

1

00:00:00,000 --> 00:00:06,840

MUSIC

2

00:00:06,840 --> 00:00:09,840

MUSIC

3

00:00:09,840 --> 00:00:15,280

Coming up on Mythbusters, our mailbag special, starring you.

4

00:00:15,280 --> 00:00:18,720

It's the fans' turn for a place in the sun.

5

00:00:18,720 --> 00:00:20,080

There we go, flame!

6

00:00:20,080 --> 00:00:21,920

Nine seconds.

7

00:00:21,920 --> 00:00:25,840

As amateur Mythbusters build solar death rays.

8

00:00:25,840 --> 00:00:28,120

It'll start fires like that.

9

00:00:28,120 --> 00:00:31,080

And turn up the heat on Adam and Jamie.

10

00:00:31,080 --> 00:00:33,560

What the hell is that thing?

11

00:00:33,560 --> 00:00:36,200

It's the disco mirror from hell.

12

00:00:36,200 --> 00:00:41,200

After a great song and dance, the mother of all death rays

13

00:00:41,200 --> 00:00:44,840

gets unleashed in this ultimate viewer challenge.

14

00:00:44,840 --> 00:00:45,840

Look at that!

15

00:00:45,840 --> 00:00:46,840

Ha ha ha!

16

00:00:46,840 --> 00:00:48,840

You're gonna get smoke!

17

00:00:48,840 --> 00:00:52,920

Who are the Mythbusters?

18

00:00:52,920 --> 00:00:53,920

Adam Savage.

19

00:00:53,920 --> 00:00:54,920

Oh!

20

00:00:54,920 --> 00:00:56,440

Oh!

21

00:00:56,440 --> 00:00:57,880

And Jamie Heineman.

22

00:00:57,880 --> 00:01:00,680

This is gonna kill you.

23

00:01:00,680 --> 00:01:04,520

Between them more than 30 years of special effects experience.

24

00:01:04,520 --> 00:01:06,480

That's what I'm talking about!

25

00:01:06,480 --> 00:01:08,760

Joining them, Tori Belachie.

26

00:01:08,760 --> 00:01:10,320

Very excited about this.

27

00:01:10,320 --> 00:01:11,320

Carrie Byron.

28

00:01:11,320 --> 00:01:12,920

Look, he cracked into a skull.

29

00:01:12,920 --> 00:01:14,520

And Grant Imahara.

30

00:01:14,520 --> 00:01:16,360

Don't say anything.

31

00:01:16,360 --> 00:01:19,960

They don't just tell the Myths.

32

00:01:19,960 --> 00:01:21,960

They put them to the test.

33

00:01:21,960 --> 00:01:38,560

Alright, so the Archimedes death ray burn off?

34

00:01:38,560 --> 00:01:39,560

What the hell is that?

35

00:01:39,560 --> 00:01:44,560

Well, you remember back at the beginning of series two when we tested the myth about

36

00:01:44,560 --> 00:01:48,160

Archimedes having created a solar death ray?

37

00:01:48,160 --> 00:01:49,160

I do!

38

00:01:49,160 --> 00:01:51,000

I remember it.

39

00:01:51,000 --> 00:01:54,000

I think it was yesterday.

40

00:01:54,000 --> 00:02:00,240

Who could forget this classic myth from the classical era?

41

00:02:00,240 --> 00:02:08,720

In 215 BC, the Romans were about to conquer the Greeks until Archimedes saw the light.

42

00:02:08,720 --> 00:02:14,560

He supposedly built a giant mirror that focused the sun's energy with such ferocity that

43

00:02:14,560 --> 00:02:18,560

it ignited the invading Roman ships.

44

00:02:18,680 --> 00:02:23,760

When the mythbusters tried it, they busted it big time.

45

00:02:23,760 --> 00:02:30,200

Adam built a rig of over 300 mirrors and by carefully aligning each one, he tried to focus

46

00:02:30,200 --> 00:02:33,720

them all to a single, hot, focal point.

47

00:02:33,720 --> 00:02:35,920

Oh, bright light!

48

00:02:35,920 --> 00:02:36,920

Sail away!

49

00:02:36,920 --> 00:02:38,960

Right, it may have been.

50

00:02:38,960 --> 00:02:42,800

But it was no more deadly than a flashlight.

51

00:02:42,800 --> 00:02:44,800

What's the temperature, Jamie?

52

00:02:44,800 --> 00:02:45,800

150.

53

00:02:45,800 --> 00:02:46,800

150?

54

00:02:47,520 --> 00:02:49,520

Yet a minute!

55

00:02:49,520 --> 00:02:51,520

200 degrees!

56

00:02:51,520 --> 00:02:58,320

They peaked at 290 degrees, less than half of what was needed to ignite the wood.

57

00:02:58,320 --> 00:03:03,440

So they resorted to something which Archimedes was way too mature for.

58

00:03:03,440 --> 00:03:06,480

So why are we going back here again?

59

00:03:06,480 --> 00:03:10,240

Well, there were a number of viewers that thought we got it wrong.

60

00:03:10,240 --> 00:03:13,600

And so what we're going to do is give them a chance to put their money and their time

61

00:03:13,680 --> 00:03:19,040

where their mouth is and they're going to have to design and build and film their version

62

00:03:19,040 --> 00:03:20,760

of the mirror that proves us wrong.

63

00:03:20,760 --> 00:03:23,320

And there's got to be two parts to this contest.

64

00:03:23,320 --> 00:03:27,000

One is they've got to build a mirror that can focus and burn something at five feet

65

00:03:27,000 --> 00:03:30,360

and another category where they've got to build something that can burn something a

66

00:03:30,360 --> 00:03:33,320

minimum of a hundred feet away.

67

00:03:33,320 --> 00:03:40,080

After receiving a deluge of angry emails, the mythbusters have set this challenge.

68

00:03:40,080 --> 00:03:44,440

Build your own death ray or quit moaning.

69

00:03:44,440 --> 00:03:48,880

On the website they posted a set of rules for a five foot death ray and a hundred foot

70

00:03:48,880 --> 00:03:49,880

death ray.

71

00:03:49,880 --> 00:03:56,720

Then they waited three months until the shortlisted entries arrived.

72

00:03:56,720 --> 00:03:58,360

All the entries are in.

73

00:03:58,360 --> 00:03:59,360

Fantastic.

74

00:03:59,360 --> 00:04:03,560

Now what we have to do is decide who we're going to bring out here to San Francisco to

75

00:04:03,560 --> 00:04:04,960

do the final burn off.

76

00:04:04,960 --> 00:04:06,320

I've been waiting to see these.

77

00:04:06,320 --> 00:04:07,520

This is awesome.

78

00:04:07,520 --> 00:04:11,120

And the first one is Dan Cooke's.

79

00:04:11,120 --> 00:04:15,800

So while we're waiting for it to load, what are the judging criteria we're going to apply?

80

00:04:15,800 --> 00:04:17,240

Creative use of materials.

81

00:04:17,240 --> 00:04:22,800

How relative to the actual Archimedes myth they are, do they make stuff burn?

82

00:04:22,800 --> 00:04:24,280

How good they are at making a video.

83

00:04:24,280 --> 00:04:25,280

All right, here it is.

84

00:04:25,280 --> 00:04:26,280

It's ready to go.

85

00:04:26,280 --> 00:04:27,280

I'm 37 years old.

86

00:04:27,280 --> 00:04:28,280

I live in Lakewood, Colorado.

87

00:04:28,280 --> 00:04:29,280

And I'm a handyman.

88

00:04:29,280 --> 00:04:33,760

How cool he's dressing in a toga.

89

00:04:33,760 --> 00:04:34,760

That's a little creepy.

90

00:04:34,760 --> 00:04:38,880

I feel like I'm watching something I didn't mean to find.

91

00:04:38,880 --> 00:04:43,600

For the five foot challenge, Toga Dan is building a catenary.

92

00:04:43,600 --> 00:04:47,440

A row of mirrors arranged on a chain.

93

00:04:47,440 --> 00:04:52,680

But can this unusual idea harness enough energy to form a death ray?

94

00:04:52,680 --> 00:04:57,400

See if we can set my shorts on fire.

95

00:04:57,400 --> 00:05:02,000

Like the Mythbusters rig, there's a complete shortage of fire.

96

00:05:02,440 --> 00:05:05,960

Rather than address the issue, Dan tries something rather strange.

97

00:05:05,960 --> 00:05:11,920

Today, we're going to try to set fire to one of these logs as a projectile.

98

00:05:11,920 --> 00:05:14,520

Violet's going downrange at 300 feet per second.

99

00:05:14,520 --> 00:05:15,520

Yeah, about that.

100

00:05:15,520 --> 00:05:17,400

Wait a minute, wait a minute, wait a minute.

101

00:05:17,400 --> 00:05:19,040

What's going 300 feet per second?

102

00:05:19,040 --> 00:05:25,240

He's apparently going to try to ignite the log while it's underway in the air.

103

00:05:25,240 --> 00:05:35,560

You're pretty much trying the hardest thing you could possibly imagine, which is setting

104

00:05:35,560 --> 00:05:39,520

fire to a moving object when you have yet to prove that it can actually set fire to anything.

105

00:05:39,520 --> 00:05:40,520

Yeah.

