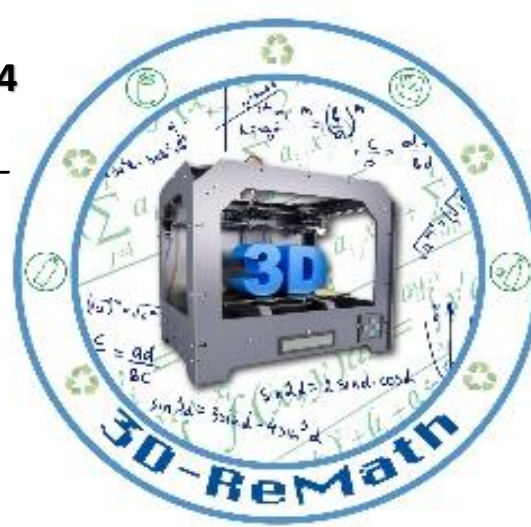




Project code:
2019-1-EL01-KA201-062914

Erasmus+ Call: 2019 - KA2 -



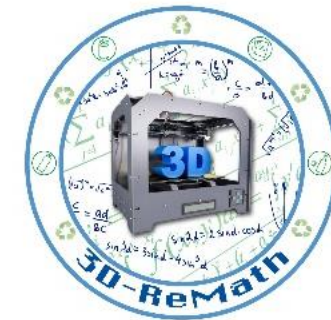
3D printing technology aims students understanding maths and recycling procedure

02_3rd Curricula of Maths: Stereometry

3D shapes_Surface Area and Volume

Outline

- 3D Shapes: Surface Area and Volume
- Videos



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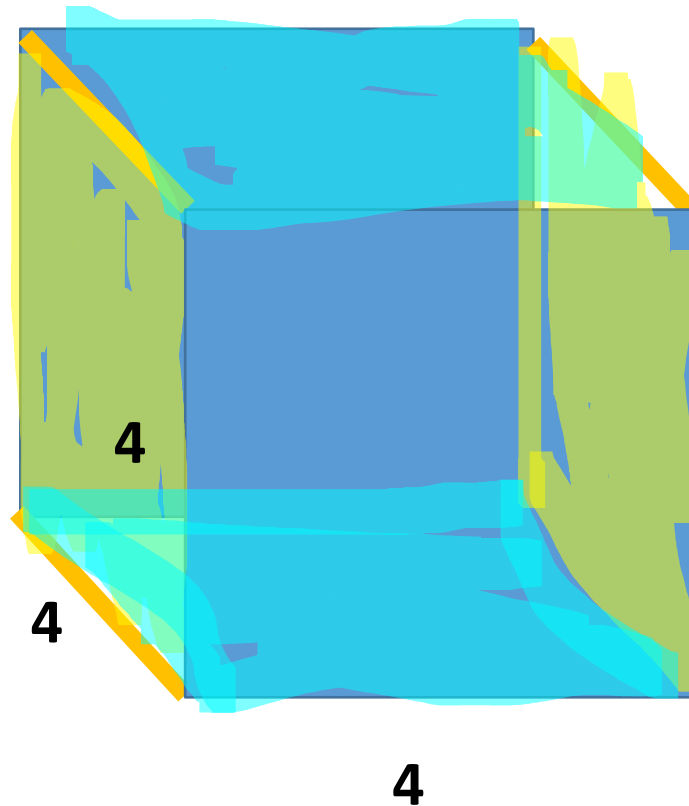
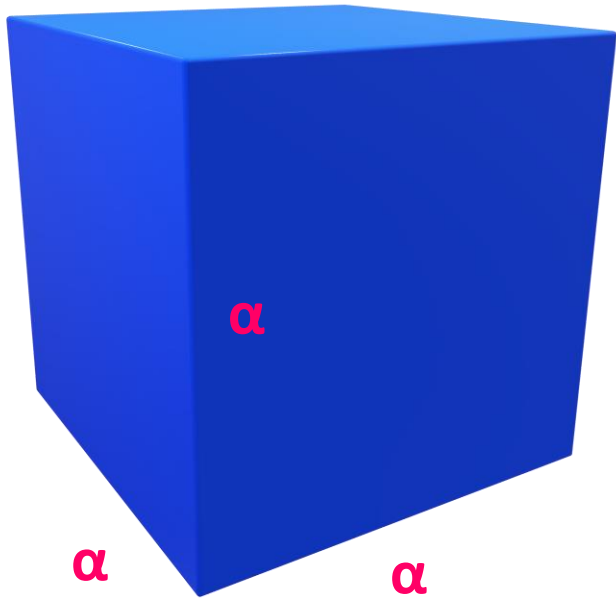


