Continue

Calipers are very popular measuring tools used in various scenes such as manufacturing and DIY. This section provides a basic overview of calipers, including what they are, their features, types, and correct usage. The name "caliper" is said to be derived from the name of Petrus Nonius, a Portuguese mathematician who invented the vernier scale. The construction mainly consists of a main scale with external jaws, internal jaws, and a slider. With a single caliper, the outside dimension, inside dimension, depth dimension, and step dimension of the object can be measured. By combining the main scale with the vernier scale on the slider, it is possible to get a more detailed reading. The minimum reading of general analog calipers is 0.05 mm. 0.02 mm units are now available and can be used for different purposes. Digital calipers that read in increments of 0.01 mm are now available, making calipers more convenient to use. The measuring range is usually 0 to 300 mm, and some calipers can measure up to 2000 mm in length. The caliper can measure four types of measurements: outside, inside, step, and depth of the object to be measured. For clarity, examples of measurements which photos? Outside Measurement The two outer jaws are used to clamp the object to be measured. Inside Measurement This is done by inserting the two inner jaws into the measured object.Step measurementThis is done using the measurement surface for steps (the left end of the main scale and the left end of the slider).Depth measurementThis is done using a depth bar. In addition to standard calipers such as the aforementioned M-type and digital types, there are various types of specialized calipers. Typical examples include "point" calipers for measuring between irregularly shaped, narrow dimensions, "offset" calipers for measuring different steps, and "depth gauges" for measuring depth. Which figure? there are also various other types for different purposes of use, such as measuring the diameter of narrow grooves, measuring the inside diameter of a stepped hole, and measuring a stepped section. Here we explain the main usage and precautions, using the M-type standard caliper as an example. [Confirmation before use] 1. Slider Operation First, clean each measuring surface and the sliding surface of the main scale. Make sure that the slider moves smoothly and evenly over the entire measurement range. Also, make sure that the slider does not rattle against the sliding surface in the vertical direction. 2. Gap between measurement surfaces for outsideClose the outer measuring face, hold it up to the light and observe it from the back. Check that there is no light leakage or that an even, faint light is visible. Also check if the tip of the jaw is not deformed. 3. Gap between measurement surfaces for inner sideObserve from an angle to confirm that the gap between the inner measuring surfaces is even and that the tip is not deformed. 4. Zero point confirmation Close the outer measuring face and check that the zero graduation lines of the vernier and the main scale match. When checking the alignment of the graduation lines, be sure to take a reading from directly in front (A). Reading from an angle (B) will cause parallax (x). [How to read the scale] Read the value of the main scale (in increments of 1 mm) pointed to by the zero graduation line on the vernier scale. Read the value of the vernier scale (in increments of 0.05 mm) that coincides with the main scale. Add the readings of the main scale and vernier scale to obtain the measurement value. [Outside measurement] 1. Insert the object to be measured into the outer jaw and adhere the measuring surface to the object to be measured with appropriate and uniform measuring force. 2. Read the scale while holding the object to be measured. *Caution - Do not apply more measuring force than necessary. Excessive measuring force will cause the jaws to tilt, resulting in measurement errors. - Do not hold the object to be measured at an angle. Tilting will cause measurement errors. - Clamp the object to be measured as close as possible to the reference end face of the scale. If the object is clamped near the tip of the outer jaw, the measurement error is likely to increase. [Inside measurement] 1. Insert the inner jaw into the object to be measured and adhere the measuring surface to the object with appropriate and uniform measuring force. 2. Read the scale in the position where the measuring object is kept in close contact with the scale. *Caution: - Insert the inner jaw as deeply as possible into the object to be measured. - When measuring the inside diameter, keep the measuring surfaces in close contact and read the value when the scale is at its maximum. - When measuring the groove width, place the measuring surfaces in close contact and read the value when the scale is at its minimum. [Step measurement] 1.Place the step measurement surface (on the main scale side) in close contact with the object to be measured. 2. Move the slider until the step measurement surface (on the slider side) butts up against the measurement object (on the step surface). 3. Read the scale in a position where it remains in close contact with the object to be measured.