1
00:00:00,000 --> 00:00:00,833
(mellow music)

2
00:00:00,833 --> 00:00:03,160
- [Narrator] If you could put
on a special pair of glasses

3
00:00:03,160 --> 00:00:05,150
and look up into the night sky,

4
00:00:05,150 --> 00:00:07,440
you would see something amazing,

5
00:00:07,440 --> 00:00:10,080
a sky full of exoplanets,

6
00:00:10,080 --> 00:00:13,830
planets orbiting stars
beyond our own solar system.

7
00:00:13,830 --> 00:00:16,420
A team of superhero space telescopes,

8
00:00:16,420 --> 00:00:19,400
in a sense, has done just that.

9
00:00:19,400 --> 00:00:21,380
Using powerful technology,

10
00:00:21,380 --> 00:00:22,900
they peered into space,

11
00:00:22,900 --> 00:00:25,490
discovering thousands
of these distant planets

12
00:00:25,490 --> 00:00:27,860
and unveiling their secrets.

13
00:00:27,860 --> 00:00:29,770
The first exoplanet discoveries

14
00:00:29,770 --> 00:00:31,490
were very down to earth.

15
00:00:31,490 --> 00:00:33,370
They were made from the ground.

16
00:00:33,370 --> 00:00:35,120
Pioneering new techniques,

17
00:00:35,120 --> 00:00:38,140
ground-based telescopes
began capturing evidence

18
00:00:38,140 --> 00:00:43,140
of giant, scorchingly hot
planets around other stars,

19
00:00:43,220 --> 00:00:45,350
but to see exoplanets more clearly,

20
00:00:45,350 --> 00:00:48,250
including small rocky worlds like our own,

21
00:00:48,250 --> 00:00:50,090
telescopes needed a boost.

22
00:00:50,090 --> 00:00:52,310
We began launching them into space,

23
00:00:52,310 --> 00:00:55,760
lifting them above Earth's atmosphere.

24
00:00:55,760 --> 00:00:58,490
This superhero team of space telescopes,

25
00:00:58,490 --> 00:01:02,400
Hubble, Chandra, Spitzer, Kepler, and Tess

26
00:01:02,400 --> 00:01:04,480
were free from all of the noise

27
00:01:04,480 --> 00:01:06,870
and interference from Earth's atmosphere,

28
00:01:06,870 --> 00:01:08,420
jittering air molecules,

29
00:01:08,420 --> 00:01:12,010
scattering light, clouds, and moisture,

30
00:01:12,010 --> 00:01:17,010
and the curtain parted on a
galaxy crowded with exoplanets

31
00:01:17,210 --> 00:01:21,640
giant ones, tiny ones, rocky and gaseous,

32
00:01:21,640 --> 00:01:24,450
deep-frozen, and superheated,

33
00:01:24,450 --> 00:01:26,770
planets with two or three suns,

34
00:01:26,770 --> 00:01:29,280
super Earths, mini Neptunes,

35
00:01:29,280 --> 00:01:31,760
and worlds that were just playing weird,

36
00:01:31,760 --> 00:01:34,390
like nothing we had ever seen before.

37
00:01:34,390 --> 00:01:38,600
And now, a new marvel of
technology joins NASA's team,

38
00:01:38,600 --> 00:01:41,060
the James Webb space telescope.

39
00:01:41,060 --> 00:01:42,840
Its infrared vision can peer

40
00:01:42,840 --> 00:01:45,500
into the atmospheres of exoplanets,

41
00:01:45,500 --> 00:01:48,590
expanding what we know
about distant worlds.

42
00:01:48,590 --> 00:01:51,460
High on a list of odd
exoplanets to observe

43
00:01:51,460 --> 00:01:56,460
is a terrifying place where
it might rain glass sideways.

44
00:01:56,700 --> 00:02:01,440
This exoplanet is called HD 189733b.

45
00:02:01,440 --> 00:02:03,110
And it's a hot Jupiter,

46
00:02:03,110 --> 00:02:05,900
a giant gaseous world that hugs it star

47
00:02:05,900 --> 00:02:08,070
in such a tight orbit that its temperature

48
00:02:08,070 --> 00:02:11,650

is more than 1,700 degrees Fahrenheit.

49
00:02:11,650 --> 00:02:16,650
Its winds howl at more
than 5,400 miles per hour.

50
00:02:17,400 --> 00:02:21,330
HD 189733b has been a favorite target

51
00:02:21,330 --> 00:02:22,980
of our space telescopes.

52
00:02:22,980 --> 00:02:25,770
Spitzer measured its
temperature and winds.

53
00:02:25,770 --> 00:02:29,520
Hubble discovered that the
planet's clouds are deep blue

54
00:02:29,520 --> 00:02:32,290
due to the raining glass or silicates,

55
00:02:32,290 --> 00:02:35,720
and Chandra observed its star and x-rays,

56
00:02:35,720 --> 00:02:37,220
watching the planet's shadow

57
00:02:37,220 --> 00:02:39,350
as it passed in front of the star,

58
00:02:39,350 --> 00:02:41,810
a much larger shadow
than previously thought

59
00:02:41,810 --> 00:02:44,300
because huge amounts of
the planet's atmosphere

60
00:02:44,300 --> 00:02:46,670
are evaporating into space.

61
00:02:46,670 --> 00:02:48,610
NASA's next great observatory,

62
00:02:48,610 --> 00:02:50,580
the James Webb space telescope,

63
00:02:50,580 --> 00:02:55,520
will also turn it
supervision on HD 189733b.

64
00:02:55,520 --> 00:02:58,630
Like Spitzer, its seasoned
powerful infrared light,

65
00:02:58,630 --> 00:03:01,710
but Webb's vision will
penetrate far more deeply

66
00:03:01,710 --> 00:03:05,540
into this planet's atmosphere
and others than ever before.

67
00:03:05,540 --> 00:03:07,590
What will it find?

68
00:03:07,590 --> 00:03:10,470
Put it all together,
and it's a super team,

69
00:03:10,470 --> 00:03:13,820
extraordinary telescopes,
exceptional vision,