



1  
00:00:14,920 --> 00:01:06,950  
um

2  
00:01:11,270 --> 00:01:09,510  
children have a real zeal for life and a

3  
00:01:13,270 --> 00:01:11,280  
curiosity to learn

4  
00:01:15,510 --> 00:01:13,280  
many young people have an incredible

5  
00:01:17,990 --> 00:01:15,520  
fascination and romance with airplanes

6  
00:01:19,670 --> 00:01:18,000  
and rocket ships in outer space

7  
00:01:22,149 --> 00:01:19,680  
the national aeronautics and space

8  
00:01:23,749 --> 00:01:22,159  
administration is directed by law

9  
00:01:25,749 --> 00:01:23,759  
to report to the public upon

10  
00:01:28,789 --> 00:01:25,759  
developments and peaceful uses

11  
00:01:29,590 --> 00:01:28,799  
and exploration of air and space for

12  
00:01:31,670 --> 00:01:29,600  
this reason

13  
00:01:33,429 --> 00:01:31,680

every nasa field center has an office

14

00:01:35,670 --> 00:01:33,439

that works with the general public

15

00:01:37,510 --> 00:01:35,680

as well as educators to disseminate

16

00:01:40,149 --> 00:01:37,520

knowledge gained as a result

17

00:01:42,630 --> 00:01:40,159

of nasa's research efforts one of the

18

00:01:44,469 --> 00:01:42,640

ways that nasa works with educators

19

00:01:46,469 --> 00:01:44,479

is through our aerospace education

20

00:01:48,950 --> 00:01:46,479

workshop program

21

00:01:50,950 --> 00:01:48,960

these workshops are co-sponsored each

22

00:01:52,950 --> 00:01:50,960

year by universities

23

00:01:54,469 --> 00:01:52,960

colleges and school districts across the

24

00:01:56,149 --> 00:01:54,479

whole united states

25

00:01:57,590 --> 00:01:56,159

although the content of aerospace

26

00:01:59,749 --> 00:01:57,600

workshop varies

27

00:02:00,870 --> 00:01:59,759

often teachers are introduced into such

28

00:02:03,350 --> 00:02:00,880

topics as

29

00:02:05,109 --> 00:02:03,360

applications in scientific satellites

30

00:02:07,109 --> 00:02:05,119

principles of rocketry

31

00:02:09,029 --> 00:02:07,119

exploration of the solar system

32

00:02:09,910 --> 00:02:09,039

aeronautics manned space flight

33

00:02:13,110 --> 00:02:09,920

activities

34

00:02:15,270 --> 00:02:13,120

and the arts in space in addition

35

00:02:17,430 --> 00:02:15,280

teachers are often introduced to the

36

00:02:20,070 --> 00:02:17,440

uses of community resources

37

00:02:21,190 --> 00:02:20,080

such as a visit to the local airport

38

00:02:24,790 --> 00:02:21,200

planetarium

39

00:02:27,110 --> 00:02:24,800

weather bureau or aerospace industry

40

00:02:28,949 --> 00:02:27,120

hello my name is lynn bondurant chief of

41

00:02:31,670 --> 00:02:28,959

the public services office at the nasa

42

00:02:33,670 --> 00:02:31,680

lewis research center in cleveland ohio

43

00:02:35,589 --> 00:02:33,680

and it's my pleasure to be your host as

44

00:02:37,430 --> 00:02:35,599

you visit the 11th annual

45

00:02:39,589 --> 00:02:37,440

teachers workshop the sky is your

46

00:02:40,470 --> 00:02:39,599

classroom co-sponsored by baldwin

47

00:02:42,630 --> 00:02:40,480

wallace college

48

00:02:44,070 --> 00:02:42,640

kent state university and the lewis

49

00:02:45,589 --> 00:02:44,080

research center

50

00:02:47,589 --> 00:02:45,599

in the next few minutes you will be

51  
00:02:49,350 --> 00:02:47,599  
introduced into how model rockets are

52  
00:02:50,470 --> 00:02:49,360  
