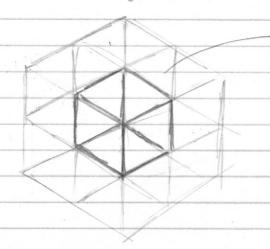
we first note that 360°/30° = 12. That is, if we evaluate assimilar and altitude parameters at 30° intervals, it would take 12 readings to obtain a complete circle around the sphere. Since this is symmetrical, to answer the question, we divide the sphere into 8 part in 3-Directional space, so we simply evaluate number of brangles in 1/8 of sphere, then multiply by 8 to get number of brangles in sphere.



Evaluate 8

corner of

sphere that
would fit in
this cube.

That is, we need to consider 3 altitude and 3 arimuth not counting starting position.

readings of There are I asimuth readings for every altitude reading not at the north south pole. This means we have $3\times2=6$ quadrilaterals \rightarrow 12 triangles. We also have 3 have triangles extending from the pole. That is, we have 15 triangles in 18 of sphere, so we have $15\times8-120$ triangles in the sphere.

The smallest triangle would be the one formed near the poles, whereas the largest triangle would be near the "equator", we use a unit rector to compare ratios.

We how determine parition weeks of any arbitrary small transfer and large transfer using r-1 and changing & and &

Hilbroy

Small triangle how first point at pole (0,0,1). Second point is changing altitude θ to 30° , given $(\sin(30)\cos(0), \sin(30)\sin(0), \cos(30)) = (\frac{12}{2}, 0, \frac{13}{2})$. Third point is at asimuth of 30° from second to $(\sin(30)\cos(30), \sin(30)\sin(30), \cos(30)) = (\frac{13}{4}, \frac{14}{4}, \frac{13}{2})$.

Targe triangle has first point at 60° attitude, which give $(\sin(60)\cos(0), \sin(60)\sin(0), \cos(60)) = (73/2, 0, 1/2).$ Second point at 30° asimuth from first is $(\sin(60)\cos(30), \sin(60)\sin(30), \cos(60)) = (3/4, 73/4, 1/2).$ Third point is 30° attitudes from second, so $(\sin(90)\cos(30), \cos(90)) = (73/2, 1/2, 0).$

To summontee, small trangle coordinate at (0,0,1), (12,0, 13/2).

and (13/4, 1/4, 13/2), large trangle coordinate at
(13/2,0,1/2), (3/4, 13/4, 1/2) and (13/2,1/2,0).

we now take & of magnitude of inverproduct to get

Small: || AB x A(|| /2 = || (1/2, 0, \f3/2-1) \times (\f3/4, 1/4, \f3/2-1) || /2
= || (12-\f3)/8, \family \gamma - \f3/2, \family \gamma) || /2
= \familis (12-\f3)/8 \times 0.0648602

Large = 11 AB x A C 11/2 = 11 (3/4-13/2, 13/4, 0) x (0, 1/2, -1/2) 11/2 = 11 (-13/8, 3/8-13/4, 3/8-13/4) 11/2 = 145-2413 (16 2.115765

A, B, C denok

new point

on large

trangle

Ratio of smallest + largest = .0648602 /.115765

The ratio between the involvent triangle to the langest is approximately 0.560:1.

Hilroy

We note that the contestan wordinates x, y, 2 are given by 7 = rsin(0) (0) (x: rsin(0) 5m(0), y = rcos(0), Thus, we have z = 4 sin (60°) (05(135°) = X = 4 5m (60°) 8m (135°) = 16 y= .4cos (60°) The converge parition in (x, y, 2) courdinals is therefore we rok that is is simply the normalized unit vector of the position vector. That is, it becomes (\$\frac{13/2}{2} \) 1/2, -\frac{13/2}{2}) The up vector is (0,1,0) We can use this to find cx, which is the con product of up x cz $(0,1,0) \times (\frac{13/2}{2},\frac{1}{2},-\frac{13/2}{2}) = (-\frac{13/2}{2},0,-\frac{13/2}{2})$ Normalized, cx = (-1/12, 0, -1/12) We can find cy, which is the cross product of cz x Cx = (-13/2 /3, -15/2) x (-1/12, 0, -1/12) = (-1/2/2, 13/2, 1/2/2) Therefore the three camera frame bain vectors are cx= (-12/2, 0, -12/2), cy= (-1/212, 13/2, 1212.) and c2= (13/2, 1/2, -13/2) when expressed as measures in the world frame basis To determine MW, we compose the rotation and 3. A. translation to obtain CMW = negative of position camera. -1/TZ 0 -1/TZ 0 100-16 010-2 1 16

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Hibrory

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	sin 45 cos 45 0 0 12 = 1
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North St. Committee Commit	0 0 0 1 1 1
	Now, Since this is the point P on surface expressed in world
	Frame, the light direction of comes from finding the
	vector from point P to light source, which is
,	o G O This is the tight direction vector
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	O O to camera frame coordinates we
	1 [1] 6] Apply MW from Part 3A to get
	1.0
	-1/20-1/20 0 This is
	-25 1/2 252 0 -1 = -13/2 the light direction
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	(remove the O)
Ь.	The state of the s
Q-	The view direction rection storts at point P and points in direction
	e. This is in the direction of the comera, which we found
,	cartesian coordinate for in 2A. So, the view direction vector becomes
	To 0 This is the view direction
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- 5. A. We have 27.3 days required for a foll 360° rotation around

 the Earth by the moun. Since I second of animation corresponds

 with I day of real time, this means the animatel mon

 travels full 360° in 27.3 seconds. Since we have 60 frames

 per second, we need a total of 60 x 27.3 = 1636 frames.

 Thus, we need to rotate 360/1638 degrees per frame, which

 is around 0.2198 degrees per frame.
 - The perceived orbital period would result from adding the conhibutions in rotation from both the sun and the Earth. Since the Carth has an orbital period of 365 days, this means it makes a 360/365 degree rotation each day. Similarly, the sun makes a 360/25.4 degree rotation each day. Adding this means a total of 360/365 + 360/35.4 = 140544 9271 \$ 15.16 rotation each day. Adding this means a total of day. 360/15.16 = 23.75. Thus, the perceived orbital period of the Earth would be approximately 23.75 days. In our program, the orbital period would therefore be around 23.75 seconds.