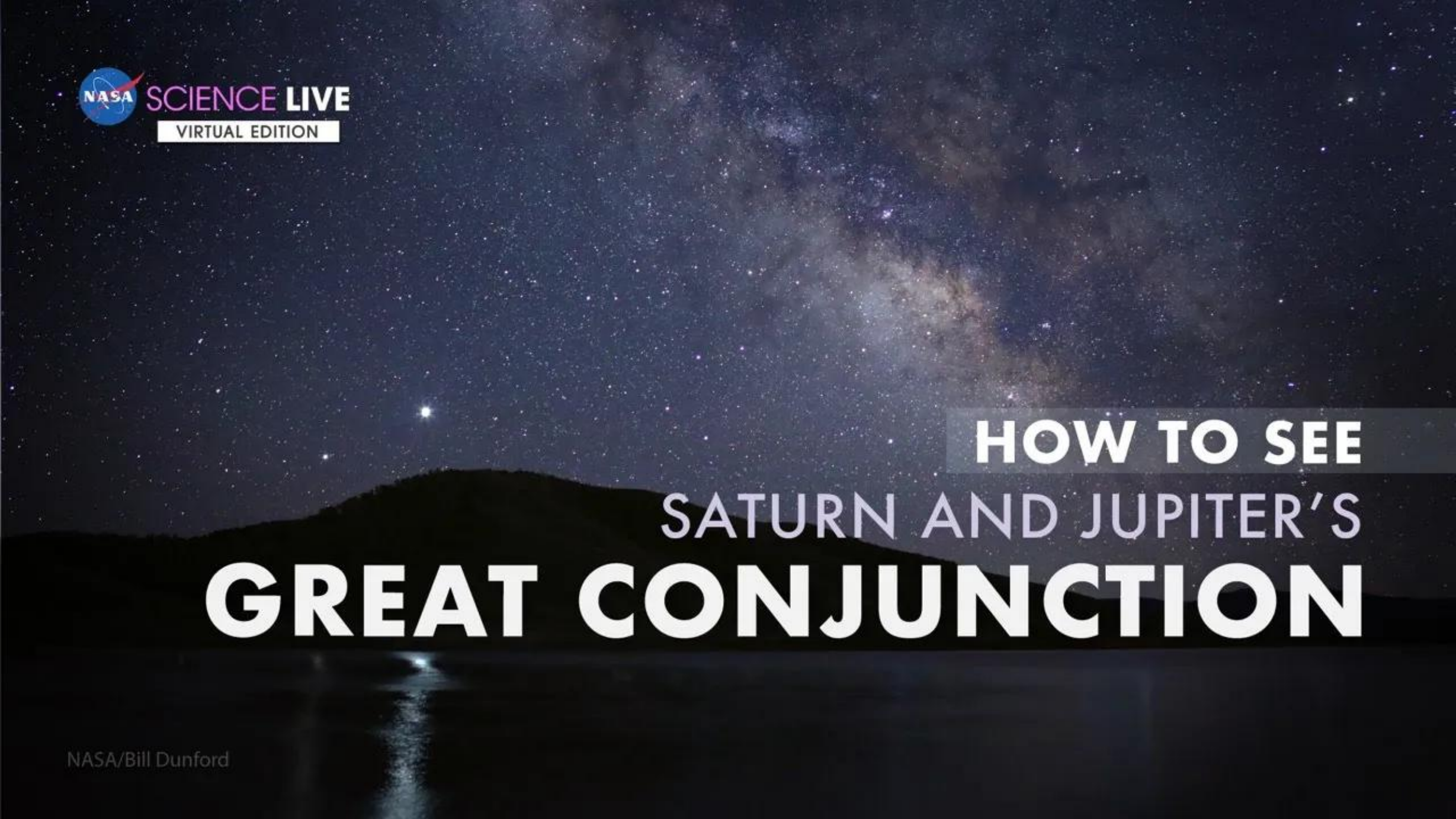
NASA SCIENCE LIVE
VIRTUAL EDITION
HOW TO SEE
SATURN AND JUPITER'S
GREAT CONJUNCTION
NASA/Bill Dunford

1
00:00:12,789 --> 00:00:07,310
[Music]

