10th Math Sum Angles
Classroom

Teacher: [00:02:00] All right give you a couple minutes, find those missing angles. Grab a calculator if you need it. You guys take another minute. [inaudible 00:02:12] Yeah, but how do you know that?[inaudible 00:02:26]A little more, a little more. You don't have to draw the [inaudible 00:02:44]

Student: I need to study.

Teacher: All right, you got to subtract this. [inaudible 00:02:55] [crosstalk 00:03:27] Do these two angles have [inaudible 00:03:40]

Student: No.

Teacher: [00:04:00] These two angles, so let's think about all the [inaudible 00:03:45]. Instead of trying to measure every angle, what degree is this?

Student: [inaudible 00:03:59]

Teacher: All right, so let's try to figure out what [inaudible 00:04:02]. I'll give you guys a little bit more time, seeing some good answers here, some good diagrams. [inaudible 00:04:26] Let's talk about it. This is something we've done quite awhile ago. We proved this quarter two maybe, interior angles of a triangle. Today, and I know it doesn't say it on the title, we're going to be extending this into polygons. What happens if we have a four-sided shape or a five-side shape or a ten-sided shape or a thousand-sided shape? We're going to extrapolate from there and figure out what are the interior angles going to add up to. Then of course, just like you guys did for these, find those missing pieces. For the first guy, what kind of triangle is this?

Student: Isosceles.

Teacher: Isosceles, of course. Which means these two angles are?

Student: The same.

Teacher: [00:06:00] Congruent, yeah the same. We can label this x=degrees if we really wanted to. I know many of you don't need to write the full equation, but to be precise let's write it out. We know the sum of the interior angles is always the same, which is 180. We technically can write this full equation. Whether you actually did this or not, this is the thought that you guys had when you were doing this. Basically we have 34+X+X=that 180. Of course, what you guys actually did is you minused 34 and then you divided by two. In the end, when we did that, what did we come out with?

Student: 73.

Teacher: 73 degrees, good. Because this is an equation, one of the great features that we can

exploit is we can check our answer. If you have 73, or something else, what if you had 72 or you got a different answer? You can add them up. You can add up 73 and 73 and 34 and check to see if that is 180. Now again, this one is fairly straight forward, so probably not necessary, but that is a way of checking, such as on a test, just to make sure that you got it right.

Second one, right triangle, same idea. We have our 64+90+something=180, and Student, what did that actually come out to?

Student: 26 degrees.

Teacher: 26 degrees, sounds about right. Fairly straight forward, it's basic arithmetic. Sometimes you have to be clever because certain angles are congruent and they don't give you one of those angles, because that would just give you the answer, so your equation needs to be a bit more complicated, but in general it's addition and subtraction. We will get on to some of those equations, later on, where it's like 64+X or 2X-3, and you have to make those bigger equations. We talked about that in our review last class, but for the most part, a lot of the math you're going to do today is simply addition and subtraction. Not a big deal, should be pretty good.

No homework last time, huh? I have not graded your test yet. I will do those as soon as possible. If you really want to get idea of what you have, come see me after class today. We can go through it and I don't think I can grade it that quickly, but we can talk about it [00:08:00] and see what you guys actually got. I'll try to do that this weekend, as soon as possible.

Today we're going to be investigating and then writing down our last theorem, which has to do with the interior angles of any shape, not just a triangle, but what about a four-sided, five-sided, six-sided shape? We're going to start with a little activity, so grab your books. Open to a blank page, which I guess is the next page. Grab one of the protractors that I put on your desk. What's your question?

Student: Can I get my book?

Teacher: Yes, go ahead it's fine. We're going to investigate, and if you actually look inside your workbook, on page 149, there's a little table. We're going to fill that out later, so maybe you just want to keep that off to the side. It looks like this, by the way. Can we double check? Is it 159?

Student: 150.

Teacher: There is one on 150, but I think there's another one on 149. Check 149. Is that the one? No, there you go. Okay, yes. There's a lot of tables here. We're not going to fill them all out. There's basically two ideas we're going to do. First of all, we're going to investigate, and this is the inductive reasoning. We're going to physically draw some of these polygons. We're going to measure their angles, which again, is not the most accurate way of doing it, because we're just going to make them up, and we are going to add up

those angles. We're going to try to come up with an idea, come up with a theory about how these angles are related inside a bunch of different polygons.

