

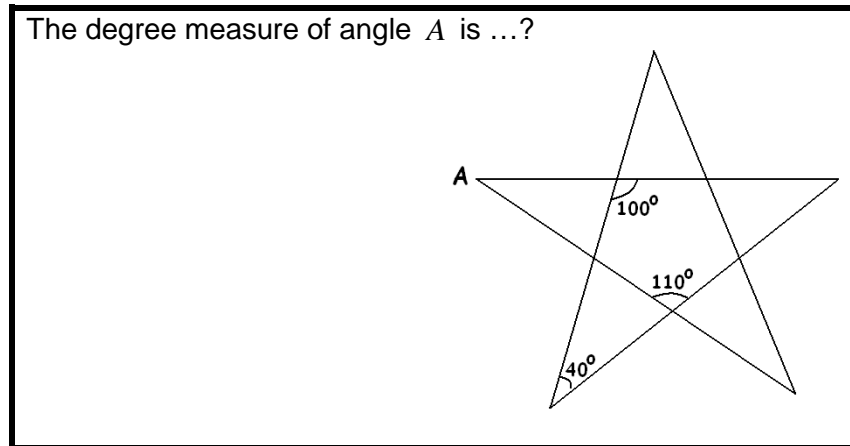
Curriculum Inspirations

Inspiring students with rich content from the
MAA American Mathematics Competitions



Curriculum Burst 2: Angles in a Star

By Dr. James Tanton, MAA Mathematician in Residence



SOURCE: This is question # 21 from the 1999 MAA AMC 8 Competition.

QUICK STATS:

MAA AMC GRADE LEVEL

This question is appropriate for the 8th grade level.

MATHEMATICAL TOPICS

Geometry: Angles in triangles, straight angles (linear pairs) and vertical angles.

COMMON CORE STATE STANDARDS

7.G-5: Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

MATHEMATICAL PRACTICE STANDARDS

- MP1** Make sense of problems and persevere in solving them.
- MP3** Construct viable arguments and critique the reasoning of others.
- MP7** Look for and make use of structure

PROBLEM SOLVING STRATEGY

ESSAY 7: **PERSEVERANCE IS KEY**



Click here for video

THE PROBLEM-SOLVING PROCESS:

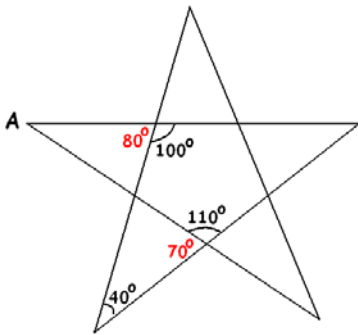
The most important step ...

STEP 1: Read the question, have an emotional reaction to it, take a deep breath, and then reread the question.

My reaction is ... This looks like a geometry problem from a textbook.

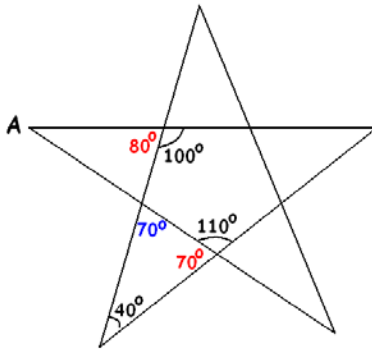
I personally don't feel too overwhelmed by this question as I am sure I can just start writing in angles. Something will probably come of it. (And if nothing does ... I'll panic then!)

Let's leap into it. I can see two angles I can write in right away.



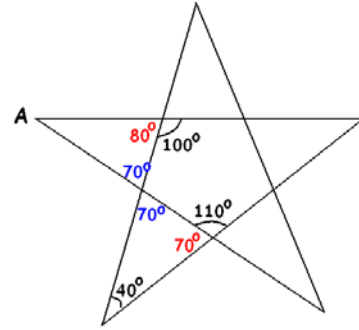
Actually, now I am stuck! Hmm.

Ooh! I see a triangle on the lower left with a 40° and a 70° angle in it. As three angles in a triangle sum to 180° , its third angle has measure 70° as well.



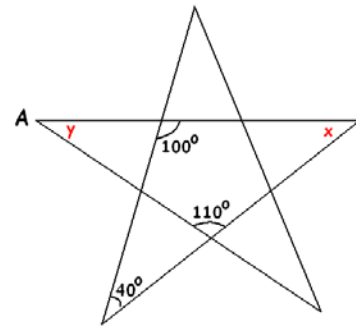
Okay. Still not sure where we're going.

Let's see. What else is there to we can do? (I am just plugging along.) Oh! There are vertical angles.



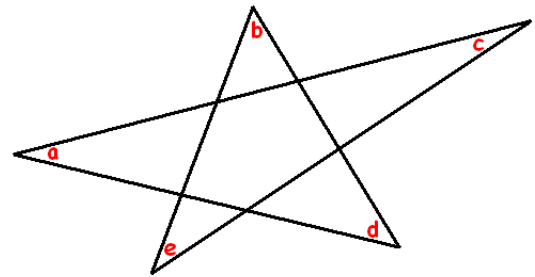
And now I see the triangle on the left. It has $70^\circ + 80^\circ + \text{angle } A = 180^\circ$. This means the measure of angle A is 30° !

Extension: In this picture, do you see $40^\circ + 100^\circ + x = 180^\circ$?



Do you also see $x + 110^\circ + y = 180^\circ$?

CLASSROOM SURPRISE: With rulers and pencils have students draw some lopsided five-pointed stars.



With protractors, measure the five angles in the points and compute their sum: $a + b + c + d + e$. What amazing thing does your class notice about this sum each and every time?

See the video www.jamestanton.com/?p=868 for an explanation.

Curriculum Inspirations is brought to you by the Mathematical Association of America and the MAA American Mathematics Competitions.