Wandering Epicycle Addendum

3 January 2022

Jim Stevenson

First, this problem is dealt with in more detail and more expansively on the Mathologer Youtube website by Burkard Polster in his 7 December 2018 post on the "Secrets of the Nothing Grinder" (Figure 1).[1] A further, deeper discussion of epicycles is given in the Mathologer's 6 July 2018 post on "Epicycles, complex Fourier and Homer Simpson's orbit" (Figure 2).[2] And finally, a panoply of related puzzles is given in the 30 December 2021 Mathologer post "The 3-4-7 miracle. Why is this one not super famous" (Figure 3).[3]

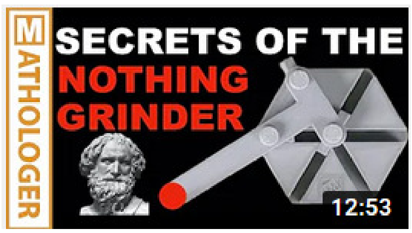

Figure 1

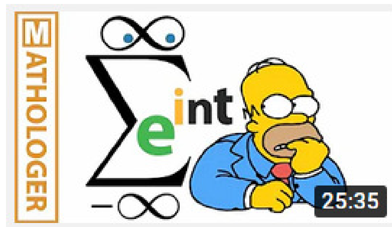

Figure 2

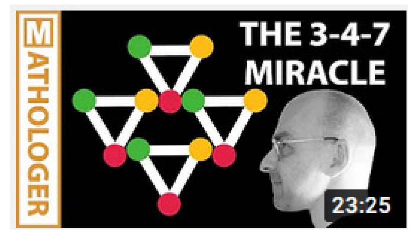

Figure 3

This last post reveals the ambiguity of the idea of "one full (360°) rotation" I disingenuously added to the problem to try to get the answer of 14 given in Math Calendar version.

As Polster shows in his "3-4-7" post and seems the more natural definition, a full rotation should restore the *orientation* of the circle to its original position, namely, with the point P at the top. In this sense, a full "rotation" would put the inner circle back on top, making the length of the path of the point P be 2x14 = 28. I tried to finesse the situation by looking at the rotation of the radius of the inner circle, somewhat as shown in Figure 4. But since the path of P is the diameter of the large circle and not the curved, red dashed line, this would be misleading.

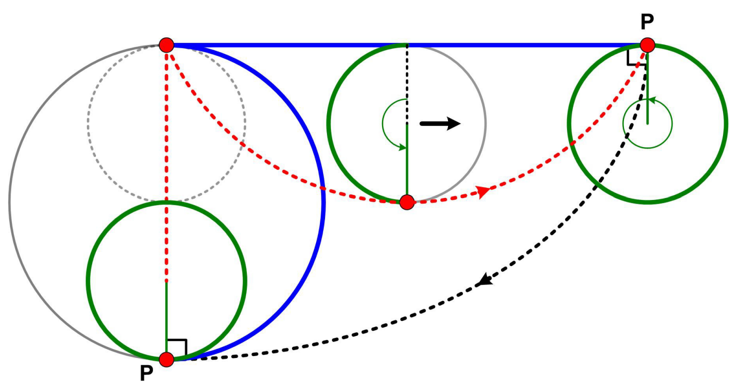

Figure 4

Still, some ambiguity remains. Perhaps a clearer definition of "full rotation" would have helped.

---

[1] https://www.youtube.com/watch?v=7Fn-26Jmi5E
[2] https://www.youtube.com/watch?v=qS4H6PEcCCA
[3] https://www.youtube.com/watch?v=oEN0o9ZGmOM