Cube

Edges	Vertices	Faces
12	8	6

Cube

Square



Up and down 2 squares

Area of 1 square = $4 * 4 = 16$

Area of 2 squares = $2 * 16 = 32$

Front and back 2 squares

Area of 1 square = $4 * 4 = 16$

Area of 2 squares = $2 * 16 = 32$

Right and left 2 squares

Area of 1 square = $4 * 4 = 16$

Area of 2 squares = $2 * 16 = 32$

Surface Area = $32 + 32 + 32 = 96$

Volume = $4 * 4 * 4 = 64$

$$\text{Surface Area} = 6 * (\alpha * \alpha) = 6 * \alpha^2$$

$$\text{Volume} = \alpha * \alpha * \alpha = \alpha^3$$



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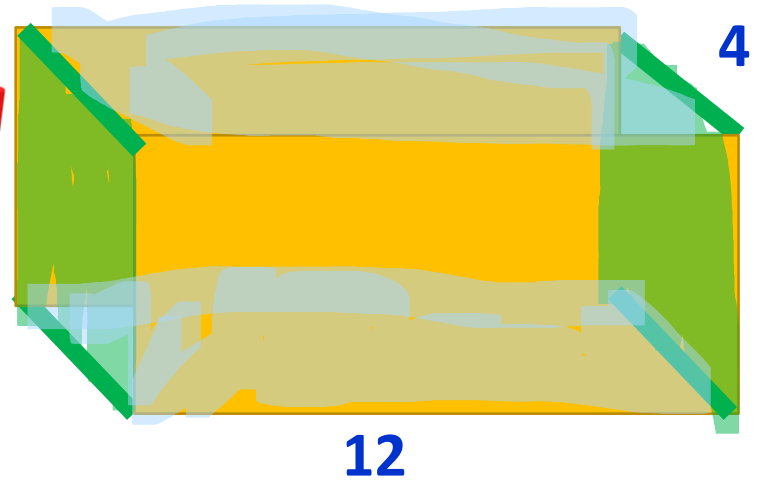
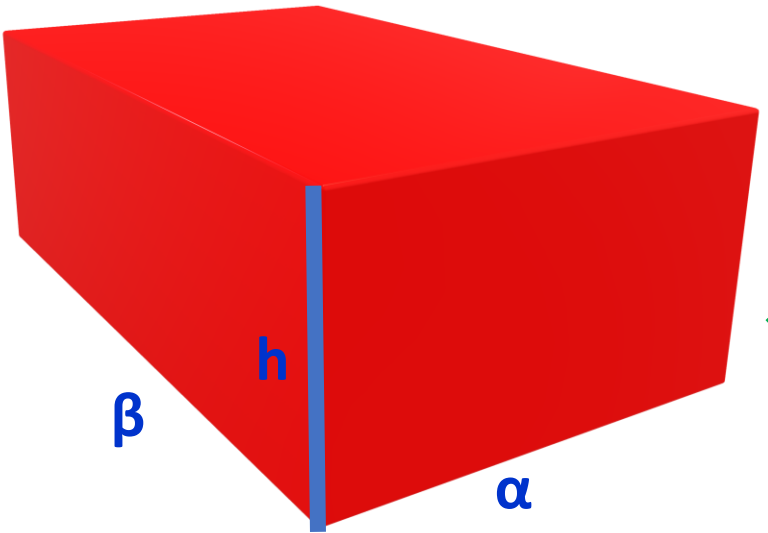
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Cuboid-Rectangular Prism

