

1

00:00:00,000 --> 00:00:05,000

Remember, do not try anything you are about to see at home.

2

00:00:30,000 --> 00:00:41,000

What you got there?

3

00:00:41,000 --> 00:00:42,000

This is a good one.

4

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

Picture two bullets, each exactly the same distance from the ground,

5

00:00:46,000 --> 00:00:51,000

each released at the exact same second, except one bullet is dropped to the ground,

6

00:00:51,000 --> 00:00:53,000

the other is fired from a gun.

7

00:00:53,000 --> 00:00:58,000

The classic physics thought experiment states that both bullets will hit the ground at the same time.

8

00:00:58,000 --> 00:00:59,000

Based on what theory?

9

00:00:59,000 --> 00:01:03,000

Based on the theory that the bullet that's fired from the gun has no wings on it, no lift.

10

00:01:03,000 --> 00:01:06,000

Thus gravity has the same effect on it as it does on the droplet,

11

00:01:06,000 --> 00:01:09,000

and thus they hit the ground simultaneously.

12

00:01:09,000 --> 00:01:17,000

It's an age-old physics fable that says a bullet dropped and a bullet fired simultaneously from the same height

13

00:01:17,000 --> 00:01:19,000

will hit the ground at the same time.

14

00:01:19,000 --> 00:01:25,000

But it's so darn difficult to test that no one's tried until now.

15

00:01:25,000 --> 00:01:27,000

So what's the plan?

16

00:01:27,000 --> 00:01:30,000

Well, I've been thinking about this one for so long.

17

00:01:30,000 --> 00:01:33,000

While I have seen this experiment elucidated in textbooks the world over,

18

00:01:33,000 --> 00:01:39,000

I don't think that anyone anywhere has ever tried it full-size, full-scale,

19

00:01:39,000 --> 00:01:42,000

with real bullets coming out of real guns.

20

00:01:42,000 --> 00:01:43,000

That's what we should do.

21

00:01:43,000 --> 00:01:45,000

It sounds like it could be kind of tricky actually,

22

00:01:45,000 --> 00:01:49,000

and I think we should do some shop experiments before we start using any live rounds.

23

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

Fair enough, let's start.

24

00:01:52,000 --> 00:01:56,000

So before going ballistic with the ballistics,

25

00:01:56,000 --> 00:02:01,000

Adam comes up with a more simple way to put that textbook theory to the test.

26

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

Well, this test is going to be comprised of two separate parts,

27

00:02:05,000 --> 00:02:07,000

and I am using a bullet of sorts.

28

00:02:07,000 --> 00:02:11,000

You may recognize the steel ball bearing as some of our ammunition from Steam Mushinga.

29

00:02:14,000 --> 00:02:15,000

Part the first.

30

00:02:15,000 --> 00:02:18,000

I will be dropping this ball bearing from exactly table height,

31

00:02:18,000 --> 00:02:21,000

handily marked by this green line right here.

32

00:02:21,000 --> 00:02:23,000

I'll be filming its drop on a high-speed camera

33

00:02:23,000 --> 00:02:27,000

and counting how long it takes to get to the ground.

34

00:02:27,000 --> 00:02:29,000

Part the second.

35

00:02:29,000 --> 00:02:32,000

I'll be shooting this ball bearing from my little pinball shooter here,

36

00:02:32,000 --> 00:02:35,000

which I've marked out to be really accurate every time I shoot it,

37

00:02:35,000 --> 00:02:38,000

and I'm going to fire it across the same grid

38

00:02:38,000 --> 00:02:42,000

and measure how long it takes to reach the floor on the same high-speed camera.

39

00:02:42,000 --> 00:02:46,000

If this myth is true, those two times should be identical.

40

00:02:46,000 --> 00:02:48,000

Okay, here we go.

41

00:02:49,000 --> 00:02:52,000

This is the drop from table height.

42

00:02:52,000 --> 00:02:55,000

And three, two, one.

43

00:02:57,000 --> 00:02:58,000

Pretty simple.

44

00:02:59,000 --> 00:03:03,000

Couldn't be simpler, but there's a lot more to this test than meets the eye.

45

00:03:05,000 --> 00:03:08,000

Counting the frames of the high-speed shot that Marble took exactly 201 frames

46

00:03:08,000 --> 00:03:10,000

to get from my hand to the ground,

47

00:03:10,000 --> 00:03:12,000

and because we were filming at 500 frames per second,

48

00:03:12,000 --> 00:03:16,000

the same is two milliseconds, which means that the total travel was 402 milliseconds,

49

00:03:16,000 --> 00:03:18,000

or for those of you who love fractions,

50

00:03:18,000 --> 00:03:20,000

then come on, who doesn't?

51

00:03:20,000 --> 00:03:23,000

4.02 seconds.

52

00:03:23,000 --> 00:03:26,000

So, 4.02 is the benchmark.

53

00:03:26,000 --> 00:03:29,000

Now, how will the fired ball stack up?

54

00:03:29,000 --> 00:03:30,000

High-speed ready?

55

00:03:30,000 --> 00:03:33,000

Time for some pinball wizardry.

56

00:03:33,000 --> 00:03:35,000

Here we go. Pinball shooter.

57

00:03:35,000 --> 00:03:37,000

And three, two, one.

58

00:03:38,000 --> 00:03:41,000

And the results are flipping fabulous.

59

00:03:41,000 --> 00:03:43,000

What do you got?

60

00:03:43,000 --> 00:03:45,000

It's actually pretty cool.

61

00:03:45,000 --> 00:03:48,000

When I drop the ball from table height,

62

00:03:48,000 --> 00:03:51,000

it takes 402 milliseconds to reach the ground.

63

00:03:51,000 --> 00:03:53,000

When I shoot it from this pinball shooter,

64

00:03:53,000 --> 00:03:56,000

410 milliseconds to reach the ground.

65

00:03:56,000 --> 00:04:00,000

It's 8 tenths of 1% difference. That's pretty much identical.

66

00:04:00,000 --> 00:04:04,000

With less than 1% difference, that's a pretty powerful result.

67

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

And a provisional thumbs up for the myth.

68

00:04:07,000 --> 00:04:10,000

But Jamie's not impressed.

69

00:04:10,000 --> 00:04:14,000

Okay, but I thought the story was about guns.

70

00:04:14,000 --> 00:04:17,000

You really want to get to shooting guns?

71

00:04:17,000 --> 00:04:20,000

Well, yeah.

72

00:04:25,000 --> 00:04:29,000

This Socket 2 M saga comes from the world of boxing.

73

00:04:29,000 --> 00:04:33,000

When a particularly powerful pugilist was said to be so strong,

74

00:04:33,000 --> 00:04:36,000

he could knock someone clean out of their socks.

75

00:04:36,000 --> 00:04:39,000

But is it really possible?

76

00:04:39,000 --> 00:04:41,000

Alright, knocking your socks off.

77

00:04:41,000 --> 00:04:44,000

I mean, this is a weird one, but I like it. What's the plan?

78

00:04:44,000 --> 00:04:46,000

Well, since this idiom has its roots in boxing,

79

00:04:46,000 --> 00:04:49,000

I think we definitely should start with some sort of heavy impact punch.

80

00:04:49,000 --> 00:04:51,000

And that pretty much rules any of us out.

81

00:04:51,000 --> 00:04:53,000

Okay, I got an idea.

82

00:04:53,000 --> 00:04:55,000

Let's get the nitrogen cannon from the superhero special.

83

00:04:55,000 --> 00:04:57,000

But instead of firing a grappling hook,

84

00:04:57,000 --> 00:04:59,000

we reconfigure it to fire a fist,

85

00:04:59,000 --> 00:05:02,000

giving Buster the biggest uppercut of his life.

86

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

Well, you know what it sounds like to me?

87

00:05:04,000 --> 00:05:06,000

It's time for the main event.

88

00:05:06,000 --> 00:05:08,000

Pull your corners.

89

00:05:11,000 --> 00:05:14,000

In a long line of lethal inventions,

90

00:05:14,000 --> 00:05:18,000

Grant says this is one of the most dangerous he's ever built.

91

00:05:18,000 --> 00:05:20,000

But will it do the job on Buster?