106

00:05:40,520 --> 00:05:43,520

I just think he lacks a little focus.

107

00:05:43,520 --> 00:05:48,400

And worryingly for the Mythbusters, so do many other entries.

108

00:05:48,400 --> 00:05:49,720

Take Doug Graham.

109

00:05:49,720 --> 00:05:52,120

I'm using ordinary paintballs here.

110

00:05:52,120 --> 00:05:53,600

Here I am.

111

00:05:53,600 --> 00:05:54,600

Hi.

112

00:05:54,600 --> 00:06:00,760

Here's Archimedes, catapult's paintballs and a model boat on a blue plastic bag.

113

00:06:00,760 --> 00:06:01,760

Yes!

114

00:06:01,760 --> 00:06:03,240

Right there!

115

00:06:03,240 --> 00:06:10,520

Matt Peterson does a complex build, but also fails to repeat Archimedes' feat.

116

00:06:10,520 --> 00:06:14,840

It's not hot enough to set that cardboard box on fire yet.

117

00:06:14,840 --> 00:06:17,720

We're reading about 129.6.

118

00:06:17,720 --> 00:06:21,560

That's pretty pathetic.

119

00:06:21,560 --> 00:06:22,680

So he's out.

120

00:06:22,680 --> 00:06:23,680

Who's next?

121

00:06:23,680 --> 00:06:25,280

Kerry and Jess.

122

00:06:25,280 --> 00:06:26,280

No last names?

123

00:06:26,280 --> 00:06:27,280

No.

124

00:06:27,280 --> 00:06:28,280

Sounds interesting.

125

00:06:28,280 --> 00:06:31,040

I look at DVD I wouldn't want my wife to find.

126

00:06:31,040 --> 00:06:32,640

Hi, I'm Kerry.

127

00:06:32,640 --> 00:06:33,640

And I'm Jess.

128

00:06:33,640 --> 00:06:37,840

And we're the Mythbusters.

129

00:06:37,840 --> 00:06:41,120

So far the entries are short on success.

130

00:06:41,120 --> 00:06:42,720

Can the girls do any better?

131

00:06:42,720 --> 00:06:48,400

So Jess found out that in Archimedes' mirror he used a hexagon in the center.

132

00:06:48,400 --> 00:06:50,560

Okay, come on, let's see how it works.

133

00:06:50,560 --> 00:06:53,160

Cut to the chase!

134

00:06:53,160 --> 00:06:58,720

With the DVDs he doesn't want his wife to find, add them fast forwards to the good bits.

135

00:06:58,720 --> 00:07:00,920

Okay, piece of wood test, excellent.

136

00:07:00,920 --> 00:07:03,600

And we have a hole in the wood.

137

00:07:03,600 --> 00:07:06,120

Yes, our wood is burning.

138

00:07:06,120 --> 00:07:07,760

There's fire in the hole.

139

00:07:07,760 --> 00:07:11,440

Admittedly they're using balsa wood rather than a slab of oak.

140

00:07:11,440 --> 00:07:13,440

But it's progress.

141

00:07:13,440 --> 00:07:15,160

I've seen enough.

142

00:07:15,160 --> 00:07:17,120

They were able to get fire.

143

00:07:17,120 --> 00:07:19,440

They've got a nice design, they're good on camera.

144

00:07:19,440 --> 00:07:21,240

They got fire, I think they're in.

145

00:07:21,240 --> 00:07:22,240

Okay.

146

00:07:22,240 --> 00:07:23,640

Who's next?

147

00:07:23,640 --> 00:07:25,760

Stephen Marsh, Brendan Milstein.

148

00:07:25,760 --> 00:07:26,760

Alright.

149

00:07:26,760 --> 00:07:34,160

Now Archimedes, Greek philosopher and mathematician, may have been too noble for dumpster diving.

150

00:07:34,160 --> 00:07:36,160

But thankfully we aren't.

151

00:07:36,160 --> 00:07:38,360

We found this parabolic mirror.

152

00:07:38,360 --> 00:07:42,000

I just pulled out some kind of a mirror out of a box.

153

00:07:42,000 --> 00:07:46,400

It looks like a beautiful parabola, but that's just a mirror in a box.

154

00:07:46,400 --> 00:07:50,040

A mirror in a box it may be, but does it work?

155

00:07:50,840 --> 00:07:52,840

It's just wet.

156

00:07:52,840 --> 00:07:55,080

Dude, that is insane.

157

00:07:55,080 --> 00:07:56,600

Fire right away, that's amazing.

158

00:07:56,600 --> 00:07:59,200

I think he's setting fire to you first.

159

00:07:59,200 --> 00:08:02,600

And then he's going to set fire to me.

160

00:08:02,600 --> 00:08:05,000

I got to see this in action, I think we should bring him in.

161

00:08:05,000 --> 00:08:07,800

Yeah, it was bursting into flames in seconds.

162

00:08:07,800 --> 00:08:08,800

Yeah.

163

00:08:08,800 --> 00:08:10,320

Alright, who's up next?

164

00:08:10,320 --> 00:08:12,560

That would be Mike Bushrow.

165

00:08:12,560 --> 00:08:16,680

This one is also the only entry that we have so far in the large scale.

166

00:08:16,680 --> 00:08:20,880

Well, I got to say, I appreciate the guy putting his money where his mouth is.

167

00:08:20,880 --> 00:08:23,600

Let's see what kind of rig he's got here.

168

00:08:23,600 --> 00:08:28,600

Mike's designed a giant parabolic mirror that he hopes will ignite a boat over a hundred

169

00:08:28,600 --> 00:08:29,600

feet away.

170

00:08:29,600 --> 00:08:37,560

First full assembly, full-size death ray.

171

00:08:37,560 --> 00:08:42,560

And for the mirrors, Mike's coating steel with silvery agent, something that Archimedes

172

00:08:42,560 --> 00:08:45,600

had the technology to do.

173

00:08:45,600 --> 00:08:49,360

It's an ingenious design with one final trick up its sleeve.

174

00:08:49,360 --> 00:08:53,200

This is the focus of the primary mirror.

175

00:08:53,200 --> 00:08:55,400

This looks like he's made this thing variable focus.

176

00:08:55,400 --> 00:08:59,720

That is the only person to attempt to make a variable focus mirror.

177

00:08:59,720 --> 00:09:02,160

I mean, that's something we really grappled with with our rig.

178

00:09:02,160 --> 00:09:07,240

But when it's unleashed, Mike gets so worried that he might set fire to the neighbor's house.

179

00:09:07,240 --> 00:09:10,800

Look at how bright that thing is.

180

00:09:10,800 --> 00:09:13,960

That he nervously returns it to the safety of the shade.

181

00:09:13,960 --> 00:09:16,840

All right, so we throw this to the judges to make a decision?

182

00:09:16,840 --> 00:09:19,760

Yeah, let's do it.

183

00:09:19,760 --> 00:09:34,080

All right, so the winners for the trip to San Francisco are Kerry and Jess.

184

00:09:34,080 --> 00:09:36,280

And Stephen and Brendan.

185

00:09:36,280 --> 00:09:38,280

Yes, those are in the small scale category.

186

00:09:38,280 --> 00:09:41,120

And in the large scale category, we don't really have much choice.

187

00:09:41,120 --> 00:09:43,720

It's either Mike Bushrow or Mike Bushrow.

188

00:09:43,720 --> 00:09:49,040

So all those five get to come to San Francisco, help us set stuff on fire for the great Archimedes

189

00:09:49,040 --> 00:09:50,040

burn off.

190

00:09:50,040 --> 00:10:01,800

I'm glad we don't have to look any more of those things.

191

00:10:01,800 --> 00:10:05,680

It's a Mythbusters mailbag special.

192

00:10:05,680 --> 00:10:11,960

Adam and Janie devised a challenge for disgruntled viewers to build their own death ray.

193

00:10:12,240 --> 00:10:16,200

After all the entries were in, the finalists were chosen.

194

00:10:16,200 --> 00:10:20,720

There's Brendan from Harvard and Stephen from Berkeley.

195

00:10:20,720 --> 00:10:23,760

There's engineering students Kerry and Jess.

196

00:10:23,760 --> 00:10:30,920

And then there's Paulie Math, Mike Bushrow, with his variable focus giant.

197

00:10:30,920 --> 00:10:35,760

But what none of them know is that they're also going to be up against the Mythbusters.

198

00:10:35,760 --> 00:10:40,120

Come on down, Mythbusters satellite shack.

199

00:10:40,120 --> 00:10:45,240

Adam and Janie have acquired a giant satellite dish that they're going to turn into a mirror

200

00:10:45,240 --> 00:10:46,240

death ray.

201

00:10:46,240 --> 00:10:50,920

But if it's going to work, it has to have a perfect parabolic curve.

202

00:10:50,920 --> 00:10:56,480

Any bump, bash or bruise is going to batter down this death ray's deadline.

203

00:10:56,480 --> 00:11:01,440

The closer it is to perfect, the more all of our mirrors will be pointed to the same

204

00:11:01,440 --> 00:11:07,480

point, the smaller the focal point will be and the more intense the light on that point

205

00:11:07,480 --> 00:11:08,600

will be.

