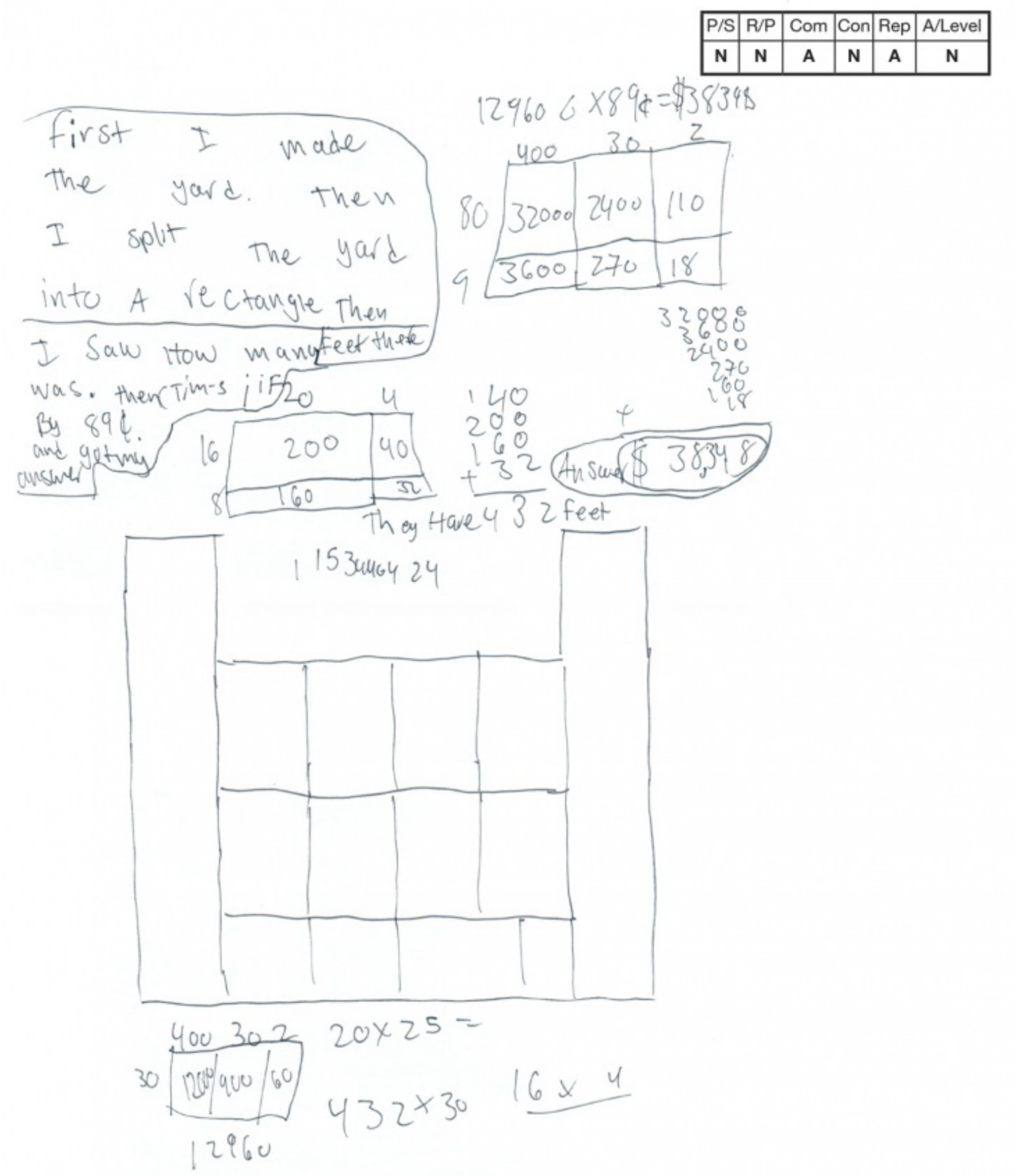
Title: Herding Cats

Achievement Level: Novice 1

Criteria and Performance Level	Rationales
Problem Solving *Novice*	The student confuses needing to find the perimeter of the enclosed space with their strategy of finding the area of the total yard. The student appears to divide the figure into rectangles and find the areas of these figures. This strategy will never lead to a correct solution for this question.
Reasoning & Proof *Novice*	The student shows little correct reasoning in attempting to solve the task. No correct reasoning is present in finding the perimeter of the yard. Numerous calculations are present, but no reasoning is provided for what is being calculated.
Communication *Apprentice*	The written explanation given for the work is limited and unclear. Work is difficult to understand and hard to follow. Significant interpretation is required to understand the student's strategy by the reader. The use of math language is limited.
Connections *Novice*	No connections are present or attempted by the student.
Representation *Apprentice*	Based on the drawing included, the student appears to correctly plot the coordinates given on a coordinate plane to create a diagram of the fenced area. The diagram is not labeled. The student then attempts to break the yard into rectangles to find the area of the total yard. The student does utilize area models for several calculations, although we are unsure what they are working to find.

Achievement Level: Novice 1

P/S	R/P	Com	Con	Rep	A/Level
N	N	A	N	A	N



Title: Herding Cats

Achievement Level: Apprentice 1

Criteria and Performance Level	Rationales