Orthogonal

Cuboid



Edges	Vertices	Faces
12	8	6



Up and down 2 rectangulars

Area of 1 rectangular = $4 * 12 = 48$

Area of 2 rectangular = $2 * 48 = 96$

Front and back 2 rectangulars

Area of 1 rectangular = $12 * 8 = 96$

Area of 2 rectangulars = $2 * 96 = 192$

Right and left 2 rectangulars

Area of 1 rectangular = $4 * 8 = 32$

Area of 2 rectangular = $2 * 32 = 64$

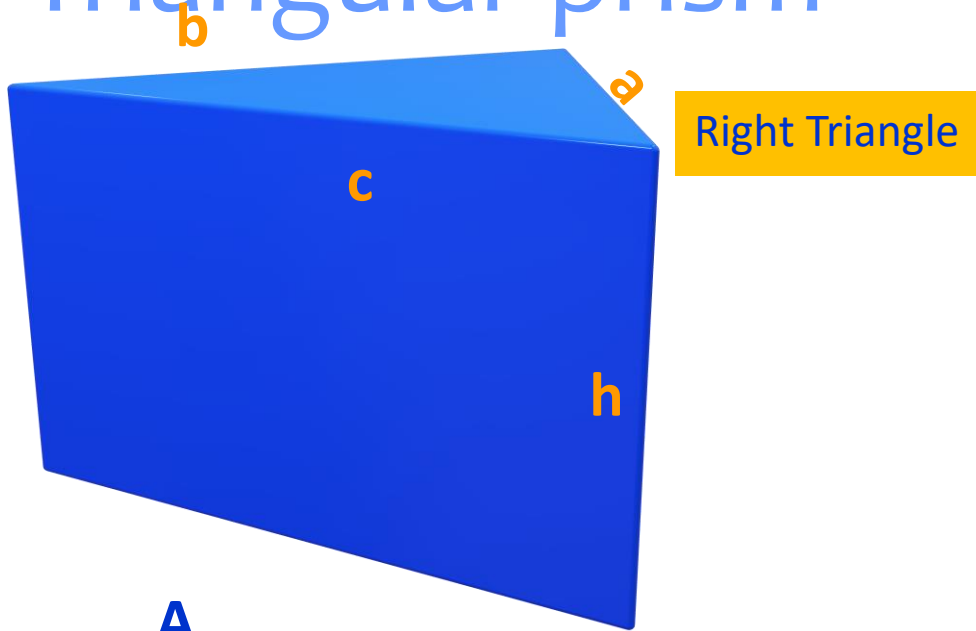
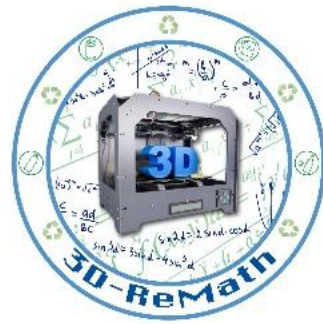
Surface Area = $48 + 192 + 64 = 352$

Volume = $4 * 8 * 12 = 384$

Surface Area = $2 * (\alpha * \beta) + 2 * (h * \alpha) + 2 * (\beta * h)$

Volume = $(\alpha * \beta) * h$

Triangular prism



Right Triangle

Surface Area

=Area of all over+2*Area of triangular

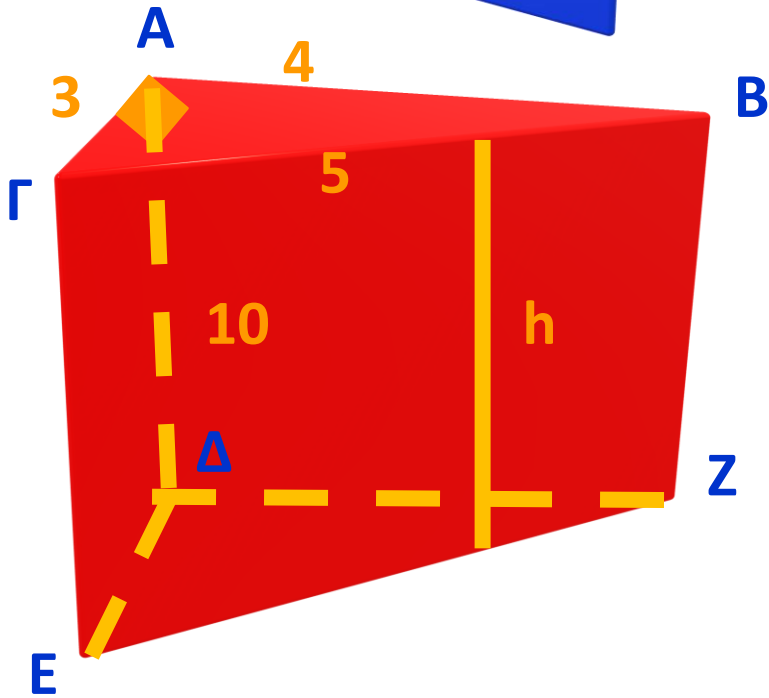
=Perimeter of triangular*h+2*1/2(a*b)

