Math Live – *Area and Perimeter*: Assessment Task

Grade: 5 **Strand**: Shape and Space (Measurement) **Outcome:** 2

SPECIFIC LEARNER OUTCOMES – Shape and Space (Measurement	
SS2	Design and construct different rectangles, given either perimeter or area, or both (whole numbers), and make generalizations.

PROCESSES **Communication (C), Connections (CN), Mental Mathematics and Estimation (ME), Problem Solving (PS), Reasoning (R), Technology (T), Visualization (V)**
C, CN, PS, R, V

EVIDENCE the student has achieved the outcomes

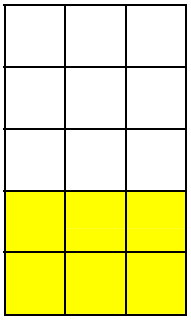
Each student will:

- Measure the effect of changing <u>one dimension</u> (length or width) of a rectangle on its perimeter.
- Through patterning, recognize that for every unit changed, the perimeter changes by twice that amount.
- Use information gathered through measuring to generalize the effect of changing one dimension of a rectangle by any given amount on its perimeter.
- Measure the effect of changing <u>one dimension</u> (length or width) of a rectangle on its area.
- Through patterning, recognize that for every unit changed, the area changes by that number of units multiplied by the other dimension.
- Use this information to generalize the effect of changing one dimension of a rectangle by any given amount on its area.

TEACHER NOTES:

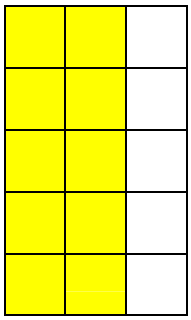
- In this assessment task, students will be asked to demonstrate their understanding of the effect of changing one dimension (length or width) of a rectangle on both its perimeter and area. They will draw a rectangular dog pen on grid paper and then explain in words the effect of decreasing the length of the dog pen by 1 unit, 2 units, and 3 units on its perimeter and on its area. Students then generalize the relationship between changing one dimension of the rectangle to its perimeter and its area.
- Students should have easy access to grid paper and tiles.
- Changing either the length or width of a rectangle changes the **perimeter** of that rectangle as follows:

Change in perimeter = (units of length or width changed) x 2



Length = 5 units
Width = 3 units
Perimeter = 16 units

Decreasing the length by 2 units decreases the perimeter by **2 units x 2** or 4 units.
Perimeter = 16 units – 4 units
= 12 units

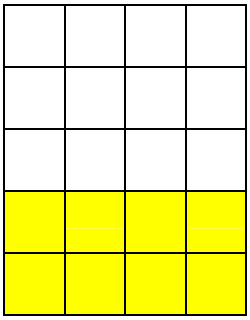


Length = 5 units
Width = 3 units
Perimeter = 16 units

Decreasing the width by 2 units decreases the perimeter by **2 units x 2** or 4 units.
Perimeter = 16 units – 4 units
= 12 units

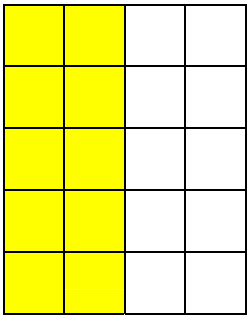
- Changing either the length or width of a rectangle changes the **area** of that rectangle as follows:

Change in area = (units of length changed) x (the width), or
Change in area = (units of width changed) x (the length)



Length = 5 square units
Width = 4 square units
Area = 20 square units

Decreasing the length by 2 units decreases the area by **2 units x width** or 8 units^2.
Area = 20 units^2 – 8 units^2
= 12 units^2

