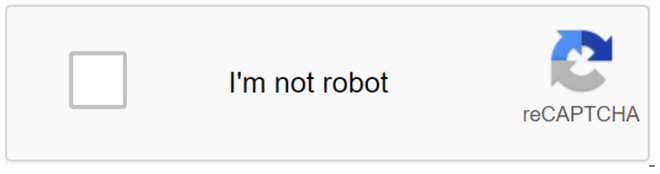

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Ideal emt bending guide

Dan has been a licensed electrician at the travel level for 17 years. He has extensive experience in most areas of the electricity trade. Useful formulas for bending The Electric ConduitVery few novice electricians teach nothing but the most basic instructions for bending the electric pipe pipeline (EMT, electric metal tubes). As a result, they can have huge difficulties when trying to bend a larger channel (more than 1). Even more experienced electricians at the travel level rarely have an idea of the wide range of possibilities available. However, learning to bend the channel from almost any angle you want is not difficult. The math and formulas that make up a simple conductor bending the manual are actually quite simple and easy to learn. The only tools needed for more complex bends are the corner of the search and a cheap scientific hand calculator or, in the modern world, a smartphone with a calculator. Any electrician bending a large channel should already have a corner finder as without a hand bender say a corner bent angle finder is needed. If you don't, there are a few examples at the end of this article. And now that we have smartphones, the calculator isn't just cheap; It's free. Recommended for Android phones is the RealCalc Scientific Calculator app, available in the Google Play store for free. Just search the RealCalc store and download it. The math used to bend the Conduit Math channel bend, which we will discuss here, comes from two sources. Some mathematicians are already built into the overall hand bender device, and the rest includes triangle geometry. Note that creating concentric bends requires the use of some additional mathematical is not discussed in this article. Mathematics from the hands of Benders deductions, radius bending, and multipliers A lot of math is built into the device hands bender. Only a few numbers and mathematical surgeries need to be taught to make offsets, saddles and 90 degree bends. Even the multiplier and deduction numbers are usually stamped on the bender device. For more information on the use of the Bender side, see Radius and deduction numbers conduitSize ConduitRadius from BendDeduk for 90 degrees1/2453/44 1/2615 3/48mmers for the Offset channel sDegree BendMultiplier10 degrees6.022 degrees2.630 degrees2.045 degrees1.460 degrees1.2 Mathematics from triangles Geometry Triangle provides formula, useful for many pipeline bends Most of the pipeline bends, In addition to a simple 90-degree bend, can be understood and calculated using the geometry of the right triangle. Use a triangle to understand the OffsetOffsetWilderness Pipe above bent in displacement. In the diagram below, a heavy black line is a curved piece of pipeline; Green shows some useful lengths and angles. OffsetThe d angle is the angle under which the channel is located One of the remaining angles of the triangle is always 90 degrees, while the third angle always depends on the first, being 90 degrees minus the angle d. The sides of the triangle are marked A, B and C; these letters represent the length of each side. In terms of using the formula below, you can get a relationship between these lengths. In real life, of course, the channel is not a one-dimensional line, but a three-dimensional object with curved, not sharp corners. But these considerations only affect the measurements you use in a very insignificant way; in everyday work, you can ignore them. Using triangles to understand saddles are used to route the pipeline around the obstacle. Look at the photos below to see how you'll use the concept of a triangle for three saddle points (by placing the second triangle back to back with the first) and four saddle points (by placing the second triangle separated from the first length of the direct channel). The three-office saddleDan HarmonThree-point saddleFour-point saddleDan HarmonFour-point saddleMath Formulas From TrianglesMazer formulas that we will use, sinus, cosin and tangents. It's just a relationship between the parties of the right triangle; they depend on the angle (d) of the triangle. The formulas are listed below, with algebraic equivalents on a case-by-case basis. Each set of formulas - sinus, cosy and tangent - is the same formula, expressed in three different ways. Calculations using SineSine (d) - A/C That is, the sine angle d is the length of the side A, divided by the length of the side of C.A. sine (d) - C Side A length is sinus (d) once the length of the side C.C. a/sine (d) The length of the side of the C is the length of the side A, divided into a sinus (d). Calculations using CosineCos (d) - B/CThe cosine angle (d) - is the length of the side B, divided by the length of the side C.B. - cos (d) - CThe length of the side B is the cosina of the angle (d) multiplied by the length of the side C.C. and B/cos (d) The length of the side C is the length of the side B, separated by the braid. Calculations using TangentTan (d) - A/BThe tangent angle (d) is a side A separated by the length of the B.A. side. Your calculator will give you a sinus, a cosy, and a tangent of any angle. Since different calculators want you to press the keys in different sequences to get results, you will have to read and understand the instructions for your particular calculator to use trigonometry features in it. These features convert the sinus, cosy or tangent figure into a corner, to the degree of bending you need. And make sure your calculator is set to describe the angles in the degrees to the Radians; radians are useless to the electrician. Examples of using mathematics to bend ConduitAssume are that we need 2 offsets in 3 1/2 pipelines. Normally, this would be impossible by using a 10o bend, since two bends can't be made that close to each other (12) in a channel that big. Using the sinus formula above, let's try bending 2o. The calculator shows that the sinus is a 2-degree angle of 0.0349. Two inches are divided into 0.0349 and 57. It's a little far apart for our bends, so let's try again using a 5o bend. Sinus 5 degrees is 0.087, and 2 /0.087 and 22.98, or about 23 . It's a more reasonable length to shift into 3 1/2 pipes, so it can be used when 10o offset can't. As an exercise, consider shifting 12 using two 22o bends. Note that it can also be written as C and A (1 / sine (22o)). Sinus is 22o th .3846, and 1 /3846 and 2.6, which is a familiar multiplier for 22o offset. This kind of math is where these multipliers come from! Suppose we need a 4 offset, and that it should take place in exactly 15. What angle should be used? We know that A Nos. 4 and B No. 15. We also know that tan (d) is No 4/15, or .2666. The calculator tells us that the reverse touch is .2666 and 15o. At the same time, we can find a 15o bend multiplier by dividing one into a 15o sine; The answer comes back that the multiplier for 15o is 3.86. Suppose we need 4 3-point saddles and that we will use 45o as a bend center with 22.5o angle bends at each end. What is the shrinkage of the pipeline, that is the amount at which the center of the bend will be closer to the end of the pipeline than the measured length of the pipe? We know that A No 4 and corner d 22.5o. What is B and C? Side C No. 4 / sine (22.4o), or 10.45. Side B No 4 / tan (22.5o) or 9.65. The difference between B and C is our shrinkage; The center of our three-chord saddle will move just under 1. Most electricians forget or ignore this shrinkage at three points of the saddle, and as a result, the center of their bend is not centered over the obstacle they cross. Bend any angle you want to get these formulas will allow the electrician to bend almost any angle he or she wants. As an electrician myself, I often find myself trying to bend a large canal into odd angles and sizes to meet the building requirements or get the look people want. Bending 3 or 4 channel into odd angles by trial and error becomes very expensive very quickly. Remembering these simple formulas can make it much easier to bend a large pipeline. My own memory help is that: Sine (d) - opposite / hypotenuseCosine (d) - adjacent / hypotenuseTangent (d) - opposite / adjacentgde hypotenuse is the longest side, the opposite is opposite the corner, and the adjoining is the side that touches the corner, but is not this is an acronym that you can hear for this memory aid. Or just formula tapes on the back of the calculator; Believe it or not, I grew up before there were calculators and I had to remember. Last note: this article is one of several written by electricians, for electricians. If you don't find what you're looking for among my other articles, leave a comment and I'll review the issue in future articles; The entire series is in the process of being developed. Electricians and TrigonometryAngle Finders On AmazonTwo are examples of Anglic Inneiders from Amazon. One is significantly cheaper and the other is more accurate and easy to use. Either will work, just make sure that whatever you choose has a magnet with at least one hand to keep it in the pipe. This article is accurate and true to the best of the author's knowledge. Content has only information or entertainment purposes and does not replace personal advice or professional advice on business, financial, legal or technical issues. The questions and answers: How can I figure out how to fit 90 degree bends with different tube sizes? Answer: The only way to do this is with concentric bends where the bends are equal rather than concentric. The problem is that the bend radius varies depending on the size of the pipe, so