Grades 5-8 (S), 9-12 (S)

Duration: 10-15 min

Tools: one Logifaces piece / student

Individual work

Keywords: Geometry, Measure, Area

513 - Surface Area
Calculation

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MATHS / 3D GEOMETRY

LOGIFACES
METHODOLOGY
Erasmus+

TEACHER

Logifaces

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DESCRIPTION

Students choose a piece from the set and calculate the areas of the polygons found on that piece using the standard units. Using these they also calculate the surface area of the piece.
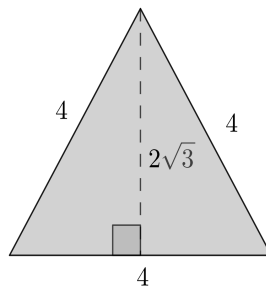
SOLUTIONS / EXAMPLES

First we present detailed calculations of the polygon areas and hence the surface area for block 132. Afterwards we summarise the results for all blocks in a table.
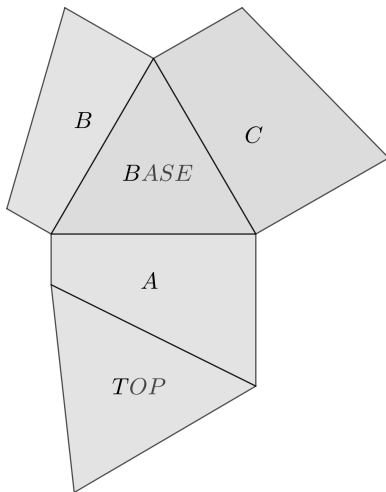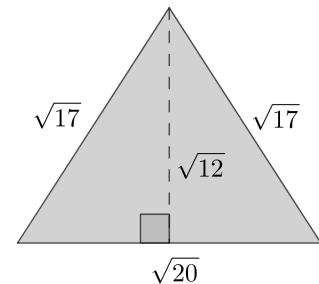
TRIANGLES

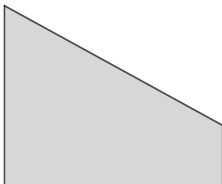BASE

$A = \frac{1}{2} \times 4 \times 2\sqrt{3} = 4\sqrt{3}$

TOP

$A = \frac{1}{2} \times \sqrt{20} \times \sqrt{12} = 2\sqrt{15}$
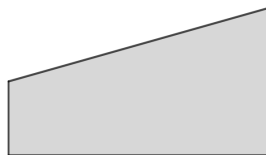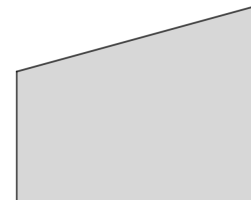
TRAPEZIUMS

A

$A = \frac{1}{2} \times (1 + 3) \times 4 = 8$

B

$A = \frac{1}{2} \times (1 + 2) \times 4 = 6$

C

$A = \frac{1}{2} \times (2 + 3) \times 4 = 10$

SURFACE = $4\sqrt{3} + 2\sqrt{15} + 8 + 6 + 10 \approx 38.67$

In the table below, the results of the calculations are shown for every block.

Block	A	B	C	Base	Top	Total
111	4	4	4	$4\sqrt{3}$	$4\sqrt{3}$	$12 + 8\sqrt{3} \approx 25.86$
222	8	8	8	$4\sqrt{3}$	$4\sqrt{3}$	$24 + 8\sqrt{3} \approx 37.86$
333	12	12	12	$4\sqrt{3}$	$4\sqrt{3}$	$36 + 8\sqrt{3} \approx 49.86$
112	4	6	6	$4\sqrt{3}$	$2\sqrt{13}$	$16 + 4\sqrt{3} + 2\sqrt{13} \approx 30.14$
122	6	6	8	$4\sqrt{3}$	$2\sqrt{13}$	$20 + 4\sqrt{3} + 2\sqrt{13} \approx 34.14$
223	8	10	10	$4\sqrt{3}$	$2\sqrt{13}$	$28 + 4\sqrt{3} + 2\sqrt{13} \approx 42.14$
233	10	10	12	$4\sqrt{3}$	$2\sqrt{13}$	$32 + 4\sqrt{3} + 2\sqrt{13} \approx 46.14$
113	4	8	8	$4\sqrt{3}$	8	$20 + 4\sqrt{3} + 8 \approx 34.93$
133	8	8	12	$4\sqrt{3}$	8	$28 + 4\sqrt{3} + 8 \approx 42.93$
123	6	8	10	$4\sqrt{3}$	$2\sqrt{15}$	$24 + 4\sqrt{3} + 2\sqrt{15} \approx 38.67$
132	6	8	10	$4\sqrt{3}$	$2\sqrt{15}$	$24 + 4\sqrt{3} + 2\sqrt{15} \approx 38.67$

PRIOR KNOWLEDGE

Area of triangles and trapeziums

RECOMMENDATIONS / COMMENTS

Complete exercises 409 - Area of Rectangular Faces and 411 - Area of Triangles to find the areas of the polygons.

The calculations can be verified using GeoGebra, see exercise 528 - Read the Results in GeoGebra.