Click to verify

home / geometry / volume and surface area / volume of a pyramidThe volume of a pyramid is the amount of space it encloses. Below are a few examples of different types of pyramids. Formula for the volume of a pyramid The volume, V, of a pyramid is: where B is the area of the base and h is the height. The volume of a prism is Bh. The volume of a pyramid that has the same base and height as the prism it is inscribed in is exactly one-third the volume of the prism. This is true for any pyramid that can be inscribed in a prism as long as the base and height are the same. Volume of a frustum pyramid If a plane cuts through a pyramid that is parallel to its base, a frustum is created. A plane parallel to its base intersects the pyramid above, forming a smaller pyramid above, and a frustum below. The volume formula for the frustum of a pyramid is where h is the height of the frustum and A1 and A2 are the areas of the bottom and top bases. Example: A frustum is created from a right square pyramid. The height of the frustum is 3, and the two bases have side lengths of 5 and 7 respectively. What is the volume of the frustum? The areas of the square bases are: A1 = 72 = 49 A2 = 52 = 25 Using the volume formula above: V = = =74 + 35 =109 Download Article Download Article To calculate the volume of a pyramid, use the formula V = 1 3 l w h {\displaystyle V={\frac {1}{3}}lwh} , where l and w are the length and width of the base, and h is the height. You can also use the equivalent formula V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , where A b {\displaystyle A_{b}} is the area of the base and h is the height. The method varies slightly depending on whether the pyramid has a triangular or a rectangular base. If you want to know how to calculate the volume of a pyramid, just follow these steps. 1 Find the length and width of the base. In this example, the length of the base is 4 cm and the width is 3 cm. If you're working with a square base, the method is the same, except the length and width of the square base will be equal. Write down these measurements.[1] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know l {\displaystyle l} and w {\displaystyle w} first. l = 4 cm {\displaystyle l=4\,{\text{cm}}} w = 3 cm {\displaystyle w=3\,{\text{cm}}} 2 Multiply the length and width to find the area of the base. To get the area of the base, simply multiply 3 cm by 4 cm.[2] [3] Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b {\displaystyle A_{b}} . You can find this by plugging in l = 4 cm {\displaystyle l=4\,{\text{cm}}} and w = 3 cm {\displaystyle w=3\,{\text{cm}}} from the previous step. A b = l w {\displaystyle A_{b}=lw} A b = (4 cm) (3 cm) = 12 cm 2 {\displaystyle A_{b}=(4\,{\text{cm}})(3\,{\text{cm}})=12\,{\text{cm}}^{2}} Advertisement 3 Multiply the area of the base by the height. The area of the base is 12 cm2 and the height is 4 cm, so you can multiply 12 cm2 by 4 cm.[4] Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b h {\displaystyle A_{b}h} . You can find this using A b {\displaystyle A_{b}} from the previous step. A b = 12 cm 2 {\displaystyle A_{b}=12\,{\text{cm}}^{2}} h = 4 cm {\displaystyle h=4\,{\text{cm}}} A b h = (12 cm 2) (4 cm) = 48 cm 3 {\displaystyle A_{b}h=(12\,{\text{cm}}^{2})(4\,{\text{cm}})=48\,{\text{cm}}^{3}} 4 Multiply your result so far by 1 3 {\displaystyle {\frac {1}{3}}} . Or, in other words, divide by 3. Remember to state your answer in cubic units whenever you're working with three-dimensional space.[5] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} . You can plug in A b h = 48 cm 3 {\displaystyle A_{b}h=48\,{\text{cm}}^{3}} from the previous step. V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} V = (1 3) (48 cm 3) = 16 cm 3 {\displaystyle V=({\frac {1}{3}})(48\,{\text{cm}}^{3})=16\,{\text{cm}}^{3}} EXPERT TIP Joseph Meyer Math Teacher Joseph Meyer is a High School Math Teacher based in Pittsburgh, Pennsylvania. He is an educator at City Charter High School, where he has been teaching for over 7 years. Joseph is also the founder of Sandbox Math, an online learning community dedicated to helping students succeed in Algebra. His site is set apart by its focus on fostering genuine comprehension through step-by-step understanding (instead of just getting the correct final answer), enabling learners to identify and overcome misunderstandings and confidently take on any test they face. He received his MA in Physics from Case Western Reserve University and his BA in Physics from Baldwin Wallace University. To find a pyramid's volume, use the formula (1/3) ∗ {\displaystyle *} Base Area ∗ {\displaystyle *} Height. Measure a pyramid's height from its tip to the base's center. Next, find the base area using the correct formula for the base shape, whether a triangle, square, or rectangle. Finally, input these values into the formula to calculate volume. Advertisement 1 Find the length and width of the base. The length and width of the base must be perpendicular to each other for this method to work. They can also be considered the base and height of the triangle. In this example, the width of the base is 2 cm and the length of the triangle is 4 cm.