instead of using a bender to determine the radius, it should correspond to the radius of the largest pipeline. The question is: Is there a concentric curve formula? Answer: Not in the sense of the formulas that are given here. But an article about concentric bending shows the math used in calculations: Emt Electric Channel Tube BendIng Instructions to create concentric Bends.The question is: I have a 10' piece 3/4 aluminum electric channel. I need to have 80 in the middle, with 90 at each end. What is the loss of 90-degree bend length? Answer: Assuming that your brand bender uses a minimum radius of bends (most of them) the NEC indicates that this figure is 4.5 to 3/4 pipes. The length of the bend is then 4.5, but the length of the pipe is used to make this bend is 3.14 4.5/2, or 7. The loss is 7-4.5, or 2.5. This is all provided by the pipe pencil line, not the three-dimensional object that we know is not true. You should check in practice, but I suspect that the NEC figure is inside the bend, meaning that the loss will be 3/4 less than calculated: the length of the completed bend will be 3/4 longer than the minimum radius. Why not just use a star on The Bender rather than an arrow? The question: I'm trying to bend the 10' stick 4 EMT in the central channel line so I can get equal length at both ends. Is there a formula for this? Answer: There is no real formula, but it can be calculated with a sufficient degree of accuracy. Multiply the bend radius Want to do at 6.28, then by degrees, bend and divide into 360. Divide again two, measure from the center of the pipe that far, then set that sign on the front edge of the bend of the shoe. The center of the bend should be very close to the center of the pipe. If you use the NEC code book to find the minimum radius of your bend, keep in mind that the shape they give is in the center of the pipe, not the edge, and correct accordingly. The question is: What is Formula 2 45 and 90? How do you measure and mock bend signs for this? Answer: Instructions can be found here: What is the formula to indicate when to start hitting at 90 and losing? Answer: Given that 90 are already bent, the same calculations as for the offset will give a fairly close answer. Referring to the diagrams in the article, the length of the C will be the length of the A divided into the sine angle D. Measurements will be taken from the back of the 90. The numbers won't be accurate because of the difference in the thickness of the pipe, but going pretty close Compression can be calculated as C-B, with B and cosine d C. But it's all figured out with 90 already bent. I suspect you're asking where to put that 90 as well, and that becomes a very different proposition as the different pipes will have a different bend radius. The best thing you could actually do is figure where 90 should be bent as if there was no impact and then add a shrinkage value to that number. Once bent, treat it as if it were offset using the same multipliers as you would to bend the offset. Again, this won't be accurate, but may be close enough for practical applications in this area. The question is: How can I figure out the development of a 15-degree saddle bend if the radius of the central line is 25? I need to know how to find out. Answer: I'm not sure what you mean by the radius of the central line 25, but here's a link to an article about bending both 3 and 4 saddle points: What are the exact measurements of a triangle bent by a channel pipe? Answer: If you ask what angles, they can be anything that adds up to 180 degrees. Keep in mind that these are INTERIOR CORNERS. How do I determine the set and bend of the allowable radial length to bend a piping or electrical pipe? Answer: Minimums are a function of the bender used and cannot be reduced. Highs are as high as you want. I once made a 180-degree bend that was almost 100 yards across. It was more of a straight line than a bend!© 2010 Dan HarmonCommentsDan Harmon (author) from Boise, Idaho May 18, 2020:@Andrew: Sorry, no link to provide a hard copy. But you can block it and print it that way. Andrew Okonkwo on May 17, 2020: It's cool and wow... I love it so much very nurturing. Andrew's Windows on May 17, 2020: I am so happy and happy when I came across this site with or sincerity, I was glad. Please sir You give me a favor by giving a link where I can print and have your lessons printed. I want to learn more to learn more. ThanksAndrewWoody nyc lu 3 from December 15, 2019: A lot of information is going to tell a lot of students to make it get on your website tough teaching young guysNate May 04, 2019: Who needs memory when you have Dan Harmon in dengarden lol. I'm kidding. I'm a 3 year electrician and this website was my go at bending all my apprenticeships. Most of everything has been transformed into a memory. But