Pyramids

1. Given a regular quadrangular pyramid with a lateral edge twice the length of the base edge.

   (a) Calculate the value of the cosine of the angle between the lateral face and the the base of the pyramid.

   Ans: $\frac{\sqrt{15}}{15}$

   (b) Find the lengths of the edges so that its lateral surface area is $36\sqrt{15}$

   Ans: $6, 12$

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2. In a regular quadrangular pyramid, the area of the base is 100 and the area of the lateral faces is 320. Calculate the volume of the pyramid.

   Ans: $\frac{100\sqrt{231}}{3}$

3. All edges of a regular quadrangular pyramid are the same length. Calculate the angle between the lateral edge of the pyramid and the base of the polyhedron.

   Ans: $45°$

4. In a regular quadrangular pyramid, opposite lateral edges are perpendicular, and the height of the lateral face drawn from the pyramid's vertex has length $3\sqrt{3}$. Calculate the volume and total surface area of the pyramid.

   Ans: $V = 36\sqrt{2}$, $A_t = 36 + 36\sqrt{3}$

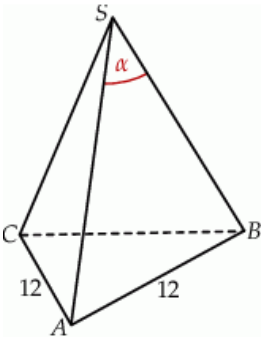
5. Calculate the volume of a regular triangular pyramid with a base edge of 6 cm and a lateral edge of 12 cm.

   Ans: $18\sqrt{11}$ cm^3

6. In a regular triangular pyramid, the ratio of the lateral surface area to the base area is equal to $\sqrt{13}$. Calculate the angle between the lateral edge of this pyramid to the plane of the base.

   Ans: $60°$

7. In a regular triangular pyramid $ABCS$, the lenght of the base edge is 12 and the volume is of the pyramid is $72\sqrt{3}$. An α angle is the angle between the lateral edges SA and SB (see figure). Calculate the sine of the angle α .



Ans: $\frac{4\sqrt{3}}{7}$

8. In a regular hexagonal pyramid, the angle between the lateral face and base plane is $45°$. Calculate the ratio of the base area to the lateral surface area of the pyramid.

Ans: $\frac{\sqrt{2}}{2}$

9. Calculate the volume and the lateral surface area of a regular hexagonal pyramid with a base edge of 2 cm and a lateral edge of 6 cm.

Ans: $V = 8\sqrt{6}$ cm^3, $A_L = 6\sqrt{35}$ cm^2