92

00:05:20,000 --> 00:05:23,000

So, to deliver the kind of punch that might knock Buster's socks off,

93

00:05:23,000 --> 00:05:25,000

I've taken this out of retirement.

94

00:05:25,000 --> 00:05:28,000

It's our nitrogen cannon from the superhero special.

95

00:05:28,000 --> 00:05:31,000

We've fired a grappling hook to try and turn the Batmobile

96

00:05:31,000 --> 00:05:33,000

around the 90-degree corner.

97

00:05:33,000 --> 00:05:34,000

We hit it!

98

00:05:34,000 --> 00:05:37,000

And today, Grant is modifying the cannon

99

00:05:37,000 --> 00:05:40,000

to blast a killer punch to Buster's jaw,

100

00:05:40,000 --> 00:05:44,000

while Tori's turning out the all-important fist.

101

00:05:45,000 --> 00:05:47,000

So, what I have here is a solid steel rod

102

00:05:47,000 --> 00:05:49,000

that's going to go into the cannon.

103

00:05:49,000 --> 00:05:51,000

On the end of it, I'm going to attach a rubber fist.

104

00:05:51,000 --> 00:05:53,000

So, I'm going to be using a high-density,

105

00:05:53,000 --> 00:05:55,000

high-impact resistant rubber.

106

00:05:56,000 --> 00:05:58,000

I'll be able to weld it to the punching rod,

107

00:05:58,000 --> 00:06:00,000

stick it into Grant's cannon,

108

00:06:00,000 --> 00:06:02,000

fire it up at Buster's jaw,

109

00:06:02,000 --> 00:06:04,000

and see if we can knock his socks off.

110

00:06:04,000 --> 00:06:07,000

The scene is set for round one of this myth.

111

00:06:07,000 --> 00:06:10,000

All right, pal. This is your big chance.

112

00:06:10,000 --> 00:06:12,000

Don't blow it.

113

00:06:12,000 --> 00:06:15,000

Previous research says that a heavyweight boxer

114

00:06:15,000 --> 00:06:18,000

can pack a punch of 4,000 Newtons.

115

00:06:19,000 --> 00:06:21,000

Pressurizing.

116

00:06:21,000 --> 00:06:23,000

So, to match that kind of power,

117

00:06:23,000 --> 00:06:25,000

Grant primes up his pride and joy

118

00:06:25,000 --> 00:06:27,000

for the knock your socks off rubble.

119

00:06:27,000 --> 00:06:29,000

Okay.

120

00:06:29,000 --> 00:06:31,000

Knock him out of his socks?

121

00:06:31,000 --> 00:06:35,000

I think that this is actually just powerful enough

122

00:06:35,000 --> 00:06:37,000

to make that old boxing adage true.

123

00:06:38,000 --> 00:06:40,000

But Grant ain't convinced.

124

00:06:40,000 --> 00:06:44,000

I think that no matter how high we go at this cannon,

125

00:06:44,000 --> 00:06:47,000

no matter if we go through his head

126

00:06:47,000 --> 00:06:49,000

and punch a hole in the ceiling,

127

00:06:49,000 --> 00:06:51,000

none of that is going to be capable of knocking his socks off.

128

00:06:51,000 --> 00:06:54,000

I just think that there's too much body.

129

00:06:54,000 --> 00:06:56,000

You know, we're talking about a punch to the chin.

130

00:06:56,000 --> 00:06:59,000

To get that to translate all the way down to his shoes

131

00:06:59,000 --> 00:07:01,000

and kick out and blow his socks off?

132

00:07:01,000 --> 00:07:03,000

No way.

133

00:07:03,000 --> 00:07:05,000

Let's not pull any more punches

134

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

and get this show on the road.

135

00:07:07,000 --> 00:07:09,000

Here we go.

136

00:07:09,000 --> 00:07:12,000

Three, two, one.

137

00:07:12,000 --> 00:07:14,000

Woo!

138

00:07:14,000 --> 00:07:16,000

Woo!

139

00:07:16,000 --> 00:07:18,000

Woo!

140

00:07:18,000 --> 00:07:20,000

Woo!

141

00:07:20,000 --> 00:07:22,000

Oh-ho!

142

00:07:22,000 --> 00:07:26,000

500 psi was really intense.

143

00:07:26,000 --> 00:07:28,000

Yeah, we took out the lights.

144

00:07:28,000 --> 00:07:30,000

Woo!

145

00:07:30,000 --> 00:07:33,000

That was some punch.

146

00:07:33,000 --> 00:07:35,000

But it's clear that amidst the carnage,

147

00:07:35,000 --> 00:07:38,000

Buster's socks stayed put.

148

00:07:38,000 --> 00:07:40,000

But only just.

149

00:07:40,000 --> 00:07:42,000

Whoa!

150

00:07:42,000 --> 00:07:44,000

Take a look at this. Look, look,

151

00:07:44,000 --> 00:07:46,000

they'd suck slightly got dragged off.

152

00:07:46,000 --> 00:07:49,000

Now that's what I call taking it on the chin.

153

00:07:49,000 --> 00:07:52,000

The punch not only sent Buster barreling backwards,

154

00:07:52,000 --> 00:07:54,000

it ripped off one of his shoes,

155

00:07:54,000 --> 00:07:56,000

partially dragging a sock with it.

156

00:07:56,000 --> 00:08:00,000

But it's not enough to call the myth a winner.

157

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

So according to the high-speed footage,

158

00:08:02,000 --> 00:08:04,000

the nitro punch accelerated the fist

159

00:08:04,000 --> 00:08:08,000

to a final speed of 22.2 meters per second,

160

00:08:08,000 --> 00:08:12,000

giving us an overall force of over 6,000 newtons,

161

00:08:12,000 --> 00:08:17,000

which is 50% more than your heavyweight prize fighters' best punch.

162

00:08:17,000 --> 00:08:20,000

And even at superhuman punching strength,

163

00:08:20,000 --> 00:08:24,000

it still wasn't enough to knock Buster's socks off.

164

00:08:24,000 --> 00:08:26,000

But you know what?

165

00:08:26,000 --> 00:08:30,000

The cannon's reputation is still intact.

166

00:08:30,000 --> 00:08:32,000

Now, I'm not saying that this is busted.

167

00:08:32,000 --> 00:08:35,000

All I'm saying is right now it's not looking good for the myth.

168

00:08:35,000 --> 00:08:38,000

But let's say it wasn't a boxer that knocked the person's socks off.

169

00:08:38,000 --> 00:08:41,000

Maybe it was something bigger with more power.

170

00:08:41,000 --> 00:08:43,000

Sorry, Buster, we're gonna have to wake you up.

171

00:08:43,000 --> 00:08:45,000

We've got more experimenting to do.

172

00:08:45,000 --> 00:08:46,000

Get up, buddy.

173

00:09:05,000 --> 00:09:14,000

Bullet baloney or physics fact.

174

00:09:14,000 --> 00:09:18,000

This test is so hard, no one's ever dared try it.

175

00:09:18,000 --> 00:09:22,000

Does a bullet fired and a bullet dropped simultaneously

176

00:09:22,000 --> 00:09:26,000

from the same height hit the ground at the same time?

177

00:09:26,000 --> 00:09:30,000

Before breaking out the real bullets,

178

00:09:30,000 --> 00:09:34,000

Adam's letting loose with something a little more manageable.

179

00:09:34,000 --> 00:09:38,000

A paintball gun.

180

00:09:38,000 --> 00:09:39,000

Perfect.

181

00:09:39,000 --> 00:09:42,000

We've mounted this paintball gun so that not only is it perfectly level,

182

00:09:42,000 --> 00:09:44,000

but it's tuned back so that the paintballs will actually hit the ground

183

00:09:44,000 --> 00:09:46,000

before they hit the end of the shop.

184

00:09:46,000 --> 00:09:49,000

This should allow us to do some perfect comparisons

185

00:09:49,000 --> 00:09:53,000

between a fired projectile and a dropped projectile.

186

00:09:53,000 --> 00:09:57,000

Which brings the mythbusters neatly to their next challenge.

187

00:09:57,000 --> 00:09:59,000

When you fire a paintball gun from this gun

188

00:09:59,000 --> 00:10:01,000

and catch a shot of it on the high speed camera at the other end of the shop,

189

00:10:01,000 --> 00:10:04,000

hitting the ground, how do I know exactly when it left the gun?

