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Euclid's Dilemma

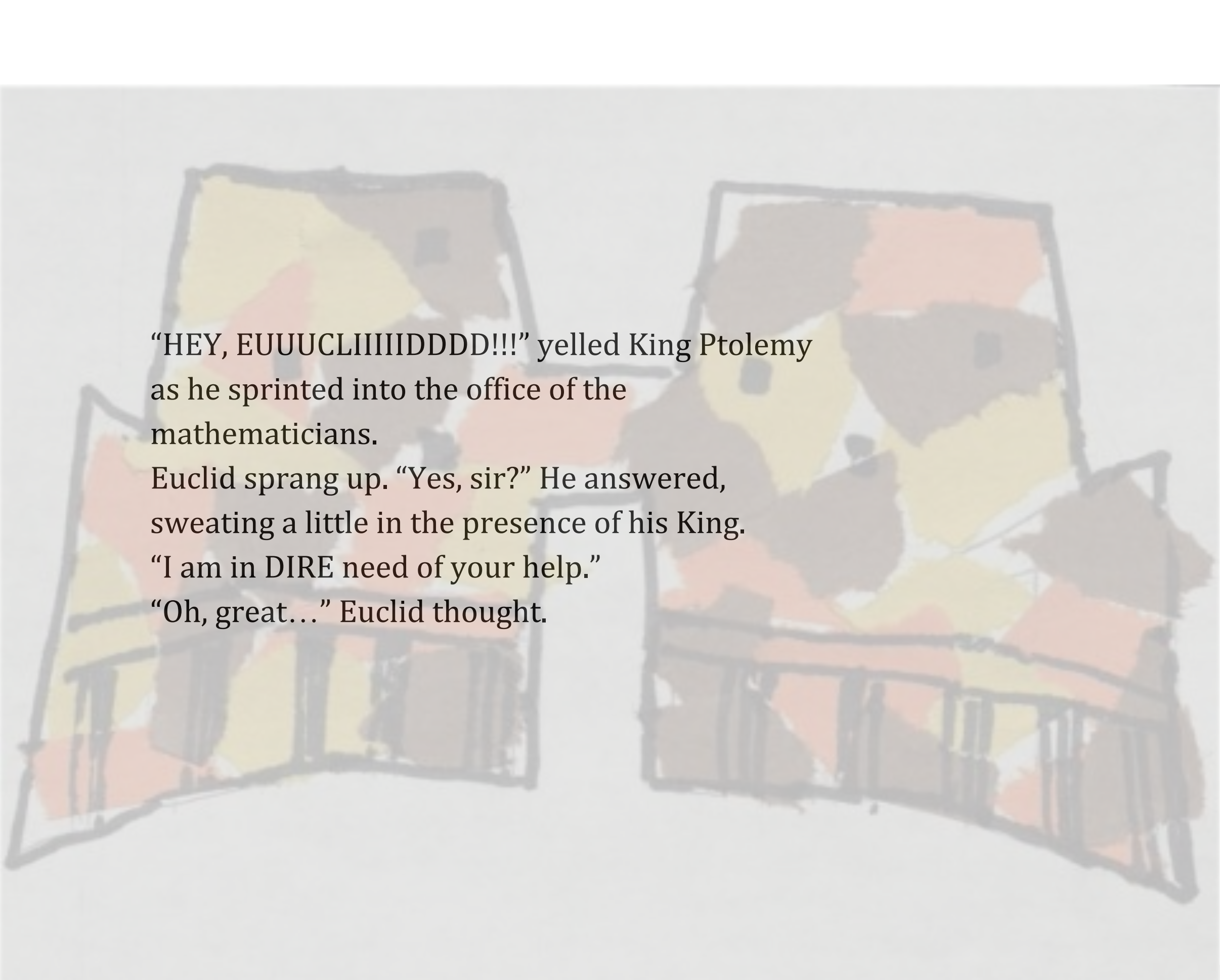
“There is no royal road to geometry,”
Euclid of Alexandria

This picture book describes an event that potentially took place within the relationship between King Ptolemy Soter and Euclid of Alexandria. Unfortunately, very little is known about Euclid's life, so creative measures were taken to create this book.

