I'm not a bot

Hanna Pamua, PhDHanna (Hania) Pamua holds a Ph.D. in Bioacoustics / Mechanical Engineering, obtained at AGH University of Science and Technology. She has participated in research work in labs in France and the UK and presented papers at several international conferences. Hania has a penchant for photography and graphic design. When not in the office, shes probably traveling, hiking, or out in the field, watching birds and recording their calls. See full profileCheck our editorial policyBogna Szyk, Jack Bowater, and Borys Kuca, PhDPhD, Jagiellonian University, Cracow, PolandA mathematician at the Jagiellonian University in Cracow, Poland, fascinated with patterns in numbers. Always keen to know more, read more, and see more, he has turned learning into a way of life. When he is not busy proving new theorems, you can find him discussing books with friends, hiking nearby mountains, or sipping green tea. He never refuses dark chocolate with chili the spicier, the merrier. See full profileCheck our editorial policy3 587 people find this calculator helpfulOur cylinder volume calculator can help you calculate the volume of that solid. Whether you want to figure out how much water fits in a can, coffee in your favorite mug, or even the volume of a drinking straw you're in the right place. The other option is calculating the volume of a cylindrical shell (hollow cylinder).Let's start from the beginning what is a cylinder? It's a solid bounded by a cylindrical surface and two parallel planes. We can imagine it as a solid physical tin with lids on top and bottom. To calculate its volume, we need to know two parameters the radius (or diameter) and height:cylinder volume = cylinder radius cylinder heightThe cylinder volume calculator helps in finding the volume of right, hollow, and oblique cylinders:The hollow cylinder, also called the cylindrical shell, is a cylinder from which someone has cut out a smaller cylinder in such a way that the same vertical axis passes through the center of both. Think of a drinking straw or a pipe.The formula behind the volume of a hollow cylinder is: cylinder volume = (R - r) cylinder heightwhere:R external radius; andr internal radius.Similarly, we can calculate the cylinder volume using the external diameter, D, and internal diameter, d, of a hollow cylinder with this formula: cylinder volume = [(D - d)/4] cylinder heightTo calculate the volume of a cylindrical shell, let's take some real-life examples, maybe... a roll of toilet paper, because why not? Enter the external diameter of the cylinder. Typically, it is approximately 11 cm.Determine the internal cylinder diameter. It's the internal diameter of the cardboard part, around 4 cm.Find out what's the height of the cylinder; for us, it's 9 cm.Tadaaam! The volume of a hollow cylinder is equal to 742.2 cm.Remember that the result is the volume of the paper and the cardboard. If you want to calculate how much plasticine you can put inside the cardboard roll, use the standard formula for the volume of a cylinder the calculator will calculate it in the blink of an eye!The oblique (or slanted) cylinder is the one that 'leans over' the sides are not perpendicular to the bases in contrast to a standard 'right cylinder'. How to calculate the volume of an oblique cylinder? The formula is the same as for the straight one. Just remember that the height must be perpendicular to the bases.Now that you know how to calculate the volume of a cylinder, maybe you want to determine the volumes of other 3D solids? Use this general volume calculator!If you are curious about how many teaspoons or cups fit into your container, use our volume converter.To calculate the volume of soil needed for flower pots of different shapes also for the cylindrical one use the potting soil calculator.FAQsCylinders are all around us, and we are not just talking about Pringles cans. Although things in nature are rarely perfect cylinders, some examples of approximate cylinders are tree trunks & plant stems, some bones (and therefore bodies), and the flagella of microscopic organisms. These make up a large amount of the natural objects on Earth!To draw a cylinder, follow these steps:Draw a slightly flattened circle. The more flattened it is, the closer you are to looking at the cylinder side on.Draw two equal, parallel lines from the far sides of your circle going down.Link the ends of the two lines with a semi-circular line that looks the same as the bottom half of your top circle.Add shadow and shading as appropriate.To calculate the weight of a cylinder:Square the radius of the cylinder.Multiply the square of radius by pi and the cylinders height.Multiply the volume by the density of the cylinder. The result is the cylinders weight.Find the volume of the cylinder using the formula rh.Find the surface area of the cylinder using the formula 2rh + 2r.Make a ratio out of the two formulas, i.e., rh: (2rh + 2r).Alternatively, simplify it to rh:2(h+r).Divide both sides by one of the sides to get the ratio in its simplest form.If you have the volume and radius of the cylinder:Make sure the volume and radius are in the same units (e.g., cm and cm).Square the radius.Divide the volume by the radius squared and pi to get the height in the same units as the radius.If you have the surface area and radius (r):Make sure the surface and radius are in the same units.Subtract 2r from the surface area.Divide the result of step 2 by 2r.The result is the height of the cylinder.If you have the