I still find myself coming back. Thanks for it's an easy-to-understand site. Its helped me progress in my career makes me more valuable and succesfull in my life. Dan Harmon ,author) of Boise, Idaho, July 15, 2018: @ninmmkmfdmNot'm sure I understand the issue. Measure the channel and make the same bends. You can even measure the bends using protractor.ninmmkmfdm@aol.com July 15, 2018: How can I figure out the bends and degrees for an existing channel to fit without removing emt or stiff? Otis Mullins June 17, 2018: Excellent information. So glad I found this hub. Thank you. Your center is my friend! July 30, 2017: Excellent! Things. I'm starting a new job tomorrow, where there will be a lot of pipelines. I don't have a ton of experience with this under my belt, so feeding from your center was very nutritious. I am grateful to you and your work, from here in Canada. Now I feel more confident that I will be more competent in my work. The information provided here is gold for any electrician. I recommend this to any electrician on the spot who is eager to either learn or simply improve their skills and efficiency. Jim on April 07, 2017: Learn'd more in 3 days of studying your post than 3 weeks in a few books.100% THANK YOU! Scott on February 26, 2017: Amazing. Thank you! Brought memories from the trig. There is use for it!!! Dan Harmon , author) of Boise, Idaho, November 15, 2016: Thank you, Jeffrey. It's always nice to hear that my writing was of value. By Jeffrey K Murray on November 14, 2016: I enjoy your article in particular comments. I am an EU in Cook and DuPage counties in Illinois. All wiring should be in metal racing tracks, so bending the pipeline is one of the first things every student learns. My bachelor's degree in applied mathematics and I often make the mistake of suggesting that my new collaborators are equally versed in trigonometry. I found your explanation calculations easy to follow and I sent links to your articles to all my employees. I'm sure they'll find them useful. Dan Harmon (author) of Boise, Idaho, April 08, 2016: If you want compensation of 2 1/8 at 22 degrees, the distance between the marks is 4 1/4 (2 1/8 X2). There is no subtract, except when doing 90 degrees on the hand bender. Over there some shrinkage that can be found using the Shrink-4.25-4.25'cos (22) and .31 mathematical formula in your case. Adam Adam 08 April 2016: Hire me as we deturmine subtract for bending. I figured 5 1/8 to fall with 22 bends 2 1/8... If it's correct, don't write it down while doing it... but I'm not sure what to add to the loss score in the bend. (Channel 3/4). Well, this is my first bend of the no-90s, and I'll wing it in a second here. I'd have an eye off 90 right, but I need a knock at the starting altitude. Ralph Schwartz from Idaho Falls, Idaho March 31, 2016: Excellent/even us amateurs can get some knowledge from it. SPARKY of March 04, 2016: By the time you're re-done reading this, you'll be a better electrician. GREAT TO WRITE!!! Asher Socrates from Los Angeles, California February 21, 2016: This is a very detailed and excellent write! I've always wondered how some of these pipes were bent in such an exact way. It's been a formula all along. You learn something new every day! Thank you JD Curtin from Brighton, Colorado on December 02, 2015: Wow it's great! My husband is an electrician and he tried to show me how he calculates it all, but it was just for me. Your easy to follow explanations, photos and images have really helped it make sense. Thank you :o) Dan Harmon (author) from Boise, Idaho October 14, 2015: Good for you, Jane. Hope the information has been some help for you. Thanks for the comment - it's nice to know that I was able to be a relief. Jane on October 14, 2015: Thank you! I was taught this in class and doubted that I would ever have to approach a bending pipeline with trigonometry, but after some difficulty bending the big channel today I am!argin July 14, 2015: How can I know the different take-off degrees of the pipe using tangentDan Harmon (author) from Boise, Idaho April 13, 2015: LOL - that's how it happens, John. I never had to build the odd offset in a cable tray, but did a lot of great pipes and have more than a few to come back later and ask if I could teach them how to avoid costly mistakes. Yes, the very word (mathematics) scares a lot of people, but it really isn't hard. By John A. Joslin on April 13, 2015: Interesting and extremely valuable information here!! I often use trigger functions to develop work tubes and I'm pretty lost otherwise. In contrast, a few months ago my partner warned me that he definitely wouldn't have anything to make with the cable tray to compensate we were going to build if I was going to use any math along the way. Well, then, Sez I,... If you want to work out a thing and