Euclid's Dilemma was written specifically with 7th grade students in mind. There are two Common Core State Standards for Mathematics that apply well to this story. They are:

7.G.A.1- Draw, construct, and describe geometrical figures and describe the relationships between them.

7.G.A.7- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.



“HEY, EUUUCLEIIIIIDDDDD!!!” yelled King Ptolemy as he sprinted into the office of the mathematicians.

Euclid sprang up. “Yes, sir?” He answered, sweating a little in the presence of his King.

“I am in DIRE need of your help.”

“Oh, great...” Euclid thought.





“What is it, Master?” Euclid smiled, but he was curious to know why Ptolemy desired his geometry skills.

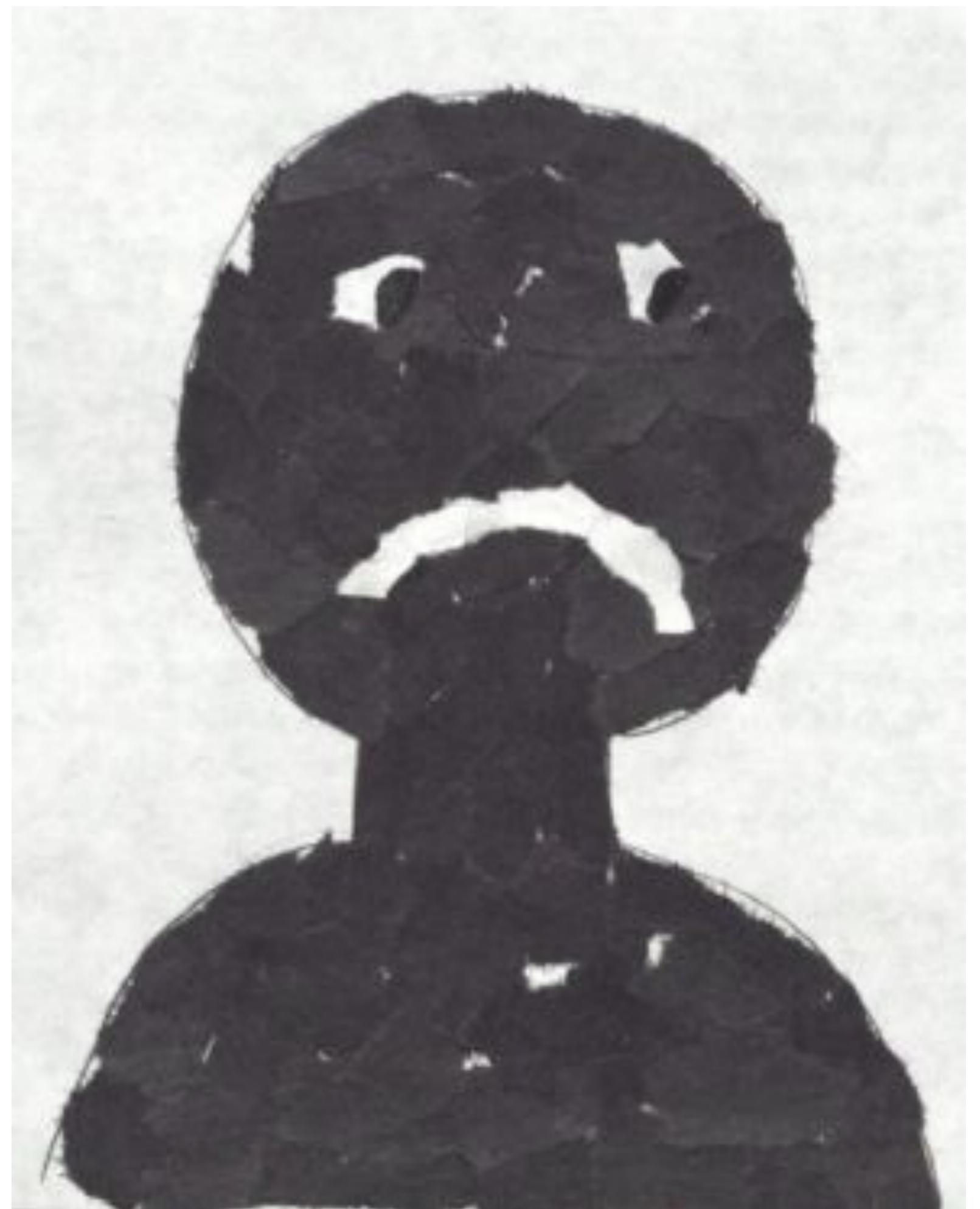
“Well,” started Ptolemy, “I’m going to build something that no one has ever built before. It will go down in history as one of the greatest buildings ever made. It will house every book and hold every important artifact in our world. It will attract the smartest people and bring in experts in every field! I’m going to make the city of Alexandria the cultural center of the world! And you are going to help me. We are going to build a library.”