volume and height of the cylinder:Make sure the volume and height are in the same units (e.g., cm and cm).Divide the volume by pi and the height.Square root the result.If you have the surface area and height (h):Substitute the height, h, and surface area into the equation, surface area = 2rh + 2r.Divide both sides by 2.Subtract surface area/2 from both sides.Solve the resulting quadratic equation.The positive root is the radius.An oval cylinder has an oval (a.k.a. ellipse) rather than a circle as its base. To find the volume of an oval cylinder:Multiply the smallest radius of the oval (minor axis) by its largest radius (major axis).Multiply this new number by pi.Multiply the area of the oval by the height of the cylinder.The result is the volume of an oval cylinder.To calculator the volume of a slanted cylinder:Find the radius, side length, and slant angle of the cylinder.Square the radius.Multiply the result by pi.Take the sin of the angle.Multiply the sin by the side length.Multiply the result from steps 3 and 5 together.The result is the slanted volume.To compute the swept volume of a cylinder:Divide the bore diameter by 2 to get the bore radius.Square the bore radius.Multiply the square radius by pi.Multiply the result of step 3 by the length of the stroke. Make sure the units for bore and stroke length are the same.The result is the swept volume of one cylinder.Did we solve your problem today?Check out 24 similar 3d geometry calculators Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Definition: The number of cubic units that will exactly fill a cylinderTry thisDrag the orange dot to resize the cylinder. The volume is calculated as you drag. See also: Surface area of a cylinderAlthough a cylinder is technically not a prism, it shares many of the properties of a prism. Like prisms, the volume is found by multiplying the area of one end of the cylinder (base) by its height.Since the end (base) of a cylinder is a circle, the area of that circle is given by the formula: Multiplying by the height h we get where: is Pi, approximately 3.142r is the radius of the circular end of the cylinderh height of the cylinder Calculator Use the calculator above to calculate height, radius or volume of a cylinder.Enter any two values and the missing one will be calculated. For example: enter the radius and height, and press 'Calculate'. The volume will be calculated.Similarly, if you enter the height and volume, the radius needed to get that volume will be calculated. Volume of a partially filled cylinderOne practical application is where you have horizontal cylindrical tank partly filled with liquid. Using the formula above you can find the volume of the cylinder which gives it's maximum capacity, but you often need to know the volume of liquid in the tank given the depth of the liquid.This can be done using the methods described inVolume of a horizontal cylindrical segment. Oblique cylindersRecall that an oblique cylinderis one that 'leans over' - where the top center is not over the base center point. In the figure above check "allow oblique' and drag the top orange dot sideways to see an oblique cylinder. It turns out that the volume formula works just the same for these. You must however use the perpendicular height in the formula. This is the vertical line to left in the figure above.To illustrate this, check 'Freeze height'. As you drag the top of the cylinder left and right, watch the volume calculation and note that the volume never changes.See Oblique Cylindersfor a deeper discussion on why this is so. UnitsRemember that the radius and the height must be in the same units - convert them if necessary. The resulting volume will be in those cubic units.So, for example if the height and radius are both in centimeters, then the volume will be in cubic centimeters. Things to try In the figure above, click 'reset' and 'hide details' Drag the two dots to alter the size and shape of the cylinder Calculate the volume of that cylinder Click 'show details' to check your answer. Related topics Definition of a face Definition of an edge Volume Prism definition Volume of a prism Surface area of a prism Volume of a sphere Surface area of a sphere Conic sections - the circle Conic sections - the ellipse Icosahedron (20 faces each an equilateral triangle) (C) 2011 Copyright Math Open Reference. All rights reserved Aditya Virani, Arron Kau, Mahindra Jain, and contributed Pi Day is celebrated on March 14th (3/14) around the world. Pi (Greek letter) is the symbol used in mathematics to represent a constant the ratio of the circumference of a circle to its diameter which is approximately 3.14159. Pi Day is an annual opportunity for math enthusiasts to recite the infinite digits of Pi, talk to their friends about math, and eat pie. Pi has been calculated to over 50 trillion digits beyond its decimal point. As an irrational and transcendental number, it will continue infinitely without repetition or pattern. While only a handful of digits are needed for typical calculations, pis infinite nature makes it a fun challenge to memorize, and to computationally calculate more and more digits. Learn More About Pi What is Pi?Who is the official sponsor of Pi Day?Mometrix is a test preparation company that has created and curated the worlds largest collection of educational materials for helping individuals pass high-stakes standardized tests.They pride themselves on producing the very best content for exams and certifications across the country. What they care