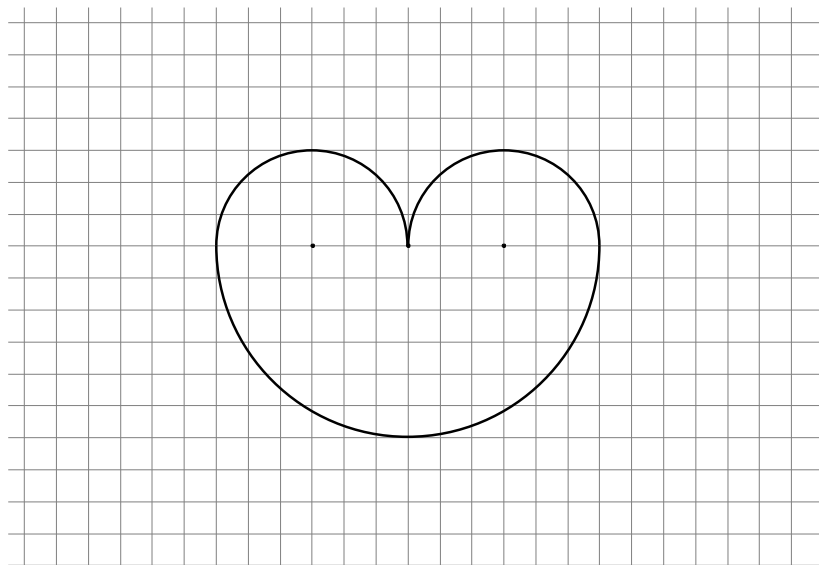


Measuring Pastures

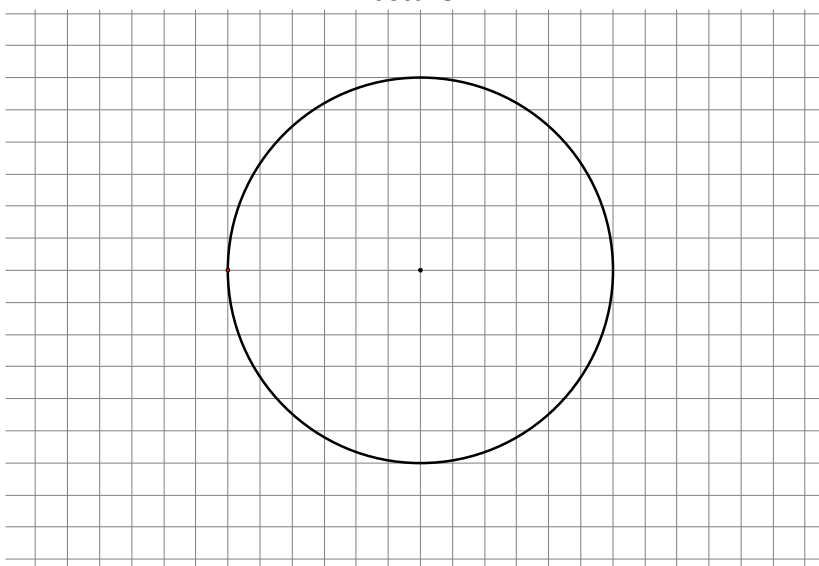
In Round County, all pasture land is formed by circles or partial circles connected together. For example, Pasture A is made from three half circles, as seen on this map:

Pasture A



1. Compare Pasture A with Pasture B, pictured below.

Pasture B

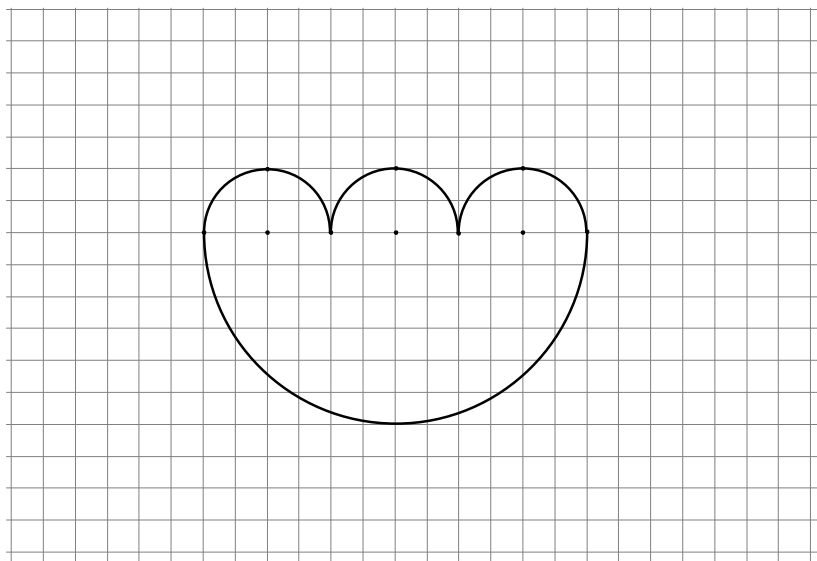


a. Which of the two pastures has a greater area? Explain (provide a convincing mathematical explanation).

b. Each pasture requires fencing that follows the curve of the outside of the pasture. Which pasture requires more fencing--that is, which one has the larger perimeter? Explain (provide a convincing mathematical explanation).

2. Pasture C is shown below.

Pasture C

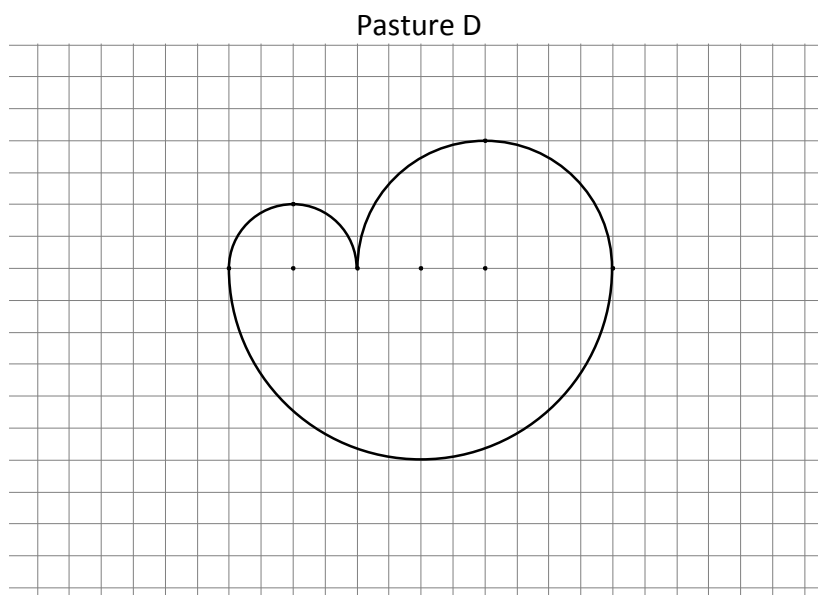


a. How much fencing does Pasture C require? Explain.

b. How does the amount of fencing required for Pasture C compare to that required for Pastures A and B? Explain why this relationship exists.

c. What is the area of Pasture C? Explain.

3. Pasture D is shown below.



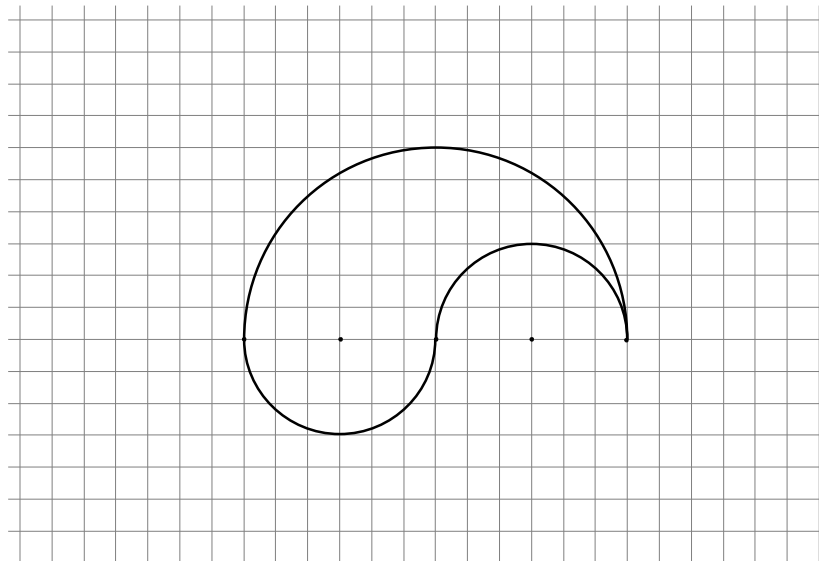
a. Predict (before calculating) the amount of fencing needed for Pasture D. Explain how you made your prediction.

b. Check your prediction by calculating how much fencing is required.