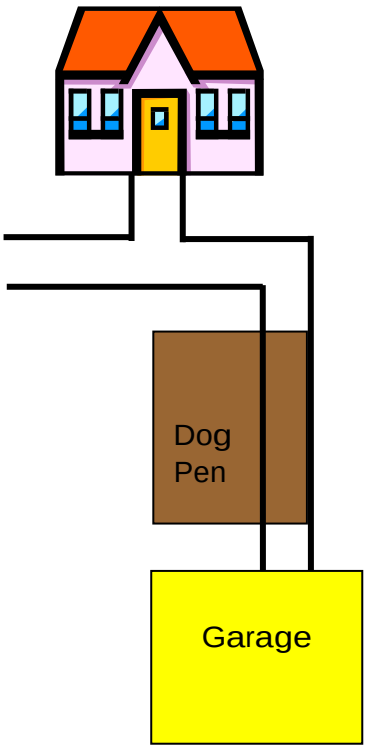


Length = 5 square units
Width = 4 square units
Area = 20 square units

Decreasing the width by 2 units decreases the area by **2 units x length** or 10 units^2.
Area = 20 units – 10 units
= 10 units^2

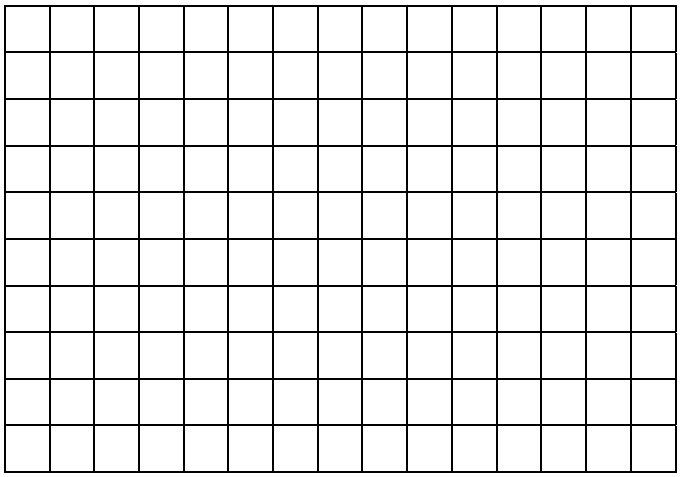
Math Live – *Area and Perimeter*: Assessment Task

You decide to build a sidewalk from your house to your garage. In order to do this, you must make the dog pen smaller.



Original Dog Pen

1. The original dog pen covered an area of 24 m^2. Draw what the original dog pen could have looked like and write the length and width. Choose your own dimensions. Calculate the perimeter of the original dog pen. Show all your work.



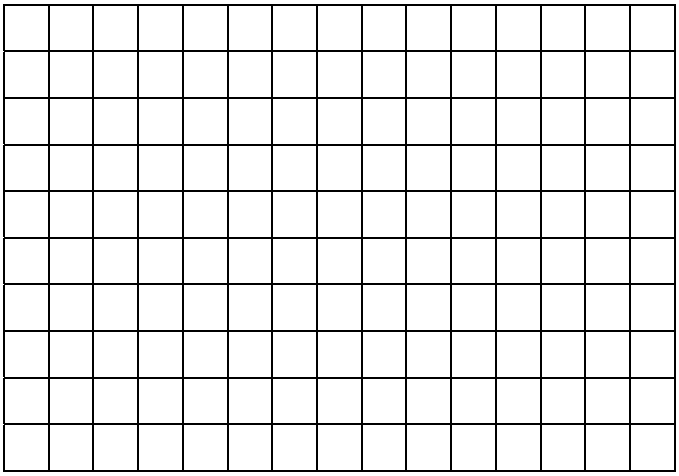
Length = _____

Width = _____

☐ = 1 m^2

Renovation of Dog Pen

2. How does decreasing the length of the dog pen by 1 m affect the perimeter of the dog run? How does decreasing the length of the dog pen by 2 m affect the perimeter of the dog run? 3 m? Show how you arrived at your answers.