*Caution: - For the step of the object to be measured, place the entire step measurement surface (1) and (2) in close contact with the object to be measured. - We do not recommend using a depth bar to measure steps because the contact area of the depth bar with the object to be measured is small and it is difficult to hold the bar in a stable posture. [Depth measurement] 1.Place the depth measurement surface (main scale side) in close contact with the object to be measured. 2. Move the slider until the depth measurement surface (depth bar side) butts up against it. 3. The scale is read in a posture that keeps it in close contact with the object to be measured. *Caution: - The depth measurement surface of the caliper is narrow and unstable. Please make sure that the caliper is in close contact with the object to be measured so that it is perpendicular to the object to be measured. *Depth measurement can be made accurately and easily by using an optional product (depth base attachment). [Cautions after use] - Clean the measuring surface, reference end face, sliding surface, etc. - If not used for a long period of time, wipe off any dirt and store with a thin coat of rust-preventive oil. - Store away from high temperatures, low temperatures, high humidity, and direct sunlight. Enjoy sharper detail, more accurate color, lifelike lighting, believable backgrounds, and more with our new model update. Your generated images will be more polished thanever.See What's NewExplore how consumers want to see climate stories told today, and what that means for yourvisuals.Download Our Latest VisualGPS ReportData-backed trends. Generative AI demos. Answers to your usage rights questions. Our original video podcast covers it allnow ondemand.Watch NowEnjoy sharper detail, more accurate color, lifelike lighting, believable backgrounds, and more with our new model update. Your generated images will be more polished thanever.See What's NewExplore how consumers want to see climate stories told today, and what that means for yourvisuals.Download Our Latest VisualGPS ReportData-backed trends. Generative AI demos. Answers to your usage rights questions. Our original video podcast covers it allnow ondemand.Watch NowEnjoy sharper detail, more accurate color, lifelike lighting, believable backgrounds, and more with our new model update. Your generated images will be more polished thanever.See What's NewExplore how consumers want to see climate stories told today, and what that means for yourvisuals.Download Our Latest VisualGPS ReportData-backed trends. Generative AI demos. Answers to your usage rights questions. Our original video podcast covers it allnow ondemand.Watch Now1Zero out the calipers before you take a measurement. Slide the clamps closed and push the extension rod in all the way to zero out Vernier calipers. Make sure that the measurement line is perfectly even with the zero.[1]If the calipers are not properly zeroed before you begin, then your reading will likely be inaccurate.Tip: Use Vernier calipers when you need the most precise measurements possible, such as for developing parts for a manufacturing operation or gathering data for a physics experiment. Vernier calipers are accurate to 1/20th of a millimeter! 2Clamp the jaws around the outside of the object for external measurement. The calipers have 2 jaws that you can open and then close around the outside of an object. The outer jaws are located on the bottom of the measurement portion of the calipers. Open the calipers wider than the outside of the object and then close them around the part of the object you want to measure.[2]For example, if you want to measure the outer diameter of a pipe, then open the calipers wider than the outside of the pipe and then close them around the outside of it. Advertisement 3Extend the jaws inside of the object to get an internal measurement. Locate the inner measurement jaws on the top portion of the calipers (above the part that looks like a ruler). These jaws are smaller than the outer jaws of the calipers. If you need to find an objects inner diameter, close the inner jaws of the calipers completely and put them into the object. Open the calipers until the inner measurement jaws are pressed against the inside of the object.For example, if you want to measure the inner diameter of a screw hole on a piece of furniture, then open the calipers until they are pressed against the inside of the hole to get your measurement.4Push the extension rod into the object for a depth measurement. Calipers can also measure the depth of an object or hole with an extension rod that you can pull out from the side (or end of the ruler section) of the calipers. Place the jaws of the calipers against the top edge of the object or hole, and then extend the bar down into the hole or object until it touches the bottom.[3]For example, if you want to measure the depth of a screw hole, then place the caliper jaws against the rim of the hole and extend the bar down into the hole until you hit the bottom.5Record the measurement going from the largest to the smallest number. Record the numbers on the sliding scale going from the largest printed number to the smallest (top to bottom on the sliding scale). The first number will go in front of a decimal (even if it is a 0) followed by a decimal and then the other 3 numbers.For example, if the largest number is 4, then start by writing 4in (10cm).Next, if the next number is 1, then your new number would be 4.1in (10cm). Note that each mark between the second set of digits stands for 0.025in (0.064cm), so if the second number falls on the second notch between 3 and 4, then your new number would be 4.35in (11.0cm).Use the last digit to fill in the third space after the decimal. For example, if the notch is aligned with the 7 for this spot, then your final measurement would be 4.357in (11.07cm).6Write whole number measurements with a decimal and 3 zeroes. Even if the number you get for your measurement is an even number with only zeros behind it, write it with 3 zeroes behind it. This will help to provide clarity for any calculations you perform with these measurements.For example, if your measurement for the inner diameter of a pipe is exactly 2in (5.1cm), record the measurement as 2.000in (5.08cm). Advertisement 1Zero out the calipers before you get started. Slide the clamps closed and push the extension rod in all the way. Then, hit reset to display only zeros on the screen.