Surface Area=

Area of all over+2*Area of triangular

=(3+4+5)*10 +2*1/2(3*4)

=132



Volume=

Area of triangular*h= $\frac{1}{2} * a * b * h$

Volume= $\frac{1}{2} * 3 * 4 * 10 = 60$



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Cylinder

Surface Area =

=Perimeter of cycle*h+2*Area of cycle

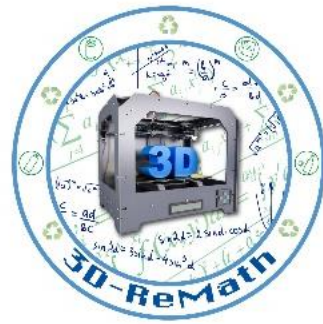
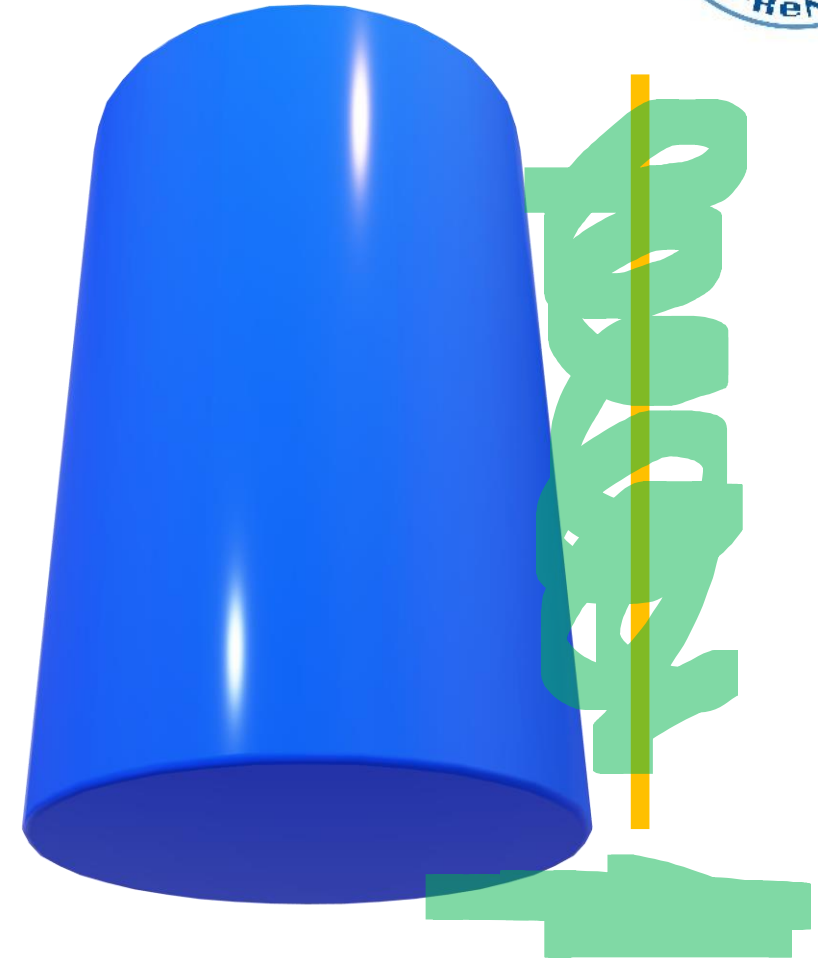
$$=2\pi r * h + 2 * \pi r^2$$

$$\begin{aligned} \text{Surface} &= 2\pi 4 * 10 + 2 * \pi 4^2 \\ &= 80\pi + 32\pi = 112\pi \end{aligned}$$

Volume=Area of cycle*h

$$= \pi r^2 * h$$

$$\begin{aligned} \text{Volume} &= \pi 4^2 * h \\ &= 16\pi * 10 = 160\pi \end{aligned}$$