Problem Solving *Apprentice*	The student correctly plots and connects the coordinates given to form a diagram of the fenced area. The student incorrectly calculates the perimeter of the polygon in unit lengths (records the bottom segment as 25 units instead of 24 units) to be 105 units instead of 104 units. The student also incorrectly uses 105 units as the perimeter, failing to multiply the measure by 30 feet/unit to get the perimeter in feet. The student multiplies the incorrect perimeter by $.89 (cost/foot) to get the incorrect cost of $93.45. These incorrect calculations still lead the student to the correct decision to reject the offer from the fence company.
Reasoning & Proof *Apprentice*	The student demonstrates some understanding of the underlying concepts of the task, but fails to use the unit rate of 30 feet/unit length to find the perimeter in feet, which is needed to determine cost using the unit rate $.89 cost/foot. The student is inconsistent in finding the unit lengths of all sides of the figure. Errors in computation of the perimeter in unit lengths lead to subsequent errors in the solution process. The calculation 25un, 22un, 4un, 6un, 16un, 6un, 4un, 22un = 105 units x 0.89 = 93.45 is also an incorrect mathematical statement.
Communication *Practitioner*	The student presents a sequenced response to communicate work. The explanations of the steps to the solution process are clear and easy to follow even though some of the calculations are incorrect. Math vocabulary is limited, yet appropriate.

Connections *Apprentice*	The student attempts to make a connection but it lacks contextual relevance.
Representation *Apprentice*	The student draws a diagram of the fenced area, but some of the unit lengths given for the sides are missing or incorrect. The diagrams units are not labeled.

Achievement Level: Apprentice 1

P/S	R/P	Com	Con	Rep	A/Level
A	A	P	A	A	A

Dear TMSFC,

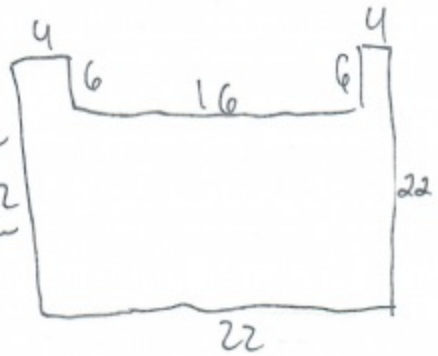
Thank you so much for the offer of installing our perimeter fencing for $3,190, however I just cannot accept your offer.