tell me what to do... have on it. Looks like you have another/better way to continue than me. I'm ready to learn something new. This was followed by a long pause. And it got a little longer ... He finally decided to weather the horrible process of my use of mathematics, and sunnuva'gun, if he did not ask later if I wanted to go over some of the intricacies with it etc. of course it was all about the main trigger that many have learned to be afraid of way back when in one class or another. - Jocelyn (Detroit) Dan Harmon (author) from Boise, Idaho, February 02, 2015: Well, it made sense to me, too. And thank you for the compliment; If you are happy with the hub it should be of some use to you. It's always nice to hear. Don February 02, 2015: Thanks for explaining that makes sense. And, yes, this is an example in the ugly of the 2011 edition of pg. 160 (they also refer to the wrong page, which brings you in hand signals, haha). I'm glad I found my blog! Dan Harmon (author) from Boise, Idaho, February 2, 2015: Do you mean ugly's example? I can only guess here, but I strongly suspect that it's because the pipe is three-dimensional, not two-dimensional. This means that 1.25 inches is quite close to half of the OD 2 pipe; They are probably measuring the minimum radius in the center of the pipe rather than choosing either inside or outside it. While this is not usually important in a small pipeline, it most definitely comes into play in big things. Or if the radius is considered in the center, adding that 1.25 will result in measurement from the outside. If you make another pipe to fit on a rack next to 2 pipes, it should have a radius of this digit plus the distance between the pipes (plus half its own diameter, of course). Don February 02, 2015: Hey Dan, I'm curious why you'd add 1.25 to determine the minimum radius of Channel 2 (as used in a few shots: 90 degree bending example Dan Harmon (author) from Boise, Idaho January 30, 2015: Thank you, Stephen. Steven on January 30, 2015: Mack, what you mean is called parallel compensation. The diameter of the second pipe. starting at 24 and you were bending 30 degree bends for 6 displacement, and you wanted one between the pipes, you would make the following signs, measuring from bottom up. 1/2 Pipe Mark 1 on 24, Mark 2 by 36 (a height shift that is 6 x offset multiplier, which is a ssecant

bending angle that csc (30), which is 2, for 12 between the signs) Now, for the 3/4 pipe, we take the O.D. pipe, which we say is inch and eighth, and we'll add it to the distance we want between the pipes, which is 1. It gives us 2.125. Now we multiply these 2,125 by a tangent half angle of displacement, which happens to be 30 degrees, so that half will be 15 degrees. So we have 2,125 x tan (15), or 2,125 x .268, which gives us .5695. To hide it up to inches, we multiply by 16, which gives us so now we know 5695 is real close to 9/16. Finally, we subtract this 9/16 from 24 to yields of 23 and 7/16. This is our first mark for 3/4 of the pipe. Our second mark will be 12 away at 35 and 7/16. It's much easier to understand if you draw your pipes in the first place so you can visualize how your signs will move along each subsequent pipe. Joys of being able to draw on an unfinished drywall.metoo October 02, 2014: Compression of the hypotenuse (bending signs) - cos corner X hypotenuseDan Harmon (author) from Boise, Idaho September 15, 2014: It depends on what you do. Shrinking if the saddle with 3 points is given in the sample section. Reducing bias is the difference between b and C in the first chart. Jose on September 15, 2014: How Can I Find a ShrinkDan Harmon (author) from Boise, Idaho September 10, 2014:1 divided into a sinus angle. Jose on September 10, 2014: How can I find a degree multiplier by Dan Harmon (author) of Boise, Idaho February 25, 2014: This will depend on the desired angle of the ascent and what angle the center should bend. See ... for full instructions for the saddle. Michael Bryant on February 25, 2014: When bending 3 bend saddles, my sign is 30 inches and im crossing a 3-inch object, then what are my measurements for Sign B and CDan Harmon (author) from Boise, Idaho February 23, 2014:10 degrees rising by inch. Rising by 60 degrees per inch -571/ (sin (10))-1/ (tan (10)).08Four example shows this. Kelly on February 23, 2014: What is a reduction per inch of lifting by 10 and 60 degree bends? Dan Harmon (author) from Boise, Idaho, December 14, 2013: Not bad, although some additions need to be made. The 2.5 per inch lift applies only to the 22/45 saddle, not the 10/22 or 30/60 degree saddle. The B bend is not at one point on the Bender, but in the center of the chosen degree for tilting the center. The A and C bends must be made using a bender. And if the order of bending A,B,C Bender should be reversed after the