Edges	Vertices	Faces
2	0	3

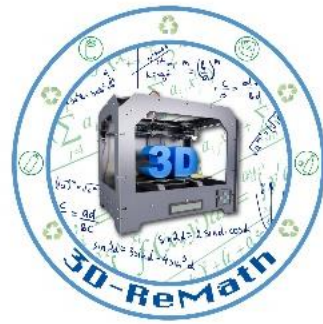


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Square base Pyramid

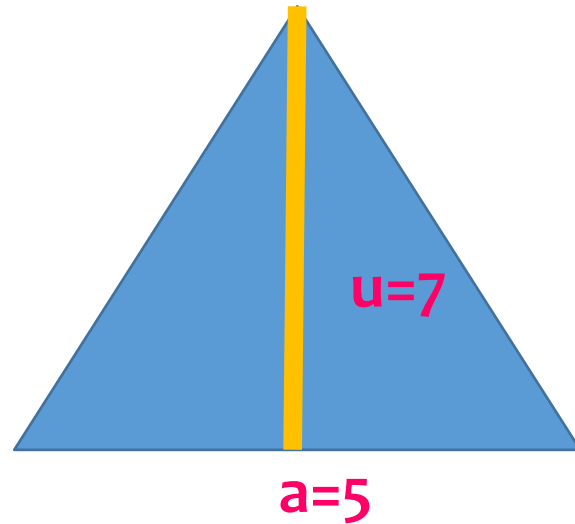


Surface Area =
=Perimeter of triangular + area of square

$$= \frac{1}{2} * 4 * a * u + a^2$$

Surface Area =

$$= \frac{1}{2} * 4 * 5 * 7 + 5^2$$
$$= 70 + 25 = 95$$

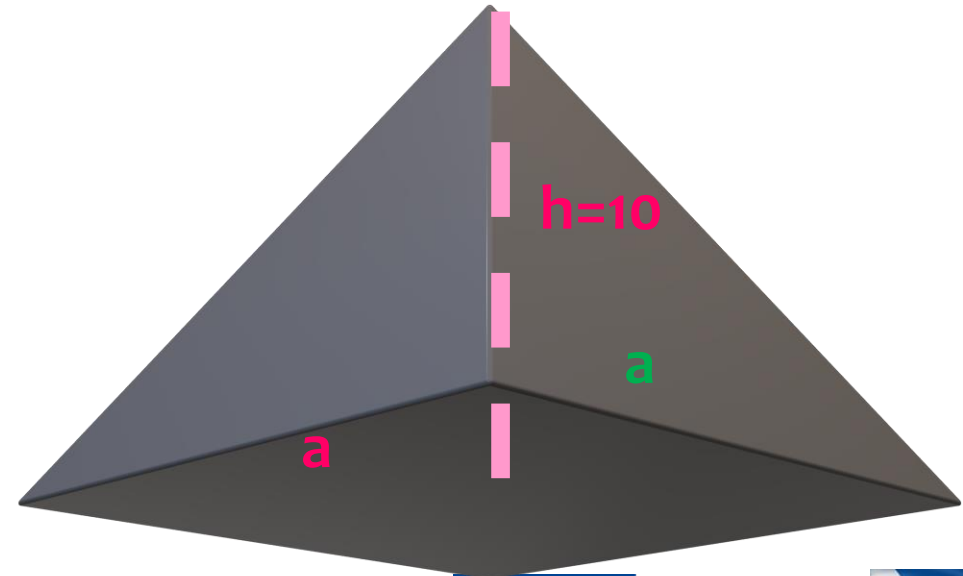


Volume =