about even more, however, is empowering individuals across the nation to achieve their dreams.Mometrixs goal is for their study materials, coupled with diligent effort, to empower a test-taker to attain the highest score within their ability to achieve. Mometrix prepares people to achieve their dreams by helping them overcome the testing hurdles necessary for them to get where they want to be. Go back to Calculators page Volume calculator will determine the volume of the most common geometric solids.What is Volume?Volume is the amount of total space on the interior of the solid. Knowing the definition of volume, we can now focus on the formulas for volume of common geometric solids. Using these formulas manually wont be difficult, but for fast, accurate results every time, use the volume calculator.Formulas for volume:Cone = \((\frac{1}{3})\pi r^{2}h\), where r is the radius and h is the height.Cube = \(s^{2}\), where s is the length of the side.Cylinder = \(\pi r^{2}h\), where r is the radius and h is the height.Rectangular prism= \(l\times w\times h\), where l is the length, w is the width and h is the height.Sphere = \((\frac{4}{3})\pi r^{3}\), where r is the radius.Simply enter the dimensions into the calculator to find the volume. The units for volume will always be cubed, as compared to square units for surface area.@mometrixNeed a volume calculator? Link in bio. ##pi ##piday ##volume ##sphere ##math ##mathhelp ##mometrix ##fyp original sound Mometrix Test PreparationCalculating the Volume of a Cube ExampleHeres an example for calculating the volume of a cube.For this example, suppose the side length of the cube is 5 cm. Then the volume is simply \(5\times 5\times 5=125\) cubic centimeters.Lets take a look at another example. Suppose you want the volume of a cone with a height of 4 cm and radius of 3 cm.Volume = \((\frac{1}{3})\pi(3)^{2}(4)=12\pi\)cubic centimetersOne might wonder where this calculator will be useful in a real-life setting. Its very important in terms of architecture and constructionRelated Topics of InterestThere are many applications in real life where the volume calculator is useful. One such instance is in road or pavement construction where slabs of concrete must be built. Generally concrete slabs are rectangular solids, so the rectangular prism calculator can be used.Sticking with the construction theme, surface area is important when determining the amount of tile to put on a rectangular floor, of wallpaper on a wall or the amount of paint needed to cover the total surface of a building.All of these calculations can be done manually, but in the real world, time is of the essence when completing a project. Therefore, a calculator that will solve these problems are volume and surface area are essential. Try ours today!@mometrixNeed a volume calculator? Link in bio! ##pi ##piday ##volume ##cone ##formula ##math ##mathhelp ##mometrix ##geometry ##fyp ##stepbystep original sound Mometrix Test Preparation@mometrixHeres the formula for volume of a cylinder! Link in bio for more. ##pi ##piday ##formula ##math ##mathhelp ##mometrix ##fyp ##stepbystep ##cylinder original sound Mometrix Test PreparationUse this volume calculator to easily calculate the volume of common bodies like a cube, rectangular box, cylinder, sphere, cone, and triangular prism. Volume formulas and explanations can be found below the tool. Quick navigation: Depending on the particular body, there is a different formula and different required information you need to calculate its volume. Below are volume formulas for the most common types of geometric bodies - all of which are supported by our online volume calculator above. All measures need to be in the same unit. The result is always in cubic units: cubic centimeters, cubic inches, cubic meters, cubic feet, cubic yards, etc. Volume calculations for three-dimensional objects are useful in a lot of sciences, in construction work and planning, in cargo shipping, in climate control (e.g. air conditioning calculations), swimming pool management, and more. Volume of a cube The volume formula for a cube is side3, as shown in the figure below: The only information required to find the volume of a cube is the length of its side. Knowing that, take its cube and you have found the cube's volume. It is the same as multiplying the area of one side by the depth of the cube. For this type of figure one barely needs a calculator to do the math. Volume of a box To find the volume of a rectangular box use the formula height x width x length, as seen in the figure below: To calculate the volume of a box or rectangular tank you need three dimensions: width, length, and height. They are usually easy to measure due to the regularity of the shape, each side being a rectangle. By designating one dimension as the rectangular prism's depth or height, the multiplication of the other two gives us the area which then needs to be multiplied by the depth / height to get the volume. To calculate the volume of a tank of a different shape, use our volume of a tank calculator. Volume of a cylinder The equation to find the volume of a cylinder is height x x (diameter / 2)2, where (diameter / 2) is the radius of the base (d = 2 x r), so another way to write it is height x x radius2. Essentially it consists of multiplying the area of the cylinder's base by its height. The graph below illustrates the needed measurements: Two measurements are required at the minimum: the height of the cylinder and the diameter of its