206

00:11:08,600 --> 00:11:15,720

To get a small focal point, they're using one inch square mirrors because these tiny

207

00:11:15,720 --> 00:11:20,800

pieces will follow the curve better than big ones.

208

00:11:20,800 --> 00:11:26,200

Trouble is they need 6,000 of them and it's driving them crazy.

209

00:11:26,200 --> 00:11:37,240

Mirror, mirror on the wall.

210

00:11:37,240 --> 00:11:40,280

It takes 10 hours to glue them all.

211

00:11:40,280 --> 00:11:46,400

I think that's it.

212

00:11:46,400 --> 00:11:49,680

Whereupon it's time to test out this puppy.

213

00:11:49,680 --> 00:11:51,920

Dude, come here.

214

00:11:51,920 --> 00:11:53,520

We're already seeing smoke.

215

00:11:53,520 --> 00:11:55,520

Oh, yeah.

216

00:11:56,520 --> 00:11:58,880

That would be fire.

217

00:11:58,880 --> 00:12:01,520

That's so bright you can't even look at it.

218

00:12:01,520 --> 00:12:05,720

Will any of the male bagged finalists stand a chance of beating this?

219

00:12:05,720 --> 00:12:11,280

Well, it's time to find out because they're here.

220

00:12:11,280 --> 00:12:15,240

At first up, it's the battle of the small scale death rays.

221

00:12:15,240 --> 00:12:20,360

Carrie and Jess versus Brendan and Steve.

222

00:12:20,360 --> 00:12:24,320

They're going to get straight to it with a preliminary test.

223

00:12:24,320 --> 00:12:30,400

After this, both teams will have 24 hours to hone their weapons before the final 5-foot

224

00:12:30,400 --> 00:12:32,120

burn off.

225

00:12:32,120 --> 00:12:36,240

So let the games begin.

226

00:12:36,240 --> 00:12:38,080

Here are the rules.

227

00:12:38,080 --> 00:12:42,720

You'll each be given three materials, samples that you would find on a Roman vessel.

228

00:12:42,720 --> 00:12:49,920

Wood, oakum, soaked in pitch, and hemp will be timing you from the point you've given

229

00:12:49,920 --> 00:12:52,400

the materials to ignition.

230

00:12:52,480 --> 00:12:55,880

Mythbusters, you'll be the ones calling flame.

231

00:12:55,880 --> 00:12:59,360

At that point, I'll stop the stopwatch.

232

00:12:59,360 --> 00:13:03,960

First up in this preliminary test, it's the wood.

233

00:13:03,960 --> 00:13:06,440

Ready, set, go.

234

00:13:06,440 --> 00:13:12,080

To get flame, both teams need to find their mirrors focal point, the hottest part of the

235

00:13:12,080 --> 00:13:13,080

reflection.

236

00:13:13,080 --> 00:13:15,880

There we go, flame.

237

00:13:15,880 --> 00:13:17,880

Nine seconds.

238

00:13:17,880 --> 00:13:18,880

Okay.

239

00:13:18,880 --> 00:13:22,000

Look at that, it's like roasting a marshmallow.

240

00:13:22,000 --> 00:13:24,120

Now our comedies would be proud.

241

00:13:24,120 --> 00:13:27,800

The girls on the other hand take more than two minutes longer.

242

00:13:27,800 --> 00:13:29,800

Okay, flame, I see it.

243

00:13:29,800 --> 00:13:30,800

Calling flame, Jamie.

244

00:13:30,800 --> 00:13:31,800

You need just your mirrors.

245

00:13:31,800 --> 00:13:34,040

Okay, 245.

246

00:13:34,040 --> 00:13:38,760

With this early win under their belts, the brainy boys start to get cocky.

247

00:13:38,760 --> 00:13:41,400

You can't even beat our trash.

248

00:13:41,400 --> 00:13:43,320

That's just something you guys found, so...

249

00:13:43,320 --> 00:13:48,200

You got to get a raw 7-11 for their steering mirrors.

250

00:13:48,200 --> 00:13:52,680

I'd like to point out that while you're denigrating the girls, they actually built their rig.

251

00:13:52,680 --> 00:13:53,680

Thank you.

252

00:13:53,680 --> 00:13:56,560

That's true, I'd also like to point out that they lost.

253

00:13:56,560 --> 00:14:01,800

It's getting touchy out there, so the referee moves things on.

254

00:14:01,800 --> 00:14:04,800

Round number two, O'combe dipped in pitch.

255

00:14:04,800 --> 00:14:06,600

Ready, set, go.

256

00:14:06,600 --> 00:14:09,800

But round two has the same winner.

257

00:14:09,800 --> 00:14:11,800

No flame.

258

00:14:11,800 --> 00:14:18,560

The boys hit the spot in nine seconds, while the girls failed to ignite the target at all.

259

00:14:18,560 --> 00:14:23,520

With such success, the boys' parabola looks to be the perfect death ray.

260

00:14:23,520 --> 00:14:25,920

But not if the target is moving.

261

00:14:25,920 --> 00:14:32,000

A parabola is hottest only where all the light meets, the fixed focal point.

262

00:14:32,000 --> 00:14:38,400

If the target moves slightly in front or just behind this, the death ray is rendered useless.

263

00:14:38,400 --> 00:14:41,040

Okay, this is the next round.

264

00:14:41,040 --> 00:14:43,600

Hemp and go.

265

00:14:43,600 --> 00:14:46,200

New round, same story.

266

00:14:46,200 --> 00:14:47,200

Flame!

267

00:14:47,200 --> 00:14:48,200

Nine seconds.

268

00:14:48,200 --> 00:14:49,200

Nine seconds.

269

00:14:49,200 --> 00:14:51,200

Nine seconds again.

270

00:14:51,200 --> 00:14:54,560

Yet again, the boys whip the girls.

271

00:14:54,560 --> 00:14:59,120

Carrie and Jess will need to refine their rig big time if they're going to beat the boys'

272

00:14:59,120 --> 00:15:02,800

perfect parabola in tomorrow's small-scale showdown.

273

00:15:02,800 --> 00:15:05,480

Well, okay, teams.

274

00:15:05,480 --> 00:15:07,400

That's our three tests for today.

275

00:15:07,400 --> 00:15:08,400

Well done.

276

00:15:08,400 --> 00:15:14,280

You have 24 hours to go and tweak your systems, get them perfected, and we meet back out here

277

00:15:14,280 --> 00:15:15,280

tomorrow.

278

00:15:15,280 --> 00:15:21,200

But before this solar standoff, Tari's setting sail on the big-scale challenge.

279

00:15:21,200 --> 00:15:24,720

Tari, for the small-scale experiment, we've got everything we need.

280

00:15:24,720 --> 00:15:26,920

We've got the pitch, we've got the oak, and we've got the wood.

281

00:15:26,920 --> 00:15:30,760

But for the large-scale experiment, we have to find an ancient Roman tri-ring.

282

00:15:30,760 --> 00:15:32,600

Well, we need to find a boat.

283

00:15:32,600 --> 00:15:34,080

It's got to be made of wood.

284

00:15:34,080 --> 00:15:37,280

It's got to have spent a long time in the water because of the moisture content in the

285

00:15:37,280 --> 00:15:43,200

water and how that's affected it are absolutely critical to confirming or busting this myth.

286

00:15:43,200 --> 00:15:47,520

Last time around, Tari made a boat out of dry timber.

287

00:15:47,520 --> 00:15:51,520

This time, he's getting a boat that's spent most of its life on the sea.

288

00:15:51,520 --> 00:15:56,480

It'll be harder for the death ray to ignite, but it's much more realistic.

289

00:15:56,480 --> 00:15:57,640

We're not paying for this, are we?

290

00:15:57,640 --> 00:16:01,360

I mean, they should be paying us to get it out of their docks.

291

00:16:01,360 --> 00:16:03,320

The boat's been grounded.

292

00:16:03,320 --> 00:16:09,120

It's got more holes than the Titanic and may just take as long to fix.

293

00:16:09,120 --> 00:16:11,840

We've got to drain it.

294

00:16:11,840 --> 00:16:13,520

We've got to patch it.

295

00:16:13,520 --> 00:16:20,800

Then another big job is taking this off and getting this vessel as close to a tri-ring

296

00:16:20,800 --> 00:16:21,800

as possible.

297

00:16:21,800 --> 00:16:25,800

It's going to need a Mythbusters makeover special.

298

00:16:25,800 --> 00:16:31,000

Yeah, got some fine sailing vessels and these slips.

299

00:16:31,120 --> 00:16:36,040

Twenty-four hours and counting, the girls are trying to design a new array that can beat

300

00:16:36,040 --> 00:16:39,240

the boys' perfect parabola.

301

00:16:39,240 --> 00:16:44,320

It's an uphill struggle until Grant gives them a helping hand.

302

00:16:44,320 --> 00:16:46,040

Contestants, attention please.

303

00:16:46,040 --> 00:16:48,400

We need to clarify the rules.

304

00:16:48,400 --> 00:16:54,240

So here off the Discovery Channel website, the rule for small scale category one.

305

00:16:54,240 --> 00:17:00,360

To build any device capable of igniting the target at a distance of five feet.

306

00:17:00,360 --> 00:17:06,640

We now have 21 hours to make sure that when we test again, you can ignite your target

307

00:17:06,640 --> 00:17:09,360

at a distance of five feet.