first bend - usually I will bend B,A,C and reverse the bender after bending. This is also contained in mcKee's article of December 14, 2013: Squeezing by an inch of lift :22 degrees - 3/1630 degrees - 1/445 degrees - 3/83 saddle point: Mark The central line A after adding a shrinkage - the first bend is the B line sign after adding 2.5 to the rise point of the central line. Then resize the C line using the same dimension, that and line B is higher, but mark on the opposite side of the central line A. Tnene bending the pipeline in order A, B, C.Multipliers :10 degrees - 6,022 degrees - 2,630 degrees - 2,045 degrees - 1,460 degrees - 1.2dan Harmon (author) from Boise, Idaho October 14, 2013: Ron. I've done a lot of great EMT (seldom tough) and that's what prompted this Mistakes get very expensive very quickly when you are dealing with Channel 4, whether it's tough or EMT. This is not the time to speculate and experiment. Ron Stewart, of Knoxville, Tennessee, October 13, 2013:I does electrical work for 35 years. Started wiring at home, then to schools, hospitals, grocery stores and now works as a lineman in a utility company at substations. I really like the information you shared here and find it not only useful but necessary to do a professional job. When working with a large hard channel, the wrong bend is not an easy solution as well as expensive. Dan Harmon (author) of Boise, Idaho, September 23, 2013: Knowledge of electrical codes is enormous. You may need to know how to bend the channel, depending on the choice of fields. Wiring the house, for instances there is virtually no bending the pipeline. Learning to read drawings and sometimes diagrams will be important. Depending on the condition you live in, you may be required to go to school to learn a lot from this, as well as to work as a apprentice learning profession. Check you your state and local laws on what it requires to come as an electrician. Eddie September 22, 2013: I want to be an electrician. As far as I'm concerned, I'm going to learn about power tools, wiring, how to conduct engines, PLC n management, electricity distribution, electrical codes, drawing diagrams, electronic component circuits, a bit of construction, and how to bend the channel. Is there anything else I have to learn and that is the hardest thing to learn. I've heard PPL say that the AC theory is a P channel bending bitch. Dan Harmon (author) from Boise, Idaho on May 03, 2013: You're probably right that we use 22.5 degrees because it's 1/4 out of 90. Or 1/2 of 45 (which in turn is half 90), take your choice. Interestingly, you use 60 divided angels and it works pretty well. Within 1/8 of an inch is almost always good enough; if you need to be closer than you probably have to adjust it some anyway.khaki ninja May 03, 2013:@wilderness, angle 22.5 because it is 1/4 out of 90. Make concentric bends easier. I would also add, usually, I believe that if you need to do uncommonon degree bias (like 17), your multiplier, how many times degrees goes into 60. So, 60-17 and 3.5. I applied this to bend hard ocal and it got me pretty darn close. Within 1/8th.david March 09, 2013: I believe that Jerome's implied take is the amount you lose in the entire length of the pipe when bending 90. (Don't confuse the shrinkage you get with offsets) useful to know if you want to cut and thread the pipe before you bend it. Dan Harmon (author) from Boise, Idaho November 19, 2012:@Mike: Yes 30 degree bias 2, that's what's on the chart above. You got an error elsewhere in the What did I miss when I was corrected? You are right in that 22 degrees is about 2.4, but the mark on the hand bender for 22.5 degrees (for some unknown reason), making the multiplier 2.6.mike on November 19, 2012: your multiplier 6 is wrong if you use a 30 degree angle of your mutiplier is 2. The 22nd degree is about 2.4Dan Harmon (author) of Boise, Idaho October 14, 2012: LOL There are probably about as much memory tools as there are people. I'd have more trouble remembering Sohcahtoa than I would formula! A history buff can use it though - thanks for tip.ttx336 October 13, 2012: for the help of memory: chief Sohcahtoa ... For me, S'O/H C'A/H T'O/Aprobably, as I'm Cherokee;-)Dan Harmon (author) from Boise, Idaho, June 05, 2012: Thank you, cable operators. This bend pipe is actually a practical use of trigonometry is not common knowledge. I just got curious one day and put some of my college math to work - it's been helpful so far. Dan Harmon (author) from Boise, Idaho on May 09, 2012: You are more than welcome and thanks for the comment. It's always appreciated.shiloh Morgan may 09, 2012: Very intense information. It will take a few days to understand and experience I am sure. But thanks still Toan Harmon (author) from Boise, Idaho on May 01, 2012: That's my guess, as I said - you just overwork it just a little bit. And your idea that this was in the accounting of the spring back is likely right - it's very easy to do, especially with a small degree of bends. Looks like you're doing well. A little more experience uses that bender and you'll be a professional! Croakerchoker May 01, 2012: Thank you so much for the quick response and long-term information! I use a bender standing upright it has a stand and the little plate thing it slides together as its being bent. We have a small corner of the roofers in our store, which I use to find angles. I guess I was over the bent pipe when I was actually trying to compensate for the spring effect being released. I think these benders should be made with more precision, as I said, that what keeps the shoe pipe and shoes playing too much and end up bending the pipe where u not expected. I will continue to try to use these formulas and keep my calculator in my truck. We just got this bender about 6 months ago and I'm always the one running into the store to bend the pipe, if I can get it up to the science that I know what it is, I'd be b happy :)I'm still having a little trouble understanding the calculations, probably because when in high school I finished all my math early and picked up against the trigger so I could talk to all the honeys in business math, now look where I am! HahahahahDan Harmon (author) from Boise, Idaho April 30, 2012 Brian: If you got 6.5 offset with marks of 28.75 apart you have a 13 degree bend. It doesn't matter what size the pipe is, nor what that It's a trig works for any and all size pipe or bender.6.5/28.75'.226 It's a sinus. Reverse sinus 0.226 and 13 degreesIt's not hard to do with big benders. I also use Greenlee Bender for big pipes and it's always a hassle. Some thoughts are here: I always use a bender upright that requires someone to keep it from falling. This leaves the pipe horizontal and the end bent upwards. It is very important that the pipe is really horizontal, at 0 degrees; Check with the level. I can't remember for 3 pipes, but often different shoes works very well to set the end of the channel to level it out. Protractor is then used to measure the bend produced; I'm going about 2 degrees, easing the pressure and re-publishing. It is very important to get the two stamps in exactly the same place on the bender, and it is not always easy with a large pipe. The hook that the pipe fits through sometimes does not want to come all the way back to the shoe, the bottom shoe can not be completely back, etc., and all these things need to be thoroughly checked. Finally, it is very easy to over or under the bend of the pipe at ten degrees. The difference of 3 degrees from what you want is 30%, while if you make a 30 degree bend and go to 3 degrees that's only 10%. Many protractors are very hard to read exactly what you want, and 1 or 2 degrees away very often. You're on the right track here and your math is correct - you've even caught that a multiplier for 10 degrees is not 6, but actually 5.75 (6 just can use a figure that is easy to work with). I'm sure the problem is in the process of bending - the wrong angle (do you use a bender on its side and measuring with a rod that goes to indicate a bend?), marks a little off to be awful!), inaccurate or poorly placed protractor, etc. Every job I've been to bending a big pipe has been with a greenlee bender, but they've probably made an improvement compared to the old models I used. Brian on April 30, 2012: Sorry, I left a few words that might be misleading so. After I tilted the first in 22, I tried 10 degrees, but it seems the multiplier (6) is too big. I then tried 5.75 space 28.75 apart and came out with 6.5 offsetSo ... Sine (10) . . . . . My boss said there was no formula, but I know there is. Maybe Greenlee has multipliers that are used for some benders. I think my almost perfect tube will get fitted with a good new connection :) at least it wasn't too small. Brian on April 30, 2012: I tried to use these calculations to recreate the results that I had at work today. I need a 5 to 5 1/2 offset in a 3 inch pipeline. I tried 22 degrees as close together as possible, it was over 9 inches. I previously tried your multiplier 6, and was unsuccessful, today I tried 5.75 s 28.75. I led with a 6.5 shift. Please clarify if my calculations are off, or if I'm missing something, I've never picked up a trigger, but my calculator is done and I can recreate your results on paper with it, but the multipliers don't seem to be working. Dan Harmon (author) from Boise, Idaho on March 06, 2012: ???I don???t know what to do. I'm not sure what you're referring to - subtract the numbers are different for each channel size. Although it's stamped on every bender I've ever seen, just like you say.john March 06, 2012: Subtract 6 