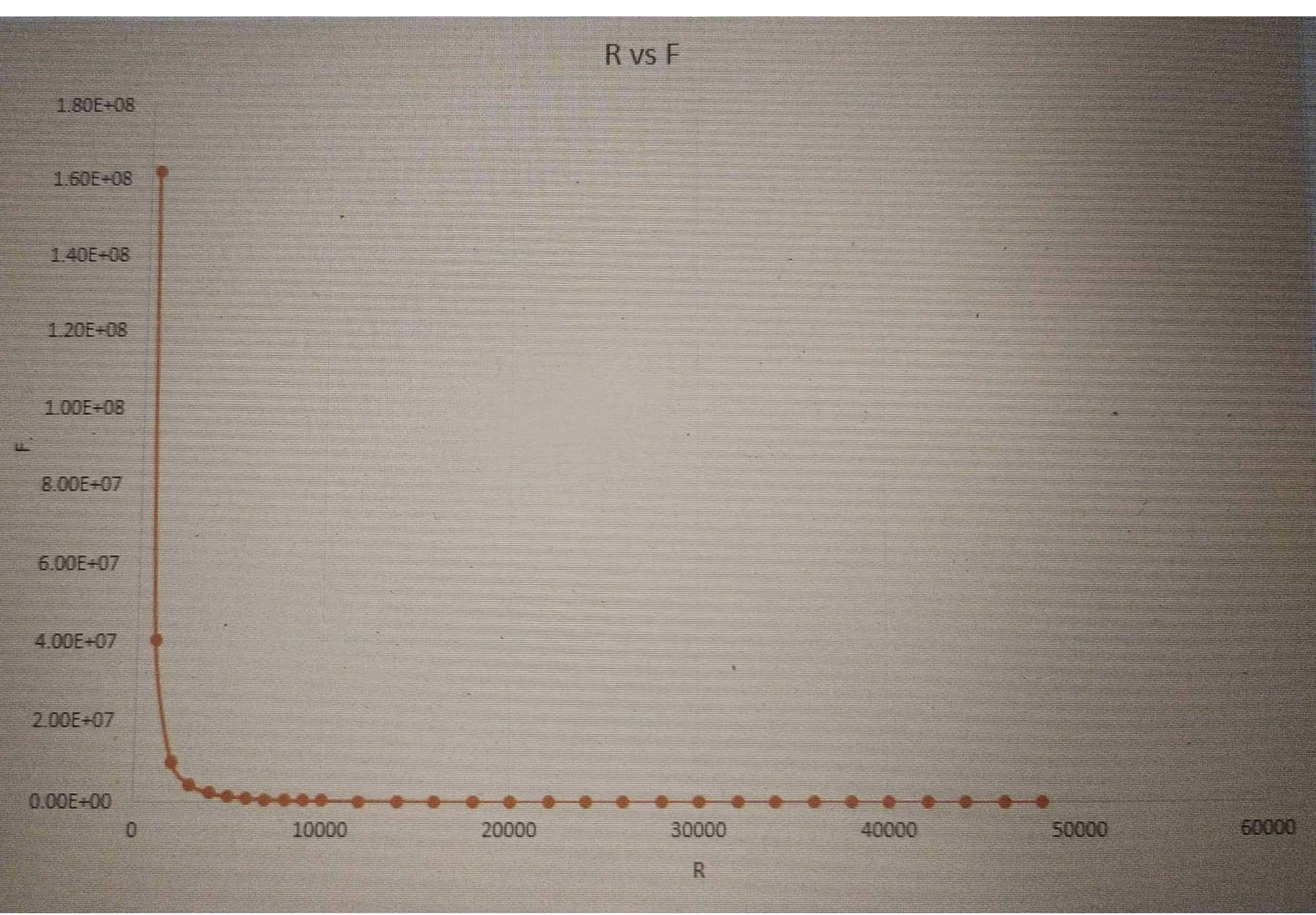
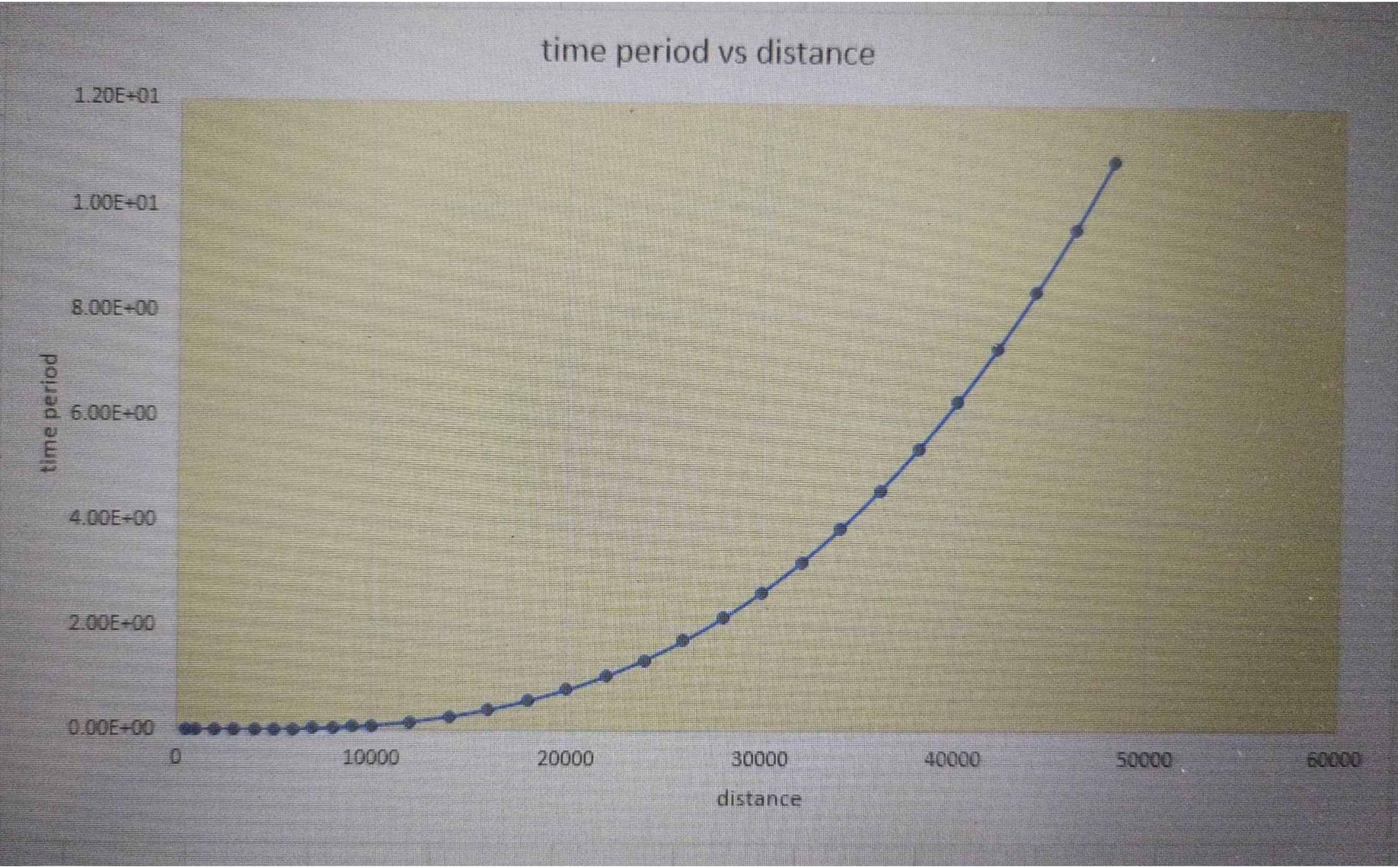