308

00:17:09,360 --> 00:17:11,240

That is all.

309

00:17:11,240 --> 00:17:13,760

It's bad news for both teams.

310

00:17:13,760 --> 00:17:19,520

To avoid disqualification, they must scrap their rule-defying mirrors and go back to

311

00:17:19,520 --> 00:17:21,920

the drawing board.

312

00:17:21,920 --> 00:17:24,320

Where the girls already have a plan.

313

00:17:24,320 --> 00:17:29,920

They came up with a really clever idea to try to just warp a single mirror.

314

00:17:29,960 --> 00:17:34,560

Slightly about an eighth of an inch so that we can get a focal point of at least five

315

00:17:34,560 --> 00:17:35,800

feet.

316

00:17:35,800 --> 00:17:40,560

By carefully bending a mirror with a screw, the team is able to get a parabola with a

317

00:17:40,560 --> 00:17:43,440

focal point at exactly five feet.

318

00:17:43,440 --> 00:17:46,200

But, does it generate any heat?

319

00:17:46,200 --> 00:17:47,920

Oh dude, look at that.

320

00:17:47,920 --> 00:17:50,120

I'm hitting over 300 degrees.

321

00:17:50,120 --> 00:17:51,120

Woo!

322

00:17:51,120 --> 00:17:52,120

All right.

323

00:17:52,120 --> 00:17:54,560

It's a good start.

324

00:17:54,560 --> 00:18:01,640

And by adding another 15 mirrors, they may just win this burn-off yet.

325

00:18:01,640 --> 00:18:04,800

Trouble is, the boys think that they are also onto a winner.

326

00:18:04,800 --> 00:18:11,600

If you take a vat of liquid and spin it, the liquid surface will become a parabola.

327

00:18:11,600 --> 00:18:17,520

So if we spun plaster until it dried, we could, you know, in a vat this big, we could get

328

00:18:17,520 --> 00:18:21,320

a two meter diameter parabolic mirror.

329

00:18:21,320 --> 00:18:23,840

Brendan's putting a new spin on things.

330

00:18:23,840 --> 00:18:27,920

When liquid is spun, the surface forms a natural parabola.

331

00:18:27,920 --> 00:18:32,920

So by spinning liquid plaster at a specific speed, the boys hope they'll end up with a

332

00:18:32,920 --> 00:18:38,360

parabola with a focal point at five feet.

333

00:18:38,360 --> 00:18:40,040

It's a nice theory.

334

00:18:40,040 --> 00:18:49,200

But getting the focal point to be precisely five foot away is going to be pretty tough.

335

00:18:49,200 --> 00:18:53,040

This parabola is going to need to be really flat in order for the focal point to be pretty

336

00:18:53,040 --> 00:18:54,040

far away.

337

00:18:54,040 --> 00:18:58,320

But it looks pretty flat, so I'm hopeful.

338

00:18:58,320 --> 00:19:06,320

As the clock counts down, have the boys bitten off more than they can chew.

339

00:19:06,320 --> 00:19:10,280

It's a Mythbusters mailbag special.

340

00:19:10,280 --> 00:19:16,120

And Mike Bushrow, finalist for the Big Scale Challenge, has just arrived and his rig will

341

00:19:16,120 --> 00:19:18,040

follow shortly.

342

00:19:18,040 --> 00:19:23,080

My mirror, the sword of Archimedes, is so big I couldn't get it on the plane, I couldn't

343

00:19:23,080 --> 00:19:27,040

get it in my car, I couldn't rent a truck big enough, we have to have it specially

344

00:19:27,040 --> 00:19:31,160

shipped down here, and I'm really waiting for it to rise so I can show it off to Adam

345

00:19:31,160 --> 00:19:32,720

and Jamie.

346

00:19:32,720 --> 00:19:38,240

But before any big scales showing off, there's just an hour left until the final small scale

347

00:19:38,240 --> 00:19:39,240

burn off.

348

00:19:39,240 --> 00:19:44,560

And both Brendan and Stephen and Carrie and Jess have been working flat out to get their

349

00:19:44,560 --> 00:19:48,000

mini death rays up to speed.

350

00:19:48,000 --> 00:19:51,840

I think the new rig is going to do awesome because we're already lighting stuff on fire

351

00:19:51,840 --> 00:19:56,440

with one mirror focused at the correct focal point, and as soon as we get the other 15

352

00:19:56,440 --> 00:20:00,480

there, then it'll start fires like that.

353

00:20:00,480 --> 00:20:07,160

And after 15 hours, the boys' plaster parabola has set, been lined with a reflective foil

354

00:20:07,160 --> 00:20:09,400

and is now ready for a temperature test.

355

00:20:09,400 --> 00:20:13,440

It's definitely heat, but it's more like the heat up a sandwich kind of heat.

356

00:20:13,440 --> 00:20:16,600

309 degrees, 111.

357

00:20:16,600 --> 00:20:19,400

That's not that great.

358

00:20:19,400 --> 00:20:22,520

While Adam desperately polishes it for more power.

359

00:20:22,520 --> 00:20:25,760

That's not a bad idea actually.

360

00:20:25,760 --> 00:20:29,240

Brendan and Stephen have had a last minute brainwave.

361

00:20:29,240 --> 00:20:35,480

We're going to create a slight, slight vacuum in the steel drum, and then that, if we put

362

00:20:35,480 --> 00:20:39,520

mylar over that, should form a parabola also.

363

00:20:39,520 --> 00:20:44,040

By carefully controlling the pressure of the vacuum, they should be able to adjust the

364

00:20:44,040 --> 00:20:47,640

focal point to five feet.

365

00:20:47,640 --> 00:20:51,640

It's ingenious, but way beyond Archimedes' technology.

366

00:20:51,640 --> 00:20:56,800

And now, for both teams, time's up.

367

00:20:56,800 --> 00:21:02,200

For the final small-scale burn-off, it's seconds out.

368

00:21:02,200 --> 00:21:04,000

Ready, set, go.

369

00:21:04,000 --> 00:21:07,640

It's round one, the wood.

370

00:21:07,640 --> 00:21:12,480

Remember that this time, the burning needs to take place at exactly five feet, or the

371

00:21:12,480 --> 00:21:14,480

rig will be disqualified.

372

00:21:14,480 --> 00:21:18,320

My feet, keep going, keep going, keep going.

373

00:21:18,320 --> 00:21:20,400

And the boys are in hot water.

374

00:21:20,400 --> 00:21:21,400

60-inch mark.

375

00:21:21,400 --> 00:21:23,600

It's not an orchard.

376

00:21:23,600 --> 00:21:25,360

Our parabola is not shallow enough.

377

00:21:25,360 --> 00:21:28,120

The focus point is way closer than that.

378

00:21:28,120 --> 00:21:29,640

Sounds like they're forfeiting.

379

00:21:29,640 --> 00:21:34,360

They can't burn anything at five feet, so it looks like we're going to win.

380

00:21:34,360 --> 00:21:39,520

The girls' rig may be legal, but it's not that effective.

381

00:21:39,520 --> 00:21:42,760

They're getting a lot of smoke, but no fire.

382

00:21:42,760 --> 00:21:48,040

And while they wait for ignition, the boys, to avoid disqualification, are switching to

383

00:21:48,040 --> 00:21:51,400

their ingenious plan B.

384

00:21:51,400 --> 00:21:56,440

By adjusting the pressure of the vacuum, they've pinpointed their focal point to exactly five

385

00:21:56,440 --> 00:21:57,440

feet.

386

00:21:57,440 --> 00:22:01,520

But, like the girls, there's only smoke signals.

387

00:22:01,520 --> 00:22:11,640

In the perfect conditions, can there really ever have been a death ray?

388

00:22:11,640 --> 00:22:17,200

The contestants in San Fran are struggling using the hottest midday sun, which was not

389

00:22:17,200 --> 00:22:22,400

an option for Archimedes, because Syracuse faces east.

390

00:22:22,400 --> 00:22:26,880

So he could only have harnessed the much weaker sunlight at dawn.

391

00:22:26,880 --> 00:22:31,680

There's a nail in the coffin for this myth.

392

00:22:31,680 --> 00:22:35,560

With no fire so far, it's time to up the ante.

393

00:22:35,560 --> 00:22:39,120

What the hell is that thing?

394

00:22:39,120 --> 00:22:43,000

It's the disco mirror from hell.

395

00:22:43,000 --> 00:22:45,880

Adam's even more cocky than the boys' team.

396

00:22:45,880 --> 00:22:49,800

Will his array finally turn the heat up on this myth?

397

00:22:49,800 --> 00:22:55,280

Okay teams, next round, oakum and pitch.

398

00:22:55,400 --> 00:23:01,120

Rather predictably, the professional mythbusters get fire pretty darn quick.

399

00:23:01,120 --> 00:23:03,680

Flame, I see it.

400

00:23:03,680 --> 00:23:06,320

That's great Jamie, but I'm sorry you disqualified.

401

00:23:06,320 --> 00:23:08,040

It wasn't at five feet.

402

00:23:08,040 --> 00:23:10,120

Yeah, we didn't know anything about the five feet.

