

Chapter 1

Slipping Between Falling Drops

(Motion)

Here are the references and web links for the stories in the book. **Recently added references are highlighted.** For updates to those stories and for all the new stories, go to the following:

Chap 1 archives part A (1-51)

<http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=37>

Chap 1 archives part B (56-97)

<http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=51>

Chap 1 archives part C (109-151)

<http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=50>

Chap 1 archives part D (162-199)

<http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=49>

Chap 1 archives part E (200-209)

<http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=48>

Chap 1 archives part F (210-end)

Jan

2015

1.1 Run or walk in the rain?

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.abc.net.au/science/k2/moments/gmis9749.htm> An essay about running in the rain (the audio control does not seem to work any more)

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1.2 Traffic platoons and gridlock

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.laobserved.com/images/chinatraffic.jpg>

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1.3 Shock waves on the freeway

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.amasci.com/amateur/traffic/traffic1.html> Discussion of traffic waves

<http://www.uh.edu/engines/epi433.htm> Audio and transcript by John H. Lienhard from *Engines of Our Ingenuity* radio program. Home page for the programs and information about his books:
<http://www.uh.edu/engines/engines.htm>

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1.4 Minimum trailing distance for a car

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1.5 Running a yellow light

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1.6 Spin out during hard braking

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1.7 To slide or not to slide

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1.8 Skidding to a stop

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1.9 Short Story: Some records for skid marks

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http://www.bluebird-electric.net/spirit_of_america_1.htm Discussion of the Spirit of American and its crash at the end of the record-setting skid marks

http://www.bluebird-electric.net/bluebird_images/spirit_of_america_crash.jpg Photo of the crash, nose down in the salt water

<http://jalopnik.com/cars/jet/> Jet powered cars, including a beetle!

<http://www.ugofadini.com/omicron10story.html> Discussion and photos of the Infinity jet car, including photo after the crash

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1.10 Woodpeckers and big-horn sheep and concussion

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=ULRtdk-3Yh4&mode=related&search=> National Geographic video: bighorn sheep clashing horns (but there is also the mating aftermath)

<http://www.dcwild.com/images/Backyard/Downy-Woodpecker%201.jpg>

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1.11 Short Story: The game of g's

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=RUBE125ege0> The film that got the producer in deep trouble. Here is information about the film: <http://www.rendezvousdvd.com/>

<http://www.youtube.com/watch?v=9ZDqzgvtdits&mode=related&search=> From 0 to 100 miles per hour and back to 0 in 9.4 seconds

<http://www.youtube.com/watch?v=JTIG2FsXQVk&mode=related&search=> Rocket sled at Holloman Air Force Base: 10430 km/h (real fast!)

<http://www.youtube.com/watch?v=uyDuVCxA5qY&mode=related&search=> Rocket sled runs (water trough used as a brake)

<http://www.autoprancing.com/AboutOurTeam.htm> A contrast between an early dragster and a modern one

<http://www.musclegcars.faketrix.com/car-crashes-auto-accidents-wrecks-picture-5.htm> Funny car on fire

<http://www.youtube.com/watch?v=j451KAvCUTQ&mode=related&search=> Dragster undergoes flip over

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1.12 Head-on car collision

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=RfaSOy3OZvc> Video. Stark description of what happens to the driver during a head-on collision when neither seatbelt or air bag are used.

<http://www.youtube.com/watch?v=pR1NJtX9r-c&mode=related&search=> Scenes from a head-on collision and x ray images showing some of the consequences.

<http://www.plan59.com/photos/photos068.htm> photo

http://www.nctimes.com/articles/2005/12/28/news/californian/20_59_5412_27_05.txt photos and news story

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1.13 Short Story: Playing with locomotives

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=QGJfNaM0804&NR=1> Head-on crash of trains, as seen from one of the trains

<http://buckcreek.tripod.com/traincrash.html> story plus photos (click on the gallery button)

http://www.northernontariorailroadmuseum.ca/latest_photos.html another head-on train crash

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1.14 Rear-end collision and whiplash injury

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.addonheadrest.com/> a device to protect against whiplash injury

<http://www.burtchiropractic.com/personalinjury.asp> diagrams plus description

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1.15 Race-car turns

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=mRuZsowlPb4> Turns with drifting

<http://ps3media.ign.com/ps3/image/article/734/734195/formula-one-06-20060921090942649.jpg> Formula ones in a tight turn

http://www.ae-photography.co.uk/gallery/Formula_One_Testing_Silverstone_250406_AE_2500.jpg

<http://www.youtube.com/watch?v=tScs-4SLZH8> Drifting turns

<http://www.youtube.com/watch?v=Kjaxez9OIX8> Video camera inside the car during high-speed drifting

<http://www.youtube.com/watch?v=Dbge-y9jMJg> Lots of drifting

<http://www.youtube.com/watch?v=2J4KdQQIzW4> Drifting truck (looks unstable as everything)

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1.16 Sprint tracks

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.17 Take-off illusion

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.ussyorktown.com/yorktown/21stcentury2.htm>

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1.18 Short story: Air Canada Flight 143

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.airdisaster.com/photos/aca143/photo.shtml> a photo of the airplane on the runway, with its nose down on the tarmac. In the foreground we see some of the race cars that were using the tarmac as a race course

1.19 Fear and trembling at the amusement park

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

roller coaster

<http://www.youtube.com/watch?v=xDqCvwb6e2k&mode=related&search=> Video of the Maverick at Cedar Point 2007. Animation. Shows the 90 degree drop, the corkscrews, the horizontal roll, and a lot more.

<http://www.youtube.com/watch?v=qIQLKtOsduE&mode=related&search=> Video of Cedar point 2005

<http://www.youtube.com/watch?v=NKUHqYQz7TI&mode=related&search=> Video of coasters at Cedar Point 2003

<http://www.rcdb.com> Data bank about roller coasters, current and under construction

<http://www.coastergallery.com> Thousands of coaster photos

<http://www.learner.org/exhibits/parkphysics/coaster.html> Amusement park physics. Allows you to design a roller coaster.

<http://www.ultimatecoaster.com> Guide to thrill rides of all sorts

www.ghettodriveby.com/itza/fy.chalmers.se/LISEBERG/eng/loop_pe.html
www.tiggerman.com/pics-rcoaster.htm
http://www.joyrides.com/cedar_point/magnum1.htm
http://www.joyrides.com/cedar_point/magnum2.htm

rotor

http://www.ride-extravaganza.com/rides/rotor/rotor_01.jpg
http://www.ride-extravaganza.com/rides/rotor/rotor_11.jpg
http://www.ride-extravaganza.com/rides/rotor/rotor_12.jpg
<http://www.ride-extravaganza.com/rides/rotor/>

demon drop

<http://www.youtube.com/watch?v=umm1Wjci7FU> Video
<http://www.youtube.com/watch?v=3IJigg3sH44> Video
http://www.joyrides.com/cedar_point/demon_drop1.htm Photo
http://www.joyrides.com/cedar_point/demon_drop2.htm Photo

swing ride

http://www.istockphoto.com/file_closeup/?id=456895&refnum=411821&Lang=en Photo, showing the outward deflection as each swing is dragged around in a circle

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1.20 Short Story: Circus loop-the-loop acts

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.circushistory.org/bandwagon/Bandwagon.htm> If you like stories about old circus and carnival acts, this is the publication for you.

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1.21 Catching a fly ball

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=xIvhasII-pA> Video. See how the fielder first runs up to the proper distance (while the baseball is still climbing) and then adjusts his orientation at that distance.

<http://www.youtube.com/watch?v=9VWUxgRutIo> Watch how the outfielder in this game of cricket backs up to the proper position

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1.22 Short Story: High ball

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.23 Hitting a baseball

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.kettering.edu/~drussell/bats.html> Lots of material on the physics of a baseball bat by Professor Daniel A. Russell of Kettering University in Flint, Michigan

<http://webusers.npl.uiuc.edu/~a-nathan/pob/> Another huge source of information, this by Dr. Allan Nathan of the University of Illinois at Urbana-Champaign, Urbana, Illinois

<http://www.physics.usyd.edu.au/~cross/> Rod Cross is an expert on ball collisions in sports

<http://www.intute.ac.uk/sciences/cgi-bin/browse.pl?id=239> Large source of links to sports physics

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1.24 Legal passes in rugby

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=RgMIDy2jP9s> Video showing how a backward pass can be an illegal forward pass

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1.25 Juggling

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=MqDAf_lg9Xs&feature=dir Amazing ball control while inside a plastic cone

<http://www.youtube.com/watch?v=2kVpRQDm8ec&mode=related&search=> Bouncing ball from orthogonal boards. Stunning.

<http://www.youtube.com/watch?v=NT9-vsoFrwQ&mode=related&search=> Contact juggling. Balancing and moving one or more glass balls over hands and arms.

<http://users.ox.ac.uk/~juggsoc/juggling.shtml> There is a button for a tutorial on juggling

<http://www.youtube.com/watch?v=bGeJivG3Gzg> Video of Joel Heidtman, juggling, yo-yos, diabolo. I really love this stuff.

<http://www.youtube.com/watch?v=8Wf1d-hVzBo> Five ball juggling

http://premierespeakers.com/raspyni_brothers Hilarious juggling (click on the video)

<http://www.youtube.com/watch?v=QYUXaYckv-A> Beautiful, from Chris Bliss

<http://www.youtube.com/watch?v=AT-2oAdN40> Another video from Chris Bliss

http://www.youtube.com/watch?v=rx5Sp_hoHKM Tim Kelly with lots of variations

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1.26 Pole vaulting

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.cs.indiana.edu/~kinzler/pubs/pvfigs/> physics of pole vaulting

<http://www.rdccairo.org/news/Walker%20and%20Stuczynski.html> photo

<http://entertainment.howstuffworks.com/pole-vault.htm> Material from HowStuffWorks

Videos

<http://www.youtube.com/watch?v=0tuz-hVnGfk> Pole vault part 4

http://www.youtube.com/watch?v=xWO_v6ck1r4&mode=related&search= Part 3

<http://www.youtube.com/watch?v=n1Tg6tzmbGc&mode=related&search=> Part 5

<http://www.youtube.com/watch?v=eEqcd68otE8> Montage of jumps

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1.27 Launch of an atlatl and a toad tongue

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.atlatl.com/> description plus videos

http://www.uwlax.edu/mvac/PreEuropeanPeople/EarlyCultures/archaic_tools.html description and sketches

http://www.petroglyphs.us/photographs_atlatl_cliff_petroglyphs_AC.htm petroglyphs show atlatl use in primitive times

http://www.art.com/asp/sp-asp/_/PD--11991179/SP--A/IGID--

[1076497/A_Woodhouse_Toad_Bufo_Woodousii_Aims_its_Tongue_at_an_Earthworm.htm?sOrig=CAT&sOrigID=20737&ui=653E083974C44483A9E18D0F2C070AE8](http://www.art.com/asp/sp-asp/_/PD--11991179/SP--A/IGID--1076497/A_Woodhouse_Toad_Bufo_Woodousii_Aims_its_Tongue_at_an_Earthworm.htm?sOrig=CAT&sOrigID=20737&ui=653E083974C44483A9E18D0F2C070AE8) toad tongue