The book wanted you to do all of them, and obviously that's going to take forever, so I just broke you guys up by two polygons. I alternated them so you're not doing a million different sides. On your table there should be a sticky note. It'll say polygon with 9 and 5 sides, or 7 and 4 sides, whatever, just two different polygons. What you need to do is just like I did over here. Make a polygon with that number of sides, and then make the
[00:10:00] second polygon with that number of sides. Just make them straight. Use the straight edge. They don't have to be perfect. They don't have to be regular. They don't have to have any particular length.

Just make them and then, as accurately as you can, but rounded to the nearest whole number, please measure those angles and add them up. We'll take a couple minutes here and see what you guys can do. You can work with a person at your table, but draw them, measure them, and then compare. See if you guys got the same measurements for each of these items. Take a couple minutes. They're not going to come out perfect, but we'll get them close enough. [crosstalk 00:10:58]

Yeah? You have your six side, now you need to measure [inaudible 00:11:49]. You're doing good. You line it up as much as possible and then you want to see where this
[00:12:00] ends. [inaudible 00:12:06] You have to start from this side.

Please be careful guys, the protractor has 2 sides to it. Right? One of them counting up, one of them counting down, look at the angle and see if it's acuter or obtuse and that will be an easy way to switch to tell which side you should be using, right? Just be careful that. I switch that up all the time. [crosstalk 00:12:40]

Let me give you one of these. It's kind of hard to measure [crosstalk 00:12:46]. Basically, you add this and line it up with the side to see if the other side adds up. As close as you can, I'm not sure how accurate this is going to be. We will try it, then we will do the rhythm. This will be interesting to see how close you guys will get. [inaudible 00:13:35] As close as you can get. Get at least one of those down and measure it before you start
[00:14:00] the second one just so we can get a little bit ahead here.

You start at the corner and line it up. This is [inaudible 00:14:06] Right? Then your other angle is coming off this side. The easiest way is to use another obtuse to straighten it and then line it up. No, no that's not obtuse. [inaudible 00:14:46] Yeah, the tenths kind of [inaudible 00:14:51]. It doesn't have to be that. It's getting close guys. Let's take one more minute and get at least 1 down and start adding up those angles. Let's do as many
[00:16:00] as we can on our table and then we'll find the exact angle.

Once you get one of your answers, start the table. I'll give you 1 more minute and then we'll be done. Get at least 1 down. [inaudible 00:16:22] What do you do? [inaudible 00:16:36] Put that on the end and then you line up this line with [inaudible 00:16:41] Then you want this line, you cannot see it all the way. That would need to come from

this side. [crosstalk 00:17:14] All right, do we have a couple angles we can put up here? I know the giant ones are kind of tricky.

[00:18:00] How about the triangle? We already know that one, yeah? How about the triangle? What does that add up to? I saw a couple people do the quadrilateral, the 4 sided one, although we've already talked about that and so what does that one come out to? 360.

Alright, I saw a couple people doing the pentagon. Student you had that one, what did that add up to?

Student : 541, but I'm thinking it may be 540.

Teacher: 541, but you are thinking it may be 540. Let's just survey everyone. Does anyone have another sum you can do right now? Anything bigger? Student, you can answer. Which one was that? 77? 87?

Student : 87.

Teacher: 87? Okay. There is a pattern here. It's kind of hard to find, all right? When you're measuring things, you're not getting exact angles, because you're just making this up. This is a problem. However, when people had looked at this throughout history they noticed that there was something happening. There was some sort of pattern. When they took 2 different pentagons, and they measured the angles, they were all around 541, 540, 539. They were all around the same sort of area. Were you going to say something?

Student : I got 880.

Teacher: 880? Okay. They were related in some way. You guys can see that as we get higher up here, these number seem to get bigger, which kind of makes sense there's more angles. There is some sort of pattern. [inaudible 00:19:35]

Student: I got 1280.

Teacher: For which one?

Student: For this 87.

Teacher: 1020? You guys want to see the real answers?

Student: Is it adding by 1?