190

00:10:04,000 --> 00:10:05,000

I'll tell you how.

191

00:10:05,000 --> 00:10:08,000

I've got a switch hooked up right here to the trigger of this gun.

192

00:10:08,000 --> 00:10:13,000

When I pull it, this battery powers an LED down there hooked up to our high speed camera.

193

00:10:13,000 --> 00:10:15,000

Alright, here we go.

194

00:10:15,000 --> 00:10:19,000

So without further ado, Adam does the fire test.

195

00:10:19,000 --> 00:10:21,000

Ugh!

196

00:10:21,000 --> 00:10:24,000

The high speed records the moment the light comes on

197

00:10:24,000 --> 00:10:26,000

and the paintball hitting the ground.

198

00:10:26,000 --> 00:10:29,000

Look at how beautiful that is.

199

00:10:29,000 --> 00:10:34,000

Making it possible to precisely time how long the journey from gun to ground takes.

200

00:10:34,000 --> 00:10:39,000

Which, for this test, is exactly 555 milliseconds.

201

00:10:39,000 --> 00:10:42,000

Ha ha ha ha ha!

202

00:10:42,000 --> 00:10:43,000

That is science.

203

00:10:43,000 --> 00:10:47,000

Now, Adam gets ready for part two of the experiment.

204

00:10:47,000 --> 00:10:51,000

So I'm just about to hold this paintball up at exactly the level of the barrel.

205

00:10:51,000 --> 00:10:53,000

I'm going to use a laser level to help me know it.

206

00:10:53,000 --> 00:10:58,000

Film it on high speed and time exactly how long it takes to get from my fingers to the ground.

207

00:10:58,000 --> 00:11:01,000

I will then compare that time to the fired paintball.

208

00:11:01,000 --> 00:11:06,000

Paintball drop test in three, two, one.

209

00:11:23,000 --> 00:11:27,000

Well, this is a conundrum.

210

00:11:27,000 --> 00:11:30,000

Our first two experiments seem to contradict each other.

211

00:11:30,000 --> 00:11:34,000

However, I think the culprit lies in the paintballs themselves.

212

00:11:34,000 --> 00:11:36,000

Watch this.

213

00:11:36,000 --> 00:11:39,000

See those trajectories?

214

00:11:39,000 --> 00:11:40,000

Each one's different.

215

00:11:40,000 --> 00:11:41,000

They're curving.

216

00:11:41,000 --> 00:11:44,000

That tells me that the irregular surfaces of the paintballs,

217

00:11:44,000 --> 00:11:49,000

manufacturing vagaries, is causing these things to have aerodynamic artifacts

218

00:11:49,000 --> 00:11:51,000

that makes them inaccurate.

219

00:11:51,000 --> 00:11:55,000

And thus, I think renders the paintball test invalid.

220

00:11:55,000 --> 00:12:00,000

I don't see anywhere to go with this except to start using real bullets and soon.

221

00:12:00,000 --> 00:12:09,000

Carry, Tori and Grant are trying to literally knock someone's socks off.

222

00:12:09,000 --> 00:12:14,000

A KO to the kisser put Buster down for the count.

223

00:12:14,000 --> 00:12:18,000

And just about totaled the workshop.

224

00:12:18,000 --> 00:12:21,000

We knocked Buster out.

225

00:12:21,000 --> 00:12:26,000

So now the team is ramping up outdoors with more power.

226

00:12:27,000 --> 00:12:30,000

Look at the size of this thing.

227

00:12:30,000 --> 00:12:33,000

Buster is going to be hating it.

228

00:12:33,000 --> 00:12:40,000

More power means more force and possibly a greater chance of knocking off Buster's socks.

229

00:12:40,000 --> 00:12:43,000

This is a gravitational potential energy pendulum.

230

00:12:43,000 --> 00:12:46,000

Normally, it's used for testing highway safety barriers.

231

00:12:46,000 --> 00:12:50,000

But today, it's going to be our battering ram.

232

00:12:50,000 --> 00:12:53,000

We're going to use it to try and knock Buster's socks off.

233

00:12:53,000 --> 00:12:56,000

But before Buster gets put in the firing line...

234

00:12:56,000 --> 00:12:58,000

You can get off the brake now.

235

00:12:58,000 --> 00:13:00,000

No brakes.

236

00:13:00,000 --> 00:13:06,000

The team wants to see how powerful the pendulum of destruction is.

237

00:13:06,000 --> 00:13:07,000

Can't wait.

238

00:13:07,000 --> 00:13:09,000

Here we go.

239

00:13:09,000 --> 00:13:13,000

In three, two, one.

240

00:13:24,000 --> 00:13:27,000

That might knock Buster's socks off.

241

00:13:27,000 --> 00:13:29,000

Come on, let's see.

242

00:13:29,000 --> 00:13:34,000

Although the pendulum's impact is actually slower than the flying fist...

243

00:13:34,000 --> 00:13:41,000

Because its mass is so much greater, it's able to deliver over 20 times the force of the nitro cannon.

244

00:13:41,000 --> 00:13:43,000

That's one hell of a punch.

245

00:13:43,000 --> 00:13:45,000

Look at that.

246

00:13:45,000 --> 00:13:50,000

I mean, this was enough to lift this van and shift it back about four or five feet.

247

00:13:51,000 --> 00:13:56,000

Which in a crack nutshell is not good news for Buster.

248

00:13:56,000 --> 00:13:58,000

I think we're ready.

249

00:13:58,000 --> 00:14:00,000

Coming up...

250

00:14:00,000 --> 00:14:04,000

Adam and Jamie blaze a trail towards physics glory.

251

00:14:04,000 --> 00:14:06,000

That looks like we might have hit it.

252

00:14:06,000 --> 00:14:13,000

And Carrie, Tori and Grant make another bruising bid to knock Buster's socks off.

253

00:14:13,000 --> 00:14:14,000

Shoes are still there.

254

00:14:14,000 --> 00:14:16,000

Yeah, but let's see about the socks.

255

00:14:17,000 --> 00:14:24,000

So far, testing whether a slug fired and a slug dropped simultaneously hit the ground at the same time...

256

00:14:24,000 --> 00:14:26,000

Oh, a little too powerful.

257

00:14:26,000 --> 00:14:29,000

...has been a mixed bag for Adam and Jamie.

258

00:14:29,000 --> 00:14:31,000

Perfect.

259

00:14:31,000 --> 00:14:36,000

In two small-scale tests, the myth was falling towards confirmed in one...

260

00:14:37,000 --> 00:14:39,000

It's pretty much identical.

261

00:14:39,000 --> 00:14:41,000

But busted in the other.

262

00:14:41,000 --> 00:14:43,000

So, what now?

263

00:14:43,000 --> 00:14:48,000

We gotta go full-scale with bullets, but dude, how difficult is that gonna be?

264

00:14:48,000 --> 00:14:53,000

I mean, for starters, I don't know how far a bullet fired level from a gun even goes.

265

00:14:53,000 --> 00:14:55,000

Well, why don't we try a .45 caliber pistol?

266

00:14:55,000 --> 00:15:00,000

I mean, that has a large, big, large hole in it.

267

00:15:00,000 --> 00:15:02,000

And head out to the range and see where it hits the ground.

268

00:15:02,000 --> 00:15:03,000

Exactly.

269

00:15:03,000 --> 00:15:05,000

Perfect. Let's do it.

270

00:15:05,000 --> 00:15:11,000

And the shooting range is the perfect place to get the lowdown on launching bullets.

271

00:15:11,000 --> 00:15:13,000

We're looking for a couple different things here.

272

00:15:13,000 --> 00:15:18,000

The first is that we need to have all the bullets coming out of the gun consistently.

273

00:15:18,000 --> 00:15:21,000

So, we know we're collecting accurate data.

274

00:15:21,000 --> 00:15:22,000

That's perfect.

275

00:15:22,000 --> 00:15:28,000

And the second thing is that we need to have all the bullets coming out of the gun consistently.

276

00:15:28,000 --> 00:15:29,000

That's perfect.

277

00:15:29,000 --> 00:15:38,000

The second one is we're wanting to find out how they're dropping, how far away from that gun they travel before they hit the ground.