<http://www.youtube.com/watch?v=Ej3it7Ct76w> Documentary about atlatl

http://www.youtube.com/watch?v=917XMjtO9_s Showing the technique of throwing with an atlatl

<http://www.youtube.com/watch?v=8arUyIf59rw> Also showing the throwing technique

http://www.youtube.com/watch?v=SnZOZY_CNDs Another one showing the technique

<http://www.youtube.com/watch?v=nTatpBIdTmQ> Making an atlatl, part 1

<http://www.youtube.com/watch?v=iD8z38Hzq8M> Part 2

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1.28 Slings

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=lSreXRMhrO4> Video of instruction

<http://www.youtube.com/watch?v=aIoksV2PwXg&mode=related&search=> How to make a sling

http://www.grannysstore.com/Wilderness_Survival/Slings_and_Slinging.htm

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1.29 Tomahawks

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=UyPGWRJ0bH0> Go video of throwing knives, forks, and various other objects

<http://members.aye.net/~bspentomahawk.html> Throwing a tomahawk

<http://www.vividlight.com/articles/3705.htm> Stages of making a tomahawk

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1.30 Bolas

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.flight-toys.com/bolas.htm> discussion plus photos

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1.31 Siege machine

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

http://www.rocktec.co.nz/links/rocktec_1_39.php trebuchet and a used car, photos plus video

<http://www.youtube.com/watch?v=F92FQdnLlSc> Video of trebuchet throwing a burning piano

<http://www.youtube.com/watch?v=-wVADKznOhY> Huge trebuchet

<http://www.youtube.com/watch?v=n7s8HduNb90> Trebuchet hurling stones at a minivan.

<http://www.youtube.com/watch?v=LeCP1N6Yjb4> Trebuchet of a physics class

<http://www.youtube.com/watch?v=T9kuC0-hzdk> Throwing small pumpkins

<http://www.youtube.com/watch?v=LzDIM56FXAM> Building a trebuchet to heroic music

<http://www.youtube.com/watch?v=tFksBz0J160> Backyard trebuchet

http://www.youtube.com/watch?v=0xPr_4ER5_U Meredith College

http://www.youtube.com/watch?v=odTxNOcf_Nk Catapult and heavy metal (I think they go together)

<http://www.youtube.com/watch?v=Ti2D4w3Xu28> Catapulting pumpkins

<http://www.youtube.com/watch?v=EVzorAMTnFM> PVC catapult from MakeMagazine

Stupid

<http://www.youtube.com/watch?v=gxzW6RqbB28> Trebuchet throwing people (a good way to end up dead, as at least one person ended up dead)

http://www.makezine.com/blog/archive/2007/02/human_trebuchet.html Another version of the video

http://www.guardian.co.uk/uk_news/story/0,3604,1605521,00.html Newstory of a student killed in a trebuchet throw

<http://news.scotsman.com/uk.cfm?id=2175392005> Another account of the death

Photos

<http://uk.geocities.com/osfuk/osf/treb.html> links lead to photos of various objects (including a piano) being hurled by a trebuchet. However, the second to last link may not be suitable for young viewers because it involves a dead cow.

<http://www.globalspec.com/trebuchet/> a game

<http://www.ripcord.ws/> Trebuchet information

<http://www.roanoke.com/news/roanoke/wb/74389> news story plus photo

<http://commons.wikimedia.org/wiki/Image:Trebuchet.jpg> photo

<http://www.castlewailes.com/trebucht.html> photo

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Related reference

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1.32 Human cannonball

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=ZSfOg4QbLTw&feature=related>

<http://www.youtube.com/watch?v=G8cIM2QQLyc> Video human cannonball

http://news.bbc.co.uk/cbbcnews/hi/newsid_4190000/newsid_4194900/4194944.stm BBC story plus photos

http://www.bbc.co.uk/cumbria/content/articles/2005/05/31/human_cannonball_feature.shtml Another BBC story, this one about the first female human cannonball

http://news.bbc.co.uk/onthisday/hi/dates/stories/august/25/newsid_2535000/2535601.stm A third BBC story, plus video

<http://www.edwardsamuels.com/illustratedstory/chapter%209/zacchini.jpg> photo of Hugo Zacchini in flight

http://wikimania2006.wikimedia.org/wiki/Image:Stephanie_smith_human_cannonball_-_melbourne_show_2005.jpg Stephanie Smith in flight

http://www.youtube.com/watch?v=OX9S_m7W4UA Human cannonball shot over the border
<http://www.youtube.com/watch?v=HdTe0O8ILAk>
<http://www.youtube.com/watch?v=hQqoL9V1j2k>
<http://www.youtube.com/watch?v=OaJ5RQeD0qQ> Human cannonball overshoots the airbag
<http://www.youtube.com/watch?v=aGLArX6eD1M&feature=related>
<http://www.youtube.com/watch?v=6-5tqhp8msA&feature=related>

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1.33 Basketball shots

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=Us_yo6CEy3w Watch the wrist snap
<http://www.youtube.com/watch?v=xWcIbJHMcio> Michael Jordan free throw
http://www.youtube.com/watch?v=IWDnFm_VGTc&feature=related Jordan makes free throw with his eyes closed
<http://www.youtube.com/watch?v=718ldCsCEck> Jeff Liles makes a free throw world record
<http://www.youtube.com/watch?v=6k4lcF9IGUk> Amazing trick shots. I could spend days on the physics of these shots.
<http://www.youtube.com/watch?v=tWLWhU4KuKQ&mode=related&search=> Incredible shot
http://www.youtube.com/watch?v=cMV_gvBwL1g Full court shot into the basket, and it wins the game!
<http://www.youtube.com/watch?v=pQxgHNmmVoM> Full court, half court, from the corner, and from behind the basket
<http://www.worsleyschool.net/science/files/physicsof/basketball.html> Essay on the physics of basketball
<http://visp.rutgers.edu/measure2.htm> Trajectory of a free throw, considering the various forces on the ball

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1.34 Short Story: Records in free throws

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=718ldCsCECK> Jeff Liles makes a free throw world record

<http://www.youtube.com/watch?v=V4eJSjwID5o> Rick Barry, one of the best free-throw shooters ever, shoots with a "granny shot"

<http://www.youtube.com/watch?v=TqudMlz4Ybw> So does Bob March, time after time

<http://www.youtube.com/watch?v=9hlibcjZXrA> Michael Jordan talking about free throws, with and without your eyes open

<http://www.youtube.com/watch?v=92YWyxOXjMs> Ok, this is just bizarre. A girl is thrown through a basketball hoop, making a full summersault on the way there.

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1.35 Hang in basketball and ballet

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=vetLRKaQmUI> Michael Jordan discusses jumping. No big secrets here.

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1.36 Golfing

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=DK9aS-tr1gE&mode=related&search=> Tiger Wood video

<http://archives.cbc.ca/IDC-1-41-1723-11853/sports/golfing/clip3> Me and Jay Ingram on CBC Radio's show Quirks and Quarks, from 1982

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1.37 Short story: Curtain of death of a meteor strike

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=jUh7pYDmK08&feature=related> Video of meteor in Australia

<http://www.youtube.com/watch?v=8mbA606ZRWI&feature=related> Video of meteor in Mexico

<http://www.youtube.com/watch?v=dx8-42JH0G4&feature=related> Video of meteor over Madrid

<http://www.youtube.com/watch?v=EydCq3It5I8&feature=related> Video of meteor

<http://www.youtube.com/watch?v=5S3WfNDD59Y&NR=1> Video of meteor over football game

<http://www.youtube.com/watch?v=tUBrxvigu0&feature=related> Video meteor over Washington

<http://www.youtube.com/watch?v=S10IS31Ht50> Video of meteor in Portland

<http://www.youtube.com/watch?v=rH-NTr4cc04> Video of meteor flight

<http://www.youtube.com/watch?v=InX3AKBnOhw>

<http://www.youtube.com/watch?v=f5lu4mtChW8&feature=related>

<http://www.physics.upenn.edu/duriangroup/impact.htm> Multiple-exposure photo of ball hit granular material and digging a crater. Look at the "curtain" of debris.

<http://www.geology.um.maine.edu/geodynamics/analogwebsite/UndergradProjects2006/Allen/introduction.html> Photos, sketches, and discussion of cratering

<http://neo.jpl.nasa.gov/neo/report2007.html> NASA's report to congress on near-Earth objects, March 2007. Click on the "final report."

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1.38 The high jump and the long jump

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=Id4W6VA0uLc> Video showing the early jumps of Dick Fosbury
<http://www.youtube.com/watch?v=x4yhE5KEPq0&mode=related&search=> World record for high jump
<http://www.youtube.com/watch?v=FIgk75Jn9ZQ> Bob Beamon's record breaking jump. I did not realize it was filmed, but thanks to YouTube we can see it.
<http://www.youtube.com/watch?v=GGIwOP2Jkpk> A black-and-white video of Beamon's jump
<http://www.youtube.com/watch?v=Xb-hqnMtySI> A front view of Beamon's jump
<http://www.youtube.com/watch?v=WdR8D4xYaC8> Another angle of Beamon's jump
http://www.youtube.com/watch?v=4C8qG50w_rw Mike Powell breaks Beamon's jump and we also watch the match with Carl Lewis; both are wonderful.

Photos

http://www.greece-athens.com/pages_images/421.jpg Pottery showing halteres used by the ancient Greeks in long jumping
<http://www.schoolsliaison.org.uk/petros/petros01.htm> Photos of a person demonstrated the use of halteres
<http://www.mlahanas.de/Greeks/ImagesGreeks/Greeks0010.html> Halteres
<http://www.cla.purdue.edu/courses/pe476/oldslides.html> One of the images shows halteres
http://www.greece-athens.com/pages_images/421.jpg More images

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1.39 Jumping beans

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=vzMdfAo0rkY> Jumping beans plus some good salsa music

<http://www.youtube.com/watch?v=0PoJ7OzoqqY&feature=related> Jumping bean race. Just the thing to watch with a good beverage on a lazy summer afternoon.

<http://www.youtube.com/watch?v=tq9sMoQDtOU> Video of the seeds (or rather, seed shells) that seemingly move themselves.

<http://www.youtube.com/watch?v=0PoJ7OzoqqY&feature=related> Jumping bean race. Just the thing to watch with a good beverage.

<http://waynesword.palomar.edu/plaug97.htm> Wayne's Word: An on-line textbook of natural history, which has many fine pages to explore. Details about the larvae, the seeds, and the plants. Also, click to read about the jumping galls.