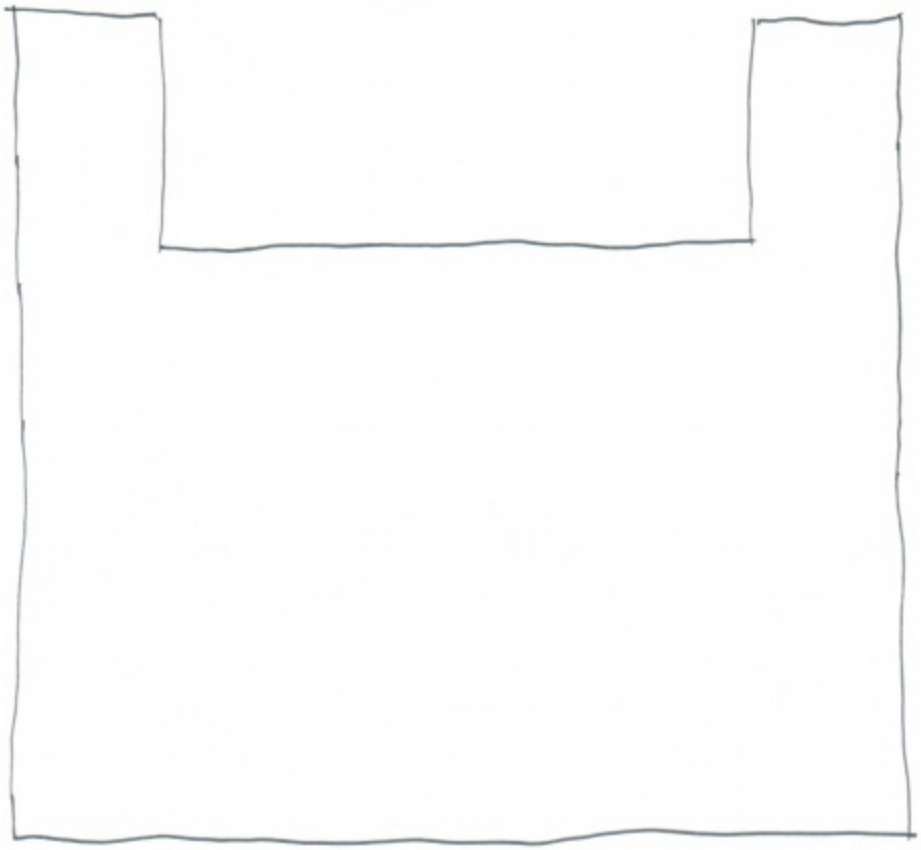
When I went to find the perimeter I found all the units. I had a photo taken with a unit graph on top. I measured the different lengths (via counting) and got the following perimeter lengths: 22, 22, 4, 6, 16, 6, 4, 22 (All of these are units) I then added all of the units and got 105 units. Because I know that each unit of fencing costs $0.89, I multiplied 105 by 0.89 and got $93.45. $93.45 would be the true cost of this perimeter fencing.

This is why I must decline your offer because $93.45 is way less than $3,190

Thank you again for your offer
- Mira

Connection / representation
I used counting, adding, and multiplication is this problem





25 un, 22 un, 4un, 6un, 16un, 6un, 9un, 22 un = 105 units x 0.892 93.45

$93.45 is a lot less than $3140 that the TMSFC is offering

Title: Herding Cats

Achievement Level: Apprentice 2

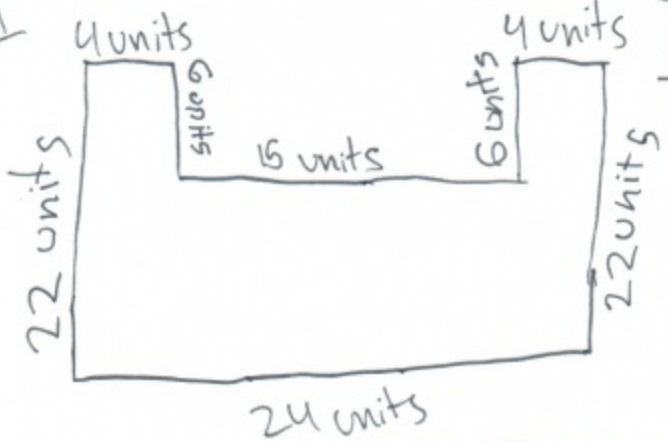
Criteria and Performance Level	Rationales
Problem Solving *Apprentice*	The student's strategy of creating a representation and finding the number of units, leading to the number of feet in the perimeter, is correct. However, the student fails to multiply the number of total feet by $0.89 to successfully solve the task. Despite failing to make the calculation of converting from total perimeter to a cost, the student does arrive at a correct answer.
Reasoning & Proof *Apprentice*	The student provides some correct reasoning for several of the steps. However, the argument is incomplete and inaccurate because the student fails to multiply the total perimeter by the $0.89 per foot, leading to an incorrect cost for the fencing.
Communication *Practitioner*	The student demonstrates a sense of purpose, clearly communicating this in the task statement at the beginning of the solution. The student's overall approach is clear, organized and sequenced. Formal mathematical language, labels and symbolic notation are evident.
Connections *Practitioner*	The student extends the task by finding the difference between the Meow Safe's offer and their calculations.
Representation *Practitioner*	There is an accurate and appropriate mathematical representation created in step 1 of the task. This representation is constructed to help portray their calculations and strategy for arriving at their final answer.

