

Module 9: Polygons

Topic 3 Content: Determining the Number of Sides of a Regular Polygon Transcript

Hi, guys. Welcome to Geometry. In this topic we're going to focus on how to determine the number of sides of a regular polygon. Your knowledge of interior and exterior angles is going to come in handy for you during this topic. You ready to get started? Let's go.

Like I said, you have to have your knowledge of interior and exterior angles skills handy to get through this one. I'm going to start out by really discussing the exterior angles first. If you have a regular polygon, you've learned, let's reveal this, that 360 degrees divided by n , or your number of sides will give you the measure of one of your exterior angles in a regular polygon. What's also true, let me reveal this, is that 360 degrees divided by the measure of one of your exterior angles will give you the number of sides your polygon has. How we're going to use that fact is in the next few examples. You're going to be given exterior angles and interior angles, in some cases, and you're going to figure out how many sides does that polygon have? You're going to figure it out just by knowing the measure of one of its interior or exterior angles. Keep that in mind, that 360 divided by the measure of one of your exterior angles equals the number of sides, keep that in mind, as we work through these next few examples.

Take a look at this one. Each exterior angle of a regular polygon measures 45 degrees. How many sides does the polygon have? What we're going to use to figure this out is that 360, 360 degrees, divided by the measure of one of our exterior angles, which in this case, 45 degrees. That's going to tell us how many sides our polygon has. I'm going to go to the calculator and do 360 divided by 45, get that calculation. 360 divided by 45, is 8. Let me go back to the work, let's go full screen here. That means that this polygon has 8 sides, or even more specifically, you could say it's an octagon. If the exterior angles of this regular polygon each measure 45 degrees, then this polygon's going to have to have 8 sides. Good job on that one.

Keep that in mind and I want you to try this one. It's a fill in the blank question, so I'll give you some time to read it, work through it. Press pause while you do that, and press play when you're ready to check your work.

Let's take a look at this one. If each exterior angle of a regular polygon measures 30 degrees, then the polygon has blank sides. We need to fill interior hat blank. Let's figure out 360 divided by 30, then we'll know how many sides this polygon has. 360 divided by 30, that's 12, so this polygon has 12 sides. Good job on that one.

Take a look at the next one. Example two. Each interior angle of a regular polygon measures 144 degrees. How many sides does the polygon have? This one's different because we were given the measure of an interior angle, not an exterior angle. Remember, there's a special relationship between the interior angle and its corresponding exterior angle in a polygon. I'm going to do a rough sketch here just to show you what I mean. I'm going to sketch just the bottom of this polygon. I'm going to dot the line so you know I'm just making this up, I'm not saying this polygon has this many sides, but I want to kind of jog your memory about that angle relationship.

I'm going to extend this side right here. Remember that an interior angle and an exterior angle of a polygon, that their sum is 180 degrees, they form a linear pair. Even though I wasn't told the exterior angle measure in this case, I can figure it out because I know that relationship. I'm

Module 9: Polygons

Topic 3 Content: Determining the Number of Sides of a Regular Polygon Transcript

going to do 180 minus 144, and that's going to give me the measure of the exterior angle of this polygon. Let's go to the calculator. 180 minus 144, that is 36. Back to the work. That means that the exterior angle of this polygon measures 36 degrees. Now I can do 360 divided by the measure of that exterior angle, 36, and figure out that this polygon has 10 sides. Do you see how a lot of different things came into play there? We use that relationship between the interior and the exterior angle of a polygon, remember they form a linear pair, so the sum of their measures is 180. We use that interior angle to figure out the measure of that exterior angle. We'll even label it right there, and then once we knew it, 360 divided by that exterior angle gave us the number of sides. Good job there.

Now I want you to go ahead and try one. Press pause, take a few minutes, work your way through this one. Press play when you're ready to check your answer.

Let's see how you did. If each interior angle of a regular polygon measures 156 degrees, then the polygon has blank sides. I'm going to use this interior angle to figure out the exterior angle. Remember, 180, 180 degrees minus that interior angle will give me that exterior angle. 180 minus 156. Let's go ahead and go to the calculator for that one. Pull that up. 180 minus 156. That's 24. Let's go back to our work. That means that for this polygon, the measure of its exterior angles is 24 degrees. Each of them measures 24 degrees. Now to figure out the number of sides, 360 divided by 24. Let's go back to the calculator for that one. 360 divided by 24, that is 15. What that means is, I'm going to go back to the work, our polygon has 15 sides. We could call it a 15-gon if we wanted. Good job on that one.

All right, guys, you've reached the conclusion of this topic on how to determine the number of sides of a regular polygon. I hope you saw how your knowledge of interior and exterior angles came in handy for you during this topic. Bye.