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1.40 Somersault of a click beetle, attack of a mantis shrimp

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=kZlrK3sNzX8&NR=1> Note the speed of the jump

<http://www.youtube.com/watch?v=5zof6yykMq0> Video of click beetle jumps

<http://www.youtube.com/watch?v=nQydbfgr1-o> Video of click beetle jumps

<http://www.ent.iastate.edu/imagegal/coleoptera/click/3936.12clickbeetle.html> Photo of a click beetle

http://www.youtube.com/watch?v=4YKprYcny_E&feature=related Video with sound

<http://www.youtube.com/watch?v=mu6yrC6bjNo> Video with sound and music

http://www.youtube.com/watch?v=Hkv_30niM_A&feature=related Video with sound with faint sound toward end

<http://www.eco-divers.com/peterlange/15.html> Photo of a mantis shrimp

<http://www.youtube.com/watch?v=-J4TWXTY1sk> Similar storage of energy prior to a sudden release, except here it is with a playing card

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1.41 Short Story: Some record lifts

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=muYOLmeMI9s> Video, tribute to Paul Anderson. Words are difficult to read but this has some hard-to-find movies: one-arm presses 300 pounds

<http://www.youtube.com/watch?v=kny0jxHszX0> The one-arm press by Anderson

<http://www.youtube.com/watch?v=XRbst03LtnI> Lifts two barrels of concrete

<http://www.youtube.com/watch?v=JOoj1kaetZA&NR=1> Tribute

Photos

http://ffden-2.phys.uaf.edu/211_fall2002.web.dir/Peter_Broadly/Pages/Strongestman.htm Description plus photos of Paul Anderson

<http://cbass.com/ANDERSON.HTM> More description and photos

<http://www.cviog.uga.edu/Projects/gainfo/paulanderson.htm> More description and photos

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1.42 Chain collisions

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://plus.maths.org/latestnews/may-aug06/newtonscradle/index.html> Photo of Newton's cradle

<http://www.physics.gla.ac.uk/~kskeldon/PubSci/exhibits/D10/> Making a Newton's cradle

<http://www.tcd.ie/Science/newton.php> Photo

<http://www.newtrier.k12.il.us/academics/math/Connections/motion/newton.htm> A hallway (large)

Newton's cradle

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See also the references for the following item.

1.43 Dropping a stack of balls

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://faraday.physics.uiowa.edu/mech/1N30.60.htm> Just under the photo, click on the MPEB Movie to see just how high the ball will go

<http://www.rose-hulman.edu/~moloney/AppComp/1999Entries/entry11.htm> Plans for a velocity amplifier using stacked disks

<http://vacuum.ramapo.edu/physics/physics-doc/amsci/AmSci01/1988/10/1988-10-body.html> My article in *Scientific American*

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1.44 Short Story: A crashing demonstration

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.45 Karate and Tae kwon do

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.tandtmartialarts.com/> T&T Martial Arts web site, here in Cleveland, Ohio. To see videos of the various forms and the techniques for one-step sparring, click on "Student Resources" in the menu at the left, then click on TKD Requirements, then choose a belt level, then click on the video selection at the right. Be sure to turn on your audio.

http://www.fightingarts.com/reading/get_author.php?author=Jearl%20Walker Two of my articles for Scientific American were about judo and aikido and are available at this web site.

<http://www.youtube.com/watch?v=RI2B0JMVHlk&NR=1> Video, breaking a stack of boards, slow motion. Note that they break one by one. Note the hand deformation.

<http://www.youtube.com/watch?v=nLPNCnPhufs> Female tae kwon do fighter breaks a number of boards

<http://www.youtube.com/watch?v=wEf8cRicJME&mode=related&search=> Video, commercial for Chuck Norris World Combat League (full contact). Very solid hits to the head.

<http://www.youtube.com/watch?v=i37NOUTOoPg> Dangerous hit to the head (which I really hate to see) but this is excellent technique. The fighter in the foreground waits for the jump forward by his opponent.

<http://www.stanford.edu/group/kenpo/photo/fall2004.shtml> Standord kenpo karate club, lots of photos

<http://www.eharrishome.com/cmaac/photos.html> Martial arts at Cornell

<http://www.kungfuscience.org/> The science of kung fu. There are movies at the right side and a slide bar at the left to go through several slides.

<http://www.straightdope.com/columns/050902.html> Cecil Adams's "Straight Dope" column about karate and tae kwon do, with Cecil's unique (strange?) view of the world.

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1.46 Boxing

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=8B9hiYodAd8> Brutal --- you get a powerful sense of how the brain sloshes around within the skull and the head gets wrenched around the brain stem

<http://www.youtube.com/watch?v=Qtp2ibwd2Ms&feature=related> Kick boxing. A kick to the head rattles the brain

<http://www.youtube.com/watch?v=BjnkKuI-YAY&feature=related> Very interesting. Even a light weight kick can bounce the brain into unconsciousness

<http://www.mlahanas.de/Greeks/Olympic2.htm> Look at the images of the hand straps used in boxing in ancient Greece.

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1.47 Skywalk collapse

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.answers.com/topic/hyatt-kansas-city-collapse-gif> photo

http://antoine.frostburg.edu/phys/invention/case_studies/disasters/kansas_city_walkway.html photo plus description

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1.48 World Trade Center collapses

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.evesmag.com/empirestatecrash.htm> Photo and description of the B-25 aircraft that crashed into the Empire State Building in 1945

<http://www.damninteresting.com/?p=179> Story plus photos of the B-25 and the crash site

<http://www.tms.org/pubs/journals/JOM/0112/Eagar/Eagar-0112.html> Online version (including photos) of the article by Eagar and Musso that is listed below

<http://www.musarium.com/stories/america-attacked/bottom03.html> A photo

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1.49 Falls from record heights

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=GOLjggSAUE&mode=related&search=> Cliff diving 27 m

<http://www.youtube.com/watch?v=tjXriN4SjD0&mode=related&search=> Cliff diving 52 m!

<http://www.youtube.com/watch?v=QwVS6zJo1VU&mode=related&search=> I get sick just watching this!

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1.50 A daring parachuting rescue

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=akH48PqewbM> Recreation of the Robertson and Williams midair rescue

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1.51 Cats in long falls

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.damninteresting.net/content/falling_cat.jpg Strobe photos

<http://www.ocf.berkeley.edu/~barneye/kitty.html> Strobe photos and description

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1.52 Land diving and bungee jumping

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

- <http://www.youtube.com/watch?v=MdmbkeJe6zo&feature=related> Good grief
- <http://www.youtube.com/watch?v=0bANYW0Y65c> Good grief
- <http://www.youtube.com/watch?v=NeaqnfBWRtc&feature=related> Good grief
- <http://www.youtube.com/watch?v=MdmbkeJe6zo&feature=related>
- <http://www.youtube.com/watch?v=840qqkhFZQU&feature=related>
- http://www.youtube.com/watch?v=kHAt_BOREzI Land diving of Pentecoste Island (do not try this)
- <http://www.youtube.com/watch?v=gUgyY16UWAM>
- <http://www.youtube.com/watch?v=0HJz5KJmzW4&mode=related&search=> Highest

<http://users.tkk.fi/~adent/benji.html> Photos, from 150 meters

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1.53 Trapped in a falling elevator cab

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.54 Short Story: Bomber crashes into the Empire State Building

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.evesmag.com/empirestatecrash.htm> Photo and description

<http://www.nytimes.com/ProdDetail.aspx?prodId=2366> Photo of damage to the building and the New York Times source where it can be bought

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1.55 Falls in fighting, landing during parachuting

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.56 Beds of nails

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://sciences.csuohio.edu/print_gallery.php?key=Physics+in+Action%3A+Jearl+Walker Amanda Beach stands on the beds of nails, with me sandwiched between them.

<http://media.www.stateronline.com/media/storage/paper867/news/2006/11/16/News/Nailing.Down.Physics-2463347.shtml?sourcedomain=www.stateronline.com&MIHost=media.collegepublisher.com> Daily Kent Stater, student newspaper at Kent State University, photo of me

<http://www.straightdope.com/columns/020111.html> Cecil Adams's "Straight Dope" column about the bed-of-nails demonstration, with Cecil's unique (?) view of the world.

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1.57 Hanging spoons

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.58 Trails of migrating rocks

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=u1hoiHvOeGc> Video showing how the water is pushed over the ground and how it might then freeze.

http://groundtruthinvestigations.com/photography/travel/death_valley.html Use the links to see the tracks left by the rocks

http://joeorman.shutterace.com/Landscapes/Landscapes_05.html photo plus description

<http://www.livingwilderness.com/patterns/racetrack.html> Photo

<http://facultyfiles.deanza.edu/images/mitchelldan/PlayaRock20060403.jpg> Photo

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1.59 Hitches

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=iCFdfakldck> Video showing a bowline and a taut-line hitch

<http://www.youtube.com/watch?v=X8-i5jr6WVc> Video showing a hitch and a half hitch

<http://www.troop7.org/Knots/> Instructions on tying knots

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1.60 Rock climbing

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=qJEopoD-YYI> Fall

<http://www.youtube.com/watch?v=Zdcbhfdjt2w> Steve McClure, montage, with falls.

http://www.youtube.com/watch?v=Mh_4IUax2MM&feature=related More Steve McClure

<http://www.youtube.com/watch?v=BHQ9pWEG9dE&mode=related&search=> Video: Nice layback and a fall (he lives through it)

<http://www.youtube.com/watch?v=Iy42ndIUHrA> Video, lots of techniques

http://www.camp4.com/photos/images.php?page=11&cat_id=1&category=Rock%20Climbing&order= Photos

http://www.dangeroussite.com/images/peak_routes/scoop2big.jpg Layback photo

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1.61 Rock climbing by bighorn sheep

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://cache.eb.com/eb/image?id=6493&rendTypeId=4> photo

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1.62 Pulling statues across Easter Island

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=3FpjKp1nQeo> Video showing the statues

<http://ourworld.compuserve.com/homepages/dp5/easter2.htm> Description plus many photos, including ones of modern day erection of a statue

http://newsgrist.typepad.com/robertgoldwaterlibrary/2007/01/tomas_munita_fo.html news story plus photo

<http://www.wayfaring.info/2006/11/30/explore-the-amazing-mystery-which-moai-giant-stone-statues-of-easter-island-creates/> news story plus photo

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1.63 Erecting Stonehenge

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=IRRDzFROMx0> One man moving large blocks.