$$= \frac{1}{3} * \text{area of square} * h$$

Volume =

$$= \frac{1}{3} * 25 * 10 = 83,3$$



Edges	Vertices	Faces
8	5	5

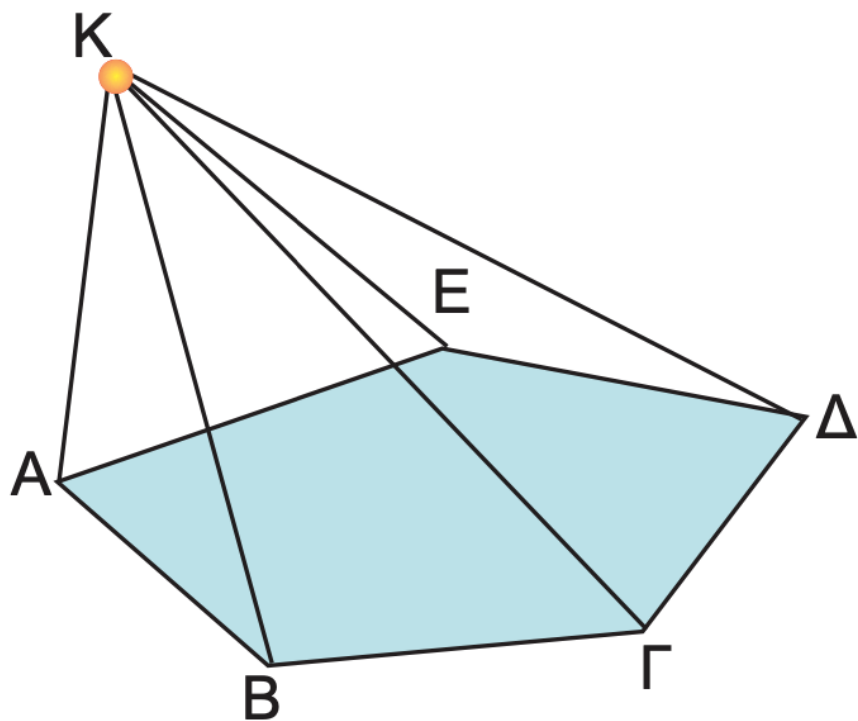
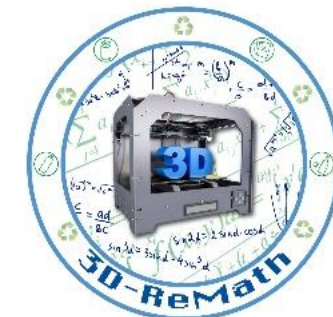


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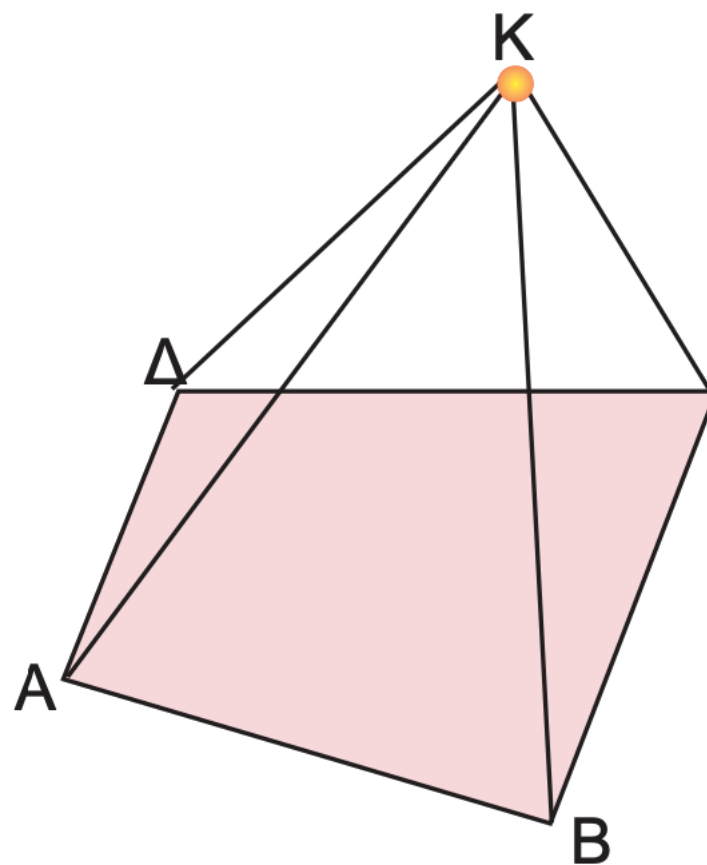
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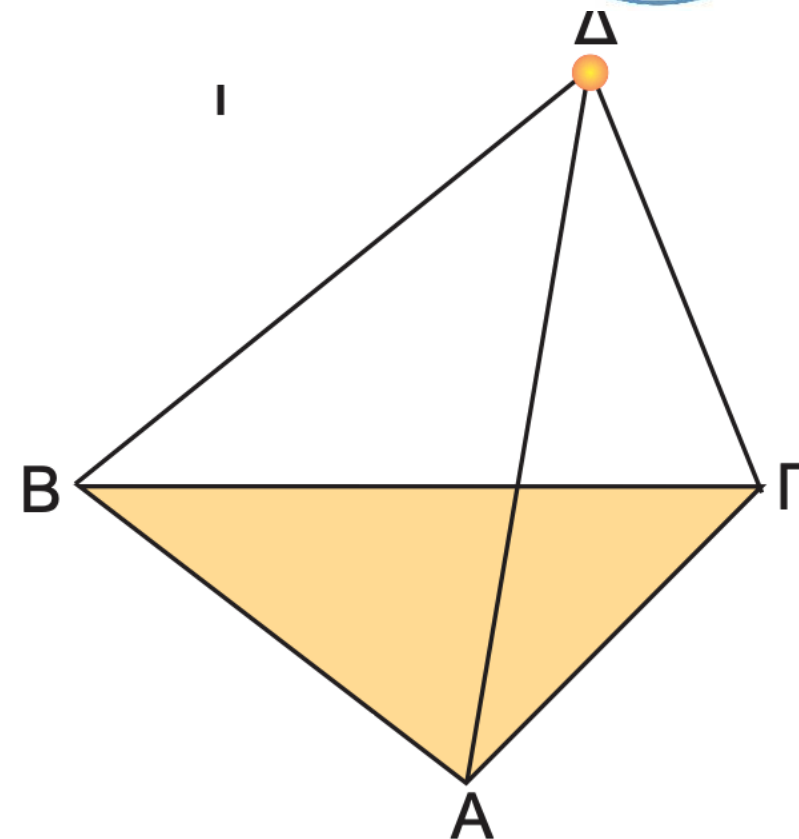
Types of Pyramid



