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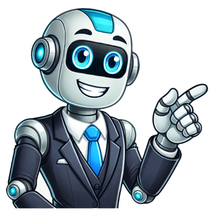

Download Article A detailed guide to measuring internal or external diameters and depth with a Vernier caliper Download Article If youre in need of a very precise length measurement, a Vernier caliper is going to be your best friend. This tool is used to measure internal and external dimensions, and it will give you much more specific measurements than a regular ruler. Learning to read a Vernier caliper is easy, and after a bit of practice, youll be using it like a pro. Keep reading to learn how to measure using this nifty tool and how to read the numbers youre seeing. Calibrate your caliper before using it by closing the jaws and lining up the 0 marks on the two scales, then place your object between the jaws.Tighten the jaws by sliding the moving scale until the jaws are flush against your object.Record the values being shown on the main scale and moving scale separately, then add them together to get your final measurement.1Locate both sets of jaws and measuring scales on your caliper. A Vernier caliper has large jaws that are used for measuring an objects external diameter, as well as smaller jaws that are used for measuring the internal diameter. There are also two scales. The Vernier scale is the sliding scale that opens and closes the jaws, while the main scale remains fixed in place.[1]Some models also have a depth gauge at the very end of the main scale. 2Read the scales on your Vernier caliper like you would read a ruler. A caliper usually has a main scale marked with numbered inches or centimeters, plus smaller divisions between them. The sliding (Vernier) scale often has an engraved label that tells you what units are being used.[2]If the sliding scale doesn't have a label, then assume that the numbered divisions represent 1/10 of the smallest division on the main scale.For example, if the main scale's smallest lines represent 0.1 inches, then each numbered division on the Vernier scale represents 0.01 inches.The main scale is "life-size" while the sliding scale is magnified for easy reading. This magnification system allows the Vernier caliper to measure more precisely than a ruler. Advertisement 3Determine the value of the smallest tick marks on the main scale. Before making a measurement, count the number of tick marks between two numbers on the main scale. Use this to determine how much distance each of the smaller lines represents.[3]For example, imagine that the numbers on your scale represent 1 inch, and there are five unnumbered tick marks between them.1 inches 5 = 0.2 inches. Therefore, each of the unnumbered lines represents 0.2 inches.4Clean the object youre going to measure. Using a soft, dry cloth, wipe off any dirt or grease from the object. Make sure that there nothing in the way that will prevent you from getting the most accurate measurement.[4]5Loosen the locking screw on your Vernier caliper. This screw is on top of the Vernier scale and prevents the scale from sliding around freely when not being used. Twist the screw counter-clockwise to loosen it and start using your scale.[5]6Close the jaws to zero out your Vernier caliper. Before measuring anything, close the jaws so that the 0s on the main scale and Vernier scale line up exactly. Doing so ensures a precise measurement later on. If your caliper isnt zeroed out from the beginning, youll have to correct for this zero error later to get the exact measurement.