Photos

http://viewfinder.english-heritage.org.uk/search/reference.asp?index=133&imageUID=108954&main_query=&theme=ARCHAEOLOGY&period=&county=&district=&place_name= Photo, tilithon stones and lintel stones
<http://www.mendhak.com/paranormal/mystery/show.php?id=31> Description plus photos

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1.64 Lifting the blocks for the Egyptian pyramids

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.richard-seaman.com/Travel/Egypt/Dahshur/AllPyramids/> Discussion plus photos

<http://members.aol.com/aditt48670/pyramid.html> Discussion about moving the blocks

<http://www.sakkaragroup.com/cityDetails17.htm> Discussion plus photos. Click on the photos

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1.65 A Slinky

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=EZL6RGkPjws> 1960s Slinky television commercial

http://www.youtube.com/watch?v=CM_sMM_tvX8&feature=related

http://www.bigroadstudios.com/di_sketch/images/slinky.jpg Sketch

<http://content.perspicuity.com/?q=node/33> Cartoon

<http://www.youtube.com/watch?v=bbNATW4eRsU&mode=related&search=> Video of a person pretending to be a slinky. Very funny.

http://www.metacafe.com/watch/884327/slinky_man/ Same

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1.66 Leaning tower of blocks

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=CA-gF53jvTY> Video of stacking blocks and then placing a thin rod under the center of mass of the full stack.

http://www.physics.ucla.edu/demoweb/demomanual/mechanics/center_of_mass_demonstrations/stacking_blocks.html UCLA, diagram of how to stack the blocks

<http://groups.physics.umn.edu/demo/mechanics/1J1120.html> Photo

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1.67 Leaning tower of Pisa

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://news.bbc.co.uk/2/hi/europe/7423957.stm>

<http://torre.duomo.pisa.it/> Official site, hundreds of photos and interactive perspectives

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1.68 Falling dominoes

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://news.bbc.co.uk/2/hi/europe/7730834.stm> world record of toppling dominoes

http://www.sas.org/tcs/weeklyIssues_2007/2007-11-02/project2/index.html Home experiment to measure the speed of the domino effect by using the windows sound recorder, Ron Larham, part 1

www.sas.org/tcs/weeklyIssues_2007/2007-12-07/project2/index.html part 2

An attempt to set a new record for toppling dominoes, with some effects I have not seen previously:

<http://www.cnn.com/video/#/video/offbeat/2007/11/17/vo.netherlands.domino.ap>

<http://www.youtube.com/watch?v=MnqP8IBUwgs> Video dominos and pool balls

<http://www.youtube.com/watch?v=Hgtekdw1eyo&mode=related&search=> World record video

<http://www.youtube.com/watch?v=zkJTjuelQfo0&mode=related&search=> video

<http://www.youtube.com/watch?v=0-Bje2VkJEvM&mode=related&search=> video, coins used instead of dominos. (This is like a nightmare to me!)

<http://www.youtube.com/watch?v=YocnQ0NMTUA&feature=related> domino effect with computer hard drives

<http://www.youtube.com/watch?v=FHH26cAhGi8&feature=related>

<http://www.youtube.com/watch?v=-vLvDaFoJK4&feature=related> 30,000 dominoes

<http://www.youtube.com/watch?v=-MgXr2k4nhI&feature=related> Domino wall

http://www.youtube.com/watch?v=JufTiwmR_tA&NR=1 Part 1

<http://www.youtube.com/watch?v=JRy8bsl2pl8&feature=related> Part 2

<http://www.youtube.com/watch?v=SY5NVkGtZ0Y&feature=related> Demolition #2

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1.69 Falling chimneys, pencils, and trees

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://laplace.ucv.cl/GalileosGallery/FreeFall/falling-beam/movimiento.html>

http://www.youtube.com/watch?v=CCUG_fGtf9w&mode=related&search=

<http://myweb.lmu.edu/gvarieschi/chimney/chimney.html>

<http://www.youtube.com/watch?v=z10zyAccqoU&mode=related&search=> video

<http://www.youtube.com/watch?v=gJuVtxH8Eos> Base knocked out of building structure on one side allows the rest of the structure to rotate around the remaining support.

<http://www.megalithia.com/brittany/carnac/grandmenhir/index.html> Photos plus discription of Le Grand Menhir Bris

<http://www.culture.gouv.fr/culture/arcnat/megalithes/fr/mega/megalocmen.htm> Photo, sketches, discussion

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1.70 Breaking pencil points

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.71 Failure of a bridge section

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically

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1.72 Jack-knifing of a train

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.73 Bowling strikes

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=VJkJKzeLmSE> Video, perfect bowling

<http://www.youtube.com/watch?v=64vbnwtL7I8> Video, backward bowling

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1.74 Shots in pool and billiards

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=pZqkaJDaz2A> Slow motion billiard shots

<http://www.youtube.com/watch?v=edBj7uKHYZ0> Video terrific shot

<http://www.youtube.com/watch?v=BnHsqtWiDOU&mode=related&search=> Video trick shots

<http://www.youtube.com/watch?v=pZqkaJDaz2A&mode=related&search=> Slow motion showing curved paths

<http://www.youtube.com/watch?v=Fhr-0AARuAY> With the right amount of English, a pool ball spins for 26 seconds

<http://www.msu.edu/user/brechtjo/physics/airTable/airTable.html> Simulation of pool and billiard shots. You can shift the red cue ball up and down to get two-dimensional collisions.

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1.75 Miniature golf

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.76 Superball tricks

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=MqDAf_lg9Xs&feature=dir Amazing ball control while inside a plastic cone

<http://www.youtube.com/watch?v=2kVpRQDm8ec&mode=related&search=> Bouncing ball from orthogonal boards. Stunning.

<http://www.youtube.com/watch?v=2GSkE4zNziE> Video of amazing bouncing ball tricks (or what can you do when you have lots of free time on your hands)

<http://www.youtube.com/watch?v=mqzTMsI7LyM> Ping pong ball tricks involving multiple reflections

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1.77 Racquetball shots

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=60f9OPzhuM>

<http://www.youtube.com/watch?v=rIQPEE51N6Q>

<http://www.metacafe.com/watch/804642/unbelievable/> Wait until he starts shooting the ball toward the goal

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Also see the references for "Tennis."

1.78 Short Story: A controversial goal

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.79 Tennis

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.physics.usyd.edu.au/~cross/tennis.html> Professor Rod Cross, physics of tennis

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1.80 Bicycles and motorcycles

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.81 Motorcycle long jumps

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.metacafe.com/watch/yt-MLejkyXbJlc/robbie_maddisons_2008_new_years_eve_jump_in_hd/

Robbie Maddison

<http://www.youtube.com/watch?v=pbMt5ZrGtDo> same video

http://gorillamask.net/gm_media.php?show_page=video&page_id=21027 same video

<http://au.youtube.com/watch?v=EvuXT3PIRRg> Part 1: Youtube taken off television set, audio is not great but this includes interviews.

http://au.youtube.com/watch?v=xQz3Zlg_CM&feature=related Part 2

related:

<http://www.youtube.com/watch?v=viHldcfLhEI&feature=related>

<http://www.youtube.com/watch?v=7n0m6VGVDbg> Robbie Knievel jumps over 24 delivery trucks to break his dad's record on May 2008

<http://www.wlwt.com/video/16388974/index.html> Here is the same news item linked directly to the television station

<http://www.wlwt.com/news/16385783/detail.html> And here is page where they run the raw video footage without commentary

<http://www.youtube.com/watch?v=1UBtaVgaw84> Evel Knievel at Portland

<http://www.youtube.com/watch?v=SLURFJQGeZE&feature=related> Evel Knievel jumps 11 Mack trucks

<http://www.youtube.com/watch?v=4-PKx2GIC7U&feature=related> Evel comes down a ramp and jumps over 50 cars

<http://www.youtube.com/watch?v=Q2xwO1ciEko> Evel Knievel jumps

<http://www.youtube.com/watch?v=0J4pK2PBpf0&mode=related&search=> Evel Knievel Houston Astrodome

<http://www.youtube.com/watch?v=1UBtaVgaw84&mode=related&search=> Evel Kinevel in Portland

<http://www.youtube.com/watch?v=Gg9Hrp0CVms> Evel Knievel terrible crash

<http://www.youtube.com/watch?v=4cO9qKcRoLk> Robie Knievel jumps the Grand Canyon (on a windy day!)

<http://www.youtube.com/watch?v=BA4KcqErN3U&mode=related&search=> The bike rotates due to conservation of angular momentum

<http://www.youtube.com/watch?v=FBFz7hzktXU&feature=related> Eddie Kidd jumps 14 buses, landing orientation very dangerous

<http://www.youtube.com/watch?v=JLvNAMgLbXE&feature=related> Robie Knievel spectacular jump

<http://www.youtube.com/watch?v=hTQJgwIVtEU&feature=related> Robie jumps from roof top to roof top

<http://www.youtube.com/watch?v=aIuopDLnAgg&feature=related> Robie jumps on a battleship

<http://www.youtube.com/watch?v=ffR-XjkOIiY&feature=related> Robie jumps over Pepsi trucks

<http://www.youtube.com/watch?v=Pfph7tbbjF0&feature=related> Robie jumps

<http://www.youtube.com/watch?v=Ao-H4wOoh9Q&feature=related> Eddie Kidd, jump shot from a helmet camera, many other jumps, plus surf music --- who could want more?

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Book reference style: author, title, publisher, date, pages

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1.82 Skateboards

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Video

http://www.youtube.com/watch?v=3_1Y8UoLIu4 Burnquist: A ramp eight stories tall!

<http://www.youtube.com/watch?v=2ijzi2mPtq0> Burnquist: Jump into the Grand Canyon!

<http://www.youtube.com/watch?v=BDla-x-l4Hc> Burnquist: Skateboarding in a pipe, upside down!

<http://www.youtube.com/watch?v=S5jwbgiRUbk&mode=related&search=> Lots of stunts by Burnquist

<http://www.youtube.com/watch?v=bGswbKkRkDdl> Burnquist drives the announcers wild

<http://www.youtube.com/watch?v=BdamrGj7bsg> Great Wall of China

<http://www.youtube.com/watch?v=2h8N76hSIX8> Great ollie

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1.83 Pitching horseshoes

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=P6R7ghsrBGO&mode=related&search=> Video

<http://www.youtube.com/watch?v=6y6YYrkQ7r8&mode=related&search=> Video showing a few throws.

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1.84 Spinning Hula-Hoops and lassos

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=uGXnC18nITg> Video, Elena Lev in Cirque du Soleil, superb

<http://www.youtube.com/watch?v=s3oKylueUgU> Video of Hula Hoop Man on the Steve Harvey show

<http://www.youtube.com/watch?v=2yS6o1kYQAc> Video spinning lasso

<http://www.shannonwoodward.com/hula%20hoop.jpg> Hula hoop

<http://markwoodfunshow.com/images/Copy%20of%20large-lasso-for-press-kit.jpg> Lasso

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1.85 Yo-yo

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=pj1oB2xPmhQ>

http://www.youtube.com/watch?v=snqF_FEizWs

<http://www.youtube.com/watch?v=XvG3IK-hzRs&mode=related&search=>

Sites devoted to yo-yos

<http://www.topmuseum.org/> Museum of tops, gyroscopes, and yo-yos.

