



CENTRIPETAL FORCE



1
00:00:00,240 --> 00:00:08,629

[Music]

2
00:00:08,639 --> 00:00:13,170

so

3
00:00:13,180 --> 00:00:24,550

[Music]

4
00:00:28,390 --> 00:00:26,470
hello my name is shane kimbrough and i'm

5
00:00:30,470 --> 00:00:28,400
an astronaut living and working aboard

6
00:00:32,790 --> 00:00:30,480
the international space station we're

7
00:00:35,830 --> 00:00:32,800
currently orbiting 250 miles above the

8
00:00:37,190 --> 00:00:35,840
earth's surface at approximately 17 500

9
00:00:38,630 --> 00:00:37,200
miles per hour

10
00:00:40,389 --> 00:00:38,640
you may be wondering how it's possible

11
00:00:42,549 --> 00:00:40,399
for the space station to be continuously

12
00:00:43,990 --> 00:00:42,559
orbiting earth well today we're going to

13
00:00:46,310 --> 00:00:44,000

answer that question and explore

14

00:00:48,549 --> 00:00:46,320

centripetal force in the microgravity

15

00:00:51,029 --> 00:00:48,559

environment of the space station

16

00:00:53,189 --> 00:00:51,039

let's get started

17

00:00:55,029 --> 00:00:53,199

before we dive into centripetal force

18

00:00:56,950 --> 00:00:55,039

it's important to look at newton's first

19

00:00:58,549 --> 00:00:56,960

law of motion which states that an

20

00:01:01,189 --> 00:00:58,559

object will continue moving with a

21

00:01:03,590 --> 00:01:01,199

constant velocity along a straight path

22

00:01:04,710 --> 00:01:03,600

unless acted upon by a net external

23

00:01:06,310 --> 00:01:04,720

force

24

00:01:08,310 --> 00:01:06,320

this means that the space station will

25

00:01:11,190 --> 00:01:08,320

move along a straight path if it weren't

26

00:01:13,670 --> 00:01:11,200

for one key external force acting on it

27

00:01:16,070 --> 00:01:13,680

earth's gravitational pull

28

00:01:17,749 --> 00:01:16,080

another name for this external force is

29

00:01:21,590 --> 00:01:17,759

centripetal force

30

00:01:24,230 --> 00:01:21,600

that keeps an object moving along a

31

00:01:26,390 --> 00:01:24,240

circular path gravity in this case is a

32

00:01:28,469 --> 00:01:26,400

centripetal force because it is the

33

00:01:32,789 --> 00:01:28,479

force that is keeping our space station

34

00:01:34,870 --> 00:01:32,799

moving in its circular path around earth

35

00:01:37,190 --> 00:01:34,880

all right here's our example we have aki

36

00:01:39,030 --> 00:01:37,200

here that has an object tied to a string

37

00:01:40,469 --> 00:01:39,040

it's just a yo-yo but it's an object on

38

00:01:42,630 --> 00:01:40,479

the end of a string

39

00:01:43,910 --> 00:01:42,640

he's going to whirl this object around

40

00:01:46,630 --> 00:01:43,920

attached to the string so that it's

41

00:01:48,069 --> 00:01:46,640

moving in a circular path

42

00:01:50,149 --> 00:01:48,079

the string in this demonstration

43

00:01:51,670 --> 00:01:50,159

provides a force of tension which is the

44

00:01:54,630 --> 00:01:51,680

centripetal force

45

00:01:56,709 --> 00:01:54,640

keeping the yoyo revolving around aki's

46

00:01:58,550 --> 00:01:56,719

hand

47

00:02:00,550 --> 00:01:58,560

it's important to note that centripetal

48

00:02:03,350 --> 00:02:00,560

means center seeking therefore a

49

00:02:04,709 --> 00:02:03,360

centripetal force is a center-seeking

50

00:02:09,510 --> 00:02:04,719

force

51
00:02:11,910 --> 00:02:09,520
inward toward the center or axis of

52
00:02:14,070 --> 00:02:11,920
revolution this is because it's the

53
00:02:15,990 --> 00:02:14,080
force of tension from the string pulling

54
00:02:18,550 --> 00:02:16,000
inward that keeps the yoyo revolving

55
00:02:20,630 --> 00:02:18,560
around the axis of revolution

56
00:02:22,550 --> 00:02:20,640
now aki's going to set the object moving

57
00:02:24,470 --> 00:02:22,560
in the circular path free

58
00:02:26,150 --> 00:02:24,480
and remove that centripetal force by

59
00:02:27,990 --> 00:02:26,160
releasing the string

60
00:02:30,630 --> 00:02:28,000
as you saw once the tension from the

61
00:02:32,630 --> 00:02:30,640
string or triple the force was removed

62
00:02:34,309 --> 00:02:32,640
the object continues to follow newton's

63
00:02:36,710 --> 00:02:34,319

first law of motion

64

00:02:38,710 --> 00:02:36,720

it keeps moving at a constant velocity

65

00:02:40,949 --> 00:02:38,720

along a straight path relative to the

66

00:02:42,550 --> 00:02:40,959

space station

67

00:02:44,949 --> 00:02:42,560

can you think of other examples of

68

00:02:46,710 --> 00:02:44,959

centripetal forces back on earth

69

00:02:48,390 --> 00:02:46,720

to learn more about centripetal force

70

00:02:50,309 --> 00:02:48,400

use the corresponding classroom

71

00:02:52,710 --> 00:02:50,319

connection to conduct your own

72

00:02:54,869 --> 00:02:52,720

experiment and discover other ways and

73

00:02:56,390 --> 00:02:54,879

triple the forces play out in your

74

00:02:57,990 --> 00:02:56,400

everyday life

75

00:03:03,490 --> 00:02:58,000

thanks for exploring some physics with

76

00:03:03,500 --> 00:03:20,630

[Music]