Extension:

Pasture E is shown below.

Pasture E



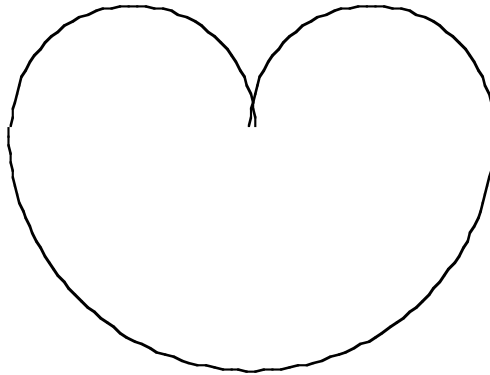
a. Describe two ways to compute the exact area of Pasture E. Explain each method.

b. How much fencing does Pasture E require? Explain.

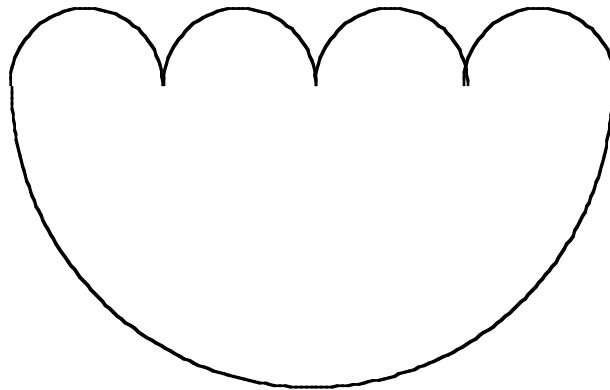


Warm-up for Measuring Pastures

1. On the Cut-out Shapes pages, you will see 11 half-circles. Use **all** of the half-circles to make three figures. Each piece may be used only once. Two of the three figures you make will have this shape (not necessarily the same size)



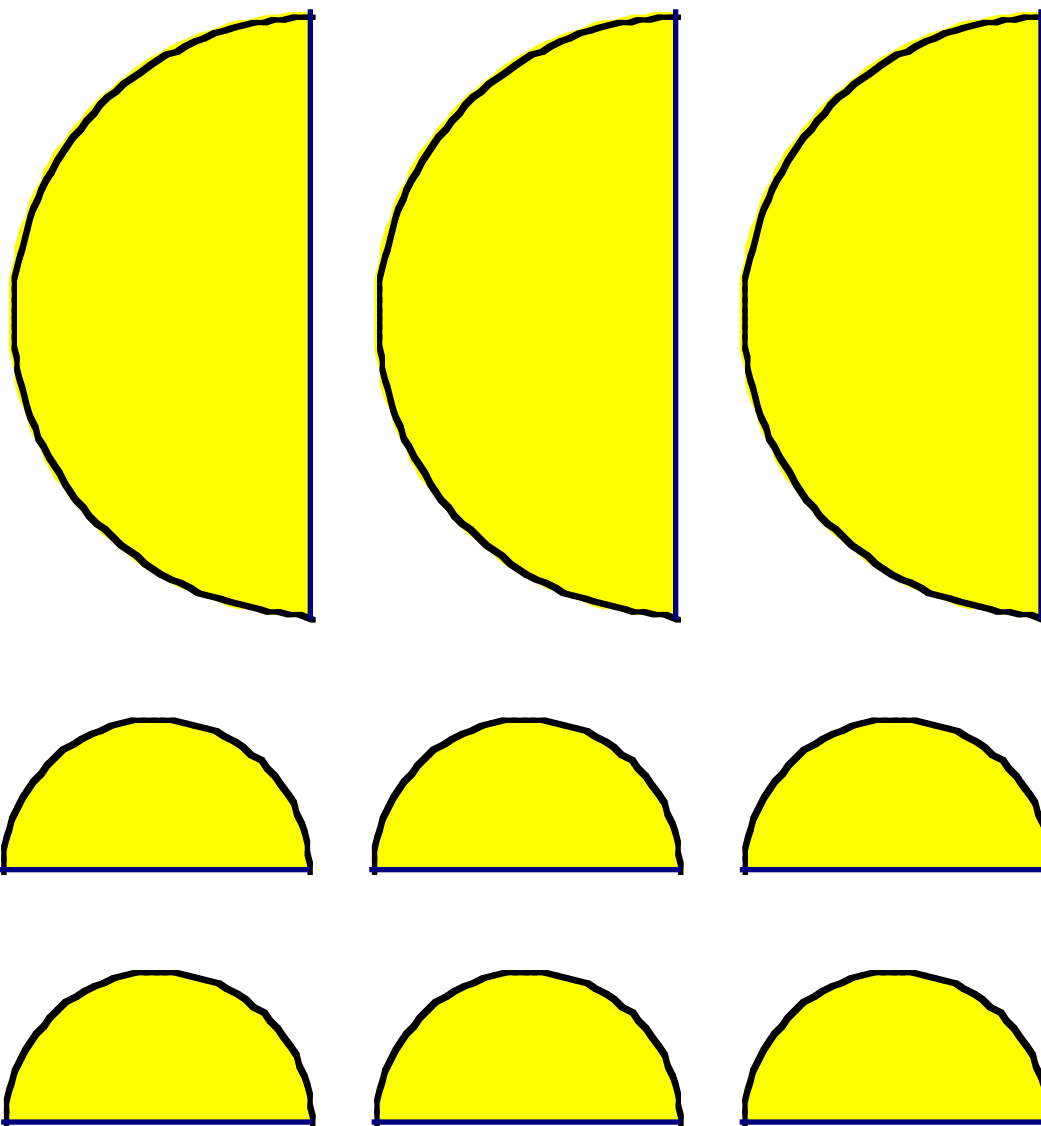
and one will have this shape:

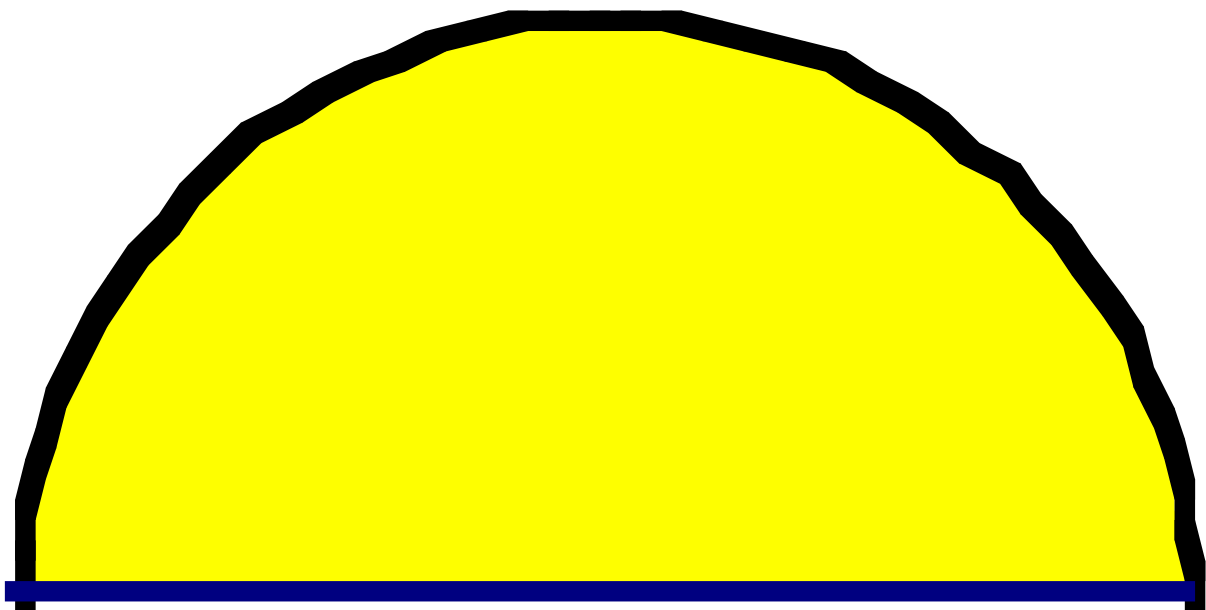
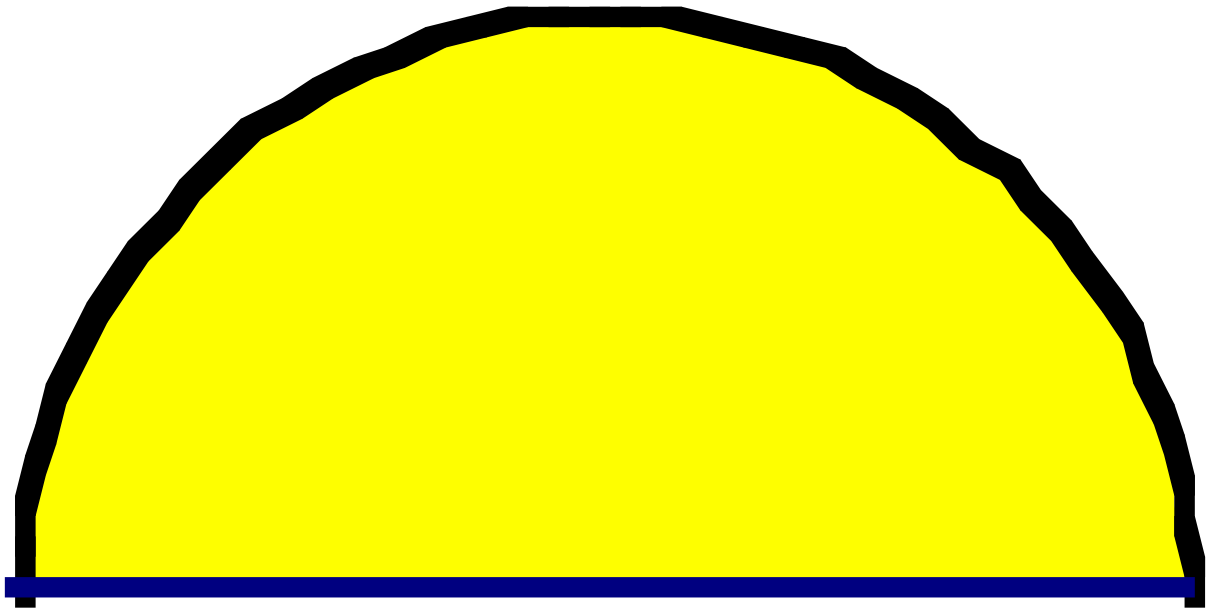