2
00:00:17,670 --> 00:00:15,110
hello and welcome to another virtual

3
00:00:20,390 --> 00:00:17,680
episode of nasa science live i'm your

4
00:00:22,710 --> 00:00:20,400
host tahira allen and today we are

5
00:00:24,950 --> 00:00:22,720
thrilled to talk about a real once in a

6
00:00:27,750 --> 00:00:24,960
lifetime event as you might have heard

7
00:00:30,070 --> 00:00:27,760
in the news on december 21st the two

8
00:00:32,229 --> 00:00:30,080
largest planets in our solar system

9
00:00:35,190 --> 00:00:32,239
saturn and jupiter will appear in the

10
00:00:37,030 --> 00:00:35,200
night sky as if they are nearly touching

11
00:00:40,150 --> 00:00:37,040
and yes you will be able to see this

12
00:00:42,790 --> 00:00:40,160
with the naked eye no telescope needed

13
00:00:45,510 --> 00:00:42,800

this rare astronomical event known as

14
00:00:48,630 --> 00:00:45,520
the great conjunction only appears every

15
00:00:52,549 --> 00:00:48,640
20 years however the last time it has

16
00:00:54,549 --> 00:00:52,559
been seen this close was in 1623

17
00:00:56,869 --> 00:00:54,559
so get excited because today we are

18
00:00:58,950 --> 00:00:56,879
talking all about the great conjunction

19
00:01:00,470 --> 00:00:58,960
from the science behind the event to

20
00:01:01,590 --> 00:01:00,480
where you'll be able to see it in the

21
00:01:03,349 --> 00:01:01,600
night sky

22
00:01:05,189 --> 00:01:03,359
throughout the show we'll also be

23
00:01:07,510 --> 00:01:05,199
sharing photos that people have taken

24
00:01:09,429 --> 00:01:07,520
from around the world of saturn and

25
00:01:12,550 --> 00:01:09,439
jupiter coming together for this big

26
00:01:15,350 --> 00:01:12,560
moment let's get started

27
00:01:17,749 --> 00:01:15,360
i am joined today by dr henry through

28
00:01:19,350 --> 00:01:17,759
astronomer at nasa headquarters henry

29
00:01:21,830 --> 00:01:19,360
thank you so much for being with us

30
00:01:23,749 --> 00:01:21,840
today i have been seeing so much buzz

31
00:01:26,230 --> 00:01:23,759
about the great conjunction of saturn

32
00:01:28,390 --> 00:01:26,240
and jupiter online and can you share

33
00:01:30,789 --> 00:01:28,400
with us what's the science behind what's

34
00:01:32,069 --> 00:01:30,799
happening

35
00:01:33,190 --> 00:01:32,079
thanks for having me here it's so great

36
00:01:35,109 --> 00:01:33,200
to be able to talk about this

37
00:01:37,109 --> 00:01:35,119
conjunction that almost everybody on

38
00:01:39,109 --> 00:01:37,119

earth can see so what's happening here

39
00:01:40,710 --> 00:01:39,119
let's step back and look at our planet's

40
00:01:42,389 --> 00:01:40,720
place in the solar system in the solar

41
00:01:44,789 --> 00:01:42,399
system we have one star at the center

42
00:01:46,310 --> 00:01:44,799
that's the sun and then outward from

43
00:01:47,830 --> 00:01:46,320
that you have the orbits of east the

44
00:01:49,749 --> 00:01:47,840
individual planets you have mercury

45
00:01:51,270 --> 00:01:49,759
venus earth mars and then in this case

46
00:01:52,870 --> 00:01:51,280
jupiter and saturn are the ones that

47
00:01:54,870 --> 00:01:52,880
we're interested in now you can imagine

48
00:01:57,830 --> 00:01:54,880
these as being each of the planets is

49
00:01:59,670 --> 00:01:57,840
running on its own circle uh essentially

50
00:02:01,510 --> 00:01:59,680
it's like it's like runners on a track

51
00:02:03,910 --> 00:02:01,520
where we have the earth and the sun at

52
00:02:05,510 --> 00:02:03,920
the center and we are looking outward

53
00:02:06,870 --> 00:02:05,520
through the rest of the solar system and

54
00:02:09,350 --> 00:02:06,880
being able to see over the rest of the

55
00:02:12,229 --> 00:02:09,360
planets outside of us especially jupiter

56
00:02:13,830 --> 00:02:12,239
and saturn now every 20 years uh ever

57
00:02:15,030 --> 00:02:13,840
actually every 12 years jupiter goes

58
00:02:19,750 --> 00:02:15,040
around the sun

59
00:02:22,309 --> 00:02:19,760
12 years saturn the next planet out is

60
00:02:23,910 --> 00:02:22,319
has further to go and it's moving slower

61
00:02:26,390 --> 00:02:23,920
because it's tugged around less strongly

62
00:02:27,750 --> 00:02:26,400
by the force of the sun's gravity and so

63
00:02:29,990 --> 00:02:27,760

saturn is quite a bit slower saturn

64
00:02:32,710 --> 00:02:30,000
takes 30 years to go around the sun when

65
00:02:35,030 --> 00:02:32,720
jupiter takes 12 years so every 20 years

66
00:02:36,869 --> 00:02:35,040
saturn is going to pass

67
00:02:38,550 --> 00:02:36,879
jupiter is going to pass saturn in its

68
00:02:39,910 --> 00:02:38,560
orbit and you can imagine this just

69
00:02:41,350 --> 00:02:39,920
being like runners on the track you're

70
00:02:43,430 --> 00:02:41,360
standing there at the center and you've

71
00:02:45,990 --> 00:02:43,440
got a fast runner on the inside track

72
00:02:47,670 --> 00:02:46,000
and they're overtaking and passing the

73
00:02:49,110 --> 00:02:47,680
slower runners going further on the

74
00:02:51,030 --> 00:02:49,120
outside track and that's exactly what's

75
00:02:53,110 --> 00:02:51,040
happening in our solar system this week

76
00:02:55,910 --> 00:02:53,120
in this diagram here you can see the you

77
00:02:58,790 --> 00:02:55,920
can see jupiter as it's uh approaching

78
00:03:01,190 --> 00:02:58,800
saturn and then from our perspective on

79
00:03:04,630 --> 00:03:01,200
earth uh you'll see it lined up almost

80
00:03:07,350 --> 00:03:04,640
in exactly the same place in the sky

81
00:03:10,229 --> 00:03:07,360
okay so if this lines up about every 20

82
00:03:14,390 --> 00:03:10,239
years why is this one occurrence so

83
00:03:16,309 --> 00:03:14,400
close together since 1623

84
00:03:18,949 --> 00:03:16,319
that's right so the planet's orbits are

85
00:03:20,869 --> 00:03:18,959
not exactly flat in the solar system if

86
00:03:22,630 --> 00:03:20,879
they were exactly flat and everything

87
00:03:24,470 --> 00:03:22,640
was in the same plane then the planets

88
00:03:26,630 --> 00:03:24,480

would in fact cross in front of each

89
00:03:28,470 --> 00:03:26,640
other and so jupiter would would block

90
00:03:30,149 --> 00:03:28,480
saturn in the sky because the planet's

91
00:03:33,030 --> 00:03:30,159
orbits are slightly tilted the naughty's

92
00:03:34,470 --> 00:03:33,040
lined exactly then the planets pass near

93
00:03:36,949 --> 00:03:34,480
each other but not exactly in front of

94
00:03:38,710 --> 00:03:36,959
each other now usually every 20 years

95
00:03:41,270 --> 00:03:38,720
when jupiter overtakes saturn in its

96
00:03:44,229 --> 00:03:41,280
orbit it passes about a degree apart

97
00:03:45,750 --> 00:03:44,239
from saturn in the sky and the degree is

98
00:03:47,350 --> 00:03:45,760
about twice the width of the full moon

99
00:03:49,990 --> 00:03:47,360
so you can see them separated very

100
00:03:52,070 --> 00:03:50,000
widely in the sky about like yay now

101
00:03:53,270 --> 00:03:52,080
this particular time they're coming very

102
00:03:55,270 --> 00:03:53,280
close and that's just because of the

103
00:03:56,630 --> 00:03:55,280
alignment between them they're not close

104
00:03:57,990 --> 00:03:56,640
in space they're still hundreds of

105
00:03:59,190 --> 00:03:58,000
millions of kilometers apart from each

106
00:04:01,429 --> 00:03:59,200
other but they're

107
00:04:02,789 --> 00:04:01,439
in the sky they appear as two points

108
00:04:04,229 --> 00:04:02,799
very close in the sky and it's about a

109
00:04:06,630 --> 00:04:04,239
tenth of a degree apart in fact they're

110
00:04:08,630 --> 00:04:06,640
so close that if you take your pinky and

111
00:04:10,710 --> 00:04:08,640
you extend it at your at uh arm's length

112
00:04:12,149 --> 00:04:10,720
you'll be able to cover both planets

113
00:04:14,229 --> 00:04:12,159

with just your pinky finger now this is

114
00:04:16,229 --> 00:04:14,239
a rare alignment this happens just about

115
00:04:18,150 --> 00:04:16,239
every 400 years the last time it

116
00:04:19,509 --> 00:04:18,160
happened was 400 years ago

117
00:04:21,270 --> 00:04:19,519