[4]Properly zeroed calipers are essential to getting an accurate measurement, so make sure to do this!Tip: Opt for digital calipers when you need to get accurate measurements quickly, such as for replacing a part on an appliance or repairing a piece of furniture. 2Clamp the jaws around the outside of the object for an external measurement. Calipers have 2 large jaws that you can open and close around the outside of an object. These jaws are located at the bottom of the ruler part of the calipers. Open the calipers so they are wider than the outside of the object, and then close the calipers around the part of the object you want to measure.[5]For example, to measure the length of a nail, open the calipers wider than the length of the nail and close them so that 1 jaw is touching the head of the screw and the other is against the pointed end of the screw.3Open the jaws inside of an object to find the inner diameter. Find the inner measurement jaws on top of the calipers (above the part that looks like a ruler). These are smaller than the outer jaws. Close the inner jaws of the calipers and put them inside of the object. Open the calipers so the inner jaws are pressed against the inside of the object.[6]For example, to measure the inner diameter of a pipe, open the calipers until they are pressed against the inside of the pipe to get your measurement.4Push the extension rod into the object for a depth measurement. Locate the extension rod on the side (or end of the ruler section) of the calipers. Position the calipers against the top edge of the object or hole, and then extend the bar down into the hole or object until it touches the bottom.[7]For example, to measure the depth of a hole, place the caliper jaws against the rim of the hole and extend the bar down into the hole all the way to the bottom.5Look at the digital reading. Look at the screen and record the number. Keep in mind that the readout will include a zero or whole number followed by a decimal and 3 digits behind it.[8]For example, the readout may say 0.365in (0.93cm) or 4.987in (12.67cm). Record the entire number as your measurement.Some digital calipers have a button to change the measurement from imperial to metric or vice versa. Check to see if this is a feature of your calipers and press the button if needed. Advertisement Add New Question Question What are the sharp blades at the ends for? What can I use as a standard to check accuracy? The tapered edges on each side help keep measurements of small parts accurate. Digital calipers allow you to reset zero at any position. You can set zero when closed, then measure against a ruler or any other measuring device. Ask a Question 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 199,886 times. Co-authors: 10 Updated: October 1, 2024 Views:199,886 Categories: Measuring and Marking Tools PrintSend fan mail to authors Thanks to all authors for creating a page that has been read 199,886 times. 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. A caliper is a precision measuring instrument that has the good flexibility to measure various dimensions such as thickness, outside diameter, inside diameter, length, width, and depth of an object in a single tool. Its a very complete tool to support your multiple dimension measurement.A caliper is made of steel. However, sometimes carbon material (plastic) can be used. In some situations when the steel can cause scratches, the plastic one is appropriate to use.It can measure with better resolution rather than the conventional ruler.The typical resolution of calipers ranges from 0.1 to 0.02 mm. However, the most used one is 0.02 mm. The most common measuring range is from 0 to 15 mm or 6 inches. But it can extend depending on the requirements on the job site. Its one of the well-known linear measuring tools that we use to get a precise measurement.FunctionsLong vernier caliperWhen it comes to measuring the diameter of cylindrical objects, the caliper is the right choice to use. Whether the inside or the outside diameter, with a single instrument, the task can be finished easily accurately.To measure thickness, length, and width, you can certainly use this device. Use the bigger jaws to secure the object to find the measurement of its external dimensions.You can use it as well for measuring depth. A caliper is equipped with a thin stick on the backside. Use that stick to measure the depth of anything you want. Make sure the depth should be around below 15mm or 6inch.Thanks to its benefits, a caliper is one of the key measuring instruments that is usually used in various fields such as