11.3 Surface Area

What is surface area?

Why learn about surface area?

What is a prism?

What is a cylinder?

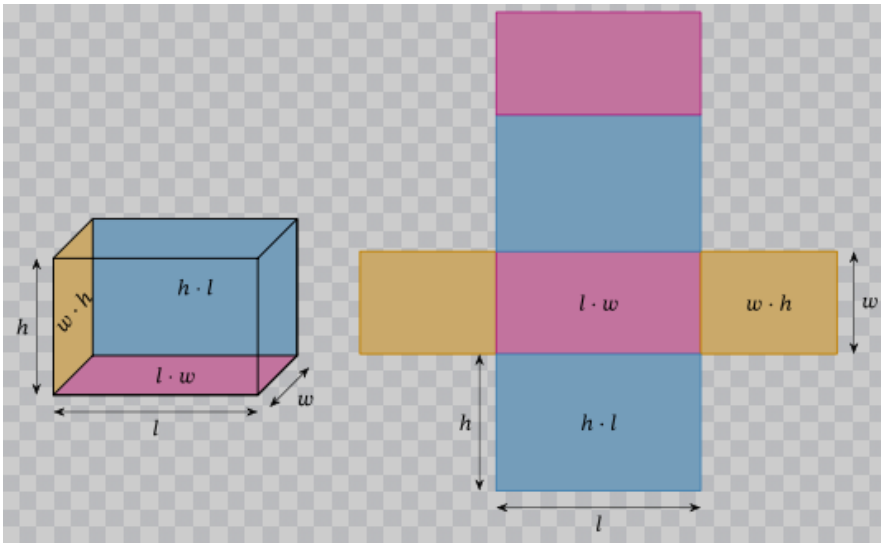
...but first

- Need more practice solving problems
- Those practice problems are going to be worth points
- The points are going to go into the projects category
- Sets of 5 problems worth either 5 or 10 points
- Small test every week or two - directly from the problems
- Tests will have no corrections since tests are open notes

11.3 Surface Area

What is surface area?

Surface area is just what it says. The area of a surface.



11.3 Surface Area

Why learn about surface area?

- Calculate amount of stain/paint to cover a wall/surface
- Calculate amount of fabric for upholstery (furniture seats, etc.)
- Packaging sizing (making boxes)

11.3 Surface Area

What is a prism?

A prism has a top and bottom that are parallel to each other and sides that connect the top and bottom to each other. (We are going to say that those sides are perpendicular or normal to the top and bottom.)

Right Prism

Oblique Prism

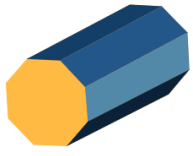
Triangular Prism

Rectangular Prism

Square Prism

Pentagonal Prism

Hexagonal Prism



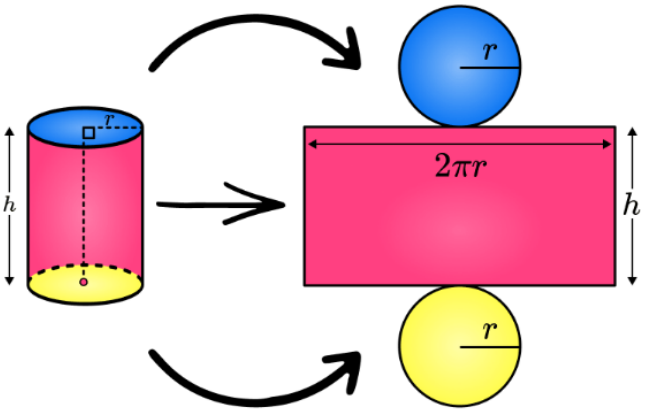
Octagonal Prism

https://www.geeksforgeeks.org/prism/

11.3 Surface Area

What is a cylinder?

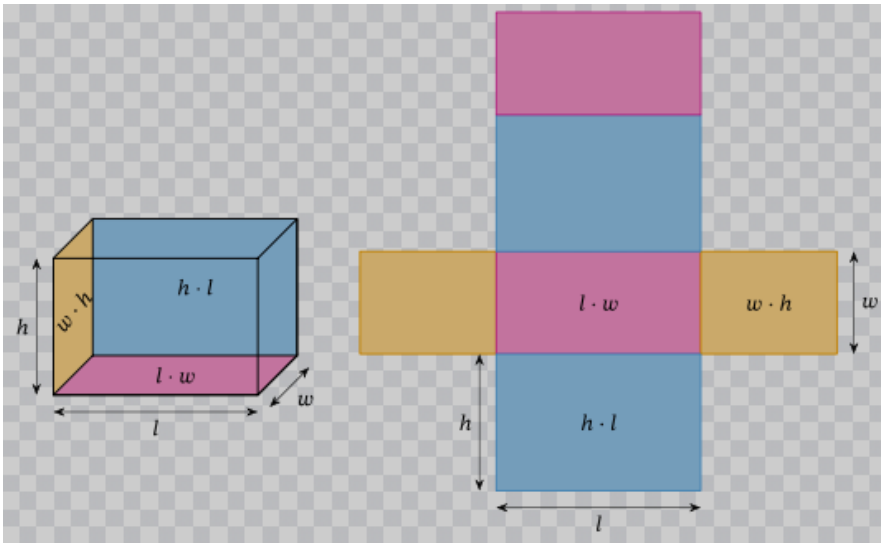
A cylinder is really just a (right) prism with a circular base.



