

TASK 2.1.1: WHAT'S THE PERIMETER?**Solutions**

Directions: Examining each of the geometric animal shapes on the handout, estimate to the nearest five-tenths of a centimeter the perimeter of each animal and record in the table below. After all estimations are recorded, then measure the perimeter of each animal and record it in Table I. Use the table to answer the following questions.

Table I

Geometric Design	Estimated (Perimeter)	Calculated (Perimeter)
Alligator	40 cm	35 cm
Goat	49 cm	47.5 cm
Inchworm	53 cm	45 cm
Duck	54.5 cm	51cm
Camel	45 cm	43 cm
Bear	48 cm	47 cm
Polar Bear	51 m	47.5 cm

Note that actual answers will vary. This is true even with the Calculated Perimeter. The numbers given here are the measurements that the authors observed. Because of publication, the measurements that the instructor observes may differ.

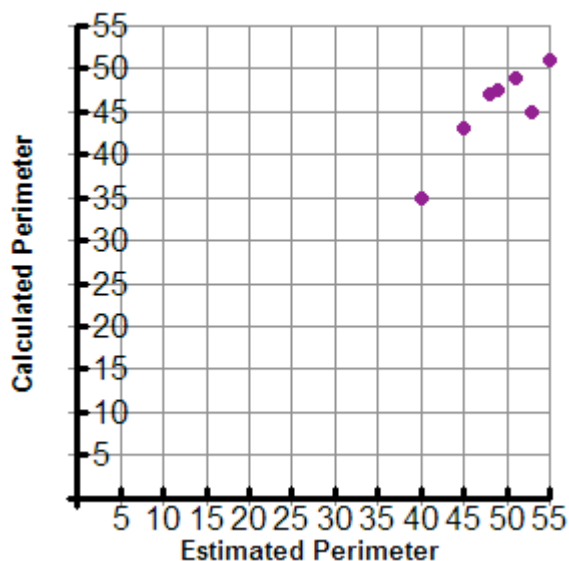
1. Use the coordinate grid to sketch a graph of the data in Table I. Label the axes appropriately. Justify your choice for independent variable and your choice for dependent variable.

Is your data discrete or continuous? What are the domain and range of your data?

For this set of data, either variable can be the independent variable or the dependent variable. There is no correct choice; justification must be provided for the choice.

This set of data is discrete, since the domain of the independent variable is a discrete set.

The choice for the independent variable determines the domain of the function; the range of the function is dependent on the domain. Specifically, the values recorded in Table I represents the domain and the range. The actual numerical values for the domain and range will vary for each group of participants.

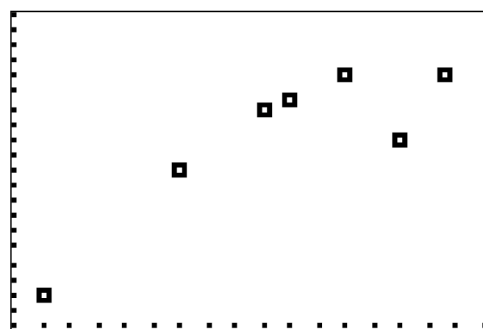


Questions for participants to consider:

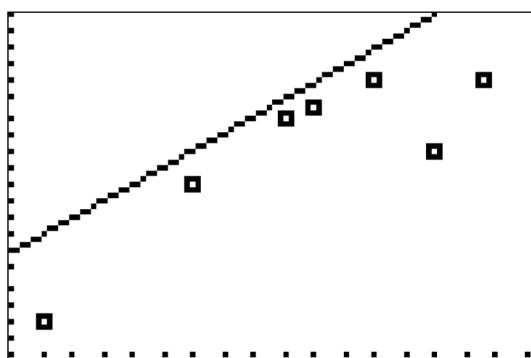
- How well did you estimate?
- How do you think we can judge if you are a good estimator?
- How do you think we could tell if you overestimated?
- How do you think we could tell if you underestimated?
- Does it matter which variable you choose as the dependent variable?
- How would your graph change if you chose a different dependent variable?
- How would the two graphs compare?