3. In general, how does changing the length of any rectangle change its perimeter? Use diagrams and words to justify your answer.[1]

[1] Diagnostic Mathematics Program: Numeration Division II

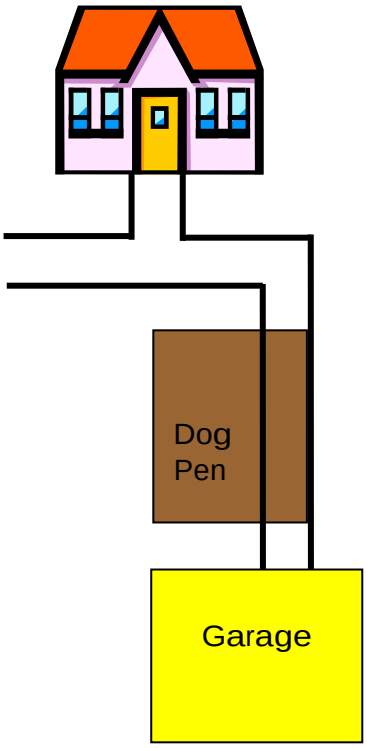
Math Live – *Area and Perimeter*: Scoring Guide

Level / Criteria	Calculates the effect of changing one dimension (length or width) of a rectangle on its perimeter and area Questions #2 and #4	Generalizes the effect of changing the dimensions of a rectangle on its perimeter Question #3	Generalizes the effect of changing the dimensions of a rectangle on its area Question #5
Wow!	Accurately calculates the decrease in perimeter and area when the length of the dog pen is decreased and clearly states this change using the correct standard units of measure	States specifically that the perimeter of a rectangle will increase or decrease by twice the number of units as the change in length	States specifically that the area of a rectangle will increase or decrease by the change in length times the width as the length is changed
Yes		States specifically that the perimeter of a rectangle will decrease by twice the number of units as the change in length	States specifically that the area of a rectangle will decrease by the change in length times the width as the length is changed
Yes, but…	Calculates the decrease in perimeter and area when the length of the dog pen is decreased and states this change without using standard units of measure	States that the perimeter of a rectangle will decrease or increase by two meters for every unit change in length	States that the perimeter of a rectangle will decrease or increase by a specific number of square metres as the length is changed
No, but…	Incorrectly calculates the decrease in perimeter and area when the length of the dog pen is decreased or fails to state this change	States generally that the perimeter simply gets smaller or bigger as the length decreases or increases	States generally that the area simply gets smaller or bigger as the length is changed
Insufficient / Blank	No score awarded due to insufficient evidence of student learning based on the requirements of the assessment task	No score awarded due to insufficient evidence of student learning based on the requirements of the assessment task	No score awarded due to insufficient evidence of student learning based on the requirements of the assessment task

Wow!

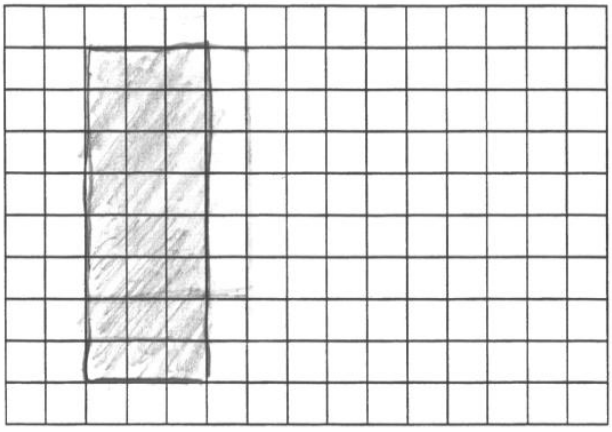
DOG PEN DILEMMA - Student Assessment Task

You decide to build a sidewalk from your house to your garage. In order to do this, you must cut into the fencing for your dog pen and make the dog run smaller.