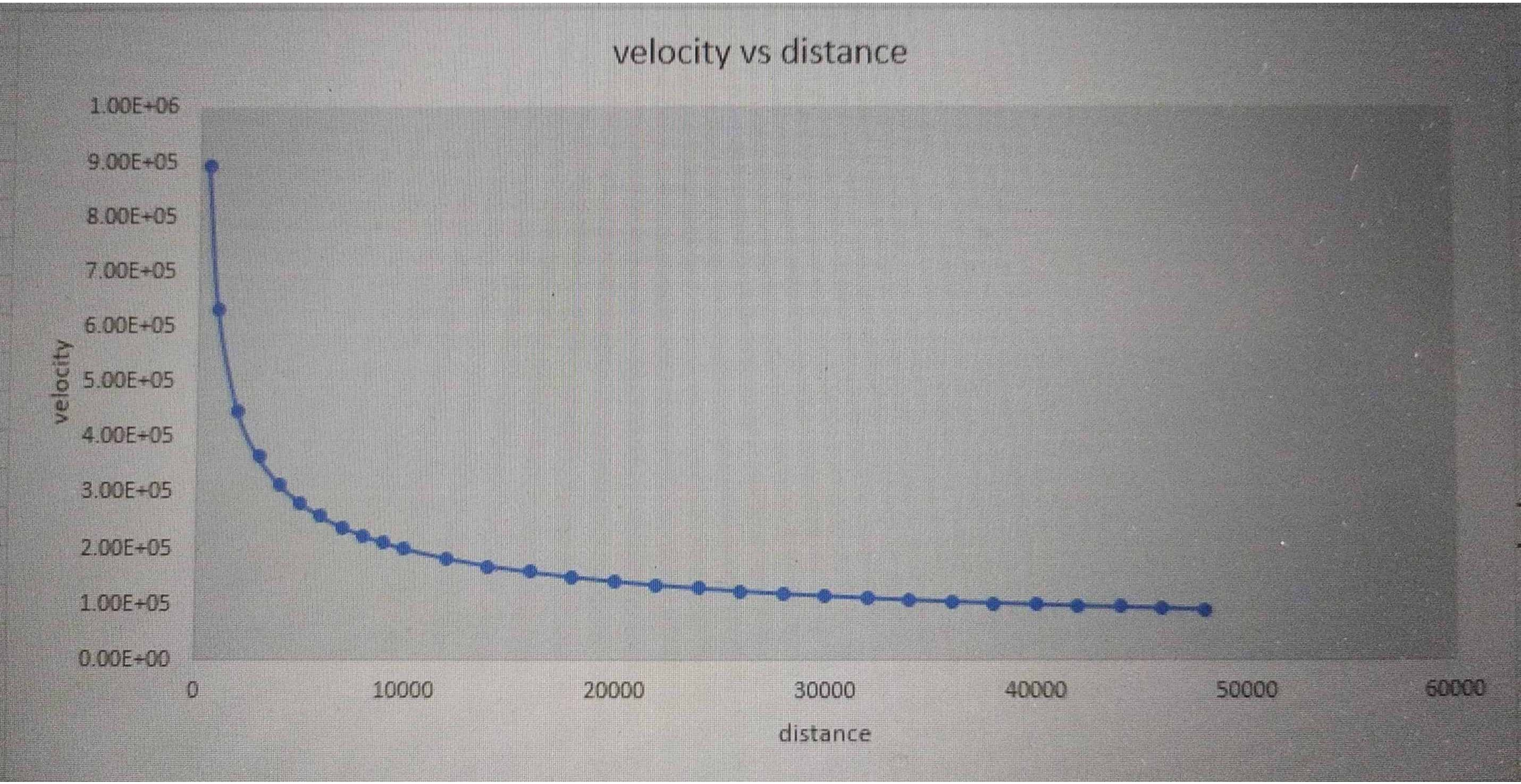