when the planets were this close in the

118
00:04:23,670 --> 00:04:21,280
sky

119
00:04:26,230 --> 00:04:23,680
wow i mean what a treat for all of us

120
00:04:28,310 --> 00:04:26,240
you know to end out this year um this is

121
00:04:30,310 --> 00:04:28,320
so exciting to hear about and i

122
00:04:32,950 --> 00:04:30,320
understand that there's some really cool

123
00:04:35,189 --> 00:04:32,960
history behind the event can you walk us

124
00:04:37,030 --> 00:04:35,199
through what that is

125
00:04:39,110 --> 00:04:37,040
yeah so well let's let's go back let's

126
00:04:41,030 --> 00:04:39,120
what was happening 400 years ago in the

127
00:04:42,710 --> 00:04:41,040
solar system the solar system was still

128
00:04:44,629 --> 00:04:42,720
there but we on earth were just in our

129
00:04:45,510 --> 00:04:44,639
in our infancy of exploring the solar

130
00:04:47,510 --> 00:04:45,520
system

131
00:04:49,510 --> 00:04:47,520
um using using telescopes the first

132
00:04:52,230 --> 00:04:49,520
telescope was uh used to explore the

133
00:04:54,950 --> 00:04:52,240
solar system by galileo in the year 1610

134
00:04:57,030 --> 00:04:54,960
which is a little bit uh this last this

135
00:05:00,230 --> 00:04:57,040
last uh conjunction of this size was

136
00:05:02,629 --> 00:05:00,240
1623. in 1610 galileo was using his

137
00:05:04,230 --> 00:05:02,639
telescope to for the very first time

138
00:05:05,749 --> 00:05:04,240

look at jupiter and look at its four

139
00:05:07,270 --> 00:05:05,759
moons and this in fact is a is an

140
00:05:09,270 --> 00:05:07,280
excerpt from his notebook at the time at

141
00:05:10,950 --> 00:05:09,280
the bottom there you can see a big

142
00:05:12,550 --> 00:05:10,960
circle which is jupiter and you can see

143
00:05:15,430 --> 00:05:12,560
four little circles and those are the

144
00:05:19,430 --> 00:05:15,440
jupiter's moons named io europa ganymede

145
00:05:21,749 --> 00:05:19,440
and callisto and so in 1610 just just uh

146
00:05:23,270 --> 00:05:21,759
before this uh this previous close uh

147
00:05:25,350 --> 00:05:23,280
close conjunction

148
00:05:26,790 --> 00:05:25,360
what we knew about jupiter was that it

149
00:05:29,590 --> 00:05:26,800
had these moons they had just been

150
00:05:31,510 --> 00:05:29,600
discovered similarly with saturn galileo

151
00:05:33,830 --> 00:05:31,520
was using his telescope to look for the

152
00:05:35,990 --> 00:05:33,840
first time at the rings of saturn he

153
00:05:38,390 --> 00:05:36,000
didn't know what they were it was later

154
00:05:40,230 --> 00:05:38,400
observations what galileo saw and what a

155
00:05:42,310 --> 00:05:40,240
christian huygens another astronomer uh

156
00:05:44,150 --> 00:05:42,320
soon after him saw is that saturn looked

157
00:05:46,070 --> 00:05:44,160
very very strange we now know that uh

158
00:05:47,749 --> 00:05:46,080
those are the rings going around saturn

159
00:05:49,510 --> 00:05:47,759
at the time of uh it looked they were

160
00:05:51,430 --> 00:05:49,520
described as handles on a cop or perhaps

161
00:05:53,990 --> 00:05:51,440
moons that were fixed on both edges of

162
00:05:56,469 --> 00:05:54,000
saturn so 400 years ago that's what our

163
00:05:58,550 --> 00:05:56,479

knowledge of the uh of the the science

164
00:06:00,710 --> 00:05:58,560
of jupiter and saturn was

165
00:06:02,950 --> 00:06:00,720
and uh you can in some of these images

166
00:06:05,350 --> 00:06:02,960
now it's actually very easy to see these

167
00:06:07,430 --> 00:06:05,360
moons very similar to how galileo was

168
00:06:09,350 --> 00:06:07,440
seeing them galileo's telescope was a

169
00:06:11,670 --> 00:06:09,360
couple of inches across on the on the

170
00:06:13,830 --> 00:06:11,680
lens on front and with a similarly sized

171
00:06:15,189 --> 00:06:13,840
uh telescope or binoculars or camera

172
00:06:16,870 --> 00:06:15,199
lens you can see those moons very

173
00:06:18,469 --> 00:06:16,880
clearly now here's a couple of pictures

174
00:06:20,469 --> 00:06:18,479
where you can see the moons of jupiter

175
00:06:22,070 --> 00:06:20,479
those we call them the galilean moons

176
00:06:24,390 --> 00:06:22,080
the moons of jupiter extended from

177
00:06:26,070 --> 00:06:24,400
jupiter and then you can see uh saturn

178
00:06:28,070 --> 00:06:26,080
uh up on the up on the top there here's

179
00:06:30,870 --> 00:06:28,080
another great shot that shows the shows

180
00:06:33,189 --> 00:06:30,880
the four moons of jupiter um the the

181
00:06:34,629 --> 00:06:33,199
faint spots uh with jupiter the center

182
00:06:37,029 --> 00:06:34,639
and then you can just barely see the

183
00:06:38,070 --> 00:06:37,039
rings of saturn now uh in these images

184
00:06:41,189 --> 00:06:38,080
it's a little bit hard to see the rings

185
00:06:43,350 --> 00:06:41,199
of saturn saturn is a uh further out and

186
00:06:45,270 --> 00:06:43,360
so it's appears smaller in the sky but

187
00:06:48,710 --> 00:06:45,280
uh the moons of jupiter are quite easy

188
00:06:50,390 --> 00:06:48,720

to see if you have uh telescope or

189
00:06:54,070 --> 00:06:50,400
binoculars

190
00:06:56,710 --> 00:06:54,080
to see the

191
00:06:59,189 --> 00:06:56,720
the moons of jupiter with

192
00:07:01,990 --> 00:06:59,199
wow so we are really living history

193
00:07:03,749 --> 00:07:02,000
right now and i'm curious will anyone

194
00:07:06,629 --> 00:07:03,759
around the world be able to see this or

195
00:07:08,469 --> 00:07:06,639
do you have to be in a special location

196
00:07:09,670 --> 00:07:08,479
so this is really neat that the the

197
00:07:12,070 --> 00:07:09,680
planets the planets going around the

198
00:07:13,909 --> 00:07:12,080
whole solar system uh we can the earth

199
00:07:16,150 --> 00:07:13,919
is rotating in such a way so that you

200
00:07:18,070 --> 00:07:16,160
can see all the planets from essentially

201
00:07:19,270 --> 00:07:18,080
everywhere planets are bright also so

202
00:07:20,870 --> 00:07:19,280
you don't need to be in a super dark

203
00:07:23,990 --> 00:07:20,880
location in fact even if you go to the

204
00:07:26,550 --> 00:07:24,000
most uh the uh well-lit uh heavily lit

205
00:07:28,070 --> 00:07:26,560
uh city on the on the planet on the on

206
00:07:30,070 --> 00:07:28,080
the earth then you can see the planets

207
00:07:31,430 --> 00:07:30,080
quite easily so uh the only place you

208
00:07:32,790 --> 00:07:31,440
might not be able to see this

209
00:07:34,950 --> 00:07:32,800
conjunction between the planets is if

210
00:07:36,390 --> 00:07:34,960
you're in antarctica this season the sun

211
00:07:38,870 --> 00:07:36,400
is up in antarctica and so it's going to

212
00:07:40,070 --> 00:07:38,880
be light all day and the sun doesn't set

213
00:07:41,589 --> 00:07:40,080

so you won't be able to see the planets

214
00:07:43,430 --> 00:07:41,599
from antarctica pretty much anywhere

215
00:07:46,309 --> 00:07:43,440
else if it's not cloudy and if you don't

216
00:07:47,430 --> 00:07:46,319
have something in the way then uh then

217
00:07:49,029 --> 00:07:47,440
you should be able to see the

218
00:07:52,070 --> 00:07:49,039
conjunction between jupiter and saturn

219
00:07:54,230 --> 00:07:52,080
this uh all month long in december

220
00:07:55,749 --> 00:07:54,240
that is such great news that everyone

221
00:07:59,110 --> 00:07:55,759
around the world can take part in this

222
00:08:00,869 --> 00:07:59,120
well most everyone and um when and where

223
00:08:02,469 --> 00:08:00,879
should we be looking up into the night

224
00:08:04,950 --> 00:08:02,479
sky

225
00:08:06,629 --> 00:08:04,960
so this conjunction is happening during

226
00:08:08,629 --> 00:08:06,639
the entire month of december the planets

227
00:08:09,909 --> 00:08:08,639
are coming closer and closer and closer

228
00:08:11,029 --> 00:08:09,919
together

229
00:08:12,230 --> 00:08:11,039
right now they've they said at the

230
00:08:13,670 --> 00:08:12,240
beginning of the month they started off

231
00:08:15,990 --> 00:08:13,680
maybe two degrees apart now they're a

232
00:08:17,830 --> 00:08:16,000