- Using your data, create a scatter plot on your graphing calculator. Given the box as your calculator window, sketch your scatter plot, including axes and scale. Justify your viewing window choice.

According to the sample graph, the variable x stands for the estimation of perimeter of geometric designs, so x min is 0 cm and x max is the maximum number of cm estimated for the perimeter of the animal shapes (Table I). The variable y stands for the calculated perimeter, so y min is 0 cm and y max is the maximum number of centimeters for the calculated for the animal shapes (Table I).



- Using your calculator, graph the “perfect-estimate” line over the scatter plot.



Algebra I: Strand 2. Linear functions; Topic 1. Parent Functions; Task 2.1.1

4. Did you overestimate or underestimate? Explain.

If the student's points lie mostly above the line, then they underestimated.

If the student's points lie mostly below the line, then they overestimated.

In the graph that corresponds to the Table I provided in #1, we underestimated since all of the points are below the line $y=x$.

5. Is the relationship between your Estimated Perimeter and the Calculated Perimeter proportional? Is it a direct variation? Justify your answer.

Unless the participants guess "perfectly", the data is not proportional and therefore is not a direct variation. Only with a perfect estimation will the line include the origin.

Math notes

Participants can choose the Estimated Perimeter as the independent variable and the Calculated Perimeter as the dependent variable or vice versa. If participants all do the graph with the same variables as the independent and dependent variable, then recommend that the presenter select one set of values and graph the data with a different independent and dependent variable.

Participants measure to the nearest five-tenths of a centimeter and calculate the perimeter of each *Geometric Shapes Animal* and record in Table I.

Teacher notes

When handouts are copied, the actual size of the animal shapes may vary and participants' solutions will depend on the size of shapes that they are given. Therefore, expect answers to vary. However, for the teacher's convenience we have included our Estimated and Calculated Perimeter as a point of reference. These are the values that we graphed, but expect your participants' measurements to vary to some extent.

Ask participants to compare scatter plots within their group.

Ask participants to sketch a "perfect-estimate" line, a line that represents perfect estimation of the perimeter of the geometric shapes animals.

Ask participants to write a sentence to describe the "perfect-estimate" line and then translate to symbols.

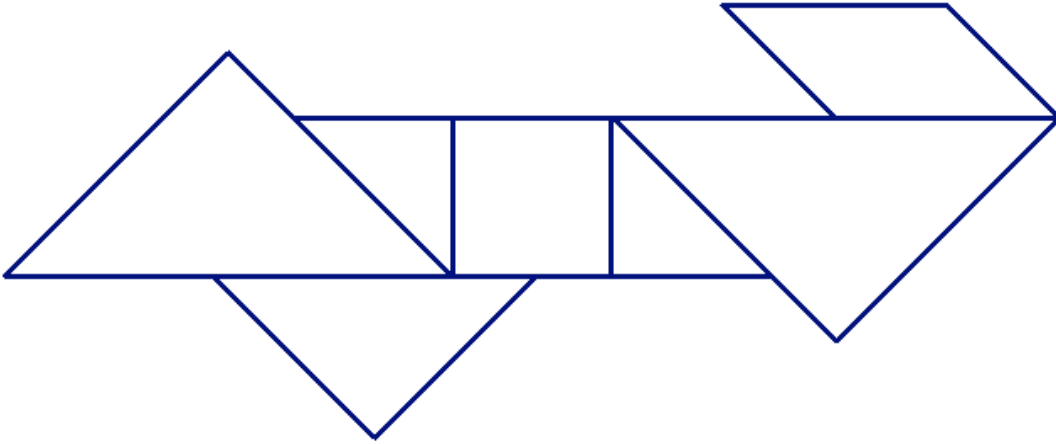
"All my estimates are the same as the calculated perimeter."