Euclid starred in astonishment. “How in the world are my math skills going to help you do all that, sir?”

“What I need from you is to find the best spot for this place. Otherwise, why would the scholars come if they can’t live in an ideal location?”

“Live?”

“Yes, Euclid. I’m going to pay for scholars to come to this library to live and work here! I want all the best and brightest in my city of Alexandria.



“Well what do you want for them?”

“I want them to be near to everything interesting and worthwhile. We can’t have the library directly in Alexandria, since there is not enough space for its grounds. It needs to be along the outskirts. And because I want equal access to my library for everyone, it needs to be in a place so that the people in the neighborhoods of Rhakotis, the Jewish Quarter, and the Port can visit it as they please. This way, the scholars can also visit the benefits of these neighborhoods. It has to be PERFECT, Euclid. No exceptions. I will - I mean my library will - go down in history!” King Ptolemy exclaimed.



Once all of Alexandria slept, Euclid sat alone in his office. “How can I do this all by myself? I can’t disappoint Ptolemy. Tomorrow I will reach out to other scholars and get their opinions. This is not a job for one man.”



Euclid scampered straight to the offices of the philosophers at daybreak. “Surely they can reason through this debate!”



“Hello, men!” Euclid burst in the room. “I need your help!” He detailed Ptolemy’s dilemma to the scholars.

The men bickered about who was worthy of access to the library. “The common people don’t need a library! They cannot read. What is the point? Put the library where the scholars want it. They are the only ones who will use it!”

“We should promote an educated citizenry! Knowledge is power! They deserve it, too.”

Euclid left the men to their arguments. Clearly they would never reach a consensus.

He dashed to the offices of the astronomers. “Maybe something will be written in the stars that tells us where to put the library!”



Euclid busted through the door. “Help me! King Ptolemy has a dilemma and I need your assistance!” He explained his plight as the men looked upon him in confusion. “Of course the King can’t make a decision, he’s a Libra.”
“But Alexander, you’re a Libra, too... Maybe we aren’t the people for this job. Sorry, Euclid.”

Euclid slumped, taking the long way to his office.

He plopped into his chair and lowered his head to his desk, eyes clenched tight to keep the tears from escaping. “What am going to do?”