[6] If the length and width are not perpendicular and you don't know the height of the triangle, there are a few other methods you can try to calculate the area of a triangle. Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know l {\displaystyle l} and w {\displaystyle w} first. l = width of pyramid base = base of triangle, or b = 2 cm {\displaystyle l={\text{width of pyramid base}}={\text{base of triangle, or}}\,b=2\,{\text{cm}}} w = length of pyramid base = height of triangle, or h = 4 cm {\displaystyle w={\text{length of pyramid base}}={\text{height of triangle, or}}\,h=4\,{\text{cm}}} 2 Calculate the area of the base. To calculate the area of the base, just plug the base and height of the triangle into the following formula: A b = 1 2 b h {\displaystyle A_{b}={\frac {1}{2}}bh} .[7] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know A b {\displaystyle A_{b}} . You can find this using b {\displaystyle b} and h {\displaystyle h} from the previous step. A b = 1 2 b h {\displaystyle A_{b}=({\frac {1}{2}})(2\,{\text{cm}})(4\,{\text{cm}})} A b = (1 2) (2 cm) (4 cm) {\displaystyle A_{b}=({\frac {1}{2}})(2\,{\text{cm}})(4\,{\text{cm}})} A b = (1 2) (8 cm 2) {\displaystyle A_{b}=({\frac {1}{2}})(8\,{\text{cm}}^{2})} A b = 4 cm 2 {\displaystyle A_{b}=4\,{\text{cm}}^{2}} 3 Multiply the area of the base by the height of the pyramid. The area of the base is 4 cm2 and the height is 5 cm. Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b h {\displaystyle A_{b}h} . You can find this using A b {\displaystyle A_{b}} from the previous step. A b = area of triangular base = 4 cm 2 {\displaystyle A_{b}={\text{area of triangular base}}=4\,{\text{cm}}^{2}} h = height of pyramid = 5 cm {\displaystyle h={\text{height of pyramid}}=5\,{\text{cm}}} A b h = (4 cm 2) (5 cm) = 20 cm 3 {\displaystyle A_{b}h=(4\,{\text{cm}}^{2})(5\,{\text{cm}})=20\,{\text{cm}}^{3}} 4 Multiply your result so far by 1 3 {\displaystyle {\frac {1}{3}}} . Or, in other words, divide by 3. Your result will show that the volume of a pyramid with a height of 5 cm and a triangular base with a width of 2 cm and a length of 4 cm is 6.67 cm.[8] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} . You can plug in A b h = 20 cm 3 {\displaystyle A_{b}h=20\,{\text{cm}}^{3}} from the previous step. V = (1 3) A b h {\displaystyle V=({\frac {1}{3}})A_{b}h} V = (1 3) (20 cm 3) = 6.67 cm 3 {\displaystyle V=({\frac {1}{3}})(20\,{\text{cm}}^{3})=6.67\,{\text{cm}}^{3}} Advertisement Add New Question Question How do I calculate the volume of a pyramid Question How do I find the height if given the volume and the base length for a square pyramid? Triple the volume and divide that by the area of the base (which is the square of the length of an edge). Question How do I double the volume of a square pyramid? Either double the height of the pyramid or double the area of the base. Accomplish the latter by multiplying the length of each side of the base by the square root of 2 (1.414). See more answers Ask a Question Advertisement Thanks Thanks Thanks Advertisement Thanks Advertisement This article was reviewed by Grace Imson, MA. Grace Imson is a math teacher with over 40 years of teaching experience. Grace is currently a math instructor at the City College of San Francisco and was previously in the Math Department at Saint Louis University. She has taught math at the elementary, middle, high school, and college levels. She has an MA in Education, specializing in Administration and Supervision from Saint Louis University. This article has been viewed 764,840 times. Co-authors: 51 Updated: May 22, 2025 Views: 764,840 Categories: Featured Articles | Volume Article SummaryXTo calculate the volume of a pyramid, you need to know its height and the area of the base. Once you have that information, you can find the volume using the formula V (volume) = 1/3 x Ab (the area of the base) x h (height). If the pyramid has a square or rectangular base, simply multiply the width of the base by its length to find the area. Then, multiply the area of the base by the height of the pyramid, and multiply the result by 1/3—which is the same as dividing by 3. For instance, if your pyramid has a square base that is 3 inches long by 3 inches wide, and a height of 4 inches, the volume would be (3 x 3 x 