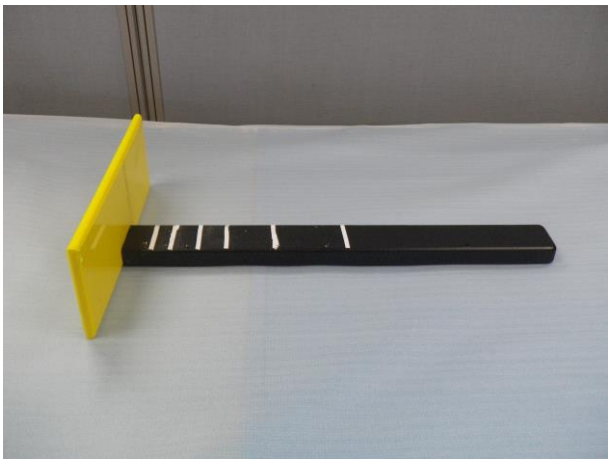
T Bar Sundial - Teacher's Notes

T Bar Sundial

Solar hours are estimated by dividing daylight by twelve.



Paintings of T bar sundials were found on tomb walls in the pyramids. They were made of wood, would have been inexpensive to make and light enough to carry about on worksites. They were used by Egyptian work overseers to measure out the working hours of slaves and peasants. Hours were marked by holes drilled on the position of the shadow on the long arm. Only six marks were necessary as at midday when the sun was overhead, there was no shadow. The sundial was reversed at midday to measure the shadow as it moved over to the other side. These measured twelve solar hours which are of different lengths at different times of the year.

A copy can be made of cardboard or thick paper. A ruler makes a good pattern for the long arm.

Materials

- A ruler and pencil
- Cardboard (old boxes are great)
- Scissors
- Masking tape or sticky tape
- Pencil or chalk

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- A magnetic compass, mobile phone compass app or a school map to estimate an east to west direction.

Method

1. Use your ruler to outline a strip of card about 20cm long and cut it out.
2. Cut out a 5cm square of cardboard and stick it onto the end of the strip so that it covers the last 5cm of the strip.
3. Then fold it at right angles to a T shape so it looks like the photograph above.
4. Set it with the T running east to west.
5. Using a standard clock mark the hourly divisions along the long arm

What is a solar hour? One twelfth of daylight on that day
What does your sundial measure? The movement of a shadow along the bar
What are the advantages of this over the stone or clay nodal sundial? It is easier and cheaper to make and is easier to carry around
What is the smallest fraction of one hour that you can measure accurately using this? Early in the day and late at night you can measure quarter hours but near noon only half hours because the hour marks are so close together.

Extra for experts

On sailing ships fresh water was kept in wooden casks and often drinking it could be a health hazard. In Royal Navy ships captains had casks of rum for drinking. The officers drank tots neat and the sailors had watered rum. The addition of alcohol made the water safer to drink.

Using what we have just learned, why would sea captains wait until the sun was over the topmost yardarm to break out the rum ration and let the sailors stand easy on deck? The ship's yardarm was used like the T bar to

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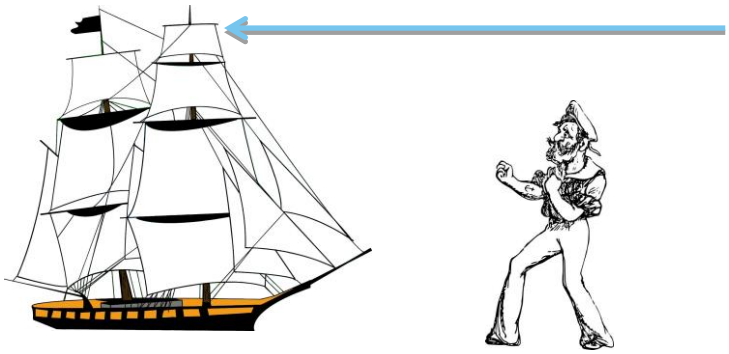
tell the time. On the North Atlantic in summer the sun would "cross" over this at about 11am when half the working day was already over. This way, if the sailors became drunk and difficult to handle they would only have to be controlled until dark when everything quieted down. "Oh what shall we do with the drunken sailor?"



Topmost yardarm

Yardarms are horizontal spars from which sails are set

Students may know the sea shanty "What shall we do with the drunken sailor". It was used to keep sailors pulling or walking ropes in unison.

Chorus: Hoorah! And up she rises [three times, appears before each verse]
Early in the morning.
What shall we do with a drunken sailor? [three times]
Early in the morning.
Put him in the long-boat and make him bail her.
Early in the morning.
What shall we do with a drunken soldier?
Early in the morning.
Put him in the guardroom till he gets sober.
Early in the morning.