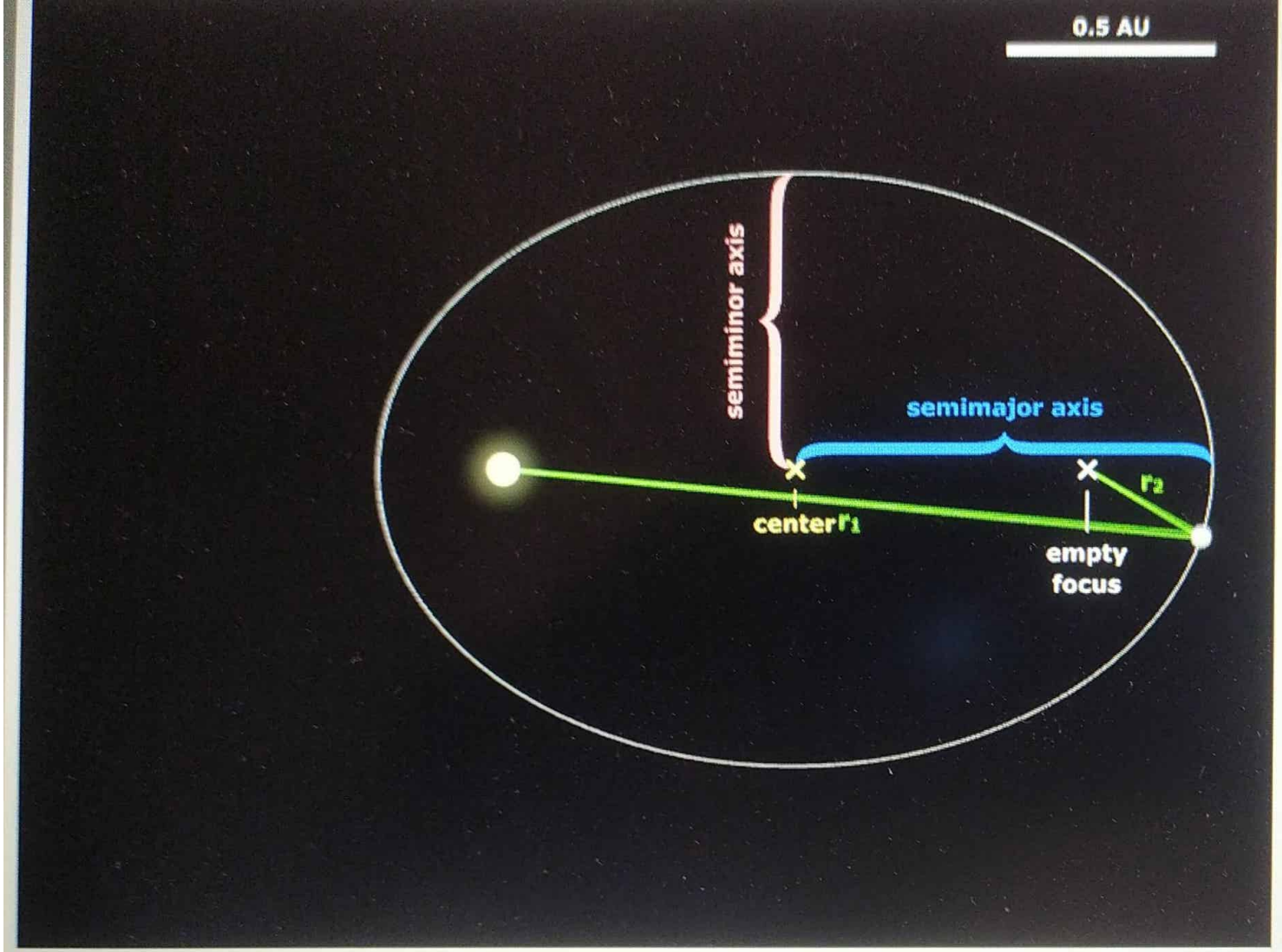
variables			Values
1	dependent	F	
2	independent	R	
3	constants	G	6.67E-11
		M1	1.02E-01
		M2	5.97E+24