4)/3, or 12. Since you're describing the volume of a 3-dimensional object, remember to write your answer in cubic units. In this case, the pyramid has a volume of 12 cubic inches. For pyramids with a triangular base, the technique is a little different. If you know the triangle's height and the width of its base, plug those numbers into the formula ½ x b (base) x h (height) to find the area of the triangle. From there, you can use the same formula that you used for the square-based pyramid. For example, say your pyramid has a base that's a triangle with a base width of 2 cm and a height of 4 cm, and the pyramid has a height of 6 cm. First, find the area of the triangle using the formula ½ x 2 x 4, which will give you a base area of 4 square centimeters. Next, multiply the area by the height of the pyramid, then multiply the product by 1/3. In this case, 6 x 4 x 1/3 = 8, which means the pyramid has a volume of 8 cubic centimeters. To learn how to calculate the volume of a pyramid with a triangular base, read on! Print Send fan mail to authors Thanks to all authors for creating a page that has been read 764,840 times. "wikiHow is the most helpful thing ever! I aced science because it taught me how to read a weather map, and I aced math because I can do all the fancy stuff!"..." more Share your story In this section of Revision Maths you will learn how to calculate the volume of prisms, pyramids and frustums. Volume is a 3D Measurement so we need to always write answers as cubed numbers, for example CM3 or M3. Volume of a Prism To calculate the volume of a prism you need to use this formula: Area of a cross-section x height or length. In the example above the volume = 4 x 5 x8 = 160cm3 To find out how to work out the area of a 2D shape click here. Volume of a Pyramid To calculate the volume of a pyramid you use this formula: 1/3 area of a cross section x height. In the example above the volume = 1/3 x 4 x 5 x 8 = 53.33cm3 (to 4.s.f). Volume of a Frustum A frustum is made by cutting the top end of a cone to calculate the volume of a frustum use the formula below: 1/3 π R2 H – 1/3 πr2h The second half of the formula is how to work out the volume of the entire cone. In the example above 1/3π [(82 x 11) – (42 x 5) So the volume of this frustum = 208 πcm3 or 653cm3 (to 3 s.f) Show students the following video:Then, ask students:What do you notice?What do you wonder?Give students 60 seconds (or more) to do a rapid write on a piece of paper.Then, ask students to share with their neighbours for another 60 seconds.Finally, allow students to share with the entire group.Some of the noticing and wondering that may arise include:I notice two 3D figures.I notice a prism and a pyramid.They both have a square for their base.I wonder why we're looking at shapes?I wonder what they're going to do with those figures?How much wrapping paper would it take to wrap those figures?How many of the pyramid will it take to fill the prism?And many more.At this point, you can acknowledge some of the details that students noticed and answer any of the wonders that will not reveal too much information as to take away from the intentionality of the lesson.Estimation: Video & PromptShare the following video:Prompt students with:How many square base pyramids will it take to fill the square base prism?Make an estimate.Be sure students are made aware that the prism and the pyramid both have a congruent square base (i.e.: the same base) and an equivalent height (i.e.: the same height).We can now ask students to make an estimate using their spatial reasoning as to how many square base pyramids it will take to fill the square base prism. Encourage students to share their predictions and justification with neighbours before welcoming them to the group as a whole.Update Estimate: Video & PromptShare the following video:Prompt students with:How many square base pyramids will it take to fill the square base prism?Update your estimate.Monitor student thinking by circulating around the room and listening to the mathematical discourse. Encourage students to use precise mathematical language where appropriate and listen for the use of additive thinking (it will take one more pyramid to fill the prism) or multiplicative thinking (the prism can hold 2 and ½ pyramids of water).Allow students to share their estimates with neighbours first, then with the class. Write down their estimates on the chalkboard/whiteboard/chart paper so students feel their voices are being heard and so they feel they have a stake in solving this problem. At this point, encourage students to describe their thinking so that anyone could be convinced of their estimate. Show students the productive struggle prompt video:While the video is