[6]For example, if the zero on the sliding scale starts out lined up with the 1 mm mark on the fixed scale, you have a positive zero error of +1 mm. Subtract 1 mm from your final measurement to get the correct result.If the zero on the sliding scale is to the left of the main scale zero, you have a negative zero error and must add the error value to your measurement to get the precise number.Slide the Vernier scale so that the zeros line up while watching another mark to see the size of the error.For example, if youre watching the 0.5 mm mark and see that it moves from the 1 mm mark to the 2.1 mm mark, the zero error is -(2.1 - 1), or -1.1 mm. Add 1.1 mm to your final measurement to correct the error. Advertisement 1Open the jaws wide enough to fit around or inside your object. The caliper has two types of jaws. The larger ones tighten around an object to measure the distance across it, and the smaller jaws fit into an opening and can then be pushed outward to measure the internal diameter. Adjust either pair of jaws by sliding the Vernier scale along the track.[7]If your Vernier caliper has a locking screw, twist it clockwise to tighten it once the jaws are in place around or inside your object.To extend the depth gauge, turn the thumb screw closest to the gauge counterclockwise to loosen it, then move the Vernier scale along the track.Stick the depth gauge into the hole so that it touches the very bottom, then adjust the rods length using the Vernier scale until the main scale touches the top of the hole. Tighten the thumb screw once again to keep the scale in that position.2Read the line on the main scale thats in line with the 0 on the Vernier scale. The main scale on a Vernier caliper typically tells you the whole number plus the first decimal of your final measurement. Read this just as you would a ruler, using the 0 mark on the Vernier (sliding) scale to determine which line you should be reading.[8]For example, if the 0 on the sliding scale lines up with the 2 inch mark, your measurement is 2 inches. If it lines up past 2 inches by six 0.1 inch marks, your measurement is 2.6 inches.If the result is between two lines, round to the smaller value. Do not try to estimate a value between the two lines.Use the exact same process when reading the depth measurement.3Find the first mark on the Vernier scale that lines up with a line on the main scale. This mark tells you the value of the additional digits of your final measurement. If the 0 mark of the Vernier scale is between two numbers on the main scale, this is how youll figure out what the exact measurement is.[9]For example, let's say the tick marks on the Vernier scale represent 0.001 inch increments and that the first mark on the Vernier scale to line up with a tick on the main scale is the 14th mark.This means that the Vernier scale reading is 0.014 (14 x 0.001)It doesnt matter which line the Vernier scale lines up with on the main scale. The important thing is that you find the first two marks that line up exactly.The process of reading the Vernier scale is exactly the same when youre measuring depth using the depth gauge.4Add the two measurements together. Add the main scale and Vernier scale results together to get the final answer. Make sure you use the correct units as labeled on each scale, or you won't get the right answer.In our example, we measured 2.6 inches on the main scale and 0.014 inches on the Vernier scale. So our final measurement is 2.614 inches (2.6 + 0.014).For another example, if the main centimeter scale reads 0.85, and the Vernier 0.01 cm scale reads 12, adding them together results in 0.85 + 0.012 = 0.862 cm. Advertisement Add New Question Question How do I find the least count? Least count is the ratio of the smallest division of the main scale to the number of divisions on the vernier scale. Question How do you find the measurement of the vernier scale? For measuring length, compare the 0 line of the Vernier scale with the main scale. Then check the division that coincides with the main scale. Then add the first reading with the third reading by multiplying. Question What are the applications of Vernier caliphs in everyday life? They can be used in the repair or creation of anything that needs a tight tolerance. These instruments are commonly used in scientific and industrial fields. See