1
00:00:19,650 --> 00:00:15,800
humans have always looked up at the sky

2
00:00:22,080 --> 00:00:19,660
they used astronomy to track time orient

3
00:00:24,749 --> 00:00:22,090
their cities decide when to plant their

4
00:00:27,720 --> 00:00:24,759
crops and even based their religious

5
00:00:31,500 --> 00:00:27,730
practices on their celestial world but

6
00:00:32,549 --> 00:00:31,510
there was so much more to learn in the

7
00:00:35,369 --> 00:00:32,559
16th century

8
00:00:38,090 --> 00:00:35,379
Copernicus advanced the concept that the

9
00:00:40,200 --> 00:00:38,100
Sun was the center of the solar system

10
00:00:42,990 --> 00:00:40,210
blasphemy because everyone knows that

11
00:00:45,990 --> 00:00:43,000
the earth is the center and huge models

12
00:00:49,290 --> 00:00:46,000
were built to demonstrate it on to the

13
00:00:52,170 --> 00:00:49,300

17th century where we find Galileo the

14
00:00:54,240 --> 00:00:52,180
first modern scientist using a telescope

15
00:00:57,060 --> 00:00:54,250
to look at celestial bodies

16
00:01:00,380 --> 00:00:57,070
he discovered the four brightest moons

17
00:01:03,990 --> 00:01:00,390
of Jupiter a solar system in miniature

18
00:01:07,020 --> 00:01:04,000
he also discovered sunspots and craters

19
00:01:09,540 --> 00:01:07,030
and mountains on the moon later that

20
00:01:12,600 --> 00:01:09,550
century Kepler developed the three laws

21
00:01:14,969 --> 00:01:12,610
of planetary motion and said the square

22
00:01:16,590 --> 00:01:14,979
of the orbital period is proportional to

23
00:01:20,880 --> 00:01:16,600
the cube of planets

24
00:01:22,679 --> 00:01:20,890
some imagination and scientific

25
00:01:24,740 --> 00:01:22,689
accomplishments spurred on the

26
00:01:30,340 --> 00:01:24,750
discoveries of more moons and planets

27
00:01:37,130 --> 00:01:33,770
but history took a dramatic turn on

28
00:01:40,370 --> 00:01:37,140
October 4th 1957 when the Soviet Union

29
00:01:43,990 --> 00:01:40,380
launched Sputnik 1 the first man-made

30
00:01:46,910 --> 00:01:44,000
satellite about the size of a basketball

31
00:01:49,160 --> 00:01:46,920
it caught the world's attention and the

32
00:01:52,430 --> 00:01:49,170
American public off-guard when the

33
00:01:56,240 --> 00:01:52,440
Soviet Union launched Sputnik 2 the

34
00:01:59,080 --> 00:01:56,250
score was the Soviet Union to the United

35
00:02:01,389 --> 00:01:59,090
States zero

36
00:02:03,340 --> 00:02:01,399
but three months later the United States

37
00:02:05,529 --> 00:02:03,350
joined the race when it launched

38
00:02:07,710 --> 00:02:05,539

Explorer one which discovered the

39
00:02:10,150 --> 00:02:07,720
radiation belts around the earth

40
00:02:11,920 --> 00:02:10,160
surprisingly sputnik's greatest

41
00:02:14,020 --> 00:02:11,930
achievement was that it would lead to

42
00:02:16,210 --> 00:02:14,030
the creation of the National Aeronautics

43
00:02:19,479 --> 00:02:16,220
and Space Administration with the

44
00:02:22,530 --> 00:02:19,489
signing of the Space Act in July 1958 a

45
00:02:24,970 --> 00:02:22,540
new era of political military

46
00:02:28,449 --> 00:02:24,980
technological and scientific endeavors

47
00:02:31,300 --> 00:02:28,459
had begun discoveries now leapt forward

48
00:02:35,080 --> 00:02:31,310
with tremendous energy during 50 years

49
00:02:37,930 --> 00:02:35,090
in space many may argue that the 20th

50
00:02:39,759 --> 00:02:37,940
century was the Information Age but one

51
00:02:42,160 --> 00:02:39,769
could also argue that it was the

52
00:02:46,569 --> 00:02:42,170
aerospace age brought about through

53
00:02:49,119 --> 00:02:46,579
aviation rocket and space pioneering the

54
00:02:53,050 --> 00:02:49,129
era of human exploration began with Yuri

55
00:02:55,780 --> 00:02:53,060
Gagarin's flight in 1961 in the United

56
00:02:58,900 --> 00:02:55,790
States Project Mercury was initiated in

57
00:03:01,960 --> 00:02:58,910
1958 and three weeks after the Garen's

58
00:03:06,069 --> 00:03:01,970
flight Alan B Shepard jr. became the

59
00:03:08,170 --> 00:03:06,079
first American to fly into space project

60
00:03:10,780 --> 00:03:08,180
Gemini was the second human spaceflight

61
00:03:13,509 --> 00:03:10,790
program it made twenty flights including

62
00:03:14,400 --> 00:03:13,519
two unmanned flights to test new space

63
00:03:17,170 --> 00:03:14,410

equipment

64
00:03:19,589 --> 00:03:17,180
President Kennedy however was not

65
00:03:21,759 --> 00:03:19,599
content with just these achievements I

66
00:03:25,479 --> 00:03:21,769
believe that this nation should commit

67
00:03:28,120 --> 00:03:25,489
