Chapter 13

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**Video: Black Holes**

1) In the video it is said that black holes may be the end point for stars with initial masses greater than about ______ times the mass of the Sun:
   a) 15
   b) 16 to 18
   c) 20
   d) 25
   e) 30

2) When at a point in space "everything breaks down", for example there is: infinite mass density, infinite curvature, then this point is called a:
   a) white dwarf
   b) neutron star
   c) black hole
   d) singularity
   e) quantum point

3) The video says that singularities are points where:
   a) everything breaks down
   b) nothing starts to make sense anymore
   c) mathematical equations do not give you a defined answer
   d) all the above
   e) none of the above

4) Near the black hole singularity it is believed that even light can not escape. The distance from the singularity within which even light can not escape is called the:
   a) Hawking limit
   b) event horizon
   c) radius of the singularity
   d) a) and b)
   e) b) and c)

5) Near the black hole, but outside the event horizon, is a luminous region called the:
   a) disruption domain
   b) accretion disk
   c) disruption horizon
   d) Hawking torus

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Chapter 14

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**Video: Scale of the Galaxy**

1) Even traveling at the speed of the fastest Voyager satellite, it would take about how long to travel to the nearest star (from the Sun)?
   a) 10,000 years
   b) 20,000 years
   c) 40,000 years
   d) 80,000 years
   e) 160,000 years

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Chapter 15

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**Video: Red Shift**

1) In the Khan Academy video on red shift, the drawing showed ______ wavelengths of light between the source and the observer?
   a) 1
   b) 2
   c) 3
   d) 4
   e) 5

(Note: in all cases one answer is better than all others ...)

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2) In the video the light from the moving source had a perceived:
a) longer wavelength and lower frequency  
b) longer wavelength and higher frequency  
c) shorter wavelength and lower frequency  
d) shorter wavelength and higher frequency

video: Hubble’s Law

1) In the Khan Academy video on Hubble’s Law, the drawings showed a "n x m" array of points in space at two different times. The number of points in the "n x m" array was:
a) 2 x 2  
b) 3 x 3  
c) 3 x 4  
d) 4 x 4  
e) 4 x 5

2) In defining $h_0$, the "Hubble's constant", the Khan Academy video said that $h_0$ is the Hubble's constant:
a) at time t=0  
b) at the average time (since the big bang)  
c) at January 1, 2000  
d) right now

3) The value of Hubble's constant in the Khan Academy video was:
a) 70.1 km/(sec Mpc)  
b) 70.4 km/(sec Mpc)  
c) 70.6 km/(sec Mpc)  
d) 71.0 km/(sec Mpc)  
e) 71.9 km/(sec Mpc)

4) The value for the uncertainty in Hubble's constant in the Khan Academy video was:
a) +/- 2.1 km/(sec Mpc)  
b) +/- 3.1 km/(sec Mpc)  
c) +/- 4.1 km/(sec Mpc)  
d) +/- 5.1 km/(sec Mpc)  
e) +/- 6.1 km/(sec Mpc)

video: Quasars

1) Quasars, or quasi-stellar radio sources, are thought to be super-massive black holes. And near the "event horizon" of the super massive black hole, the extremely hot material emits radiation mostly in the ___ part of the spectrum?
a) radio  
b) infra-red (IR)  
c) visible  
d) ultra violet (UV)  
e) X-ray

2) The light from MOST quasars is predominantly in what part of the electromagnetic spectrum?
a) X-ray to radio  
b) X-ray to infra-red  
c) X-ray to visible  
d) X-ray to ultra-violet

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3) Most quasars are very far away (or they only existed very long ago). In the video it was said that the closest quasar is ___ light years away?
a) 280 million light years  
b) 580 million light years  
c) 780 million light years  
d) 980 million light years  
e) 1 trillion light years

4) The super massive black hole in the center of the Milky Way may become "active" again in 4 to 5 billion years when we collide with:
a) small Magellanic Cloud  
b) large Magellanic Cloud  
c) Andromeda galaxy (M31)  
d) Triangulum galaxy (M33)  
e) Cigar galaxy (M62)