more answers Ask a Question Advertisement This article was co-authored by wikiHow staff writer, Ali Carbacz, B.A. . Ali earned her B.A. in Linguistics and Asian Languages and Cultures with a focus on East Asia from the University of Wisconsin-Madison in 2022. She has published articles centering around culture and history for non-profits and has also done news writing for an online news site. Ali now writes as an editor at wikiHow with the hopes of becoming a part in helping to achieve wikiHows goal of teaching everyone to do anything. She enjoys the process of researching and learning new things to share with readers and creating content that is both informative and fun. This article has been viewed 2,183,003 times. Co-authors: 42 Updated: March 9, 2025 Views:2,183,003 Categories: Measuring and Marking Tools PrintSend fan mail to authors Thanks to all authors for creating a page that has been read 2,183,003 times. 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 345,389 times. Co-authors: 11 Updated: May 6, 2025 Views:345,389 Categories: Measuring and Marking Tools PrintSend fan mail to authors Thanks to all authors for creating a page that has been read 345,389 times. Digital Distance Learning Invictus School Integrated Program Find a Center agra,ahmedabad,ajmer,akola,aligarh,ambala,amravati,amritsar,aurangabad,ayodhya,bangalore,bareilly,bathinda,bhagalpur,bhilai,bhiwani,bhopal,bhubaneswar,bikaner,bilaspur,bokaro,chandigarh,chennai,coimbatore,cuttack,dehradun,delhi ncr,dhanbad,dibrugarh,durgapur,faridabad,ferozpur,gandhinagar,gaya,ghaziabad,goa,gorakhpur,greater noida,gurugram,guwahati,gwalior,haldwani,haridwar,hisar,hyderabad,indore,jabalpur,jaipur,jalandhar,jammu,jamshedpur,jhansi,jodhpur,jorhat,kaithal,kanpur,karimnagar,karnal,kashipur,khammam,kharagpur,kochi,kolhapur,kolkata,kota,kottayam,kozhikode,kurnool,kurukshetra,latur,lucknow,ludhiana,madurai,mangaluru,mathura,meerut,moradabad,mumbai,muzaffarpur,mysore,nagpur,nanded,narnaul,nashik,nellore,noida,palwal,panchkula,panipat,pathankot,patiala,patna,prayagraj,puducherry,pune,raipur,rajahmundry,ranchi,rewa,rewari,rohtak,rudrapur,sahganganagar,srinagar,surat,thrissur,tinsukia,tiruchirapalli,tirupati,trivandrum,udaipur,udhampur,ujjain,vadodara,vapi,varanasi,vellore,vijayawada,visakhapatnam,warangal,yamuna-nagar Reading vernier caliper takes more steps than reading dial caliper or reading digital caliper. The users have to manually calculate both the scales (the main scale and the vernier scale). Vernier scale calculation, especially, is the contrasting thing when compared to reading those two types of caliper.Your eyes have to be careful when deciding which one the aligned line is. This is the core thing when you read vernier caliper. It requires good eyesight. If you fail to do that, your measurement will be incorrect.In many cases, you can see our list of recommended vernier calipers, a single vernier caliper commonly provides inch and mm graduation. That means you can get two versions of readout whether in mm or inch. But, some products can also come with either mm or inch graduation only.If you see on the market, the inch reading models provide a resolution down to 0.001 or 1/128 (imperial unit). On the other hand, the metric models provide a resolution down to 0.02 mm, 0.05 mm, or 0.1 mm (metric unit). The variation of these resolutions leads to different graduation systems. Even further, among the same resolution, the graduation system can be different as well.In this post, we will be discussing how to read vernier caliper that has those kinds of graduation systems. Whether it is in mm (millimeter) or inch, we will be covering it here. Through this post, youll know the graduation variation systems that we mean. Before you go further, you have to learn first what the general formula is and how to read the zero error.The General FormulaBasically, the thumb rule in reading vernier caliper is