Original Dog Pen

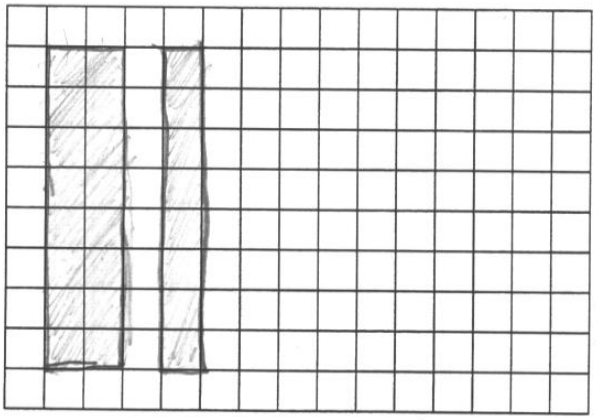
1. The original dog pen covered an area of 24 m^2. Draw what the original dog pen could have looked like and write the length and width. Choose your own dimensions. Calculate the perimeter of the original dog pen. Show all your work.



Wow!

Renovation of Dog Pen

2. How does decreasing the length of the dog pen by 1 m affect the <u>perimeter</u> of the dog run? How does decreasing the length of the dog pen by 2 m affect the perimeter of the dog run? 3 m? Show how you arrived at your responses.



A) Decreasing the length by 1m causes the perimeter to go down by 2m.

B) Decreasing the length by 2m causes the perimeter to go down by 4m.

C) Decreasing the length by 3m causes the perimeter to disapear.

D) 2m - 4m - 6m

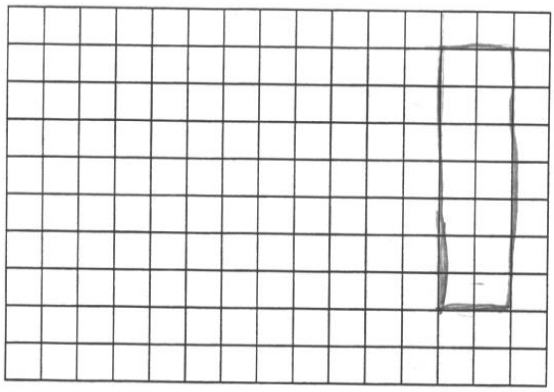
3. In general, how does changing the length of any rectangle change its perimeter? Use diagrams and words to justify your response.

Taking off one unit will make it go down 2 times more then how many units you take off

Puting on one unit will make it go up two times more then how many you put on

Wow!

4. How does decreasing the length of the dog pen by 1 m affect the area of the dog pen? What happens to the area when you decrease the length by 2 m? 3 m? Show how you arrived at your responses.



A) Decreasing the length by 1m will cause the area to go down by as many m^2 you have in the length column.

B) Decreasing the length by 2m will cause the area to go down 2 times more then the m^2 you have in the length column.

C) Decreasing the length by 3m will cause the area to go down 3 times more than the m^2 you have in the length column.

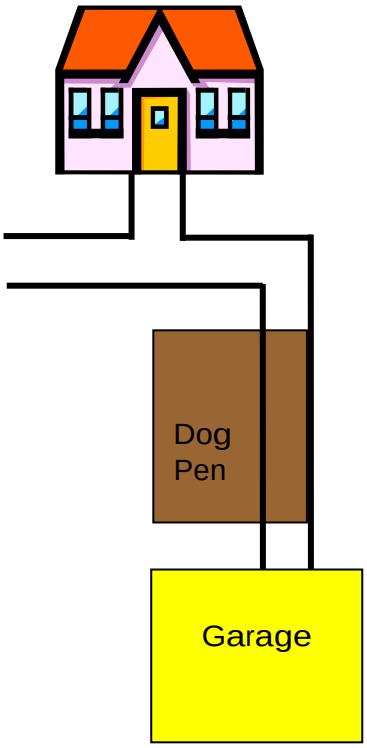
5. In general, how does changing the length of any rectangle change its area? Use diagrams and words to justify your response.

Changing the length of a rectangle will either cause it to go up or down by the change in length times the width.

Yes

DOG PEN DILEMMA - Student Assessment Task

You decide to build a sidewalk from your house to your garage. In order to do this, you must cut into the fencing for your dog pen and make the dog run smaller.