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1.86 Unwinding a yo-yo

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.87 Driving through the sound barrier

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=LKQ-xj5C2m8> The car Thrust SSC breaks the sound barrier and sets the land speed record. Montage of images of the car, its preparation, and the actual runs, including audio. You can hear the car's sonic boom!

<http://www.youtube.com/watch?v=gaGO-we-Fag&mode=related&search=> Soon after the supersonic car passes the camera, we hear the shock wave.

<http://www.youtube.com/watch?v=fr0KdxhYgFY&mode=related&search=> Video from the car and audio from the driver as he sets the land speed record

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1.88 Short story: Spin test explosion

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

www.testdevices.com Look for the videos of a disc spinning apart

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1.89 Kayak roll

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=jSoQj_oacIQ&feature=related

http://www.youtube.com/watch?v=_mm7dLII658

<http://www.youtube.com/watch?v=34KdMDe6iSo&feature=Playlist&p=3D573117E6A94403&index=3>

back deck sweep roll

<http://www.youtube.com/watch?v=Dguv1CdEJXQ&feature=Playlist&p=3D573117E6A94403&index=4> C

to C roll

<http://www.youtube.com/watch?v=dEd2Z4dMiJc&feature=Playlist&p=3D573117E6A94403&index=6>

hybrid roll

http://www.youtube.com/watch?v=ff_te_yjcHM&feature=Playlist&p=3D573117E6A94403&index=7 twist

and slice roll

<http://www.youtube.com/watch?v=tMXbFXmaCfM&feature=related>

<http://www.youtube.com/watch?v=CbwCU7LuY6Q&feature=related>

http://www.youtube.com/watch?v=Zst8VESE_-U&feature=related

<http://www.youtube.com/watch?v=8HiBIHQzGIY&feature=related>
<http://www.youtube.com/watch?v=YjLobTjpFFc&feature=related> does not always work

<http://www.youtube.com/watch?v=jfxVDXO1Q9E&feature=Playlist&p=3D573117E6A94403&index=9>

http://www.savagesnow.com/whitewater_kayaking/pdhtml_kayak_paddling/pd011_kayak_roll.html Click to activate videos

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1.90 Curling

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://archives.cbc.ca/IDCC-1-41-550-2826/sports/curling/> Jay Ingram and me, audio clip from Quirks and Quarks on the CBC Radio Network

<http://www.youtube.com/watch?v=oYhMkMoBBno&feature=related>

<http://www.youtube.com/watch?v=xfVx1-emCV8&feature=related>

<http://www.youtube.com/watch?v=dXeXNHRPMMI>

<http://www.youtube.com/watch?v=qxmrH20IA2Q&feature=related>

<http://www.nashvillecurling.org/media.htm> Home page of the Nashville Curling Club, with several links, including the audio of me on Quirks and Quarks.

<http://www.sweepmag.com/Archive.html> CBC archive about curling, including that audio of me.

<http://www.curlingbasics.com/> Animated introduction to curling

http://www.trempealeaucountytourism.com/Centerville,%20Wisconsin_files/Centerville%20curling.jpg

Photo

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1.91 Tightrope walk

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://easybartricks.com/balancing-coin.html>

Videos

<http://www.youtube.com/watch?v=Ts9LZGFUkgk> Video documentary on tightrope walking
<http://www.youtube.com/watch?v=6ddpV1GvF7E&feature=related> Phillippe Petit walks a line between the twin towers of the World Trade Center
<http://www.youtube.com/watch?v=2ynvT1zOvkl&feature=related> Animated story about Petit's walk
<http://www.youtube.com/watch?v=1AVj21VC9ko&feature=related> News report and video of Petit's walk
<http://www.youtube.com/watch?v=u5jd0nZKSNO&feature=related> television news story plus archived video of other walks, including walking backward
<http://www.youtube.com/watch?v=6keJEhVQwRY&feature=related> more television coverage

<http://www.youtube.com/watch?v=yu7S8JuRMXM&mode=related&search=> Funny video on tightrope walking
http://www.youtube.com/watch?v=_Qy3fLz1thg Michael Rosman walks a burning tightrope

Photos

http://www.ananova.com/news/story/sm_2021396.html Tightrope walker 400 meters above the ground, on cable-car cable
<http://www.bloggingmontreal.net/images/april06/tightRope1.jpg> Photo
http://nymag.com/images/news/01/09/wtc_4_300x400.jpg Photo
<http://www.darylscience.com/Demos/TightRope.html> Instructions from Newton's Apple television show

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1.92 Bull riding

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=ibR9Y1D9btg> Video bull riding, some pretty, some not so pretty
http://www.youtube.com/watch?v=nHQiJ_9TH9w More video
<http://www.sights-and-culture.com/America/rodeo-bull-riding.jpg> Photo
<http://www.billybobstexas.com/bullriding.htm> Live bull riding inside Billy Bob's Texas nightclub in Fort Worth, Texas, where I grew up.

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1.93 Tearing toilet paper

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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Book reference style: author, title, publisher, date, pages

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Related reference

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1.94 Skipping stones and bombs

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=ICRIsjJFRNo&feature=related> 1954 movie *The Dambusters*. Here is the part about the attack on the first dam.

<http://www.youtube.com/watch?v=JM1VGw0wM7k&feature=related> Here is the part of the 1954 movie that shows the attack on the second dam

<http://www.youtube.com/watch?v=o3ohMEZ-d3I&feature=related> Video of original testing, including one where the bomb exploded the airplane

<http://www.youtube.com/watch?v=qrN0iVJjLgU> Documentary, including original footage of the early test of the bouncing bombs and comparison between the spherical and cylindrical versions of the bomb.

<http://www.youtube.com/watch?v=fsvUhSzdngg&feature=related> Very good documentary; includes a map showing the flight plans

<http://www.youtube.com/watch?v=93AQQ9qYoQo> The German version of the bouncing bomb

Dambusters anniversary in May 2008

http://news.bbc.co.uk/2/hi/uk_news/7404052.stm video news item about the anniversary, with a Lancaster airplane flying by

http://news.bbc.co.uk/2/hi/uk_news/7405514.stm video from the cockpit of the Lancaster airplane during anniversary flyby

http://news.bbc.co.uk/2/hi/uk_news/7404447.stm News item about the dambusters

<http://www.dambusters.org.uk/index.htm> Dambusters web site

<http://www.youtube.com/watch?v=cAYApK7iRBU&NR=1> Slow motion. Blurry at first but the final stages are fairly clear. Note how the stone maintains its orientation (it does not flip over with each skip). That orientation is stabilized by the spin, much like spin stabilizes the upright orientation of a top.

<http://www.youtube.com/watch?v=xwQsoop6-tA&NR=1> Teaches stone skipping

<http://www.youtube.com/watch?v=HtOVF4nzJ8k> Teaches stone skipping

<http://www.youtube.com/watch?v=iceK8d8ngYo> Stone skipping

<http://www.youtube.com/watch?v=IKxdqdrifWk&NR=1>

<http://www.youtube.com/watch?v=xM1aydr4HXw&feature=related> Very long skipping path

www.pastoneskipping.com/Steiner.htm

A video of Kurt Steiner setting the world's record of 40 skips

References

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www.pastoneskipping.com/Steiner.htm

A video of Kurt Steiner setting the world's record of 40 skips

1.95 Spinning ice skater

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=5JaMJUdvoZI&feature=related>

<http://www.youtube.com/watch?v=gQhf7WSUsGE&feature=related>

<http://www.youtube.com/watch?v=XJk1TryI5QU&feature=related> a new spinning move

<http://www.youtube.com/watch?v=AQLtcEAG9v0> Setting the Guinness record for the spin rate: 308 rpm

Natalia Kanounnikova

http://www.youtube.com/watch?v=AzwfiUf_TBE Stephane Lambiel montage and then instruction

http://www.youtube.com/watch?v=NtEnEeEyw_s Sasha Cohen spinning

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1.96 Spinning a book

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

These videos show a book spun on a finger or some other point-like object. The spinning is stable and can be "pumped" like a spinning lasso.

<http://www.youtube.com/watch?v=cpRkhrn3scM>

<http://www.youtube.com/watch?v=aAKqj9liwus>

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1.97 Falling cat, astronaut antics, and fancy diving

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=RHhXbOhK_hs&feature=related excellent falling cat slow-motion video

http://www.youtube.com/watch?v=Ua4Gh_4XdwQ&NR=1 falling cat in slow motion

[http://www.youtube.com/watch?v=eP6AJXprOXc&mode=related&search=Cirque du Soleil, rotations in midair](http://www.youtube.com/watch?v=eP6AJXprOXc&mode=related&search=Cirque+du+Soleil,rotations+in+midair)

[http://www.youtube.com/watch?v=I85GyQIhBsE&mode=related&search=More rotations from Cirque du Soleil](http://www.youtube.com/watch?v=I85GyQIhBsE&mode=related&search=More+rotations+from+Cirque+du+Soleil). Stunning. So difficult that I get nervous just watching the video.

[http://www.youtube.com/watch?v=okH_IzGPHXE&mode=related&search=Video, excellent break dancing](http://www.youtube.com/watch?v=okH_IzGPHXE&mode=related&search=Video,excellent+break+dancing).

<http://www.youtube.com/watch?v=hXjYuiPQUEk&NR=1> Video of martial arts performer. Watch the back jumps, which consist of rotation around both the vertical axis and the horizontal axis.

<http://www.gobaeng.de/images/products/tp163.jpg> The famous sequence of photos of a falling cat, published (I believe) in Life Magazine in the 1950s.

http://www.damninteresting.net/content/falling_cat.jpg A more recently shot sequence of photos

<http://www.ocf.berkeley.edu/~barneye/kitty.html> Strobe photos and discussion

<http://www.usa-gymnastics.org/publications/technique/1997/2/twisting.html> Essay on the biomechanics of twisting

falling cat:

http://www.youtube.com/watch?v=_q_ULVhyfJg&feature=related skip the commercial at the start. 80 ft fall. Watch the tail.

<http://www.youtube.com/watch?v=ZRZimLYiO9Y> Here is the same fall but with footage after the fall to show that the cat is (probably) ok.

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1.98 Quadruple summersault

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=PaStqxC5L0M&NR=1> Bruno Vargas does a quadruple

<http://www.youtube.com/watch?v=h5VgLXiIt6k> And he does it again.

<http://www.youtube.com/watch?v=Un-3Zg711sE> Double summersault

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1.99 Tumbling toast

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=q5CvMqYfNhA> funny advertisement

http://www.youtube.com/watch?v=IBpv_ODy28w&feature=related behind the scenes

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1.100 Ballet

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.studio360.org/episodes/2007/10/19/segments/87060> National Public Radio show "Studio 360": Newstory and interview about Ken Laws, who is the first and the foremost person to explain the physics of ballet. (You may have to allow a popup here.)

