



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.

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