used to teach about the principles of

53  
00:02:52,390 --> 00:02:50,480  
rocketry

54  
00:02:54,790 --> 00:02:52,400  
how eggs are packaged to represent an

55  
00:02:56,869 --> 00:02:54,800  
astronaut landing on another planet

56  
00:02:58,149 --> 00:02:56,879  
and how a trip to the cleveland museum

57  
00:03:00,070 --> 00:02:58,159  
of natural history

58  
00:03:01,190 --> 00:03:00,080  
was used to introduce a telescope and

59  
00:03:24,789 --> 00:03:01,200  
planetarium

60  
00:03:28,869 --> 00:03:26,470  
hey nancy why are you taking the teacher

61  
00:03:30,550 --> 00:03:28,879  
workshop i'm taking it because i've

62  
00:03:31,910 --> 00:03:30,560  
heard so many wonderful things about it

63  
00:03:33,430 --> 00:03:31,920

a lot of my friends have already taken

64  
00:03:34,470 --> 00:03:33,440  
the workshop and have highly recommended

65  
00:03:36,149 --> 00:03:34,480  
it to other teachers

66  
00:03:37,589 --> 00:03:36,159  
so that's why i'm taking it this summer

67  
00:03:39,110 --> 00:03:37,599  
i'm taking the teacher workshop

68  
00:03:40,710 --> 00:03:39,120  
primarily because i've heard good things

69  
00:03:42,390 --> 00:03:40,720  
about it and also what i'm hoping to get

70  
00:03:44,470 --> 00:03:42,400  
out of it is to

71  
00:03:46,390 --> 00:03:44,480  
get some ideas for things i can do in

72  
00:03:48,229 --> 00:03:46,400  
the classroom and also some ideas i can

73  
00:03:51,430 --> 00:03:48,239  
use to help other teachers in our system

74  
00:03:54,470 --> 00:03:51,440  
with it works out great thanks

75  
00:03:58,789 --> 00:03:54,480  
all right we want to do another activity

76

00:04:01,270 --> 00:03:58,799

and this one is one that

77

00:04:02,710 --> 00:04:01,280

i thoroughly enjoyed doing with teachers

78

00:04:05,270 --> 00:04:02,720

and students

79

00:04:06,070 --> 00:04:05,280

and i would love someday to be able to

80

00:04:09,750 --> 00:04:06,080

do it with

81

00:04:11,350 --> 00:04:09,760

the administration especially that

82

00:04:13,429 --> 00:04:11,360

person in that school

83

00:04:15,750 --> 00:04:13,439

who is in charge of talking on the

84

00:04:18,310 --> 00:04:15,760

squawk box all the time

85

00:04:19,189 --> 00:04:18,320

you know you catch three of the 15 words

86

00:04:20,469 --> 00:04:19,199

that they say

87

00:04:21,590 --> 00:04:20,479

and you try to put the three together

88

00:04:22,790 --> 00:04:21,600

and you don't have any idea what they're

89

00:04:24,870 --> 00:04:22,800

talking about

90

00:04:26,550 --> 00:04:24,880

so we're going to play a little game

91

00:04:28,150 --> 00:04:26,560

called communication

92

00:04:30,390 --> 00:04:28,160

and what we're going to do is that we're

93

00:04:33,030 --> 00:04:30,400

going to have some tracking stations

94

00:04:34,950 --> 00:04:33,040

which will be some of you people mike up

95

00:04:36,950 --> 00:04:34,960

behind the curtains here just around the

96

00:04:40,469 --> 00:04:36,960

corner

97

00:04:47,350 --> 00:04:40,479

is these same objects

98

00:04:54,830 --> 00:04:50,629

on top of it is

99

00:04:57,749 --> 00:04:54,840

a round shape

100

00:05:01,670 --> 00:04:57,759

with eight holes going around it

101  
00:05:05,909 --> 00:05:04,710  
this the center hole is perpendicular to

102  
00:05:08,830 --> 00:05:05,919  
the object

103  
00:05:14,629 --> 00:05:08,840  