similar both for the inch and mm scale.Final Result = Main Scale Reading + Vernier Scale Reading Zero ErrorThe main scale reading is the amount of the vernier scale divisions that are completely passed by the vernier scales zero line. While the vernier scale reading is the amount of vernier scale divisions from 0 to the aligned line.You could see the following picture. The first (left) yellowed line shows how many divisions passed by the vernier 0 marking. In this case, it has passed 42 divisions. While the second (right) yellowed line shows the aligned line.The main scale is the red one; the vernier scale is the blue one. Click the picture to enlarge in the new tab.Therefore, the main scale reading depends on the vernier scale, while the vernier scale reading depends on the aligned line. What is the aligned line? Whenever you slide the vernier scale, there must be two lines (one from the main scale and one from the vernier scale) that completely shape a united straight line.The vernier scale functions to divide the smallest division of the main scale into a particular amount of divisions so that it generates the desired resolution.If the main scale has 40 divisions per inch, it means each smallest division on the main scale has a value of 0.025.Smallest main scale divisions value = 1 : 40 divisions = 0.025To generate a 0.001 resolution, the vernier scale has to provide 25 divisions. Thats because the smallest main scale division divided by 25 is 0.001.Smallest vernier scale divisions value = 0.025 : 25 divisions = 0.001Further, the calculation of the main and vernier reading takes zero error into account although in most cases, the zero error is 0 and you can avoid it.What is Zero Error?Prior to reading the vernier caliper, you need to check whether the zero error exists or not. If it appears, you have to figure it out when calculating/reading the final measurement. Keep measuring without taking the zero error into calculation, you are measuring in an incorrect way.Zero error is the condition where the zero markings of both scales (main scale and vernier scale) dont shape an aligned line. It happens when you close both the two jaws (fixed and movable jaw) properly. a. No Zero Error b. Negative Zero Error Zero Error There are 3 possibilities that may happen: no zero error, negative zero error, and positive zero error.Negative zero error is when the vernier scales zero marking lies at the left side of the main scales zero markings.Positive zero error is when the vernier scales zero marking lies at the right side of the main scales zero marking.No zero error means its completely an aligned line.If you find a misalignment (either positive or negative zero error), you have to include it in the calculation of the final measurement.How to Read Vernier Calipers Zero ErrorBasically, to read the zero error is the same as to read the vernier caliper as usual. It takes both the main and vernier scales to measure. However, it can be confusing when you are facing a negative zero error. Fortunately, by creating an imaginary additional scale like the following image, you can start putting the measurement in a fixed formula.How to Read Vernier Calipers Zero Error; click the picture to enlarge in the new tab.The first step that you have to do is to define the value of each smallest division for both the main and vernier scale. Decide whether the scale is imperial (inches) or metric (mm). In this case, the above scale is inches. By looking at the graduation, we know that the main scale has 20 divisions per inch and the vernier scale has 50 divisions. Then,Main scale value / division = 1 inch : 20 divisions = 0.05/divisionVernier scale value / division = 0.05 : 50 divisions = 0.001/divisionThe second step is to count the main and the vernier scale, then add them altogether.Main scale = 1 0.05/division = 0.05Vernier scale = 47 0.001/division = 0.047Negative zero error = 0.050 + 0.047 = 0.003Actually, there is a shorter way of reading the zero error. But we just want to make sure that you know this basic measurement before jumping into the shortcut method.The shorter way is by reading in reverse. If you find the vernier scale graduated from left to right. You can imagine that the increment (0 to 50) is graduated from right to left. Just directly measure zero error from the 0 markings of the vernier scale, and you will get the answer. But, this method works only when the zero error is less than the smallest main scale division value.How to Read Vernier Caliper in mm (Metric)When it comes to metric vernier caliper, there are several resolutions available: 0.02 mm, 0.05 mm, and 0.1 mm. Different resolution has different graduation model.Soon, you will know the graduation models that we mean and how to read them.We name them as model 1 (0.02 mm resolution), model 2 (0.05 resolution), and model 3 (0.1 mm resolution). Among these models, model 1 is the most used and easily found on the market.1. Reading Vernier Caliper Model 1 (0.02 mm Resolution)This model has 10 divisions per cm on its main scale and 50 divisions on its vernier scale. Example of vernier caliper that comes with this graduation model is Mitutoyo 532-119 vernier caliper.See the following image when this graduation model shows no zero error.How to Read Vernier Calipers Zero Error; click on the picture to open it in the new tab.Therefore, the smallest reading on the main scale:1 cm : 10 divisions = 1 mmAnd the smallest reading on the vernier scale:1 mm : 50 divisions = 0.02 mmReading Metric Vernier Caliper Model 1 Case 1 (With No Zero Error)Main scale =10 1 mm = 10 mmVernier scale =3 0.02 mm = 0.06 mmZero error = 0 mmFinal reading = 10 mm + 0.06 mm 0 mm = 10.06 mmReading Metric Vernier Caliper Model 1 Case 2 (With Negative Zero Error)Main scale =1 1 mm = 1 mmVernier Scale =47 0.02 mm = 0.94 mmZero error = 1 mm + 0.94 mm = 0.06 mmMain scale =12 1 mm = 12 mmVernier scale =13 0.02 mm = 0.26 mmZero error = 0.06 mmFinal reading = 12 mm + 0.26 mm (0.06 mm) = 12.32 mmReading Metric Vernier Caliper Model 1 Case 3 (With Positive Zero Error)Main scale = 0 1 mm = 0 mmVernier scale =3 0.02 mm = 0.06Zero error = 0 mm + 0.06 mm = 0.06 mmMain scale =18 1 mm = 18 mmVernier scale =37 0.02 mm = 0.74 mmZero error = 0.06 mmFinal reading = 18 mm + 0.74 mm 0.06 mm = 18.68 mmReading Metric Vernier Caliper Model 1 Case 4 (With No Zero Error)Main scale =18 1 mm = 18 mmVernier scale =45 0.02 mm = 0.9 mmZero error = 0 mmFinal reading =18 mm + 0.9 mm 0 mm = 18.9 mm2. Reading Vernier Caliper Model 2 (0.05 mm Resolution)This model has 10 divisions per cm on its main scale and 20 divisions on its vernier scale. Example of vernier caliper that comes with this graduation model is Mitutoyo 531-128.See the following image when this graduation model shows no zero error.The smallest reading on the main scale is1 cm : 10 divisions = 1 mmThe smallest reading on the vernier scale is1 mm : 20 divisions = 0.05 mmReading Metric Vernier Caliper Model 2 Case 1 (With No Zero Error)Main scale =10 1 mm = 10 mmVernier scale = 3 0.05 mm = 0.15 mmZero error = 0 mmFinal reading = 10 mm + 0.15 mm 0 mm = 10.15 mmReading Metric Vernier Caliper Model 2 Case 2 (With Negative Zero Error)Main scale =1 1 mm = 1 mmVernier Scale = 17 0.05 mm = 0.85 mmZero error = 1 mm + 0.85 mm = 0.15 mmMain scale =13 1 mm = 13 mmVernier scale =7 0.05 mm = 0.35 mmZero error = 0.15 mmFinal reading = 13 mm + 0.35 mm (0.15 mm) = 13.35 mm + 0.15 mm = 13.50 mmReading Metric Vernier Caliper Model 2 Case 3 (With Positive Zero Error)Main scale = 0 1 mm = 0 mmVernier Scale = 3 0.05 mm = 0.15 mmZero error = 0 mm + 0.15 mm = 0.15 mmMain scale =18 1 mm = 18 mmVernier scale =19 0.05 mm = 0.95 mmZero error = 0.15 mmFinal reading = 18 mm + 0.95 mm 0.15 mm = 18.80 mm3. Reading Vernier Caliper Model 3 (0.1 mm Resolution)This model has 10 divisions per cm on its