Teacher: It is adding by something. It is adding. Let's ... Before I even show you guys this, let's try something else. This is inefficient because we have to literally measure every single
[00:20:00] length. We already know a fact. We already know something about polygons at least simple polygons. That is ... Triangles have a measure. If I draw a triangle and I add up the

angles of any triangle? What does it come out to?

Class : 180.

Teacher: 180. Does it matter how I draw it? Does it matter it's shape, it's size? No right? This is a fact that we have proven. We've proved it several different ways. The way I remember is the parallel lines, you can draw a little triangle inside it. There are lots of ways of proving it. Here is what we want to do, let's see if we can take those polygons, the ones you just drew, and divide them up into triangles. Here's the thing, you cannot just divide them up into any triangles, that will not work. You need to divide them up nice. We can show you examples. We'll take this guy. I'm going to divide this up into triangles. You guys tell me if I did this right.

Class : No.

Teacher: Here's the problem, I want the triangles to help me find the interior angles. These triangles and this isn't even a triangle ... Triangles do not have the vertices at the quarters of this shape, which means the vertices are going to be able to equal the corners of the shape. I would do is I want to draw it nicely. I'm going to show you guys a trick so you guys can use this on your diagram. The trick is, pick 1 vertices. Highlight 1 vertices on the shape that you just drew, doesn't matter ... Any one. Then connect that vertices to every other vertices.

[00:22:00] Clearly the adjacent ones are already connected, so not necessary. For these, connect it and then connect it. For this one, I guess there's only 1, connect. Alright I'm going to five you guys a minute. This will be much easier than trying to add up all the stuff. Take your 2 shapes and connect one corner to all the other corners that you can. Then count up the number of triangles. Give it a try. Anytime you draw it, it can come up kind of weird, just make sure it connects to the corners. [crosstalk 00:22:24] The thing is, this one is already connected. [inaudible 00:22:51] I don't know the answers quite yet. You are [inaudible 00:23:03].

All right, let's fill out our table. Depending on what you guys had, use them all. Turn to page 150. This is the much better way of investigating this, it does not require that you measure any angles, just like a triangle. It does not require that you measure any angles. Let's fill this guy out. Number of sides, very simple. Does it stop at octagon or do I cut that off?

Class : The last one's obtuse.

Teacher: We're just going to see the pattern you can extend this as far as you guys want. Now number of triangles formed to 5 diagonals. For a triangle, I assume that's 1. How about for a quadrilateral?

Class : 2.

Teacher: 2. How about for a pentagon?

Class : 3.

Teacher: Hexagon?

[00:24:00]
Class : 4.

Teacher: Now what is the sum of the interior angles of 1 triangle?

Class : 28.

Teacher: Okay, so I'm just going to do that. Now let's think about this. The triangles make the polygon. The triangle's corners make the corner of the part. If I add up all off those corners and all the different sides. Which in fact is adding up all of the angles inside the triangles, I should get the full sum of the interior angles. For a triangle obviously it's 180. How about for a quadrilateral?

Class : 360.

Teacher: How about for a pentagon?

Class : 540.

Teacher: Okay, keep going. Fill out the table. Follow the pattern. Much easier than measurements. By the way, you guys will be using this table quite a bit for today, so you don't have to calculate it every single time. Make sure it's all filled out. Don't write on this one but you can use it. [crosstalk 00:25:29] All right hexagon?

Class : 720.

Teacher: 720. Hectagon?

Class : 900.

Teacher: 900. Octagon?

Class : [crosstalk 00:25:46]

Teacher: I don't know why. That's not even a time. What am I doing? Let's take this aside. You guys recognize these numbers? You ever seen these before? Anyone skateboard?

Class : No.

[00:26:00]

Teacher: You guys know these numbers? Tony Hawk, super famous for doing he 900, no? I think on snowboards and stuff they do 1080's and more, something like that. This is something that is sort of familiar to many of you, right? In the X games, or in the Olympics or whatever ... When someone spins on a skateboard or snowboard or ski's or whatever, they don't usually land sideways. That's not usually a good way to land. They are usually landing forward or backwards, which is a spin of 180. If you keep adding 180, as we've done here, you get those multiples. What comes after 1080? What comes after 1080? 12? They keep going. Obviously, you can make this go on as long as you want. You can find any of them. That's kind of titeous just adding 180 forever. If I said, "All right, I have this 100 sided polygon. How are we going to find the angles?" Kind of a lot. Let's see if we can figure out a better method for doing this.