base. In many school formulas the radius is given instead, but in real-world situations it is much easier to measure the diameter instead of trying to pinpoint the midpoint of the circular base just so you can measure the radius. Our volume calculator requires that you insert the diameter of the base. Through the diameter the area of the cylinder base can be calculated and then the multiplication by its height results in its volume. Volume of a sphere To find the volume of a sphere, use the formula 4/3 x x (diameter / 2)3, where (diameter / 2) is the radius of the sphere (d = 2 x r). Another way to write the equation is as 4/3 x x radius3. A visual presentation can be seen in the figure below: Same as with a circle, one only needs one measurement of the sphere to compute its volume: either its diameter or its radius. Volume of a cone The formula for a cone is (height x x (diameter / 2)2) / 3, where (diameter / 2) is the radius of the base (d = 2 x r). The equation can also be expressed as (height x x radius2) / 3, as seen in the figure below: Despite being a somewhat complex shape, one only needs to know three dimensions to calculate the volume of a regular cone. For irregular cones, which are not supported by our tool, yet, you would also need to know the angle of the cone. Volume of a triangular prism The volume of a triangular prism is calculated using the formula (height x base x length) / 2. These length measurements can be seen in the figure below: Similar to rectangular boxes, one needs just three dimensions: height, base, and length, in order to find a triangular prism's volume. Examples of volume formulae applications Volume calculations have a vast array of practical applications. If you are faced with a construction project, home decoration DIY job, or certain engineering tasks, a volume calculator will help you if the figure you want to find the volume of falls within any of the above forms. Complex figures can usually be decomposed, at least approximately, to a sum of these basic figures. If you are looking to complete a more specific task, such as to calculate the amount of concrete needed, or the amount of asphalt, gravel, soil, sand, or mulch, it is best to refer to each of these tools respectively. Leave FeedbackWas this lesson helpful? Why wasn't it helpful?Didn't help me understandWhich sections were not helpful?Volume of Cylinders and Prisms CalculatorKey Steps: How to Find the Volume of Cylinders and PrismsVolume of Cylinders & PrismsPractice: Volume of Cylinders & PrismsHow can financial brands set themselves apart through visual storytelling? Our experts explainhow.Learn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explainhow.Learn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explainhow.Learn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' Favorites In math, when we want to measure the volume of a solid figure, we first need to understand what the figure looks like and its structure. In grade 7 math, two important types of 3-dimensional shapes that we often come across are prisms and cylinders. These shapes are quite common and can be found in many everyday objects around us.What is volume?Volume is a measure of the space occupied by an object. It is usually measured in cubic units such as cubic centimeters (cm3), cubic meters (m3), etc. If you think of a box filled with cubes, the volume would be the count of all the small cubes present inside the box.What are prisms?A prism is a solid object with two equal ends and flat sides. The important thing to remember is that the cross-section does not change along its length. The ends or bases decide the name of the prism. For example, if the base is a triangle, it is called a triangular prism.Examples of prisms triangular prism rectangular prism (also called cuboid) hexagonal prismVisual example of a prismConsider the following simplified visual representation of a rectangular prism: The highlighted portion represents the top of the prism, which represents one of the bases. The other flat surfaces connect the two ends. The cross-section between the two ends remains the same throughout the shape.How to calculate the volume of a prism?The volume of a prism can be found by multiplying the area of the base of the prism by its height. In mathematical terms: Volume of prism = Base Area HeightExample calculation of a triangular prismLet's find the volume of a triangular prism. Suppose we have a prism whose base is a right-angled triangle with a length of 3 cm and a height of 4 cm. The height of the prism is 10 cm.First, find the area of the triangular base: Area of base = 1/2 Base of triangle Height of triangle = 1/2 3 cm 4 cm = 6 cmNow find the volume of the prism: Volume = Base Area Height of prism = 6 cm 10 cm = 60 cmWhat is a cylinder?A cylinder is a solid object with two equal circular bases connected by a curved surface. It also has a uniform cross-section along its length that is similar to a prism but with curved edges.Visual example of a cylinder The circular parts form the bases of the cylinder. The curved surface connects these two bases and wraps around them.How to calculate the volume of a cylinder?The volume of a cylinder is found by multiplying the area of the circular base of the cylinder by the height of the cylinder. The formula is: Volume of cylinder = Radius HeightHere, (pi) is approximately 3.14159.Example of calculation of cylinderLet us find the volume of a cylinder with a circular base of radius 5 cm and height 12 