the blue spoke is put in one of the side

104  
00:05:17,990 --> 00:05:17,110  
keep going perpendicular still above

105  
00:05:20,950 --> 00:05:18,000  
that straight

106  
00:05:21,430 --> 00:05:20,960  
up is a yellow spoke about two inches in

107  
00:05:26,070 --> 00:05:21,440  
length

108  
00:05:33,350 --> 00:05:29,830  
on top of that is a green

109  
00:05:42,230 --> 00:05:33,360  
fin shape stuck in

110  
00:05:50,830 --> 00:05:44,790  
time that you didn't get all the way

111  
00:05:50,840 --> 00:06:03,749  
yes

112  
00:06:07,909 --> 00:06:05,990  
okay bring it down and then take it and

113  
00:06:08,390 --> 00:06:07,919

walk it along and take a look to see how

114

00:06:15,909 --> 00:06:08,400

well

115

00:06:20,629 --> 00:06:18,150

scientific and application satellites

116

00:06:22,950 --> 00:06:20,639

affect our lives daily

117

00:06:25,749 --> 00:06:22,960

we use communication satellites to tie

118

00:06:28,150 --> 00:06:25,759

the world closer together

119

00:06:30,469 --> 00:06:28,160

meteorological satellites to see weather

120

00:06:32,469 --> 00:06:30,479

on a global basis

121

00:06:33,990 --> 00:06:32,479

scientific satellites to monitor the

122

00:06:40,550 --> 00:06:34,000

earth and its atmosphere from

123

00:06:45,990 --> 00:06:43,189

a visit to the lewis research center

124

00:06:48,230 --> 00:06:46,000

provides an opportunity to see firsthand

125

00:06:50,309 --> 00:06:48,240

the facilities and equipment that have

126  
00:07:00,830 --> 00:06:50,319  
played a significant role

127  
00:07:00,840 --> 00:07:14,830  
research

128  
00:07:14,840 --> 00:07:33,110  
so

129  
00:07:36,629 --> 00:07:35,350  
the first a in nasa stands for

130  
00:07:38,950 --> 00:07:36,639  
aeronautics

131  
00:07:40,950 --> 00:07:38,960  
in a workshop teachers construct model

132  
00:07:42,070 --> 00:07:40,960  
airplanes to learn about the principles

133  
00:08:38,829 --> 00:07:42,080  
of flight

134  
00:08:38,839 --> 00:10:25,670  
do

135  
00:10:29,110 --> 00:10:27,750  
the cowling which is the front part of

136  
00:10:30,870 --> 00:10:29,120  
the plane here

137  
00:10:33,110 --> 00:10:30,880  
and the propeller this has a three

138  
00:10:34,150 --> 00:10:33,120

bladed propeller some have two blade

139

00:10:37,670 --> 00:10:34,160

props and

140

00:10:40,230 --> 00:10:37,680

this one has little electrical de-icing

141

00:10:43,430 --> 00:10:40,240

boots here so that if we get into ice

142

00:10:45,269 --> 00:10:43,440

we can turn this on and the heat

143

00:10:48,710 --> 00:10:45,279

in the boot itself will help to melt the

144

00:10:52,630 --> 00:10:48,720

ice off the spinner here

145

00:10:55,110 --> 00:10:52,640

causes the shape to be more streamlined

146

00:10:57,430 --> 00:10:55,120

so it reduces the resistance of the drag

147

00:10:58,710 --> 00:10:57,440

the nose gear of course retracts up into

148

00:11:01,190 --> 00:10:58,720

the fuselage

149

00:11:01,750 --> 00:11:01,200

we have a landing light here for a night

150

00:11:04,630 --> 00:11:01,760

flying

151  
00:11:06,069 --> 00:11:04,640  
or anytime around an airport environment

152  
00:11:23,910 --> 00:11:06,079  
and you want to turn the light on so

153  
00:11:27,030 --> 00:11:26,470  
one thing that you might not think about

154  
00:11:29,350 --> 00:11:27,040  
is

155  
00:11:30,710 --> 00:11:29,360  
the wright brothers are credited with