engineering, medicine, construction, household, and metalworking.Advantages and DisadvantagesThe following is a list of the pros and cons of the caliper that we compile:Advantages:Accuracy and Precision: The first advantage of a caliper is that it provides accurate and precise readings.Versatility: Calipers are versatile instruments, they can be used for various purposes. They can be used to take internal readings, external readings, and depth.Durability: Since the calipers are made with strong materials like stainless steel, they are durable. You can use it for a long period of time.No Need of Extra Scale: For the direct reading caliper type, they have a fixed scale and a moving scale. They dont require an extra separated scale for making a measurement.Price: We can easily find calipers in the market. Some are affordable, while the others are pretty expensive yet reasonable.Disadvantages:Chance of Personal Error: The angle of the reading matters. There is a chance of personal error when a less experienced person uses it. Certainly, it behaves to the vernier caliper type.Need An Additional Scale: The indirect reading calipers require a separate ruler or related scale to calculate the measurement.Need for Good Eyesight: The analog model that includes vernier and dial calipers require good eyesight. People who dont have good eyesight will have trouble reading the measurements.Zero Error: One of the most common drawbacks of using an analog vernier caliper is the zero error. When the jaws are fully closed, they must indicate zero reading. If they dont indicate zero that means that it has zero error. The caliper that has zero error needs to be recalibrated or it should be repaired because it will provide inaccurate readings.Types of CalipersVernier, Dial, and Digital Calipers of Moore and Wright BrandThe term caliper doesnt represent only one single shape. There are actually some models and types which are called calipers. The easiest way to differentiate them is through the reading scale, whether the scale is separated or fixed on the tool.1. Indirect Reading CalipersThese calipers require an additional external scale to measure the distance.Inside Caliper: The inside calipers are designed in a way to measure the internal measurement of an object. The legs of the inside caliper are adjusted according to the object to get the desired measurements.Outside Caliper: The outside calipers are designed in a way to measure the external measurement of the object. Just like the inside caliper, the legs of the outside caliper are adjusted to get the desired measurements.Divider Caliper: The divider caliper, commonly known as a compass is used to mark locations on the surfaces. The edges of the legs are very sharp hence they can be easily used to draw arcs or circles. They are also used to measure the distance between different points on a map.Odd leg Caliper: The odd leg calipers have a bent leg, they are designed this way to scribe a line while the bent leg runs along the edge of the workpiece.2. Direct Reading CalipersDirect reading calipers have the scale right built in the calipers themselves. Although they employ a display (either mechanical or digital system), they are actually different in several factors. The direct reading calipers have the following types: Caliper Body PartsAn indirect reading caliper, that has a separated scale, consists of two pivoted legs that are adjusted across the points of the object that are supposed to be measured. Some calipers have long legs, some have short and some may have bent legs as well.On the other hand, the direct reading caliper has two scales, one is the fixed main scale while the other is the moving one. It consists of jaws instead of legs. When the jaws are fully closed, they must indicate zero reading.A direct reading caliper allows the measurement to be read through the vernier scale, dial, or through a digital display. All the parts of these three kinds are basically the same except the look of the reading display.The image above is a typical vernier caliper and its parts. The list below is the explanation of each number that is marked on the image.Internal Jaws: The jaws to measure the internal dimension such as internal diameter.External Jaws: The measuring face to secure the object in order to measure its external dimensions such as length, thickness, outside diameter, and width.Locking Screw: When needed, you can spin the screw to tighten the object you are measuring. It functions to prevent the object from moving.Upper Vernier Scale: The part of the vernier scale in which the inch graduation takes place.Lower Vernier Scale: Similarly, its the part of the vernier scale where the metric graduation located if you are going to measure with the metric unit.Main Scale: This is the major scale. The graduation is adjusted in two positions where the upper side is for inch and the lower side is for millimeter.The three below images are the other parts of the caliper. The most important thing to know is the stick to measure the depth. Its the third position from the left. The rest of it is the pictures from behind. Lets SummarizeWhenever its important to have a precise measurement, we can rely on the caliper. Caliper is a perfect choice when you are going to measure a cylinder-shaped object both inside and outside diameter, length, thickness, and depth. All those tasks can be done in a nice tool. You need to save this tool at least one unit in your toolbox in case you need to measure those dimensions as precisely as possible. 