Achievement Level: Apprentice 2

P/S	R/P	Com	Con	Rep	A/Level
A	A	P	P	P	A

Was the meow safe fencing company giving Maru an accurate estimate of the cost? Should she accept or reject the offer?

Step1



Step 2

1 Unit = 30 ft

now we need to add up all the units to convert them into ft ↓

4 units
4 units
6 units
6 units
16 units
22 units
22 units
24 units

104 units

Step 4

the company offered her to pay $3,190 for the fence, but the value is only $3,120, so she should reject the offer because they are making her pay an extras $70.

Step3

104 units × 30 = 3,120 ft

(we multiply by 30 because there is 30ft in a unit)

Letter to the company

Dear Meow Safe fencing company,

I will not be accepting your offer because my calculations show that the fence only costs $3,120 But you are charging me $3,190. That is $70 extra that is not needed to cover the cost of the fence

from,
Maru

Title: Herding Cats

Achievement Level: Practitioner 1

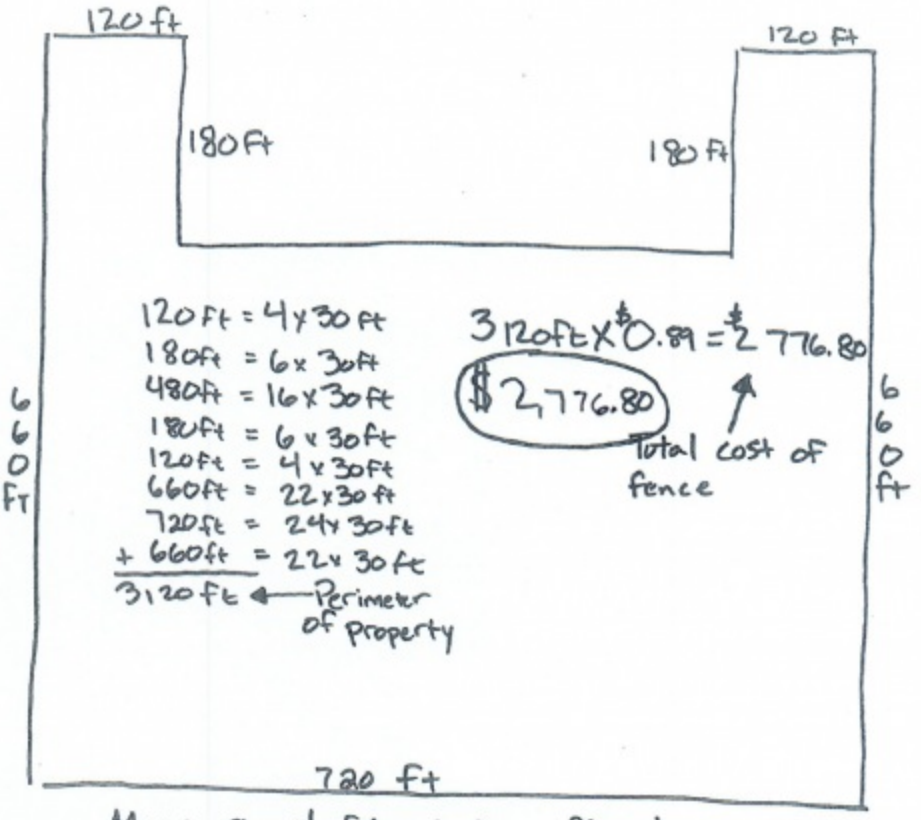
Criteria and Performance Level	Rationales
Problem Solving *Practitioner*	The student correctly plots the points given to create a diagram of the fenced area. The student determines the unit lengths of each line segment and converts these to feet by multiplying each value by 30 (feet per unit length). The student correctly determines the cost at $2776.80 by multiplying 3120 feet by $.89 (cost/foot). The student correctly determines that the offer from the fence company should be rejected.
Reasoning & Proof *Practitioner*	The student's argument is sequenced, logical and easy to follow. The student demonstrates correct reasoning of the underlying concepts of the task. The student determines the length in feet of the fence and then calculates the total cost by multiplying by the unit rate of $.89. Calculations are correct and support the solution given.
Communication *Practitioner*	The student uses an organized and sequenced response to communicate work. The student explains each step to the solution process. Work is clear and easy to follow. Appropriate math language is used.
Connections *Expert*	The student describes a second way the task can be solved (but does not actually show the calculations). The student also makes a connection between the mathematics in the task and how the strategy for solving the task could be extended to other cases, "when your coding."

