

1
00:00:08,400 --> 00:00:13,059
infrared light as its name suggests is

2
00:00:11,320 --> 00:00:15,820
the portion of the electromagnetic

3
00:00:13,058 --> 00:00:18,669
spectrum beyond the red end of visible

4
00:00:15,820 --> 00:00:20,618
light its wavelengths start at 700

5
00:00:18,669 --> 00:00:22,480
nanometers and extend more than a

6
00:00:20,618 --> 00:00:25,259
thousand times larger to one millimeter

7
00:00:22,480 --> 00:00:29,019
where the microwave region begins

8
00:00:25,259 --> 00:00:31,920
infrared light is heat radiation it can

9
00:00:29,019 --> 00:00:36,189
show you that these zebras are indeed

10
00:00:31,920 --> 00:00:38,920
warm-blooded animals in contrast this

11
00:00:36,189 --> 00:00:41,469
blue is a snake wrapped around someone's

12
00:00:38,920 --> 00:00:44,980
forearm and the snake is a cold-blooded

13
00:00:41,469 --> 00:00:47,259
animal now which of these cups contains

14
00:00:44,979 --> 00:00:50,739
hot liquid and which contains cold

15
00:00:47,259 --> 00:00:54,009
liquid with visible wavelengths one has

16
00:00:50,740 --> 00:00:56,500
to guess but at infrared wavelengths we

17
00:00:54,009 --> 00:00:59,890
can easily see that the hot liquid is on

18
00:00:56,500 --> 00:01:02,320
the Left infrared light is also longer

19
00:00:59,890 --> 00:01:04,838
wavelengths and those wavelengths can

20
00:01:02,320 --> 00:01:08,200
penetrate through some material such as

21
00:01:04,838 --> 00:01:11,048
through this plastic bag note however

22
00:01:08,200 --> 00:01:13,749
the gentleman's glasses glass is

23
00:01:11,049 --> 00:01:16,829
transparent at visible wavelengths but

24
00:01:13,748 --> 00:01:19,478
obviously not at infrared wavelengths

25
00:01:16,828 --> 00:01:21,158
infrared observations plate have a

26
00:01:19,478 --> 00:01:23,920
variety of applications

27
00:01:21,159 --> 00:01:26,259
wherever temperature is important such

28
00:01:23,920 --> 00:01:29,498
as in medicine energy audits and

29

00:01:26,259 --> 00:01:30,789
firefighting in astronomy infrared

30
00:01:29,498 --> 00:01:34,449
observations play a role from the

31
00:01:30,789 --> 00:01:37,868
smallest to the largest of scales the

32
00:01:34,450 --> 00:01:41,618
planet Jupiter emits infrared radiation

33
00:01:37,868 --> 00:01:44,138
these bright bands and spots show you

34
00:01:41,618 --> 00:01:47,590
where that infrared energy is escaping

35
00:01:44,138 --> 00:01:50,078
from Jupiter's atmosphere in the Eagle

36
00:01:47,590 --> 00:01:53,770
Nebula we can again compare visible and

37
00:01:50,078 --> 00:01:56,498
infrared views the infrared light passes

38
00:01:53,769 --> 00:01:58,718
through some of the gas revealing new

39
00:01:56,498 --> 00:02:01,239
details in the nebula as well as an

40
00:01:58,718 --> 00:02:05,168
amazing number of stars within and

41
00:02:01,239 --> 00:02:08,318
behind the nebula in this pillar in the

42
00:02:05,168 --> 00:02:12,370
Carina Nebula a newborn star is formed

43
00:02:08,318 --> 00:02:15,299

but we can't see it until we look in

44

00:02:12,370 --> 00:02:15,300
infrared light

45

00:02:15,979 --> 00:02:22,818
four galaxies visible light emphasizes

46

00:02:19,939 --> 00:02:25,128
these stars in the galaxy where as

47

00:02:22,818 --> 00:02:28,009
infrared light can show you the bright

48

00:02:25,128 --> 00:02:31,929
star-forming regions as well as the vast

49

00:02:28,009 --> 00:02:34,969
clouds of gas and dust between the stars

50

00:02:31,930 --> 00:02:38,000
infrared light also plays a crucial role

51

00:02:34,969 --> 00:02:40,939
in looking at the most distant galaxies

52

00:02:38,000 --> 00:02:43,370
in the universe the expansion of the

53

00:02:40,939 --> 00:02:45,530
universe stretches their light beyond

54

00:02:43,370 --> 00:02:48,849
visible wavelengths such that they are

55

00:02:45,530 --> 00:02:52,030
only observable in infrared light

56

00:02:48,848 --> 00:02:55,988
whether one is looking at planets stars

57

00:02:52,030 --> 00:02:58,430
nebulae galaxies or the distant universe

58

00:02:55,989 --> 00:03:02,170

infrared astronomy plays an important

59

00:02:58,430 --> 00:03:02,170

and often pivotal role