

Module 10: Circles

Topic 3 Content: Finding the Lengths of Intersecting Tangents Transcript

Hi guys, welcome to Geometry. In this topic, we're going to focus on how to find the lengths of intersecting tangents. Your knowledge of circle and your algebra skills are going to come in handy during this topic. You ready to get started? Let's go.

Earlier we learned that a tangent is a line that intersects a circle at exactly one point. What we're going to find out here is how to determine the length of a segment of that tangent. Given a situation where you have two tangents that intersect in the interior of a circle. This is the rule we're going to use to figure out the length of those tangents. $A = B$. Given the length of one, the other tangent has the exact same length. The lengths are congruent. Keep that rule in mind as we work through the next few examples. When tangents intersect in the exterior of the circle, their lengths are congruent.

Let's take a look at this one. We're given two tangents intersecting in the exterior of a circle. We know the length of the tangent seven. Because we know our rule, we automatically know that these lengths are congruent. What that tells us is that X also equals seven. And you're actually all done with this one at that point. As long as you know those tangents are congruent, you're good to go.

Let's take a look at the next one. Here asked to determine X , Y , and Z . I know this one is a little different from that prior example. If you look here, what we have is pairs of tangents intersecting the exterior of the circle. It just so happens because of how the situation is set up, the image that we're left with at the end looks like we have a circle inscribed in a triangle, which is essentially what we have, but if we break it down so that we can use our rule, we have pairs of tangents intersecting in the exterior of the circle. To find X , it's intersecting with the tangent that has a length of five. So I know that these tangents which I have my pen, these are going to be congruent. That tells be that X equals five.

Y is intersecting with this tangent. It has a length of seven. So I know those are congruent. Y equals seven. Z is intersecting with this tangent here. I know that these are congruent. Z equals eight. Then you're actually all done with that one. Remember, just break it down so that you can determine where are those tangents that are intersecting because that will help you determine which tangents are congruent. Here, X equals five. These were are two pair congruent tangents. Y equals seven. Z equals eight. Good job on that one.

Now I want you to try this one. Make sure that's out of your way there. Go ahead and press pause. Take a few minutes, work your way through this one. Press play when you're ready to check your work.

Alright, let's see how you did here. Let's go ahead and read through this one. Points X , Y , and Z are the vertices of a triangle and mark the location of satellites that orbit the Earth. Each satellite has a viewing angle formed by tangent lines. The lengths of a few of the tangent segments have been given below. Find the perimeter of triangle X , Y , Z .

If I look here, I'm given a situation kind of like example two, where it looks like I have a circle inscribed in a triangle, but in order to use my rule that I break that down a bit and realize that I have pairs of tangents intersecting in the exterior of the circle. I'm going to use that

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fact to help me determine A, B, and C. Then I'll be able to figure out the perimeter of this triangle.

I'm actually going to move some things around a bit. I'm going to move my triangle. Let's get rid of the pen there. Get the pointer tool. Going to move my triangle to the left side here. I'm going to do my work on the right. Here, there's a pair of congruent tangents. I know that A will equal 240 or 240 miles. I'm just going to take the numerical part right now. B; here's a pair of congruent tangents. I know these are congruent. B equals 220. And C; there's another pair of congruent tangents. C equals 320. Remember; don't stop there because we were actually asked to find the perimeter of this triangle.

In order to do that, I'm going to erase my congruent marks here so that we don't get too crowded. And we're going to write in these values here. That A was 240, B was 220, and C was 320. Now I'm going to figure out the perimeter of this triangle, which if you remember, perimeter is the distance around a figure. In order to find out the perimeter, we're just going to want to add up the lengths of these pieces and that'll give us the perimeter of this whole triangle.

I'm going to simplify this a bit because we have a lot of numbers here. Get a little more space. I'm going to say P for perimeter. I have two lengths that are 240. So I'm going to say two times 240, write that down. Add two lengths that are 220, so two times 220 plus, then add two lengths that are 320. So, two times 320. I'm essentially just taking a shortcut so I don't have to in the calculator, add 240 plus 240 plus 320 plus 320 plus 220 plus 220. You can absolutely do that and you'd be perfectly correct, I'm just trying to condense it a little bit so there are fewer things that I need to type into the calculator.

Let's see, let's try to remember as many of these as we can at once. We have two times 240, plus two times 220. Let's get that in there first. Two times 240, plus two times 220, plus two times 220. Then let's get that last value there. That was two times 320. So, two times 320. Alright, and we have 1,560, 1560. Let's go back to our work here. That was 1560. That means the perimeter of the triangle is 1,560 miles. You're all done with that one.

Just to recap, just to pull all that together. We use the rule that we know about intersecting tangents to figure out those missing links, right? We determine the lengths of A, B, and C. That gave us all of the missing parts of that triangle that we were asked to find the perimeter of. We just took a little shortcut in order to find that perimeter. I condensed that expression a little bit. But like I said, you absolutely could've just added up those individual pieces. We condensed it a bit and then we were able to figure out that the perimeter of the triangle is 1,560 miles. Good job there.

Alright guys, we reached the conclusion of this topic of how to determine the lengths of intersecting tangents. I hope you saw how your knowledge of circles and your algebra skills came in handy during this topic. Bye.