2. Compare your three figures. Predict which one has the greatest length around the outside. (You may know the word 'perimeter' for this length.) Once you have made your prediction, find a method to determine if you are correct. (Measuring the lengths is permitted.)



Cut-out Shapes





Potential Sentence Starters and Frames

Some ideas for sentence frames/starters that could be incorporated into your lesson are listed below. If you think a sentence frame/starter will be helpful, consider how will it support students' mathematical learning and/or development of academic language, and decide which sentence frame/starter (from the list below or that you create) would best support students' learning. You may find that the starters and frames vary in level of difficulty, and plan to provide them to students accordingly.

Starters

The geometric shapes helped me determine the area and perimeter of the pastures are

These geometric shapes helped me because

Frames

I know that the area of pasture A is _____ the area of pasture B because
(larger than/smaller than/the same as)

I know that the perimeter of pasture A is _____ the perimeter of pasture B because
(larger than/smaller than/the same as)

Academic Language

Students should have opportunities to see, hear, and write key mathematical ideas during this activity. There are some specific terms that students need to understand in order to engage in this task, and there are some additional terms and phrases that may surface as the students engage with the task. You may think of additional words or phrases that are key to this activity. As the task is introduced, solved by the students, and discussed, ensure that students have opportunities to experience (i.e., through discussion, pictures, and the use of gestures) and to build understanding for key words and phrases. Examples of words and phrases that may be involved in work on this problem include:

- Circles; partial circles; semicircles
- Circumference; diameter; radius
- Pi
- Area; perimeter
- Pasture
- Curve
- Predict; prediction
- Combining the half circles
- Combining partial squares
- Center of the circle
- Convincing



