
CEDAR

1
00:00:20,790 --> 00:00:19,510
welcome to the nasa lewis research

2
00:00:23,429 --> 00:00:20,800
center

3
00:00:23,990 --> 00:00:23,439
louis originally an aircraft propulsion

4
00:00:26,550 --> 00:00:24,000
lab

5
00:00:29,589 --> 00:00:26,560
was one of the original nasa centers

6
00:00:31,910 --> 00:00:29,599
with the start of the space race in 1958

7
00:00:33,030 --> 00:00:31,920
lewis became nasa's lead center for

8
00:00:36,389 --> 00:00:33,040
space propulsion

9
00:00:37,510 --> 00:00:36,399
power and communications lewis's science

10
00:00:39,430 --> 00:00:37,520
and technology

11
00:00:41,430 --> 00:00:39,440
has been critical to putting a man on

12
00:00:43,350 --> 00:00:41,440
the moon and the development of the

13
00:00:46,310 --> 00:00:43,360

space shuttle

14
00:00:47,990 --> 00:00:46,320
today lewis is also a lead center for

15
00:00:50,150 --> 00:00:48,000
microgravity sciences

16
00:00:52,069 --> 00:00:50,160
and is responsible for the power system

17
00:00:53,910 --> 00:00:52,079
of the space station

18
00:00:55,510 --> 00:00:53,920
during your visit you'll have the

19
00:00:58,549 --> 00:00:55,520
opportunity to learn about

20
00:01:02,069 --> 00:00:58,559
our aeronautics and space programs

21
00:01:05,670 --> 00:01:02,079
from experimental high performance jets

22
00:01:07,830 --> 00:01:05,680
to space shuttles and the space station

23
00:01:08,870 --> 00:01:07,840
unfortunately you won't be able to

24
00:01:11,190 --> 00:01:08,880
experience how

25
00:01:12,789 --> 00:01:11,200
our pilots and astronauts feel in these

26
00:01:14,390 --> 00:01:12,799
dynamic environments

27
00:01:17,270 --> 00:01:14,400
but there may be a way you can

28
00:01:19,590 --> 00:01:17,280
experience some of the sensations

29
00:01:20,310 --> 00:01:19,600
the cedar point amusement park and nasa

30
00:01:22,149 --> 00:01:20,320
lewis have

31
00:01:24,550 --> 00:01:22,159
teamed up to show you how your

32
00:01:25,670 --> 00:01:24,560
experiences within 200 feet of the

33
00:01:28,789 --> 00:01:25,680
earth's surface

34
00:01:29,910 --> 00:01:28,799
relate to activities 200 miles above the

35
00:01:32,950 --> 00:01:29,920
earth

36
00:01:35,190 --> 00:01:32,960
located 60 miles northwest of lewis

37
00:01:37,429 --> 00:01:35,200
cedar point has many rides on which you

38
00:01:40,230 --> 00:01:37,439

can challenge the laws of nature

39
00:01:41,510 --> 00:01:40,240
as you speed around corners and fly

40
00:01:45,109 --> 00:01:41,520
through the air

41
00:01:47,190 --> 00:01:45,119
at times seeming to defy gravity

42
00:01:48,469 --> 00:01:47,200
some of these rides create environments

43
00:01:50,469 --> 00:01:48,479
identical to those

44
00:01:52,310 --> 00:01:50,479
experienced by high performance jet

45
00:01:54,310 --> 00:01:52,320
pilots and astronauts

46
00:01:55,990 --> 00:01:54,320
the only difference is the length of

47
00:01:57,350 --> 00:01:56,000
time you are in these thrilling

48
00:01:59,429 --> 00:01:57,360
environments

49
00:02:01,510 --> 00:01:59,439
let's explore some of the similarities

50
00:02:04,550 --> 00:02:01,520
between amusement park rides

51
00:02:05,830 --> 00:02:04,560
and space flight keeping your

52
00:02:07,670 --> 00:02:05,840
orientation while

53
00:02:10,869 --> 00:02:07,680
spinning around on rides like the

54
00:02:13,030 --> 00:02:10,879
witch's wheel can be a difficult task

55
00:02:14,710 --> 00:02:13,040
this was also difficult for the mercury

56
00:02:17,589 --> 00:02:14,720
seven america's first

57
00:02:18,550 --> 00:02:17,599
astronauts to see if these men had the

58
00:02:20,869 --> 00:02:18,560
right stuff

59
00:02:23,270 --> 00:02:20,879
they came to nasa lewis to train in the

60
00:02:24,710 --> 00:02:23,280
multiple axis space test inertia

61
00:02:28,390 --> 00:02:24,720
facility

62
00:02:32,710 --> 00:02:28,400
the what that's multiple

