LAB 04 QUESTIONS

QUESTION 1

Look at the lab page, and compare the figure at the top to the Geogebra model of the gutter. Notice that the figure at the top is labeled in inches, but the Geogebra figure does not indicate units. How does the change in units affect the problem?

○ Since the figure in inches and the figure without dimensions are similar, the same angle will give the maximum area in either case.

○ The angle will have to be divided by a scaling factor

○ The angle will have to be multiplied by a scaling factor

○ When units aren't indicated we can assume they are in centimeters, because the metric system is more scientific.

0.5 points

QUESTION 2

Refer to the Geogebra model. What area does the model give for the angle size 90°? Report the number, without units.

○ Somewhere between 13.2 and 14.6

○ Somewhere between 14.0 and 14.7

○ Somewhere between 15.5 and 15.8

○ Somewhere between 15.9 and 16.1

○ Somewhere between 16.5 and 17.0

1 points

QUESTION 3

What area does the Geogebra model give for the angle size 30°?

○ $12.2 < area < 12.7$

○ $13.4 < area < 14.0$

○ $14.7 < area < 15.1$

○ $15.2 < area < 15.7$

○ $15.7 < area < 16.1$

1 points

QUESTION 4

What is the largest that angle BOA can be before the model breaks down ? (Hint: it is impossible for the gutter material to pass through itself.) Report the number of degrees to the nearest whole degree.

QUESTION 5

What is the cross sectional area of the gutter exactly if the angle x is 30°? (You will have to do some geometry--the model does not report exact measures.)

○

○

○

○

○

QUESTION 6

What is the cross sectional area exactly if the the angle x is 45°?

○

○

○

○ 16

○

QUESTION 7

Develop a formula that uses trigonometric functions to give the cross sectional area as a function of the angle x. (Hint: decompose the trapezoid that is the gutter cross section as a rectangle and two triangles.)

○ $16*\sin(x)*\cos(x)+ 16*\cos(x)$

○ $16*\sin(x)*\cos(x) + 16*\sin(x)$

○ $16*\sin(x)*\cos(x) + 8*\cos(x)$

○ $16*\sin(x)*\cos(x) + 8*\sin(x)$

○ $8*\sin(x)*\cos(x) + 16*\cos(x)$

○ 8*sin(*x*)*cos(*x*) + 16*sin(*x*)

QUESTION 8

Use the graphing utility to plot the function you found in the previous question. What value of the angle x makes the area a maximum according to the graph of the function you found? Answer to the nearest hundredth. (Hint: Look for the smallest positive angle. The grapher reports the answer in radians, not degrees, so give your answer as a number in radians.)

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QUESTION 9

Convert the size of the angle that yields the maximum area from radians to degrees. Report the answer to the nearest degree.

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QUESTION 10

What is the maximum cross sectional area of the gutter in square inches? Report the number to three decimal places (nearest thousandth), without units (Use the grapher: the number reported by Geogebra is not accurate enough to answer this question. You will need to zoom in to get the necessary accuracy.)

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