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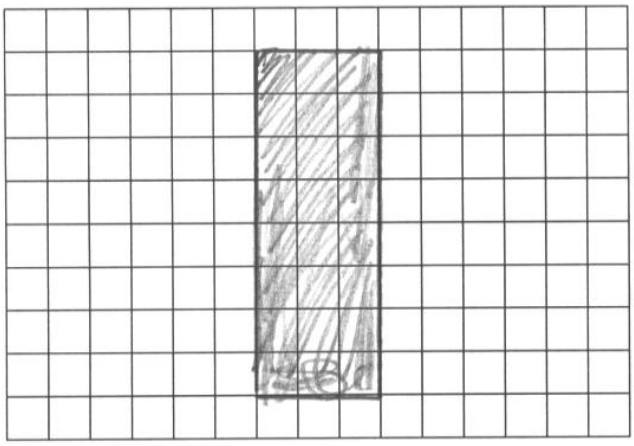
1. The original dog pen covered an area of 24 m2. Draw what the original dog pen could have looked like and write the length and width. Choose your own dimensions. Calculate the perimeter of the original dog pen. Show all your work.



Length = 8m

Width = 3m

□ = 1 m^2

Perimeter =

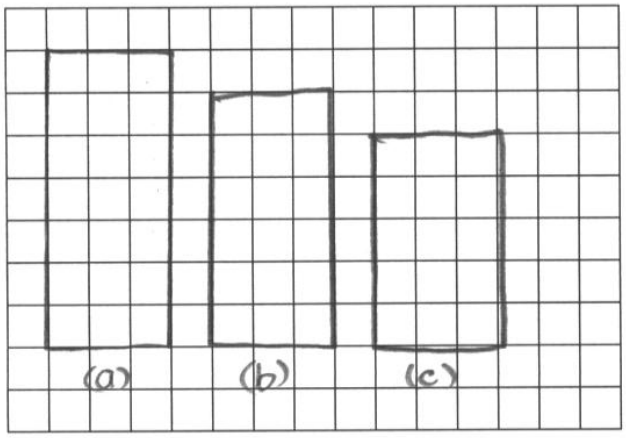
8m + 8m + 3m + 3m =

22m

Yes

Renovation of Dog Pen

2. How does decreasing the length of the dog pen by 1 m affect the <u>perimeter</u> of the dog run? How does decreasing the length of the dog pen by 2 m affect the perimeter of the dog run? 3 m? Show how you arrived at your responses.



(a) 3m + 3m + 7m + 7m = 20m

(b) 3m + 3m + 6m + 6m = 18m

(c) 3m + 3m + 5m + 5m = 16m

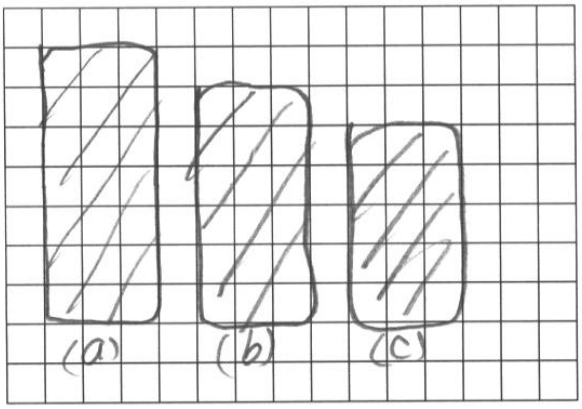
Decreasing the length by 1m decreases the perimeter by 2m each time

3. In general, how does changing the length of any rectangle change its perimeter? Use diagrams and words to justify your response.

Changing the length of any rectangle makes it smaller perimeter by 2 times the amount you take off.

Yes

4. How does decreasing the length of the dog pen by 1 m affect the <u>area</u> of the dog pen? What happens to the area when you decrease the length by 2 m? 3 m? Show how you arrived at your responses.



a) $7m \times 3m = 21m^2$

b) $6m \times 3m = 18m^2$

c) $5m \times 3m = 15m^2$

$8 \times 3 = 24$
$8 \times 2 = 16$
$8 \times 1 = 8$

The area decreases by $3m^2$ each time you take off 1m.

