3D Time: From Transportation to Physics
Part 6: Orbits

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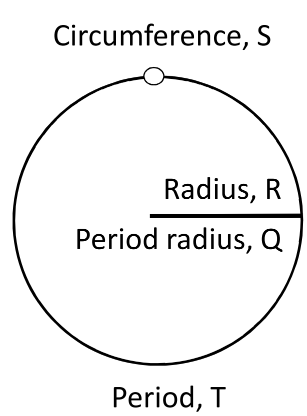
Orbits and rotations

- In space and time
  - Circumference S and radius R
  - Period T and period radius Q
- Circle
  - $2\pi = S/R$
  - angle $\theta = s/R$
- Cycle
  - $Q = T/2\pi$
  - $2\pi = T/Q$
  - period angle $\phi = t/Q$



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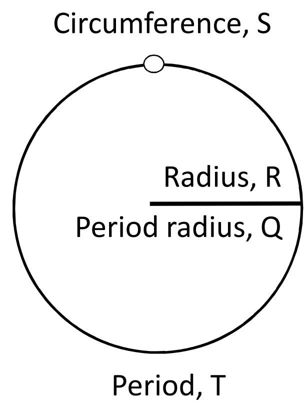
Orbits in space

- Linear speed, $v = ds/dt = S/T$
- Frequency, $f = 1/T$
  - If S = 1, then $v = f$
- Angular velocity, $\omega = d\theta/dt$
  - If R = 1, then $v = \omega$
- Units: m/s, rpm, cps, Hz
- Independent variable is time
  - dependent variable is angle in space



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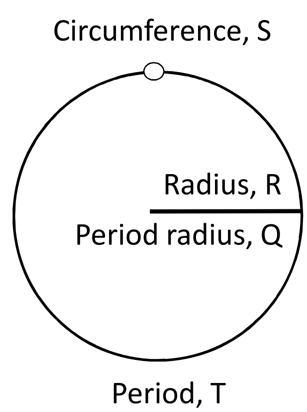
Orbits in time

- Linear pace, $u = dt/ds = T/S$
- *Circuncy*, $h = 1/S$
  - if T = 1, then $u = h$
- Angular legerity, $\psi = d\phi/ds$
  - if Q = 1, then $u = \psi$
- Units: s/m, circuits/km
- Independent variable is length
  - dependent variable is angle in time



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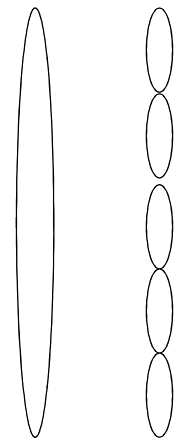
Circuncy

- Number of circuits per unit distance
- Alice has a 2 km commute
  - Each day her circuncy is 0.5 circuit/km
  - Each week her circuncy is 0.1 circuit/km
- Bart has a 10 km commute
  - Each day his circuncy is 0.1 circuit/km
- So Alice's weekly circuncy equals Bart's daily circuncy



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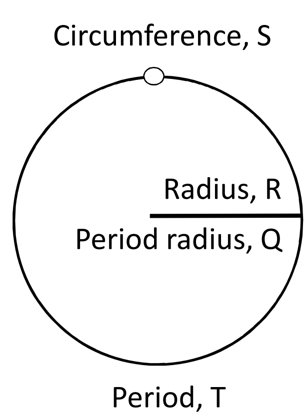
Acceleration & expedience

- Tangential velocity
  - $v = \mathrm{d}s/\mathrm{d}t = S/T$
- Tangential legerity
  - $u = \mathrm{d}t/\mathrm{d}s = T/S$
- Centripetal acceleration
  - $a = \Delta v/T = 2\pi v/T = v^2/R$
- *Centrifugal* expedience
  - $b = \Delta u/S = 2\pi u/S = u^2/Q$



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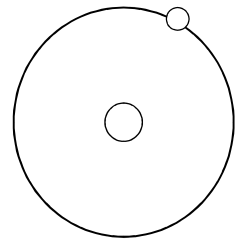
Circular orbits in space

- Assume three propositions:
1. Each planet orbits the Sun in a circular path with radius R (and circumference S).
2. The Sun is at the center of mass of each planet's orbit.
3. The speed of each planet is constant.