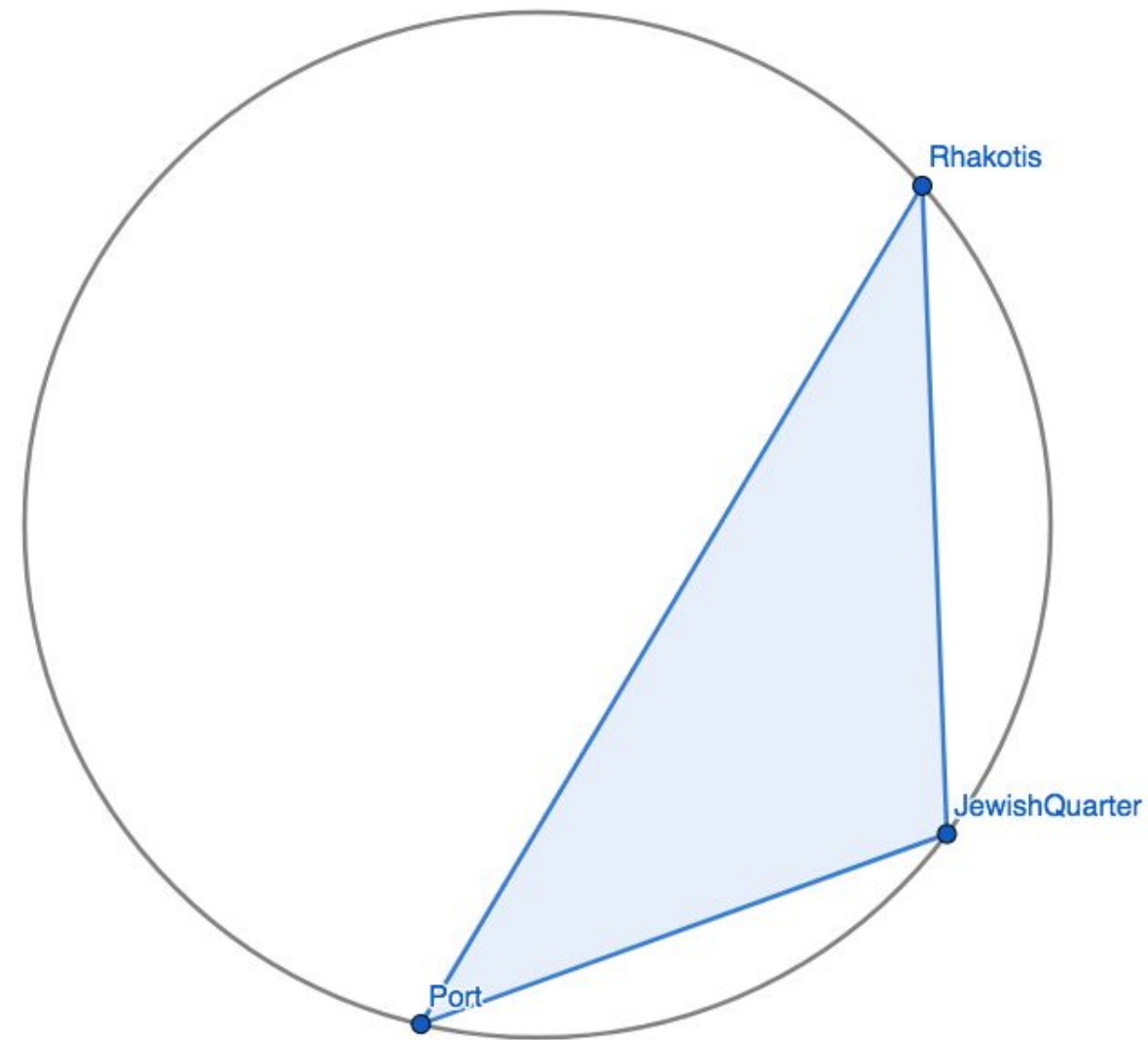


“Wait, what am I doing?! How have I been so naive? I don’t need others to help me! I’m the Father of Geometry... I can turn to math to solve this dilemma! I can be a problem solver!”