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. Download Article Download Article Calipers are measuring tools used to precisely determine the width of a gap or object, much more accurately than a tape measure or ruler. Besides digital models, which uses an electronic screen, a caliper can display the measurement on a pair of scales (vernier caliper) or on a scale and dial gauge (dial caliper). 1Identify your caliper. Use the instructions for vernier calipers if your tool has two scales, one sliding over the other. If your tool has one scale and a round dial instead, see the dial caliper instructions instead.If you are using a digital caliper, the measurement should be displayed on an electronic screen, typically with the option to switch between mm (millimeters) and inches (in). Before you take the measurement, close the larger jaws completely and press the Zero, Tare or ABS button to set the closed position to a value of zero. Advertisement 1Check for zero errors. Loosen the screw or screws holding the sliding scale in place. Move the sliding scale until the larger jaws of the caliper are fully pressed against each other. Compare the 0 positions on the sliding scale and the fixed scale, which is engraved on the caliper body. If the two 0 marks are lined up exactly, skip ahead to reading the measurement. Otherwise, continue to the next step to correct the error. 1Use an adjustment wheel if present. While this is not common, some vernier calipers have an adjustment wheel on the sliding scale, which can be pushed to adjust the sliding scale without affecting the caliper jaws. If your model has this wheel, push it until the zeroes on the sliding scale and fixed scale line up, then skip ahead to reading the measurement. Otherwise, continue to the next step.Watch the jaws closely to make sure you are not pushing a fine adjustment screw, which opens and closes the jaws by small amounts.2Calculate a positive zero error. If the sliding scale's 0 is to the right of the fixed scale's 0, read the measurement on the fixed scale that lines up with the sliding scale's 0. This is a positive zero error, so write this down with a + sign.For example, if the sliding scale's 0 is at 0.9mm on the fixed scale, write down "zero error: +0.9 mm."3Calculate a negative zero error. If the sliding scale's 0 is to the left of the fixed scale's 0, take the following steps:With jaws closed, look for a mark on the sliding scale that lines up exactly with a value on the fixed scaleMove the sliding scale so that mark lines up with the next highest value. Repeat until the sliding scale 0 is to the right of the fixed scale 0. Note the amount of distance moved.Read the value on the fixed scale that lines up with the sliding scale's 0.Subtract the amount of distance moved from the value you just read. Write down this zero error, including the negative sign.For example, the 7 on the sliding scale lines up with the 5mm mark on the fixed scale. Move the sliding scale until it is further right than the fixed scale, then line up the 7 with the next fixed-scale mark: 7mm. Note that you moved a distance of 7 - 5 = 2mm. The sliding scale's 0 is now located at the 0.7mm mark. The zero error is equal to 0.7mm - 2mm = -1.3mm.4Subtract the zero error from all measurements. Any time you take a measurement, subtract your zero error from the result to get the actual dimensions of the object. Don't forget to take the sign of the zero error (+ or -) into account.For example, if your zero error is +0.9mm, and you take a measurement that reads 5.52mm, the actual value is 5.52 - 0.9 = 4.62mm.For example, if your zero error is -1.3mm, and you take a measurement that reads 3.20mm, the actual value is 3.20 - (-1.3) = 3.20 + 1.3 = 4.50mm. Advertisement Reading the Measurement1Adjust the jaws to take a measurement. Clamp the large, flat jaws around an object to measure an outside dimension. Insert the smaller, curved jaws into an object and expand them outward to measure the interior dimension. Tighten the locking screw to keep the scale in place.Slide the scale to open or close the jaws. If your caliper has a fine adjustment screw, you can use this to make more precise adjustments.2Read the fixed scale value. Once you have the caliper jaws in the right position, look at the fixed scale, engraved onto the body of the caliper. Typically there is an imperial and a metric fixed scale; either one will work. Take these steps to find the first couple digits of your measurement:Find the 0 value on the smaller, sliding scale, next to the fixed scale you are using.On the fixed scale, find the nearest mark to the left of that 0, or exactly on it.Read that mark's value just like you would read a ruler but note that the imperial side of a caliper divides each inch into tenths, not sixteenths as most rulers do.3Check the sliding scale for additional digits. Examine the sliding scale carefully, starting at the 0 mark and moving right. Stop when you find a mark that lines up exactly with any mark on the fixed scale. Read this value on the sliding scale as you would a regular ruler, using the unit engraved on the sliding scale.The value of the fixed-scale mark makes no difference. You only need to read the value on the sliding scale.4Add the two values together to get your final answer. This should be a simple case of writing the fixed scale digits, then writing the sliding scale digits afterward. Check the unit engraved on each scales just to make sure.For example, your fixed scale measures 1.3 and is marked "inches." Your sliding scale measures 4.3 and is marked "0.01 inches," meaning it represents 0.043 inches. The exact measurement is 1.3 inches + 0.043 inches - 1.343 inches.If you found a zero error earlier, don't forget to subtract it from your measurement. Advertisement 1Check for a zero error. Close the jaws completely. If the needle on the dial doesn't point to zero, rotate the dial with your fingers, until the zero is beneath the needle.