little under a degree apart and then on

233
00:08:19,350 --> 00:08:17,840
the night of december 21st they're

234
00:08:21,350 --> 00:08:19,360
getting to be about a tenth of a degree

235
00:08:23,510 --> 00:08:21,360
apart and they'll be a similar distance

236
00:08:26,150 --> 00:08:23,520
to that uh for the day before and the

237
00:08:28,070 --> 00:08:26,160
day after uh so in order to find the

238
00:08:29,589 --> 00:08:28,080

planets in the sky it's really easy if

239
00:08:31,110 --> 00:08:29,599
you just look up if you can see the

240
00:08:32,709 --> 00:08:31,120
sunset that means you're looking to the

241
00:08:34,149 --> 00:08:32,719
west the southwest if you're in the

242
00:08:35,829 --> 00:08:34,159
northern hemisphere

243
00:08:37,430 --> 00:08:35,839
if you can see the sunset then you'll be

244
00:08:39,670 --> 00:08:37,440
able to see saturn and jupiter you want

245
00:08:41,589 --> 00:08:39,680
to go outside about maybe 45 minutes

246
00:08:42,949 --> 00:08:41,599
after suns after sunset let the sky

247
00:08:44,710 --> 00:08:42,959
darken a little bit you don't need to

248
00:08:46,870 --> 00:08:44,720
wait till night time and then look

249
00:08:49,190 --> 00:08:46,880
toward the sunset and you'll have about

250
00:08:50,630 --> 00:08:49,200
an hour of time where you can observe

251
00:08:52,550 --> 00:08:50,640
jupiter and saturn in the sky what

252
00:08:53,910 --> 00:08:52,560
they'll look like is very bright stars

253
00:08:55,910 --> 00:08:53,920
jupiter will look like the brightest

254
00:08:57,590 --> 00:08:55,920
star in the sky of course it's not a

255
00:08:59,590 --> 00:08:57,600
star it's jupiter it's reflecting all of

256
00:09:00,470 --> 00:08:59,600
its light not internally and the light

257
00:09:02,310 --> 00:09:00,480
doesn't come internally but it's

258
00:09:03,829 --> 00:09:02,320
reflected light from the sun and then

259
00:09:05,670 --> 00:09:03,839
saturn is going to be a little bit above

260
00:09:08,070 --> 00:09:05,680
a little bit to the left of jupiter and

261
00:09:09,829 --> 00:09:08,080
a little bit fainter

262
00:09:11,910 --> 00:09:09,839
so while these planets have been inching

263
00:09:14,070 --> 00:09:11,920

closer to each other we actually asked

264
00:09:16,150 --> 00:09:14,080
the public to send us in their photos of

265
00:09:17,350 --> 00:09:16,160
saturn and jupiter so while we played

266
00:09:19,829 --> 00:09:17,360
through some of these awesome

267
00:09:22,150 --> 00:09:19,839
submissions could you share some basic

268
00:09:24,389 --> 00:09:22,160
tips for how we can best photograph this

269
00:09:26,070 --> 00:09:24,399
event in the night sky

270
00:09:28,150 --> 00:09:26,080
what's really great is that saturn and

271
00:09:30,230 --> 00:09:28,160
jupiter are bright uh you know you don't

272
00:09:31,910 --> 00:09:30,240
need a sometimes with astrophotography

273
00:09:33,590 --> 00:09:31,920
you need really fancy equipment you need

274
00:09:35,829 --> 00:09:33,600
a telescope you need a mount and so

275
00:09:37,190 --> 00:09:35,839
forth to take photos of the planets but

276
00:09:39,110 --> 00:09:37,200
with these uh there's so many

277
00:09:41,430 --> 00:09:39,120
opportunities even from well-lit cities

278
00:09:43,269 --> 00:09:41,440
from bright cities uh you can you can

279
00:09:44,630 --> 00:09:43,279
see the points of light in the sky many

280
00:09:45,590 --> 00:09:44,640
of these photos that have been submitted

281
00:09:47,990 --> 00:09:45,600
here and that we're showing have been

282
00:09:49,910 --> 00:09:48,000
taken with with phones and with small

283
00:09:51,750 --> 00:09:49,920
cameras and so forth

284
00:09:53,110 --> 00:09:51,760
i like photos where you can see in fact

285
00:09:54,949 --> 00:09:53,120
some of the foreground so you can see

286
00:09:56,790 --> 00:09:54,959
the context for what we're seeing here

287
00:09:58,550 --> 00:09:56,800
here you see images over uh over some

288
00:10:00,949 --> 00:09:58,560

houses and buildings some of these other

289
00:10:02,550 --> 00:10:00,959
pictures you've seen uh images over of

290
00:10:04,389 --> 00:10:02,560
the planets over cities or in front of

291
00:10:06,389 --> 00:10:04,399
trees and so forth that kind of brings

292
00:10:07,750 --> 00:10:06,399
it home that anybody can go out and see

293
00:10:09,590 --> 00:10:07,760
these planets

294
00:10:11,110 --> 00:10:09,600
if you're using a phone uh smartphone

295
00:10:12,550 --> 00:10:11,120
you want to take photos of it

296
00:10:14,949 --> 00:10:12,560
you can you can

297
00:10:16,230 --> 00:10:14,959
many modern phones have a what's called

298
00:10:18,389 --> 00:10:16,240
a night mode on that and that will let

299
00:10:19,670 --> 00:10:18,399
you take a an exposure of a couple of

300
00:10:21,350 --> 00:10:19,680
seconds long it will kind of

301
00:10:22,790 --> 00:10:21,360
automatically stabilize the image for

302
00:10:25,030 --> 00:10:22,800
you a couple of seconds we'll let you

303
00:10:27,110 --> 00:10:25,040
see the dark night sky as well as the

304
00:10:28,870 --> 00:10:27,120
bright uh jupiter and saturn there and

305
00:10:30,230 --> 00:10:28,880
the moon if the moon is passing nearby

306
00:10:32,630 --> 00:10:30,240
as well

307
00:10:35,110 --> 00:10:32,640
if you have a larger camera like a dslr

308
00:10:36,550 --> 00:10:35,120
for instance uh then you can take a wide

309
00:10:38,230 --> 00:10:36,560
angle picture really nicely which will

310
00:10:39,910 --> 00:10:38,240
show the whole context of the sky and

311
00:10:41,509 --> 00:10:39,920
then if you zoom in a little bit then

312
00:10:42,949 --> 00:10:41,519
you can see if you see if you have a

313
00:10:44,710 --> 00:10:42,959

large zoom lens like about 200

314
00:10:47,430 --> 00:10:44,720
millimeters or so then you'll be able to

315
00:10:48,790 --> 00:10:47,440
see the moons of jupiter itself as well

316
00:10:50,630 --> 00:10:48,800
we have some other photo tips we've put

317
00:10:53,670 --> 00:10:50,640
together this website that you can go to

318
00:10:55,829 --> 00:10:53,680
it's at go.nasa.gov

319
00:10:57,910 --> 00:10:55,839
planetphototips and i hope that people

320
00:11:00,389 --> 00:10:57,920
will be able to uh look at those tips

321
00:11:01,829 --> 00:11:00,399
and take some great photos showing the

322
00:11:04,150 --> 00:11:01,839
solar system that we can see in their

323
00:11:06,630 --> 00:11:04,160
context around them

324
00:11:08,550 --> 00:11:06,640
well that is awesome i am so excited to

325
00:11:10,710 --> 00:11:08,560
go out there and capture it for myself

326
00:11:12,870 --> 00:11:10,720
and i know so many people tuning in are

327
00:11:15,190 --> 00:11:12,880
as well we have received some really

328
00:11:17,269 --> 00:11:15,200
great questions from users online and i

329
00:11:19,030 --> 00:11:17,279
want to remind those tuning in it's not

330
00:11:21,269 --> 00:11:19,040
too late to join the conversation with

331
00:11:22,949 --> 00:11:21,279
us please don't hesitate to submit your

332
00:11:25,030 --> 00:11:22,959
questions in the comment box wherever

333
00:11:28,150 --> 00:11:25,040
you're watching from or by using the

334
00:11:29,670 --> 00:11:28,160
hashtag asknasa on social media so henry

335
00:11:32,630 --> 00:11:29,680
to kick things off i've got a great

336
00:11:34,550 --> 00:11:32,640
question from kate on twitter who asks

337
00:11:36,470 --> 00:11:34,560
will the great conjunction be much

338
00:11:38,949 --> 00:11:36,480

brighter than how we normally see

339
00:11:41,269 --> 00:11:38,959
jupiter and saturn

340
00:11:43,829 --> 00:11:41,279
the jupiter's and saturn's distance from

341
00:11:44,870 --> 00:11:43,839
us is similar to what it to what it is

342
00:11:47,110 --> 00:11:44,880
other times of the year it's a little

343
00:11:48,550 --> 00:11:47,120
bit uh uh it goes up and down a little

344
00:11:49,750 --> 00:11:48,560
bit during the year as the earth moves

345
00:11:51,990 --> 00:11:49,760
through its orbit but no it's not

346
00:11:54,389 --> 00:11:52,000
substantially brighter uh what is going

347
00:11:55,910 --> 00:11:54,399
