
Contents**Phase portrait illustration, slowing pendulum**

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The velocity and position of a pendulum, against time

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The velocity and position of a pendulum, take time off any axis

<http://www.dannydorling.org/>

Metadata

The tables and graphs in this file correspond to those in Slowdown-Fig5. The difference between this one and Fig5 is that here the pendulum is more 'real' as it would not have a perpetual motion, but would slow down to stop at some point due to the natural friction in the air. For further information of how it is drawn, please see https://wikipedia.org/wiki/File:Pendulum_phase_portrait_illustration.svg

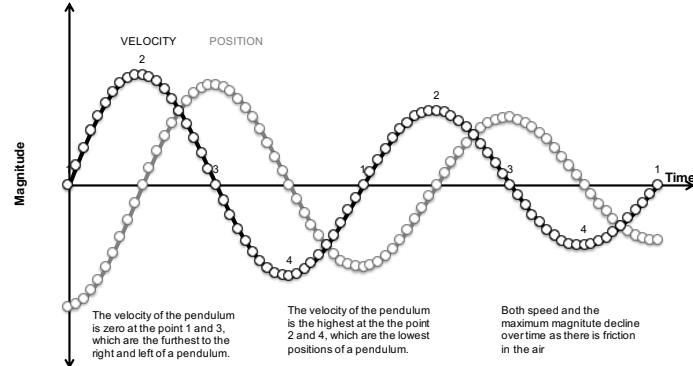
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The velocity and position of a pendulum, against time

Source: An imaginary pendulum
 Maximum magnitude 1.0
 Friction (damping coefficient) 0.1

Observation date	Velocity	Position	Label
1	0.00	-1.00	1
1.1	0.15	-0.98	
1.2	0.30	-0.93	
1.3	0.44	-0.86	
1.4	0.56	-0.78	
1.5	0.67	-0.67	
1.6	0.76	-0.55	
1.7	0.83	-0.42	
1.8	0.88	-0.29	
1.9	0.90	-0.14	
2	0.90	0.00	2
2.1	0.88	0.14	
2.2	0.84	0.27	
2.3	0.78	0.40	
2.4	0.70	0.51	
2.5	0.61	0.61	
2.6	0.50	0.69	
2.7	0.38	0.75	
2.8	0.26	0.79	
2.9	0.13	0.82	
3	0.00	0.82	3
3.1	-0.13	0.80	
3.2	-0.25	0.76	
3.3	-0.36	0.71	
3.4	-0.46	0.64	
3.5	-0.55	0.55	
3.6	-0.62	0.45	
3.7	-0.68	0.35	
3.8	-0.72	0.23	
3.9	-0.74	0.12	
4	-0.74	0.00	4
4.1	-0.72	-0.11	
4.2	-0.69	-0.22	
4.3	-0.64	-0.33	
4.4	-0.58	-0.42	
4.5	-0.50	-0.50	
4.6	-0.41	-0.56	
4.7	-0.31	-0.62	
4.8	-0.21	-0.65	
4.9	-0.11	-0.67	
5	0.00	-0.67	1
5.1	0.10	-0.66	
5.2	0.20	-0.62	
5.3	0.30	-0.58	
5.4	0.38	-0.52	
5.5	0.45	-0.45	
5.6	0.51	-0.37	
5.7	0.56	-0.28	
5.8	0.59	-0.19	
5.9	0.61	-0.10	
6	0.61	0.00	2
6.1	0.59	0.09	
6.2	0.57	0.18	
6.3	0.52	0.27	
6.4	0.47	0.34	
6.5	0.41	0.41	
6.6	0.34	0.46	
6.7	0.26	0.50	
6.8	0.17	0.53	
6.9	0.09	0.55	
7	0.00	0.55	3
7.1	-0.08	0.54	
7.2	-0.17	0.51	
7.3	-0.24	0.47	
7.4	-0.31	0.43	
7.5	-0.37	0.37	
7.6	-0.42	0.30	
7.7	-0.46	0.23	
7.8	-0.48	0.16	
7.9	-0.50	0.08	
8	-0.50	0.00	4
8.1	-0.49	-0.08	
8.2	-0.46	-0.15	
8.3	-0.43	-0.22	
8.4	-0.39	-0.28	
8.5	-0.33	-0.33	
8.6	-0.27	-0.38	
8.7	-0.21	-0.41	
8.8	-0.14	-0.44	
8.9	-0.07	-0.45	
9	0.00	-0.45	1

The movement of a pendulum against the time
 (The velocity and position of the slowing pendulum)



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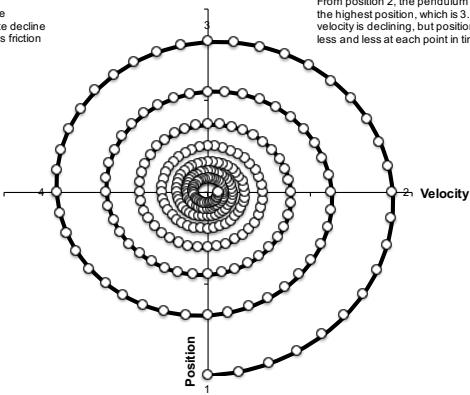
The velocity and position of a pendulum, take time off any axis

