scale factor 2:	$A = \frac{1}{2} \times 8 \times 4\sqrt{3} = 2^2 \times 4\sqrt{3}$	$A = 2^2 \times 2\sqrt{13}$
Scale factor $\frac{1}{2}$:	$A = \left(\frac{1}{2}\right)^2 \times 4\sqrt{3}$	$A = \left(\frac{1}{2}\right)^2 \times 2\sqrt{13}$

Side faces		
Block 112:	$A = 6$	$A = 4$
Scale factor 2:	$A = 2^{\,2} \times 6$	$A = 2^{\,2} \times 4$
Scale factor $\frac{1}{2}$:	$A = \left(\frac{1}{2}\right)^{2} \times 6$	$A = \left(\frac{1}{2}\right)^{2} \times 4$

	Surface area	Volume
Block 112:	$Surface = 16 + 4\sqrt{3} + 2\sqrt{13} \approx 30.14$	$Volume = \frac{4}{3} \times 4\sqrt{3}$
Scale factor 2:	$Surface = 2^{\,2} \times \left(16 + 4\sqrt{3} + 2\sqrt{13}\right) \approx 120.56$	$Volume = 2^{\,3} \times \frac{4}{3} \times 4\sqrt{3}$
Scale factor $\frac{1}{2}$:	$Surface = \left(\frac{1}{2}\right)^{2} \times \left(16 + 4\sqrt{3} + 2\sqrt{13}\right) \approx 120.56$	$Volume = \left(\frac{1}{2}\right)^{3} \times \frac{4}{3} \times 4\sqrt{3}$

LEVEL 3

PRIOR KNOWLEDGE

Similarity

RECOMMENDATIONS / COMMENTS

This exercise can be used to practise the concept of similarity. It is recommended to see exercises [513 - Surface Area Calculation](#) and [517 - Heights and Volumes](#) first.