Video

[http://www.youtube.com/watch?v=UaKWStmq7mM&mode=related&search= 36 pirouettes!](http://www.youtube.com/watch?v=UaKWStmq7mM&mode=related&search=36%20pirouettes!)

[http://www.youtube.com/watch?v=5xqTrWHs6iY&mode=related&search= Sleeping Beauty](http://www.youtube.com/watch?v=5xqTrWHs6iY&mode=related&search=Sleeping+Beauty)

<http://www.youtube.com/watch?v=NcjXMK9UsTc> Video montage

<http://www.youtube.com/watch?v=82hA6HJZNcU>

<http://www.youtube.com/watch?v=1Zh3IykqMn8> Pirouettes video

<http://www.geocities.com/CapeCanaveral/Hangar/4421/> Web site devoted to the physics of ballet dancing, by Sheila Dodge

http://web.hep.uiuc.edu/home/g-gollin/dance/dance_physics.html Web site of physics and dance by Professor George Gollin

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1.101 Skiing

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.102 Abandoned on the ice

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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Also see the references for the preceding two items.

1.103 Short story: Rotation sequence matters

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.104 Personalities of tops

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=LDXAhwhsZ9k> Wonderful video, lots of different types of tops

<http://www.youtube.com/watch?v=hwY8zS4zGsg> Paper clip tops

<http://www.youtube.com/watch?v=IH8YvO1uPhY> The Thai spinning top

<http://www.youtube.com/watch?v=AC5HuGGIX7k&mode=related&search=> The rotation turns on LEDs, which light up the top

<http://www.youtube.com/watch?v=7eXEMIMuesU> Music set to a spinning top

<http://www.youtube.com/watch?v=Fhr-0AARuAY> With the right amount of English, a pool ball spins for 26 seconds

The paper “Why does not spinning top collapse?” by W.-Y. Hwang is at <http://arxiv.org> In the search line at the upper right, type in physics/0602078v2 and then choose the latest version.

Sites devoted to tops

<http://www.topmuseum.org/> Museum of tops, gyroscopes, and yo-yos.

<http://www.maths.surrey.ac.uk/interactivemaths/michaelspages/Spin.htm> Equations of motion but, even better, an applet that allows you to choose the parameter values and then shows the resulting motion

<http://www.geocities.com/athens/aegean/7680/> Click on the various buttons

<http://folk.uio.no/knuthe/top/links.html> Lots of links to collections of tops

http://www.4physics.com/phy_demo/top/top.html Discussion. Click on the video links to see smooth precession and nutation

<http://www.papersnowflakes.com/tops.htm> Make a top with an old audio CD.

<http://www.thinkingfountain.org/t/tops/tops.html> Make a top with home materials.

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1.105 Short Story: A headstrong suitcase

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.106 Tippy tops

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

http://www.metacafe.com/watch/1042865/malfunctioning_toy_tops/

http://www.youtube.com/watch?v=xu_Dp9IfgSU

http://www.youtube.com/watch?v=5k-Is_VjYKk Same but with music

<http://www.youtube.com/watch?v=4-amrp2LqpA>

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1.107 Spinning eggs

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=ojCBjsCIGPQ> Video

<http://www.youtube.com/watch?v=bqLOjkPPPfc> Video, how tell a hard-boiled egg from a fresh egg by spinning the egg

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1.108 Diabolos

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=KdybfykJER0> Stunning tricks with a diabolo, here called a Chinese yo-yo

<http://www.youtube.com/watch?v=2X33JRa0Fog> Very difficult tricks with a diabolo, from a television show

<http://www.youtube.com/watch?v=3RfIYySSoM> Some of the basic tricks.

<http://www.youtube.com/watch?v=b3nGUcoW4-o>

<http://www.youtube.com/watch?v=5N3u0o8yfco> Diabolo in Paris

<http://www.youtube.com/watch?v=bGeJivG3Gzg> Video of Joel Heidtman, juggling, yo-yos, diabolo. I really love this stuff.

http://www.youtube.com/watch?v=O9m0FXvy_q8 Amazing tricks with multiple diabolos, some difficult to see but some absolutely amazing.

<http://www.diabolotricks.com/> Instructions on using a diabolo and doing tricks

<http://www.ping.be/~ping7849/description.htm> Sketch

<http://www.youtube.com/watch?v=g8oIKrTMpuQ> Artistic stage production with diabolos

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1.109 Rattlebacks

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.shopatron.com/search/174.0?q=rattleback> This link takes you to Tedco, from which you can buy plastic rattlebacks via the internet.

demo.physics.uiuc.edu/.../1148/more%20info.html Here is a movie that shows how the commercially available rattlebacks will reverse direction when spun in the "wrong" direction.

http://www.youtube.com/watch?v=AcQMoZr_x7Q New Scientist video

http://www.youtube.com/watch?v=0_145zVizxM bent spoon

<http://www.youtube.com/watch?v=YT2t1TovNcU>

<http://www.youtube.com/watch?v=rUwKXujLAyk> aluminum foil (I think)

<http://www.youtube.com/watch?v=0fw43SgFG8w>

http://www.youtube.com/watch?v=LMCN1IJ8WbE&playnext_from=PL&feature=Playlist&p=46D9C5BFAC30D5EB&playnext=1&index=47

http://www.youtube.com/watch?v=puaiF3OTJL4&playnext_from=PL&feature=Playlist&p=26484A269165808A&playnext=1&index=2

http://www.youtube.com/watch?v=JkTGysN7gcA&playnext_from=PL&feature=Playlist&p=26484A269165808A&playnext=1&index=3

<http://www.youtube.com/watch?v=PydoEA5Jx5s>

<http://www.youtube.com/watch?v=q1q5yv7UZ->

[8&playnext_from=PL&feature=Playlist&p=46D9C5BFAC30D5EB&playnext=1&index=46](http://www.youtube.com/watch?v=q1q5yv7UZ-8&playnext_from=PL&feature=Playlist&p=46D9C5BFAC30D5EB&playnext=1&index=46)

<http://www.youtube.com/watch?v=f6uMuwrCFjE>

<http://www.youtube.com/watch?v=bJh2wd12DC8>

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1.110 Wobbling coins and bottles

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://video.google.com/videoplay?docid=-3373325946329775094&q=euler+disk&total=1&start=0&num=10&so=0&type=search&plindex=0> Watch the video of the spinning disk (a *Euler disk*) and also listen to the sound it makes.

http://www.youtube.com/watch?v=6UGeZJ_CWOs

<http://www.youtube.com/watch?v=fwYPCoHMoeW> Trying to set the world's record spinning a coin, with a bit of imagination.

<http://www.youtube.com/watch?v=R912ISJCLaU> Slow motion video

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1.111 Judo, aikido and Olympic wrestling

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Aikido videos

<http://www.youtube.com/watch?v=aicHsMC6rxM>

<http://www.youtube.com/watch?v=sJ8VLPPTuH0> http://www.youtube.com/watch?v=CxdVF_R334U

<http://www.youtube.com/watch?v=Bn59zha-uAQ>

http://www.youtube.com/watch?v=LPx7IAIj_A

Judo videos

<http://www.judoinfo.com/video.htm> Videos of many competitions and throwing techniques. The later ones are shown larger on your screen.

<http://www.judoinfo.com/haraigo.htm> Movie and animated series of sketches illustrating the sweeping hip throw (harai goshi)

<http://www.judoinfo.com/menu.htm> Home site from which you can click to see other techniques, including mat (ground) techniques.

<http://news.bbc.co.uk/2/low/asia-pacific/911383.stm> Vladimir Putin, president of Russia, is thrown to the mat. Photos

<http://www.stanford.edu/group/kenpo/photo/fall2004.shtml> Standord kenpo karate club, lots of photos

<http://www.youtube.com/watch?v=DA37pZzxago&NR=1> Video

<http://www.youtube.com/watch?v=uPLCHw9QeAA&mode=related&search=> Video

<http://www.youtube.com/watch?v=4u41omoNO4U&mode=related&search=> Video

http://www.fightingarts.com/reading/get_author.php?author=Jearl%20Walker Two of my articles for *Scientific American* were about judo and aikido and are available at this web site.

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1.112 Bullet spin, and long passes

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://abcnews.go.com/Video/playerIndex?id=3139392>

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1.113 Pumping playground swings

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.114 Incense swing

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=2QFd_55E11I Video showing the pumping

<http://www.youtube.com/watch?v=0P1R2GxpuNY> Video showing the length of rope; then the pumping is shown

<http://www.youtube.com/watch?v=PkKzYQoKpG8> Video showing the wide extent of the swinging

<http://www.ssaviours.org/BrunosPilgrimage/bp%20-%201999-10-22%20Incense%20at%20Santiago%20di%20Compostela.jpg.png> Photos

<http://www.galiciaguide.com/Santiago-pilgrimage.html> Photo plus description

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Also see the references for the preceding item.

1.115 The pendulum in the pit

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=at_ui1Jp5y0 Not appropriate for young viewers. Scenes from the 1960s movie starring Vincent Price, set to music

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1.116 Inverted pendulums, unicycle riders

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=8LP7jADmVsE> Covent Garden, London, unicycle. There is almost always someone there doing this act.

<http://www.youtube.com/watch?v=NRk5TT5IyR8> Inverted pendulum, stable against mild sideways deflection

<http://www.youtube.com/watch?v=qSIIXdZdLAo>

<http://www.youtube.com/watch?v=8HDDzKxNMEY> Double inverted pendulum

<http://www.youtube.com/watch?v=RI6FbSj2SN0> Double inverted pendulum

<http://www.youtube.com/watch?v=uTRQ7KBYjuQ> Video of unicycle riders

<http://www.youtube.com/watch?v=FhHixicVS4k&mode=related&search=> Cirque du Soleil, handbalancing on canes

<http://www.youtube.com/watch?v=eKhTN2Do4-4> Inverted pendulum on two wheels (should fall over)

<http://www.youtube.com/watch?v=LhoqIdU3V3g> Inverted pendulum on two wheels

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1.117 Carrying loads on the head

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Photos

- <http://www.pubpol.duke.edu/centers/hlp/programs/fellows/myounger/images/Ix1l%20women%20carrying%20blocks%20on%20their%20head.jpg>
- <http://www.lib.uwo.ca/weldon/news/hottopics/images/woman%20carrying%20food%20home.jpg>
- http://www.uni.edu/gai/people_pictures/Girl_head_carrying.jpg
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1.118 Carrying loads with oscillating poles

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Photos

<http://www.edina.k12.mn.us/creekvalley/classrooms/1st/china/images/rural3.GIF>

<http://www.clemson.edu/caah/history/FacultyPages/EdMoise/vn8913.30.jpg>

<http://pages.interlog.com/~wwhite/gifs/imgxch34.jpg> This photo brings up a question. Isn't a somewhat longer pole better?