156  
00:11:33,350 --> 00:11:30,720  
the first successful

157  
00:11:34,069 --> 00:11:33,360  
heavier than their aircraft at the end

158  
00:11:37,350 --> 00:11:34,079  
of december

159  
00:11:40,230 --> 00:11:37,360  
now the

160  
00:11:40,870 --> 00:11:40,240  
europeans the english and the french did

161  
00:11:43,110 --> 00:11:40,880  
the most

162  
00:11:45,350 --> 00:11:43,120  
of developing early aircraft but the

163  
00:11:48,389 --> 00:11:45,360

first aircraft was flown in europe

164

00:11:49,670 --> 00:11:48,399

it wasn't flown in europe until 1906. so

165

00:11:51,269 --> 00:11:49,680

you've got at least a two year

166

00:11:52,790 --> 00:11:51,279

difference there at the minimum

167

00:11:54,150 --> 00:11:52,800

between the first aircraft flown in the

168

00:11:54,629 --> 00:11:54,160

united states and the first one in

169

00:11:58,470 --> 00:11:54,639

europe

170

00:12:01,670 --> 00:11:58,480

but if you go to say like 1910 1911 1912

171

00:12:03,350 --> 00:12:01,680

most all the aircraft that were built

172

00:12:04,710 --> 00:12:03,360

and flying were built in europe

173

00:12:08,710 --> 00:12:04,720

and you have any idea why they were not

174

00:12:12,870 --> 00:12:10,310

it's mainly because the wright brothers

175

00:12:15,509 --> 00:12:12,880

were having a fight over their patent

176

00:12:17,030 --> 00:12:15,519

on the controllability the main person

177

00:12:18,470 --> 00:12:17,040

they were against was a guy by the name

178

00:12:19,990 --> 00:12:18,480

of glenn curtis

179

00:12:22,550 --> 00:12:20,000

and they had a big fight and it didn't

180

00:12:24,949 --> 00:12:22,560

end really until in the 1930s

181

00:12:25,829 --> 00:12:24,959

so we didn't develop many airplanes

182

00:12:28,150 --> 00:12:25,839

whenever

183

00:12:29,670 --> 00:12:28,160

curtis would build an airplane the

184

00:12:30,629 --> 00:12:29,680

rights would say he was infringing on

185

00:12:32,470 --> 00:12:30,639

their patent

186

00:12:33,590 --> 00:12:32,480

but now in england and france they

187

00:12:34,710 --> 00:12:33,600

really didn't care about the rights

188

00:12:35,990 --> 00:12:34,720

patents so they just went ahead and

189

00:12:37,670 --> 00:12:36,000

built airplanes

190

00:13:18,829 --> 00:12:37,680

hot air balloons this is how it started

191

00:13:18,839 --> 00:13:35,030

so

192

00:13:38,949 --> 00:13:36,629

that's the biggest difference between a

193

00:13:42,550 --> 00:13:38,959

planetarium and an observatory

194

00:13:42,790 --> 00:13:42,560

a lot of times uh teachers will mix them

195

00:13:44,230 --> 00:13:42,800

up

196

00:13:45,189 --> 00:13:44,240

people come into the planetarium for the

197

00:13:46,790 --> 00:13:45,199

first time and they'll say well what

198

00:13:48,550 --> 00:13:46,800

they do is they open the ceiling up

199

00:13:50,310 --> 00:13:48,560

and show you what the sky looks like

200

00:13:51,750 --> 00:13:50,320

well that doesn't happen in the

201  
00:13:53,110 --> 00:13:51,760  
planetarium that happens only in an

202  
00:13:55,910 --> 00:13:53,120  
observatory so there is

203  
00:13:57,189 --> 00:13:55,920  
a very distinct difference there is a

204  
00:13:58,470 --> 00:13:57,199  
machine of course in the middle of the

205  
00:14:03,670 --> 00:13:58,480  
room

206  
00:14:07,430 --> 00:14:03,680  