Here's what we just did up to this. You can see the triangles. You can see the sides of the polygons and there is some method here. If you guys could answer those questions on the bottom of that page. How many triangles would you need for a 22 sided figure? What would the angles be? Then see if you can come up with a simple formula for this and we'll talk about this in a second.

Class : What questions?

Teacher: 4-7 I guess. All right give it a try.

Student: [inaudible 00:27:39]

Teacher: [00:28:00] [00:30:00] If that's the angle or if that's the trick. I mean see if it works for one of these. [crosstalk 00:27:48] [crosstalk 00:29:10] All right I want to see some good equations here. [inaudible 00:30:05] When I had 4 sides, what did we do to the 4? [crosstalk 00:30:22] No, not necessary.

All right, lets take a look. How many angles?

Class : 20.

Teacher: 20. As you guys noticed, the pattern is minus 2. There's a reason for this but we don't have to go into it today. The sum of the interior angles?

Class : 3,600.

Teacher: 3,600 right? You take that 20 and you multiply it by the 180. Let's right down our therom here, of course you want to put this in your book afterwards so you can use it. Let's just write it down here. Basically, the therom for the sum of the interior angles of any polygon ... They call it an "N" sided polygon. I saw many of you using X, totally acceptable. The official one is N. It says, the sum measures of the interior angles of a polygon insides is N minus 2, keep the parentheses, times by 180.

That gives you the number of triangles then you times it by the 180, which is the angles

inside that triangle. Please put it down and then let's practice. There's your formula for the day. Now you can see how we got it. That is what we use for the rest of our class. I [00:32:00] should probably put this on the board. All right, lets give this a try. I got a polygon here, some polygon. Let's find the missing angle. [inaudible 00:32:37] You've got 30 seconds. Let's see what you got. How many sides? Let's see what you got? All right, 20 seconds. All right. What'd we get?

Class : 64.

Teacher: 64. What kind of shape is this?

Class : Quadrilateral.

Teacher: Quadrilateral. You count the sides, therefore we check our table. It's 60 degrees, add all those up and then minus 360. Here's another trick that I like to do guys. Sometimes, I [00:34:00] forget the table. Sometimes I forget the stuff, here's what I learned to do. I will just literally draw the triangle on the paper. Now I can see, oh yeah, 2 triangles ... 180 plus 180. Right? I'm done. That is a much nicer way than having to reference a table or memorize something. Just generate it for yourself as you formulate it.

One last thing to talk about before I let you guys practice. We have some special polygons. We have some polygons that are nice. These are called regular polygons. A regular polygon is a polygon that equal sides, equal angles. We know the equilateral triangle. We know the square. Of course, all the other polygons have the same property. They don't have fancy names. We just call them regular polygons. You can see we have a bunch of different types. They're all equal. Obviously they're angles are getting bigger as we go. They have some special properties here. The main property is their angles are equal like we said, which means we can kind the measure of a specific angle without actually having to measure all the other angles. That works out pretty good.

All right, let's see if we can figure this out. I got 2 polygons here. Work with your table partners. Find me the angle of the measure of a single regular polygon. Remember, they [00:36:00] are all congruent ... Very similar to how you do an equilateral triangle. [crosstalk 00:36:07] I see people who got the answer already. Use your tables, reference. All right, I see some answers already. All right, Dustin?

Student: 72 degrees.

Teacher: 72?

Student: I got 72.

Teacher: How did you get 72?

Student: I divided [inaudible 00:36:44]

Teacher: Oh okay. You're on the right track though. You're on the right track. He had a sum and divided it by a certain number of sides. I just think he has the wrong angles. Let's fix it. What is the sum of this type of shape?

Class : 540.

Teacher: 540 and we divide it by?

Class : 5.

Teacher: 5 because it's 5 sides and they're all equal. That gives us?

Class : 108.

Teacher: 108, very good. 108 should be for A. For B, something you had down?

Class : 135.

Teacher: 135. Whatever this is with a 1080, something like that. That adds up close to 1080 and you divide it by 8. This is the other thing you guys will see. They will not give you any angles. They will give you a shape and you need to do the division yourself to find those angles. These are kind of nice. In the book they have this table. I'm trying to think if we have time to do this. You know I think we're going to skip this for now. You can generate them as you go. We may have time at the end to fill this out. I don't want to do it right now.