<http://www.thailex.info/THAILEX/THAILEXENG/lexicon/mai%20kaan%20haab.htm>

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1.119 Coupled pendulums

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.phys.utk.edu/demoroom/WAVE/couppend.htm> Photo

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1.120 Spring pendulum

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1.121 The bell that would not ring

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=KR0YAVMzUYI> Video of a bell that rings just fine. Look at the action of the clapper.

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Dots • through ●●● indicate level of difficulty

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1.122 Spaghetti effect

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=QD2UVIsRplU> Video slurping spaghetti. Watch the sauce that gets slung off

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1.123 The spider and the fly

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.124 Footbridge and dance floor oscillations

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=MNBun1JgDYo> Bridge oscillations. Actually this looks dangerous.

http://www.youtube.com/watch?v=Grvr_0K1p4M&NR=1 Another fun loving couple out to resonant a bridge

<http://www.youtube.com/watch?v=3-kksSHBHck&NR=1> Twisting resonance

http://www.youtube.com/watch?v=xIOS_31Ubdo&NR=1 More people intent on demonstrating bridge oscillations

<http://www.youtube.com/watch?v=mWheI7qGZHY> Video: Oscillating Morumbi stadium. Look at the relative oscillations of the guard rail. My gosh!

<http://www.youtube.com/watch?v=gQK21572oSU&mode=related&search=> Video documentary about the Millenium Bridge oscillating

http://www.youtube.com/watch?v=eAXVa_XWZ8 Video of the Millenium Bridge oscillating, without commentary

<http://www.youtube.com/watch?v=JWDuHekqt9c> Video of students and their teacher setting a footbridge into resonant oscillations.

http://www.youtube.com/watch?v=Grvr_0K1p4M&NR=1 Video of another footbridge in resonant oscillation

<http://jamesmuspratt.com/photography/millennium-bridge> Photo

www.iwalt.com/.../the-millennium-bridge.php Photo

http://blog.sciam.com/index.php?title=rock_festival_as_human_experiment_hip_ho&more=1&c=1&tb=1&pb=1&ref=rss Report of thousands of people jumping in unison at a rock concert to see if they could trigger seismic detectors.

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1.125 Precariously balanced structures and rocks

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Water towers that would be precariously balanced in a seismic wave:

<http://www.wilhelm-aerospace.org/Photos/summer-2005/roll-04/2790-clinton-water-tower.jpg>

<http://static.howstuffworks.com/gif/water-peach.jpg>

<http://www.aidan.co.uk/lg/UaeShjNwWaterTwr4618.jpg>

<http://www.youtube.com/watch?v=FXTDmLndmy4> This tower has a fairly wide "footprint" and can be brought down for the movie being shot only when one of the legs is cut.

Precariously balanced rocks:

<http://www.seismo.unr.edu/PrecRock/precrock.html> Home site for research on seismology and precariously balanced rocks. Click on "Research Projects"

<http://www.seismo.unr.edu/PrecRock/gradresearch.html> Photo plus description

<http://www.neara.org/Moore/balancedrocks.htm> Photos and discussion of naturally balanced rocks

http://gocalifornia.about.com/bl_utgsescphoto_bal.htm Photo

<http://www4.flickr.com/photos/sovietuk/10490661/> Photo

<http://www.terrageria.com/pictures-subjects/balanced-rocks/> Terrageria, photos by Q. t. Luong, natural precariously balanced rock and balanced rock art

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1.126 Sinking of the nuclear submarine *Kursk*

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.walter-rockets.i12.com/hw/kursk.htm> Photos plus description

http://www.whatreallyhappened.com/KURSK/kazouille_1105145222_torpille4.jpg Photo of ripped hull

<http://www.aerospaceweb.org/question/weapons/submarine/kursk-wreck.jpg> Another photo of hull

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1.127 Detection by sand scorpion

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=TCtJ8JCsKhU> Me, briefly talking about sand scorpion detection. This was a video tease that I did for a chapter in the early electronic version of the textbook I write (*Fundamentals of Physics*, by Halliday, Resnick, and Walker). Someone has posted a fuzzy copy of the video.

<http://www.youtube.com/watch?v=BM5Q-3ix4T4&mode=related&search=> Scorpion finding a cricket

<http://www.youtube.com/watch?v=Xap9hkWOczA> Video of a scorpion being held.

<http://www.richard-seaman.com/Wallpaper/Nature/Horrors/GoldSandScorpion.jpg> Photo of what I dreaded as a youth in Texas

<http://www.youtube.com/watch?v=xDtOI2an-QA&mode=related&search=> Video of scorpion stinging a cricket. I think the cricket touches the right right leg of the scorpion. The tail moves too fast for me to see.

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1.128 Snow waves

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.129 Football-stadium wave

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=8uRMqq2YXak> Video of a football (or Mexican) wave

http://www.youtube.com/watch?v=dD_ZGXTToVyY A similar wave, involving the tossing of snow

<http://www.youtube.com/watch?v=HPGR4KPOdVk> Another view of the “snow wave.”

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1.130 Body armor

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.131 Archer's paradox

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://library.thinkquest.org/27344/physics.htm> Archery physics, including videos and simulations (in which you can control the variables)

<http://www.youtube.com/watch?v=aNI9BG87qcl&NR=1> Video of a wildly oscillating arrow in flight.

<http://www.youtube.com/watch?v=MX6aerxQPOs&NR=1> This is a compilation of slow motion videos. Toward the end you see the slow motion oscillation of an arrow as it snakes its way past the stock of a bow.

<http://www.youtube.com/watch?v=z8uiIyXHgcw> Slow motion video of an arrow in flight. Look at the arrow's oscillation

<http://www.intute.ac.uk/sciences/cgi-bin/browse.pl?id=236> Many links to sports physics

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1.132 Oscillating plants

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1.133 Oscillating tall buildings

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=g1eo6s4gQuw> The mass damper in Taipei 101, which set a record for the world's tallest building

<http://www.youtube.com/watch?v=BK-sAqBUwxk> Video about installation of an active tuned mass damper
<http://www.pulitzer.org/year/1996/criticism/works/CRIT-MAR3.html> Article from the Boston Globe (and winner of the 1996 Pulitzer Prize) about the windows in the John Hancock Tower in Boston.

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1.134 Diving from a springboard

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=PjWMZRc3koQ>

<http://www.youtube.com/watch?v=ZUQ5k6gBG2c&mode=related&search=> No one died

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1.135 Flycasting

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=t2SgcCw6I8M> Lessons part 1

<http://www.youtube.com/watch?v=B6h5Gd2CKEM> Part 2

<http://www.youtube.com/watch?v=eduCfwQLdTY> Part 3

<http://www.youtube.com/watch?v=9o8ty08EBhY> Part 4

<http://www.youtube.com/watch?v=oNjWnZw4yA4> Part 5

<http://www.youtube.com/watch?v=zVQfBftKCJs> Part 6

<http://www.youtube.com/watch?v=0w6y6Kh1AtY> Part 7

<http://www.youtube.com/watch?v=8KvL7Fru6-U> Part 8

<http://www.youtube.com/watch?v=pcaTedAqonY> Part 9

<http://www.youtube.com/watch?v=KGknIvbnDXQ> Part 25

http://www.youtube.com/watch?v=eZbms_2go7I Part 26

<http://www.youtube.com/watch?v=HfkJpkrV1dw> Part 27

<http://www.youtube.com/watch?v=hiintoZYsGA> Part 28

<http://www.youtube.com/watch?v=m0jTY80e7RQ> Fly fishing cast but tough to see the line against the backdrop

<http://www.youtube.com/watch?v=sVmsNDfZeKg&NR=1> Whip cracking

<http://www.youtube.com/watch?v=ZKCMY8VojIU> Fly fishing, with a little bit showing the casting

Description and photos

http://www.ehow.com/how_16390_basic-cast-fly.html

<http://www.mnflyfishing.com/MinnesotaFlyFishing/CastingTips/tabid/256/Default.aspx>

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1.136 The Falkland Islands battle, Big Bertha

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=_36MiCUS1ro Video of ball rolling on a rotating merry-go-round

<http://www.youtube.com/watch?v=IJL1uGDsrTM> World War II German newsreel video of big gun but not Big Bertha

http://www.greatwardifferent.com/Great_War/Paris_at_War/Big_Bertha_01.htm Photo of Big Bertha, plus description

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1.137 Jack and the beanstalk to space

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=F2UZDHHHdhg> Video with animation

<http://www.youtube.com/watch?v=jfKKy33rb0U&mode=related&search=> Video with animation

http://static.flickr.com/2/2494802_66cb705f5f.jpg Drawing

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1.138 Spring fever and the standing of eggs

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos of standing eggs on end.

<http://www.youtube.com/watch?v=p88IBUyi85Q&mode=related&search=>

http://www.youtube.com/watch?v=D-2nE_Q1tQg

<http://www.youtube.com/watch?v=YBmfVhyayHE&mode=related&search=> Egg standing on a glass table, with shots taken underneath

<http://www.youtube.com/watch?v=XWf174yh3KY>

<http://www.youtube.com/watch?v=HM8BXG1p1pA> Balancing eggs on pavement

<http://www.youtube.com/watch?v=E2SAc8qGuYQ&feature=related> Balancing egg on counter top

Photos

http://www.badastronomy.com/bad/misc/egg_spin.html#badegg "Bad Astronomy" web page. Includes photos.

http://www.dur.ac.uk/yaoling.niu/Photos_files/Photos/Work/AndyStandEgg.jpg

http://www.learner.org/jnorth/images/graphics/d-e/egg_Kloewer.jpg

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1.139 Moon madness

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.140 Gravity hill

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.psy.ritsumei.ac.jp/~akitaoka/saka-e.html> Series of photos (may be slow to load) of Yashima Drive Way, Mt. Yashima, Takamatsu City, Japan. Photos by Akiyoshi Kitaoka

http://www.youtube.com/watch?v=ZHPmdO_f-wI&mode=related&search= Video

<http://www.youtube.com/watch?v=lrK6AVYJonw&mode=related&search=> Video

<http://www.youtube.com/watch?v=2LawmLgSSRY&mode=related&search=> Video

<http://www.ghosttraveller.com/gravityhills.htm> Photo plus description

http://www.unexplainedresearch.com/files_anomalies/gravity_hill.html Photo plus description

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1.141 Falling through the center of Earth

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.wwnorton.com/catalog/fall99/annotatednotes2.htm> Pages of *The Annotated Alice* by Lewis Carroll, introduction and notes by Martin Gardner

<http://hyperphysics.phy-astr.gsu.edu/HBASE/Mechanics/earthhole.html> The math is worked out for a uniformly dense Earth

<http://www.digholes.com/> Program that allows you see where you would come out if you entered a straight tunnel through the center of the Earth

<http://books.google.com/books?id=-blJhrfvouUC&pg=PA13&lpg=PA13&dq=%22a+hole+through+the+earth%22&source=web&ots=BtEBrVQO3h&sig=VaRGfO-9N3NcLWSBEU4b2xLx5j0#PPA13,M1> Scanned pages of *The Annotated Alice* by Lewis Carroll, introduction and notes by Martin Gardner

<http://www.nas.edu/history/mohole/> Story about Project Mohole, drilling into the Earth surface in the ocean

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1.142 Stretching of plastic shopping bags

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.143 Giant's Causeway and starch columns

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Video

http://www.youtube.com/watch?v=b6_Yq7hmMzQ

<http://www.youtube.com/watch?v=OpQjxrBxnmU>

Photos

http://content.answers.com/main/content/wp/en/f/f2/Giants_Causeway_Organ.jpg

<http://www.simonward.com/wallpaper/causeway.jpg>

<http://www.nationaltrust.org.uk/main/w-093134-giants-causeway.jpg>

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<http://www.classbrain.com/artmonument/uploads/hpc-001947.jpg>

http://p.vtourist.com/1790175-Devils_Postpile_National_Monument_CA-Devils_Postpile_National_Monument.jpg

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1.144 Broken fingernails

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.145 Crumpling paper into a ball

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=6QAE9crPHOY> Opening a bottle of beer with a sheet of paper
<http://segovia.mit.edu/~leapfrog/Crumpling/crumpled.paper.gif> Here is photo of a crumpled sheet of paper.
 Can you see the d-cones and ridges?