R (in meters)	F $F = \frac{G M_1 M_2}{R^2}$	P^2 $P^2 = \frac{4\pi^2}{GM_E} R^3$	V $V = \sqrt{\frac{GM_E}{R}}$
500	1.62E+08	1.24E-05	8.92E+05
1000	4.06E+07	9.90E-05	6.31E+05
2000	1.02E+07	7.92E-04	4.46E+05
3000	4.51E+06	2.67E-03	3.64E+05
4000	2.54E+06	6.34E-03	3.16E+05
5000	1.62E+06	1.24E-02	2.82E+05
6000	1.13E+06	2.14E-02	2.58E+05
7000	8.29E+05	3.40E-02	2.39E+05
8000	6.35E+05	5.07E-02	2.23E+05
9000	5.01E+05	7.22E-02	2.10E+05
10000	4.06E+05	9.90E-02	2.00E+05
12000	2.82E+05	1.71E-01	1.82E+05
14000	2.07E+05	2.72E-01	1.69E+05
16000	1.59E+05	4.06E-01	1.58E+05
18000	1.25E+05	5.78E-01	1.49E+05
20000	1.02E+05	7.92E-01	1.41E+05
22000	8.39E+04	1.05E+00	1.35E+05
24000	7.05E+04	1.37E+00	1.29E+05
26000	6.01E+04	1.74E+00	1.24E+05
28000	5.18E+04	2.17E+00	1.19E+05
30000	4.51E+04	2.67E+00	1.15E+05
32000	3.97E+04	3.25E+00	1.12E+05
34000	3.51E+04	3.89E+00	1.08E+05
36000	3.13E+04	4.62E+00	1.05E+05
38000	2.81E+04	5.43E+00	1.02E+05
40000	2.54E+04	6.34E+00	9.98E+04
42000	2.30E+04	7.34E+00	9.74E+04
44000	2.10E+04	8.44E+00	9.51E+04
46000	1.92E+04	9.64E+00	9.30E+04
48000	1.76E+04	1.10E+01	9.11E+04


