

Problem 1 - How many times does Ganymede orbit Jupiter in the time it takes Europa to orbit six times?

Answer: The information says that Europa orbits once when Ganymede orbits $1/2$ times, so $1 \times \text{Europa} = 1/2 \times \text{Ganymede}$ and so $2 \times \text{Europa} = 1 \times \text{Ganymede}$. If Europa orbits 6 times, then $3 \times (2 \times \text{Europa}) = 3 \times (1 \times \text{Ganymede})$, and so **Ganymede orbits 3 times.**

Problem 2 - How many times does Leda orbit Jupiter in the time it takes Ganymede to orbit Jupiter 6 times?

Answer: Leda orbits once when Ganymede orbits 34 times, so $1 \times \text{Leda} = 34 \times \text{Ganymede}$, so $1 \times \text{Ganymede} = 1/34 \times \text{Leda}$. So $6 \times (1 \times \text{Ganymede}) = 6 \times (1/34 \times \text{Leda})$ so Leda goes only $6/34$ or **$3/17$** of the way around its orbit in the time it takes Ganymede to go 6 times around in its orbit.

Problem 3 - How many orbits will Thelxinoe have to orbit Jupiter before Kalyke orbits exactly five times?

Answer: $5 \times \text{Leda} = 2 \times \text{Thelxinoe}$
so $\text{Leda} = 2/5 \text{ Thelxinoe}$

also $3 \times \text{Leda} = 1 \times \text{Kalyke}$
so $\text{Leda} = 1/3 \text{ Kalyke}$,

then in the same orbit time as for Leda, $2/5 \text{ Thelxinoe} = 1/3 \text{ Kalyke}$,
and $\text{Thelxinoe} = (5/2 \times 1/3) \text{ Kalyke}$
so $\text{Thelxinoe} = 5/6 \text{ Kalyke}$,

and so $6 \times \text{Thelxinoe} = 5 \times \text{Kalyke}$
then if Kalyke orbits 5 times, **Thelxinoe orbits 6 times.**