Other videos

<http://easybartricks.com/newspaper-bottle-opener.html> Bar trick

<http://www.youtube.com/watch?v=t0kmaNng7BI> Brainiac tv show with a big piece of paper and then with a big piece of toilet paper

<http://pomonahistorical.org/12times.htm> Description of a student who achieved 12 folds of a toilet paper strip. The strip was so long that she had to lay it out on a shopping mall floor.

<http://www.youtube.com/watch?v=wQujcNk7LOI> Video of 8 folds of thin wrapping paper

<http://www.youtube.com/watch?v=qrXmDiYHUY0&mode=related&search=> Opening a bottle with a sheet of paper

Photos and stories

<http://www.damninteresting.com/?p=594> Description of the 12 fold accomplishment

<http://mathworld.wolfram.com/Folding.html> Description of the 12 fold accomplishment

<http://plus.maths.org/issue19/news/crumpled/index.html> Story plus graph

<http://jfi.uchicago.edu/~tten/rainbow/Crumpling/paper.network/> Menu gives photos of crumpled paper and the resulting deformations

<http://focus.aps.org/story/v9/st7> Story plus photo

<http://jfi.uchicago.edu/~tten/Crumpling/> Photos, descriptions, links

<http://mrsec.uchicago.edu/research/nuggets/crumpling/> Description plus photo

<http://classes.yale.edu/fractals/FracAndDim/BoxDim/PowerLaw/CrumpledPaper.html> Photos plus example of how the crumbled paper ball is an example of a fractal.

<http://www.wiley.com/college/phy/halliday320005/jearl/Fractal.pdf> My essay about the fractal dimensions of a crumpled ball

<http://nsdl.org/resource/2200/20061011095817699T> Research paper: Chaieb, S., and F. Melo, “Crescent singularities and stress focusing in a developable cone”

<http://segovia.mit.edu/~leapfrog/Crumpling/ridge.html> Article and photos of crumpled paper

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1.146 Playful to tragic examples of explosive expansion

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=jjUTZH_Vdxx&feature=related bullets piercing through objects causes debris to explode in both the forward and rearward directions

<http://www.youtube.com/watch?v=vwTBmXT4-IE&NR=1> bullet through a glass of wine, explosions in both directions

http://www.metacafe.com/watch/782944/high_speed_photography/ Slow motion

<http://www.youtube.com/watch?v=n3g5MKeqBwI&mode=related&search=> Slow motion video of water balloon burst by a fist strike

<http://www.youtube.com/watch?v=MX6aerxOPOs&NR=1> The same balloon burst with other slow-motion videos, including a bullet through an apple, banana, playing card, and jar. Note that the jar disappears when the bullet goes through a container of pop, note the backward burst of material.

<http://www.pulsephotonics.com/gallery.htm> Scroll down to the shot of the bullet into the glass and then click on it.

<http://www.answers.com/topic/john-f-kennedy-assassination> Story plus photos.

http://www.wilsonsalmanc.com/images2/kennedys_dallas1.jpg Blurry photo of President Kennedy

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1.147 Why a hanging picture becomes crooked

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.148 A two-spring surprise

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://demo.physics.uiuc.edu/lectdemo/scripts/demo_descript.idc?DemoID=1065 Two photos, before and after the string is cut

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1.149 Stability of a pop can

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.150 Wilberforce pendulum

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://groups.physics.umn.edu/demo/waves/3A7010.html> Photo, but click on it to get video

http://www.sfu.ca/physics/ugrad/courses/teaching_resources/demoindex/waves/wo3a/wlbr2.jpg Photo

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1.151 Drag racing starts

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.metacafe.com/watch/782944/high_speed_photography/ Toward the end of this slow-motion video, watch the tire on a dragster at the start of the race. See the distortions?

http://www.youtube.com/watch?v=i7_3AAun5kY Video mustang drag racing

<http://www.youtube.com/watch?v=siram8gu4E&NR=1> Video dragster crash

http://www.youtube.com/watch?v=X_XkBv_zt1w Video funny-car crash, driver survives

<http://www.youtube.com/watch?v=wz8HdTCzQIE&mode=related&search=> Video dragster crashes, driver survives

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1.152 Turn or stop

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.153 Slipping past a bus

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.154 Compression region in sticky tape

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.155 Bobsled in a curve

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.156 Too quick to slide

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.157 The home of the Little Prince

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.158 Parachuting with a pumpkin

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.159 Pulling in a feisty fish

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=j-jTsz1845o&mode=related&search=> Video, pulling in a feisty, big catfish.

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1.160 Fiddlesticks

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.161 Rotor on a notched stick

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.physics.umd.edu/lecdem/services/demos/demosg1/g1-81.htm> video, making the rotor from a pencil

<http://craftvideos.blogspot.com/2009/04/making-geehaw-whimmy-diddle.html> making the rotor from a twig

<http://www.youtube.com/watch?v=0AHdjBoCn6w>

<http://home.frognet.net/~ejcov/geehaw.html> Sketch plus description

<http://faraday.physics.uiowa.edu/mech/1Q30.90.htm> demonstration description

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http://www.smokymountainnews.com/issues/09_04/09_15_04/art_down_to_business.html news item

http://yankeedoodlewoodworkers.com/classic_folk_toys.htm purchase

search "whammy doodle", "wammy doodle", "beano stick", "gee-haw whimmy diddle" "whimmy diddle"

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1.162 Shot put and hammer throw

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=FYsFdtK6cs> Blurry but world record
<http://www.youtube.com/watch?v=M5jpErXKvvg&mode=related&search=>
<http://www.youtube.com/watch?v=vlmujrcqiXs&mode=related&search=>
<http://www.youtube.com/watch?v=Jpbgg2TRCuw>

Photos

<http://www.kin.ucalgary.ca/Athletics/dino/Track/graphics/cw05/09-JessSP.jpg>
http://gauntlet.ucalgary.ca/~gauntlet/eg/eg2/20060608/zelinka_web.jpg

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1.163 Jumps during downhill ski race

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.164 Pulling a table cloth beneath dishes

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://easybartricks.com/great-bar-trick.html> the original video

<http://www.youtube.com/watch?v=SLRsFDblIuQ> the same video but posted on YouTube

<http://easybartricks.com/very-cool-lighter-trick.html>

<http://www.youtube.com/watch?v=7gfWvexu4u4> Video

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1.165 Short Story: Pulling with teeth

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.cnn.com/video/#/video/offbeat/2007/08/16/vo.india.plane.puller.reuters> Rishi Saxena

<http://news.sky.com/skynews/video/videoplayer/0,,31200-1280155,,html> Same video

<http://video.aol.com/video-detail/id/3151461570> Same video

<http://youtube.com/watch?v=DUz9bhHJ1DU> A team pull a heavy airplane

<http://youtube.com/watch?v=Kn-epd6KwgY> Pulling a FedEx airplane

<http://www.gva.be/dossiers/-e/eeuw/img/1988/MASSIS2.jpg> Photo

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<http://www.youtube.com/watch?v=eHXOzrZvygw> Video, steam engine pulled by a group of women

<http://www.youtube.com/watch?v=1keDItRX7oQ> A team pulls an airplane with a rope

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1.166 Jerking chair

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

1.167 Lifting a person with fingers

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.168 Rockets, and a problem with an iceboat

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1.169 Short Story: Earth to Venus

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.170 A choice of hammers

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.171 Pressure regulator

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

1.172 Sliding a stick across fingers

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.173 Short Story: Giant tug-of-war

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=W9_UfRbnbpQ Video of women in huge tug of war, periodic pull instead of continuous pull.

<http://www.youtube.com/watch?v=OFJPGGrF0Yk0&mode=related&search=> Video of men in tug of war, continuous pull (with bare hands!!)

1.174 Shooting along a slope

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.175 Starting a car on a slippery road

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.176 Balancing a tire

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.177 Carnival bottle swing

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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1.178 Hanging goblet, ready to crash

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.179 Breaking a drill bit

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1.180 Swinging watches

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1.181 Short Story: Flattening the Golden Gate Bridge

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<http://sonic.net/~playland/ggsag.html> Photo

<http://sonic.net/~playland/ggbridge.html> Photos.

[http://sfgate.com/cgi-](http://sfgate.com/cgi-bin/object/article?o=7&f=/templates/types/store/pages/buyphotos/dtl/goldengate.DTL&type=printable)

[bin/object/article?o=7&f=/templates/types/store/pages/buyphotos/dtl/goldengate.DTL&type=printable](http://sfgate.com/cgi-bin/object/article?o=7&f=/templates/types/store/pages/buyphotos/dtl/goldengate.DTL&type=printable)

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1.183 Oscillating car antenna

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1.185 Road corrugation

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http://www.expedition360.com/australia_lessons_science/corrugations_in_road.jpg photo of corrugated dirt road

<http://perso.ens-lyon.fr/nicolas.taberlet/washboard/>

<http://www.youtube.com/watch?v=UHCJgh30kNE> Video of a lab demonstration showing road corrugation

<http://www.gi.alaska.edu/ScienceForum/ASF18/1815.html> Article by Ned Rozell

<http://www.usroads.com/journals/rmej/0006/rm000601.htm> Article by Ken Skorseth

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1.186 Seeing only one side of the Moon

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1.189 Moon trip figure eight

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1.190 Earth and Sun pull on Moon

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1.191 Gravitational slingshot effect

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1.192 Making a map of India

In the past when India was surveyed, the measures were reportedly slightly This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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1.193 Shaving with twin blades

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