5. In general, how does changing the length of any rectangle change its area? Use diagrams and words to justify your response.

Changing the side by 1m decreases the area by the area of one unit of width eg.

and 2m decreases by 2x units of width and so on....

L = 8m W = 3m
Area = $24 m^2$

L = 7m W = 3m – take away
Area = $24m^2 - 3m^2 = 21m^2$

L = 6m w = 3m (take away 2 x $3m^2$)
Area = $24 m^2 - 6m^2$

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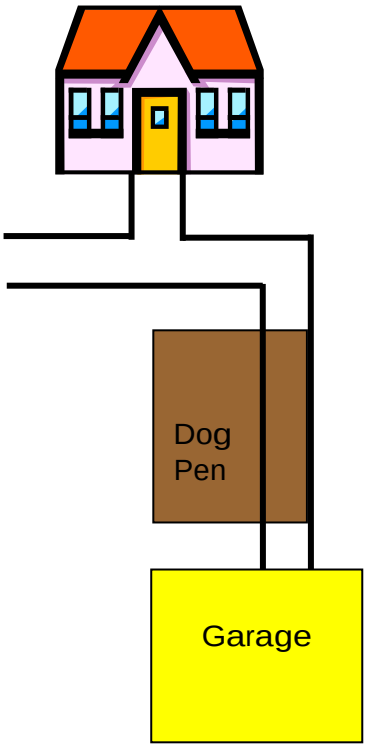

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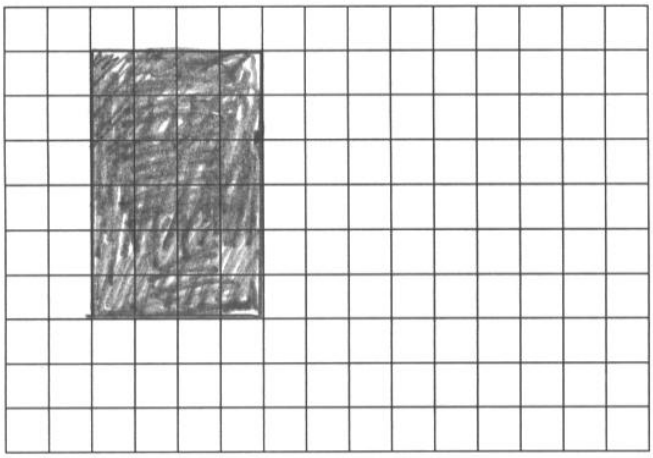


Length = 6 m^2

Width = 4 m^2

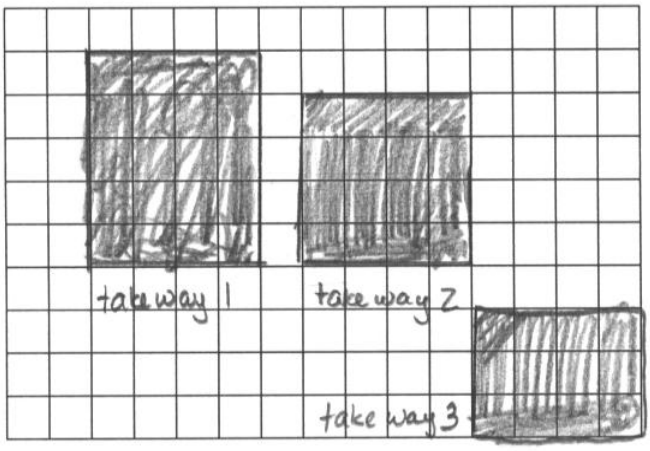
□ = 1 m^2

Perimeter =
6 + 4 + 6 + 4 = 20 m^2

Yes, but

Renovation of Dog Pen

2. How does decreasing the length of the dog pen by 1 m affect the <u>perimeter</u> of the dog run? How does decreasing the length of the dog pen by 2 m affect the perimeter of the dog run? 3 m? Show how you arrived at your responses.