here and in this case its telescope

207  
00:14:09,030 --> 00:14:07,440  
here's the edge of the sun here's the

208  
00:14:10,790 --> 00:14:09,040  
the one edge of the sun i'm not sure if

209  
00:14:11,430 --> 00:14:10,800  
that's leading or the following edge i'd

210  
00:14:13,590 --> 00:14:11,440  
have to

211  
00:14:14,710 --> 00:14:13,600  
figure out the optics i believe that's

212  
00:14:17,189 --> 00:14:14,720  
probably the

213  
00:14:20,949 --> 00:14:17,199

following edge there let me go across

214

00:14:56,829 --> 00:14:20,959

the disc here again there's those spots

215

00:15:15,110 --> 00:15:10,829

do

216

00:15:17,350 --> 00:15:15,120

the space telescope becomes operational

217

00:15:19,670 --> 00:15:17,360

we will be able to see 10 times farther

218

00:15:22,150 --> 00:15:19,680

into space than we can now

219

00:15:24,629 --> 00:15:22,160

we will be able to see objects 50 times

220

00:15:27,350 --> 00:15:24,639

fainter than we can from the earth

221

00:15:28,030 --> 00:15:27,360

we will increase our visible universe to

222

00:15:31,350 --> 00:15:28,040

a volume

223

00:15:33,509 --> 00:15:31,360

350 times what it is today

224

00:17:11,829 --> 00:15:33,519

think of the exciting discoveries that

225

00:17:15,270 --> 00:17:13,189

first of all the guys that flew in these

226

00:17:16,870 --> 00:17:15,280

flights were pretty small in statute

227

00:17:19,110 --> 00:17:16,880

remember in the apollo program in the

228

00:17:21,029 --> 00:17:19,120

early programs the astronaut could be no

229

00:17:22,789 --> 00:17:21,039

taller than 5 foot 11 and weigh no more

230

00:17:24,390 --> 00:17:22,799

than 175 pounds

231

00:17:26,309 --> 00:17:24,400

the reason that was because of the size

232

00:17:45,190 --> 00:17:26,319

of the spacecraft you know

233

00:17:48,870 --> 00:17:46,710

battle has it look looks good here

234

00:17:50,710 --> 00:17:48,880

flight good agreement okay who's that

235

00:17:54,230 --> 00:17:50,720

either that's once he looks good but

236

00:17:54,240 --> 00:18:26,830

okay we're going capcom let's get really

237

00:18:26,840 --> 00:19:36,830

do

238

00:19:36,840 --> 00:19:50,830

so

239

00:20:16,789 --> 00:20:04,830

oh

240

00:20:40,549 --> 00:20:18,830

he's got one with rubber bands over

241

00:21:00,830 --> 00:20:43,590

anybody want a name oh no you want parts

242

00:21:04,390 --> 00:21:02,549

okay

243

00:21:06,310 --> 00:21:04,400

in the past few minutes you've seen just

244

00:21:07,029 --> 00:21:06,320

a portion of the activities that are

245

00:21:10,310 --> 00:21:07,039

carried out

246

00:21:13,110 --> 00:21:10,320

during the workshop sessions many other

247

00:21:14,070 --> 00:21:13,120

activities and stations are conducted to

248

00:21:16,630 --> 00:21:14,080

familiarize

249

00:21:18,710 --> 00:21:16,640

teachers with up-to-date information and

250

00:23:44,950 --> 00:21:18,720

provide an overview of air and space

251  
00:23:48,710 --> 00:23:46,310  
kevin why are you taking the air and

252  
00:23:50,470 --> 00:23:48,720  
space workshop here at louis well

253  
00:23:52,070 --> 00:23:50,480  
my wife took it last year and she had

254  
00:23:53,190 --> 00:23:52,080  
taken it about seven or eight years

255  
00:23:55,669 --> 00:23:53,200  
before so she's

256  
00:23:57,029 --> 00:23:55,679  
actually taking the same workshop twice

257  