Estimate = Calculated

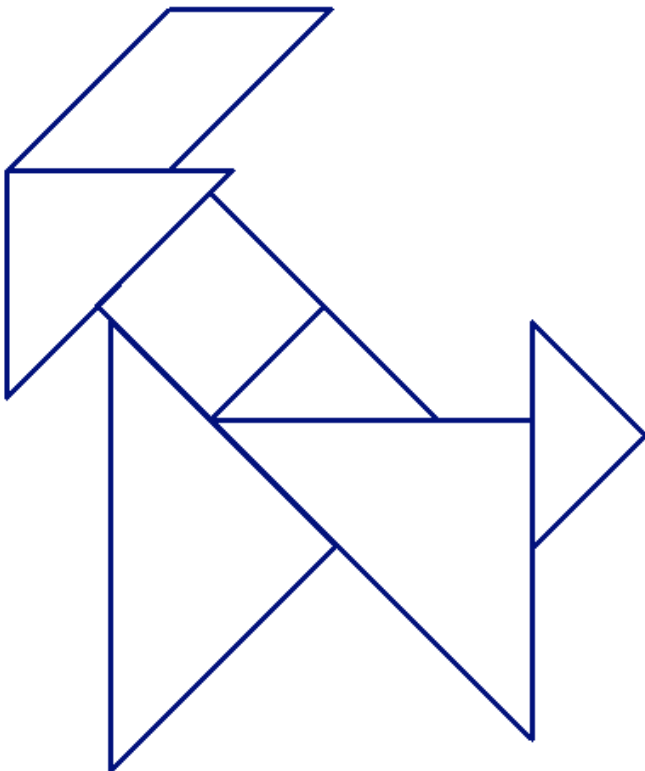
$E = C$ or $y = x$

Geometric Animal Shapes

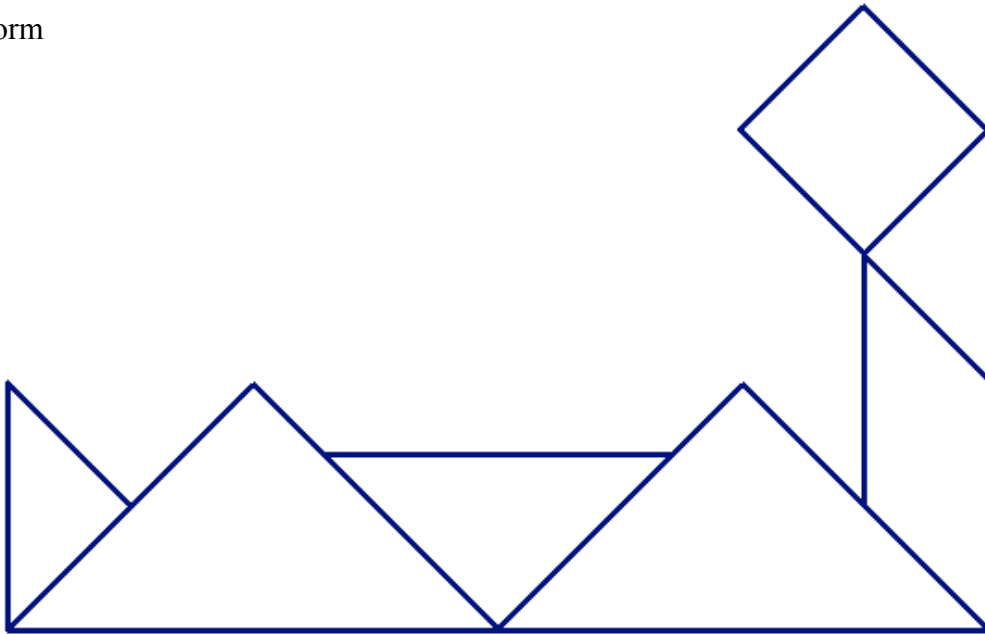