to be unique here is how close jupiter

348
00:11:57,269 --> 00:11:55,920
and saturn are to each other so they

349
00:11:59,590 --> 00:11:57,279
will look the same but they're going to

350
00:12:01,750 --> 00:11:59,600
be inching closer and closer and closer

351
00:12:03,670 --> 00:12:01,760
to each other in the sky now when they

352
00:12:04,710 --> 00:12:03,680
get to be a tenth of a degree apart in

353
00:12:06,470 --> 00:12:04,720
the sky

354
00:12:08,310 --> 00:12:06,480
uh they won't you'll still be able to

355
00:12:09,910 --> 00:12:08,320
separate them as two

356
00:12:11,670 --> 00:12:09,920
as two bright objects it would not like

357
00:12:13,110 --> 00:12:11,680
they will merge into one uh but you

358
00:12:14,389 --> 00:12:13,120
should be able to see them as two bright

359
00:12:16,230 --> 00:12:14,399
objects right next to each other in the

360
00:12:18,310 --> 00:12:16,240
sky

361
00:12:20,790 --> 00:12:18,320
so i've got a great follow-up to that um

362
00:12:22,870 --> 00:12:20,800
a mall on twitter asks what will be the

363
00:12:25,509 --> 00:12:22,880

distance between jupiter and saturn at

364
00:12:28,389 --> 00:12:25,519
the time of this great conjunction

365
00:12:30,389 --> 00:12:28,399
so they're still 600 million kilometers

366
00:12:32,389 --> 00:12:30,399
from each other so there's very little

367
00:12:33,750 --> 00:12:32,399
influence between them they're not uh

368
00:12:35,590 --> 00:12:33,760
for instance the gravity of jupiter is

369
00:12:37,990 --> 00:12:35,600
not affecting the gravity of saturn in

370
00:12:39,750 --> 00:12:38,000
any unusual or any strong way at this

371
00:12:42,230 --> 00:12:39,760
point the motion of the planets is

372
00:12:43,829 --> 00:12:42,240
controlled almost exclusively by their

373
00:12:45,190 --> 00:12:43,839
gravity around the sun rather than their

374
00:12:46,790 --> 00:12:45,200
gravitational interaction with each

375
00:12:48,629 --> 00:12:46,800
other so this is not something that's

376
00:12:50,310 --> 00:12:48,639
going to move the orbits of any of the

377
00:12:52,550 --> 00:12:50,320
planets this happens every 20 years if

378
00:12:56,230 --> 00:12:52,560
the solar system wasn't stable we would

379
00:13:00,470 --> 00:12:58,470
so simplicator on twitter wants to know

380
00:13:04,470 --> 00:13:00,480
what's the exact time of this closest

381
00:13:10,870 --> 00:13:08,069
so the exact time uh oh man i forget the

382
00:13:13,190 --> 00:13:10,880
exact hour of it but um the uh the if

383
00:13:15,110 --> 00:13:13,200
you go out on the 21st it's the the

384
00:13:17,750 --> 00:13:15,120
distance doesn't change very much on for

385
00:13:19,590 --> 00:13:17,760
the duration of 21st so um during that

386
00:13:22,150 --> 00:13:19,600
uh during that 24 hours the distance

387
00:13:24,790 --> 00:13:22,160
will change only a small amount and so

388
00:13:27,590 --> 00:13:24,800

uh from everybody's individual location

389
00:13:29,190 --> 00:13:27,600
on earth you'll have about an hour uh

390
00:13:30,870 --> 00:13:29,200
maybe a little bit more in order to see

391
00:13:33,509 --> 00:13:30,880
the planets before they set depending on

392
00:13:35,350 --> 00:13:33,519
what your horizon is so uh they'll be

393
00:13:37,509 --> 00:13:35,360
they'll be up about an hour after sunset

394
00:13:39,430 --> 00:13:37,519
and then they will set about two hours

395
00:13:41,430 --> 00:13:39,440
after sunset more or less

396
00:13:43,670 --> 00:13:41,440
um so you have about an hour or so

397
00:13:45,350 --> 00:13:43,680
window um and that that time is going to

398
00:13:46,550 --> 00:13:45,360
be the exact time is going to be a

399
00:13:47,750 --> 00:13:46,560
little different depending on what time

400
00:13:50,870 --> 00:13:47,760
zone you're in but it's always going to

401
00:13:53,430 --> 00:13:50,880
be right after sunset

402
00:13:55,350 --> 00:13:53,440
so i know you mentioned earlier that

403
00:13:57,670 --> 00:13:55,360
really almost everyone around the world

404
00:13:59,430 --> 00:13:57,680
can see this but a user on twitter says

405
00:14:01,509 --> 00:13:59,440
that they live in new york city and that

406
00:14:04,150 --> 00:14:01,519
there's so much light pollution here and

407
00:14:05,750 --> 00:14:04,160
it makes stargazing tough will

408
00:14:08,069 --> 00:14:05,760
the twitter user be able to see it with

409
00:14:10,710 --> 00:14:08,079
the naked eye and how long will the

410
00:14:13,430 --> 00:14:10,720
conjunction last

411
00:14:15,590 --> 00:14:13,440
if you're in new york city uh that's

412
00:14:18,310 --> 00:14:15,600
good news for you stargazing hard but

413
00:14:20,470 --> 00:14:18,320

planets are bright uh jupiter and saturn

414
00:14:22,069 --> 00:14:20,480
jupiter in particular you can see from

415
00:14:24,550 --> 00:14:22,079
almost any city in the world i've lived

416
00:14:25,990 --> 00:14:24,560
in some very uh big cities with very

417
00:14:27,030 --> 00:14:26,000
bright lights in them and we were still

418
00:14:29,110 --> 00:14:27,040
able to see

419
00:14:30,389 --> 00:14:29,120
uh see the planets extremely well uh

420
00:14:32,949 --> 00:14:30,399
during these you should be able to see

421
00:14:34,710 --> 00:14:32,959
jupiter and probably saturn from even

422
00:14:36,710 --> 00:14:34,720
from a place like new york

423
00:14:38,629 --> 00:14:36,720
and if you don't see it on the 21st

424
00:14:40,949 --> 00:14:38,639
that's okay because who knows you might

425
00:14:42,230 --> 00:14:40,959
have clouds you might have some

426
00:14:43,910 --> 00:14:42,240
might not be able to see it for any

427
00:14:45,829 --> 00:14:43,920
number of reasons on the 21st that's

428
00:14:47,670 --> 00:14:45,839
okay go out on the day before the day

429
00:14:49,430 --> 00:14:47,680
before the day after and so forth

430
00:14:51,269 --> 00:14:49,440
because this this conjunction it's a

431
00:14:52,870 --> 00:14:51,279
month or so of the planets that the

432
00:14:54,550 --> 00:14:52,880
plants have been coming together closer

433
00:14:55,670 --> 00:14:54,560
and closer in the sky

434
00:14:57,590 --> 00:14:55,680
and then it will be another couple of

435
00:14:59,670 --> 00:14:57,600
weeks is them of them getting further

436
00:15:00,949 --> 00:14:59,680
apart until they set early enough that

437
00:15:02,870 --> 00:15:00,959
you're not going to be able to see them

438
00:15:04,310 --> 00:15:02,880

and so if you miss it on one day just go

439
00:15:05,670 --> 00:15:04,320
out another day and see them in fact i

440
00:15:06,949 --> 00:15:05,680
think that's really one of the neatest

441
00:15:08,550 --> 00:15:06,959
things here is seeing the motion of the

442
00:15:10,629 --> 00:15:08,560
planet seeing them come together and

443
00:15:12,389 --> 00:15:10,639
seeing our solar system change as the

444
00:15:13,910 --> 00:15:12,399
planets go through their orbits it's uh

445
00:15:15,430 --> 00:15:13,920
that's just as exciting as seeing them

446
00:15:17,590 --> 00:15:15,440
close to close to each other on the

447
00:15:19,350 --> 00:15:17,600
conjunction itself

448
00:15:21,590 --> 00:15:19,360
that is such great news i know i've been

449
00:15:24,230 --> 00:15:21,600
seeing so many people saying online that

450
00:15:26,550 --> 00:15:24,240
uh in their area on december 21st it's

451
00:15:28,550 --> 00:15:26,560
cloudy so it's great to know that we've

452
00:15:31,749 --> 00:15:28,560
got some time to really watch this come

453
00:15:33,910 --> 00:15:31,759
together and amy on facebook is asking a

454
00:15:35,910 --> 00:15:33,920
question that i've seen a lot she's she

455
00:15:39,269 --> 00:15:35,920
wants to know why are people calling it

456
00:15:42,470 --> 00:15:41,430
so this uh so-called you know people

457
00:15:44,310 --> 00:15:42,480
have been

458
00:15:46,310 --> 00:15:44,320
uh enchanted by this by the stars and by

459
00:15:47,829 --> 00:15:46,320
the sky above us for thousands and

460
00:15:49,670 --> 00:15:47,839
thousands of years people have been

461
00:15:50,710 --> 00:15:49,680
always uh looking at the sky look at the

462
00:15:52,150 --> 00:15:50,720