63
00:02:36,070 --> 00:02:32,720

more than one axis a real or imaginary

64
00:02:40,070 --> 00:02:36,080
straight line on which an object rotates

65
00:02:43,350 --> 00:02:40,080
space you mean like outer space

66
00:02:45,430 --> 00:02:43,360
yes test

67
00:02:48,830 --> 00:02:45,440
can you do that again i think i forgot

68
00:02:55,990 --> 00:02:52,470
inertia how do you stop this thing

69
00:02:57,190 --> 00:02:56,000
facility just down the midway behind the

70
00:03:00,949 --> 00:02:57,200
merry-go-round

71
00:03:04,309 --> 00:03:00,959
not that kind as another example

72
00:03:06,070 --> 00:03:04,319
if you take a ride on the magnum xl 200

73
00:03:08,869 --> 00:03:06,080
you'll notice that at the bottom of the

74
00:03:11,030 --> 00:03:08,879
first hill you'll feel heavier

75
00:03:11,990 --> 00:03:11,040
typically about three or four times

76
00:03:13,830 --> 00:03:12,000
heavier

77
00:03:15,670 --> 00:03:13,840
that's because the seat of the roller

78
00:03:18,070 --> 00:03:15,680
coaster is pushing you back up

79
00:03:18,949 --> 00:03:18,080
so that you can climb the next hill

80
00:03:20,790 --> 00:03:18,959
that's the same

81
00:03:22,550 --> 00:03:20,800
feeling the space shuttle astronauts

82
00:03:24,550 --> 00:03:22,560
have during a launch

83
00:03:25,750 --> 00:03:24,560
in order to get up enough speed to get

84
00:03:27,830 --> 00:03:25,760
into space

85
00:03:30,390 --> 00:03:27,840
the shuttle must accelerate at about

86
00:03:32,710 --> 00:03:30,400
four times the force of gravity

87
00:03:35,750 --> 00:03:32,720
the difference is this lasts for over

88
00:03:38,390 --> 00:03:35,760

eight minutes when you're an astronaut

89
00:03:39,030 --> 00:03:38,400
perhaps the most obvious similarity is

90
00:03:41,830 --> 00:03:39,040
for those

91
00:03:42,550 --> 00:03:41,840
brave enough to go on the demon drop

92
00:03:45,830 --> 00:03:42,560
this ride

93
00:03:48,149 --> 00:03:45,840
sends its occupants into a brief

94
00:03:50,869 --> 00:03:48,159
from the rider's point of view gravity

95
00:03:53,030 --> 00:03:50,879
seems to be suspended as they rise up

96
00:03:55,190 --> 00:03:53,040
from their seats

97
00:03:58,390 --> 00:03:55,200
this brief experience for demon drop

98
00:04:00,390 --> 00:03:58,400
riders is the way of life for astronauts

99
00:04:01,589 --> 00:04:00,400
shuttle crews have stayed in orbit for

100
00:04:03,670 --> 00:04:01,599
two weeks

101
00:04:05,830 --> 00:04:03,680
while space station crews will live and

102
00:04:07,030 --> 00:04:05,840
work in space for several months at a

103
00:04:08,949 --> 00:04:07,040
time

104
00:04:13,190 --> 00:04:08,959
this puts a whole new meaning to the

105
00:04:16,229 --> 00:04:15,429
let's look at why what you feel on the

106
00:04:18,469 --> 00:04:16,239
demon drop

107
00:04:20,629 --> 00:04:18,479
is so similar to what the astronauts

108
00:04:22,870 --> 00:04:20,639
experience in space

109
00:04:24,790 --> 00:04:22,880
if an astronaut releases an apple on

110
00:04:26,950 --> 00:04:24,800
earth it falls

111
00:04:28,629 --> 00:04:26,960
when he releases an apple on the space

112
00:04:31,110 --> 00:04:28,639
shuttle it falls too

113
00:04:32,070 --> 00:04:31,120

it just doesn't look like it's falling

114
00:04:34,950 --> 00:04:32,080
that's because

115
00:04:35,909 --> 00:04:34,960
they are all falling together the apple

116
00:04:38,469 --> 00:04:35,919
the astronaut

117
00:04:39,749 --> 00:04:38,479
and the orbiter but they aren't falling

118
00:04:42,870 --> 00:04:39,759
towards the earth

119
00:04:44,629 --> 00:04:42,880
they're falling around it

120
00:04:48,150 --> 00:04:44,639
let's imagine that we put another

121
00:04:50,230 --> 00:04:48,160
astronaut on an elevator on earth

122
00:04:51,909 --> 00:04:50,240
the elevator is going to the top of a

123
00:04:54,310 --> 00:04:51,919