Base: pentagon



Base: polyedron



Base: triangular



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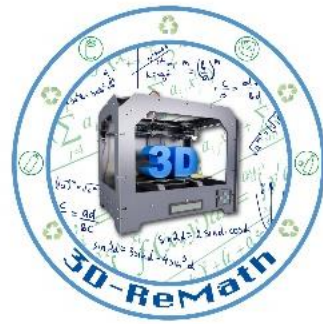
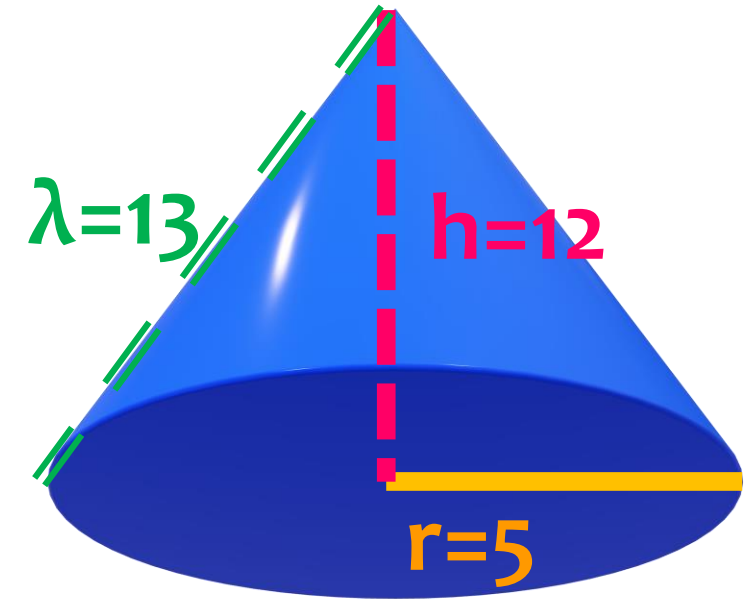
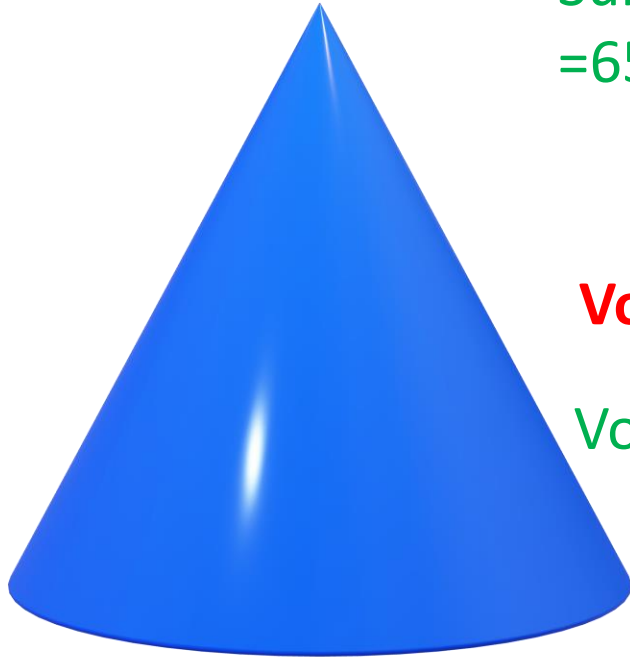