Take way 1:
5+4+5+4 = 18 (2 less)

Take way 2
4+4+4+4 = 16 (4 less)

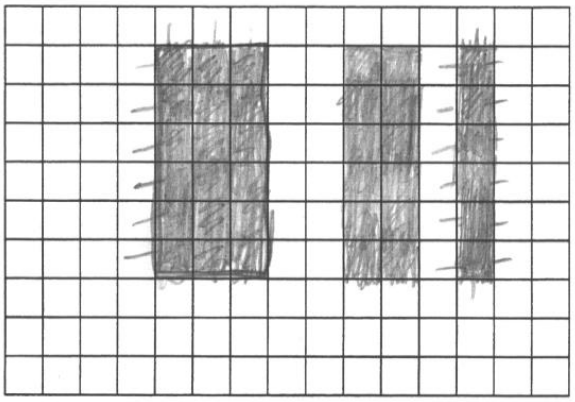
Take way 3
3+4+3+4 = 14 (6 less)

3. In general, how does changing the length of any rectangle change its perimeter? Use diagrams and words to justify your response.

Everytime you cut off 1m, the perimeter goes down by 2 m. If you add 1m, it goes up by 2 m.

Yes, but

4. How does decreasing the length of the dog pen by 1 m affect the area of the dog pen? What happens to the area when you decrease the length by 2 m? 3 m? Show how you arrived at your responses.



c) Decreasing the length by 3m caused the perimeter to become 14m.

a) Decreasing the length by 1m caused the perimeter to go down by two meters.

b) Decreasing the length by 2m causes the perimeter to become 20m.

5. In general, how does changing the length of any rectangle change its area? Use diagrams and words to justify your response.

The rectangles size will decrease. If you were to take some length off it wouldnt be as long as before.

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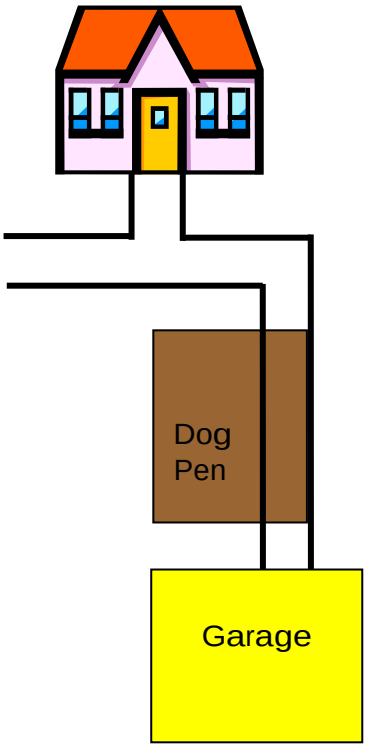

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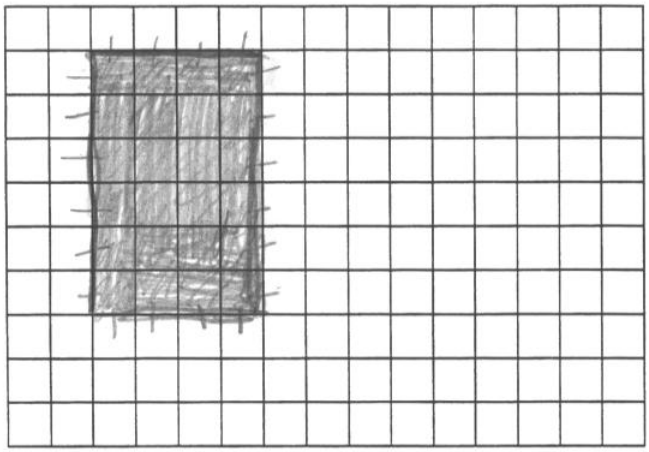