main scale and 10 divisions on its vernier scale. Examples of vernier caliper that come with this graduation model are EISCO PH0078B and Vikye.See the following image when this graduation model shows no zero error.The smallest reading of the main scale is:1 cm : 10 divisions = 1 mmThe smallest reading of the vernier scale is1 mm : 10 divisions = 0.1 mmReading Metric Vernier Caliper Model 3 Case 1 (With No Zero Error)Main scale =12 1 mm = 12 mmVernier scale = 5 0.1 mm = 0.5 mmZero error = 0 mmFinal reading = 12 mm + 0.5 mm 0 mm = 12.5 mmReading Metric Vernier Caliper Model 3 Case 2 (With Negative Zero Error)Main scale = 1 1 mm = 1 mmVernier Scale = 7 0.1 mm = 0.7 mmZero error = 1 mm + 0.7 mm = 0.3 mmMain scale =19 1 mm = 19 mmVernier scale =9 0.1 = 0.9 mmZero error = 0.3 mmFinal reading = 19 mm + 0.9 mm (0.3 mm) = 20.2 mmReading Metric Vernier Caliper Model 3 Case 3 (With Positive Zero Error)Main scale = 0 1 mm = 0 mmVernier Scale = 3 0.1 mm = 0.3 mmZero error = 0 mm + 0.3 mm = 0.3 mmMain scale = 10 1 mm = 10 mmVernier scale =3 0.1 mm = 0.3 mmZero error = 0.3 mmFinal reading = 10 mm + 0.3 mm 0.3 mm = 10 mmHow to Read Vernier Caliper in inches (Imperial)The imperial (inch) vernier calipers may come in decimal or fractional resolution. The decimal resolution is commonly 0.001, while the fractional resolution is commonly 1/128.However, the decimal resolution models vary in terms of graduation models. Some of them have the main scale graduated with 50 divisions per inch, and the vernier scale graduated with 20 divisions. Another model has the main scale graduated with 40 divisions per inch while the vernier scale graduated with 25 divisions. And another decimal model has the main scale graduated with 20 divisions per inch while the vernier scale graduated with 50 divisions.1. Reading Imperial Vernier Caliper Model 1 (0.001 Resolution)This model has 50 divisions per inchon its main scale and 20 divisions on its vernier scale. Example of vernier caliper that comes with this graduation model is Starrett 456AZ.See the following image when this graduation model shows no zero error.The smallest reading of the main scale is1 : 50 divisions = 0.02The smallest reading of the vernier scale is0.02 : 20 divisions = 0.001Reading Imperial Vernier Caliper Model 1 Case 1 (With No Zero Error)Main scale =50 0.02 = 1Vernier scale =3 0.001 = 0.003Zero error = 0Final reading =1 + 0.003 0 = 1.003Reading Imperial Vernier Caliper Model 1 Case 2 (With Negative Zero Error)Main scale = 1 0.02 = 0.02Vernier scale = 17 0.001 = 0.017Zero error = 0.020 + 0.017 = 0.003Main scale =56 0.02 = 1.12Vernier scale =17 0.001 = 0.017Zero error = 0.003Final reading =1.12 + 0.017 (0.003) = 1.137 + 0.003 = 1.140Reading Imperial Vernier Caliper Model 1 Case 3 (With Positive Zero Error)Main scale = 0 0.02 = 0Vernier scale = 3 0.001 = 0.003Zero error = 0 + 0.003 = 0.003Main scale =56 0.02 = 1.12Vernier scale =5 0.001 = 0.005Zero error = 0.003Final reading = 1.12 + 0.005 0.003 = 1.1222. Reading Imperial Vernier Caliper Model 2 (0.001 Resolution)This model has 40 divisions per inchon its main scale and 25 divisions on its vernier scale. Example of vernier caliper that comes with this graduation model is Mitutoyo 532-119.See the following image when this graduation model shows no zero error.The smallest reading of the main scale is1 : 40 divisions = 0.025The smallest reading of the vernier scale is0.025 : 25 divisions = 0.001Reading Imperial Vernier Caliper Model 2 Case 1 (With No Zero Error)Main scale =40 0.025 = 1Vernier scale =3 0.001 = 0.003Zero error = 0Final reading = 1 + 0.003 0 = 1.003Reading Imperial Vernier Caliper Model 2 Case 2 (With Negative Zero Error)Main scale = 1 0.025 = 0.025Vernier scale = 22 0.001 = 0.022Zero error = 0.025 + 0.022 = 0.003Main scale =51 0.025 = 1.275Vernier scale = 0 0.001 = 0Zero error = 0.003Final reading = 1.275 + 0 (0.003) = 1.275 + 0.003 = 1.278Reading Imperial Vernier