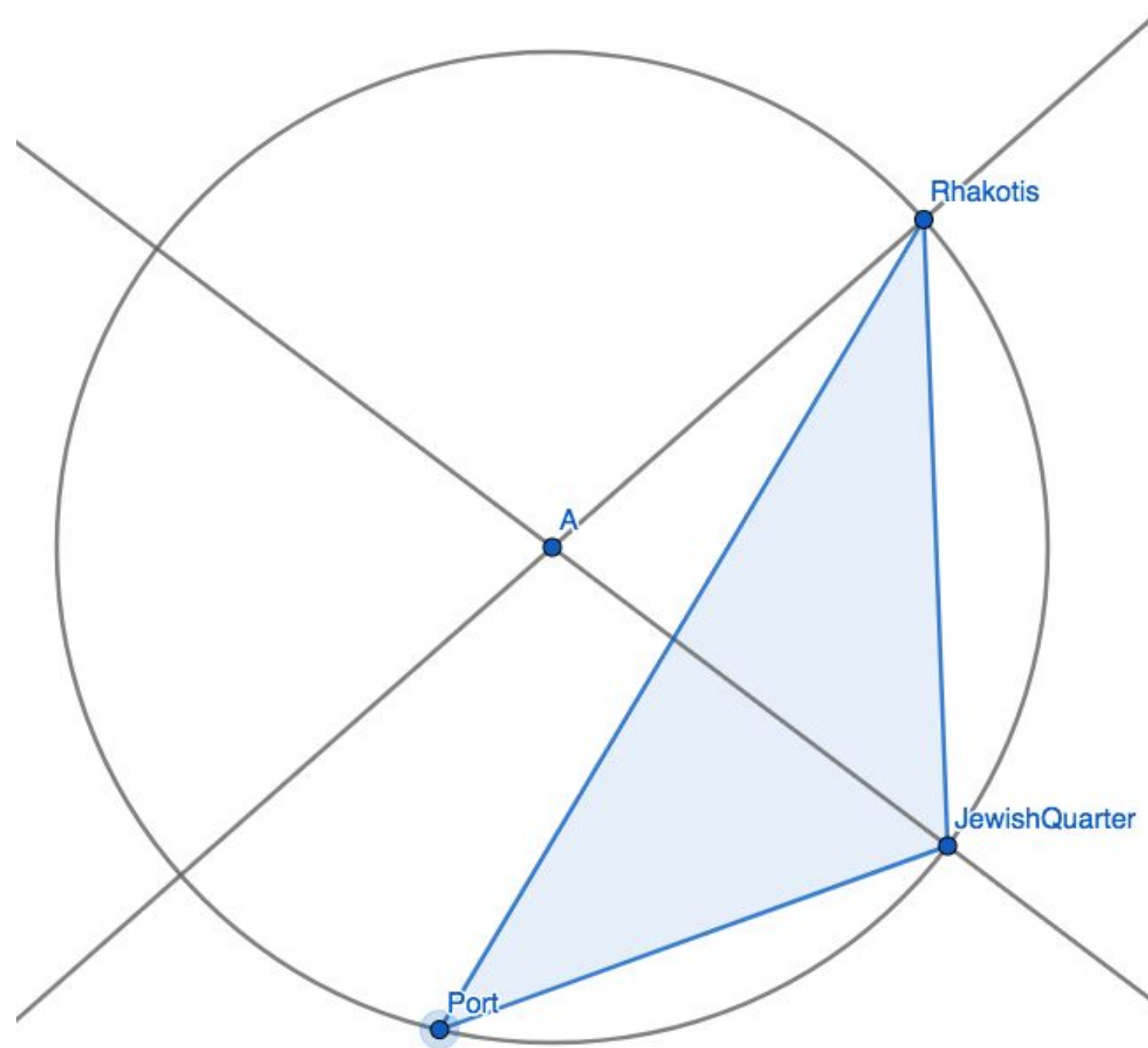


Euclid studied the map of Alexandria. “What would be a fair location for this library? What does it even mean to be fair? What would be an efficient location for the library? What does it mean to be efficient?” He connected the neighborhoods of Rhakotis, the Jewish Quarter, and the Port with line segments to form a triangle. He worked diligently -- his smile widened like the Nile during heavy rains as he continued.