278

00:15:38,000 --> 00:15:46,000

And before the boys blaze away, they're rigging the gun rigid and level, exactly 36 inches off the ground.

279

00:15:46,000 --> 00:15:48,000

Nice. I think we're ready.

280

00:15:48,000 --> 00:15:54,000

The reason we've gone level is that I'm only interested in gravity's effect on the bullet once it leaves the gun.

281

00:15:54,000 --> 00:15:58,000

If I am the gun higher, that bullet will go farther, but it's going farther because of its trajectory.

282

00:15:58,000 --> 00:16:02,000

If I shoot it level, then it starts dropping.

283

00:16:02,000 --> 00:16:04,000

Gravity starts having effect the moment it leaves the barrel.

284

00:16:04,000 --> 00:16:05,000

And that's what I'm interested in.

285

00:16:05,000 --> 00:16:06,000

How fast does it drop?

286

00:16:06,000 --> 00:16:08,000

And how far does it go?

287

00:16:10,000 --> 00:16:11,000

Gun is off.

288

00:16:11,000 --> 00:16:15,000

Right now, the guys have no idea where the bullet will land.

289

00:16:15,000 --> 00:16:26,000

So Adam and Jamie test to see how far the bullet falls over 100, 200 and 300 feet.

290

00:16:30,000 --> 00:16:32,000

That one was half an inch above the other one. Let's go take a look.

291

00:16:32,000 --> 00:16:33,000

Okay.

292

00:16:34,000 --> 00:16:38,000

What we've got so far in terms of data is actually pretty freaking cool.

293

00:16:39,000 --> 00:16:41,000

This orange line represents the bullet at 100 feet.

294

00:16:42,000 --> 00:16:46,000

The laser sight was aimed just about an inch higher than that, which is just what we'd expect to see.

295

00:16:46,000 --> 00:16:51,000

A very little amount of drop off, 200 feet, a little more drop off, 300 feet.

296

00:16:51,000 --> 00:16:54,000

That blue line, a lot more drop off.

297

00:16:54,000 --> 00:17:04,000

Armed with that info, Adam and Jamie can now zero in on the drop zone, which they've calculated to be between 350 and 370 feet away.

298

00:17:05,000 --> 00:17:08,000

Well, this right here is a runway.

299

00:17:08,000 --> 00:17:12,000

It's a runway for our little bullets to land on.

300

00:17:12,000 --> 00:17:14,000

I expect their landing to be rocky.

301

00:17:14,000 --> 00:17:16,000

I expect them to bounce.

302

00:17:16,000 --> 00:17:22,000

But most of all, I expect to be able to see where they land by the marks they make on this white paper.

303

00:17:22,000 --> 00:17:27,000

And hopefully, where they land is a reasonably discreet space.

304

00:17:27,000 --> 00:17:32,000

Fire rate. Three, two, one.

305

00:17:35,000 --> 00:17:38,000

Oh, that looks like we might have hit it.

306

00:17:38,000 --> 00:17:48,000

And after letting loose one more time, Adam and Jamie discover the bullets are biting the dust roughly 360 feet from the gun.

307

00:17:50,000 --> 00:17:52,000

I think we got what we came for.

308

00:17:53,000 --> 00:17:58,000

We've been able to predict fairly consistently where the bullets are hitting the ground.

309

00:17:58,000 --> 00:18:03,000

But the problem is we're outside, we could get a breeze that might kind of skew the results.

310

00:18:03,000 --> 00:18:08,000

And also, and this is the most important thing, the ground here is really uneven.

311

00:18:08,000 --> 00:18:13,000

So to go forward from here, we need a perfectly flat surface to work off of.

312

00:18:13,000 --> 00:18:17,000

Well, all we need now is 400 feet of flat floor.

313

00:18:17,000 --> 00:18:20,000

I think I might be able to handle that.

314

00:18:23,000 --> 00:18:25,000

Three, two, one.

315

00:18:25,000 --> 00:18:31,000

Carri Tori and Grant are busting Buster's chops, trying to knock him out of his car.

316

00:18:31,000 --> 00:18:34,000

Yeah, we took out the lights. Woo!

317

00:18:34,000 --> 00:18:40,000

Now they're winding the carnage up a notch at a car-clobbering crash test station.

318

00:18:40,000 --> 00:18:50,000

And these guys know how to wreck stuff. They smashed our moose, they smashed our trailer, and they smashed our fruit stand.

319

00:18:52,000 --> 00:18:55,000

Now they're going to smash Buster.

320

00:18:55,000 --> 00:19:00,000

So while the team dresses Buster in a pair of everyday shoes and socks...

321

00:19:00,000 --> 00:19:05,000

By the way, thanks to Andrew Parris of Houston, Texas, for letting us use his socks.

322

00:19:05,000 --> 00:19:12,000

And knocked out of Andrew's socks or not, it's clear that Buster's in for a torrent time.

323

00:19:13,000 --> 00:19:16,000

This is knock your socks off experiment.

324

00:19:16,000 --> 00:19:19,000

Buster in shoes and socks versus battering ram.

325

00:19:19,000 --> 00:19:22,000

In three, two, one.

326

00:19:34,000 --> 00:19:35,000

The shoes didn't fall off at all.

327

00:19:35,000 --> 00:19:37,000

Let's see if they loosened it all.

328

00:19:37,000 --> 00:19:40,000

That's a pretty massive hit. Dang, that looked like it hurt.

329

00:19:41,000 --> 00:19:43,000

Yep, that's a definite ouch.

330

00:19:43,000 --> 00:19:48,000

Buster just got walloped with 17,000 pounds of body-breaking force.

331

00:19:48,000 --> 00:19:53,000

But did his footwear fly? Hmm, not this time.

332

00:19:53,000 --> 00:19:55,000

Look at that. They're not even loose.

333

00:19:55,000 --> 00:19:58,000

I bet his joints are looser than the shoes.

334

00:19:58,000 --> 00:20:00,000

It looks like he's still in good shape.

335

00:20:00,000 --> 00:20:01,000

Should we set him up and go for another test?

336

00:20:01,000 --> 00:20:02,000

Yep.

337

00:20:02,000 --> 00:20:08,000

We just dropped a pendulum that weighs almost a ton straight into Buster's chest and knocked him back 40 feet.

338

00:20:08,000 --> 00:20:11,000

But we were still unable to knock off his shoes or his socks.

339

00:20:11,000 --> 00:20:13,000

But we're not done yet.

340

00:20:13,000 --> 00:20:16,000

Seen on the last test, these shoes stayed on.

341

00:20:16,000 --> 00:20:18,000

But what if he just got his socks?

342

00:20:18,000 --> 00:20:20,000

Maybe the shoes are holding the socks on.

343

00:20:20,000 --> 00:20:23,000

Sounds like Buster's in for another bashing.

344

00:20:23,000 --> 00:20:24,000

Will socks back up?

345

00:20:24,000 --> 00:20:27,000

So with Buster's feet supporting his own weight,

346

00:20:27,000 --> 00:20:30,000

the pendulum is once again lifted to full height.

347

00:20:30,000 --> 00:20:33,000

For full knock your socks off power.

348

00:20:35,000 --> 00:20:36,000

Okay, here we go.

349

00:20:36,000 --> 00:20:41,000

This is Buster with Socks Only versus a Pendulum.

350

00:20:41,000 --> 00:20:44,000

In three, two, one.

351

00:20:52,000 --> 00:20:53,000

Yeah!

352

00:20:53,000 --> 00:20:54,000

Yeah!

353

00:20:54,000 --> 00:20:56,000

His head came off.

354

00:20:56,000 --> 00:20:59,000

But look, one of his socks is knocked almost completely off.

355

00:20:59,000 --> 00:21:01,000

Yeah, but still technically on.

356

00:21:01,000 --> 00:21:04,000

Yeah, he didn't get knocked out of him necessarily.

357

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

Oh, you guys are so hard to satisfy.

358

00:21:07,000 --> 00:21:10,000

Hmm, Maggie Carey should take a look at the high speed

359

00:21:10,000 --> 00:21:12,000

before she gets carried away.

360

00:21:14,000 --> 00:21:16,000

Here comes the pendulum.

361

00:21:16,000 --> 00:21:18,000

That's all I've got.