R vs F
1.80E+08
1.60E+08
1.40E+08
1.20E+08
1.00E+08
8.00E+07
6.00E+07
4.00E+07
2.00E+07
0.00E+00
F
0
10000
20000
30000
40000
50000
60000
R


time period vs distance
1.20E+01
1.00E+01
8.00E+00
6.00E+00
4.00E+00
2.00E+00
0.00E+00
time period
0
10000
20000
30000
40000
50000
60000
distance


velocity vs distance
1.00E+06
9.00E+05
8.00E+05
7.00E+05
6.00E+05
5.00E+05
4.00E+05
3.00E+05
2.00E+05
1.00E+05
0.00E+00
velocity
0
10000
20000
30000
40000
50000
60000
distance



Orbit Settings

set parameters for: Earth OK

semimajor axis (AU) 1.00

eccentricity 0.700

Animation Controls

pause animation

animation rate (yrs/s) 0.10

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law

Newtonian Features

- [x] show empty focus
- [x] show center
- [x] show semiminor axis
- [x] show semimajor axis
- [x] show radial lines

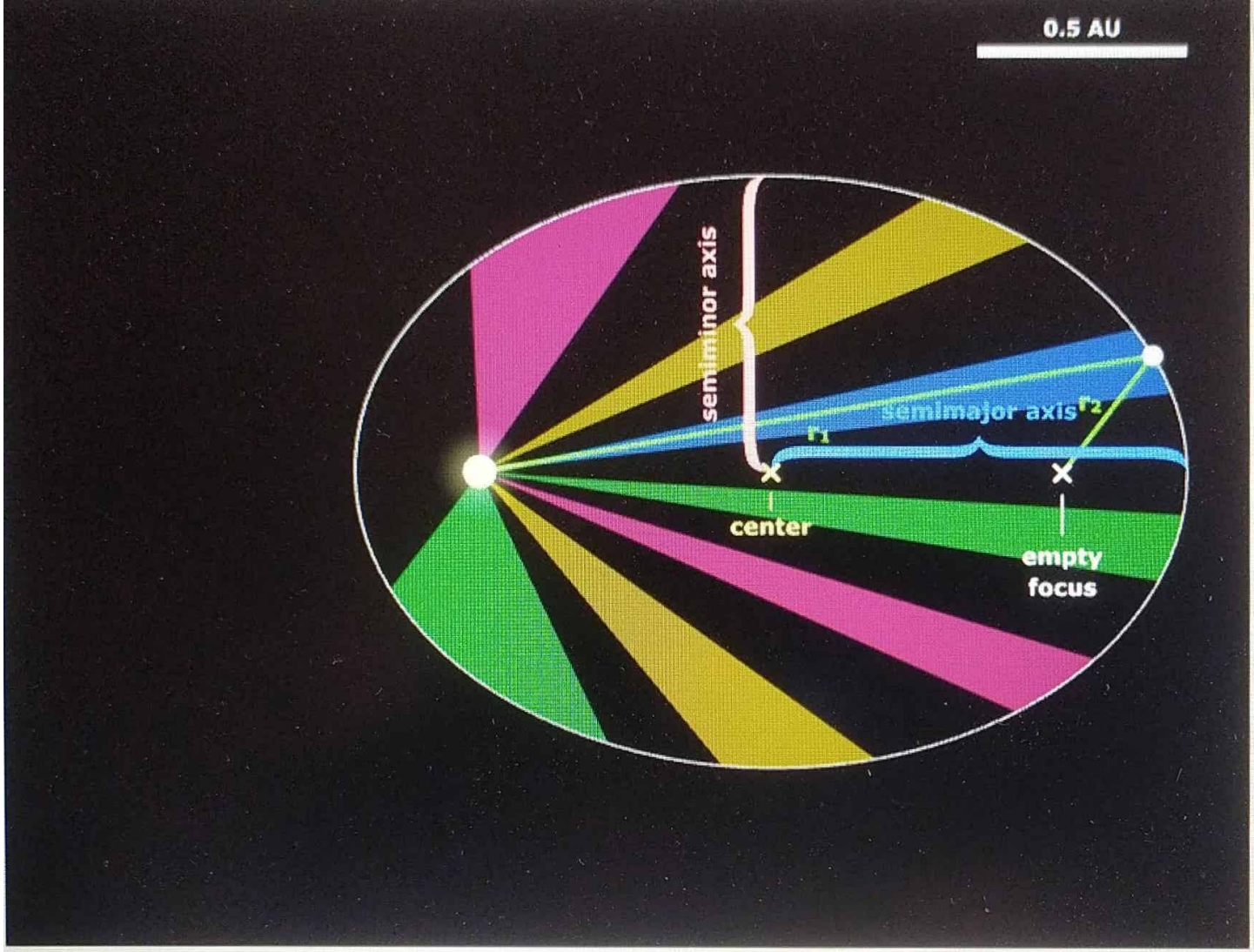
$r_1 + r_2 = 2 \times a$

1.68 AU + 0.317 AU = 2.00 AU

Visualization Options

- [ ] show solar system orbits
- [ ] show solar system planets
- [ ] label the solar system orbits
- [ ] show grid

clear optional features



Orbit Settings

set parameters for: Earth OK

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eccentricity 0.700

Animation Controls

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Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law

Newtonian Features

start sweeping

erase sweeps

sweep continuously

use sound effect

adjust size:

a fractional sweep size of

$\frac{1}{16}$ (or 6.3%)