[00:38:00] Basically, they want you to kind of generate those interior angles. Let's just put a few of them in here since you guys know some of them. We said the 8 one was ... Was it 135? For the 8 sided one? We just said 135? Then the pentagon was 108. How about a 4 sided shape? You guys know this one. What do we call a regular quadrilateral? What's the fancy name?

Class : [inaudible 00:38:14]

Teacher: What do we call the shape?

Class : 90 degree.

Teacher: They are 90. What do we call that shape?

Class : Isn't it a square?

Teacher: Of course, a square. Then we have the triangle. You guys know that one.

Class : 180. 160.

Teacher: Again, don't worry about the rest of these you can generate them as needed. We'll use them later. If you want to fill this out when we are doing our packet that's fine. I just want to move on for a second now. As we go forward you can find it each time. Basically you just have to find that sum and then divide it by N, whatever the number of sides are for the number. I want to talk about one last thing. I saw some of you guys drawing things that looked like this. Is this a polygon?

Class : No.

Teacher: That's fine. It's a polygon. How is it different than the normal kind that we draw? Something about the shape, yeah? Something about it's angles actually. It has these reflex angles right? The reflex angles are bigger than 180 and they're interior like that. They're kind of hard to measure. They're still angles. This is still a polygon. This is not a polygon. When you draw it so it overlaps the corners. That suddenly becomes separate polygons. A polygon must have a continuous area, which means that all the area here must be connected to itself.

I'm going to show you guys a little animation just to prove to you guys that this worked. What I've always learned or what they've always said ... I was looking at a textbook, they always say use these polygons right? Use the polygon. Don't use the concave ones. I'm like, "Well why not? It's still a polygon." I found some program that's going to animate
[00:40:00] this . Let's see. Let's see if it works. I want you guys to look down here. These are the angles that the computer is just measuring them and then it's adding up those 3 numbers, so let's see what's happening here.

That angle is changing. What's happening to the sum? Rock solid. You can make them really tiny, really big. We knew that, triangles obviously. Let's look at another type of shape. How about this guy? You can see the sum, 540 as we know. Let's mess it up, change it. Even if we make it crazy like this, rock solid. This is the cool thing, it doesn't even matter what the shape looks like, unless ... That works too. Unless, you overlap it like this and now suddenly it cannot calculate because it's too tonic. You guys can see. Of course, for any shape this will work. Here's the 1080, the 8 sided shape ... Make PAC Man ... Any crazy shape that you want. All the angles move but you can see as one of them gets bigger, it sort of forces the other one to get smaller, no matter what crazy shape you make. It will still work, unless of course you cross one of them to not make a polygon. I don't remember if I did that. You guys can see even that one will work.

Usually they don't give you ones that look like this but you guy get the idea. It still would work. Okay. We're going to do 2 more things here. Guess who needs help? Make it a little bit. Your favorite. All right so [inaudible 00:41:41], got to go with the gazebo. You guys remember the shape of the gazebo? Is it a hexagon? It's a hexagon. If she wants a bench to go in the middle to kind of match that gazebo, here's the bench. You have to cut the pieces of wood to kind of nail together here. With your table partners I want you
[00:42:00] to find me this angle. What angle would have to cut that so these 2 things would join nicely? You guys should get this pretty quick actually since you know all the other stuff. What is this sort of black ... What is this angle here that cut down the size? Draw the

hexagon from the top if you need to. See what you guys got.

Hexagon shapes. I'm going to pass out something while you guys are doing this just keep it on your desk. Maybe find this. This may be a strategy. What you found is this angle. All right Student?

Student: 60.

Teacher: How did you get 60?

[00:44:00]
Student: Divided 720.

Teacher: Okay, that's a full interior angle.

Student: I mean 6 by 7 feet.

Teacher: No you were right. You took the 720 which is the interior angles of the hexagon. You divided it by 6. That gives you this angle. This outside angle. That's not the angle we're cutting with our saw. How'd you get he octagon?

Student: I divided it by 2.

Teacher: Remember we talked about this. When you're doing trim or whatever in a house, you watched that video? You want to make it equal no matter what the angle is you have to dissect it. The easiest way of course is to know the angle and divide it. Remember we had those paper trigs, those compass trigs and everything? That one works too.

