Golden Rectangles

In the 19th century, many adventurers travelled to North America to search for gold.

A man named Dan Jackson owned some land where gold had been found.

Instead of digging for the gold himself, he rented plots of land to the adventurers.





Dan gave each adventurer four wooden stakes and a rope measuring exactly 100 metres.

Each adventurer had to use the stakes and the rope to mark off a rectangular plot of land.

 Assuming each adventurer would like to have the biggest plot, how should he place his stakes? Explain your answer.

Read the following proposition:

"Tie the ropes together! You can get more land if you work together than if you work separately."

- 2. Investigate whether the proposition is true for two adventurers working together, still using four stakes.
- 3. Is the proposition true for more than two people? Explain your answer.

Follow-up task for students

Look carefully at the following extracts of work from other students. Imagine you are their teacher. Go through each piece of work and write comments on each one.

- Have they chosen a sensible method?
- Are the calculations correct?
- Are the conclusions sensible?
- Is the work easy to understand?

Name	Comments
Alvin	
Bernie	
Chria	
Chris	
Danny	
Elsie	

Now try to write out an answer that is better than all of them!

Alvin's answer

25 46 R 30 10 400 m2 10 25 20 625m2 600 m2 20 40 30 25 you want the biggest plot, IF I think you need the biggest area, so what I did was draw the rectangles and I found out out that the more equal it is the bigger the area. better to work on your It is 2 own because if you work together there will be a bigger area but you will have to half it the other person, For example, IF you combrine the ropes you will have 200m, IF you do so x so to Find the area it will be 2500m2 but you will need to half that with other person so that will give you 1250 m², so you will have more to do. so it is easier to work on your own. it is not true for mone NO 3 than 2 people, they will have 60 harder usork

Bernie's answer

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Chris's answer

25 × 25 = 625 m² D MOR DO DO DO DO DO DO DO 30 x20 = 600 m² 40 X10 = 400 m2 rectangulae He should place the states in a spines, because then he has the most land. But the eachangle need to be 30 x 20m. b With two ropes of 100 m. you can get a bigger. amount of land. Is you take 55 m x 45 m, you of more than the dubble amount of land. 55xus=2175. 2475m2:2 = 1237.5m2 0 Cyes, be cause you can make the plot of land bigger in that way everyone has more land If the plot of land is So x to, the land is stop m? 5600 m2:3 = 1866.67 - 1866.7 m2 per person. That is more land

Danny's answer

The should place his stakes in a square to give the biggest area like this 625m25 25 25 2) If two adventurers work together they will have 200m of rope so they can make a square twice as long and 25 25 while. 25 25 = 4x area 25 25 25 15 This is much better than 2x area. 3 If three work together they will have 300 m of rope so they can make a square three times as long and wide 25 25 25 =9x area 25 25 25 This is much better than 3x area I think that the area goes up by square involvers each time.

Elsie's answer

a. 4 x 25 metres -> area = 25 x 25 = 625 m2 2×20 & $2 \times 30 \rightarrow 0$ (eq. = 20 × 30 = 600 m² 2×10 & $2 \times 40 \rightarrow area = 10 \times 40 = 400 \text{ m}^2$ So 41 x 25 metres would make the biggest ofer b 2 x 100 metres of Rope = 200 m. 4 x 50 metres -> area = 50 x 50 = [2500 m] 2 x 20 & 2 x 00 -> area = 20 x 00 = 1600 m2 2 × 30 & 2 × 70 -> acea = 30 × 70 = 2100 m2 2 × 40 & 2 × 60 - alea = 40 × 60 = 2400 m2 $2 \times 10 \quad \text{B} \ 2 \times \text{gp} \rightarrow \text{area} = 10 \times \text{go} = \text{goo} \ \text{m}^2$ So the proposition is the working together will deliver much more land to dig for gold. C FOR example. 300 matries of \$ Rope 4 x 75 metres - area = 75.75 = 5625 m² So how longer the rope is how bigger the land will be 1400 metres of rope (4 people working together) (4 × 100 metres → area = 100 100 = 10000 m²

Progression in key processes

			Representing	Analysing	Interpreting and evaluating	Communicating
			The student draws one or two rectangles with a perimeter of 100m.	The student works out the areas of their rectangles correctly.	The student draws several rectangles but not a square and the justification is incorrect or omitted.	The work is communicated adequately, but there are gaps and/or omissions.
	PROGRESSION	7	Draws several rectangles.	Calculates the areas of their rectangles and attempts to come to some generalisation.	Realises that different shapes have different areas but comes to incorrect or incomplete conclusion.	The work is communicated clearly and the reasoning may be followed.
			Draws several, correct rectangles for an adventurer working alone and for 2 working together. May draw far too many rectangles.	Calculates the areas correctly and finds that a square is best for 1 adventurer and that 2 working together do better than alone.	Attempts to give some explanation for their findings.	The work is communicated clearly and the reasoning may be easily followed.
	\bigvee		Draws an appropriate number of rectangles and collects the data in an organised way.	Calculates the correct areas, finds that a square is best for 1 adventurer and that 2 working together do better than alone. Finds a rule or pattern in their results.	Gives reasoned explanations for their findings.	Explains work clearly and may consider other shapes.