Source: An imaginary pendulum
 Maximum magnitude 1.0
 Friction (damping coefficient) 0.1

Observation date	Velocity	Position	Label
1	0.00	-1.00	1
1.1	0.15	-0.98	
1.2	0.30	-0.93	
1.3	0.44	-0.86	
1.4	0.56	-0.78	
1.5	0.67	-0.67	
1.6	0.76	-0.55	
1.7	0.83	-0.42	
1.8	0.88	-0.29	
1.9	0.90	-0.14	
2	0.90	0.00	2
2.1	0.88	0.14	
2.2	0.84	0.27	
2.3	0.78	0.40	
2.4	0.70	0.51	
2.5	0.61	0.61	
2.6	0.50	0.69	
2.7	0.38	0.75	
2.8	0.26	0.79	
2.9	0.13	0.82	
3	0.00	0.82	3
3.1	-0.13	0.80	
3.2	-0.25	0.76	
3.3	-0.36	0.71	
3.4	-0.46	0.64	
3.5	-0.55	0.55	
3.6	-0.62	0.45	
3.7	-0.68	0.35	
3.8	-0.72	0.23	
3.9	-0.74	0.12	
4	-0.74	0.00	4
4.1	-0.72	-0.11	
4.2	-0.69	-0.22	
4.3	-0.64	-0.33	
4.4	-0.58	-0.42	
4.5	-0.50	-0.50	
4.6	-0.41	-0.56	
4.7	-0.31	-0.62	
4.8	-0.21	-0.65	
4.9	-0.11	-0.67	
5	0.00	-0.67	
5.1	0.10	-0.66	
5.2	0.20	-0.62	
5.3	0.30	-0.58	
5.4	0.38	-0.52	
5.5	0.45	-0.45	
5.6	0.51	-0.37	
5.7	0.56	-0.28	
5.8	0.59	-0.19	
5.9	0.61	-0.10	
6	0.61	0.00	
6.1	0.59	0.09	
6.2	0.57	0.18	
6.3	0.52	0.27	
6.4	0.47	0.34	
6.5	0.41	0.41	
6.6	0.34	0.46	
6.7	0.26	0.50	
6.8	0.17	0.53	
6.9	0.09	0.55	
7	0.00	0.55	
7.1	-0.08	0.54	
7.2	-0.17	0.51	
7.3	-0.24	0.47	
7.4	-0.31	0.43	
7.5	-0.37	0.37	
7.6	-0.42	0.30	
7.7	-0.46	0.23	
7.8	-0.48	0.16	
7.9	-0.50	0.08	
8	-0.50	0.00	
8.1	-0.49	-0.08	
8.2	-0.46	-0.15	
8.3	-0.43	-0.22	
8.4	-0.39	-0.28	
8.5	-0.33	-0.33	
8.6	-0.27	-0.38	
8.7	-0.21	-0.41	
8.8	-0.14	-0.44	
8.9	-0.07	-0.45	
9	0.00	-0.45	
9.1	0.07	-0.44	
9.2	0.14	-0.42	
9.3	0.20	-0.39	
9.4	0.25	-0.35	
9.5	0.30	-0.30	
9.6	0.34	-0.25	
9.7	0.37	-0.19	
9.8	0.39	-0.13	
9.9	0.41	-0.06	
10	0.41	0.00	
10.1	0.40	0.06	
10.2	0.38	0.12	
10.3	0.35	0.18	
10.4	0.32	0.23	
10.5	0.27	0.27	
10.6	0.23	0.31	
10.7	0.17	0.34	
10.8	0.12	0.36	
10.9	0.06	0.37	
11	0.00	0.37	
11.1	-0.06	0.36	
11.2	-0.11	0.34	
11.3	-0.16	0.32	
11.4	-0.21	0.29	
11.5	-0.25	0.25	
11.6	-0.28	0.20	
11.7	-0.31	0.16	
11.8	-0.32	0.10	
11.9	-0.33	0.05	
12	-0.33	0.00	
12.1	-0.33	-0.05	

**The movement of a pendulum without the time
 (The velocity and position of the slowing pendulum)**

Both speed and the maximum magnitude decline over time as there is friction in the air



From position 2, the pendulum decelerates to the highest position, which is 3. Hence, the velocity is declining, but position is rising, just less and less at each point in time.

