
NASA
LECTU

1
00:00:11,190 --> 00:00:07,510
we could have a base on the moon within

2
00:00:13,589 --> 00:00:11,200
30 years reach mars in 50 years and

3
00:00:16,710 --> 00:00:13,599
explore the moons of the outer planets

4
00:00:20,630 --> 00:00:16,720
in 200 years

5
00:00:23,349 --> 00:00:20,640
by reach i mean with man or should i say

6
00:00:26,550 --> 00:00:23,359
person space flight

7
00:00:29,509 --> 00:00:26,560
we have already driven rovers on mars

8
00:00:30,390 --> 00:00:29,519
and landed a probe on titan a moon of

9
00:00:32,790 --> 00:00:30,400
saturn

10
00:00:35,430 --> 00:00:32,800
but if one is considering the future of

11
00:00:37,270 --> 00:00:35,440
the human race we have to go there

12
00:00:40,549 --> 00:00:37,280
ourselves

13
00:00:43,110 --> 00:00:40,559

going into space won't be cheap but it

14
00:00:45,670 --> 00:00:43,120
would take only a small proportion of

15
00:00:47,910 --> 00:00:45,680
world resources

16
00:00:50,869 --> 00:00:47,920
nasa's budget has remained roughly

17
00:00:53,830 --> 00:00:50,879
constant in real terms since the time of

18
00:00:58,790 --> 00:00:53,840
the apollo landings but it has decreased

19
00:01:00,630 --> 00:00:58,800
from 0.3 of usgdp in 1970

20
00:01:02,150 --> 00:01:00,640
to 0.12

21
00:01:03,990 --> 00:01:02,160
now

22
00:01:07,429 --> 00:01:04,000
even if we were to increase the

23
00:01:10,390 --> 00:01:07,439
international budget 20 times to make a

24
00:01:14,870 --> 00:01:10,400
serious effort to go into space it would

25
00:01:17,030 --> 00:01:14,880
only be a small fraction of world gdp

26
00:01:19,350 --> 00:01:17,040
there will be those who argue that it

27
00:01:22,310 --> 00:01:19,360
would be better to spend our money

28
00:01:25,670 --> 00:01:22,320
solving the problems of this planet like

29
00:01:27,830 --> 00:01:25,680
climate change and pollution rather than

30
00:01:30,630 --> 00:01:27,840
wasting it on a possibly fruitless

31
00:01:33,030 --> 00:01:30,640
search for a new planet

32
00:01:35,190 --> 00:01:33,040
i am not denying the importance of

33
00:01:38,230 --> 00:01:35,200
fighting climate change and global

34
00:01:40,630 --> 00:01:38,240
warming but we can do that and still

35
00:01:43,190 --> 00:01:40,640
spare a quarter of a percent of world

36
00:01:45,670 --> 00:01:43,200
gdp for space

37
00:01:48,149 --> 00:01:45,680
isn't our future worth a quarter of a

38
00:01:50,630 --> 00:01:48,159

percent

39
00:01:52,950 --> 00:01:50,640
we thought space was worth a big effort

40
00:01:53,710 --> 00:01:52,960
in the sixties

41
00:01:55,270 --> 00:01:53,720
in

42
00:01:57,590 --> 00:01:55,280
1962

43
00:02:00,310 --> 00:01:57,600
president kennedy committed the u.s to

44
00:02:01,910 --> 00:02:00,320
landing a man on the moon by the end of

45
00:02:04,389 --> 00:02:01,920
the decade

46
00:02:06,830 --> 00:02:04,399
this was achieved just in time by the

47
00:02:10,389 --> 00:02:06,840
apollo 11 mission in

48
00:02:12,949 --> 00:02:10,399
1969 the space race helped to create a

49
00:02:16,150 --> 00:02:12,959
fascination with science and led to

50
00:02:18,150 --> 00:02:16,160
great advances in technology including

51
00:02:20,630 --> 00:02:18,160
the first large-scale integrated

52
00:02:22,630 --> 00:02:20,640
circuits which are the basis of all

53
00:02:25,589 --> 00:02:22,640
modern computers

54
00:02:27,510 --> 00:02:25,599
however after the last moon landing in

55
00:02:30,150 --> 00:02:27,520
1972

56
00:02:31,509 --> 00:02:30,160
with no future plans for further manned

57
00:02:34,390 --> 00:02:31,519
space flight

58
00:02:36,949 --> 00:02:34,400
public interest in space declined this

59
00:02:39,350 --> 00:02:36,959
went along with the general dissentment

60
00:02:41,830 --> 00:02:39,360
with science in the west because

61
00:02:44,630 --> 00:02:41,840
although it had brought

62
00:02:46,869 --> 00:02:44,640