cm.First, find the area of the base: Area of base = Radius = (5 cm) = 25 cm 78.54 cmNow find the volume of the cylinder: Volume = Area of Base Height = 78.54 cm 12 cm 942.48 cmComparison and conclusionAlthough prisms and cylinders differ in terms of their base and lateral structures, the volume of both can be found by multiplying the base area by the height. Understanding the volume of these shapes helps us apply these concepts to real-world problems, whether it is figuring out how much stuff a container can hold or calculating the amount of material needed for construction.A solid understanding of these concepts paves the way for more complex geometrical and mathematical studies as students progress in their education. Always remember, practicing with different examples can greatly enhance understanding and master these essential mathematical concepts.Keep experimenting with different shapes of bases - for prisms and cylinders with different radii and heights to see how the volume changes. These explorations can be fun and informative, helping to deepen the understanding of three-dimensional spaces. Page 2 Imagine you have been given a brand new box, a wonderful gift filled with all kinds of sweets. You are curious to know how much cardboard was used to make the box or how many sweets can be stored in the box. These questions refer to two concepts of mathematics: surface area and volume, which are part of the field of study known as measurement. What is the surface area?Surface area is the total area that a three-dimensional object covers. If you cut your gift box open and lay it flat, the amount of cardboard you have laid out is the surface area.The surface area is different for different shapes. Let's learn about these different shapes and how to find their surface area. Cuboid A cuboid has six faces: top, bottom, left side, right side, front, and back. Each face is a rectangle, and the opposite faces are identical. To calculate the surface area, you need to find the area of each face and then add these areas together.To understand this better, let's take a rectangle with length (l), width (b) and height (h).Surface area of cuboid = 2(lb + bh + hl) Cube A cube is a special type of cuboid where the length, width, and height are all equal. This simplifies calculating surface area because each of the six faces of a cube is a square of side a.Surface area of the cube = 6a 2 Right circular cylinder A cylinder has one curved surface and two flat circular bases; so its surface area includes the area of both the circles and the curved surface.Curved surface area of cylinder = 2rhArea of both circular bases = 2r 2Total surface area of cylinder = 2rh + 2r = 2r(h + r) Circle A sphere is a perfectly round 3D shape, where every point on its surface is the same distance from its center. Calculating the surface area of a sphere is simple because it has no extra faces or edges.Surface area of sphere = 4r What is volume?Volume is the space occupied by a 3D object. Consider the sweets box again, the volume would be the internal capacity of the box, which tells you how many sweets it can hold.Like surface area, calculating volume also varies with different shapes. Volume of a cuboidThe volume of a cuboid is found by multiplying its length, breadth, and height. Volume of cuboid = l b h Volume of a cubeGiven that a cube has all equal sides, its volume is simply the cube of the side length. Volume of the cube = a 3 Volume of a right circular cylinderThe volume of a cylinder is determined by multiplying the area of its circular base by its height. Volume of cylinder = rh Volume of a sphereThe volume of a sphere is calculated using the radius of the sphere, and uses formula. Volume of sphere = (4/3)r Examples of calculating surface area and volume Example 1: CuboidA cuboid has a length of 5 cm, width of 3 cm and height of 2 cm. What is its surface area and volume?Calculate the surface area:Surface area = 2(lb + bh + hl)= 2(5 3 + 3 2 + 2 5)= 2(15 + 6 + 10)= 2 31= 62 cmCalculate the volume:Volume = L W H= 5 3 2= 30 cm Example 2: CubeThe length of the side of a cube is 4 cm. What is its surface area and volume?Calculate the surface area:Surface area = 6a= 6 4= 6 16= 96 sq.cmCalculate the volume:Volume = a= 4= 64 cm Example 3: Right circular cylinderA cylinder has a radius of 3 cm and a height of 7 cm. What is its surface area and volume?Calculate the surface area:Surface area = 2r(h + r)= 2 3.14 3 (7 + 3)= 18.84 10= 188.4 cmCalculate the volume:Volume = rh= 3.14 3 7= 3.14 9 7= 3.14 63= 197.82 cm Example 4: SphereThe radius of a sphere is 5 cm. What is its surface area and volume?Calculate the surface area:Surface area = 4r= 4 3.14 5= 4 3.14 25= 314 sq. cmCalculate the volume:Volume = (4/3)r= (4/3) 3.14 5= (4/3) 3.14 125= 523.33 cm ConclusionIn mathematics, understanding surface area and volume helps us understand the extent and capacity of three-dimensional objects. Surface area helps us know how much material is needed to cover an object, while volume tells us how much space it takes up. Appreciating these concepts builds foundational skills for higher-level mathematics and provides practical utility in many real-world applications. Page 3 In mathematics, measurement is the branch that deals with the measurement of geometrical figures and their parameters such as length, volume, area, perimeter, etc. It deals with both two-dimensional (2D) and three-dimensional (3D) figures.Basic concepts of mensurationLengthLength is a measure of distance. For