This is a real life application. I've had to do stuff like this when I am building little home projects and stuff and I of course appreciate your guys help. One last piece, what if we have 2 polygons that are stuck together? Let's do this one together and then we're going to do some group work and present a few problems at the end. Let's figure out what happened here. We got 2 regular polygons. We have a square and a hexagon. We want to find this angle. This sort of outside group angle. What should I look for first?

Student: The interior angle.

Teacher: The interior angle of course. The other side, right How much for the square?

Student: 90.

Teacher: All right, so we got 90 degrees right here. How about for the hexagon? We just did this one.

Class : 120.

Teacher: All right, so what's next?

Class : 210.

Teacher: How'd you get that?

Class : You add them up.

Teacher: Okay, so you added up 90 plus 120. Okay and you got 210. That's this angle and and then what?

Class : 150.

Teacher: How'd you get 150?

Class : [crosstalk 00:45:50] 360.

Teacher: You had 360 minus 210 and you got?

Class : 150.

[00:46:00]
Teacher: This is the other skill and we talked about this last class. Many times you can find part of a circle and then you can use a little subtraction to find the other missing part of the circle. Just like when we had a linear pair, you can find that missing angle that adds up to 180. These angles add up to 360. You can sort of generate that by subtracting it off the end. These are the basic skills that we need to be successful at this. We're going to be solving some problems so grab the paper in front of you and I know it's kind of small so if you need room, please use your book. This is going to be our practice. Let's take ... What'd I say.

We'll do about 15 or 20 minutes. We'll see how long it takes. I don't know. There's a couple problems on here, there are some equations, so be careful to write the full equation. I know you guys are good at sort of finding some of the stuff in your head, but if you could write the full equation out in your book that may help you for the ones with a lot of extras in them. Just be careful with that. Alright, I'll turn on the radio. We have 15 minutes lets say. Please work on your handouts. Please work quietly with your table partners and be ready to present a couple at the end to put them up on the board.

[00:48:00] [crosstalk 00:48:04] [crosstalk 00:50:02] [crosstalk 00:52:05] [crosstalk 00:54:06] [crosstalk 00:56:02] Let's say 14 more minutes. Help each other out. We'll present a
[00:58:00] couple of these at that point. [crosstalk 00:58:04] [crosstalk 01:00:16] Just remember guys, you can always check your answer at the end. Once you get an angle make sure if
[01:02:00] it's obtuse, is it acute? Does it make sense with the type of polygon you were given?
[01:04:00] [crosstalk 01:02:03] [crosstalk 01:04:02] [crosstalk 01:06:03] [crosstalk 01:08:02] We'll take about 4 more minutes. If you're finished you can start your homework. We'll

[01:10:00] present a few of these and talk about them in the end. [crosstalk 01:10:02] [crosstalk 01:12:03] You guys have 10 minutes.

One quick thing I wasn't to add. I don't know if this is how it's suppose to be ... The answer. You guys can zoom in on C. C ... I don't know if there's enough information to solve this one. It should be but I feel like I'm missing something. Just to make this work, they way that we've talked about it ... If you could make these 2 line parallel, then you can solve it. Right? Then you have more equivalencies that you can then write, yeah? If you have these then this angle is congruent to this angle. This would be 180 minus 3y. Suddenly, you have enough variables to solve for this. That's what I would say just to make a little bit more doable.

I'm not exactly sure what they wanted us to do for this one. The other ones came out pretty nice. I feel like we're missing something for that one though. I made a mistake when I made the copies I don't know. Let's give it 1 more minute. Finish up your last problem. We're going to present a few of these on the board. We're going to talk about them and then we will our ... If you could your protractors back on the sticky notes for
[01:14:00] the next period that would be awesome. I think there's 2 on each one. If you could do that, that would be awesome. [crosstalk 01:14:35] A little more time.

All right guys. Let's talk about it =at the front. I'll check ... Zoom into B for a second. Did
[01:16:00] we do that one? Was that one of my examples on the notes? Help me find it. All right, a 6 sided shape. What's a fancy name for that?

Class : Hexagon.

Teacher: There are 6 sides, you found 720, which was the sum. How did you know you could divide by 6? Why 6?