Alligator



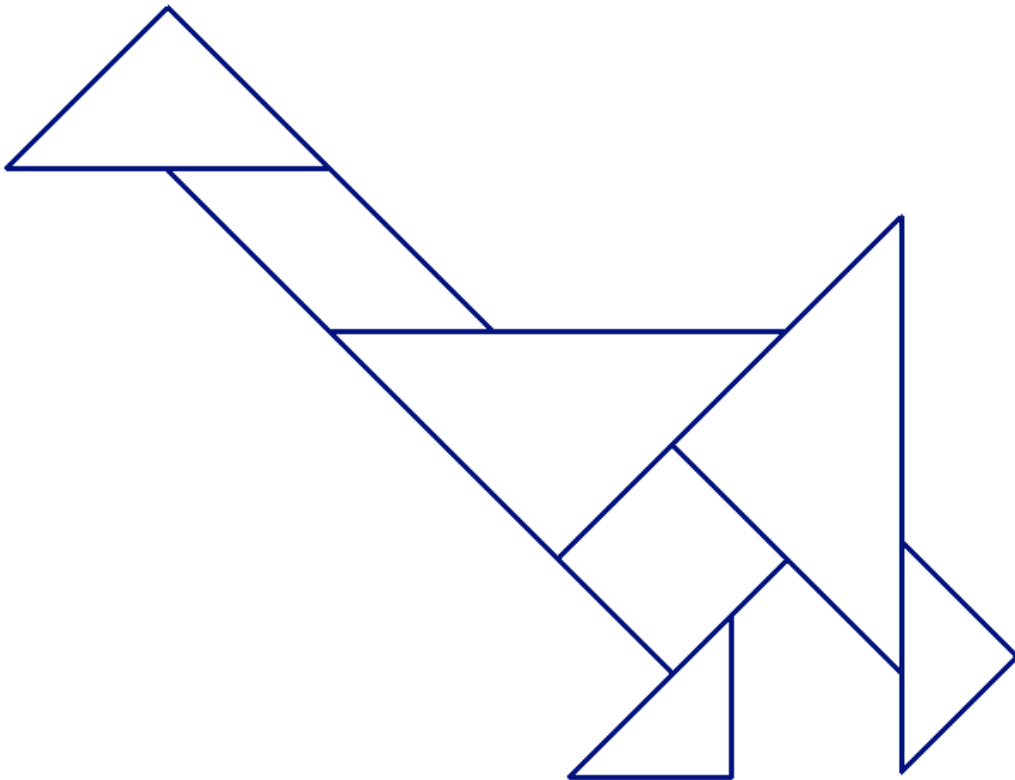
Goat



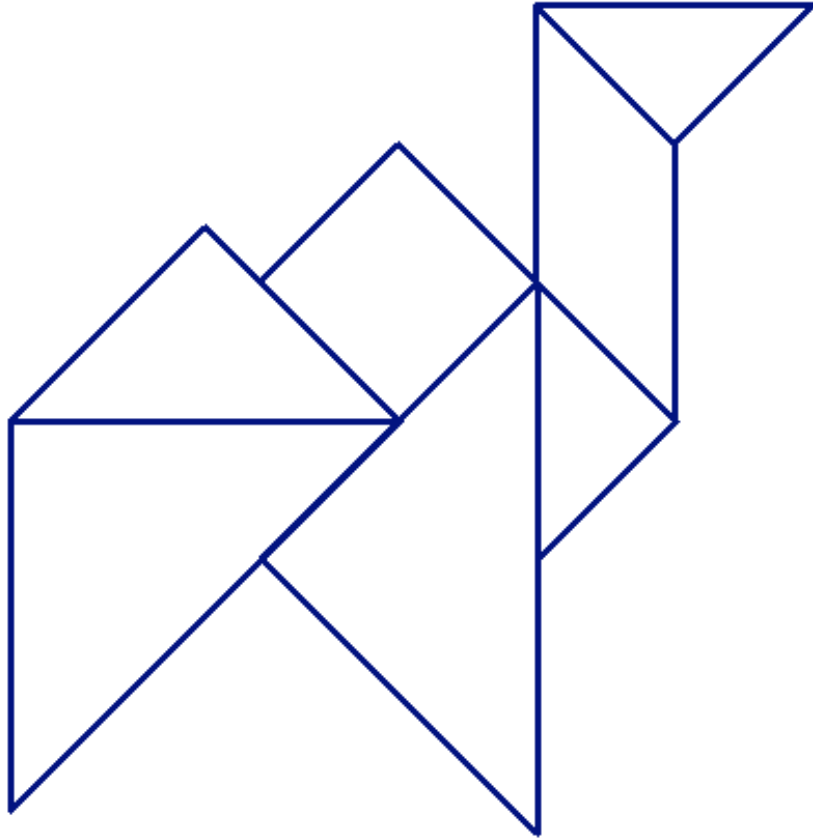
Inchworm