[1] You may need to loosen a screw at the top or base of the dial face before you can do this.[2] If so, remember to tighten the screws again after you've made the adjustment.2Take the measurement. Close the larger, flat jaws around an object to measure the outside diameter or width, or insert the smaller, curved jaws into an object and expand to measure the interior diameter or width.3Read the scale value. The scale engraved on your caliper can be read just as you would a regular ruler. Find the value at the inner edge of your caliper's jaws.The scale should be labeled with a unit, typically cm (centimeters) or in (inches).Note that the inches scale of a caliper is typically an engineer's scale, with each inch divided into ten parts (0.1) or five parts (0.2). This is different from most rulers, which display sixteenths or eighths of an inch.4Read the dial value. The needle on the dial points to an additional value for more precise measurement. The units should be labeled on the dial face, typically 0.01 or 0.001 cm or in.5Add the two values together. Convert both measurements to the same unit, then add them together. For many applications, you may not need to use the most precise digits.For example, the fixed scale displays 5.5 and is labeled cm. The needle on the dial points to 9.2 and is labeled 0.001 cm, so this represents 0.0092 cm. Add them together to get a measurement of 5.5092 cm. Unless you are working on a project that requires extreme precision, you can probably round this to 5.51 cm. Advertisement Ask a Question Advertisement 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 349,137 times. Co-authors: 11 Updated: May 6, 2025 Views:349,137 Categories: Measuring and Marking Tools PrintSend fan mail to authors Thanks to all authors for creating a page that has been read 349,137 times. Calipers can be called the right hand of engineers in various industries. Measurement accuracy has always been one of the most important topics in engineering, and in countries with advanced industries, we see more accurate measurement equipment. Calipers have long been used by engineers as a high-precision measuring tool. The history of calipersAccording to recorded studies, the first use of the Caliper is related to Romans and Ionians. But the oldest caliper dates back to the 6th century BC and was found in the ruins of an island off the coast of Italy. The wooden part found has a fixed part and a movable opening. Modern calipers were invented by Pierre Vernier, who was a French mathematician and inventor.Types of calipersLike many other tools, calipers are produced in different types. Calipers have 3 common models. Vernier caliper (simple), dial caliper (hourly), digital caliper. All these calipers are very similar in terms of performance. Only reading values in these calipers differ from each other. All these calipers include a ruler with a fixed opening and a moving opening with an indicator.Vernier caliper (simple)Caliper (hourly)Digital caliperVernier caliperA simple caliper has a fixed ruler (in centimeters, millimeters, and inches) and a moving part (called a vernier).Dial caliperDial calipers use a dial to accurately help you read a workpiece or tool in fractions of a millimeter or inch.Digital caliperA digital caliper isa precision instrument used to take very accurate measurements. The caliper is easy to use with a digital display. Most are able to measure up to 0.01 mm (0.0005 inches). April 1, 2025April 1, 2025 by Shinta The drain camera is more excellent in facing the blockage issue with your drain line than the sewer camera. This is because drain cameras have specs for that, such as a smaller diameter cable, more bendable cable, water-resistant camera head, etc. Compared to sewer lines, the drain lines have typical smaller diameter pipes and more Read more Categories Measuring Device An hour meter functions to monitor the running time of your engine. In fact, in some cases, it is also equipped with the capability to trace the engine RPM (tachometer). Therefore, some say it a tach-hour meter. Because there are two functions in a single tool: tachometer and hour meter. There are many benefits you Read more Categories Measuring Device Leave a comment April 1, 2025April 1, 2025 by Shinta Many utility infrastructures are buried deep underground. They include telephone lines, electrical, fiber optic, and data cables. These are usually challenging to engineers and maintenance technicians since locating faults is not straightforward. You cannot dig the entire cable length to identify the fault position. That is where the underground cable fault locators come in. Unlike Read more Categories Measuring Device April 1, 2025April 1, 2025 by Shinta Vernier protractor or vernier bevel protractor is an important tool in angle measurement. Not only for measurement but also