362

00:21:18,000 --> 00:21:19,000

Woo!

363

00:21:19,000 --> 00:21:24,000

His feet go straight back, but his socks haven't come off yet.

364

00:21:24,000 --> 00:21:25,000

Wow.

365

00:21:25,000 --> 00:21:26,000

Still on.

366

00:21:26,000 --> 00:21:28,000

Oh, there it is.

367

00:21:28,000 --> 00:21:30,000

It's dragging along the ground.

368

00:21:30,000 --> 00:21:32,000

It's not knocking him out of his socks.

369

00:21:32,000 --> 00:21:34,000

Okay, so that doesn't count?

370

00:21:34,000 --> 00:21:35,000

No.

371

00:21:35,000 --> 00:21:40,000

Confirming this myth is turning out to be as tough as Buster's stay put socks.

372

00:21:40,000 --> 00:21:42,000

Yeah, but we can't bust this now.

373

00:21:42,000 --> 00:21:44,000

I mean, I don't think we've tried hard enough to knock him out of his socks.

374

00:21:44,000 --> 00:21:48,000

No, I think we need a new technique, something a little bit more.

375

00:21:48,000 --> 00:21:51,000

Or in other words, this ain't over till it's over.

376

00:21:51,000 --> 00:21:53,000

Good work, buddy.

377

00:21:53,000 --> 00:21:57,000

And the mythbusters are going in search of more power.

378

00:21:58,000 --> 00:22:00,000

Next, pool.

379

00:22:00,000 --> 00:22:03,000

The team go all out on the explosives.

380

00:22:03,000 --> 00:22:06,000

That oughta knock some socks off.

381

00:22:06,000 --> 00:22:11,000

And later, Adam and Jamie get on target for a world first.

382

00:22:11,000 --> 00:22:13,000

Dude, I'd say that is absolutely perfect.

383

00:22:13,000 --> 00:22:14,000

Works for me.

384

00:22:17,000 --> 00:22:20,000

Please do not try what we do on this show at home.

385

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

We're what you call experts.

386

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

It's safer that way.

387

00:22:25,000 --> 00:22:26,000

Socks.

388

00:22:26,000 --> 00:22:29,000

Sometimes they just seem to have a mind of their own.

389

00:22:29,000 --> 00:22:32,000

But can they ever be knocked off your feet?

390

00:22:32,000 --> 00:22:36,000

Okay, so far Buster's lost a shoe, but no socks.

391

00:22:36,000 --> 00:22:38,000

Yeah, the impact doesn't seem to be working out.

392

00:22:38,000 --> 00:22:42,000

It seems like you're going to need a massive amount of force to get those socks off.

393

00:22:42,000 --> 00:22:45,000

I think you're right, and I think I have just the thing.

394

00:22:45,000 --> 00:22:46,000

What?

395

00:22:46,000 --> 00:22:47,000

Explosives.

396

00:22:47,000 --> 00:22:48,000

Surprise.

397

00:22:48,000 --> 00:22:49,000

You need to see that one coming.

398

00:22:49,000 --> 00:22:50,000

Seriously?

399

00:22:50,000 --> 00:22:51,000

Yeah.

400

00:22:51,000 --> 00:22:56,000

There have been cases of people getting their clothes blown off from an explosion, yet they survived the blast.

401

00:22:56,000 --> 00:22:58,000

So socks are closed.

402

00:22:58,000 --> 00:22:59,000

I say we test this one.

403

00:22:59,000 --> 00:23:04,000

Okay, well, let's go to the quarry and take, say, like, I don't know, 500 pounds of explosives.

404

00:23:04,000 --> 00:23:05,000

I like 500.

405

00:23:05,000 --> 00:23:10,000

Get some mannequin legs, put some socks on them, and then we'll put them at different distances from the center of the blast.

406

00:23:10,000 --> 00:23:11,000

Round three.

407

00:23:11,000 --> 00:23:14,000

Knock your socks off with an explosive shockwave.

408

00:23:14,000 --> 00:23:17,000

And you couldn't have picked a nicer day for it.

409

00:23:17,000 --> 00:23:18,000

Wow.

410

00:23:18,000 --> 00:23:21,000

Oh my gosh, this is awesome.

411

00:23:21,000 --> 00:23:24,000

Are you guys ready to map out the grid for our experiment?

412

00:23:24,000 --> 00:23:25,000

Sounds great.

413

00:23:25,000 --> 00:23:26,000

X mark spot.

414

00:23:26,000 --> 00:23:28,000

This is just like making crop circles.

415

00:23:28,000 --> 00:23:29,000

I know, exactly.

416

00:23:29,000 --> 00:23:33,000

The mannequin legs are going to be screwed onto these stands.

417

00:23:33,000 --> 00:23:38,000

Then position on a circular grid at various distances from the explosion.

418

00:23:38,000 --> 00:23:39,000

This is the blast center.

419

00:23:39,000 --> 00:23:43,000

This is where we're going to be setting off a 500 pound explosion.

420

00:23:43,000 --> 00:23:46,000

Hopefully that blast will give us enough power to knock off the socks.

421

00:23:46,000 --> 00:23:56,000

Now we're going to put our first set of legs 15 feet away from the blast, then 25 feet, 35 feet, 45 feet, and finally, 55 feet away.

422

00:23:56,000 --> 00:23:58,000

This way we have a runaway.

423

00:23:58,000 --> 00:24:07,000

The first set of legs 15 feet away from the blast, then 25 feet, 35 feet, 45 feet, and finally, 55 feet away.

424

00:24:07,000 --> 00:24:10,000

This way we have a variety of distances from the blast.

425

00:24:10,000 --> 00:24:15,000

Because the closer you are to the blast, probably the more likely that your socks are going to get knocked off.

426

00:24:15,000 --> 00:24:20,000

But let's face it, if you're standing too close to the blast, I'm sure you're going to lose more than just your socks.

427

00:24:20,000 --> 00:24:27,000

Which is why the team are now adding and living to tell the tale to the knock your socks off myth.

428

00:24:27,000 --> 00:24:31,000

So in addition to knocking your socks off, a big part of this myth is survivability.

429

00:24:31,000 --> 00:24:35,000

And we measure the force of an explosion in pounds per square inch, or PSI.

430

00:24:35,000 --> 00:24:42,000

Just to give you an idea of what we're talking about, at 2.5 PSI, you're likely to rupture your eardrums.

431

00:24:42,000 --> 00:24:50,000

And we've calculated with 500 pounds of explosives at a range of 20 feet, you're going to experience over 100 PSI.

432

00:24:50,000 --> 00:24:53,000

Which means a very high likelihood of death.

433

00:24:53,000 --> 00:25:00,000

To measure exactly where that lethal pressure kicks in, Grant is assembling some super sensitive equipment.

434

00:25:00,000 --> 00:25:08,000

This is a burst disk made by our friends at Oseco. It's a very thin metal membrane that's calibrated to rupture at 100 PSI.

435

00:25:08,000 --> 00:25:15,000

That's very simple. The pressure wave comes in here. If it's less than 100 PSI, then it just remains intact.

436

00:25:15,000 --> 00:25:20,000

But if it exceeds 100 PSI, it actually blows through here, leaving a hole.

437

00:25:20,000 --> 00:25:28,000

Now if this is still intact at the end of the experiment, and we've blown the socks off, then there's a real chance of confirming this myth.

438

00:25:28,000 --> 00:25:32,000

Meanwhile, Carrie and Tori dull out the dummies.

439

00:25:32,000 --> 00:25:39,000

We've specifically designed these legs to give us every opportunity for a successful sock blast removal.

440

00:25:39,000 --> 00:25:44,000

Now we've got one foot on the ground, one foot in the air as if you were running or walking.

441

00:25:44,000 --> 00:25:49,000

That way if a sock is going to come off in either of these positions, myth is confirmed.

442

00:25:50,000 --> 00:25:57,000

And just to mark this explosive occasion, the official Mythbusters sneaker.

443

00:25:57,000 --> 00:25:59,000

They're blast zone shoes. I like them.

444

00:25:59,000 --> 00:26:05,000

And one of our fans hand-knit an entire box of socks for us.

445

00:26:05,000 --> 00:26:10,000

Fags big time patience void of Somerville, Massachusetts.