great benefits it had not solved the

63
00:02:48,830 --> 00:02:46,879

social problems that increasingly

64
00:02:51,670 --> 00:02:48,840
occupied public

65
00:02:54,630 --> 00:02:51,680
potencies a new manned space flight

66
00:02:57,589 --> 00:02:54,640
program would do a lot to restore public

67
00:02:59,270 --> 00:02:57,599
enthusiasm for space and for science

68
00:03:01,830 --> 00:02:59,280
generally

69
00:03:05,110 --> 00:03:01,840
robotic missions are much cheaper and

70
00:03:07,110 --> 00:03:05,120
may provide more scientific information

71
00:03:09,509 --> 00:03:07,120
but they don't catch the public

72
00:03:11,670 --> 00:03:09,519
imagination in the same way

73
00:03:14,390 --> 00:03:11,680
and they don't spread the human race

74
00:03:16,550 --> 00:03:14,400
into space which i'm arguing should be

75
00:03:20,070 --> 00:03:16,560
our long-term strategy

76
00:03:23,750 --> 00:03:20,080
a goal of a base on the moon by 2020 and

77
00:03:26,390 --> 00:03:23,760
of a man landing on mars by 2025

78
00:03:29,110 --> 00:03:26,400
would reignite the space program and

79
00:03:31,270 --> 00:03:29,120
give it a sense of purpose in the same

80
00:03:34,229 --> 00:03:31,280
way that president kennedy's moon

81
00:03:36,869 --> 00:03:34,239
targeted in the 1960s

82
00:03:39,270 --> 00:03:36,879
a new interest in space would also

83
00:03:41,670 --> 00:03:39,280
increase the public standing of science

84
00:03:44,390 --> 00:03:41,680
generally the low scheme in which

85
00:03:47,110 --> 00:03:44,400
science and scientists are held is

86
00:03:49,190 --> 00:03:47,120
having serious consequences

87
00:03:51,350 --> 00:03:49,200
we live in a society that is

88
00:03:54,149 --> 00:03:51,360

increasingly governed by science and

89
00:03:56,949 --> 00:03:54,159
technology yet fewer and fewer young

90
00:04:00,229 --> 00:03:56,959
people want to go into science

91
00:04:02,949 --> 00:04:00,239
as a small step towards curing this my

92
00:04:05,190 --> 00:04:02,959
daughter lucy and i have written a

93
00:04:07,990 --> 00:04:05,200
children's book

94
00:04:11,190 --> 00:04:08,000
i will now let lucy talk about how to

95
00:04:13,589 --> 00:04:11,200
encourage the next generation to take an

96
00:04:18,069 --> 00:04:13,599
interest in space and in science

97
00:04:23,350 --> 00:04:20,949
hello and good afternoon

98
00:04:26,710 --> 00:04:23,360
i'm very very honored to be here at the

99
00:04:29,270 --> 00:04:26,720
nasa 50th birthday lecture series it's a

100
00:04:30,950 --> 00:04:29,280
great honor to be here talking to you

101
00:04:33,189 --> 00:04:30,960
you've heard my father

102
00:04:34,469 --> 00:04:33,199
telling you about why we need to travel

103
00:04:37,030 --> 00:04:34,479
into space

104
00:04:39,430 --> 00:04:37,040
well i'd like to take just a few minutes

105
00:04:41,749 --> 00:04:39,440
to tell you why we think we need to have

106
00:04:43,830 --> 00:04:41,759
a next generation who wants to travel

107
00:04:46,150 --> 00:04:43,840
into space as well

108
00:04:47,990 --> 00:04:46,160
as my father said at the moment we face

109
00:04:49,270 --> 00:04:48,000
a paradox

110
00:04:51,430 --> 00:04:49,280
never before

111
00:04:53,670 --> 00:04:51,440
have science and technology played such

112
00:04:56,710 --> 00:04:53,680
a big part in our lives

113
00:04:58,790 --> 00:04:56,720

and yet at the same time it seems that

114
00:05:00,950 --> 00:04:58,800
children are turning away from science

115
00:05:03,110 --> 00:05:00,960
they're losing interest in science and

116
00:05:04,950 --> 00:05:03,120
they're not studying it

117
00:05:07,189 --> 00:05:04,960
so i'd like to talk a bit about what we

118
00:05:09,590 --> 00:05:07,199
learn from children what we learned

119
00:05:12,469 --> 00:05:09,600
about children in science education and

120
00:05:14,390 --> 00:05:12,479