403

00:23:10,120 --> 00:23:13,920

Yeah, five feet wasn't a rule when you told us to build this so we can go.

404

00:23:13,920 --> 00:23:15,240

Actually, it was.

405

00:23:15,240 --> 00:23:21,720

The mythbusters forgot to check the rulebook and are eliminated.

406

00:23:21,760 --> 00:23:26,680

Just when their challengers get this lifeline, the sun goes behind the clouds.

407

00:23:26,680 --> 00:23:32,440

Another major problem for this weapon.

408

00:23:32,440 --> 00:23:38,160

Would Archimedes have built a weapon that could be rendered useless by cloud cover?

409

00:23:38,160 --> 00:23:40,320

It's another nail.

410

00:23:40,320 --> 00:23:42,040

This test is hemp.

411

00:23:42,040 --> 00:23:43,040

Ready?

412

00:23:43,040 --> 00:23:44,040

One, two, three.

413

00:23:44,040 --> 00:23:50,240

It's the final decider and with no fire so far from either team, the pressures really

414

00:23:50,240 --> 00:23:51,240

are.

415

00:23:51,760 --> 00:23:57,200

The girls more traditionally built rig is generating a lot of smoke, but just when it's looking

416

00:23:57,200 --> 00:24:01,560

good, the boys take the checkered flag.

417

00:24:01,560 --> 00:24:05,600

Flame, flame.

418

00:24:05,600 --> 00:24:11,800

Their vacuum pump Mylar Special does the trick and just in time as the clouds roll in once

419

00:24:11,800 --> 00:24:12,800

more.

420

00:24:12,800 --> 00:24:18,880

It was a fair fight, but now it's all down to the judges.

421

00:24:18,880 --> 00:24:24,840

Their challenge was to build a device capable of igniting your target at a distance of five

422

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

feet.

423

00:24:25,840 --> 00:24:32,920

And based on creative use of materials, excellent scavenging ability, we find that the winners,

424

00:24:32,920 --> 00:24:36,800

the small scale burn off, are Brendan and Steven.

425

00:24:36,800 --> 00:24:38,800

Congratulations.

426

00:24:38,800 --> 00:24:44,080

Worthy winners, but to test the myth thoroughly, it's time for the big guns.

427

00:24:44,080 --> 00:24:45,720

Great.

428

00:24:45,720 --> 00:24:51,040

So while the judges felt that Jess and Kerry put in a really good effort, Brendan and Steven

429

00:24:51,040 --> 00:24:53,200

were more in the spirit of myth busters.

430

00:24:53,200 --> 00:24:57,760

Yeah, but dude, that is what has me totally jazzed about moving into the large scale aspect

431

00:24:57,760 --> 00:24:58,760

of this myth.

432

00:24:58,760 --> 00:25:04,320

Mike Bushrow's super innovative and very authentically built adjustable focus parabola.

433

00:25:04,320 --> 00:25:08,840

I mean, we're really going to get down to some critical aspects of whether or not this

434

00:25:08,840 --> 00:25:12,320

was totally possible.

435

00:25:12,320 --> 00:25:18,280

Our comedies was such a mastermind that it's going to need a genius to emulate him.

436

00:25:18,280 --> 00:25:22,480

Luckily, Mike Bushrow is just that.

437

00:25:22,480 --> 00:25:25,000

After all, he's a rocket scientist.

438

00:25:25,000 --> 00:25:29,920

He works the cameras on a spacecraft that explores Saturn's moons.

439

00:25:29,920 --> 00:25:36,360

So if anyone stands a chance of probing this myth, it's Mike.

440

00:25:36,360 --> 00:25:40,560

But when his big rig finally arrives, there's an even bigger problem.

441

00:25:40,560 --> 00:25:44,800

Oh, no.

442

00:25:44,800 --> 00:25:45,800

It's broken.

443

00:25:45,800 --> 00:25:52,400

The freight company is going to get seven years bad luck because Mike's mirror is busted.

444

00:25:52,400 --> 00:25:56,800

I worked really hard to get a chance to be here and show myself off to Adam and Jamie.

445

00:25:56,800 --> 00:26:01,080

Now I don't see how I can possibly do it because it's so trashed.

446

00:26:01,080 --> 00:26:05,160

It's not going to showcase what I was able to do before it left.

447

00:26:05,160 --> 00:26:07,240

It's ruined.

448

00:26:07,240 --> 00:26:12,400

Given that this was the only entry in the big scale challenge, the team is now going

449

00:26:12,400 --> 00:26:16,480

to need a miracle.

450

00:26:16,480 --> 00:26:25,960

Once mighty warriors now a broken wreck.

451

00:26:25,960 --> 00:26:30,200

The mythbusters have had a mailbag set back.

452

00:26:30,200 --> 00:26:36,720

Mike Bushrow's ultimate solar death ray has arrived battered, bruised, and maybe beyond

453

00:26:36,720 --> 00:26:37,720

repair.

454

00:26:37,720 --> 00:26:41,000

We could put the pieces back together again and we can make it look nice.

455

00:26:41,000 --> 00:26:44,640

But there's no way it's ever going to set wood on fire.

456

00:26:44,640 --> 00:26:50,840

It looks like the only entrant in the large scale challenge is down for the count until

457

00:26:50,840 --> 00:26:54,160

the mythbusters get lucky.

458

00:26:54,160 --> 00:26:59,360

In an amazing bit of serendipity, very recently an MIT professor and his students inspired

459

00:26:59,360 --> 00:27:06,120

by our very efforts successfully used 129 one foot modern silver mirrors to set fire

460

00:27:06,120 --> 00:27:11,280

to a replica Roman tri-ream at a distance of 100 feet.

461

00:27:11,280 --> 00:27:16,920

Sure enough it seems these brainy bots got their death ray to work.

462

00:27:16,920 --> 00:27:22,840

MIT understood the problems of the parabola, so used a different approach.

463

00:27:22,840 --> 00:27:29,880

They took less than 10 minutes to aim 129 glass mirrors at their oak boat and moments

464

00:27:29,880 --> 00:27:44,080

later MIT's stunning success suddenly puts this myth back into the realm of possibility.

465

00:27:44,080 --> 00:27:52,800

What this does is give us the opportunity to work with them to revisit this experience.

466

00:27:53,280 --> 00:28:03,000

We've invited them to come to San Francisco and recreate the experiment except they're

467

00:28:03,000 --> 00:28:08,080

going to be using a real boat as a target, they're going to be using bronze mirrors,

468

00:28:08,080 --> 00:28:12,880

and they've got to be able to create an open flame on the boat at the distance of about

469

00:28:12,880 --> 00:28:17,560

a bow shot which is what the original death ray was supposed to be able to do.

470

00:28:17,560 --> 00:28:18,560

Wow.

471

00:28:18,920 --> 00:28:30,200

For this ultimate revisit MIT wants the mythbusters to build 13 mirror holding stands.

472

00:28:30,200 --> 00:28:35,640

The 300 bronze mirrors will each be slightly worn which should ensure that their reflected

473

00:28:35,640 --> 00:28:40,480

beam does not dissipate with distance.

474

00:28:40,480 --> 00:28:46,320

It's going to be a big build but Jamie and Adam are more than happy to do it.

475

00:28:46,320 --> 00:28:50,640

This design comes right from the guys at MIT and I have to tell you to the guys at MIT

476

00:28:50,640 --> 00:28:54,880

I thank you because this is a rare day where I get to come in and just build something

477

00:28:54,880 --> 00:29:00,680

from someone else's drawing and gotta say it's a sheer pleasure.

478

00:29:00,680 --> 00:29:04,280

Good job he's enjoying it because there's a lot to do.

479

00:29:04,280 --> 00:29:11,280

But Adam and Jamie aren't the only mythbusters preparing for monster mirror mayhem.

480

00:29:11,280 --> 00:29:18,440

Carrie is also busy polishing MIT's mirrors.

481

00:29:18,440 --> 00:29:20,920

When I started polishing the bronze I didn't realize there was 50.

482

00:29:20,920 --> 00:29:23,680

50 of these panels.

483

00:29:23,680 --> 00:29:26,920

That's over \$2,000 worth of bronze.

484

00:29:26,920 --> 00:29:30,080

This is one serious experiment.

485

00:29:30,080 --> 00:29:33,040

This is my second one and my third hour.

486

00:29:33,040 --> 00:29:34,040

This one's only half done.

487

00:29:34,040 --> 00:29:38,760

It's really one and a half in three hours.

488

00:29:38,760 --> 00:29:47,960

It's a time consuming process but why are they using bronze anyway?

489

00:29:47,960 --> 00:29:52,360

One of the critical factors in looking at the possibility of this myth is history of

490

00:29:52,360 --> 00:29:54,120

mirroring.

491

00:29:54,120 --> 00:29:58,800

Mirrors of the period were always polished metals primarily bronze.

492

00:29:58,800 --> 00:30:03,320

There is evidence that they were able to silver some of these polished metal mirrors but there

493

00:30:03,320 --> 00:30:08,440

is no mirror excavated from Archimedes time much larger than a hand mirror.

494

00:30:08,440 --> 00:30:13,520

The first attempt at plating the backside of a piece of glass wasn't until I believe

495

00:30:13,520 --> 00:30:15,200

around the 16th century.

