AST101: Time/Date practice problems

On March 21, the local mean solar time (LMT) is 11 am. Find the local sidereal time (LST).

At 11 am LMT, the sun's local hour angle (LHA) is -1h, that is, the sun ($\odot$) is 1h left (east) of the local meridian. You can visualize the situation by remembering that the sun is on the meridian at local noon (12h) or by using the formula (definition) for LMT:

LMT = LHA + 12h
or LHA = LMT - 12h
so LHA = 11h - 12h
= -1h

On March 21 the sun's RA = 0h

The RA at the sun's position is 0h, so the RA on the local meridian (1h west of the sun) must be 23h. The RA on the meridian = LST, so LST = 23h. If you prefer using a formula, this one will work:
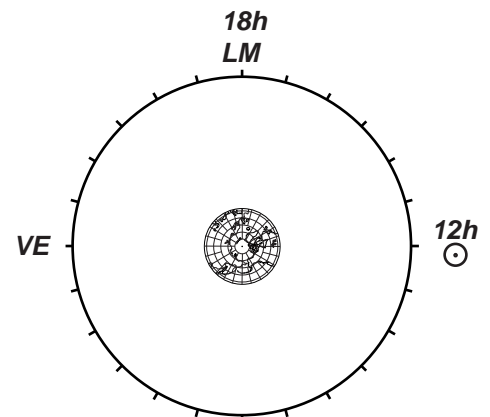
LST = sun's RA + sun's LHA
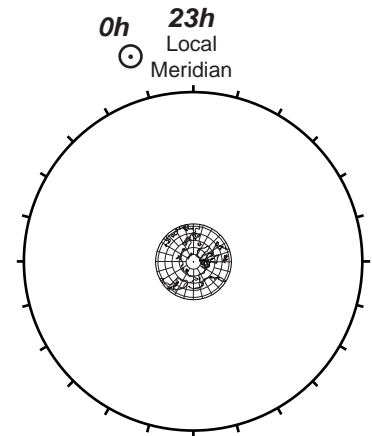
An object which has an RA = 18h is transiting. On September 23, what is the approximate mean solar time (LMT)?

LST = 18h

RA of the sun on Sept 23 = 12h

The LHA of the sun is +6h (6h right (west) of the meridian). Therefore the mean solar time will be approx. 6 pm. Using the formula:

LMT = LHA +12h
= 6h + 12h
= 18h
= 6 pm

The sidereal time = 17h and the mean solar time = 8 pm. What's the approximate date?

LST = 17h

LMT = 8 pm or 20h. Therefore the sun is 8h west of the meridian. By the formula:

LHA = LMT -12
LHA = 20 -12
= +8h (+ means to the right or clockwise)

The sun's RA = 9h, since it's 8h to the right of 17h.

The sun's RA is 9h around August 7