itself to achieving the goal before this

68
00:03:30,220 --> 00:03:28,130
decade is out of landing a man on the

69
00:03:33,370 --> 00:03:30,230
moon and returning him safely to the

70
00:03:36,159 --> 00:03:33,380
earth the Apollo program began with the

71
00:03:39,159 --> 00:03:36,169
tragedy when a flash fire in the command

72
00:03:41,620 --> 00:03:39,169
module during the launch pad test killed

73
00:03:44,500 --> 00:03:41,630
three astronauts the

74
00:03:47,620 --> 00:03:44,510
subsequent redesign produced a safer and

75
00:03:50,620 --> 00:03:47,630
superior series of spacecraft for the 45

76
00:03:54,910 --> 00:03:50,630
astronauts that flew in them 12 men

77
00:03:56,950 --> 00:03:54,920
would eventually walk on the moon also

78
00:03:59,650 --> 00:03:56,960
memorable was the apollo-soyuz test

79
00:04:02,670 --> 00:03:59,660
project when the two superpowers on

80
00:04:04,570 --> 00:04:02,680
earth joined in space with a handshake

81
00:04:08,280 --> 00:04:04,580
representing the partnership between

82
00:04:10,660 --> 00:04:08,290
Russian Soyuz and the Apollo astronauts

83
00:04:13,720 --> 00:04:10,670
Skylab was then developed for

84
00:04:15,880 --> 00:04:13,730
long-duration space travel and to expand

85
00:04:18,850 --> 00:04:15,890
our knowledge of solar astronomy beyond

86
00:04:21,610 --> 00:04:18,860
earth-based observations a space shuttle

87
00:04:24,690 --> 00:04:21,620
has dominated American human spaceflight

88
00:04:27,640 --> 00:04:24,700

since it was launched on April 12th 1981

89
00:04:29,740 --> 00:04:27,650
the technology developed for its many

90
00:04:32,140 --> 00:04:29,750
missions the gyrations of its

91
00:04:34,510 --> 00:04:32,150
manipulator arm and its service

92
00:04:36,430 --> 00:04:34,520
capabilities for payloads such as the

93
00:04:40,840 --> 00:04:36,440
Hubble Space Telescope and the space

94
00:04:42,940 --> 00:04:40,850
station have been phenomenal today the

95
00:04:45,240 --> 00:04:42,950
International Space Station is the most

96
00:04:49,420 --> 00:04:45,250
complex engineering and construction

97
00:04:52,420 --> 00:04:49,430
project in the world 16 countries and

98
00:04:56,410 --> 00:04:52,430
over 100,000 people are involved in this

99
00:04:58,960 --> 00:04:56,420
monumental achievement yes space travel

100
00:05:01,060 --> 00:04:58,970
may have started with a race but look

101
00:05:04,000 --> 00:05:01,070
what was discovered and developed in

102
00:05:06,520 --> 00:05:04,010
those 50 years balloons and rockets

103
00:05:08,710 --> 00:05:06,530
carried small scientific payloads space

104
00:05:10,930 --> 00:05:08,720
communications and navigation satellites

105
00:05:13,990 --> 00:05:10,940
evolved to highly successful Global

106
00:05:16,150 --> 00:05:14,000
Positioning System satellites provided

107
00:05:19,870 --> 00:05:16,160
data for weather forecasting beginning

108
00:05:21,820 --> 00:05:19,880
with Tyros in 1962 going beyond weather

109
00:05:24,900 --> 00:05:21,830
satellites were developed to study

110
00:05:28,730 --> 00:05:24,910
Earth's atmosphere its hydrology cycle

111
00:05:30,620 --> 00:05:28,740
meteorology climate oceans and cries

112
00:05:33,200 --> 00:05:30,630
and let's not forget about that great

113
00:05:35,720 --> 00:05:33,210

ball of fire in the sky including not

114
00:05:38,720 --> 00:05:35,730
only its complex interior and surface

115
00:05:41,660 --> 00:05:38,730
sunspots but also its flares and coronal

116
00:05:43,880 --> 00:05:41,670
mass ejections many questions about the

117
00:05:47,030 --> 00:05:43,890
complex relationship between the Sun and

118
00:05:49,520 --> 00:05:47,040
the earth remain to be answered solar

119
00:05:51,740 --> 00:05:49,530
system exploration and mapping began

120
00:05:55,460 --> 00:05:51,750
with missions to our moon then Venus

121
00:05:58,220 --> 00:05:55,470
Mars mercury Jupiter Saturn Titan Uranus

122
00:06:00,140 --> 00:05:58,230
Neptune Pluto and comets several

123
00:06:04,100 --> 00:06:00,150
landings have taken place on Venus and

124
00:06:05,810 --> 00:06:04,110
Mars and even on an asteroid scientists

125
00:06:08,090 --> 00:06:05,820
now have a greater understanding of

126
00:06:10,760 --> 00:06:08,100
space astronomy but we are still

127
00:06:13,210 --> 00:06:10,770
learning about comets black holes

128
00:06:16,280 --> 00:06:13,220
gamma-ray bursts neutron stars

129
00:06:18,830 --> 00:06:16,290
supernovas gravity waves galaxies and

130
00:06:20,480 --> 00:06:18,840
galaxies streams dark energy the

131
00:06:26,150 --> 00:06:20,490
structure and evolution of the universe