496

00:30:15,200 --> 00:30:19,840

And large optically consistent mirrors as we know them today, those did not come into

497

00:30:19,840 --> 00:30:22,480

production until the early 19th century.

498

00:30:22,480 --> 00:30:28,360

So the historical evidence would suggest that Archimedes would have used small bronze mirrors

499

00:30:28,360 --> 00:30:30,680

if he used mirrors at all.

500

00:30:30,680 --> 00:30:36,120

So Carrie's hard work is ensuring that this test is as authentic as possible.

501

00:30:36,680 --> 00:30:43,760

And while she polishes for the professors, Grant and Tari are about to embark on a Mythbusters

502

00:30:43,760 --> 00:30:46,400

makeover special.

503

00:30:46,400 --> 00:30:52,360

They need to convert this boat into a Roman tri-ree for the MIT burn off.

504

00:30:52,360 --> 00:30:54,480

What, that's the boat?

505

00:30:54,480 --> 00:30:55,480

That's it.

506

00:30:55,480 --> 00:30:56,480

We think you love it.

507

00:30:56,480 --> 00:30:59,720

It's in good shape, right?

508

00:30:59,720 --> 00:31:03,680

Actually no, but that's all about the change.

509

00:31:04,680 --> 00:31:11,680

With some heavy duty chainsaw action, it's not long before she goes topless.

510

00:31:11,680 --> 00:31:14,680

Hey, convertible!

511

00:31:14,680 --> 00:31:24,840

Slowly but surely she gets stripped down piece by piece until after four sweaty hours there's

512

00:31:24,840 --> 00:31:26,680

only one thing left to do.

513

00:31:26,680 --> 00:31:29,920

Well we've been avoiding it all morning but it's time.

514

00:31:29,920 --> 00:31:32,920

We need to tackle the toilet.

515

00:31:34,680 --> 00:31:36,680

Can I have a little privacy here?

516

00:31:36,680 --> 00:31:38,680

I mean, really.

517

00:31:44,680 --> 00:31:50,400

Modern mirrors like at this California power station can harness the sun's energy.

518

00:31:50,400 --> 00:31:55,880

But over 2,000 years ago, could Archimedes have used mirrors as a weapon?

519

00:31:55,880 --> 00:32:00,680

Well it's thanks to MIT that the Mythbusters may just find out.

520

00:32:00,680 --> 00:32:02,680

Hi, I'm David.

521

00:32:02,680 --> 00:32:03,680

I'm Barry.

522

00:32:03,680 --> 00:32:04,680

Nate.

523

00:32:04,680 --> 00:32:05,680

Pete.

524

00:32:05,680 --> 00:32:06,680

Mika.

525

00:32:06,680 --> 00:32:07,680

Stacy.

526

00:32:07,680 --> 00:32:08,680

Yasmin.

527

00:32:08,680 --> 00:32:09,680

You guys always dress like this?

528

00:32:09,680 --> 00:32:10,680

Yeah, yeah.

529

00:32:10,680 --> 00:32:11,680

Of course.

530

00:32:11,680 --> 00:32:12,680

All the time.

531

00:32:12,680 --> 00:32:15,680

But how did these fashion gurus get involved?

532

00:32:15,680 --> 00:32:22,160

I saw the myth attempt on the Mythbusters a couple years ago and while I was sitting there

533

00:32:22,160 --> 00:32:26,600

watching it I did a quick back of the envelope and thought, hmm, should be able to get this

534

00:32:26,600 --> 00:32:27,680

to work.

535

00:32:27,680 --> 00:32:33,680

And sure enough, using modern mirrors in Massachusetts, they got ignition.

536

00:32:33,680 --> 00:32:40,680

But this myth is about what Archimedes could do and for him, glass mirrors were a no-go.

537

00:32:40,680 --> 00:32:45,680

So this time MIT are using bronze mirrors.

538

00:32:45,680 --> 00:32:52,680

But for a backup plan, the shiny death ray won't be the only weapon come experiment day.

539

00:32:53,680 --> 00:32:58,680

Grant, we have something we shall call Project X for you.

540

00:32:58,680 --> 00:33:01,120

And what exactly is Project X?

541

00:33:01,120 --> 00:33:05,520

We know from historical accounts that Archimedes had in his arsenal weapons that were effective

542

00:33:05,520 --> 00:33:08,840

over at least the distance of this supposed burning mirror.

543

00:33:08,840 --> 00:33:13,520

And specifically we're thinking about a small scale one referred to as the Scorpion.

544

00:33:13,520 --> 00:33:15,800

So you want us to build this in two days?

545

00:33:15,800 --> 00:33:17,680

Yeah, what's your problem?

546

00:33:17,680 --> 00:33:18,680

Okay.

547

00:33:18,680 --> 00:33:20,440

That's a standard schedule, man.

548

00:33:20,440 --> 00:33:21,680

Get on it.

549

00:33:22,680 --> 00:33:26,680

The Scorpion or Ballista is a torsion catapult.

550

00:33:26,680 --> 00:33:33,180

Like a giant crossbow, it had a range of well over 600 feet and it's down to Grant to build

551

00:33:33,180 --> 00:33:36,680

one in time for the big scale burn off.

552

00:33:36,680 --> 00:33:44,680

It got its power through torsion springs, which in Archimedes time were made out of something

553

00:33:44,680 --> 00:33:46,680

rather unpleasant.

554

00:33:46,680 --> 00:33:52,680

Tari and Grant think this is bull tendon, but Kari's about to spring a surprise.

555

00:33:52,680 --> 00:33:53,680

That's not tendon.

556

00:33:53,680 --> 00:33:54,680

Grab that other end.

557

00:33:54,680 --> 00:33:55,680

What is it?

558

00:33:55,680 --> 00:33:56,680

Penis.

559

00:33:58,680 --> 00:33:59,680

This is the bull penis.

560

00:33:59,680 --> 00:34:00,680

Come again?

561

00:34:00,680 --> 00:34:01,680

This is...

562

00:34:02,680 --> 00:34:03,680

Are you serious?

563

00:34:03,680 --> 00:34:04,680

No.

564

00:34:04,680 --> 00:34:05,680

Yeah, it's penis.

565

00:34:05,680 --> 00:34:06,680

No.

566

00:34:06,680 --> 00:34:11,680

That's a long thin penis you got there.

567

00:34:12,680 --> 00:34:17,680

A long, thin and springy penis is, according to Grant, ideal.

568

00:34:17,680 --> 00:34:19,680

But will it work?

569

00:34:19,680 --> 00:34:20,680

Hold that side.

570

00:34:20,680 --> 00:34:21,680

I'll hold this side.

571

00:34:21,680 --> 00:34:23,680

All right, there you go.

572

00:34:23,680 --> 00:34:26,680

Grab your side up a little bit more like that.

573

00:34:26,680 --> 00:34:27,680

Good.

574

00:34:27,680 --> 00:34:28,680

All right.

575

00:34:32,680 --> 00:34:33,680

Perfect.

576

00:34:33,680 --> 00:34:36,680

And that's what it's going to do.

577

00:34:36,680 --> 00:34:43,680

The bull privates should do the job, but to increase their strength and elasticity even

578

00:34:43,680 --> 00:34:46,680

more, a bit of brain power is needed.

579

00:34:46,680 --> 00:34:49,680

Ho, ho, ho, ho, ho, ho.

580

00:34:49,680 --> 00:34:50,680

Dang!

581

00:34:50,680 --> 00:34:54,680

I'm going to make brain milkshakes today.

582

00:34:54,680 --> 00:35:01,680

Brains contain a naturally mulsifier that when spread upon the bull members should make

583

00:35:01,680 --> 00:35:03,680

them more stretchy.

584

00:35:03,680 --> 00:35:11,680

So you just want to get a nice coat on the dried bull unit because the more you put on,

585

00:35:11,680 --> 00:35:15,680

the more elastic it's going to be.

586

00:35:15,680 --> 00:35:19,680

And after a few hours of curing, the stretching can begin.

587

00:35:19,680 --> 00:35:24,680

The more stretchy they are, the better torsion springs they'll make.

588

00:35:24,680 --> 00:35:26,680

Oh, God, what did you do?

589

00:35:26,680 --> 00:35:28,680

It's like you snotted on them.

590

00:35:28,680 --> 00:35:32,680

You know, I'm sure no one's going to notice if you guys wanted to borrow them this weekend.

591

00:35:32,680 --> 00:35:34,680

Oh, see you later, Tori.

592

00:35:34,680 --> 00:35:38,680

Your brains and penis smell way too bad to stay out here.

593

00:35:38,680 --> 00:35:39,680

Dang!

594

00:35:39,680 --> 00:35:40,680

It's disgusting.

595

00:35:40,680 --> 00:35:42,680

I can't believe it's doing that.

596

00:35:42,680 --> 00:35:48,680

While the torsion spring catapult gets sprung, Adam and Jamie are getting ready for the ultimate

597

00:35:48,680 --> 00:35:50,680

experiment of the docks.

598

00:35:50,680 --> 00:35:53,680

Horrible in here.

599

00:35:53,680 --> 00:36:00,680

Over the past 48 hours, the mythbusters have built every single part of the MIT's monster

600

00:36:00,680 --> 00:36:02,680

death ray rig.