playing, you can narrate what students see to reveal the struggle prompt for this task:Along with updating your estimate of how many square based pyramids will it take to fill the square based prism, also make an estimate of:how many triangular based pyramids it will take to fill the triangular based prism; and,how many cones will it take to fill the cylinder?Note that each prism and pyramid we are comparing has a congruent base and equivalent height.After you give students an opportunity to make an estimate and share with neighbours and to the group, prompt students to investigate the volume relationships between each pair of prisms and pyramids by filling and pouring water, sand, rice or similar into geometric solids from a math manipulative kit or by creating their own prisms and pyramids using the provided templates.While it may be tempting for educators to skip over the opportunity for students to construct their own prisms and pyramids due to the time it will require, note that this is an opportunity for students to better spatially recognize each figure by exploring their nets and also to deeply investigate the volume relationships from each pyramid and prism with a congruent base and equivalent height. Show students the following reveal video:Consider leaving the final frame up for students to reflect on and discuss as you prepare to head into the consolidation of the lesson. While all students are now keenly aware that it requires 3 pyramids to fill a prism with a congruent base and equivalent height, do not assume that all students will independently make the connection that they can then simply modify the formula for each congruent base prism and take 1 third of that quantity.In order to ensure we explicitly bring this idea to the forefront, we can prompt students with:What might the formula be to determine the volume of each pyramid?Discuss with your neighbour.Consider leveraging the silent solution video animation below or the supporting slides included in the downloads section to ensure students make the connection between the volume relationship of each prism and pyramid with their symbolic volume formula.Deriving Formula for the Volume of a Square-Based PyramidIn this silent solution animation video, we attempt reiterating what was discovered through investigation today. By determining the volume of a square (or rectangular) based prism by calculating the area of the base times the height, we can easily determine the volume of the same base and height pyramid by taking 1 third of that volume or dividing the volume by 3.Deriving Formula for Volume of a Triangular Based PyramidThe same is true for the relationship between any prism and pyramid as we can see with this silent solution video of a triangular based prism and pyramid.While students may feel confident that they understand the 1 to 3 relationship between a pyramid and prism with the same base and height, exploring these silent solution animations can be helpful to reinforce our understanding of how we determine volume in general as well as how we can extend this thinking to pyramids.Deriving Formula for the Volume of a Cone (Circular Based Pyramid)And despite the naming convention being a little different for circular based prisms (cylinders) and pyramids (cones), the relationship still holds true.These explorations are critical in helping students build a concrete foundation in understanding how the volume of 3-dimensional figures can be determined as well as how they relate to one another. The surface area is the area that describes the material that will be used to cover a geometric solid. When we determine the surface areas of a geometric solid we take the sum of the area for each geometric form within the solid. The volume is a measure of how much a figure can hold and is measured in cubic units. The volume tells us something about the capacity of a figure. A prism is a solid figure that has two parallel congruent sides that are called bases that are connected by the lateral faces that are parallelograms. There are both rectangular and triangular prisms. To find the surface area of a prism (or any other geometric solid) we open the solid like a carton box and flatten it out to find all included geometric forms. To find the volume of a prism (it doesn't matter if it is rectangular or triangular) we multiply the area of the base, called the base area B, by the height h. $$V=B\cdot h$$ A cylinder is a tube and is composed of two parallel congruent circles and a rectangle which base is the circumference of the circle. Example The area of one circle is: $$A=\pi r^{2}$$ $$A=\pi \cdot 2^{2}$$ $$A=\pi \cdot 4$$ $$A\approx 12.6$$ The circumference of a circle: $$C=\pi d$$ $$C=\pi \cdot 4$$ $$C\approx 