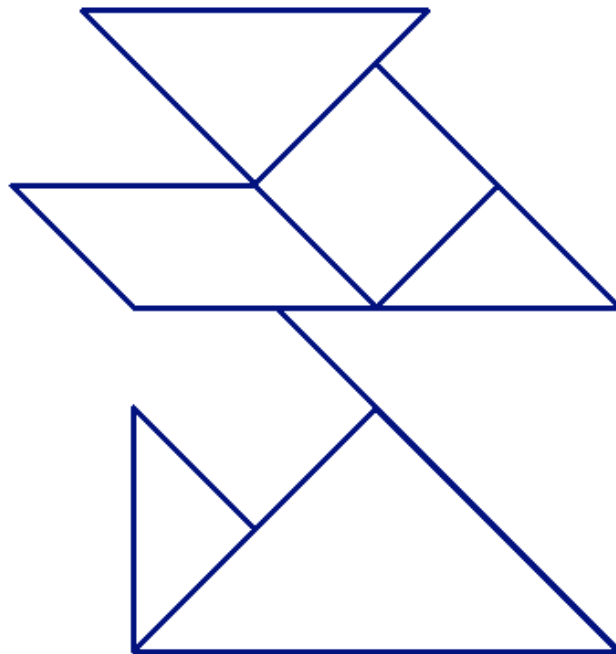
Duck



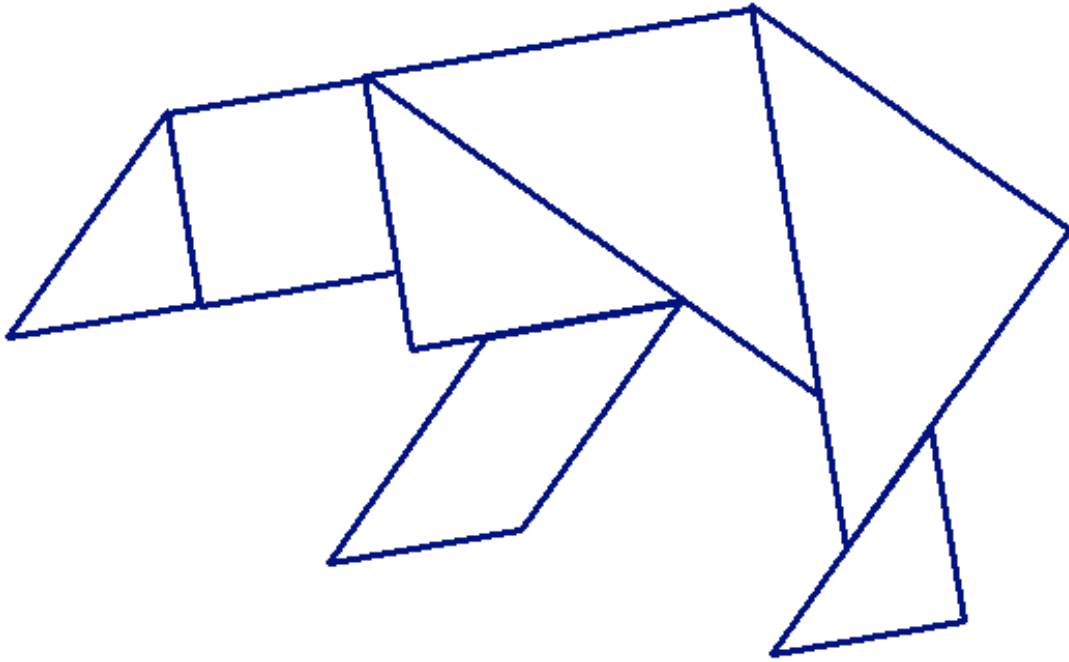
Camel



Bear



Polar Bear



TASK 2.1.1: WHAT'S THE PERIMETER?