example, the length of a pencil tells how long the pencil is.CircumferenceThe perimeter of a shape is the total distance around that shape. Imagine you are putting a fence around a park, then the total length of the fence will be the perimeter.AreaArea is the size of a surface. It measures the amount of space inside a shape. For example, if you want to cover a floor with tiles, the number of tiles needed depends on the area of the floor.VolumeVolume measures the amount of space an object occupies. Consider a fish tank: its volume determines how much water it can hold.Now, let's look at how we measure these properties for different shapes.Measuring two-dimensional shapesRectangleA rectangle is a four-sided shape whose opposite sides are equal and all angles are right angles.Perimeter of a rectangle:Perimeter = 2 (Length + Width)Example: If the length is 8 units and the width is 4 units, then:Perimeter = 2 (8 + 4) = 24 unitsArea of a rectangle:Area = Length WidthExample: For the same rectangle with length = 8 units and width = 4 units:Area = 8 4 = 32 square unitsSquareA square is a rectangle whose all sides are equal.Perimeter of a square:Perimeter = 4 SideExample: If one side of the square is 6 units, then:Perimeter = 4 6 = 24 unitsArea of a square:Area = Side SideExample: For a square with side 6 units:Area = 6 6 = 36 square unitsTriangleA triangle has three sides and three angles. There are different types of triangles depending upon the length of the sides and angles. Here we will discuss the formula of a general triangle.Perimeter of a triangle:Perimeter = Side1 + Side2 + Side3Example: If the lengths of the sides of a triangle are 3 units, 4 units and 5 units, then:Perimeter = 3 + 4 + 5 = 12 unitsArea of the triangle:The most common formula for the area of a triangle uses the base and height:Area = (Base Height) / 2Example: For a triangle with base = 5 units and height = 3 units:Area = (5 3) / 2 = 7.5 square unitsCircleA circle is a group of points located at equal distance from a central point.Circumference of a circle:Circumference = 2 RadiusExample: If the radius of the circle is 7 units, then assuming is approximately 3.14:Circumference = 2 3.14 7 = 43.96 unitsArea of a circle:Area = Radius RadiusExample: For the same circle with radius = 7 units:Area = 3.14 7 7 = 153.86 square unitsMeasuring three-dimensional shapesCuboidA cuboid is a box-shaped 3D figure with six rectangular faces, and each pair of opposite faces is identical.Surface area of cuboid:Surface Area = 2 (Length Width + Width Height + Height Length)Example: If the length is 3 units, width is 4 units, and height is 5 units:Surface Area = 2 (3 4 + 4 5 + 5 3) = 94 square unitsVolume of a cuboid:Volume = Length Width HeightExample: Using the same dimensions:Volume = 3 4 5 = 60 cubic unitsCubeA cube is a special type of cuboid in which all sides are equal.Surface area of a cube:Surface Area = 6 Side SideExample: If the side of the cube is 4 units:Surface Area = 6 4 4 = 96 square unitsVolume of a cube:Volume = Side Side SideExample: For the same cube:Volume = 4 4 4 = 64 cubic unitsCylinderA cylinder has a circular base and a certain height. It is like a can.Surface area of a cylinder:Total Surface Area = 2 Radius (Height + Radius)Example: For a cylinder of radius 3 units and height 6 units:Total Surface Area = 2 3.14 3 (6 + 3) = 169.56 square unitsVolume of a cylinder:Volume = Radius Radius HeightExample: Using the same cylinder dimensions:Volume = 3.14 3 3 6 = 169.56 cubic unitsApplications of mensurationMeasurement has countless applications in everyday life, whether you are planning to paint a wall and want to calculate the amount of paint needed, or you are checking the space capacity of various objects and containers.Example 1: Painting a wallLet's say you want to paint a rectangular wall 10 meters long and 3 meters high. You need to calculate the area to know how much paint to buy:Area = Length Height = 10 3 = 30 square metersExample 2: Filling a swimming poolYou have a rectangular swimming pool 25 m long, 10 m wide, and 2 m deep. To find the volume of the pool and the amount of water it can hold:Volume = Length Width Depth = 25 10 2 = 500 cubic metersExample 3: Construction of a shedYou want to build a shed with a rectangular floor plan. If the floor is 8 m long and 5 m wide, and you want to fence around it, you need to know the perimeter:Perimeter = 2 (Length + Width) = 2 (8 + 5) = 26 metersConclusionMeasurement is an essential topic in math that has a lot of use in the real world. Understanding how to calculate the perimeter, area, and volume of different shapes makes it easier to tackle practical problems in many fields, from construction to logistics and beyond. The volume of a solid is the number of cubic units contained in its interior.Volume is measured in cubic units, such as cubic meters (m3).Volume PostulatesPostulate 1 (Volume of a Cube) :The volume of a cube is the cube of the length of its side.That is V = s3Postulate 2 (Volume Congruence Postulate) :If two polyhedra are congruent, then they have the same volume.Postulate 3 (Volume Addition Postulate) :The volume of a solid is the sum of the volumes of all its non-overlapping parts.Finding the Volume of a Rectangular PrismExample 1 :The box shown below is 5 units long, 3 units wide, and 4 units high. How many unit cubes will fit in the box ? What is the volume of the box ?Solution :The base of the box is 5 units by 3 units. This means 5 3 or 15 unit cubes, will cover the base.Solution (a) :Three