for layout, it can be a decisive tool for accuracy and precision in which the resolution of the vernier protractor reaches up to 5 minutes. The same as the analog vernier caliper and vernier height gauge, Read more Categories Angular Measurement, Basics, Guide We use a paint thickness gauge to measure the vehicles surface paint. Touch the probe to the car panel surface, and it will take the reading. Its not only the main object to measure with this paint meter, it also measures other coatings such as the pipe coating, etc. The base of the paint/coating may Read more Categories Guide Rafter square, speed square, triangle square, and rafter angle square are actually the same tools in spite of their different names. This tool is used for a range of applications such as measuring, layout, marking, and scribing guide, it acts as a saw guide for 90- and 45-degree cuts, establishes perpendicular angles, and makes rafters. Read more Categories Guide April 1, 2025March 24, 2025 by Shinta Gauge blocks are a set of precision-cut stable metal blocks of different thicknesses used as a length standard. They usually come in a set, but you could also find them individually. Measuring instruments such as micrometers, digital calipers, vernier calipers, dial calipers, height gauge, dial indicators, and test indicators use gauge blocks for inspection and Read more Categories Guide April 1, 2025March 24, 2025 by Shinta Using a gauge block is not complicated but there are several things you have to master; have to learn at least. Because this block is manufactured and shaped with a high degree of accuracy, a special treat is needed. This page will walk you through how to use the gauge block from the selection up Read more Categories Guide April 1, 2025March 24, 2025 by Shinta There are some points that we can identify in the case of the differences between dial indicator and test indicator. The identification of these two indicator models can lead us to deeply understand whether to use the dial indicator or the test indicator when facing a certain measuring challenge. If you are new and on Read more Categories Guide Leave a comment April 1, 2025March 24, 2025 by Shinta Physical quantities and units are among the basic things in measurement that you have to know. When learning about physics, engineering, instrumentation, and metrology, you are not far from physical quantities and units. In regard to buying a measuring device, it goes the same thing, physical quantities and units are the most fundamental thing you Read more Categories Guide Leave a comment Theyre used to measure objects which cant be easily measured using a ruler or other measuring equipment. They feature two legs attached to a central hinge, which enables them to move closer together or further apart to reach a measurement.Some types, for examplespring, require another measuring tool like a ruler to calculate the distance between the measuring legs. These are also referred to as transfer measuring tools. Other types, such asdigital,dialandvernier, feature a scale. This means measurements can be read straight from the display on the tool.As well as calipers, theres a wide range of othermeasurement equipmentavailable on our website. July 24, 2022July 24, 0202 by Brandon Fowler Categories Measuring Tools Tags calibration, calipers, dial calipers, digital calipers, guides, how to GD&T Symbols Quick Reference A caliper is a precision measuring instrument that has the good flexibility to measure various dimensions such as thickness, outside diameter, inside diameter, length, width, and depth of an object in a single tool. Its a very complete tool to support your multiple dimension measurement.A caliper is made of steel. However, sometimes carbon material (plastic) can be used. In some situations when the steel can cause scratches, the plastic one is appropriate to use.It can measure with better resolution rather than the conventional ruler.The typical resolution of calipers ranges from 0.1 to 0.02 mm. However, the most used one is 0.02 mm. The most common measuring range is from 0 to 15 mm or 6 inches. But it can extend depending on the requirements on the job site. Its one of the well-known linear measuring tools that we use to get a precise measurement.FunctionsLong vernier caliperWhen it comes to measuring the diameter of cylindrical objects, the caliper is the right choice to use. Whether the inside or the outside diameter, with a single instrument, the task can be finished easily accurately.To measure thickness, length, and width, you can certainly use this device. Use the bigger jaws to secure the object to find the measurement of its external dimensions.You can use it as well for measuring depth. A caliper is equipped with a thin stick on the backside. Use that stick to measure the depth of anything you want. Make sure the depth should be around below 15mm or 6inch.Thanks to its benefits, a caliper is one of the key measuring instruments that is usually used in various fields such as engineering, medicine, construction, household, and metalworking.Advantages and DisadvantagesThe following is a list of the pros and cons of the caliper that we compile:Advantages:Accuracy and Precision: The first advantage of a caliper is that it provides accurate and precise readings.Versatility: Calipers are versatile instruments, they can be used for various purposes. They can be used to take internal readings, external readings, and