Cone

$$\begin{aligned}\text{Surface Area} &= \\ &= \text{Perimeter of cycle} * h + \text{Area of cycle} \\ &= \pi r \lambda + \pi r^2\end{aligned}$$

$$\begin{aligned}\text{Surface} &= \pi * 5 * 13 + \pi * 5^2 \\ &= 65\pi + 25\pi = 90\pi\end{aligned}$$

$$\begin{aligned}\text{Volume} &= \frac{1}{3} \pi r^2 * h \\ \text{Volume} &= \frac{1}{3} * \pi * 5^2 * 12 = 100\pi\end{aligned}$$



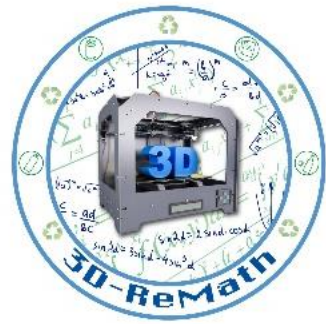
Edges	Vertices	Faces
1	1	2



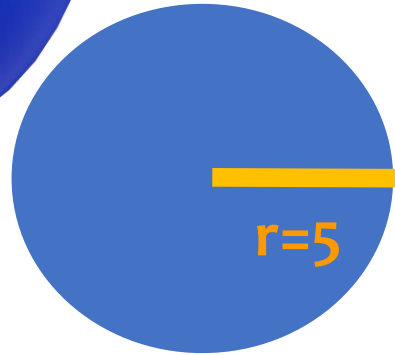
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Sphere



$$\text{Surface Area} = 4\pi r^2$$

$$\text{Surface} = 4 * \pi * 5^2 = 100\pi$$

$$\text{Volume} = \frac{4}{3} * \pi * r^3$$

$$\text{Volume} = \frac{4}{3} \pi * 5^3 = 166,6 \pi$$

Edges	Vertices	Faces
0	0	1

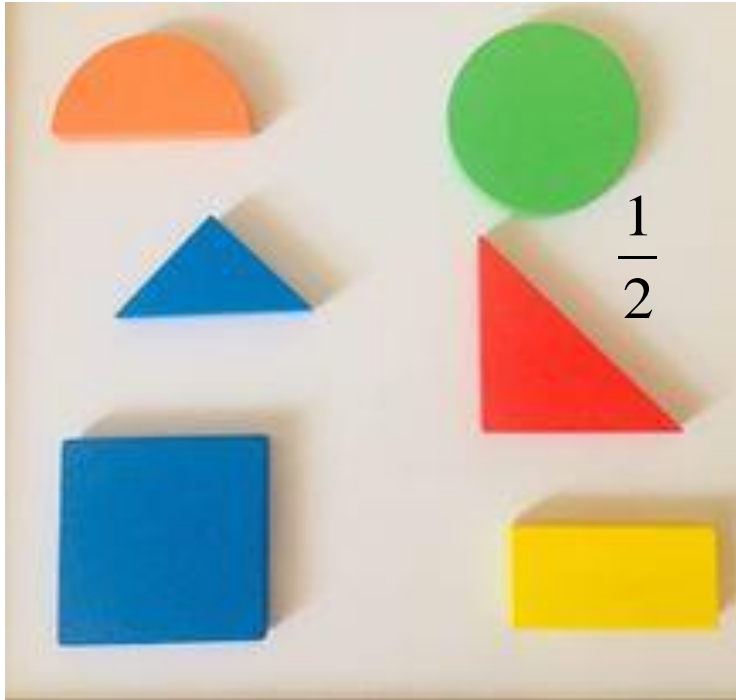


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Video



- <https://www.youtube.com/watch?v=CYVmmTaqIPU>
- <https://www.youtube.com/watch?v=3-QwWFkz5hw>
- https://www.youtube.com/watch?v=_XJ1A5io8vc
- <https://www.youtube.com/watch?v=LEuFeXsqXXA>
- <https://www.youtube.com/watch?v=ZJ-VMcbLTaU>



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