1
00:00:28,359 --> 00:00:25,659
we often take the things we use everyday

2
00:00:30,310 --> 00:00:28,369
for granted we use them and we expect

3
00:00:33,069 --> 00:00:30,320
them to work that's because they were

4
00:00:35,530 --> 00:00:33,079
tested many many times before we even

5
00:00:39,730 --> 00:00:35,540
see them would you ride in a car that

6
00:00:45,400 --> 00:00:39,740
had only been tested once puffy wouldn't

7
00:00:46,140 --> 00:00:45,410
work so well how about a toaster not so

8
00:00:49,690 --> 00:00:46,150
good either

9
00:00:52,660 --> 00:00:49,700
now what about a satellite the same

10
00:00:56,140 --> 00:00:52,670
thing applies what if we had a telescope

11
00:00:58,870 --> 00:00:56,150
that couldn't take pictures luckily NASA

12
00:01:00,310 --> 00:00:58,880
was able to put glasses on Hubble but

13
00:01:02,800 --> 00:01:00,320

it's not always so easy

14
00:01:04,539 --> 00:01:02,810
that's why engineers do their best to

15
00:01:07,599 --> 00:01:04,549
make sure things work right and we'll

16
00:01:09,609 --> 00:01:07,609
keep working for a long time and how do

17
00:01:12,840 --> 00:01:09,619
you design something that can do the

18
00:01:16,660 --> 00:01:12,850
same thing over then over and over again

19
00:01:18,429 --> 00:01:16,670
you test it before we start testing

20
00:01:20,859 --> 00:01:18,439
though we should make sure we know a

21
00:01:22,569 --> 00:01:20,869
little bit about our mission that way we

22
00:01:24,940 --> 00:01:22,579
can figure out what we're testing as

23
00:01:27,760 --> 00:01:24,950
well as what we're allowed to do to

24
00:01:30,039 --> 00:01:27,770
improve it these are called constraints

25
00:01:32,800 --> 00:01:30,049
constraints help engineers get a good

26
00:01:34,539 --> 00:01:32,810
idea of where to start for example we

27
00:01:38,270 --> 00:01:34,549
probably wouldn't want to build a lunar

28
00:01:41,480 --> 00:01:38,280
lander out of let's say bricks

29
00:01:43,609 --> 00:01:41,490
actually let's use that example we need

30
00:01:45,800 --> 00:01:43,619
to land humans on the moon we have a

31
00:01:47,719 --> 00:01:45,810
design for a lunar lander and it has to

32
00:01:50,420 --> 00:01:47,729
land safely from the same height each

33
00:01:53,859 --> 00:01:50,430
time we also have to be able to reuse it

34
00:01:56,330 --> 00:01:53,869
so let's try it out

35
00:01:59,660 --> 00:01:56,340
well that didn't work

36
00:02:01,639 --> 00:01:59,670
good thing we're just testing let's try

37
00:02:07,330 --> 00:02:01,649
it again but let's think about how we

38
00:02:13,130 --> 00:02:10,190

clothes but how can we keep it from

39
00:02:19,120 --> 00:02:13,140
tipping over at all maybe some rockets

40
00:02:24,680 --> 00:02:22,340
great now maybe you were wondering what

41
00:02:28,009 --> 00:02:24,690
the letter n was doing up in the corner

42
00:02:29,840 --> 00:02:28,019
but simply N is a variable scientists

43
00:02:32,090 --> 00:02:29,850
and engineers use this variable to

44
00:02:34,580 --> 00:02:32,100
represent the number of times we've

45
00:02:37,520 --> 00:02:34,590
tested something in our example we've

46
00:02:40,520 --> 00:02:37,530
tested our design three times so N

47
00:02:43,280 --> 00:02:40,530
equals three luckily we came up with a

48
00:02:45,410 --> 00:02:43,290
good solution some designs need to be

49
00:02:48,080 --> 00:02:45,420
tested hundreds of times before they

50
00:02:50,960 --> 00:02:48,090
work but that's okay in the end all this