Caliper Model 2 Case 3 (With Positive Zero Error)Main scale = 0 0.025 = 0Vernie scale = 3 0.001 = 0.003Zero error = 0 + 0.003 = 0.003Main scale =(17 4) 0.025 = 1.7Vernier scale =10 0.001 = 0.010Zero error = 0.003Final reading =1.7 + 0.010 0.003 = 1.710 0.003 = 1.707Reading Imperial Vernier Caliper Model 2 Case 4 (With No Zero Error)Main scale =(19 4) 0.025 = 1.9Vernier scale =10 0.001 = 0.010Zero error = 0Final reading =1.9 + 0.010 0 = 1.9103. Reading Imperial Vernier Caliper Model 3 (0.001 Resolution)This model has 20 divisions per inchon its main scale and 50 divisions on its vernier scale. Example of vernier caliper that comes with this graduation model is Mitutoyo 534-117.See the following image when this graduation model shows no zero error.The smallest reading of the main scale is1 : 20 divisions = 0.05The smallest reading of the vernier scale is0.05 : 50 divisions = 0.001Reading Imperial Vernier Caliper Model 3 Case 1 (With No Zero Error)Main scale =20 0.05 = 1Vernier scale =3 0.001 = 0.003Zero error = 0Final reading =1 + 0.003 0 = 1.003Reading Imperial Vernier Caliper Model 3 Case 2 (With Negative Zero Error)Main scale = 1 0.05 = 0.05Vernier scale = 47 0.001 = 0.047Zero error = 0.050 + 0.047 = 0.003Main scale =19 0.05 = 0.95Vernier scale =49 0.001 = 0.049Zero error = 0.003Final reading =0.95 + 0.049 (0.003) = 0.999 + 0.003 = 1.002Reading Imperial Vernier Caliper Model 3 Case 3 (With Positive Zero Error)Main scale = 0 0.05 = 0Vernier scale = 3 0.001 = 0.003Zero error = 0 + 0.003 = 0.003Main scale =18 0.05 = 0.9Vernier scale =39 0.001 = 0.039Zero error = 0.003Final reading = 0.9 + 0.039 0.003 = 0.939 0.003 = 0.9364. Reading Imperial Vernier Caliper Model 4 (1/128 Resolution)This model has 16 divisions per inchon its main scale and 8 divisions on its vernier scale. Example of vernier caliper that comes with this graduation model is Mitutoyo 531-128.See the following image when this graduation model shows no zero error.The smallest reading of the main scale is1 : 16 divisions = 1/16The smallest reading of the vernier scale is1/16 : 8 divisions = 1/128Reading Imperial Vernier Caliper Model 4 Case 1 (With No Zero Error)Main scale =16 1/16 = 1Vernier scale =3 1/128 = 3/128Zero error = 0Final reading = 1 + 3/128 0 = 1 3/128Reading Imperial Vernier Caliper Model 4 Case 2 (With Negative Zero Error)Main scale = 1 1/16 = 1/16Vernier scale = 7 1/128 = 7/128Zero error = 8/128 + 7/128 = 1/128Main scale = 14 1/16 = 14/16 (7/8)Vernier scale =7 1/128 = 7/128Zero error = 1/128Final reading =14/16 + 7/128 (1/128) = 112/128 + 7/128 + 1/128 = 120/128 (15/16)Reading Imperial Vernier Caliper Model 4 Case 3 (With Positive Zero Error)Main scale = 0 1/16 = 0Vernier scale = 1 1/128 = 1/128Zero error = 0 + 1/128 = 1/128Main scale =8 1/16 = 8/16 (1/2)Vernier scale =2 1/128 = 2/128Zero error = 1/128Final reading =8/16 + 2/128 1/128 = 64/128 + 2/128 1/128 = 65/128Reading Imperial Vernier Caliper Model 4 Case 4 (With No Zero Error)Main scale =30 1/16 = 30/16 = 1 14/16Vernier scale =3 1/128 = 3/128Zero error = 0Final reading = 1 14/16 + 3/128 0 = 1 112/128 + 3/128= 1 115/128ConclusionLearning how to read vernier caliper benefits you to accomplish before using it. Unlike digital caliper or dial caliper that is relatively easier to read, reading vernier caliper takes more effort to be familiar with.Aside from that benefit, learning how to read the vernier caliper means you are learning to read the vernier scale. This scale can be found in several linear measuring instruments such as vernier micrometer, vernier depth gauge, etc.In short, the opening step that you have to do is to ensure the value of the smallest division of the main scale and the vernier scale. Then, you have to check the zero error. If the zero marking is not aligned, you have to measure the value. Then, read the main and vernier scale. Finally, add the reading of the main scale, vernier scale, and zero error