corresponds to sweep duration of

0.0625 years

and a sweep area of

0.140 sq AU

Visualization Options

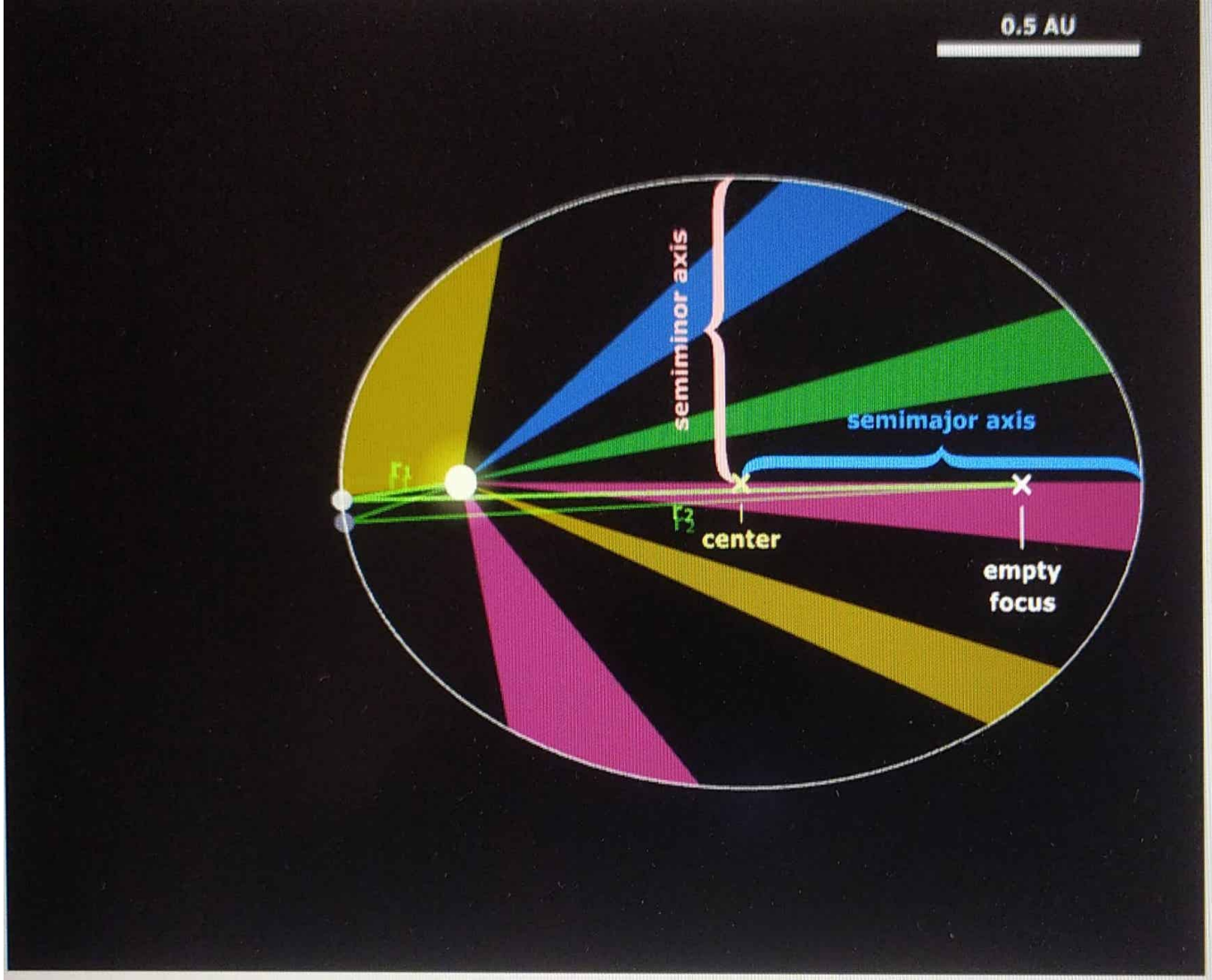
show solar system orbits

show solar system planets

label the solar system orbits

show grid

clear optional features



Orbit Settings

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eccentricity 0.700

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animation rate (yrs/s) 0.10

Visualization Options

- [ ] show solar system orbits
- [ ] show solar system planets
- [ ] label the solar system orbits
- [ ] show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law

