Name:

Date:

Tools: one Logifaces Set / 2-3 pairs or 4-6 students

538 - Ratio of Areas

MATHS / TRIGONOMETRY

LOGIFACES METHODOLOGY

Erasmus+

STUDENT

Logifaces

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DESCRIPTION

In the 9 pcs or 16 pcs Set students choose those blocks that have two vertical edges with the same height and one with different height. These are blocks 112, 113, 122, 133, 223 and 233.
They denote the area of the base triangle by

A_b and the area of the top triangle by A_t. The following connection holds between the angle between the planes of the top and base triangles (α) and the areas A_b and A_t: $cos(\alpha) = \frac{A_b}{A_t}$.

LEVEL 1 Students use this formula to complete the table below. Enter the data in the table by measurement or calculation, and then use the formula above to calculate the angle in the last column (with grey background).

To calculate the area of the triangles use Heron's formula: $A = \sqrt{s(s-a)(s-b)(s-c)}$, where a, b and c are the edges of the triangle and $s = \frac{a+b+c}{2}$.

Block	**Base triangle** $(a = b = c = 4)$	**Top triangle**					**Angle of the planes** α
	A_b	a	b	c	s	A_t	
112							
113							
122							
133							
223							
233							

LEVEL 2 Students prove the formula $cos(\alpha) = \frac{A_b}{A_t}$.

HINT Use the results of 537 - Ratio of Heights and the fact that both triangles have an edge that is parallel to the common line of the two planes and the heights a_b and a_t are perpendicular to that edge. In fact, the proof works for any triangle with this property.

SOLUTION(S)