12.2	-0.31	-0.10
12.3	-0.29	-0.15
12.4	-0.26	-0.19
12.5	-0.22	-0.22
12.6	-0.18	-0.25
12.7	-0.14	-0.28
12.8	-0.09	-0.29
12.9	-0.05	-0.30
13	0.00	-0.30
13.1	0.05	-0.29
13.2	0.09	-0.28
13.3	0.13	-0.26
13.4	0.17	-0.23
13.5	0.20	-0.20
13.6	0.23	-0.17
13.7	0.25	-0.13
13.8	0.26	-0.09
13.9	0.27	-0.04
14	0.27	0.00
14.1	0.27	0.04
14.2	0.25	0.08
14.3	0.24	0.12
14.4	0.21	0.15
14.5	0.18	0.18
14.6	0.15	0.21
14.7	0.12	0.23
14.8	0.08	0.24
14.9	0.04	0.25
15	0.00	0.25
15.1	-0.04	0.24
15.2	-0.07	0.23
15.3	-0.11	0.21
15.4	-0.14	0.19
15.5	-0.17	0.17
15.6	-0.19	0.14
15.7	-0.20	0.10
15.8	-0.22	0.07
15.9	-0.22	0.04
16	-0.22	0.00
16.1	-0.22	-0.03
16.2	-0.21	-0.07
16.3	-0.19	-0.10
16.4	-0.17	-0.13
16.5	-0.15	-0.15
16.6	-0.12	-0.17
16.7	-0.09	-0.19
16.8	-0.06	-0.20
16.9	-0.03	-0.20
17	0.00	-0.20
17.1	0.03	-0.20
17.2	0.06	-0.19
17.3	0.09	-0.17
17.4	0.11	-0.16
17.5	0.14	-0.14
17.6	0.15	-0.11
17.7	0.17	-0.09
17.8	0.18	-0.06
17.9	0.18	-0.03
18	0.18	0.00
18.1	0.18	0.03
18.2	0.17	0.06
18.3	0.16	0.08
18.4	0.14	0.10
18.5	0.12	0.12
18.6	0.10	0.14
18.7	0.08	0.15
18.8	0.05	0.16
18.9	0.03	0.16
19	0.00	0.17
19.1	-0.03	0.16
19.2	-0.05	0.15
19.3	-0.07	0.14
19.4	-0.09	0.13
19.5	-0.11	0.11
19.6	-0.13	0.09
19.7	-0.14	0.07
19.8	-0.15	0.05
19.9	-0.15	0.02
20	-0.15	0.00
20.1	-0.15	-0.02
20.2	-0.14	-0.05
20.3	-0.13	-0.07
20.4	-0.12	-0.08
20.5	-0.10	-0.10
20.6	-0.08	-0.11
20.7	-0.06	-0.12
20.8	-0.04	-0.13
20.9	-0.02	-0.14
21	0.00	-0.14
21.1	0.02	-0.13
21.2	0.04	-0.13
21.3	0.06	-0.12
21.4	0.08	-0.11
21.5	0.09	-0.09
21.6	0.10	-0.07
21.7	0.11	-0.06
21.8	0.12	-0.04
21.9	0.12	-0.02
22	0.12	0.00
22.1	0.12	0.02
22.2	0.11	0.04
22.3	0.11	0.05
22.4	0.10	0.07
22.5	0.08	0.08
22.6	0.07	0.09
22.7	0.05	0.10
22.8	0.03	0.11
22.9	0.02	0.11
23	0.00	0.11
23.1	-0.02	0.11
23.2	-0.03	0.10
23.3	-0.05	0.10
23.4	-0.06	0.09
23.5	-0.07	0.07
23.6	-0.08	0.06
23.7	-0.09	0.05
23.8	-0.10	0.03
23.9	-0.10	0.02
24	-0.10	0.00
24.1	-0.10	-0.02
24.2	-0.09	-0.03

24.3	-0.09	-0.04
24.4	-0.08	-0.06
24.5	-0.07	-0.07
24.6	-0.06	-0.08
24.7	-0.04	-0.08
24.8	-0.03	-0.09
24.9	-0.01	-0.09
25	0.00	-0.09
25.1	0.01	-0.09
25.2	0.03	-0.08
25.3	0.04	-0.08
25.4	0.05	-0.07
25.5	0.06	-0.06
25.6	0.07	-0.05
25.7	0.08	-0.04
25.8	0.08	-0.03
25.9	0.08	-0.01
26	0.08	0.00
26.1	0.08	0.01
26.2	0.08	0.02
26.3	0.07	0.04
26.4	0.06	0.05
26.5	0.06	0.06
26.6	0.05	0.06
26.7	0.03	0.07
26.8	0.02	0.07
26.9	0.01	0.07
27	0.00	0.07
27.1	-0.01	0.07
27.2	-0.02	0.07
27.3	-0.03	0.06
27.4	-0.04	0.06
27.5	-0.05	0.05
27.6	-0.06	0.04
27.7	-0.06	0.03
27.8	-0.07	0.02
27.9	-0.07	0.01
28	-0.07	0.00
28.1	-0.07	-0.01
28.2	-0.06	-0.02
28.3	-0.06	-0.03
28.4	-0.05	-0.04
28.5	-0.05	-0.05
28.6	-0.04	-0.05
28.7	-0.03	-0.06
28.8	-0.02	-0.06
28.9	-0.01	-0.06
29	0.00	-0.06
29.1	0.01	-0.06
29.2	0.02	-0.06
29.3	0.03	-0.05
29.4	0.03	-0.05
29.5	0.04	-0.04
29.6	0.05	-0.03
29.7	0.05	-0.03
29.8	0.05	-0.02
29.9	0.05	-0.01
30	0.06	0.00