446

00:26:10,000 --> 00:26:15,000

At each foot station, some feet will have your socks and shoes.

447

00:26:15,000 --> 00:26:17,000

How's that fit, man?

448

00:26:17,000 --> 00:26:20,000

Others, just socks.

449

00:26:20,000 --> 00:26:26,000

S-15. That means sock only at 15 feet.

450

00:26:26,000 --> 00:26:30,000

That way when these get blown to smithereens, we might be able to track where they came from.

451

00:26:30,000 --> 00:26:34,000

We're all set for the final experiment for knock your socks off.

452

00:26:34,000 --> 00:26:40,000

And I am standing in the blast center where we are going to set off 500 pounds of Ampho.

453

00:26:40,000 --> 00:26:48,000

And when that goes off, these pressure calibrated burstists are going to tell us the likelihood of survivability at 15, 25 and 45 feet.

454

00:26:48,000 --> 00:26:56,000

Then once we've gathered our data from wherever it lands in the quarry, we'll be able to determine whether you can knock your socks off with an explosion.

455

00:26:56,000 --> 00:27:01,000

But before they push the plunger, the team needs two more vital ingredients.

456

00:27:01,000 --> 00:27:02,000

Cool.

457

00:27:02,000 --> 00:27:04,000

First, the fire department.

458

00:27:04,000 --> 00:27:07,000

You know what they say, safe exploding is good exploding.

459

00:27:10,000 --> 00:27:12,000

And the explosives.

460

00:27:12,000 --> 00:27:14,000

Here comes our Ampho.

461

00:27:14,000 --> 00:27:18,000

Courtesy of retired FBI agent Frank Doyle.

462

00:27:18,000 --> 00:27:20,000

So look so you guys have a package for us.

463

00:27:20,000 --> 00:27:22,000

Oh, I brought you a really nice package.

464

00:27:22,000 --> 00:27:23,000

Ampho, right?

465

00:27:23,000 --> 00:27:24,000

Yep.

466

00:27:24,000 --> 00:27:26,000

Oh, that ought to do it.

467

00:27:26,000 --> 00:27:29,000

That ought to knock some socks off.

468

00:27:29,000 --> 00:27:31,000

You better believe it.

469

00:27:31,000 --> 00:27:36,000

And if any socks are going to get knocked off soon, this is the stuff to do it.

470

00:27:36,000 --> 00:27:38,000

This is 500 pounds of Ampho.

471

00:27:38,000 --> 00:27:44,000

Just to give you an idea, it took 800 pounds of Ampho to completely vaporize the cement truck.

472

00:27:48,000 --> 00:27:50,000

The explosives are in place.

473

00:27:50,000 --> 00:27:51,000

The legs are in place.

474

00:27:51,000 --> 00:27:53,000

The burstists are connected.

475

00:27:53,000 --> 00:27:58,000

It's time for us to run away and let Frank and the bomb squad do their final preparations.

476

00:27:58,000 --> 00:28:00,000

And then it's boom time.

477

00:28:02,000 --> 00:28:05,000

Next, the Shockwave Showdown.

478

00:28:06,000 --> 00:28:09,000

Comes to a grizzly end.

479

00:28:09,000 --> 00:28:11,000

Oh my god, there's a foot inside.

480

00:28:22,000 --> 00:28:28,000

Once upon a time in the Wild West, a fired bullet could just about settle any bust up.

481

00:28:29,000 --> 00:28:31,000

All right.

482

00:28:31,000 --> 00:28:38,000

But is it true that a bullet dropped and a bullet fired simultaneously will hit the ground at the same time?

483

00:28:41,000 --> 00:28:43,000

That is science.

484

00:28:43,000 --> 00:28:44,000

Out at the range.

485

00:28:44,000 --> 00:28:46,000

All right. Good to go.

486

00:28:46,000 --> 00:28:53,000

Adam and Jamie found that a bullet from their 45 automatic flew 360 feet before it bit the dust.

487

00:28:53,000 --> 00:28:55,000

I love this myth.

488

00:28:55,000 --> 00:29:03,000

Now all they need is a location to suit one of the most sophisticated experiments the mythbusters have ever attempted.

489

00:29:06,000 --> 00:29:11,000

And down by the shores of old San Francisco Bay, they've got one.

490

00:29:11,000 --> 00:29:14,000

Ah, look at that. It's magnificent.

491

00:29:14,000 --> 00:29:17,000

I love these old military buildings.

492

00:29:17,000 --> 00:29:24,000

The historic 480 foot long Big Event Behimuth Fort Mason Center.

493

00:29:25,000 --> 00:29:28,000

Fort Mason Center is perfect for us for several reasons.

494

00:29:28,000 --> 00:29:33,000

At over 480 feet long, there's plenty of room for a fired bullet to come to rest.

495

00:29:33,000 --> 00:29:37,000

Because it's enclosed, there's no wind to worry about affecting our bullet.

496

00:29:37,000 --> 00:29:40,000

And then lastly, it's perfectly level.

497

00:29:41,000 --> 00:29:49,000

So with the gun rest in place at one end of the room, Adam's first job is to make sure it's exactly 36 inches off the floor.

498

00:29:51,000 --> 00:29:53,000

And firing level.

499

00:29:53,000 --> 00:29:55,000

I'm going to fire a bullet to that target 20 feet away.

500

00:29:55,000 --> 00:29:58,000

Now within that 20 feet, the bullet's not going to drop at all.

501

00:29:58,000 --> 00:30:06,000

So as long as the bullet hole in that target is the exact same height off the ground as the barrel, I know I've got a perfectly level bullet.

502

00:30:17,000 --> 00:30:21,000

Dude, I'd say that is absolutely perfect right on our laser line.

503

00:30:22,000 --> 00:30:23,000

That gun's firing level.

504

00:30:23,000 --> 00:30:25,000

Works for me.

505

00:30:26,000 --> 00:30:31,000

With the fired bullet rig sorted for now, Jamie rolls out the other half of the experiment.

506

00:30:32,000 --> 00:30:43,000

This is my bullet drop rate and the key component is this electromagnet right here because it'll hold on to my bullet and then on cue, it'll drop the bullet.

507

00:30:43,000 --> 00:30:53,000

Okay, we've got all the sensors we need and all the equipment we need to time the exact amount of time it takes a bullet both to be dropped from 36 inches and to be fired from 36 inches off the ground.

508

00:30:54,000 --> 00:31:00,000

And we could simply compare those two times like we did with the paintball, but that's not good enough for us.

509

00:31:01,000 --> 00:31:03,000

For we have a bigger vision.

510

00:31:03,000 --> 00:31:07,000

We want to see that drop bullet hit the ground in the spot.

511

00:31:07,000 --> 00:31:09,000

The fired bullet will be skipping off.

512

00:31:09,000 --> 00:31:11,000

That's what we're about to set up.

513

00:31:11,000 --> 00:31:17,000

That's right folks, this time both halves of the experiment are going to happen at the same time.

514

00:31:18,000 --> 00:31:27,000

So before rolling the drop rig 360 feet down the room, the boys just want to make sure their little synchronizing system is going to work.

515

00:31:28,000 --> 00:31:34,000

Simultaneous firing and bullet drop test in three, two, one.

516

00:31:35,000 --> 00:31:40,000

Let's see how it looked on high speed.

517

00:31:41,000 --> 00:31:44,000

Where the mythbusters quickly discover they have a problem.

518

00:31:45,000 --> 00:31:47,000

Let's look back at the timing about when the light goes up.

519

00:31:48,000 --> 00:31:54,000

While the gun and the timing LED go off together, the dropped bullet decides to delay its journey south.

520

00:31:55,000 --> 00:31:57,000

It sits on that electromagnet for a while.

521

00:31:58,000 --> 00:31:59,000

Yeah.

522

00:32:00,000 --> 00:32:03,000

Do you think there's any residual magnetism or something like that?

523

00:32:04,000 --> 00:32:11,000

If you look at this high speed shot of the bullet on the electromagnet, you'll notice it hangs out for 65 milliseconds.

524

00:32:11,000 --> 00:32:16,000

That tells me there's a lot of residual magnetism in the electromagnet itself, even though it's turned off.

525

00:32:17,000 --> 00:32:19,000

And it's no good as a mechanism for our drop.

