

Tides



Photo: Bill Parker



The Suffolk Coast and Heaths
- An Area of Outstanding Natural Beauty

Tides

Tides cause a change in the sea's water level, typically reaching a high and low level twice a day and usually occurring about six hours apart. The period between a high and a low tide is called the "ebb tide" and the period from low to high tide is called the "flood tide".

Tides result from the pull of gravity:

- from the earth
- between the earth and moon
- between the earth and the sun.

The earth's surfaces are naturally pulled towards the moon and the sun. This force has little effect on land masses but has an enormous effect on the earth's oceans and seas.

The gravitational pull of the sun on the earth is about 178 times stronger than the gravitational pull on the earth from the moon. However, the moon has the greatest influence on the tides. This is because the moon is four hundred times closer to the earth than the sun, and the gravitational pull by the moon is over twice that of the sun.

The oceans and seas are also affected by the force (a 'centripetal' force) created by the spinning of the earth. This has the tendency to 'throw' the water away from the surface in the way people are pushed out on a rotating fairground ride. The earth's gravity ensures no water is actually lost from the sea.

These forces create two types of tides:

- High
- Low

As the moon revolves round the earth, its gravitational force pulls on the oceans and seas nearest to the earth, creating an outward 'bulge'. There is a similar 'bulge' on the opposite side of the earth, caused by the oceans' waters being thrown outwards as the earth spins. The bulges draw water away from the areas less affected by the forces and these areas experience a low tide. As the earth spins, the areas of high tide and low tide move around the globe. There are usually two high and two low tides occurring within a period of 24 hours and 50 minutes, the time it takes the moon to revolve around the earth.

Tides

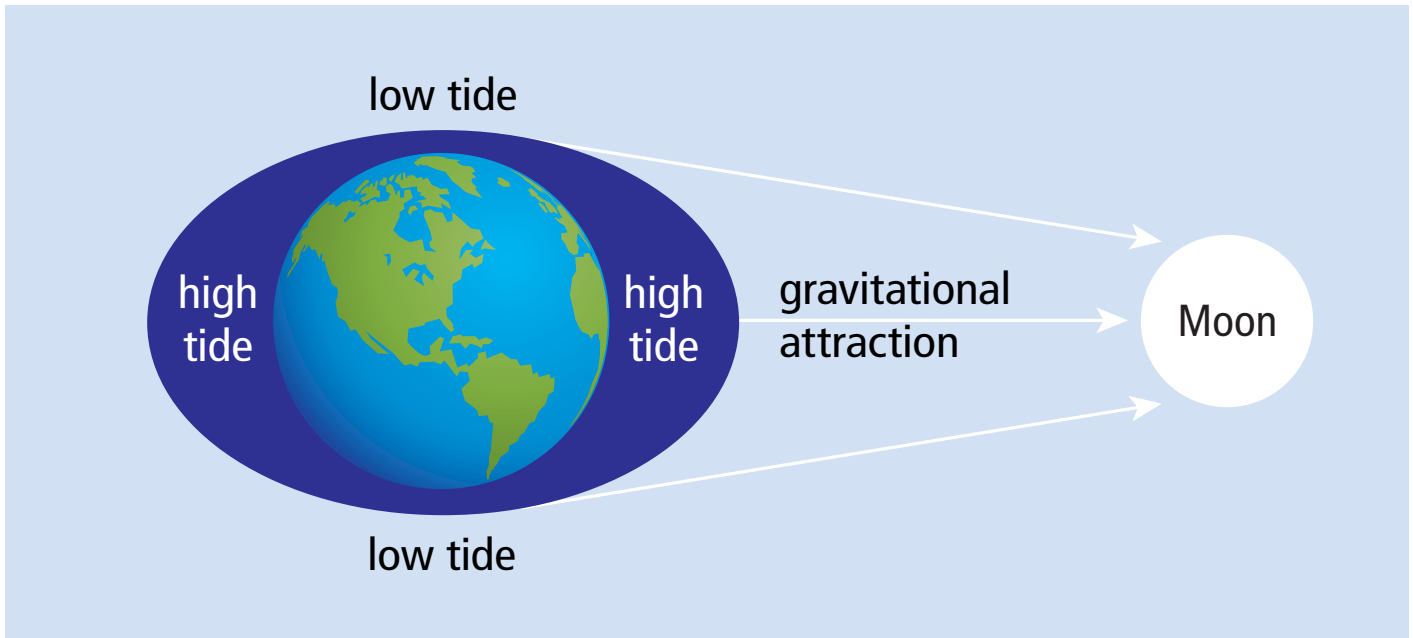
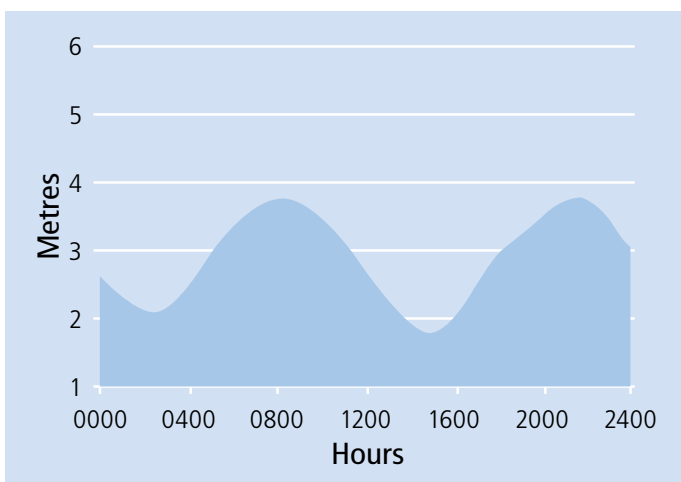