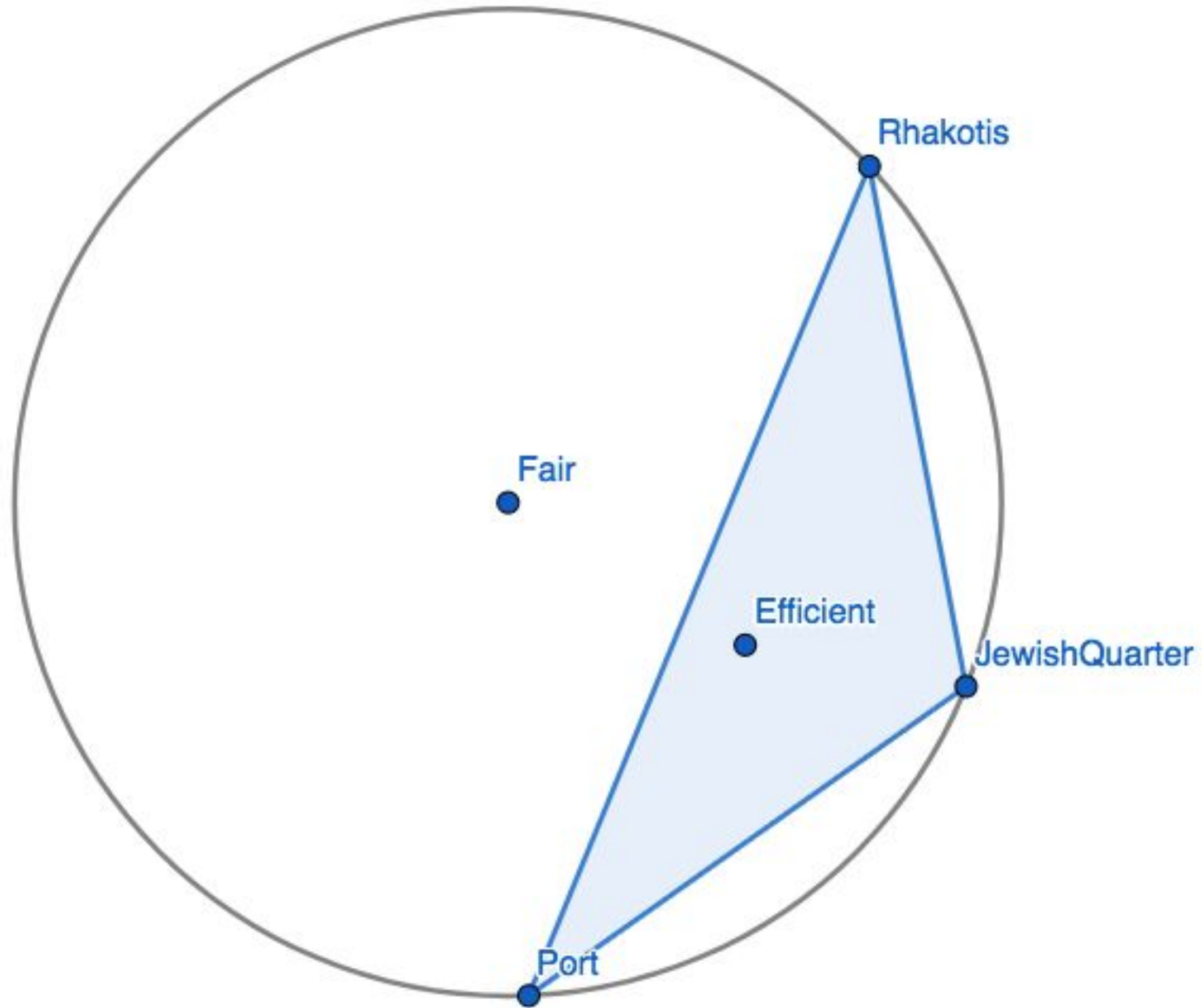
He inscribed the triangle in a circle. “What is fairness? What is efficiency? ...”



Euclid spoke to himself as he worked. “I think something is fair if the location is equidistant from all the points of interest. If we picked a fair location, that would put the library in the center of the circle, since all three points of the triangle lie on the circle. That would make the distance to the library equal to the radius! If the location is an efficient one, that would mean it must lie in between all of these three points, making it fall within the triangle! I will take this to King Ptolemy tomorrow to see if this helps with his dilemma.”