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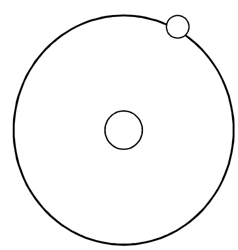
Orbits in space

- Centripetal acceleration: $a = v^2/R$
  - eliminate v
  - $a \propto R/T^2$
- From Kepler's 3rd law:
  - the semi-major axis, (A) = R,
  - is related as: $T^2 \propto R^3$
- Combine: $a \propto 1/R^2$
- Inverse square law in space



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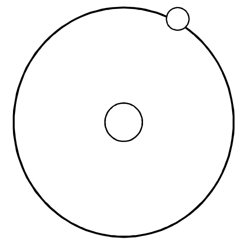
Orbits in space

- From Newton's 2nd law:
  - F = ma ∝ m/R²
- From Newton's 3rd law:
  - F = Ma ∝ M/R²
- Combine:
  - F ∝ mM/R²
  - F = GmM/R²
- Newton's force of gravitation



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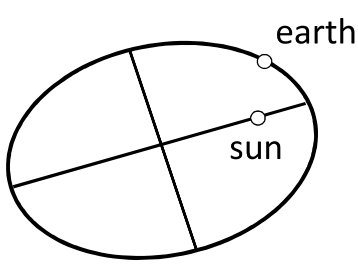
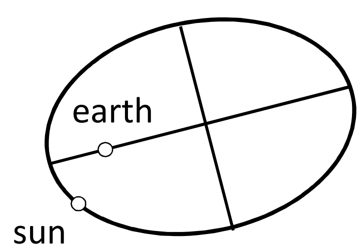
Switch reference frames

sun at focus



3D space

earth at focus



3D time

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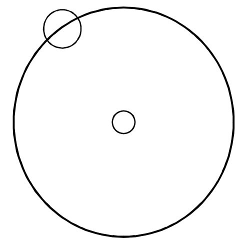
Circular orbits in time

- Exchange space and time variables
- Assume three opposite propositions:

1. The Sun orbits each planet in a circular *3D time* path with *period* T (and period radius Q).
2. Each planet is at the center of vass of their orbit.
3. The *pace* of the Sun is constant.



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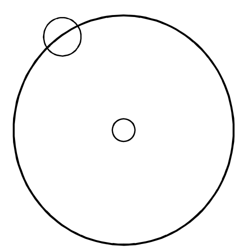
Orbits in time

- Centripetal expedience: $b = u^2/Q$
  - $b \propto Q/S^2$ or $b \propto T/S^2$
- From Kepler's 3rd law *for 3D time*:
  - the *period* semi-major axis, (C) = Q,
  - is related as: $S^2 \propto Q^3$
  - or $S^2 \propto T^3$
- Combine: $b \propto 1/T^2$
- Inverse square law in 3D time



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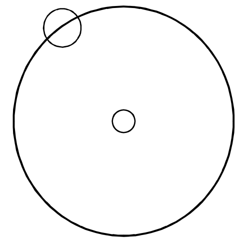
Orbits in time

- From Newton's 2nd law for 3D time:
  - H = n*b* ∝ n/T^2
- From Newton's 3rd law for 3D time:
  - H = N*b* ∝ N/T^2
- Combine:
  - H ∝ nN/T^2
  - H = LnN/T^2
- Rush of levitation
  - direction is toward the smaller body



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In conclusion

- Exchange space & time
- Orbits and rotations
  - Circular orbits
- Inverse square law
  - Law of gravitation
  - Law of levitation
- Next is *Part 7: Relativity*

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