Diagram showing the gravitational pull of the moon.

However, the change in the height of the water level with the daily tides differs from location to location due to many factors. The oceans, seas and shorelines have complex shapes and the depth, and configuration, of the sea floor varies considerably. As a result, some parts of the world only experience high and low tide once each day - called a diurnal tide. Other parts of the world experience high and low tides twice daily: a semi-diurnal tide. Some parts of the world have mixed tides, where the difference in successive high-water and low-water times is markedly varied.

The height of a tide at any location can be predicted in advance. Graphs like this can be calculated for any port - this one shows tidal rise and fall in metres over a 24 hour period.



Time (GMT)	Tide Type	Height (metres)
0225	Low	2.1
0815	High	3.8
1443	Low	1.8
2125	High	3.8

The height of the tides is shown relative to local chart datum (approximately the lowest level due to astronomical effects and excluding meteorological effects). The height will vary tide by tide. The UK Hydrological Office calculates the predicted height but the actual height will be influenced by the atmospheric and weather conditions on the day.

The biggest spring tides usually occur at the equinoxes when the new and full moons (around 21st March and the 23rd September) are closest to the earth, therefore exerting the strongest gravitational attraction.

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Spring tides

When there is a full or new moon, the earth, the sun and moon are in a straight line, and their gravitational pull combines and produce what are termed spring tides. At this time a higher tidal range will occur (the high tides are very high and the low tides very low).