altogether. The result of these three readings is the final reading.Actually, when you calibrate the vernier caliper, you are doing measurement and calculation surely, you have to add the uncertainty value. However, since this topic only covers how to read vernier caliper as a general method (not for calibration), we dont take uncertainty into the calculation. Digital Distance Learning Invictus School Integrated Program Find a Center agra,ahmedabad,ajmer,akola,aligarh,ambala,amravati,amritsar,aurangabad,ayodhya,bangalore,bareilly,bathinda,bhagalpur,bhilai,bhiwani,bhopal,bhubaneswar,bikaner,bilaspur,bokaro,chandigarh,chennai,coimbatore,cuttack,dehradun,delhi ncr,dhanbad,dibrugarh,durgapur,faridabad,ferozpur,gandhinagar,gaya,ghaziabad,goa,gorakhpur,greater noida,gurugram,guwahati,gwalior,haldwani,haridwar,hisar,hyderabad,indore,jabalpur,jaipur,jalandhar,jammu,jamshedpur,jhansi,jodhpur,jorhat,kaithal,kanpur,karimnagar,karnal,kashipur,khammam,kharagpur,kochi,kolhapur,kolkata,kota,kottayam,kozhikode,kurnool,kurukshetra,latur,lucknow,ludhiana,madurai,mangaluru,mathura,meerut,moradabad,mumbai,muzaffarpur,mysore,nagpur,nanded,narnaul,nashik,nellore,noida,palwal,panchkula,panipat,pathankot,patiala,patna,prayagraj,puducherry,pune,raipur,rajahmundry,ranchi,rewa,rewari,rohtak,rudrapur,sahganganagar,srinagar,surat,thrissur,tinsukia,tiruchirapalli,tirupati,trivandrum,udaipur,udhampur,ujjain,vadodara,vapi,varanasi,vellore,vijayawada,visakhapatnam,warangal,yamuna-nagar ContentStructureHow to UseZero Error Vernier Caliper consists of a main scale and a sliding vernier scale.It is used to measure both the internal and external diameters as well as the depth of an object as shown in the diagram below. Step 1: Check for zero error. This will be covered in more details later. Here, weassume there is no zero error.Step 2: Place the object into the correct place for measuring by using the inside jaws,outside jaws or tail as shown in the above diagram.Step 3: Read the main scale mark directly to the left of the zero mark on the verniercale. In this case, the reading on the main scale is 2.3 cm. Step 4: Read the vernier scale mark that coincides with a marking on the main scale. In this case, the reading on the vernier scale is 0.02 cm.Step 5:The actual measurement is then the sum of main scale reading and vernierscale reading, i.e. 2.3 + 0.02 = 2.32 cm. When using Vernier Calipers, we have to check for zero error. This is to check whether two zero marks coincide with each other when we are not measuring anything (jaws are in contact with each other). For reading on zero error, we have to read it from vernier scale. You can play with the applet to help you in taking the reading correctly from vernier caliper. Steps in playing the applet:For no zero error case,1) Check for zero error. In this case, both zero marks should be coincide with each other.2) Move the bottom slider to certain position and take the reading.3) Now, select “show reading” located at the bottom left to check your reading.For positive zero error,1) Click reset.2) Move the right slider up to any position and then take the zero error reading.3) Move the bottom slider to certain position and take the reading, and then calculate the actual reading.4) Now, select “show reading” located at the bottom left to check your actual reading.For negative zero error,1) Click reset.2) Move the right slider down to any position and then take the zero error reading.3) Move the bottom slider to certain position and take the reading, and then calculate the actual reading.4) Now, select “show reading” located at the bottom left to check your actual reading. Previous: Measurement of Length Next: Micrometer Screw Gauge

How to read negative zero error vernier caliper. How to check for zero error in a vernier caliper. What is positive zero error in vernier caliper. What is zero error in vernier caliper. Zero reading of vernier caliper.