Length = 6m²

Width = 4m²

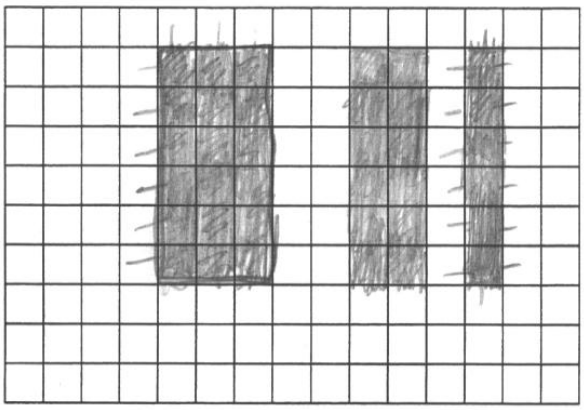
□ = 1 m²

perimeter = 20m

No, but

Renovation of Dog Pen

2. How does decreasing the length of the dog pen by 1 m affect the <u>perimeter</u> of the dog run? How does decreasing the length of the dog pen by 2 m affect the perimeter of the dog run? 3 m? Show how you arrived at your responses.



c) Decreasing the length by 3m caused the perimeter to become 14m.

a) Decreasing the length by 1m causes the perimeter to go down by two meters.

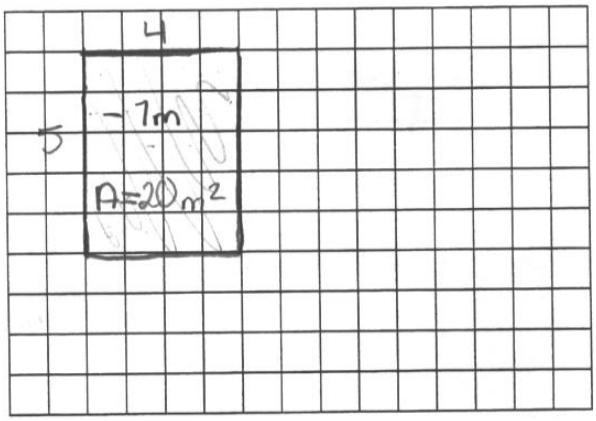
b) Decreasing the length by 2m causes the perimeter to become 20m.

3. In general, how does changing the length of any rectangle change its perimeter? Use diagrams and words to justify your response.

The rectangles size will decrease. If you were to take some length off it wouldnt be as long as before.

No, but

4. How does decreasing the length of the dog pen by 1 m affect the <u>area</u> of the dog pen? What happens to the area when you decrease the length by 2 m? 3 m? Show how you arrived at your responses.



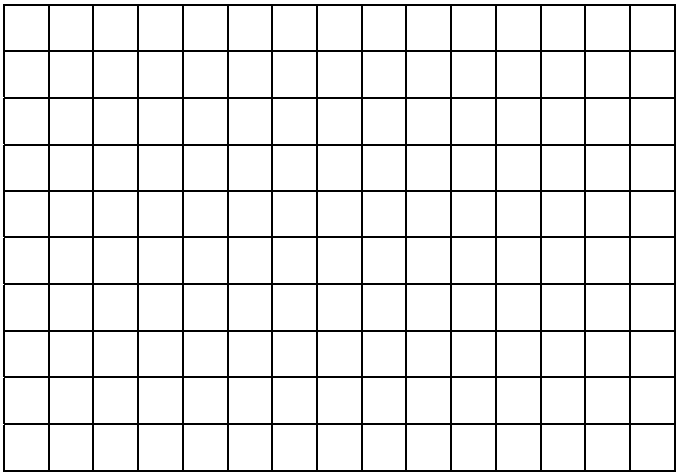
Yes, it does affect the area because the area was 24m² now it is 20m².

If you subtract more length then the area will get smaller.

5. In general, how does changing the length of any rectangle change its area? Use diagrams and words to justify your response.

If you subtract the length the area will get smaller. If you add length the area will get bigger.

4. How does decreasing the length of the dog pen by 1 m affect the area of the dog pen? What happens to the area when you decrease the length by 2 m? 3 m? Show how you arrived at your responses.



5. In general, how does changing the length of any rectangle change its area? Use diagrams and words to justify your response.