Representation *Practitioner*	The student plots the given points to create a diagram of the fenced area on a coordinate grid. The student correctly labels the length of each line segment in feet on the diagram.

Achievement Level: Practitioner 1

P/S	R/P	Com	Con	Rep	A/Level
P	P	P	E	P	P

My first step was to put the coordinates on the grid. After that, I found out the side lengths of the shape/property. Once I had all the side lengths, I added them together to get the perimeter. Once I got the perimeter/total footage I multiplied the number by 0.89 because each square foot costs 0.89 cents. The total cost was under the estimated price which is why she should reject the offer. Also, to get the side lengths I multiplied 30ft by the number of squares on one side.



Maru should reject the offer because the real price of the fence is under the estimated price, which means she can save money.

Dear Meow Safe Fencing Comany

I am rejecting your offer because your charging me extra money for it. It would only cost $2,776.80 because I found the perimeter of the property, and then multiplied that by 0.89 which is the amount of money it is for 1 square footage. This got me to the cost of $2,776.80, which is a lot less than the cost your charging me.

Sincerely
Maru

Connection:

Another way we can solve it is multiplying each side length by 0.89, then adding them all together. But what I did was add the side lengths first then multiply it by 0.89. Also, this is the type of math you would also use when your coding like putting coordinates on a grid.

Title: Herding Cats

Achievement Level: Practitioner 2

Criteria and Performance Level	Rationales
Problem Solving *Practitioner*	The student correctly plots the points given to create a diagram of the fenced area. The student determines the unit lengths of each line segment and converts these to feet by multiplying each value by 30 (feet per unit length). The student correctly determines the cost at $2,776.80 by multiplying 3,120 feet by $.89 (cost/foot). The student correctly determines that the offer from the fence company should be rejected.
Reasoning & Proof *Practitioner*	The student correctly plots points on a coordinate grid, finds the perimeter of the polygon created in unit lengths, and then converts units into feet in the diagram. Calculations for the total cost are present and correct. The student demonstrates an interesting strategy of finding half the total perimeter to enclose and then multiplying by 2 to find the other half of the perimeter.
Communication *Practitioner*	The student uses an organized, sequenced, and labeled response to communicate work. The student identifies the task to be solved, explains each step in the solution process, and explicitly states the solution. Units of measure are accurately recorded. The student uses appropriate math language.
Connections *Practitioner*	The student explores a mathematical phenomenon within their solution, “since this shape is symmetrical left to right, we can just find half the dimensions and multiply by 2.” This secondary strategy recognizes an interesting pattern in finding perimeter of symmetrical shapes.

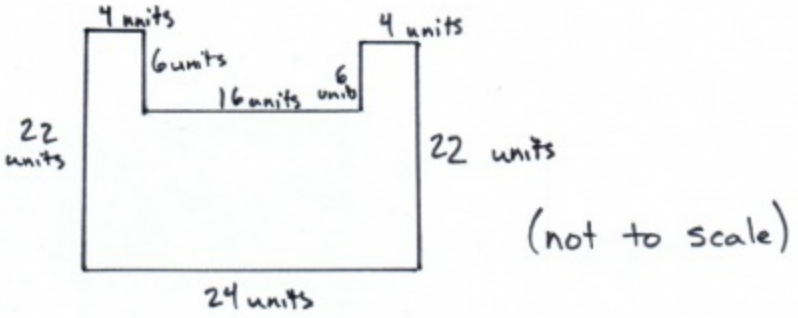
Representation *Expert*	The student creates two correct diagrams of the fenced area to help analyze the relationships between the different measurement for the perimeter of units versus feet.

