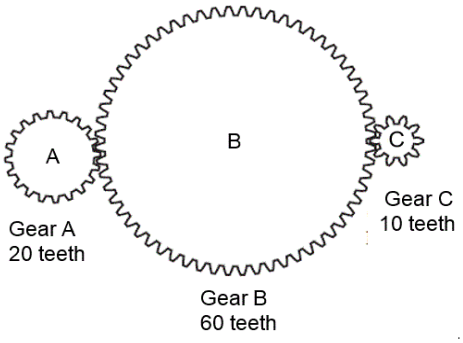
Solutions for JULY '23 LOGIC Challenges

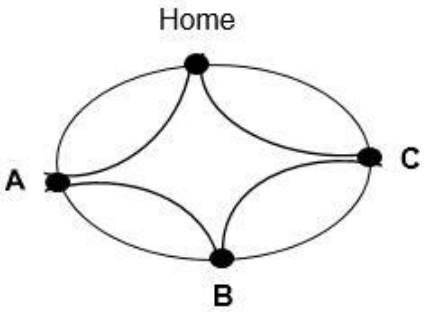
1. The turning of Gear A causes Gears B and C to turn as well. If Gear A is rotated by the motor at a rate of 100 rpm, what is the number of revolutions per minute for Gear C?



Solutions:

Since Gear A has 20 teeth and Gear B has 60 teeth, the gear ratio for Gears A and B is 20:60. Thus the ratio of the number of revolutions per minute (rpm) for the two gears is 60:20, or 3:1. Similarly, since Gear B has 60 teeth and Gear C has 10 teeth, the gear ratio for Gears B and C is 60:10, and the ratio of the rpms for the two gears is 10:60. Therefore, if Gear A turns at 100 rpm, then Gear B turns at 100/3 rpm, and
Gear C turns at (100/3) x 6 = 200 rpm.

2. Tatum has to visit towns A, B and C in any order. Some new roads are now available for connecting these towns with her Home as shown on the diagram below. How many different routes can she now take starting from Home and returning to Home, going through towns A, B and C in any order, but not more than once through each and not travelling any road twice on the same route?



Solution: CW (16) + CCW (16) = 32 routes

Going clockwise (CW) from Home through towns C, B & A. there is now a two-road option to C, followed by a two-road option to B, a further option of a two more roads to A, and finally a two-road option back to Home.. Thus, the number of different routes that Tatum can take going CW is equal to 2 x 2 x 2 x 2 = 16 different routes.