https://thirdspacelearning.com/gcse-maths/geometry-and-measure/surface-area-of-a-cylinder/

11.3 Surface Area

How do you calculate Surface area?



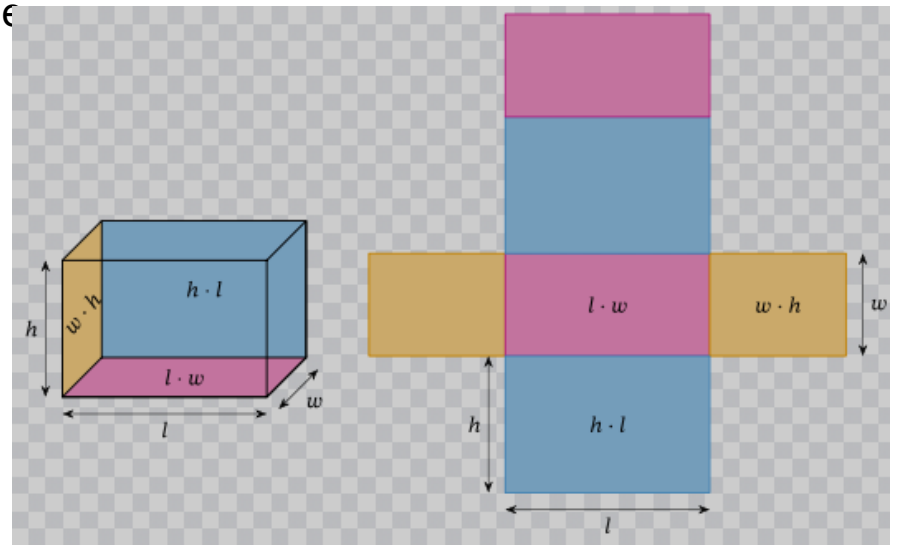
11.3 Surface Area

How do you calculate Surface area?

Two definitions

- Lateral Area - Area of the sides of the prism
- Area of the base - Area of the top/bottom

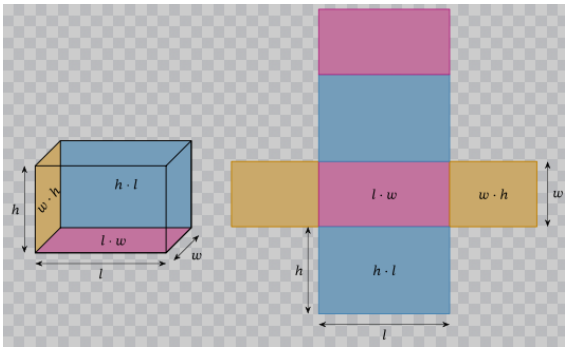
Surface Area is the sum (addition) of the lateral area and the area of the base



January 31, 2025

11.3 Surface Area

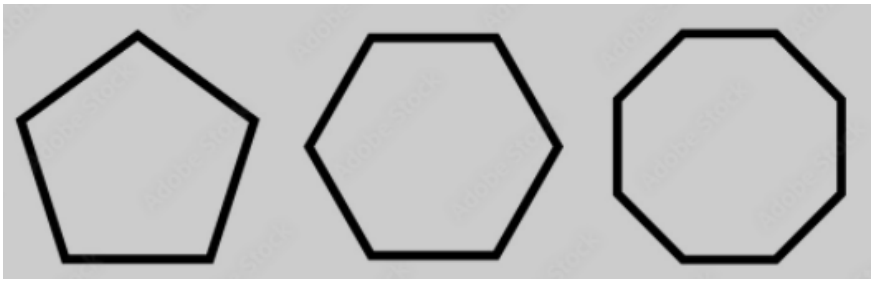
How do you calculate Surface area?