Word Chart for Measuring Pastures

Spanish, French, Portuguese

* = Cognate

Words and Phrases	Academic Language Meaning	Everyday Language Version	Other Forms of the Word or Phrase	Related Words or Phrases	Translation	Examples of word use with students
Area	The number of square units contained in the interior of a figure; the extent of a two-dimensional surface enclosed within a boundary	The space something occupies, two-dimensional	---	Enclosed Space Two-dimensional size	*Area *Aire/ Superficie *Área	
Convincing	Persuading or assuring by argument or evidence	Causing one to believe the truth of something; plausible	Convince Convinced Convincer Convincible Convincingly	Persuasive Believable Credible Plausible	*Convincente *Convaincant(e) *Convincente	
Fencing	---	An enclosure or railing; barriers enclosing a field	Fence Fenced Fencer	Border Boundary	Cerca/Vallado Clôture/Barrière Cerca	



Words and Phrases	Academic Language Meaning	Everyday Language Version	Other Forms of the Word or Phrase	Related Words or Phrases	Translation	Examples of word use with students
Perimeter	For a polygon: the sum of the lengths of its sides; for a circle: the limiting value of a sequence of perimeters of regular polygons (inscribed in a circle) with increasing numbers of sides; the total length of any closed curve	The distance around a figure; the border or outer boundary of a two-dimensional figure.	Perimetric Perimetrically	Boundary Outer limit Periphery	*Perímetro *Périmètre *Perímetro	
Predict	To make a precise guess based upon reason and study of a situation.	To suggest what may happen (e.g. weather); to tell something in advance.	Prediction Predicted Predicting Predicts	Forecast Foresee Anticipate	*Predecir/ Prever *Prédire/ Prévoir *Predizer/ Prever	
Semicircle	An arc whose endpoints are the endpoints of the diameter of a circle; the part of a circle bound by its diameter and half of its circumference	Half of a circle	Semicircular Semicircled	Semicircumference Arc Arch Half circle Half pipe	*Semicírculo *Demi-cercle *Semicírculo	



Words and Phrases	Academic Language Meaning	Everyday Language Version	Other Forms of the Word or Phrase	Related Words or Phrases	Translation	Examples of word use with students
Add	Bringing two or more values together to make a new total.	Combine values or pieces to form a sum or enlarge.	Added Addition Adds	Combine Sum	<p>Sumar/ Añadir</p> <p>*Additionner/ Ajouter</p> <p>Somar/ *Adicionar</p>	
Remove	---	To take, or move away from an occupied place or position; To eliminate.	Removed Removing Removes	Take away Subtract Eliminate Erase Withdraw	<p>*Remover/ Quitar</p> <p>Retirer</p> <p>*Remover</p>	
Subtract	To calculate the difference between numbers or quantities	To withdraw or take away; to remove a part from a whole.	Subtracted Subtracting Subtracts Subtraction	Decrease Take away Remove	<p>Restar/ *Sustraer (formal)</p> <p>*Soustraire/ Déduire</p> <p>*Subtrair</p>	

I. A more common meaning of “cerca”

In the word generation chart, “cerca” is provided as a Spanish and Portuguese translation for “fencing.” Note however that in Spanish and Portuguese, “cerca” is commonly used to express “near” or “nearby,” as well as “around” or “about.” The word derives from the Latin term, *circa*, commonly used in English to describe the date of an event.

The book is near your desk.

El libro está cerca de tu escritorio.

O livro está cerca de tua carteira.

He arrived to class around eight.

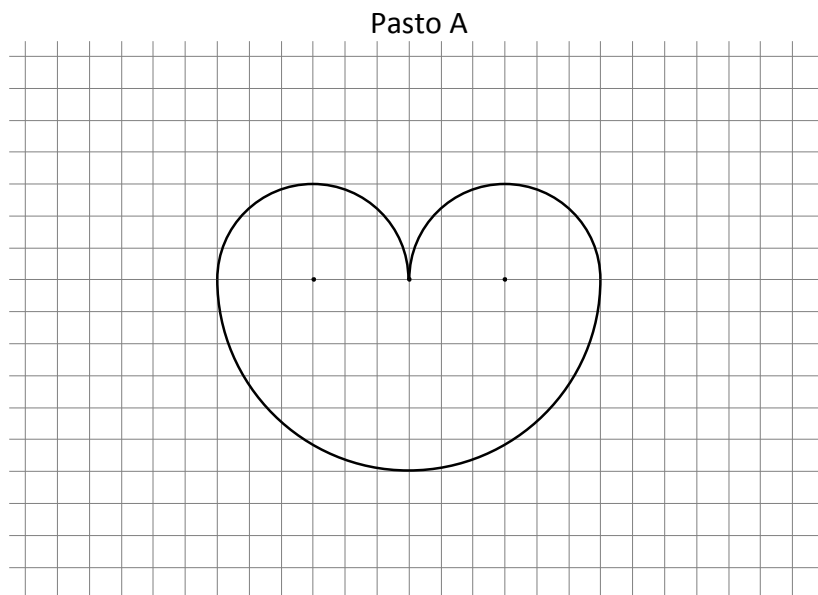
Él llegó a la aula a las ocho.

