

Answers

Step 1: The belfry of the rebel city

The first bell rings when the sun is at a 20° angle. It corresponds to 9:12. It is 12 minutes late.

The second bell rings when the sun is at a 70° angle. It corresponds to 12:40. It is 40 minutes late.

The third bell rings when the sun is at a 140° angle. It corresponds to 16:48. It is 12 minutes early.

Step 2: The city hall gardens

The area of one inner square is 81m^2 . The area of one outer square is 100m^2 .

The area of one border is 19m^2 .

Step 3: A walk on the walls

Point A is about 1.3km away from point D.

This drive takes 3 minutes and 54 seconds + 3 minutes to stop for red lights, 6 minutes and 54 seconds in total.

Point B is about 0.9km away from point D.

Walking to that point would take 10 minutes and 48 seconds.

Point C is about 1.4km away from point D.

Cycling there takes 5 minutes and 36 seconds + 100 seconds for changing streets, 7 minutes and 16 seconds in total.

Step 4: The dome of the cathedral

The perimeter of the circle is about 147,58m.

There are 16 windows of equal size plus a 1-meter-wide column between each. $147,58/16=9,2$. Since each column is 1 meter wide, the windows are approximately 8,2 meters wide.

There are 3 panes on each window. Each pane is about $8,2/3=2,7\text{m}$ wide, and therefore $2,7*2=5,4\text{m}$ high. Since the windows are 7 panes high, they are $5,4*7=37,8\text{m}$ high.

Step 5: A trace of Egypt in the north of France

Perimeters (from the base): 16m ; 14m ; 12m ; 10m ; 8m ; 6m.

Areas (from the base): 16m^2 ; $12,25\text{m}^2$; 9m^2 ; $6,25\text{m}^2$; 4m^2 ; $2,25\text{m}^2$

The second cuboid is $49/64$ of the first one.

The third is $36/49$ of the second.

The fourth is $25/36$ of the third.

The fifth is $16/25$ of the fourth.

The sixth is $7/16$ of the fifth.

Funded by the European Union. View and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Project code: 2022-1-FR01-KA220-SCH-000090275



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