526

00:32:20,000 --> 00:32:22,000

We've got to rebuild a mechanism and we've got to rebuild it fast.

527

00:32:22,000 --> 00:32:33,000

Out at the quarry, the knock your socks off squad have wisely taken themselves to higher ground and way out of the blast zone.

528

00:32:34,000 --> 00:32:43,000

Our blast zone is set up way, way, way over there, but we've decided to come really, really far back to make sure all mythbusters big and tiny are perfectly safe.

529

00:32:44,000 --> 00:32:48,000

So in order to confirm this myth, we obviously need to have a foot with no sock on it.

530

00:32:48,000 --> 00:32:52,000

But it also has to be in the radius of survivability.

531

00:32:53,000 --> 00:33:03,000

Now what I think is anything that's within 50 feet of this blast, bear in mind this is 500 pounds of anfo is just going to be completely obliterated.

532

00:33:04,000 --> 00:33:08,000

Okay you guys, the explosives are ready, the legs are in place, the bursters are set to go.

533

00:33:09,000 --> 00:33:10,000

Are you ready?

534

00:33:10,000 --> 00:33:11,000

Oh I'm ready, you ready?

535

00:33:11,000 --> 00:33:12,000

Absolutely.

536

00:33:12,000 --> 00:33:18,000

Alright this is knock your socks off using a 500 pound explosion.

537

00:33:19,000 --> 00:33:23,000

Everybody look alive, here we go in 3, 2, 1.

538

00:33:23,000 --> 00:33:30,000

Whoa!

539

00:33:31,000 --> 00:33:33,000

Whoa!

540

00:33:33,000 --> 00:33:34,000

Yeah!

541

00:33:38,000 --> 00:33:39,000

Yeah!

542

00:33:39,000 --> 00:33:40,000

Cool!

543

00:33:41,000 --> 00:33:42,000

That was awesome!

544

00:33:43,000 --> 00:33:44,000

Wow!

545

00:33:44,000 --> 00:33:47,000

Got the delay on the boom hitting you in the chest is incredible!

546

00:33:49,000 --> 00:33:50,000

I hit him!

547

00:33:51,000 --> 00:33:53,000

That was sick!

548

00:33:53,000 --> 00:33:55,000

Alright let's go check it out.

549

00:33:57,000 --> 00:34:04,000

Remember to confirm this myth, the team needs to find a sockless foot in a critical zone of human survivability.

550

00:34:07,000 --> 00:34:08,000

Whoa!

551

00:34:09,000 --> 00:34:11,000

Look at the size of that crater!

552

00:34:11,000 --> 00:34:12,000

Oh wait here's a sock!

553

00:34:12,000 --> 00:34:13,000

Wow!

554

00:34:14,000 --> 00:34:16,000

Oh my god there's a foot inside!

555

00:34:16,000 --> 00:34:19,000

It's still in there, that's disgusting.

556

00:34:19,000 --> 00:34:20,000

I don't think this counts.

557

00:34:20,000 --> 00:34:24,000

No that's definitely not blowing your socks off.

558

00:34:24,000 --> 00:34:25,000

True!

559

00:34:25,000 --> 00:34:29,000

But a closer look at the blast zone reveals some explosive results.

560

00:34:29,000 --> 00:34:31,000

Check it out, no socks!

561

00:34:31,000 --> 00:34:33,000

What distance is, what are they?

562

00:34:33,000 --> 00:34:36,000

25 foot and this is 15 feet.

563

00:34:36,000 --> 00:34:42,000

Well they finally managed to knock some socks off, but would a human be walking away?

564

00:34:42,000 --> 00:34:45,000

Yeah you're probably not going to survive this if your socks came off.

565

00:34:45,000 --> 00:34:48,000

Wait here's the pressure disc, let's see what it says.

566

00:34:48,000 --> 00:34:49,000

Okay 25 feet.

567

00:34:49,000 --> 00:34:50,000

That's blown.

568

00:34:50,000 --> 00:34:51,000

That's blown.

569

00:34:51,000 --> 00:34:59,000

And a double check of the discs confirms that under 35 feet away this bang would have sent a mere mortal to Kingdom come.

570

00:35:01,000 --> 00:35:03,000

So that's not survivable, that doesn't count.

571

00:35:03,000 --> 00:35:09,000

But at the minimum survivable radius of 45 feet, yep they're still on.

572

00:35:09,000 --> 00:35:13,000

We've got 45, we've got 55 and the socks are still on.

573

00:35:13,000 --> 00:35:20,000

So we have no survivability at the front but we lost a few socks and then as you get to the zone of survivability we still have our socks on.

574

00:35:20,000 --> 00:35:23,000

I think that gives us both of our criteria for calling this one busted.

575

00:35:23,000 --> 00:35:24,000

Yeah this is totally busted.

576

00:35:24,000 --> 00:35:27,000

I mean if your socks do get blown off you're pretty much dead.

577

00:35:27,000 --> 00:35:30,000

Yeah you wouldn't be walking away from that.

578

00:35:30,000 --> 00:35:32,000

This was cool though.

579

00:35:32,000 --> 00:35:34,000

You might say it was a blast.

580

00:35:34,000 --> 00:35:41,000

This has been a great experiment from the beginning to the end and we've come away with some solid evidence to bust this myth.

581

00:35:42,000 --> 00:35:47,000

There's no way you can knock somebody's socks off and have them survive.

582

00:35:48,000 --> 00:35:50,000

It's just not possible.

583

00:35:50,000 --> 00:35:51,000

This one is busted.

584

00:35:54,000 --> 00:36:00,000

Next, the roller coaster ride to physics fame has Adam and Jamie both dazzled.

585

00:36:00,000 --> 00:36:05,000

I think this might be the shop we've been looking for and baffled.

586

00:36:05,000 --> 00:36:08,000

We're not even seeing the pins start to move.

587

00:36:12,000 --> 00:36:16,000

Here we go.

588

00:36:16,000 --> 00:36:21,000

Mythbusters and World Firsts go together like ammonets.

589

00:36:23,000 --> 00:36:24,000

Wow!

590

00:36:24,000 --> 00:36:26,000

There's the Pycrete boat.

591

00:36:26,000 --> 00:36:28,000

Ah, King of the Worlds!

592

00:36:28,000 --> 00:36:29,000

Breaking glass.

593

00:36:29,000 --> 00:36:33,000

And the lead balloon.

594

00:36:33,000 --> 00:36:37,000

You know if someone says it's impossible we just take it as a challenge.

595

00:36:37,000 --> 00:36:41,000

Now, the Mythbusters are testing our real doozy.

596

00:36:41,000 --> 00:36:43,000

Everything's hot, ready to go.

597

00:36:43,000 --> 00:36:47,000

Bullet shot versus bullet dropped.

598

00:36:47,000 --> 00:36:50,000

But a malingering magnet is holding up the show.

599

00:36:51,000 --> 00:36:54,000

As soon as it's released it's just staying there.

600

00:36:54,000 --> 00:36:58,000

But do you think Adam's going to let something like that stand in his way?

601

00:36:59,000 --> 00:37:01,000

Awesome! That works.

602

00:37:01,000 --> 00:37:02,000

Oh no.

603

00:37:02,000 --> 00:37:04,000

So, the electromagnetic is gone.

604

00:37:04,000 --> 00:37:05,000

It's on the scrap heap.

605

00:37:05,000 --> 00:37:07,000

We've got a new little solenoid in there which will whoop,

606

00:37:07,000 --> 00:37:09,000

get out of the way and let the bullet drop.

607

00:37:09,000 --> 00:37:12,000

All we've got to do is try it once, get our timings right,

608

00:37:12,000 --> 00:37:15,000

confirm them and we should be ready to do this test.

609

00:37:15,000 --> 00:37:20,000

So the new simultaneous release system is ready for a test fire.

610

00:37:20,000 --> 00:37:26,000

Alright, simultaneous release in three, two, one.

611

00:37:31,000 --> 00:37:34,000

Alright, let's see how it did on high speed.

612

00:37:35,000 --> 00:37:38,000

But once again, there's a timing problem.

613

00:37:39,000 --> 00:37:40,000

Solenoid's way too slow.

614

00:37:40,000 --> 00:37:41,000

Yep.

