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| **Topic 1: Number and Algebra**  | **Geometric Sequences and Series** |
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| * 1. When a ball bounces, it reaches 90% of the height reached on the previous bounce. If the ball is initially dropped at 5 meters, find the height the ball reaches after the 5th bounce.
	2. Find the number of bounces it would take to no longer reach a height of 2 meters.
	3. Find the total distance the ball travels
 | (2 marks)(2 marks)(3 marks) |
| Mark scheme:1. height $=5\*0.90^{5}$

height $=2.95 $meters1. $5\*0.90^{n}<2$

$$0.90^{n}<0.4$$$$n>log\_{0.90}0.4$$$$n>8.69672…$$$$n=9$$1. Method 1:Recognizing this as a geometric series to infinity

First term of $5\*0.90$Common ratio $=0.90$Recognizing the need to double the distance and add $5$Total Distance: $2\left(\frac{5\*0.90}{1-0.90}\right)+5=95$ metersMethod 2:Recognizing this as a geometric series to infinityFirst term of $5$Common Ratio $=0.90$Recognizing the need to double the distance and subtract $5$Total Distance: $2\left(\frac{5}{1-0.90}\right)-5=95$ meters | (A1)(A1)(M1)(A1)(A1)(M1)(M1)(A1)(M1)(M1)(A1) |