Newtonian Features

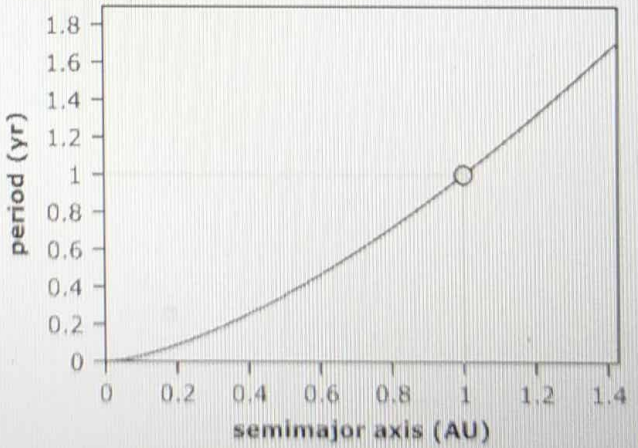
$P^2 = a^3$

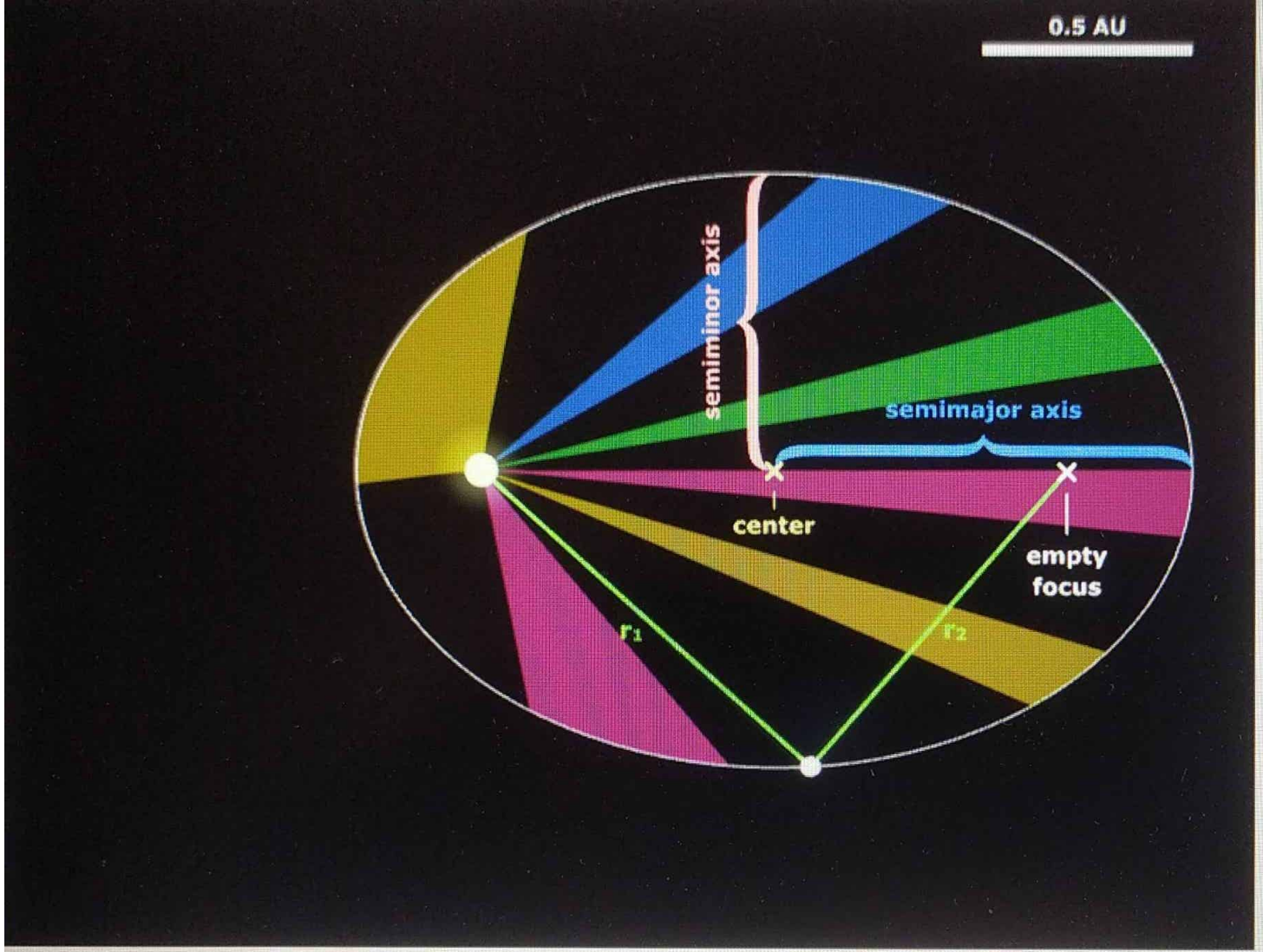
$(1.00)^2 = (1.00)^3$

$= 1.00$

plot type:

- (•) linear
- ( ) logarithmic





Orbit Settings

set parameters for: Earth OK

semimajor axis (AU) 1.00

eccentricity 0.700

Animation Controls

pause animation

animation rate (yrs/s) 0.10

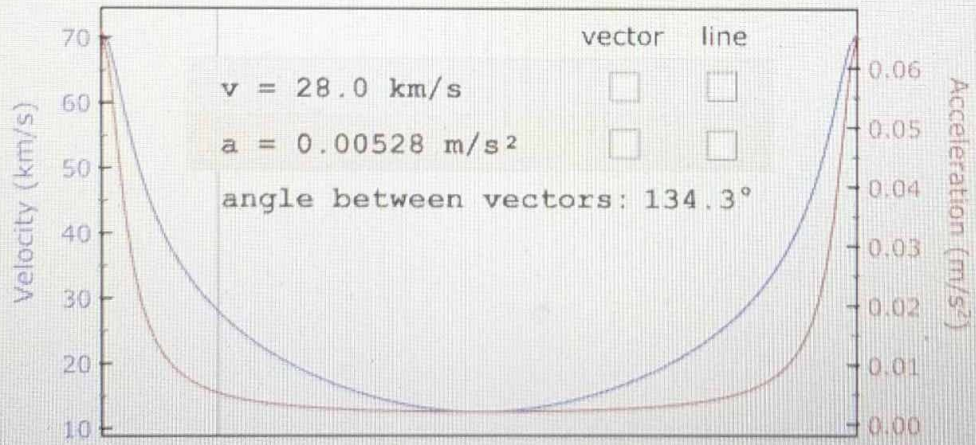
Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law

Newtonian Features