very tall building

124
00:04:55,670 --> 00:04:54,320
suddenly when he reaches the top the

125
00:04:57,990 --> 00:04:55,680
cable breaks

126
00:04:59,909 --> 00:04:58,000
the elevator car with the astronaut in

127
00:05:02,629 --> 00:04:59,919
it begins to fall

128
00:05:03,029 --> 00:05:02,639
what will happen inside the elevator

129
00:05:05,110 --> 00:05:03,039
well

130
00:05:06,550 --> 00:05:05,120
since he's falling and the elevator is

131
00:05:09,430 --> 00:05:06,560
falling at the same rate

132
00:05:11,350 --> 00:05:09,440
he starts to float his body isn't

133
00:05:12,310 --> 00:05:11,360
pushing on the inside of the elevator

134
00:05:15,350 --> 00:05:12,320
anymore

135
00:05:17,270 --> 00:05:15,360
he has no weight he's weightless

136
00:05:19,590 --> 00:05:17,280
if he had an apple with him it would

137
00:05:20,390 --> 00:05:19,600
float too just like the one in the

138
00:05:22,550 --> 00:05:20,400

shuttle

139
00:05:25,510 --> 00:05:22,560
because the astronaut the apple and the

140
00:05:28,150 --> 00:05:25,520
elevator would all be falling together

141
00:05:30,150 --> 00:05:28,160
it would be a fun ride until he hit the

142
00:05:32,310 --> 00:05:30,160
bottom

143
00:05:33,189 --> 00:05:32,320
and that's why things float around in

144
00:05:35,909 --> 00:05:33,199
space

145
00:05:38,870 --> 00:05:35,919
because they all fall on a curved path

146
00:05:41,350 --> 00:05:38,880
around the earth

147
00:05:42,469 --> 00:05:41,360
back at nasa lewis researchers have been

148
00:05:44,870 --> 00:05:42,479
using a facility

149
00:05:46,710 --> 00:05:44,880
similar to the demon drop for over 30

150
00:05:48,710 --> 00:05:46,720
years to conduct experiments

151
00:05:51,909 --> 00:05:48,720
in the low gravity environment of free

152
00:05:53,830 --> 00:05:51,919
fall the basic design and concept is the

153
00:05:56,870 --> 00:05:53,840
same as that of the demon drop

154
00:05:58,710 --> 00:05:56,880
they are almost the same size too one

155
00:06:01,350 --> 00:05:58,720
difference between the demon drop

156
00:06:02,629 --> 00:06:01,360
and the lewis drop tower is the use of a

157
00:06:04,790 --> 00:06:02,639
drag shield

158
00:06:07,270 --> 00:06:04,800
the external cover which eliminates the

159
00:06:09,749 --> 00:06:07,280
effects of wind resistance

160
00:06:11,110 --> 00:06:09,759
the experiment actually falls within the

161
00:06:13,990 --> 00:06:11,120
falling drag shield

162
00:06:14,710 --> 00:06:14,000
to create a pure low gravity environment

163
00:06:16,790 --> 00:06:14,720

about one

164
00:06:17,990 --> 00:06:16,800
one hundred thousands of normal earth

165
00:06:20,070 --> 00:06:18,000
gravity

166
00:06:22,150 --> 00:06:20,080
this environment lets scientists at

167
00:06:24,870 --> 00:06:22,160
lewis get high fidelity data

168
00:06:27,430 --> 00:06:24,880
on low gravity processes and sneak

169
00:06:29,990 --> 00:06:27,440
previews of shuttle experiments

170
00:06:32,150 --> 00:06:30,000
from a rider's point of view the smooth

171
00:06:34,150 --> 00:06:32,160
slope at the bottom of the demon drop is

172
00:06:36,309 --> 00:06:34,160
much more comfortable than the sudden

173
00:06:40,710 --> 00:06:36,319
stop in the sand pit at the bottom of

174
00:06:44,710 --> 00:06:42,870
we have shown you just a small portion

175
00:06:47,029 --> 00:06:44,720
of nasa's space program

176
00:06:49,350 --> 00:06:47,039
which overlaps with your experiences at

177
00:06:51,430 --> 00:06:49,360
amusement parks like cedar point

178
00:06:53,909 --> 00:06:51,440
we hope you enjoy the rest of your visit

179
00:06:55,909 --> 00:06:53,919
here at the nasa lewis research center

180
00:06:58,469 --> 00:06:55,919
and the next time you visit an amusement

181
00:07:01,990 --> 00:06:58,479
park let your imagination

182
00:07:14,830 --> 00:07:02,000
take you to the edge and dream of