motion that plants look at the

463
00:15:54,150 --> 00:15:52,160

motionless stars and the moon and the

464
00:15:56,389 --> 00:15:54,160
sun there's cultures and religions and

465
00:15:58,870 --> 00:15:56,399
people around the world who have been

466
00:16:00,310 --> 00:15:58,880
taking the our observations of these uh

467
00:16:01,990 --> 00:16:00,320
of the of the solar system and

468
00:16:03,269 --> 00:16:02,000
incorporating that into their traditions

469
00:16:05,749 --> 00:16:03,279
and religions

470
00:16:09,269 --> 00:16:05,759
it's uh the star of bethlehem refers to

471
00:16:11,509 --> 00:16:09,279
the refers to a a possible event um or

472
00:16:13,509 --> 00:16:11,519
observations around the around uh

473
00:16:14,710 --> 00:16:13,519
several years bc uh near the birth of

474
00:16:16,310 --> 00:16:14,720
christ

475
00:16:17,910 --> 00:16:16,320
and uh

476
00:16:19,829 --> 00:16:17,920
the um

477
00:16:21,670 --> 00:16:19,839
uh it is it is quite possible that there

478
00:16:23,670 --> 00:16:21,680
was a conjunction in the year six or

479
00:16:25,269 --> 00:16:23,680
seven bc and a conjunction very much

480
00:16:28,150 --> 00:16:25,279
like this one here where jupiter and

481
00:16:29,670 --> 00:16:28,160
saturn were near in the sky very near to

482
00:16:31,910 --> 00:16:29,680
each other maybe it wasn't a tenth of a

483
00:16:34,470 --> 00:16:31,920
degree but maybe a degree apart uh so

484
00:16:37,350 --> 00:16:34,480
it's possible that a conjunction like

485
00:16:39,030 --> 00:16:37,360
this is uh was what was referred to as

486
00:16:40,150 --> 00:16:39,040
the star of bethlehem but there are many

487
00:16:42,230 --> 00:16:40,160
other possible things this could have

488
00:16:44,710 --> 00:16:42,240

been as well uh for instance there are

489
00:16:46,550 --> 00:16:44,720
comets which are uh visitors from uh

490
00:16:49,509 --> 00:16:46,560
from our solar system mostly but which

491
00:16:51,590 --> 00:16:49,519
appear in the sky as they are passing uh

492
00:16:53,590 --> 00:16:51,600
passing toward the sun

493
00:16:55,509 --> 00:16:53,600
past the earth

494
00:16:56,710 --> 00:16:55,519
there are novas and supernovas which are

495
00:16:58,389 --> 00:16:56,720
essentially different versions of

496
00:17:00,629 --> 00:16:58,399
exploding stars

497
00:17:02,790 --> 00:17:00,639
and brightening stars and there can also

498
00:17:03,829 --> 00:17:02,800
be alignments between planets and some

499
00:17:06,549 --> 00:17:03,839
of the stars and some of the

500
00:17:08,549 --> 00:17:06,559
constellations which can uh be inspiring

501
00:17:10,630 --> 00:17:08,559
for people so uh for the star of

502
00:17:13,189 --> 00:17:10,640
bethlehem itself we don't know uh for

503
00:17:14,949 --> 00:17:13,199
certain uh which of these uh which these

504
00:17:16,630 --> 00:17:14,959
possible astronomical phenomena was

505
00:17:19,110 --> 00:17:16,640
responsible for what's known as the star

506
00:17:20,549 --> 00:17:19,120
bethlehem uh any of them are uh our

507
00:17:24,150 --> 00:17:20,559
possibilities and scholars and

508
00:17:25,750 --> 00:17:24,160
historians are uh uh uh have have

509
00:17:27,510 --> 00:17:25,760
proposed all these they're all plausible

510
00:17:28,950 --> 00:17:27,520
ideas and without additional

511
00:17:30,950 --> 00:17:28,960
observations from the time it's hard to

512
00:17:32,950 --> 00:17:30,960
say for sure exactly what it was what is

513
00:17:34,230 --> 00:17:32,960

exciting is that everybody on this earth

514
00:17:36,470 --> 00:17:34,240
is going to be able to go out and see

515
00:17:38,710 --> 00:17:36,480
this and continue this deep connection

516
00:17:40,630 --> 00:17:38,720
uh between people on the earth and uh

517
00:17:42,150 --> 00:17:40,640
and observations up in the sky and this

518
00:17:44,549 --> 00:17:42,160
continuous connection that we have to

519
00:17:46,549 --> 00:17:44,559
the to the sky above us

520
00:17:48,070 --> 00:17:46,559
and i think it's so cool that like you

521
00:17:50,150 --> 00:17:48,080
said it doesn't matter where you are in

522
00:17:51,510 --> 00:17:50,160
the world that we are all looking up at

523
00:17:54,150 --> 00:17:51,520
the same thing and we are all just

524
00:17:57,430 --> 00:17:54,160
connected by this amazing once in a few

525
00:17:59,909 --> 00:17:57,440
lifetimes event um and in that same

526
00:18:02,310 --> 00:17:59,919
light there's a user on twitter that

527
00:18:03,990 --> 00:18:02,320
says i'm confused every piece of info

528
00:18:06,789 --> 00:18:04,000
i've read about this event

529
00:18:09,270 --> 00:18:06,799
says that it's happened once every 800

530
00:18:10,710 --> 00:18:09,280
years or once every 400 years which is

531
00:18:13,270 --> 00:18:10,720
it

532
00:18:15,669 --> 00:18:13,280
ah okay that's a great question so every

533
00:18:17,110 --> 00:18:15,679
20 years jupiter passes saturn in its

534
00:18:19,430 --> 00:18:17,120
orbit and so every 20 years there's

535
00:18:21,909 --> 00:18:19,440
going to be a conjunction where they are

536
00:18:23,990 --> 00:18:21,919
a degree or so apart from each other

537
00:18:25,110 --> 00:18:24,000
however just like the moon is up half

538
00:18:26,549 --> 00:18:25,120

the time during the day and half the

539
00:18:27,830 --> 00:18:26,559
time during the night sometimes this

540
00:18:29,830 --> 00:18:27,840
conjunction is going to be during the

541
00:18:31,590 --> 00:18:29,840
daytime instead of during the night time

542
00:18:32,630 --> 00:18:31,600
so if it's if this happens during the

543
00:18:34,070 --> 00:18:32,640
daytime

544
00:18:35,990 --> 00:18:34,080
you could see it if you knew exactly

545
00:18:38,549 --> 00:18:36,000
where to point your uh uh point your

546
00:18:39,909 --> 00:18:38,559
binoculars but uh uh or where to look in

547
00:18:42,710 --> 00:18:39,919
the sky but it's really hard to see the

548
00:18:44,549 --> 00:18:42,720
planets during the during the daytime so

549
00:18:47,909 --> 00:18:44,559
uh in with this conjunction which

550
00:18:49,669 --> 00:18:47,919
happened 400 years ago 1623

551
00:18:51,990 --> 00:18:49,679
even though that was uh just right after

552
00:18:54,390 --> 00:18:52,000
the right after the uh the first use of

553
00:18:56,549 --> 00:18:54,400
the telescope by galileo and others at

554
00:18:59,430 --> 00:18:56,559
the time uh it is quite likely that

555
00:19:01,590 --> 00:18:59,440
nobody on earth actually saw it in 1623

556
00:19:03,990 --> 00:19:01,600
as a very close conjunction 10th degree

557
00:19:06,630 --> 00:19:04,000
like this one but uh but it was during

558
00:19:07,990 --> 00:19:06,640
the daytime and so galileo had no record

559
00:19:09,909 --> 00:19:08,000
of seeing it other astronomers at the

560
00:19:11,590 --> 00:19:09,919
time had no record of of actually seeing

561
00:19:13,110 --> 00:19:11,600
it and so it's possible that the last

562
00:19:15,750 --> 00:19:13,120
conjunction that was this close in the

563
00:19:18,549 --> 00:19:15,760

sky which was during the night time was

564
00:19:22,390 --> 00:19:18,559
in the year 1226 and that was the uh

565
00:19:25,190 --> 00:19:22,400
previous one which is widely observed

566
00:19:27,190 --> 00:19:25,200
wow so i've got a really great question

567
00:19:29,669 --> 00:19:27,200
from hanno he is six years old on

568
00:19:31,590 --> 00:19:29,679
facebook and he wants to know when was

569
00:19:34,470 --> 00:19:31,600
the first time nasa discovered the

570
00:19:38,870 --> 00:19:35,909
so the conjunctions have been known

571
00:19:40,870 --> 00:19:38,880
about for a long time uh in fact uh

572
00:19:43,190 --> 00:19:40,880
there's a there's a greek astronomer

573
00:19:46,870 --> 00:19:43,200
named ptolemy who was uh in about the

574
00:19:49,029 --> 00:19:46,880
year 100 a.d and he was uh one of the

575
00:19:50,870 --> 00:19:49,039
first astronomers who was uh able to

576
00:19:53,510 --> 00:19:50,880
predict them predict very reliably the

577
00:19:56,150 --> 00:19:53,520
emotions of the planets uh johannes

578
00:19:58,549 --> 00:19:56,160