00:23:58,630 --> 00:23:57,039  
and uh

258  
00:23:59,990 --> 00:23:58,640  
sitting at home and getting all the you

259  
00:24:01,590 --> 00:24:00,000  
know experience the stories of the

260  
00:24:02,149 --> 00:24:01,600  
experiences and the fun that she's had

261  
00:24:05,430 --> 00:24:02,159  
here

262  
00:24:07,350 --> 00:24:05,440  
i decided it was my turn uh i teach 9th

263  
00:24:08,789 --> 00:24:07,360

graders science and

264

00:24:10,470 --> 00:24:08,799

in fact i would have taken it last year

265

00:24:11,750 --> 00:24:10,480

except someone had to stay home and and

266

00:24:13,909 --> 00:24:11,760

watch the kids so

267

00:24:14,789 --> 00:24:13,919

this is my year and my turn for the

268

00:24:16,149 --> 00:24:14,799

workshop

269

00:24:17,990 --> 00:24:16,159

so this year you get to share the

270

00:24:19,430 --> 00:24:18,000

stories with your wife right and she

271

00:24:20,549 --> 00:24:19,440

gets to stay home and take care of the

272

00:24:22,950 --> 00:24:20,559

kids so

273

00:24:23,830 --> 00:24:22,960

i'm really looking forward to a real fun

274

00:24:26,230 --> 00:24:23,840

experience

275

00:24:28,710 --> 00:24:26,240

well that's great thanks thank you well

276

00:24:30,390 --> 00:24:28,720

i am basically an english teacher

277

00:24:32,149 --> 00:24:30,400

but every year my students are allowed

278

00:24:33,909 --> 00:24:32,159

to do an in-depth study

279

00:24:37,110 --> 00:24:33,919

on any subject that they choose they

280

00:24:38,870 --> 00:24:37,120

contract to do this program on their own

281

00:24:41,190 --> 00:24:38,880

and so many of them in recent years have

282

00:24:43,190 --> 00:24:41,200

been interested in flying in space

283

00:24:45,350 --> 00:24:43,200

and it's something that i know so little

284

00:24:47,350 --> 00:24:45,360

about i thought this was an opportunity

285

00:24:48,549 --> 00:24:47,360

for me to learn that's great why do you

286

00:24:50,870 --> 00:24:48,559

think the students are so much

287

00:24:53,110 --> 00:24:50,880

interested in there in space

288

00:24:55,990 --> 00:24:53,120

well because it's coming thing and the

289

00:24:58,830 --> 00:24:56,000

possibility of living sometime

290

00:25:00,390 --> 00:24:58,840

on another planet you know is very

291

00:25:01,830 --> 00:25:00,400

feasible

292

00:25:04,230 --> 00:25:01,840

especially when you look back at all the

293

00:25:05,430 --> 00:25:04,240

other buck rogers things that we've had

294

00:25:07,029 --> 00:25:05,440

in the past

295

00:25:10,710 --> 00:25:07,039

so the dreams of yesterday really do

296

00:25:12,470 --> 00:25:10,720

become the realities of it exactly

297

00:25:14,149 --> 00:25:12,480

the future is where our young people

298

00:25:17,510 --> 00:25:14,159

will live

299

00:25:20,950 --> 00:25:17,520

we owe them the opportunity to dream

300

00:25:24,470 --> 00:25:20,960

to wonder to imagine

301

00:25:26,630 --> 00:25:24,480

to research and experiment who knows

302

00:25:29,029 --> 00:25:26,640

what experience will become a memorable

303

00:25:31,190 --> 00:25:29,039

moment in their young lives

304

00:26:07,510 --> 00:25:31,200

that possibly could change the course of

305

00:26:12,710 --> 00:26:09,669

teaching air and space concepts can

306

00:26:37,830 --> 00:26:12,720

motivate an excited young person

307

00:26:37,840 --> 00:27:18,830

you