12.6$$ The area of the rectangle: $$A=C\cdot h$$ $$A=12.6 \cdot 6$$ $$A\approx 75.6$$ The surface area of the whole cylinder: $$A=75.6+12.6+12.6=100.8\,units^{2}$$ To find the volume of a cylinder we multiply the base area (which is a circle) and the height h. $$V=\pi r^{2}\cdot h$$ A pyramid consists of three, four or more (depending on the base) triangular lateral surfaces and a three or four sided surface, respectively, at its base. When we calculate the surface area of the pyramid below we take the sum of the areas of the 4 triangles area and the base square. The height of a triangle within a pyramid is called the slant height. The volume of a pyramid is one third of the volume of a prism. $$V=\frac{1}{3}\cdot B\cdot h$$ The base of a cone is a circle and that is easy to see. The lateral surface of a cone is a parallelogram with a base that is half the circumference of the cone and with the slant height as the height. This can be a little bit trickier to see, but if you cut the lateral surface of the cone into sections and lay them next to each other it's easily seen. The surface area of a cone is thus the sum of the areas of the base and the lateral surface: $$A_{base}=\pi r^{2}\: and\: A_{LS}=\pi rl$$ $$A=\pi r^{2}+\pi rl$$ Example $$\begin{matrix} A_{base}=\pi r^{2}\: \: &\, \, and\, \, & A_{LS}=\pi rl\: \: \: \: \: \: \\ A_{base}=\pi \cdot 3^{2} & & A_{LS}=\pi \cdot 3\cdot 9\\ A_{base}\approx 28.3\: \: && A_{LS}\approx 84.8\: \: \: \: \: \\ \end{matrix}$$ $$A=\pi r^{2}+\pi rl=28.3+84.8=113.1\, units^{2}$$ The volume of a cone is one third of the volume of a cylinder. $$V=\frac{1}{3}\pi \cdot r^{2}\cdot h$$ Example Find the volume of a prism that has the base 5 and the height 3. $$B=3\cdot 5=15$$ $$V=15\cdot 3=45\: units^{3}$$ Video lesson Find the surface area of a cylinder with the radius 4 and height 8 and the radius 3 Download Article Download Article To calculate the volume of a pyramid, use the formula V = 1 3 l w h {\displaystyle V={\frac {1}{3}}lwh} , where l and w are the length and width of the base, and h is the height. You can also use the equivalent formula V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , where A b {\displaystyle A_{b}} is the area of the base and h is the height. The method varies slightly depending on whether the pyramid has a triangular or a rectangular base. If you want to know how to calculate the volume of a pyramid, just follow these steps. 1 Find the length and width of the base. In this example, the length of the base is 4 cm and the width is 3 cm. If you're working with a square base, the method is the same, except the length and width of the square base will be equal. Write down these measurements.[1] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know l {\displaystyle l} and w {\displaystyle w} first. l = 4 cm {\displaystyle l=4\,{\text{cm}}} w = 3 cm {\displaystyle w=3\,{\text{cm}}} 2 Multiply the length and width to find the area of the base. To get the area of the base, simply multiply 3 cm by 4 cm.[2] [3] Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b {\displaystyle A_{b}} . You can find this by plugging in l = 4 cm {\displaystyle l=4\,{\text{cm}}} and w = 3 cm {\displaystyle w=3\,{\text{cm}}} from the previous step. A b = l w {\displaystyle A_{b}=lw} A b = (4 cm) (3 cm) = 12 cm 2 {\displaystyle A_{b}=(4\,{\text{cm}})(3\,{\text{cm}})=12\,{\text{cm}}^{2}} Advertisement 3 Multiply the area of the base by the height. The area of the base is 12 cm2 and the height is 4 cm, so you can multiply 12 cm2 by 4 cm.[4] Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b h {\displaystyle A_{b}h} . You can find this using A b {\displaystyle A_{b}} from the previous step. A b = 12 cm 2 {\displaystyle A_{b}=12\,{\text{cm}}^{2}} h = 4 cm {\displaystyle h=4\,{\text{cm}}} A b h = (12 cm 2) (4 cm) = 48 cm 3 {\displaystyle A_{b}h=(12\,{\text{cm}}^{2})(4\,{\text{cm}})=48\,{\text{cm}}^{3}} 4 Multiply your result so far by 1 3 {\displaystyle {\frac {1}{3}}} . Or, in other words, divide by 3. Remember to state your answer in cubic units whenever you're working with three-dimensional space.