kepler also in the uh in the late 1500s

579
00:20:00,470 --> 00:19:58,559
and 1600s was an early astronomer who

580
00:20:02,149 --> 00:20:00,480
was very much into uh mathematical

581
00:20:03,750 --> 00:20:02,159
descriptions of the of the planets and

582
00:20:05,590 --> 00:20:03,760
he was the one who first understood

583
00:20:07,669 --> 00:20:05,600
their true nature and how they orbited

584
00:20:10,070 --> 00:20:07,679
around the sun

585
00:20:12,149 --> 00:20:10,080
in his observations and so using these

586
00:20:14,549 --> 00:20:12,159
observations people have been able to

587
00:20:15,909 --> 00:20:14,559
predict and understand the uh the

588
00:20:17,750 --> 00:20:15,919

conjunctions for

589
00:20:19,590 --> 00:20:17,760
for quite some time so this is not a new

590
00:20:21,830 --> 00:20:19,600
event nasa has known about this for a

591
00:20:24,070 --> 00:20:21,840
long time as of many other uh

592
00:20:27,110 --> 00:20:24,080
many other observers of the sky and

593
00:20:29,350 --> 00:20:27,120
we're really excited to uh to share this

594
00:20:30,710 --> 00:20:29,360
with uh with everybody else on on on

595
00:20:32,710 --> 00:20:30,720
earth and

596
00:20:34,950 --> 00:20:32,720
have people go out and uh and explore

597
00:20:36,950 --> 00:20:34,960
the solar system with us

598
00:20:38,789 --> 00:20:36,960
so i'm so glad you just said that about

599
00:20:40,870 --> 00:20:38,799
sharing this with everybody on earth

600
00:20:42,549 --> 00:20:40,880
because we are celebrating 20 years of

601
00:20:45,270 --> 00:20:42,559
continuous human habitation on the

602
00:20:48,230 --> 00:20:45,280
international space station and elaine

603
00:20:50,710 --> 00:20:48,240
and adriana on twitter are asking will

604
00:20:53,110 --> 00:20:50,720
the astronauts on the iss be able to see

605
00:20:55,029 --> 00:20:53,120
the conjunction

606
00:20:57,190 --> 00:20:55,039
i believe the astronauts should see the

607
00:20:59,029 --> 00:20:57,200
conjunction yes we have to verify that

608
00:21:01,029 --> 00:20:59,039
with the astronauts uh it depends on

609
00:21:02,870 --> 00:21:01,039
exactly uh whether

610
00:21:03,669 --> 00:21:02,880
um

611
00:21:08,950 --> 00:21:03,679
uh

612
00:21:10,630 --> 00:21:08,960
would be able to see it they have a

613
00:21:12,390 --> 00:21:10,640

great view of the great view of the sky

614
00:21:15,350 --> 00:21:12,400
there um they are unaffected by the

615
00:21:17,430 --> 00:21:15,360
earth's atmosphere and uh so they should

616
00:21:20,950 --> 00:21:17,440
be able to see the conjunction along

617
00:21:22,789 --> 00:21:20,960
with everybody uh here on earth

618
00:21:24,630 --> 00:21:22,799
i hope that happens and i they take some

619
00:21:26,789 --> 00:21:24,640
really great photos from up there so

620
00:21:28,549 --> 00:21:26,799
maybe we'll see one of theirs uh after

621
00:21:31,190 --> 00:21:28,559
the 21st as well

622
00:21:33,350 --> 00:21:31,200
and i have kitty on twitter who asks is

623
00:21:35,110 --> 00:21:33,360
there a specific uh

624
00:21:36,870 --> 00:21:35,120
thing that scientists hope to learn from

625
00:21:39,990 --> 00:21:36,880
this moment or is it just for the

626
00:21:41,590 --> 00:21:40,000
delight of us to see

627
00:21:43,669 --> 00:21:41,600
this is just a great time to go outside

628
00:21:45,510 --> 00:21:43,679
and see this guy uh we're not doing

629
00:21:47,270 --> 00:21:45,520
observations because we would be doing

630
00:21:49,270 --> 00:21:47,280
observations if like jupiter was passing

631
00:21:51,029 --> 00:21:49,280
directly in front of saturn and we could

632
00:21:53,029 --> 00:21:51,039
use saturn kind of as a flashlight to

633
00:21:54,230 --> 00:21:53,039
probe through the outer atmosphere of

634
00:21:56,149 --> 00:21:54,240
jupiter that would be something which is

635
00:21:58,070 --> 00:21:56,159
scientifically would yield some some

636
00:21:59,510 --> 00:21:58,080
science which we perhaps might not be

637
00:22:00,390 --> 00:21:59,520
able to do otherwise

638
00:22:02,549 --> 00:22:00,400

um

639
00:22:04,149 --> 00:22:02,559
uh and if jupiter were passing in front

640
00:22:05,350 --> 00:22:04,159
of another star if saturn were passing

641
00:22:07,029 --> 00:22:05,360
in front of another star that would be

642
00:22:08,310 --> 00:22:07,039
something we would study

643
00:22:09,830 --> 00:22:08,320
in this case they're not passing in

644
00:22:11,909 --> 00:22:09,840
front of other light sources and they're

645
00:22:13,750 --> 00:22:11,919
not passing actually near each other in

646
00:22:15,830 --> 00:22:13,760
space so there's no scientific

647
00:22:17,669 --> 00:22:15,840
observations which nasa is studying but

648
00:22:21,110 --> 00:22:17,679
we are really excited to just go out

649
00:22:25,350 --> 00:22:23,830
nice and so i mean it's just great that

650
00:22:27,350 --> 00:22:25,360
all of us get to do this and you know

651
00:22:29,990 --> 00:22:27,360
learn a little bit about it and for

652
00:22:32,310 --> 00:22:30,000
those that do have a telescope brianna

653
00:22:33,669 --> 00:22:32,320
on periscope asks will there be a huge

654
00:22:36,149 --> 00:22:33,679
difference if i view this through a

655
00:22:37,750 --> 00:22:36,159
telescope

656
00:22:39,110 --> 00:22:37,760
so depending on the magnification of

657
00:22:40,710 --> 00:22:39,120
your telescope

658
00:22:42,710 --> 00:22:40,720
i think it should be it's

659
00:22:45,110 --> 00:22:42,720
what a telescope will do is essentially

660
00:22:47,909 --> 00:22:45,120
like a camera lens but bigger now on the

661
00:22:50,070 --> 00:22:47,919
night of the 21st uh usually a telescope

662
00:22:52,070 --> 00:22:50,080
has a high enough magnification such

663
00:22:53,350 --> 00:22:52,080

that you can see jupiter or you can see

664
00:22:54,710 --> 00:22:53,360
saturn but you're not going to see them

665
00:22:56,230 --> 00:22:54,720
at the same time you have to point the

666
00:22:59,190 --> 00:22:56,240
telescope to go back and forth between

667
00:23:00,470 --> 00:22:59,200
them and uh on the night of 21st this is

668
00:23:01,830 --> 00:23:00,480
going to be the only time that if you

669
00:23:03,350 --> 00:23:01,840
have that telescope you can look at

670
00:23:04,390 --> 00:23:03,360
jupiter and you can look at saturn and

671
00:23:06,070 --> 00:23:04,400
you're not going to have to re-point

672
00:23:07,669 --> 00:23:06,080
your telescope between them so that's

673
00:23:09,110 --> 00:23:07,679
what's going to be really really neat

674
00:23:10,390 --> 00:23:09,120
about about looking at it for a

675
00:23:11,990 --> 00:23:10,400
telescope and i'm looking forward to

676
00:23:13,510 --> 00:23:12,000
lots of people taking pictures through

677
00:23:16,149 --> 00:23:13,520
their telescopes of jupiter and saturn

678
00:23:17,750 --> 00:23:16,159
in the same field at the same time

679
00:23:19,990 --> 00:23:17,760
yes there's already been some really

680
00:23:21,990 --> 00:23:20,000
amazing ones online just showing the

681
00:23:24,710 --> 00:23:22,000
rings i cannot wait to see what it looks

682
00:23:26,549 --> 00:23:24,720
like close together and we have wanda on

683
00:23:29,029 --> 00:23:26,559
twitter who wants to know should we be

684
00:23:31,669 --> 00:23:29,039
looking high or low in the sky to see

685
00:23:34,230 --> 00:23:31,679
the conjunction

686
00:23:36,070 --> 00:23:34,240
so the uh the sun sets due to the

687
00:23:38,070 --> 00:23:36,080
rotation of the earth the planets rise

688
00:23:40,789 --> 00:23:38,080

and set from east to west in this

689
00:23:42,950 --> 00:23:40,799
exactly the same way as the uh as the

690
00:23:44,470 --> 00:23:42,960
star and the sun and the moon do and so

691
00:23:46,789 --> 00:23:44,480
what you'll see if you if you go out

692
00:23:48,230 --> 00:23:46,799
about 30 degrees i go up about 45

693
00:23:49,990 --> 00:23:48,240
minutes after the sunset and you look

694
00:23:51,510 --> 00:23:50,000
about 30 or 40 degrees up in the sky

695
00:23:53,190 --> 00:23:51,520
about halfway up in the sky a little

696
00:23:55,190 --> 00:23:53,200