more layers of 15 cubes each can be placed on top of the lower layer to fill the box. Because the box contains 4 layers with 15 cubes in each layer, the box contains a total of 4 15, or 60 unit cubes.Solution (b) :Because the box is completely filled by the 60 cubes and each cube has a volume of 1 cubic unit, it follows that the volume of the box is 60 1, or 60 cubic units.Note :In the above example, the area of the base, 15 square units, multiplied by the height, 4 units, yields the volume of the box, 60 cubic units. So, the volume of the prism can be found by multiplying the area of the base by the height. This method can also be used to find the volume of a cylinder.Cavalieris PrincipleTheorem (Cavalieris Principle) :If two solids have the same height and the same cross-sectional area at every level, then they have the same volume.The above Theorem is named after mathematician Bonaventura Cavalieri (15981647). To see how it can be applied, consider the solids below. All three have cross sections with equal areas, B, and all three have equal heights, h. By Cavalieris Principle, it follows that each solid has the same volume.Volume TheoremsTheorem 1 (Volume of a Prism) :The volume V of a prism is V = Bh where B is the area of a base and h is the height.Theorem 2 (Volume of a Cylinder) :The volume V of a prism isV = BhV = r2hwhere B is the area of a base, h is the height, and r is the radius of a base.Finding VolumesExample 2 :Find the volume of the right prism shown below.Solution :The area of the base isB = 1/2 (3)(4)B = 6 cm2The height ish = 2 cmFormula for volume of a right prism isV = BhSubstitute 6 for B and 2 for h.V = (6)(2)V = 12So, the volume of the right prism is 12 cubic cm.Example 3 :Find the volume of the right cylinder shown below.Solution :Formula for volume of a right cylinder is V =r2hSubstitute 8 for r and 6 for h.V =(82)(6)Simplify.V = 384Use calculator.V 1206.37So, the volume of the right cylinder is about 1206.37 cubic inches.Using Volumes in Real LifeExample 4 : If a concrete weighs 145 pounds per cubic foot, find the weight of the concrete block shown below.Solution :To find the weight of the concrete block shown, we need to find its volume. The area of the base can be found as follows :B = Area larger rectangle - 2 Area of small rectangleB = (1.31)(0.66) - 2(0.33)(0.39)B 0.61 ft2Using the formula for the volume of a prism, the volume isV = Bh V 0.61(0.66) V 0.40 ft3To find the weight of the block, multiply the pounds per cubic foot, 145 lb/ft3,by the number of cubic feet,0.40 ft3.Weight = [145 lb/ft3] [0.40 ft3]Simplify.Weight 58 lbSo, the weight of the concrete block is about 58 pounds. Kindly mail your feedback tov4formath@gmail.comWe always appreciate your feedback.All rights reserved. onlinemath4all.com The volume of a prism is the capacity of the prism. There can be different types of prisms like a triangular prism, square prism, rectangular prism, pentagonal prism, hexagonal prism, or octagonal prism. But the method to write the formula of volume of any prism remains the same immaterial of the type of prism. The concept of writing the formula for the volume of the prism stays the same in any case. Like all three-dimensional shapes, you will learn how to calculate the volume of any type of prism. Stay tuned to learn how to use its formula using solved examples. What is the Volume of Prism? The volume of a prism is defined as the amount of space a prism occupies. A prism is a solid 3-D shape that has two same faces and other faces that resemble a parallelogram. It is a polyhedron whose naming convention is influenced by the different shapes of the bases. In the case of prisms, every prism has a different base, triangular prism (triangular base), square prism (square base), rectangular prism (rectangular base), pentagonal prism (pentagonal base), hexagonal prism (hexagonal base), or an octagonal prism (octagonal base). Thus, as each prism is a three-dimensional shape, the volume of every prism also lies in a three-dimensional plane. The unit of volume of a prism is given as cubic meters, cubic centimeters, cubic inches or cubic feet, etc.Formula of Volume of Prism The formula for the volume of a prism is given by the product of the area of the base and height of the prism.Thus, as the bases of different types of prisms are different so are the formulas to determine the volume of the prism. Look at the table below to understand this concept better: Thus, the volume of a prism can be given as V = B H where V is the volume, B base area, and H height of the prism. The unit of base area is given in square units and the height of the prism is given in units. Thus, the unit of volume of the prism is given as V = (square units) (units) = cubic units.How to Calculate the Volume of Prism? The steps to determine the volume of the prism are:Step 1: Write the given dimensions of the prism.Step 2: Determine the volume of the prism using the formula V = B H where V, B, and H are the volume, base area, and height of the prism.Step 3: The value of the volume of the prism is once obtained then add the unit of volume of prism in the end (in terms of cubic units).Example: Find the volume of a prism whose base area is 3 square inches and height is 7 inches.Solution: As we know, the volume of the prism is V = B H. Given that: B = 3 square inches, H = 7 inches Thus, the Volume of the prism, V = B H V = 3 7 = 21 in3 Therefore, the volume of the prism is 21 cubic inches.Important NotesThe volume of any prism depends on