[5] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} . You can plug in A b h = 48 cm 3 {\displaystyle A_{b}h=48\,{\text{cm}}^{3}} from the previous step. V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} V = (1 3) (48 cm 3) = 16 cm 3 {\displaystyle V=({\frac {1}{3}})(48\,{\text{cm}}^{3})=16\,{\text{cm}}^{3}} EXPERT TIP Joseph Meyer Math Teacher Joseph Meyer is a High School Math Teacher based in Pittsburgh, Pennsylvania. He is an educator at City Charter High School, where he has been teaching for over 7 years. Joseph is also the founder of Sandbox Math, an online learning community dedicated to helping students succeed in Algebra. His site is set apart by its focus on fostering genuine comprehension through step-by-step understanding (instead of just getting the correct final answer), enabling learners to identify and overcome misunderstandings and confidently take on any test they face. He received his MA in Physics from Case Western Reserve University and his BA in Physics from Baldwin Wallace University. To find a pyramid's volume, use the formula (1/3) ∗ {\displaystyle *} Base Area ∗ {\displaystyle *} Height. Measure a pyramid's height from its tip to the base's center. Next, find the base area using the correct formula for the base shape, whether a triangle, square, or rectangle. Finally, input these values into the formula to calculate volume. Advertisement 1 Find the length and width of the base. The length and width of the base must be perpendicular to each other for this method to work. They can also be considered the base and height of the triangle. In this example, the width of the base is 2 cm and the length of the triangle is 4 cm.[6] If the length and width are not perpendicular and you don't know the height of the triangle, there are a few other methods you can try to calculate the area of a triangle. Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know l {\displaystyle l} and w {\displaystyle w} first. l = width of pyramid base = base of triangle, or b = 2 cm {\displaystyle l={\text{width of pyramid base}}={\text{base of triangle, or}}\,b=2\,{\text{cm}}} w = length of pyramid base = height of triangle, or h = 4 cm {\displaystyle w={\text{length of pyramid base}}={\text{height of triangle, or}}\,h=4\,{\text{cm}}} 2 Calculate the area of the base. To calculate the area of the base, just plug the base and height of the triangle into the following formula: A b = 1 2 b h {\displaystyle A_{b}={\frac {1}{2}}bh} .[7] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know A b {\displaystyle A_{b}} . You can find this using b {\displaystyle b} and h {\displaystyle h} from the previous step. A b = 1 2 b h {\displaystyle A_{b}=({\frac {1}{2}})(2\,{\text{cm}})(4\,{\text{cm}})} A b = (1 2) (2 cm) (4 cm) {\displaystyle A_{b}=({\frac {1}{2}})(2\,{\text{cm}})(4\,{\text{cm}})} A b = (1 2) (8 cm 2) {\displaystyle A_{b}=({\frac {1}{2}})(8\,{\text{cm}}^{2})} A b = 4 cm 2 {\displaystyle A_{b}=4\,{\text{cm}}^{2}} 3 Multiply the area of the base by the height of the pyramid. The area of the base is 4 cm2 and the height is 5 cm. Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b h {\displaystyle A_{b}h} . You can find this using A b {\displaystyle A_{b}} from the previous step. A b = area of triangular base = 4 cm 2 {\displaystyle A_{b}={\text{area of triangular base}}=4\,{\text{cm}}^{2}} h = height of pyramid = 5 cm {\displaystyle h={\text{height of pyramid}}=5\,{\text{cm}}} A b h = (4 cm 2) (5 cm) = 20 cm 3 {\displaystyle A_{b}h=(4\,{\text{cm}}^{2})(5\,{\text{cm}})=20\,{\text{cm}}^{3}} 4 Multiply your result so far by 1 3 {\displaystyle {\frac {1}{3}}} . Or, in other words, divide by 3. Your result will show that the volume of a pyramid with a height of 5 cm and a triangular base with a width of 2 cm and a length of 4 cm is 6.67 cm.[8] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} . You can plug in A b h = 20 cm 3 {\displaystyle A_{b}h=20\,{\text{cm}}^{3}} from the previous step. V = (1 3) A b h {\displaystyle V=({\frac {1}{3}})A_{b}h} V = (1 3) (20 cm 3) = 6.67 cm 3 {\displaystyle V=({\frac {1}{3}})(20\,{\text{cm}}^{3})=6.67\,{\text{cm}}^{3}} Advertisement Add New Question Question How do I calculate the volume of a three square tier pyramid? Determine the area of the base. If it is a rectangle, that's length x width, if it is a triangle it's 1/2 x the base (one side) x the height (a line perpendicular to the base to the opposite vertex). Determine the height of the pyramid. It is a line perpendicular (straight up) from the base of the pyramid to the opposite vertex. Muliply (1) x (2) and divide by 3. The formula is 1/3 x the area of the base x the height of the pyramid Question How do I find the height if given the volume and the base length for a square pyramid? Triple the volume and divide that by the area of the base (which is the square of the length of an edge). Question How do I double the volume of a square pyramid? Either double the height of the pyramid or double the area of the base. Accomplish the latter by multiplying the length of each side of the base by the square root of 2 (1.414). See more answers Ask a Question Advertisement Thanks Thanks Thanks Advertisement Thanks Advertisement This article was reviewed by Grace Imson, MA. Grace Imson is a math teacher with over 40 years of teaching experience. Grace is currently a math instructor at