depth.Durability: Since the calipers are made with strong materials like stainless steel, they are durable. You can use it for a long period of time.No Need of Extra Scale: For the direct reading caliper type, they have a fixed scale and a moving scale. They dont require an extra separated scale for making a measurement.Price: We can easily find calipers in the market. Some are affordable, while the others are pretty expensive yet reasonable.Disadvantages:Chance of Personal Error: The angle of the reading matters. There is a chance of personal error when a less experienced person uses it. Certainly, it behaves to the vernier caliper type.Need An Additional Scale: The indirect reading calipers require a separate ruler or related scale to calculate the measurement.Need for Good Eyesight: The analog model that includes vernier and dial calipers require good eyesight. People who dont have good eyesight will have trouble reading the measurements.Zero Error: One of the most common drawbacks of using an analog vernier caliper is the zero error. When the jaws are fully closed, they must indicate zero reading. If they dont indicate zero that means that it has zero error. The caliper that has zero error needs to be recalibrated or it should be repaired because it will provide inaccurate readings.Types of CalipersVernier, Dial, and Digital Calipers of Moore and Wright BrandThe term caliper doesnt represent only one single shape. There are actually some models and types which are called calipers. The easiest way to differentiate them is through the reading scale, whether the scale is separated or fixed on the tool.1. Indirect Reading CalipersThese calipers require an additional external scale to measure the distance.Inside Caliper: The inside calipers are designed in a way to measure the internal measurement of an object. The legs of the inside caliper are adjusted according to the object to get the desired measurements.Outside Caliper: The outside calipers are designed in a way to measure the external measurement of the object. Just like the inside caliper, the legs of the outside caliper are adjusted to get the desired measurements.Divider Caliper: The divider caliper, commonly known as a compass is used to mark locations on the surfaces. The edges of the legs are very sharp hence they can be easily used to draw arcs or circles. They are also used to measure the distance between different points on a map.Odd leg Caliper: The odd leg calipers have a bent leg, they are designed this way to scribe a line while the bent leg runs along the edge of the workpiece.2. Direct Reading CalipersDirect reading calipers have the scale right built in the calipers themselves. Although they employ a display (either mechanical or digital system), they are actually different in several factors. The direct reading calipers have the following types: Caliper Body PartsAn indirect reading caliper, that has a separated scale, consists of two pivoted legs that are adjusted across the points of the object that are supposed to be measured. Some calipers have long legs, some have short and some may have bent legs as well.On the other hand, the direct reading caliper has two scales, one is the fixed main scale while the other is the moving one. It consists of jaws instead of legs. When the jaws are fully closed, they must indicate zero reading.A direct reading caliper allows the measurement to be read through the vernier scale, dial, or through a digital display. All the parts of these three kinds are basically the same except the look of the reading display.The image above is a typical vernier caliper and its parts. The list below is the explanation of each number that is marked on the image.Internal Jaws: The jaws to measure the internal dimension such as internal diameter.External Jaws: The measuring face to secure the object in order to measure its external dimensions such as length, thickness, outside diameter, and width.Locking Screw: When needed, you can spin the screw to tighten the object you are measuring. It functions to prevent the object from moving.Upper Vernier Scale: The part of the vernier scale in which the inch graduation takes place.Lower Vernier Scale: Similarly, its the part of the vernier scale where the metric graduation located if you are going to measure with the metric unit.Main Scale: This is the major scale. The graduation is adjusted in two positions where the upper side is for inch and the lower side is for millimeter.The three below images are the other parts of the caliper. The most important thing to know is the stick to measure the depth. Its the third position from the left. The rest of it is the pictures from behind. Lets SummarizeWhenever its important to have a precise measurement, we can rely on the caliper. Caliper is a perfect choice when you are going to measure a cylinder-shaped object both inside and outside diameter, length, thickness, and depth. All those tasks can be done in a nice tool. You need to save this tool at least one unit in your toolbox in case you need to measure those dimensions as precisely as possible.

Measuring calipers. What is a caliper measuring tool used for. What is a caliper used to measure.

- http://lucchetta.net/userfiles/files/ac205c5c_61b5_4f2b_ab4a_1819e8f5ce8b.pdf
- http://xinchenfast.com/upload/file/16786533140.pdf
- jose
- mipovuxi
- yelivele
- http://yesjokbo.net/data/fckfiles/file/\/202571018157.pdf
- zivele
- rodu