Achievement Level: Practitioner 2

P/S	R/P	Com	Con	Rep	A/Level
P	P	P	P	E	P

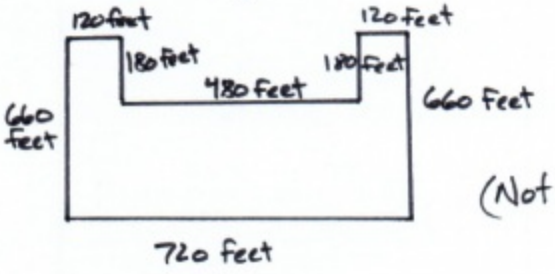
Problem: Maru wants to buy a fence around her cat roaming area. A company charges $.89 per foot and charges her $3,190. Is that the correct price?

Roaming area: We first have to draw the cat enclosure with the coordinates given to us. We get



(not to scale)

But they say that 1 unit is 30 feet (30') so we have to multiply all the dimensions to get



(Not to scale)

Perimeter: Now we have to find the perimeter. We can do this by adding up all the sides or since this shape is symmetrical left to right, we can just find half the dimensions and multiply by 2.

660
+ 120
180
240 (480 ÷ 2)
360 (720 ÷ 2)
1560

1560 · 2 = 3120
So the perimeter is
3120 feet

Price: Now we can find the price and see if "meow safe fencing" charged the right amount. Each foot of fencing cost $.89 and you have 3120 feet (perimeter) you can multiply them and find the price.

3120
x .89
$2,776.80

So Meow safe fencing overcharged Maru saying it would cost $3190.

letter: The last part of the problem was to write a letter to the company accepting or rejecting their offer.

Dear Meow Safe fencing,

I reject your offer and think you overpriced. I know this because the dimensions of my property are 720', 660', 120', 180', 480', 180', 120', 660' (see diagram in roaming area section.) If you add these up you get a perimeter of 3120 feet. Your company charges #.89 a foot so you multiply 3120 by #.89 to get a price of $2,776.80. So you should change your offer from #3,190 to #2,776.80.

Title: Herding Cats

Achievement Level: Expert 1

Criteria and Performance Level	Rationales
Problem Solving *Expert*	The student provides an effective strategy and a second more efficient strategy to solve the task. The alternative strategy at the end is considered, which shows evidence of the student analyzing the situation and defining a more efficient strategy to solve the task, “but there is a different way…” The student then describes and diagrams this alternative strategy.
Reasoning & Proof *Expert*	The student provides a systematic mathematical justification throughout. Because the student also supports their idea mathematically for an alternative strategy on how to solve the task more efficiently, “compensate for the 'dip' of 6 units at the top…” this student achieves Expert level work. Calculations are correct that support the solution.
Communication *Expert*	The student uses an organized, sequenced, and labeled response to communicate their work. The student provides insight into the efficiency of their original strategy and defines a more efficient method for reaching the same perimeter. Formal math language is used throughout to communicate their ideas.
Connections *Expert*	The student provides a deeper understanding of the mathematics in the task as they describe their alternative strategy to solve the task faster, “compensate for the 'dip' of 6 units at the top…” Experts articulate connections between various strategies for solving the task.

Representation *Expert*	The student constructs a representation that clarifies their idea of using the perimeter of the rectangle “that this shape forms” plus the “the dip.” The construction of the two representations helps to clarify how they can each be used to solve the overall question.

Achievement Level: Expert 1

P/S	R/P	Com	Con	Rep	A/Level
E	E	E	E	E	E

Herding Cats

Is the offer of $3 190 fair for all fencing?

first I graphed the enclosure. I plotted the points given, then connected them so they formed a closed shape.

Then I measured the length (in units) of each side and added them together which ended up being 104 units (this is the perimeter.)

- 24+22+22+4+4+6+6+16 = 104

After this, I converted the perimeter into feet by multiplying 104 by 30 (30 feet per unit) I got 3,120 feet.

Next, I multiplied 3,127 by .89 ($.89 per foot of fence.) I got $2,776.80 for the final price.

Finally, I compared the original estimated price of $3,190 for the project to the actual price of $2,776.80.

$3,120 > $2776.80

Based on these findings, I decided to reject the companies original offer of $3,120 as it was not a fair price

Connection:
This year I remember graphing points and connecting them then finding the perimeter like this. I think that I would have done what I did here to find the perimeter, but there is a different way with this particular shape:

Take the side lengths of the rectangle (24×22) that this shape forms, but to compensate for the "dip" of 6 units of the top, just add 12 (6×2) to the original perimeter. You get the same answer, just faster.