the City College of San Francisco and was previously in the Math Department at Saint Louis University. She has taught math at the elementary, middle, high school, and college levels. She has an MA in Education, specializing in Administration and Supervision from Saint Louis University. This article has been viewed 764,840 times. Co-authors: 51 Updated: May 22, 2025 Views: 764,840 Categories: Featured Articles | Volume Article SummaryXTo calculate the volume of a pyramid, you need to know its height and the area of the base. Once you have that information, you can find the volume using the formula V (volume) = 1/3 x Ab (the area of the base) x h (height). If the pyramid has a square or rectangular base, simply multiply the width of the base by its length to find the area. Then, multiply the area of the base by the height of the pyramid, and multiply the result by 1/3—which is the same as dividing by 3. For instance, if your pyramid has a square base that is 3 inches long by 3 inches wide, and a height of 4 inches, the volume would be (3 x 3 x 4)/3, or 12. Since you're describing the volume of a 3-dimensional object, remember to write your answer in cubic units. In this case, the pyramid has a volume of 12 cubic inches. For pyramids with a triangular base, the technique is a little different. If you know the triangle's height and the width of its base, plug those numbers into the formula ½ x b (base) x h (height) to find the area of the triangle. From there, you can use the same formula that you used for the square-based pyramid. For example, say your pyramid has a base that's a triangle with a base width of 2 cm and a height of 4 cm, and the pyramid has a height of 6 cm. First, find the area of the triangle using the formula ½ x 2 x 4, which will give you a base area of 4 square centimeters. Next, multiply the area by the height of the pyramid, then multiply the product by 1/3. In this case, 6 x 4 x 1/3 = 8, which means the pyramid has a volume of 8 cubic centimeters. To learn how to calculate the volume of a pyramid with a triangular base, read on! Print Send fan mail to authors Thanks to all authors for creating a page that has been read 764,840 times. "wikiHow is the most helpful thing ever! I aced science because it taught me how to read a weather map, and I aced math because I can do all the fancy stuff!"..." more Share your story Download Article Download Article To calculate the volume of a pyramid, use the formula V = 1 3 l w h {\displaystyle V={\frac {1}{3}}lwh} , where l and w are the length and width of the base, and h is the height. You can also use the equivalent formula V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , where A b {\displaystyle A_{b}} is the area of the base and h is the height. The method varies slightly depending on whether the pyramid has a triangular or a rectangular base. If you want to know how to calculate the volume of a pyramid, just follow these steps. 1 Find the length and width of the base. In this example, the length of the base is 4 cm and the width is 3 cm. If you're working with a square base, the method is the same, except the length and width of the square base will be equal. Write down these measurements.[1] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know l {\displaystyle l} and w {\displaystyle w} first. l = 4 cm {\displaystyle l=4\,{\text{cm}}} w = 3 cm {\displaystyle w=3\,{\text{cm}}} 2 Multiply the length and width to find the area of the base. To get the area of the base, simply multiply 3 cm by 4 cm.[2] [3] Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b {\displaystyle A_{b}} . You can find this by plugging in l = 4 cm {\displaystyle l=4\,{\text{cm}}} and w = 3 cm {\displaystyle w=3\,{\text{cm}}} from the previous step. A b = l w {\displaystyle A_{b}=lw} A b = (4 cm) (3 cm) = 12 cm 2 {\displaystyle A_{b}=(4\,{\text{cm}})(3\,{\text{cm}})=12\,{\text{cm}}^{2}} Advertisement 3 Multiply the area of the base by the height. The area of the base is 12 cm2 and the height is 4 cm, so you can multiply 12 cm2 by 4 cm.[4] Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b h {\displaystyle A_{b}h} . You can find this using A b {\displaystyle A_{b}} from the previous step. A b = 12 cm 2 {\displaystyle A_{b}=12\,{\text{cm}}^{2}} h = 4 cm {\displaystyle h=4\,{\text{cm}}} A b h = (12 cm 2) (4 cm) = 48 cm 3 {\displaystyle A_{b}h=(12\,{\text{cm}}^{2})(4\,{\text{cm}})=48\,{\text{cm}}^{3}} 4 Multiply your result so far by 1 3 {\displaystyle {\frac {1}{3}}} . Or, in other words, divide by 3. Remember to state your answer in cubic units whenever you're working with three-dimensional space.