inches for 90. If you use a hand, don't know why you would because it would look like crap, but it would be stamped on the side. Dan Harmon (author) from Boise, Idaho November 28, 2011: I'm not sure I understand your question, but let me try it. Bend bias and such requires the use of decimal points to make calculations (or at least it is much easier that way), but then use the result to tape a measure requiring the use of fractions. My solution was to memorize decimal fraction equivalents for each 1/8 inch. 1/8.125, 2/8 (or 1/4) 25, 3/8'.375 and so on. You can find them on the calculator by dividing 1 by 8, for example, which is 1/8 or .125.When the calculated result doesn't match one of the memorable eighth inch numbers (and it very rarely does) I just pick the nearest one. I have never found it necessary to measure closer than 1/8 in the field so it works perfectly there. I understand that in a class that may not be close enough and you could go the extra distance and memorize every 1/16 as well, but it usually doesn't fit exactly, either. In the final analysis, you will always need to round up and simply choose the nearest fractional equivalent of the estimated decimal figure. If I misunderstood or just didn't come up with something you can use, please let me know and I'll try again.scott November 28, 2011: go to school for a canal bend with the union and learn about the cuts and get. I just went through ac theory and they were having trouble switching decimals and fractions. They keep saying it so closely with my answers. but I know I wouldn't use them in the field. I just tilted the channel to the eye and the roulette. Could you give me some advice. Dan Harmon (author) from Boise, Idaho October 03, 2011: Sorry, I'm not familiar with this term - it's not used in my area. Are you referring to the deduction when you create 90? This will depend on the Bender used. None of the multipliers used in offsets depends on the channel material and does not depend on the size of the channel. Sorry about that. Many local terms are just that - local, and not used by the country wide.jerome on October 03, 2011: Hey, that take over the hard channel 3/4, 1'1 1/2, 2's and 3' asap need information fast hard pipes not imcDan Harmon (author) from Boise, Idaho December 31 year: Rolling displacement is indeed one of the most useful bends and can save an additional extra When done correctly. Difficult to describe, but easily mastered with the biggest challenge is how to measure the necessary biases. And yes, math and related elements (reading a tape measure, perhaps) is very important and for someone that doesn't have math training at all even simply adding or subtracting fractional shapes can be difficult. As you say, start just and go from there and the math in this center is not where to start. Learn how to use the deduction of 90 and worry about trigonometry of large channel shifts later. Michael Willis from Arkansas December 31, 2010: One of the hardest things to teach beginners can be bending the channel if they don't understand math sometimes. I always start with the basic twists first. Once they've mastered them, I'll show them more bending techniques and formulas. The one I use all the time is rolling bias. Dan Harmon (author) from Boise, Idaho November 03, 2010: You can. I actually enjoy sharing my knowledge and working tips with others. I'm glad you found it useful. ABANG RAYMOND OJONG on November 03, 2010: Thanks for sharing knowledge and training othersDan Harmon (author) from Boise, Idaho October 14, 2010: You are more than welcome. It's nice to share what I've learned over the years and I'm always happy when someone finds it useful. How are you doing? October 13, 2010: Thank you so much for sharing your knowledge. It's very appreciated. Dan Harmon (author) from Boise, Idaho on October 05, 2010: Indeed, it is, although few electricians understand this or use it. Most of the time math is built into the tools we use, but I'm sure you understand, math is behind many things that we take for granted. You're right - it can help students understand how important it is to learn and understand math - it really has an application in everyday life. Julie Burke from Alaska October 04, 2010: I didn't even realize that the trigger would have to do with bending the pipeline! I will use this new knowledge while teaching my reluctant math students. Dan Harmon (author) from Boise, Idaho August 21, 2010: Thank you for the comment and compliment. I'm glad you liked it - this is the information a few electricians know nothing about, but can certainly find out. SEOshortcuts from San Francisco CA August 21, 2010: Holy Moli - you are an artist with this center! Great in content links, very relevant to the review, and as a former electrician, good information to download! Download!