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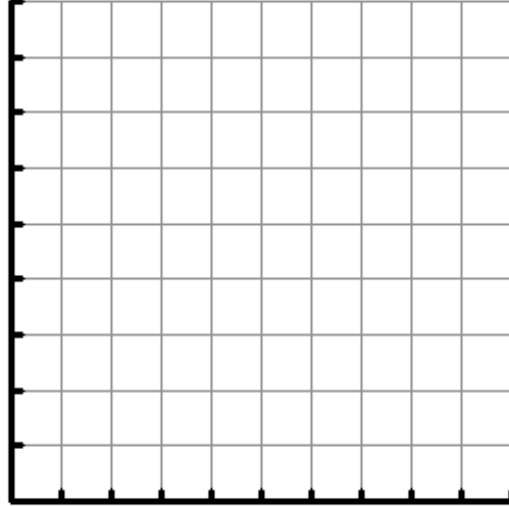
Table I

Geometric Design	Estimated (Perimeter)	Calculated (Perimeter)
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Inchworm		
Duck		
Camel		
Bear		
Polar Bear		

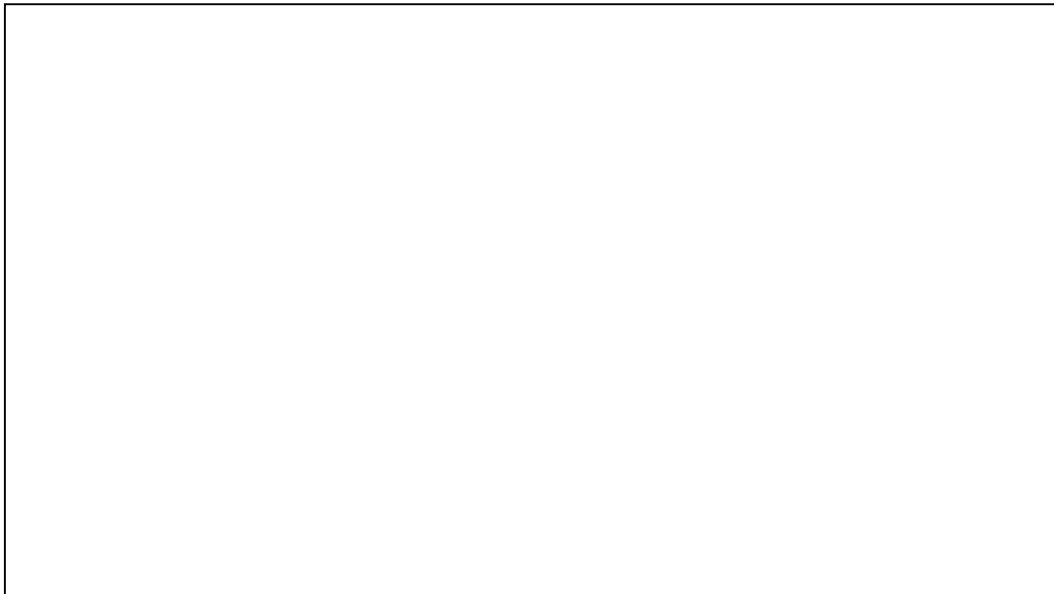
Algebra I: Strand 2. Linear functions; Topic 1. Parent Functions; Task 2.1.1

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2. Using your data from Table I, create a scatter plot on your graphing calculator. Given the box as your calculator window, sketch your scatter plot, including axes and scale. Justify your viewing window choice.



Algebra I: Strand 2. Linear functions; Topic 1. Parent Functions; Task 2.1.1

3. Using your calculator, graph the “perfect-estimate” line over the scatter plot.

4. Did you overestimate or underestimate? Explain.

5. Is the relationship between your Estimated Perimeter and the Calculated Perimeter proportional? Is it a direct variation? Justify your answer.