601

00:36:02,680 --> 00:36:08,680

And now they need to assemble it all together.

602

00:36:08,680 --> 00:36:11,680

First one's up.

603

00:36:11,680 --> 00:36:15,680

Fortunately, the rest of the team soon arrives.

604

00:36:15,680 --> 00:36:18,680

Hey, look, there's our guys from MIT.

605

00:36:18,680 --> 00:36:24,680

Fresh from their polishing, the MIT crew have come to help set up the biggest death ray reconstruction

606

00:36:24,680 --> 00:36:26,680

in history.

607

00:36:26,680 --> 00:36:32,680

And what's more, by using only authentic materials in their rig, MIT have ensured that this test

608

00:36:32,680 --> 00:36:38,680

is completely compatible with what Archimedes could have done, something that previous scientists

609

00:36:38,680 --> 00:36:41,680

have not been so concerned about.

610

00:36:46,680 --> 00:36:51,680

You know, there's a long history of people trying to replicate the myth of Archimedes' death ray.

611

00:36:51,680 --> 00:36:58,680

Now, the first one that we know of was attempted by the Comte de Bouffant in 1747.

612

00:36:58,680 --> 00:37:05,680

He used 168 glass mirrors and he was able to burn wood at a focal length of about 150 feet.

613

00:37:05,680 --> 00:37:12,680

Well, in 1973, Dr. Jonas Sakis, a Greek scientist, was able to do the experiment using 60 sailors

614

00:37:12,680 --> 00:37:16,680

holding 6 foot by 2 foot reflectors.

615

00:37:16,680 --> 00:37:19,680

And he was able to get ignition at 160 feet.

616

00:37:19,680 --> 00:37:23,680

Well, wouldn't that suggest that there's some validity to the story?

617

00:37:23,680 --> 00:37:28,680

Yes, it proves that you can ignite timber using reflectors.

618

00:37:28,680 --> 00:37:33,680

But in the case of Bouffant, it was a piece of wood coated with creosote.

619

00:37:33,680 --> 00:37:37,680

In the case of Sakis, it was a piece of plywood attached to a robo.

620

00:37:37,680 --> 00:37:41,680

Yeah, none of the more realistic targets and they were all stationary.

621

00:37:41,680 --> 00:37:43,680

Exactly.

622

00:37:43,680 --> 00:37:49,680

The Mythbusters target, as converted by Grant and Tori, is going to be stationary.

623

00:37:49,680 --> 00:37:52,680

Oh, wait, I see a problem.

624

00:37:52,680 --> 00:37:59,680

But it's much more realistic because its timbers are thick, covered in tar and wet.

625

00:37:59,680 --> 00:38:02,680

The boat spent its life on the sea.

626

00:38:02,680 --> 00:38:04,680

Check out Jamie's new pet.

627

00:38:04,680 --> 00:38:09,680

With the boat towed into position, it's almost time for its baptism of fire.

628

00:38:09,680 --> 00:38:15,680

For me to call this myth plausible, I need to see this weapon work fast enough

629

00:38:15,680 --> 00:38:22,680

and harness enough energy to set fire to this boat in the water at the farthest distance we can place it.

630

00:38:22,680 --> 00:38:26,680

After those words of wisdom, it's time to turn up the heat.

631

00:38:26,680 --> 00:38:33,680

As MIT make the final adjustments to their death ray, they get an unexpected bonus.

632

00:38:34,680 --> 00:38:42,680

Mike Bushrow's giant rig has been raised from the dead and will join forces with the MIT array.

633

00:38:42,680 --> 00:38:48,680

With the sun powering down at midday and Jamie rocking the boat in the hot seat,

634

00:38:48,680 --> 00:38:50,680

I come in peace.

635

00:38:50,680 --> 00:38:54,680

This myth can finally get cooking.

636

00:38:54,680 --> 00:39:06,680

Did Archimedes really build a solar death ray?

637

00:39:06,680 --> 00:39:13,680

The Mythbusters and MIT have joined forces to test this classical myth once and for all.

638

00:39:13,680 --> 00:39:18,680

First step is I'm just going to adjust the aiming mirror, so don't start aiming quite yet.

639

00:39:18,680 --> 00:39:22,680

Professor Wallace is going to position the aiming mirror on the hull,

640

00:39:22,680 --> 00:39:25,680

and then all of the mirrors will be aligned to that.

641

00:39:25,680 --> 00:39:30,680

These are broad mirrors at 140 feet. Let's start aiming now.

642

00:39:30,680 --> 00:39:35,680

And they're away. Both speed and precision are vital for this myth.

643

00:39:35,680 --> 00:39:39,680

The smaller the bright spot on the boat, the hotter it'll be.

644

00:39:39,680 --> 00:39:44,680

And the faster they do it, the more realistic are its weapon capabilities.

645

00:39:45,680 --> 00:39:49,680

But five minutes in, and they're still aiming.

646

00:39:49,680 --> 00:39:53,680

The moments are advancing. They're within 100 feet of the wall.

647

00:39:53,680 --> 00:39:59,680

We've got our aimers ready. Come on, slaves, let's go! Protect your masters!

648

00:39:59,680 --> 00:40:07,680

After masterful Adam's pep talk, the last stands are soon positioned, and their effect is obvious.

649

00:40:07,680 --> 00:40:11,680

Look at that! Dude, we got smoke!

650

00:40:11,680 --> 00:40:15,680

Look at it coming off the bow! That's a good sign!

651

00:40:15,680 --> 00:40:19,680

Well, it's sizzling and cracking pretty good.

652

00:40:19,680 --> 00:40:25,680

You can definitely see a cold black spot right in the middle. It's sizzling. This is awesome!

653

00:40:25,680 --> 00:40:28,680

You looking good, MIT?

654

00:40:28,680 --> 00:40:35,680

The boat's getting cooked. It's bubbling, spitting and smoking, but there's not quite enough heat for ignition.

655

00:40:35,680 --> 00:40:40,680

Well, you know, they say where there's smoke, there's fire, but I don't see any fire yet.

656

00:40:42,680 --> 00:40:48,680

To raise the power of the ray, the team realign the mirrors to dial in the focus.

657

00:40:48,680 --> 00:40:52,680

And the temperature rockets another 50 degrees.

658

00:40:52,680 --> 00:40:55,680

We're up to 450 already.

659

00:40:55,680 --> 00:41:00,680

But it's still just smoke and mirrors. It's either the bronze or the wetness of the wood,

660

00:41:00,680 --> 00:41:05,680

but so far MIT can't repeat their car park cookoff.

661

00:41:05,680 --> 00:41:11,680

You need a bit of help, but what we want you to do is reposition the boat so that we can get another pass

662

00:41:11,680 --> 00:41:14,680

at the part that we really charred.

663

00:41:14,680 --> 00:41:23,680

So what you're saying is that stands still isn't good enough? We actually have to move the boat for you into the line of fire?

664

00:41:23,680 --> 00:41:27,680

Shut up, you lazy Roman pig and do it, you're told!

665

00:41:28,680 --> 00:41:35,680

With the boat repositioned, there's yet more charring, but flame remains elusive.

666

00:41:35,680 --> 00:41:40,680

Given that the target is stationary, the weapon's hardly nuclear.

667

00:41:40,680 --> 00:41:47,680

I see a little smoke, but I've seen worse than that before. All we need to do is move a few inches.

668

00:41:48,680 --> 00:41:58,680

If this amazing array can't light the stationary boat, could Archimedes really have set fire to a moving fleet of 60 ships?

669

00:41:58,680 --> 00:42:05,680

With only charcoal so far, the team decides to try the sail.

670

00:42:05,680 --> 00:42:08,680

Can everyone see the spot on the sail?

671

00:42:08,680 --> 00:42:14,680

According to many viewers, the sail is the most obvious thing to try to ignite.

672

00:42:14,680 --> 00:42:19,680

But as the mirrors get aligned onto it, there's not even any smoke.

673

00:42:19,680 --> 00:42:30,680

Because it's white, the sail reflects much of the heat, and because it keeps moving in the cooling breeze, the death ray beam never focuses perfectly on it.

674

00:42:30,680 --> 00:42:35,680

So viewers who are fans of sails are busted.

675

00:42:36,680 --> 00:42:40,680

We have about 20 minutes left of the right amount of sunlight for us.

676

00:42:40,680 --> 00:42:46,680

Two o'clock is our closing window. As soon as I'm done talking about this, we're going to flip all these windows and go right to silver.

677

00:42:46,680 --> 00:42:49,680

Use the modern mirrors and see if we can get some flame.

678

00:42:50,680 --> 00:42:56,680

It was modern mirrors that worked in Massachusetts, but on a target that was dry.

679

00:42:58,680 --> 00:43:07,680

So back with the sudden ship, it's down with the sail and out with the bronze, as regular mirrors get their trial by fire.

680

00:43:07,680 --> 00:43:13,680

I can tell already that there's a lot more smoke coming out, and they're not even all focused on it yet.

681

00:43:13,680 --> 00:43:16,680

Plus, these guys are getting better and better at drawing in the beam.

682

00:43:17,680 --> 00:43:23,680

This time, there's plumes of smoke, because the modern mirrors are around 20% more efficient than the bronze.