less you'll see jupiter right there

697
00:23:56,549 --> 00:23:55,200
you're not gonna miss it you're gonna if

698
00:23:57,669 --> 00:23:56,559
you have a clear view of the sky and a

699
00:23:59,750 --> 00:23:57,679
clear view of the horizon you're not

700
00:24:01,190 --> 00:23:59,760
gonna miss jupiter there uh and then

701
00:24:02,470 --> 00:24:01,200
look for saturn saturn is gonna be a

702
00:24:05,029 --> 00:24:02,480
little bit fainter and a little bit

703
00:24:06,070 --> 00:24:05,039
higher than jupiter and then you've got

704
00:24:08,549 --> 00:24:06,080
them both there and then you could just

705
00:24:11,510 --> 00:24:08,559
follow them as they uh as they slowly

706
00:24:14,149 --> 00:24:12,230
so

707
00:24:16,230 --> 00:24:14,159
i have maria on twitter who wants to

708
00:24:19,510 --> 00:24:16,240
know has there ever been a triple

709
00:24:20,950 --> 00:24:19,520
planetary conjunction

710
00:24:22,549 --> 00:24:20,960
just like you can have a double as

711
00:24:23,669 --> 00:24:22,559
conjunction between two planets you

712
00:24:25,750 --> 00:24:23,679
certainly could have a conjunction

713
00:24:28,149 --> 00:24:25,760

between three planets now statistically

714
00:24:30,390 --> 00:24:28,159
it's it's harder to just like your uh

715
00:24:32,549 --> 00:24:30,400
you know one runner on the racetrack can

716
00:24:33,990 --> 00:24:32,559
pass another runner like every orbit if

717
00:24:35,750 --> 00:24:34,000
you're waiting for three runners on the

718
00:24:37,830 --> 00:24:35,760
racetrack to line up it's going to take

719
00:24:39,190 --> 00:24:37,840
longer for them to all get lined up at

720
00:24:41,430 --> 00:24:39,200
the same time so instead of waiting

721
00:24:42,950 --> 00:24:41,440
every 20 years it might be depending on

722
00:24:45,350 --> 00:24:42,960
which planets is is it might you might

723
00:24:47,269 --> 00:24:45,360
have to wait maybe 10 000 years for

724
00:24:48,549 --> 00:24:47,279
three plants to line up but you bet you

725
00:24:50,470 --> 00:24:48,559
wait long enough and eventually that's

726
00:24:52,710 --> 00:24:50,480
going to happen too we can predict or we

727
00:24:54,070 --> 00:24:52,720
can know uh because it's it's a very uh

728
00:24:56,070 --> 00:24:54,080
the motions of the planets are very well

729
00:24:57,750 --> 00:24:56,080
understood we'll be able to predict when

730
00:24:59,990 --> 00:24:57,760
that happens uh but it's not gonna be

731
00:25:02,630 --> 00:25:00,000
anytime soon for uh for jupiter saturn

732
00:25:04,390 --> 00:25:02,640
and other planets that i know of

733
00:25:06,390 --> 00:25:04,400
have there been any other planetary

734
00:25:09,669 --> 00:25:06,400
conjunctions in the past couple years

735
00:25:11,110 --> 00:25:09,679
that people could have been able to see

736
00:25:13,350 --> 00:25:11,120
yeah there's there certainly are other

737
00:25:15,190 --> 00:25:13,360
planetary conjunctions uh mercury and

738
00:25:17,909 --> 00:25:15,200

venus are the faster moving planets and

739
00:25:19,510 --> 00:25:17,919
so sometimes we see uh they they they

740
00:25:21,750 --> 00:25:19,520
move faster around the earth and so they

741
00:25:23,269 --> 00:25:21,760
cover more uh uh they have there's more

742
00:25:24,470 --> 00:25:23,279
chances for them to get lined up just

743
00:25:26,630 --> 00:25:24,480
just like those runners on the track

744
00:25:28,630 --> 00:25:26,640
they're moving faster uh we sometimes

745
00:25:30,950 --> 00:25:28,640
also see what we call our occultations

746
00:25:32,390 --> 00:25:30,960
and that's where the uh where or a

747
00:25:35,669 --> 00:25:32,400
transit and that's where the planet is

748
00:25:37,750 --> 00:25:35,679
moving in front of something else and uh

749
00:25:39,510 --> 00:25:37,760
uh in the case of our solar system both

750
00:25:41,830 --> 00:25:39,520
mercury and venus have in the last

751
00:25:43,590 --> 00:25:41,840
decade had transits which took them in

752
00:25:46,149 --> 00:25:43,600
front of the path of the sun and that's

753
00:25:47,430 --> 00:25:46,159
really really cool uh nasa and so many

754
00:25:50,549 --> 00:25:47,440
millions of people on earth witnessed

755
00:25:52,470 --> 00:25:50,559
the transits of venus and jupiter venus

756
00:25:53,990 --> 00:25:52,480
and uh and mercury in the last decade

757
00:25:56,149 --> 00:25:54,000
where you saw a little dot which was

758
00:25:58,070 --> 00:25:56,159
traveling across the surface of the sun

759
00:26:00,070 --> 00:25:58,080
now again it wasn't interacting with the

760
00:26:01,909 --> 00:26:00,080
sun it was far far many millions of

761
00:26:04,950 --> 00:26:01,919
kilometers in front of the sun when

762
00:26:06,549 --> 00:26:04,960
venus and mercury did this but it was uh

763
00:26:08,230 --> 00:26:06,559

really exciting to see that because that

764
00:26:10,470 --> 00:26:08,240
requires a very precise alignment and

765
00:26:12,310 --> 00:26:10,480
those are very rare uh very rare events

766
00:26:14,630 --> 00:26:12,320
as well

767
00:26:16,789 --> 00:26:14,640
so henry i've got one final question for

768
00:26:20,230 --> 00:26:16,799
you that i'm dying to know what are you

769
00:26:21,590 --> 00:26:20,240
most excited about for this event

770
00:26:24,470 --> 00:26:21,600
i'm most excited for everybody to go

771
00:26:25,990 --> 00:26:24,480
outside and look up and really see our

772
00:26:27,510 --> 00:26:26,000
our place in the solar system what's

773
00:26:28,230 --> 00:26:27,520
really neat here is the solar system is

774
00:26:31,830 --> 00:26:28,240
this

775
00:26:33,590 --> 00:26:31,840
object and and the planets are moving

776
00:26:36,630 --> 00:26:33,600
around and we're moving around and and

777
00:26:38,630 --> 00:26:36,640
the the sun the moon are our

778
00:26:40,710 --> 00:26:38,640
the moon is moving around us and this

779
00:26:43,110 --> 00:26:40,720
just gives us a uh gives people on earth

780
00:26:44,789 --> 00:26:43,120
a really great chance to go out and see

781
00:26:46,630 --> 00:26:44,799
where they fit in the solar system and

782
00:26:48,390 --> 00:26:46,640
don't go out just one night go out

783
00:26:49,990 --> 00:26:48,400
several nights and see how the see how

784
00:26:51,430 --> 00:26:50,000
the motion these planets changes

785
00:26:53,190 --> 00:26:51,440
relative to each other see how their

786
00:26:54,710 --> 00:26:53,200
position changes relative to the stars

787
00:26:56,950 --> 00:26:54,720
see how the position range changes

788
00:26:59,430 --> 00:26:56,960

relative to uh the sun is the sun as

789
00:27:01,430 --> 00:26:59,440
that uh as they they're gonna um move

790
00:27:04,230 --> 00:27:01,440
relative to the sunset and really use

791
00:27:05,990 --> 00:27:04,240
that to uh to make your link to the to

792
00:27:07,190 --> 00:27:06,000
the motions the planets around us just

793
00:27:08,789 --> 00:27:07,200
like people have done for thousands of

794
00:27:10,789 --> 00:27:08,799
years

795
00:27:13,190 --> 00:27:10,799
i mean henry your excitement is getting

796
00:27:15,590 --> 00:27:13,200
me excited and i'm sure those watching

797
00:27:17,750 --> 00:27:15,600
as well thank you so much for being with

798
00:27:19,669 --> 00:27:17,760
us and sharing your expertise with us

799
00:27:21,830 --> 00:27:19,679
and for those of you tuning in thank you

800
00:27:23,110 --> 00:27:21,840
for spending some time with us if you'd

801
00:27:25,830 --> 00:27:23,120
like to know more about the great

802
00:27:28,070 --> 00:27:25,840
conjunction sky watching tips or what's

803
00:27:29,750 --> 00:27:28,080
up in the night sky for december visit

804
00:27:32,149 --> 00:27:29,760
go.nasa.gov

805
00:27:34,470 --> 00:27:32,159
forward slash what's up for more

806
00:27:36,870 --> 00:27:34,480
information you can also follow nasa's

807
00:27:39,190 --> 00:27:36,880
solar system on twitter facebook and

808
00:27:41,830 --> 00:27:39,200
instagram thank you so much for tuning

809
00:27:47,530 --> 00:27:41,840
in again happy sky watching and we'll

810
00:27:47,540 --> 00:27:51,760
[Music]

811
00:27:51,770 --> 00:28:05,140
[Applause]