11.3 Surface Area

A couple more definitions

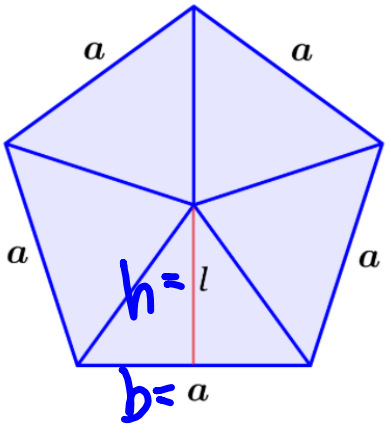
- Polygon - multi-sided figure
- Regular polygon - all sides and angles the same (congruent)



https://www.istockphoto.com/vector/pentagon-hexagon-octagon-icon-vector-geometry-polygon-gm1057585194-282630518

11.3 Surface Area

You do not need to remember all the different formulas for areas of regular polygons. All you need to know is the length of the side and the distance from the center of that side to the middle of the polygon. Then, you only need to remember the formula for area of a triangle.



$$A_\triangle = \frac{bh}{2}$$

$$A = \frac{5lh}{2}$$

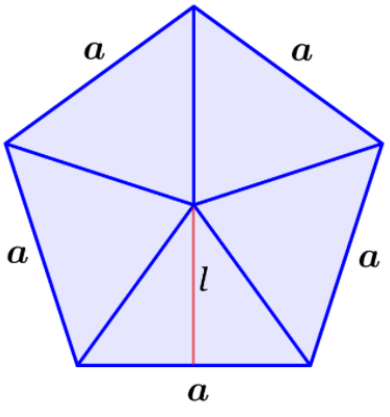
$p = 5a$ $A = \frac{5}{2}la$

https://en.neurochispas.com/geometry/area-of-a-pentagon-formulas-and-examples/

11.3 Surface Area

The lateral area is always the area of a rectangle. (Even for a cylinder.) So you only need to remember two formulas. Area of a triangle and area of a rectangle.

lateral area = $ah \cdot 5$



$p = 5a$ $A = \frac{5}{2}la$

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11.3 Surface Area

Practice (from the book):

11.3 (pp 671-673)

4, 5, 7, 9, 10

6, 8, 11, 13, 15

A couple more definitions:

- Compare usually means division or ratio (sometimes subtract)
- Ratio is a fraction

11.3 Surface Area

11.3 problems 4, 5, 7, 9, 10

11.3 problems 6, 8, 11, 13, 15

11.3 Surface Area

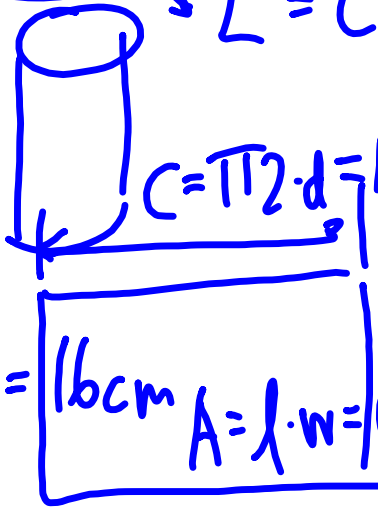
11.3 problems 4

Find lateral and surface area of the figure

Cylinder with radius of 3 cm and height of 16 cm

$C = \pi d = \pi \cdot 2 \cdot r = \pi \cdot 2 \cdot 3\,cm = 18.85\,cm$

$L = C \cdot h = 18.85\,cm \cdot 16\,cm = 301.6\,cm^2$



circle (base)

$A_B = \pi r^2 = \pi r r$

$= \pi \cdot 3\,cm \cdot 3\,cm = 28.27\,cm^2$

$SA = L + 2A_B$

$= 301.6\,cm^2 + 2 \times 28.27\,cm^2$

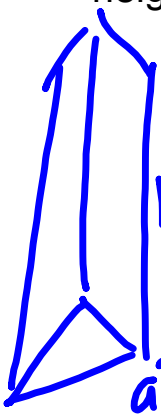
$= 358.1\,cm^2$

11.3 Surface Area

11.3 problems 5

Find lateral and surface area of the figure

Triangular based prism - right triangle with legs 6 in. and 8 in. height of 10 in.



h A_c $c=10in$ h A_b $b=8in$ A_a $h=10in$ $a=6in$

$L=$

$A_a = a \cdot h = 6in \cdot 10in = 60\ in^2$

$A_b = b \cdot h = 8in \cdot 10in = 80\ in^2$

$A_c = b \cdot h = 10in \cdot 10in = 100\ in^2$

$L=(a+b+c)h=$ $\leftrightarrow$ $L=240\ in^2$

$a^2+b^2=c^2$

$c=\sqrt{a^2+b^2}$

$c=\sqrt{6^2+8^2}=\sqrt{100}=10in$

$A_B = A_\Delta = \frac{base \cdot height}{2} = \frac{a \cdot b}{2}$

$= \frac{6 \cdot 8in}{2} = \frac{48in^2}{2} = 24in^2$

$SA = L + 2A_\Delta$

$= 240in^2 + 2 \times 24in^2$

$= 288in^2$