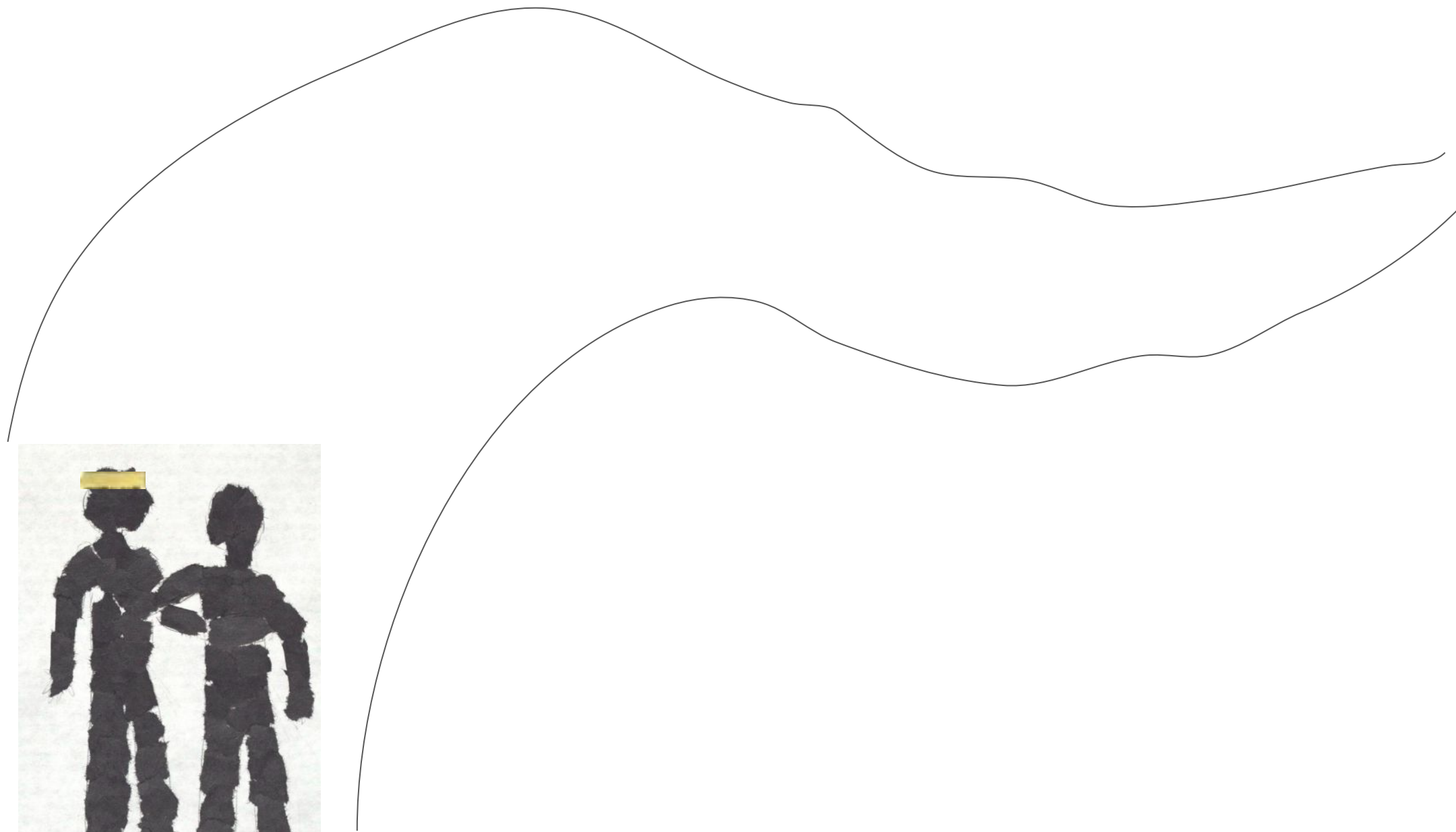


Euclid knew he could find the center of his constructed circle by using a straight edge he made. He made his straight edge using the diameter of the circle, then he repeated this action again. Where the lines intersected he knew was the center. This would be the fair location. The potentially efficient location could lie anywhere inside the triangle.



Euclid scrambled to Ptolemy's palace at dawn, eager reveal his construction.





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