



1
00:00:01,026 --> 00:00:05,106
>> As long as it goes in an
arc, the stream will stay taut.

2
00:00:07,016 --> 00:00:14,456
That has to do with the physics.

3
00:00:14,526 --> 00:00:15,786
Okay, here we go.

4
00:00:17,366 --> 00:00:19,716
I've got my yo-yo bag.

5
00:00:20,226 --> 00:00:24,646
In my yo-yo bag I
have a free-spinning,

6
00:00:24,946 --> 00:00:26,386
non-returning yo-yo.

7
00:00:28,696 --> 00:00:30,056
Okay [fizzing sound] hear that?

8
00:00:30,056 --> 00:00:35,446
Okay, that's the sound of
precision ball bearings.

9
00:00:36,416 --> 00:00:38,016
So here, spin a yo-yo.

10
00:00:38,016 --> 00:00:39,996
I've got to do orbit the Earth.

11
00:00:40,596 --> 00:00:43,096
There we go and then
it's orbiting slowly

12
00:00:43,156 --> 00:00:48,426

but it's spinning fast and then
I'm going to do around the moon.

13

00:00:48,426 --> 00:00:49,036

Look at that.

14

00:00:49,036 --> 00:00:51,826

And then I'm going to
do the tether assist.

15

00:00:52,526 --> 00:00:54,216

Now, normally we call that "Man

16

00:00:54,216 --> 00:00:56,006

on the Trapeze,"
but it won't catch.

17

00:00:56,676 --> 00:00:59,756

And so it just bounces
off the string.

18

00:01:00,186 --> 00:01:02,766

And it's kind of like the
tether technology we use

19

00:01:02,796 --> 00:01:03,936

for satellites and things.

20

00:01:04,526 --> 00:01:05,916

So I call that the
"Tether Assist."

21

00:01:08,896 --> 00:01:14,016

And let's see if I can
get it to come back down.

22

00:01:14,016 --> 00:01:14,976

Ah, there we go.

23

00:01:16,586 --> 00:01:19,506

And because I'm in
space and I can,

24

00:01:19,976 --> 00:01:23,296

I get to name these yo-yo
tricks as I invent them.

25

00:01:24,676 --> 00:01:26,836

So I call this "Shoot
the Planets."

26

00:01:28,696 --> 00:01:34,216

And I'm spending more time
training to fly the robotic arms

27

00:01:34,216 --> 00:01:36,876

so I can snag this little
spacecraft coming up here

28

00:01:36,876 --> 00:01:38,686

in a week or so called "Drag."

29

00:01:39,596 --> 00:01:41,306

And I haven't been
spending as much time

30

00:01:41,376 --> 00:01:44,136

as I should working
on my yo-yo training.

31

00:01:44,856 --> 00:01:46,476

So I've been ignoring
my yo-yo training,

32

00:01:46,546 --> 00:01:49,446

so it may take a couple of
times to get this trick correct.

33

00:01:50,296 --> 00:01:52,966

And it just shows how I've
got misplaced priorities.

34

00:01:54,456 --> 00:01:54,956

Here we go.

35

00:02:00,656 --> 00:02:03,216

Oh, so far so good,
orbit the Earth.

36

00:02:05,466 --> 00:02:08,846

And now, it's like keep
it moving in an arc,

37

00:02:08,896 --> 00:02:10,796

there's two, there's three.

38

00:02:13,246 --> 00:02:14,706

Oh, oh, how about that.

39

00:02:14,706 --> 00:02:15,946

Let's see if I can
get it to come back.

40

00:02:21,076 --> 00:02:24,926

Ah, okay. So now it's
spinning really fast.

41

00:02:25,676 --> 00:02:27,556

We'll go ahead around
-- oh, I like this.

42

00:02:28,476 --> 00:02:31,126

I'm going to do "Shoot
the Planets" again.

43

00:02:31,616 --> 00:02:35,296

So here's that, here's
that, here's that.

44

00:02:36,906 --> 00:02:38,496

There, that was a good one.

45

00:02:38,956 --> 00:02:39,496

That's a keeper.

46

00:02:43,496 --> 00:02:45,786

Okay, now I call
this "The Asteroid"

47

00:02:45,846 --> 00:02:47,596

because it's basically
uncontrolled,

48

00:02:47,646 --> 00:02:50,726

the string is lived and it's
just bouncing back and forth.

49

00:02:51,216 --> 00:02:52,406

So this trick is "The Asteroid."

50

00:02:52,406 --> 00:02:55,006

And you have to be careful
because if it comes back

51

00:02:55,406 --> 00:02:58,616

in an uncontrolled way, it could
end up hitting you in the head,

52

00:02:59,036 --> 00:03:00,516

and I call that the "G Bonk."

53

00:03:03,596 --> 00:03:07,386

Another thing about
yo-yos, there's a lot

54

00:03:07,456 --> 00:03:09,526

of physics involved in
this, a lot of physics.