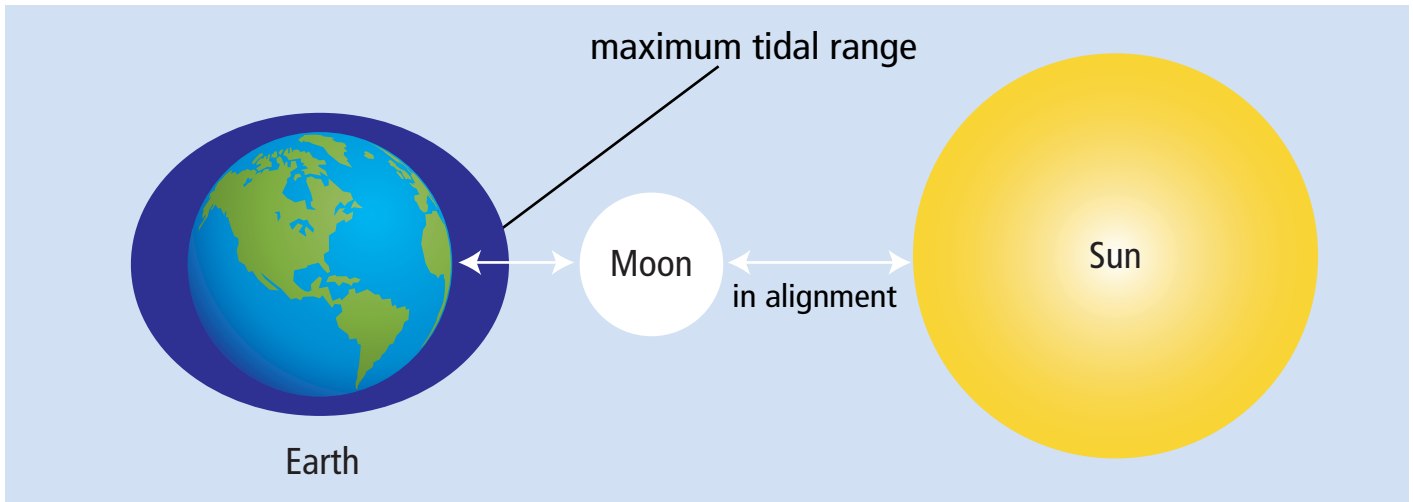


Diagram illustrating spring tides.

Neap tides

When the sun and moon form a right angle with the earth, during the quarter phases of the moon, the gravitational pull on the oceans is less, producing a smaller difference between high and low tides - a lower tidal range occurs. These are known as neap tides.

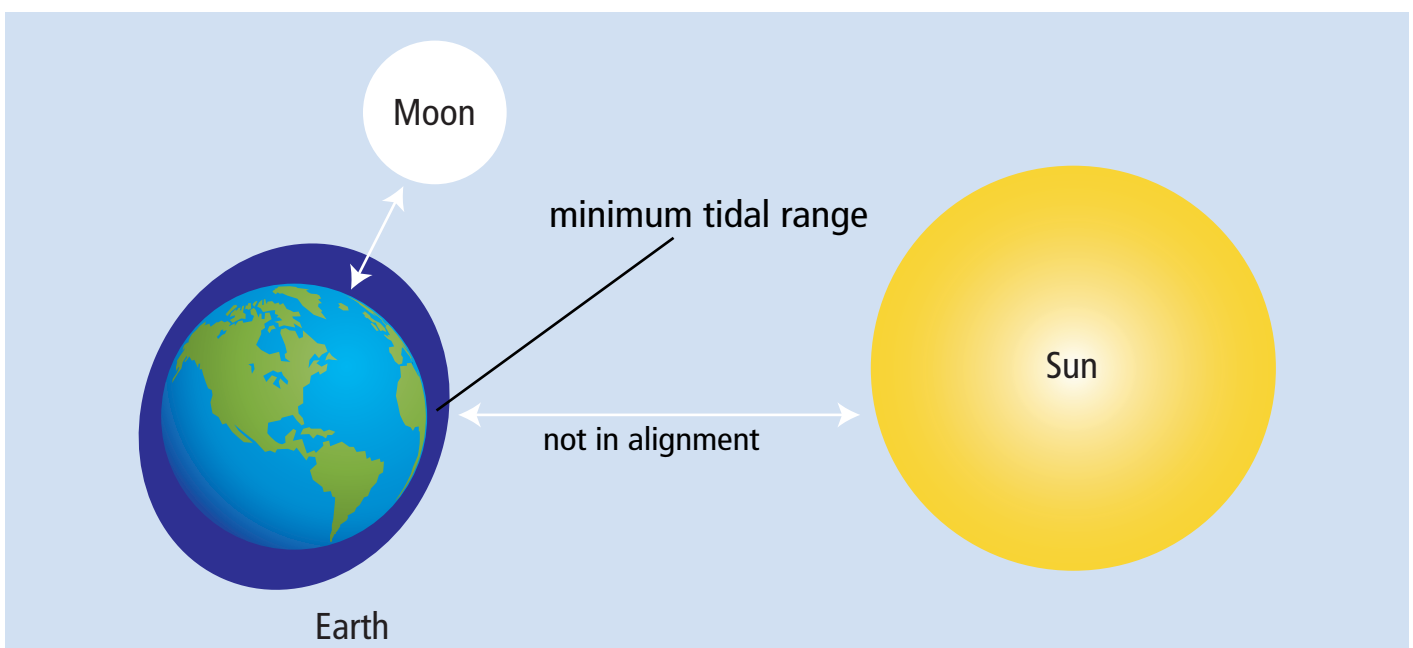


Diagram illustrating neap tides.