Class : It has 6 sides.

Teacher: You cannot do that for example because -

Class : [inaudible 01:16:38] Ask me again.

Teacher: The therom has to do with a regular hexagon. How do we know this is a regular hexagon?

Class : The angles are all even.

Teacher: Yes, the angles are all even. This actually doesn't have to be a regular hexagon. I could if I really wanted to stretch this middle side - [crosstalk 01:17:02] I could stretch this middle side out to be twice as long and the angles do not change. This is not necessarily a regular hexagon. The regularness that counts, the angle sums right? Or the angle equivalencies, those are there, so we don't really need to worry about the size. It doesn't have a size labeled so it's not necessarily a regular hexagon. [inaudible 01:17:24]

Zoom in.

All right let's take a look at the guide. This is more of the homework questions that you guys will see. Basically, there are a bunch of variables inside this polygon. Let's see if we can figure out what is happening. First of all, what type of polygon is this?

Class : [inaudible 01:17:50] 6.

Teacher: 6 sides, so Hexagon. Is this a regular hexagon?

Class : No.

Teacher: I assume not, nothing is labeled. What did you do?

[01:18:00]
Class : I added all the sides and added up the equation and made the [inaudible 01:18:04] 720. That's the sum.

Teacher: That's the sum of the interior hexagon.

Class : Added together is 52X times 8. You add 8 to both sides, 28. Then you divide by 52 and get 14.

Teacher: Excellent. X is 14, but that is not any of the angles. How did you find the actual angles after that?

Class : I plugged 14 in to X.

Teacher: Very good. Did you check? Do all these add up to 720?

Class : No.

Teacher: That's something you could do again. I trust your work. That is something you could do to find the total sum to see if your answer actually makes sense. Now a couple things I'll point out here that I really like. I really like that you have the full equation, not just pieces of it. You can kind of keep yourself organized. I really like that you kept everything in parentheses, so you didn't have to worry about negative signs or stuff spilling out. You guys can see combining the like terms, right? You want to get all the X's together so you can divide off that condition and of course we move the 8 first, divide it and it comes out nice. I guess it doesn't have to come out nice, it's a math problem in a textbook, so I assume it's going to be okay.

All right, awesome guys. Do we have one more or are we good? Actually, we are almost out of time. Let's just go through the bottom here. These are the answers. Let's see what we got. Let's zoom ... Oh, there we go. All right, you guys can see most of these angles such as D, A, C, E, these are interior angles we've already calculated. Those are

trig. Some of the other ones though, you have to do a little bit more math. For example, I ... We've got this 60 degree angle right here in this equilateral triangle and I is sort of that outside angle which is sort of in between the octagon angle and the triangle angle. You kind of just do a little subtraction. This is a trick I want you guys to be thinking about. We mentioned this last time.

[01:20:00]

Many times when you are finding a missing angle, they will not label the thing that you actually need to find. They want you to find I, but they don't tell you, you have to find X over here first. You got to find the big angle Y second. They don't tell you that. You have to sort of find what you want. This is a balancing act, because you could find 50 different angles and 49 of them would not be useful to you. You could find this angle and this angle, but they're not really useful. You want to concentrate around the area that you actually have. Awesome guys, grab this handout. You can hold this for now, finish it up if you have not.

Grab your notes, let's take our test. Actually, if you could close your workbook, I want to see if you guys can do this without looking at the table. Just make sure you put your calculators back at the end. If anyone needs to look at their test, come see me after class. Are you ready? Perfect timing. What is this shape called?

Class : Onogom.

[01:22:00]

Teacher: Onogon? [crosstalk 01:22:09] How many sides?

Class : 9.

Teacher: 9. How many triangles?

Class : 7.

Teacher: 7. How many interior angles total? Right. The sum of the interior angles?

Class : 60.

Teacher: The sum or the division?

Class : 140.

Teacher: 140 very good. This is interior angles of polygons. We know how to find this without a table. We can divide up our shape into triangles and then add up the sum of those triangles. The [inaudible 01:23:06] of something you guys already know. All right thanks very much guys. Put your protractors on your cards, calculators. Have a wonderful weekend. Come see me if you want to see your test. If you haven't, you need to take your test. [crosstalk 01:23:26]