55

00:03:10,366 --> 00:03:12,356

It change of angular momentum.

56

00:03:13,046 --> 00:03:17,116

With the yo-yo spinning, angular momentum of the yo-yo moving

57

00:03:17,306 --> 00:03:22,176

in an arc as a system and then the linear momentum of it going

58

00:03:22,256 --> 00:03:24,776

in and out of the string, and then, of course,

59

00:03:24,776 --> 00:03:27,676

there's energy expenditure and that's because you got bearings

60

00:03:27,676 --> 00:03:30,276

and friction and drag with the air around it,

61

00:03:30,276 --> 00:03:31,596

and drag with the air is kind of small.

62

00:03:32,246 --> 00:03:34,706

So you have all of these neat pieces

63

00:03:34,706 --> 00:03:36,056

of physics working on this.

64

00:03:42,106 --> 00:03:44,306

And it's good to understand the physics

65

00:03:44,606 --> 00:03:46,766
of your recreational activities.

66

00:03:46,986 --> 00:03:50,776
So if you like doing
yo-yos, you should read

67

00:03:50,776 --> 00:03:53,496
up about how they work,
how the physics works.

68

00:03:54,436 --> 00:03:56,136
And it will benefit
you in several ways.

69

00:03:56,226 --> 00:03:57,816
One way it'll benefit
you is you'll be able

70

00:03:57,816 --> 00:03:59,776
to have some delightful
conversation.

71

00:03:59,776 --> 00:04:01,946
You can impress people
by talking

72

00:04:01,946 --> 00:04:03,336
about the physics of your yo-yo.

73

00:04:03,666 --> 00:04:07,626
And if you're a guy, just
think you can impress the gals

74

00:04:07,986 --> 00:04:10,156
by talking about the physics
of how your yo-yo works.

75

00:04:10,526 --> 00:04:13,186
And, of course, there's

going to be a classic gals

76

00:04:13,186 --> 00:04:15,276

that won't be interested in
that; you won't impress them.

77

00:04:15,556 --> 00:04:17,466

But then those are the kind
you don't want to be around.

78

00:04:17,466 --> 00:04:21,386

And then if you're a gal,
and your yo-yo, again,

79

00:04:21,386 --> 00:04:23,896

learn the physics, and when
you talk about the physics

80

00:04:23,896 --> 00:04:25,376

of how the yo-yo
works in addition

81

00:04:25,426 --> 00:04:28,296

to doing your yo-yo tricks,
you can impress the guys.

82

00:04:28,606 --> 00:04:29,946

And, of course, there's
going to be some guys

83

00:04:30,076 --> 00:04:32,306

that won't be impressed
because they don't like physics.

84

00:04:33,806 --> 00:04:34,796

And you don't want to hang

85

00:04:34,796 --> 00:04:36,286

around those kind
of guys anyway.

86

00:04:36,756 --> 00:04:39,576

But there's even a more important aspect of this.

87

00:04:40,136 --> 00:04:42,636

If you learn the physics of how the yo-yo works and you can talk

88

00:04:42,636 --> 00:04:45,346

about that, that means you've learned a certain amount

89

00:04:45,406 --> 00:04:45,776

of physics.

90

00:04:46,276 --> 00:04:48,196

And when you learn a technical subject like physics,

91

00:04:48,646 --> 00:04:52,216

guess what, it helps you get a good job.

92

00:04:53,436 --> 00:04:56,266

And then, of course, when you have a good job you can afford

93

00:04:56,266 --> 00:05:01,416

to buy these fancy yo-yos and you can use your spare time then

94

00:05:01,726 --> 00:05:03,856

to do even more work with your yo-yos.

95

00:05:05,026 --> 00:05:06,746

So here we go, let's see if we can do it again.

96

00:05:07,956 --> 00:05:15,516

So orbit the Earth, orbit the moon, orbit the moon again.

97

00:05:16,696 --> 00:05:21,086

There's a tether assist, okay, tester assist,

98

00:05:24,116 --> 00:05:25,976

shoot the planets and come back.

99

00:05:26,076 --> 00:05:27,976

Hot dog, look at that!

100

00:05:28,516 --> 00:05:32,586

[Silence]

101

00:05:33,086 --> 00:05:34,696

Again, I'm going to try "Shoot the Planets" again.

102

00:05:35,496 --> 00:05:38,736

Ah, that's a string jam.

103

00:05:39,266 --> 00:05:41,276

Oh, man! And it hurts your finger.

104

00:05:41,976 --> 00:05:42,906

It hate it when that happens.

105

00:05:44,106 --> 00:05:47,326

Let's see if I could get this.

106

00:05:50,316 --> 00:05:53,186

One of the neat things about video is that you can edit

107

00:05:53,186 --> 00:05:55,926
out all these takes when you're
gooning [phonetic] up, you know.

108

00:05:56,346 --> 00:05:57,676
And then you can make it look