the shape of its base. With the change in the shape of the base, the area of the base changes as well.Example 1: What is the base area of the prism if the volume of the prism is 324 cubic units and the height of the prism is 9 units.Solution:The given dimensions are the volume of the prism = 324 cubic units and the height of the prism = 9 units. Let the base area of the prism be "B".Substituting the values in the volume of the prism formula, Volume of prism = V = B H = 324 cubic units 9B = 324 B = 36 square unitsTherefore, the base area of the prism is 36 square units. Example 2: Find the height of the prism if the volume of the prism is 729 cubic units and the base area is 27 square units.Solution:The given dimensions are the volume of the prism = 729 cubic units and the base area of prism = 27 square units. Let the height of the prism be "H".Substituting the values in the volume of the prism formula, Volume of prism = V = B H = 729 cubic units 27H = 729 H = 27 unitsTherefore, the height of the prism is 27 units. Show Solution >go to slidego to slideBreakdown tough concepts through simple visuals.Math will no longer be a tough subject, especially when you understand the concepts through visualizations with Cuemath.Book a Free Trial ClassFAQs on Volume of Prism The amount of space occupied by a prism is referred to as the volume of a prism. The volume of the prism depends on the base radius of the prism and the height of the prism. The unit of volume of the prism is expressed in m3, cm3, in3, or ft3.What is the Formula for Volume of Prism?The formula for the volume of a prism is obtained by taking the product of the base area and height of the prism. The volume of a prism is given as V = B H where, "V" is the volume of the prism, "B" is the base area of the prism, and "H" is the height of the prism.How to Find the Volume of Prism?We can find the volume of the prism using the following steps:Step 1: First write the given dimensions of the prism.Step 2: Find the volume of the prism using the formula V = B H where "V", "B", and "H" are the volume, base area, and height of the prism.Step 3: Once the value of the volume of the prism is obtained, write the unit of volume of prism in the end (in terms of cubic units).How Do You Find the Base Area of Prism if the Volume of Prism is Given?The steps to determine the base area of the prism, if the volume of the prism is given, are:Step 1: Write the given dimensions of the prism.Step 2: Substitute the given values in the formula V = B H where "V", "B", and "H" are the volume, base area, and height of the prism.Step 3: Now solve the equation for "B".Step 3: Once the value of the base area of the prism is obtained, write the unit of the base area prism in the end (in terms of square units).What Happens to the Volume of Prism if the Base Area of Prism is Doubled?The volume of the prism depends on the base radius of the prism. Thus, the volume of the prism doubles if the base area of the prism is doubled as "B" is substituted by "2B" as V = (2B) H = 2 (B H) which is double the original volume of the prism.What Happens to the Volume of Prism When the Base Area and Height are Doubled?The volume of the prism will quadruple the original volume if the base area and height of the prism are doubled as, radius, "B" is substituted by 2B, and height, "H" is substituted by 2H. Thus, V = (2B) (2H) = 4 (B H) which is four times the original volume of the prism.How Does the Volume of Prism Change if the Type of Prism Changes?The volume of the prism depends on the base area of the prism. As the type of prism changes, the base of the prism changes thereby changing the base area of the prism. This change in the base area of the prism changes the volume of the prism.Q1: What is the volume of a prism with hexagonal base with height 12 m and area of hexagonal base is 200 m2?1200 m31800 m32000 m32400 m3Q2: The length, breadth and height of a rectangular prism is 3 in, 5 in and 2 in. It's volume is: $$(3 5) + 2 in3$$$(3 + 5 + 2) in3$$$2 (3 5 2) in3$$$(3 5 2) in3$$Q3: The formula for volume of octagonal prism with base edge a and height h is: $$3a2 (1+3) h$$$2a2 (1+3)$$ $$a2 (1+2) h$$$2a2 (1+2) h$$Q4: Find the height of a rectangular prism, if the volume of the prism is 675 cm3 and the area of the base is 75 cm2?7 cm11 cm5 cm9 cmQ5: What is the volume of an equilateral triangular prism whose triangular base area is 9 square inches and height is 4 inches?20 cubic inches70 cubic inches55 cubic inches36 cubic inches Popular Tutorials in Volume of Prisms and Cylinders The volume of a cylinder is the amount of space that will fit inside it. You can use the formula for the volume of a cylinder to find that amount! In this tutorial, see how to use that formula and the radius and height of the cylinder to find the volume. Check it out! Finding the volume of a rectangular prism isn't so bad, especially if you already know the length, width, and height. In this tutorial, you'll see how to use that information and the formula for the volume of a rectangular prism to get the answer. Check it out! Finding the volume of a triangular prism isn't so bad, especially if you already know the length and height of the base and the height of the prism. In this tutorial, you'll see how to use that information and the formula for the volume of a triangular prism to get the answer. Take a look! When you fill a jar with marbles or fill a pool with water, you are taking up volume! In this tutorial, youll be introduced to volume and learn