615

00:37:41,000 --> 00:37:43,000

It's not letting go.

616

00:37:44,000 --> 00:37:47,000

The most difficult thing about this whole experiment is getting the fired bullet

617

00:37:47,000 --> 00:37:52,000

and the dropped bullet to become airborne at exactly the same time.

618

00:37:52,000 --> 00:37:55,000

And when you realize all the stuff that is going on here,

619

00:37:55,000 --> 00:37:57,000

it's trickier than you might think.

620

00:37:57,000 --> 00:38:02,000

I mean, the gun has to do its thing, the release mechanism has to do its thing,

621

00:38:02,000 --> 00:38:07,000

and we can't tolerate even a few milliseconds of variation in this mix

622

00:38:07,000 --> 00:38:10,000

to make the result that we want to see happen.

623

00:38:11,000 --> 00:38:12,000

It's hard.

624

00:38:12,000 --> 00:38:14,000

Now there's an understatement.

625

00:38:14,000 --> 00:38:16,000

So cue the brainstorm.

626

00:38:16,000 --> 00:38:19,000

We're not even seeing the pins start to move.

627

00:38:21,000 --> 00:38:25,000

It gave us the problem that we currently have, which is that it's late.

628

00:38:25,000 --> 00:38:26,000

Make it hot again.

629

00:38:27,000 --> 00:38:31,000

Having spent the past four hours trying to sort out the solenoid,

630

00:38:31,000 --> 00:38:33,000

look, let's do this twice.

631

00:38:35,000 --> 00:38:38,000

The boys are now staring failures square in the face.

632

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

And all it is is about figuring out some way to mechanically push between these two.

633

00:38:42,000 --> 00:38:46,000

until Jamie snatches victory from the jaws of defeat.

634

00:38:47,000 --> 00:38:50,000

You have a hinge that you pull in the metal.

635

00:38:50,000 --> 00:38:51,000

Yeah, that's what I meant.

636

00:38:51,000 --> 00:38:56,000

It needs to be some sort of a little bitty catch that is on its edge.

637

00:38:56,000 --> 00:38:58,000

It could make a clip like that.

638

00:38:58,000 --> 00:39:06,000

He adds a small metal clip to the trigger to delay the gun the miniscule milliseconds needed to match the solenoid.

639

00:39:08,000 --> 00:39:10,000

Everything's hot. Let's do it.

640

00:39:15,000 --> 00:39:21,000

And after a few test fires, at a bit of fine tuning, it works.

641

00:39:24,000 --> 00:39:26,000

Oh, it's good. It's good.

642

00:39:26,000 --> 00:39:30,000

It's one third of a millisecond difference.

643

00:39:30,000 --> 00:39:31,000

Wow.

644

00:39:31,000 --> 00:39:33,000

That's freaking perfect.

645

00:39:34,000 --> 00:39:36,000

Let's go do this full scale.

646

00:39:38,000 --> 00:39:43,000

Which means rolling up the room 360 feet to stake out a drop zone.

647

00:39:44,000 --> 00:39:45,000

Right about there.

648

00:39:45,000 --> 00:39:47,000

That's where they were landing out in the shooting range.

649

00:39:47,000 --> 00:39:49,000

So this is where I expect them to land here.

650

00:39:49,000 --> 00:39:50,000

Okay.

651

00:39:50,000 --> 00:40:02,000

Adam lays down a runway of white paper so the high speed camera will clearly see and measure both bullets at the same time, in the same place, and in the same shot.

652

00:40:04,000 --> 00:40:12,000

All we need now in the drop zone is Jamie's drop rig so the boys can take a shot at physics history.

653

00:40:14,000 --> 00:40:16,000

All right, you ready to do this for real?

654

00:40:17,000 --> 00:40:19,000

I think we'll hit it on the first shot.

655

00:40:19,000 --> 00:40:20,000

Really?

656

00:40:20,000 --> 00:40:21,000

Oh, yeah.

657

00:40:21,000 --> 00:40:23,000

You never make predictions. That's awesome.

658

00:40:24,000 --> 00:40:26,000

Bullet drop versus fire.

659

00:40:27,000 --> 00:40:29,000

In three, two, one.

660

00:40:34,000 --> 00:40:39,000

Adam's hoping this time that the bullet is as well placed as Jamie's optimism.

661

00:40:40,000 --> 00:40:46,000

But from 360 feet away, the boys can't see exactly where the fired bullet landed.

662

00:40:46,000 --> 00:40:47,000

Let's go see where it hit.

663

00:40:48,000 --> 00:40:52,000

So Adam takes a one-wheeled wide down the room to check out the drop zone.

664

00:40:55,000 --> 00:40:56,000

Wow.

665

00:40:57,000 --> 00:40:59,000

And the results are simply ripping.

666

00:41:00,000 --> 00:41:01,000

Can't get much closer than that.

667

00:41:02,000 --> 00:41:03,000

I can't wait to see the high speed.

668

00:41:04,000 --> 00:41:06,000

So do you see the drop zone?

669

00:41:06,000 --> 00:41:07,000

I can't wait to see the high speed.

670

00:41:08,000 --> 00:41:12,000

So dude, this bullet carved a streak right under the drop zone.

671

00:41:15,000 --> 00:41:19,000

I think this might be the shot we've been looking for.

672

00:41:20,000 --> 00:41:23,000

In real time, it's impossible to tell what happened.

673

00:41:25,000 --> 00:41:29,000

Until Adam analyzes the high speed and crunches the numbers.

674

00:41:30,000 --> 00:41:36,000

3677 minus 30915 equals 238 divided by 6.

675

00:41:38,000 --> 00:41:43,000

Dude, the difference is 39.6 milliseconds.

676

00:41:44,000 --> 00:41:47,000

Which means it's less than the human eye can make out.

677

00:41:49,000 --> 00:41:56,000

So after days of brain teasing tests, the mythbusters can claim a world first for themselves.

678

00:41:57,000 --> 00:41:59,000

And a victory for physics.

679

00:42:01,000 --> 00:42:04,000

Let me put 39.6 milliseconds into some perspective for you.

680

00:42:05,000 --> 00:42:09,000

When you go to the movies and watch a projected celluloid film on the screen,

681

00:42:09,000 --> 00:42:12,000

you know that that film is made up of individual images, right?

682

00:42:12,000 --> 00:42:16,000

What you might not have known is that it takes 24 of those per second to make up the film that you're watching.

683

00:42:16,000 --> 00:42:19,000

So each one is on screen for exactly 1.24th of a second.

684

00:42:19,000 --> 00:42:22,000

But you don't notice that because it's faster than your eye can register.

685

00:42:22,000 --> 00:42:27,000

Well, that 1.24th of a second is actually longer than 39.6 milliseconds.

686

00:42:27,000 --> 00:42:30,000

That's how close those two bullets were.

687

00:42:31,000 --> 00:42:33,000

Two bullets, one drop, one fire.

688

00:42:34,000 --> 00:42:37,000

Amazingly, they ended up in the same place at the same time.

689

00:42:40,000 --> 00:42:44,000

Dude, this myth was every bit as much fun to test as I was hoping it would be.

690

00:42:44,000 --> 00:42:47,000

And I gotta say, even though the physics textbooks had it right,

691

00:42:47,000 --> 00:42:52,000

I love the fact that we did it full size with real unmodified bullets.

692

00:42:52,000 --> 00:42:54,000

I bet no one has ever tried that before.

693

00:42:54,000 --> 00:42:55,000

I think they're right.

694

00:42:55,000 --> 00:43:00,000

And whether it was ball bearings or bullets dropped or fired, they all hit the ground at the same time.

695

00:43:00,000 --> 00:43:05,000

Yep. Gravity, man. It's not just a good idea. It's the law.

696

00:43:05,000 --> 00:43:06,000

Confirmed.

697

00:43:06,000 --> 00:43:07,000

Confirmed.

698

00:43:12,000 --> 00:43:14,000

Oh my god, that one was hilarious.

699

00:43:15,000 --> 00:43:17,000

No, I know. That one was good too.

700

00:43:17,000 --> 00:43:20,000

If you want to see more of our favorite moments on MythBusters,

701

00:43:20,000 --> 00:43:24,000

go to [Discovery.com slash MythBusters](http://Discovery.com/MythBusters) and check them out.