683

00:43:23,680 --> 00:43:27,680

But frustratingly, there's still no flash ignition.

684

00:43:30,680 --> 00:43:32,680

So what does our NASA genius think?

685

00:43:33,680 --> 00:43:40,680

I'm beginning to doubt that Archimedes actually did it, because it's not known at his time that it could be done,

686

00:43:40,680 --> 00:43:45,680

and it's a big leap of faith to go way out to try and do this hard work, not knowing that it will succeed.

687

00:43:46,680 --> 00:43:51,680

And after more than an hour, this record-breaking rig hasn't succeeded.

688

00:43:51,680 --> 00:43:57,680

Which means that this myth is looking increasingly shaky, particularly when coupled with a history lesson.

689

00:44:03,680 --> 00:44:12,680

You know, Adam, one thing a lot of people may not realize about this show is that we always back up investigations in a myth with documentary or historical evidence,

690

00:44:12,680 --> 00:44:15,680

and in this case, there's almost none to be had.

691

00:44:15,680 --> 00:44:20,680

The earliest and probably best account we have of the Battle of Syracuse was written by Pelobius,

692

00:44:20,680 --> 00:44:26,680

who wrote during the lifetime of soldiers who actually fought in the battle, and never once mentions fire or burning mirrors.

693

00:44:26,680 --> 00:44:32,680

Yeah, and the first mention of the use of fire was by Lucian, but that wasn't until 300 years later,

694

00:44:32,680 --> 00:44:37,680

and there was no mention in any place of the use of mirrors. It was just fire.

695

00:44:37,680 --> 00:44:43,680

Well, the very first definitive mention of burning mirrors in the Battle of Syracuse was written by Anthemius,

696

00:44:43,680 --> 00:44:51,680

almost 800 years after the battle, and it's his description that got expanded on in the 12th century, and eventually became the story we know today.

697

00:44:52,680 --> 00:44:58,680

The History Books, another particularly big nail in this coffin.

698

00:45:01,680 --> 00:45:03,680

Back at the dock, time is running out.

699

00:45:04,680 --> 00:45:10,680

In terms of sunlight, we're now heading into the region of the day where it'll be starting to fall off.

700

00:45:10,680 --> 00:45:15,680

We probably really could get another shot in after this, although we're hitting the diminishing returns.

701

00:45:16,680 --> 00:45:20,680

With one shot left, the team decides to go for broke.

702

00:45:21,680 --> 00:45:25,680

Okay, can you bring it in to 75 feet, which is half the distance?

703

00:45:26,680 --> 00:45:30,680

Having the distance will significantly boost the power of the beam.

704

00:45:32,680 --> 00:45:36,680

And seconds after all the mirrors are aligned onto the charred boat...

705

00:45:37,680 --> 00:45:38,680

Flame!

706

00:45:38,680 --> 00:45:40,680

Fire!

707

00:45:40,680 --> 00:45:41,680

Ho-ho!

708

00:45:42,680 --> 00:45:44,680

At last, they have fire.

709

00:45:44,680 --> 00:45:45,680

Congratulations!

710

00:45:45,680 --> 00:45:46,680

That's great!

711

00:45:46,680 --> 00:45:48,680

We'll call that a success.

712

00:45:49,680 --> 00:45:53,680

It's been a valiant effort by MIT and the Mythbusters.

713

00:45:53,680 --> 00:45:58,680

But remember, the myth is not that sun-reflecting mirrors can cause fire,

714

00:45:58,680 --> 00:46:02,680

but that this principle was used by Archimedes as a weapon.

715

00:46:04,680 --> 00:46:07,680

If you wanted something that would, like, just set fire to a boat immediately,

716

00:46:07,680 --> 00:46:11,680

it would have to be maybe four or five times the size of this thing.

717

00:46:11,680 --> 00:46:12,680

That's right.

718

00:46:12,680 --> 00:46:14,680

So you have a lot of people that are good at it.

719

00:46:14,680 --> 00:46:17,680

1,200, 1,500, 3,000 mirrors.

720

00:46:19,680 --> 00:46:24,680

So a death ray could just work only with many more mirrors and amers.

721

00:46:24,680 --> 00:46:30,680

Surely a waste of resources, especially given the alternatives.

722

00:46:32,680 --> 00:46:36,680

I think we can all agree that the burning mirror, it's hard to use.

723

00:46:36,680 --> 00:46:38,680

There's a lot of aiming involved.

724

00:46:38,680 --> 00:46:40,680

It needs a lot of people.

725

00:46:40,680 --> 00:46:41,680

It takes a long time.

726

00:46:41,680 --> 00:46:46,680

So we built something that we know Archimedes had in his arsenal at the time.

727

00:46:46,680 --> 00:46:49,680

And now we present the Scorpion.

728

00:46:49,680 --> 00:46:50,680

You ready to see it in action?

729

00:46:50,680 --> 00:46:51,680

Let's see it in action.

730

00:46:51,680 --> 00:46:52,680

All right.

731

00:46:52,680 --> 00:46:53,680

You guys ready?

732

00:46:53,680 --> 00:46:56,680

You guys brace yourself for the power of the Scorpion.

733

00:46:57,680 --> 00:47:02,680

In Archimedes' time, this catapult got its power through animal sinew.

734

00:47:02,680 --> 00:47:08,680

But for health reasons, Grant and Tori have been forced to use nylon-rope springs instead.

735

00:47:08,680 --> 00:47:15,680

And once tensioned, they're going to fire arrows coated in Jamie's secret recipe, Flammable Goo.

736

00:47:16,680 --> 00:47:17,680

Okay.

737

00:47:17,680 --> 00:47:18,680

It's all yours.

738

00:47:18,680 --> 00:47:20,680

Everybody else out of the way.

739

00:47:21,680 --> 00:47:23,680

It's the moment of truth.

740

00:47:24,680 --> 00:47:28,680

Ready and fire!

741

00:47:30,680 --> 00:47:33,680

Grant, if I was on that boat, I'd be more afraid of some guy with a rock.

742

00:47:33,680 --> 00:47:36,680

Now do you see why the Romans were so terrified?

743

00:47:36,680 --> 00:47:37,680

Can I ask one quick question?

744

00:47:37,680 --> 00:47:38,680

Grant, I'll save you.

745

00:47:38,680 --> 00:47:40,680

That's supposed to admit it's a more effective weapon.

746

00:47:40,680 --> 00:47:42,680

We have a fire out there at least.

747

00:47:42,680 --> 00:47:43,680

I know.

748

00:47:43,680 --> 00:47:46,680

But it doesn't take long for Grant to make amends.

749

00:47:46,680 --> 00:47:50,680

Ready and fire!

750

00:47:55,680 --> 00:47:58,680

And from there, it's hit after hit.

751

00:48:01,680 --> 00:48:04,680

Yet the boat still refuses to burst into flames.

752

00:48:04,680 --> 00:48:07,680

Got 20 more of these and that thing's going up.

753

00:48:07,680 --> 00:48:13,680

That's just too many for impatient Jamie, who takes the matter into his own hands.

754

00:48:16,680 --> 00:48:19,680

At last, some proper fire.

755

00:48:19,680 --> 00:48:26,680

According to the history books, Archimedes catapult could have chucked such a fireball over 600 feet.

756

00:48:28,680 --> 00:48:33,680

Even a humble archer like Tori can fire an arrow over 300 feet.

757

00:48:33,680 --> 00:48:37,680

Alternative means of attack, whether a catapult or an archer,

758

00:48:37,680 --> 00:48:41,680

must be the final nail in the coffin for this myth.

759

00:48:45,680 --> 00:48:49,680

The mythbusters and MIT put in a brave effort,

760

00:48:49,680 --> 00:48:53,680

but found their fiery death ray to be just too impractical.

761

00:48:53,680 --> 00:49:00,680

And as if to prove that point, the wind kicks up to terminate the experiment for good.

762

00:49:01,680 --> 00:49:08,680

The large scale rig that we built with MIT was stunning in terms of giving us so much more knowledge about whether or not this thing was possible.

763

00:49:08,680 --> 00:49:12,680

I was amazed at the efficiency of the thermal conductivity of the bronze

764

00:49:12,680 --> 00:49:15,680

and I think it really can ignite dry timber at a distance.

765

00:49:15,680 --> 00:49:17,680

I'm sorry, I don't agree.

766

00:49:17,680 --> 00:49:21,680

We had a stationary boat, we had a distance of less than a bow shot.

767

00:49:21,680 --> 00:49:25,680

We didn't get open flame created from bronze mirrors.

768

00:49:25,680 --> 00:49:26,680

I think it's busted.

769

00:49:26,680 --> 00:49:29,680

And then on top of that, there's the historical evidence, which there's none.

770

00:49:29,680 --> 00:49:32,680

I mean, they don't even talk about fire for another 300 years,

771

00:49:32,680 --> 00:49:34,680

and then another 400 years, they mention mirrors.

772

00:49:34,680 --> 00:49:37,680

So it looks like this one's busted.

773

00:49:37,680 --> 00:49:39,680

I agree, it's totally completely busted.

774

00:49:39,680 --> 00:49:42,680

Although I don't expect to stop getting emails about it.

775

00:49:42,680 --> 00:49:46,680

I mean, this is one of those stories that's too good to not keep telling.