Ele chegou para a aula às oito.

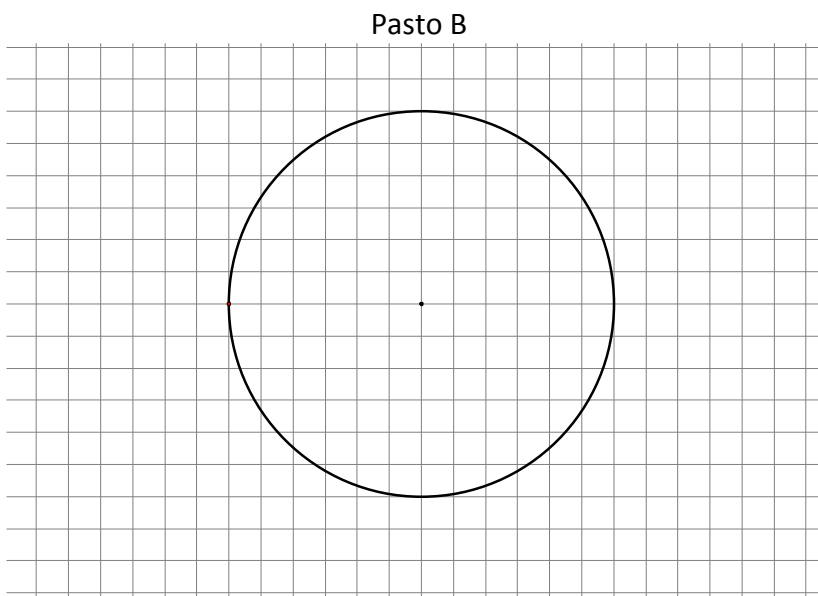
*NB: In Portuguese, while “cerca” is used to express “near” or “nearby,” the word “perto” is more frequently used.

Midiendo Pastos¹

En el condado de Round, toda la tierra de pastos está formada por círculos o círculos parciales relacionados entre sí. Por ejemplo, Pasto A está formado por tres medio-círculos como se ve en este diagrama:



1. Comparar Pasto A con Pasto B, en el diagrama siguiente:



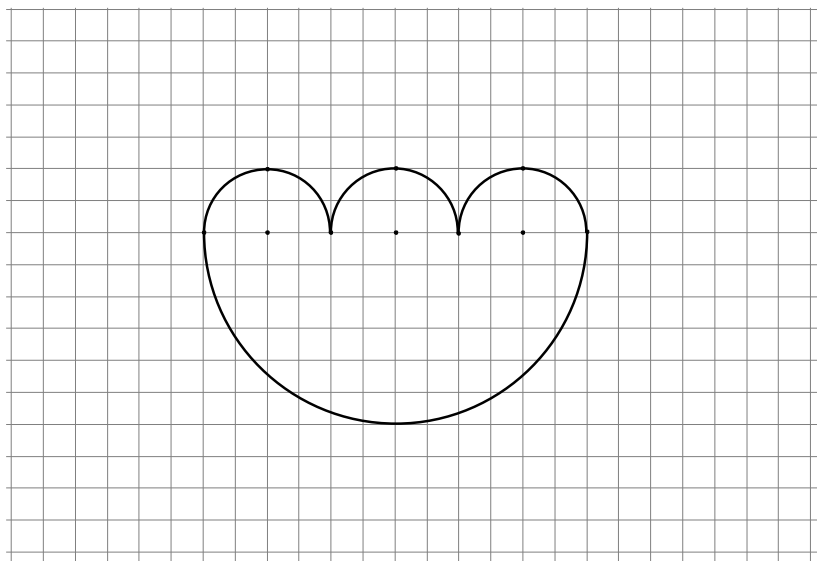
¹ Campo pastoral

a. ¿Cual de los dos pastos tiene una área más grande? Explica (da una explicación matemática convincente).

b. Cada pasto necesita una valla que sigue la curva de fuera del pasto. ¿Cual de los pastos necesita más valla—esto es, cual de los dos tiene un perímetro más largo? Explica (da una explicación matemática convincente).