how nasa makes a great contribution to

121
00:05:16,870 --> 00:05:14,400
ensuring that the next generation does

122
00:05:18,150 --> 00:05:16,880
engage with science

123
00:05:21,830 --> 00:05:18,160
last year

124
00:05:23,830 --> 00:05:21,840
my dad and i published a book for kids

125
00:05:26,310 --> 00:05:23,840
it's an adventure story in which all the

126
00:05:28,150 --> 00:05:26,320
adventures are based on real science

127
00:05:30,070 --> 00:05:28,160
it's about a little boy who lives next

128
00:05:32,230 --> 00:05:30,080
door to a scientist

129
00:05:35,110 --> 00:05:32,240
and this scientist has an amazing

130
00:05:37,590 --> 00:05:35,120
computer called cosmos and cosmos is so

131
00:05:38,870 --> 00:05:37,600
powerful and so intelligent he can draw

132
00:05:41,029 --> 00:05:38,880
a doorway

133
00:05:43,110 --> 00:05:41,039
through which you can walk to any part

134
00:05:44,150 --> 00:05:43,120
of the known universe that you want to

135
00:05:46,710 --> 00:05:44,160
visit

136
00:05:49,189 --> 00:05:46,720
now when i told some people at nasa

137
00:05:51,110 --> 00:05:49,199
about cosmos the fictional computer they

138
00:05:52,629 --> 00:05:51,120

said oh i wish we had one of them

139
00:05:55,350 --> 00:05:52,639
because that would help our budget

140
00:05:56,309 --> 00:05:55,360
enormously

141
00:05:58,469 --> 00:05:56,319
now

142
00:06:00,790 --> 00:05:58,479
my father wanted to work on this project

143
00:06:03,749 --> 00:06:00,800
because of his high level of concern

144
00:06:04,710 --> 00:06:03,759
about children and science education

145
00:06:06,629 --> 00:06:04,720
now that's

146
00:06:09,110 --> 00:06:06,639
not saying that we set out to persuade

147
00:06:10,950 --> 00:06:09,120
every child to be a scientist

148
00:06:13,430 --> 00:06:10,960
because our world needs people with a

149
00:06:15,590 --> 00:06:13,440
wide variety of skills

150
00:06:18,150 --> 00:06:15,600
but science affects all of us and it

151
00:06:20,390 --> 00:06:18,160
matters to all of us and it will do even

152
00:06:22,629 --> 00:06:20,400
more so in the future

153
00:06:25,670 --> 00:06:22,639
the children of today are the adults of

154
00:06:27,590 --> 00:06:25,680
tomorrow and they need to have a basic

155
00:06:29,029 --> 00:06:27,600
understanding of science

156
00:06:31,350 --> 00:06:29,039
if they're going to make the kind of

157
00:06:33,029 --> 00:06:31,360
decisions that will affect us all

158
00:06:34,629 --> 00:06:33,039
and we're going to need scientists as

159
00:06:36,710 --> 00:06:34,639
well not just

160
00:06:39,189 --> 00:06:36,720
to work on space travel

161
00:06:41,749 --> 00:06:39,199
but to work on issues that face us all

162
00:06:44,230 --> 00:06:41,759
like climate change or fuel sources or

163
00:06:45,749 --> 00:06:44,240

food production

164
00:06:48,309 --> 00:06:45,759
now

165
00:06:50,070 --> 00:06:48,319
some recent research has highlighted the

166
00:06:51,350 --> 00:06:50,080
fears about children and science

167
00:06:53,990 --> 00:06:51,360
education

168
00:06:54,950 --> 00:06:54,000
in the united kingdom a recent survey

169
00:06:57,510 --> 00:06:54,960
found

170
00:07:00,230 --> 00:06:57,520
that a third of uk school children

171
00:07:02,870 --> 00:07:00,240
believe that wartime prime minister

172
00:07:04,950 --> 00:07:02,880
winston churchill was the first man to

173
00:07:07,270 --> 00:07:04,960
walk on the moon

174
00:07:09,589 --> 00:07:07,280
i'm sorry about that

175
00:07:11,670 --> 00:07:09,599
nasa neil armstrong

176
00:07:13,029 --> 00:07:11,680
and though the statistics that came with

177
00:07:15,110 --> 00:07:13,039
this survey

178
00:07:17,830 --> 00:07:15,120
are not very heartening either

179
00:07:21,350 --> 00:07:17,840
they found that 40 percent of children

180
00:07:23,830 --> 00:07:21,360
thought mars was a chocolate bar

181
