

10/30/06

Skywatch extra credit - available, grades posted

News? NASA to announce  
Tuesday whether or not to repair  
Hubble.

Pic of the day - crescent Moon and  
crescent Venus in daytime



# Skywatch Extra Credit Targets constellations only, not all visible

## Magnetar Candidates

<b>Name</b>	<b>Location</b>	<b>Rotation (seconds)</b>	<b>Year Discovered</b>
SGR 0526-66	Large Magellanic Cloud	8.0	1979
SGR 1900+14	Aquila	5.16	1979
SGR 1806-20	Sagittarius	7.56	1979
SGR 1801-23	Sagittarius	-	1997
SGR 1627-41	Ara	6.4	1998
AXP 1E 2259+586	Cassiopeia	7.0	1981
AXP 1E1048.1-5937	Carina	6.4	1985
AXP 4U 0142+61	Cassiopeia	8.7	1993
AXP 1RXS J170849-400910	Scorpius	11.0	1997
AXP 1E 1841-045	Scutum	11.8	1997
AXP AX J1844-0258	Aquila	7.0	1998
AXP CXOU J010043.1-721134	Small Magellanic Cloud	8.0	2002
AXP XTE J1810-197	Sagittarius	5.5	2003
AXP CXO J164710.2-455216	Ara	10.6	2005

Balloon - what is a straight line, what is not?

What is “inside?” What is “outside?”

What does it mean to go from surface point to surface point “through” the balloon interior?

Real 3 D curved space (for us!!) might curve in a 4 D “hyperspace,” but we do not directly perceive that hyperspace.

Can determine curvature, shape of 3 D real space by doing 3 D geometry.

Do not need to ask about 4 D (but will!)

***Embedding diagram*** - 2 D “shadow” of 3 D curved space, preserves basic aspects of geometry, whether curved or not, and, if curved, how.

Meaning of ***flat space*** in 3 (or higher) dimensions

If 3 D space is flat  $C=2\pi r$ ; sum of angles of triangle =  $180^\circ$ ; parallel beams of light never cross ***in 3D***.

***The embedding diagram of 3D flat space is a flat 2D plane***

In curved 3D space, the flat space answers will be wrong: 2D embedding diagram will help to illustrate that.

## One Minute Exam

In a curved space

- A) Straight lines always connect to themselves
- B) Straight lines are the shortest distance between two points
- C) There are no straight lines
- D) The sum of the interior angles of a triangle is 180 degrees

Invert balloon - 2 D embedding diagram of curved 3 D space around gravitating object

Properties of this curved space that are preserved in the embedding diagram:

$$C < 2\pi r$$

Sum of angles of triangle not equal  $180^\circ$  (can be  $>$  or  $<$ )

Parallel lines diverge or cross