2. Pasto C se ve en el diagrama siguiente.

Pasto C



a. ¿Cuanta valla necesita Pasto C? Explica.

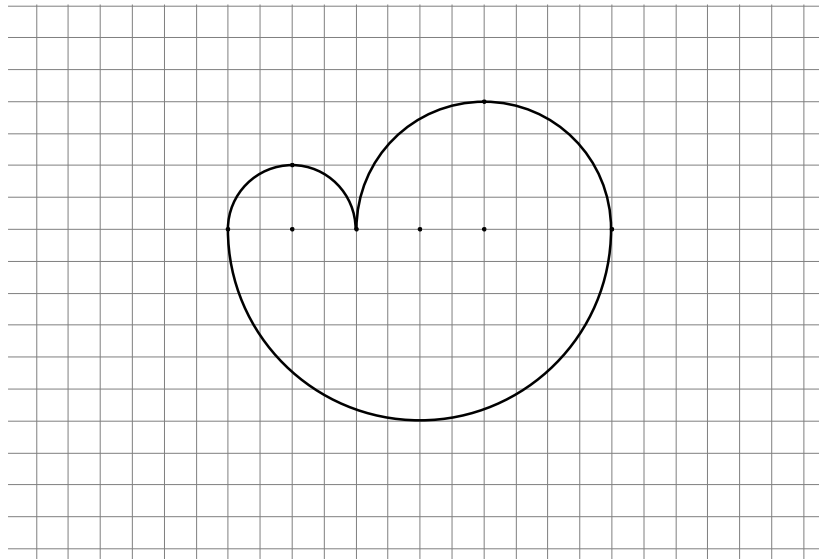


b. Comparar la cantidad de valla que se requiere para Pasto C con la cantidad que se requiere para Pastos A y B. Explica porqué esta conexión existe.

c. ¿Cual es la área del Pasto C? Explica.

3. Pasto D se ve en el diagrama siguiente.

Pasto D



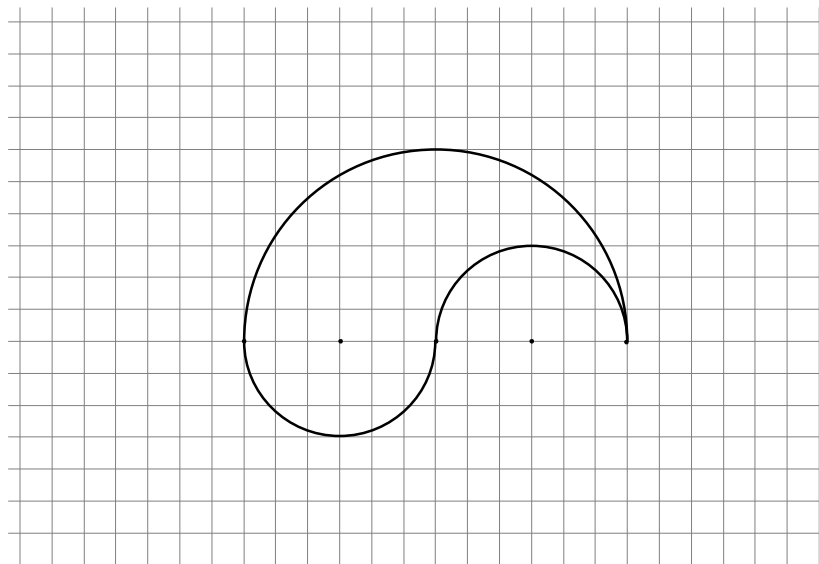
a. Pronosticar (antes de calcular) la cantidad de valla que se necesita para Pasto D. Explica como llegaste a la conclusión.

b. Chequear (verificar) la predicción calculando cuanta valla se requiere.

Extensión:

Pasto E se ve en el diagrama siguiente.

Pasto E



a. Describe dos métodos de como calcular la área exacta de Pasto E. Explica cada uno.

b. Cuanta valla se necesita para Pasto E. Explica.