00:07:26,390 --> 00:07:23,840
35 percent of children said the earth

182
00:07:29,510 --> 00:07:26,400
was not an official planet

183
00:07:32,629 --> 00:07:29,520
and extraordinarily 72 percent could not

184
00:07:34,309 --> 00:07:32,639
identify the moon from pictures

185
00:07:37,029 --> 00:07:34,319
now just in case you're sitting there

186
00:07:39,270 --> 00:07:37,039
feeling smug i'm afraid the results in

187
00:07:41,909 --> 00:07:39,280
the usa are really not looking much

188
00:07:46,710 --> 00:07:43,749

only four percent

189
00:07:48,629 --> 00:07:46,720
of u.s adults when asked could name a

190
00:07:50,550 --> 00:07:48,639
living scientist

191
00:07:54,790 --> 00:07:50,560
who they would nominate as a science

192
00:07:58,070 --> 00:07:54,800
role model although at the same time 96

193
00:08:01,110 --> 00:07:58,080
are stunning 96 percent of u.s adults

194
00:08:04,230 --> 00:08:01,120
think that it is important for the us to

195
00:08:07,110 --> 00:08:04,240
be a leader in science education so it

196
00:08:08,550 --> 00:08:07,120
all sounds rather gloomy but

197
00:08:10,950 --> 00:08:08,560
there is hope

198
00:08:13,270 --> 00:08:10,960
as i found out when i went on a

199
00:08:15,909 --> 00:08:13,280
worldwide schools lecture tour with a

200
00:08:18,070 --> 00:08:15,919
talk called surfing the solar system

201
00:08:20,469 --> 00:08:18,080
it's about the sort of concept of

202
00:08:23,749 --> 00:08:20,479
astronomy and theoretical physics that

203
00:08:25,830 --> 00:08:23,759
we set out to cover in our book

204
00:08:27,909 --> 00:08:25,840
now i've probably spoken we estimate

205
00:08:31,270 --> 00:08:27,919
i've probably spoken to about 20 000

206
00:08:34,469 --> 00:08:31,280
kids worldwide and what i discovered was

207
00:08:36,790 --> 00:08:34,479
an enormous appetite and enthusiasm for

208
00:08:38,469 --> 00:08:36,800
science and we were asked so many

209
00:08:41,350 --> 00:08:38,479
questions that we have to write another

210
00:08:43,430 --> 00:08:41,360
book in order to be able to answer them

211
00:08:44,389 --> 00:08:43,440
and they're great questions like

212
00:08:47,110 --> 00:08:44,399
can you

213
00:08:49,829 --> 00:08:47,120

skateboard on jupiter

214
00:08:52,470 --> 00:08:49,839
and what my personal favorite is what

215
00:08:54,630 --> 00:08:52,480
does happen if you get to the edge of

216
00:08:57,430 --> 00:08:54,640
the universe

217
00:08:59,509 --> 00:08:57,440
now you could say that we're just lucky

218
00:09:01,670 --> 00:08:59,519
that we've got the rockstar end of

219
00:09:04,310 --> 00:09:01,680
science at our disposal

220
00:09:08,070 --> 00:09:04,320
and without a doubt i can tell you that

221
00:09:11,590 --> 00:09:08,080
black holes presented by stephen hawking

222
00:09:15,430 --> 00:09:11,600
explain simply for kids is a winner we

223
00:09:17,190 --> 00:09:15,440
had them we had them with us all the way

224
00:09:20,470 --> 00:09:17,200
but more seriously

225
00:09:23,030 --> 00:09:20,480
some research at universities in the uk

226
00:09:25,509 --> 00:09:23,040
shows that a significant percentage of

227
00:09:28,310 --> 00:09:25,519
students studying sciences and i mean

228
00:09:30,550 --> 00:09:28,320
across the board this isn't just physics

229
00:09:33,269 --> 00:09:30,560
report that their interest in science

230
00:09:35,990 --> 00:09:33,279
was sparked by exactly these topics

231
00:09:37,750 --> 00:09:36,000
they went on to become scientists

232
00:09:40,790 --> 00:09:37,760
because of an early interest in

233
00:09:42,870 --> 00:09:40,800
astronomy and the exotic phenomena of

234
00:09:44,949 --> 00:09:42,880
theoretical physics

235
00:09:47,350 --> 00:09:44,959
that space has the power to capture

236
00:09:50,310 --> 00:09:47,360
children's imagination and engage their

237
00:09:53,030 --> 00:09:50,320
curiosity there seems absolutely no