[5] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} . You can plug in A b h = 48 cm 3 {\displaystyle A_{b}h=48\,{\text{cm}}^{3}} from the previous step. V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} V = (1 3) (48 cm 3) = 16 cm 3 {\displaystyle V=({\frac {1}{3}})(48\,{\text{cm}}^{3})=16\,{\text{cm}}^{3}} EXPERT TIP Joseph Meyer Math Teacher Joseph Meyer is a High School Math Teacher based in Pittsburgh, Pennsylvania. He is an educator at City Charter High School, where he has been teaching for over 7 years. Joseph is also the founder of Sandbox Math, an online learning community dedicated to helping students succeed in Algebra. His site is set apart by its focus on fostering genuine comprehension through step-by-step understanding (instead of just getting the correct final answer), enabling learners to identify and overcome misunderstandings and confidently take on any test they face. He received his MA in Physics from Case Western Reserve University and his BA in Physics from Baldwin Wallace University. To find a pyramid's volume, use the formula (1/3) ∗ {\displaystyle *} Base Area ∗ {\displaystyle *} Height. Measure a pyramid's height from its tip to the base's center. Next, find the base area using the correct formula for the base shape, whether a triangle, square, or rectangle. Finally, input these values into the formula to calculate volume. Advertisement 1 Find the length and width of the base. The length and width of the base must be perpendicular to each other for this method to work. They can also be considered the base and height of the triangle. In this example, the width of the base is 2 cm and the length of the triangle is 4 cm.[6] If the length and width are not perpendicular and you don't know the height of the triangle, there are a few other methods you can try to calculate the area of a triangle. Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know l {\displaystyle l} and w {\displaystyle w} first. l = width of pyramid base = base of triangle, or b = 2 cm {\displaystyle l={\text{width of pyramid base}}={\text{base of triangle, or}}\,b=2\,{\text{cm}}} w = length of pyramid base = height of triangle, or h = 4 cm {\displaystyle w={\text{length of pyramid base}}={\text{height of triangle, or}}\,h=4\,{\text{cm}}} 2 Calculate the area of the base. To calculate the area of the base, just plug the base and height of the triangle into the following formula: A b = 1 2 b h {\displaystyle A_{b}={\frac {1}{2}}bh} .[7] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} , so you need to know A b {\displaystyle A_{b}} . You can find this using b {\displaystyle b} and h {\displaystyle h} from the previous step. A b = 1 2 b h {\displaystyle A_{b}=({\frac {1}{2}})(2\,{\text{cm}})(4\,{\text{cm}})} A b = (1 2) (2 cm) (4 cm) {\displaystyle A_{b}=({\frac {1}{2}})(2\,{\text{cm}})(4\,{\text{cm}})} A b = (1 2) (8 cm 2) {\displaystyle A_{b}=({\frac {1}{2}})(8\,{\text{cm}}^{2})} A b = 4 cm 2 {\displaystyle A_{b}=4\,{\text{cm}}^{2}} 3 Multiply the area of the base by the height of the pyramid. The area of the base is 4 cm2 and the height is 5 cm. Remember, V = 1 3 A b h {\displaystyle V={\frac {1}{3}}A_{b}h} , so you need to know A b h {\displaystyle A_{b}h} . You can find this using A b {\displaystyle A_{b}} from the previous step. A b = area of triangular base = 4 cm 2 {\displaystyle A_{b}={\text{area of triangular base}}=4\,{\text{cm}}^{2}} h = height of pyramid = 5 cm {\displaystyle h={\text{height of pyramid}}=5\,{\text{cm}}} A b h = (4 cm 2) (5 cm) = 20 cm 3 {\displaystyle A_{b}h=(4\,{\text{cm}}^{2})(5\,{\text{cm}})=20\,{\text{cm}}^{3}} 4 Multiply your result so far by 1 3 {\displaystyle {\frac {1}{3}}} . Or, in other words, divide by 3. Your result will show that the volume of a pyramid with a height of 5 cm and a triangular base with a width of 2 cm and a length of 4 cm is 6.67 cm.[8] Remember, V = 1 3 l w h = 1 3 A b h {\displaystyle V={\frac {1}{3}}lwh={\frac {1}{3}}A_{b}h} . You can plug in A b h = 20 cm 3 {\displaystyle A_{b}h=20\,{\text{cm}}^{3}} from the previous step. V = (1 3) A b h {\displaystyle V=({\frac {1}{3}})A_{b}h} V = (1 3) (20 cm 3) = 6.67 cm 3 {\displaystyle V=({\frac {1}{3}})(20\,{\text{cm}}^{3})=6.67\,{\text{cm}}^{3}} Advertisement Add New Question Question How do I calculate the volume of a pyramid Question How do I find the height if given the volume and the base length for a square pyramid? Triple the volume and divide that by the area of the base (which is the square of the length of an edge). Question How do I double the volume of a square pyramid? Either double the height of the pyramid or double the area of the base. Accomplish the latter by multiplying the length of each side of the base by the square root of 2 (1.414). See more answers Ask a Question Advertisement Thanks Thanks Thanks Advertisement Thanks Advertisement This article