Tides are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the Moon and the Sun.

Since antiquity, people have noticed that oceans exhibit a much greater tidal range or spring tide around the time of the full moon and new moon. This is when the Moon and Sun are either together in the sky or are on opposite sides of the heavens. Higher tides occur during these Moon phases because the Sun also exerts a gravitational pull on our oceans, although it is only 46 percent as strong as the Moon's gravity.

When the gravitational effects of the Sun and the Moon combine, we get spring tides, which have nothing to do with the season of spring. Spring tide happens during full moon and new moon where the Sun and moon are at straight angle or 180 degrees. These are times of high-high tides and low-low tides. A week later, during either of the two quarter Moon phases, when the Sun and Moon are at right angles or 90 degrees to each other and their tidal influences partially cancel each other out, neap tides occur, and the tidal range is minimal. In fact, because the oceans take a bit of time to catch up to the geometry of the Moon, spring and neap tides usually occur about a day after the respective lunar cycles.

The tide moves a huge amount of water twice each day, and harnessing it could provide a great deal of energy.

Although the energy supply is reliable and plentiful, converting it into useful electrical power is not easy. There are eight main sites around Britain where tidal power stations could usefully be built, including the Severn, Dee, Solway and Humber estuaries. Only around 20 sites in the world have been identified as possible tidal power stations. A few years ago, "tidal power" meant "tidal barrage", but these days there are other options as well.

How it works: Tidal Barrages

These work rather like a hydro-electric scheme, except that the dam is much bigger. A huge dam (called a "barrage") is built across a river estuary. When the tide goes in and out, the water flows through tunnels in the dam. The ebb and flow of the tides can be used to turn a turbine, or it can be used to push air through a pipe, which then turns a turbine. Turbines convert mechanical energy to chemical energy. When high tide comes the water flows through a canal with propeller equipped turbine. The flowing water propels the propeller and the turbine produce electricity. The same thing happens when the water ebbs back to the sea. This process of harnessing energy is called sustainable energy because it is renewable and does not harm the environment.

http://www.almanac.com/content/spring-tides-neap-tides http://www.darvill.clara.net/altenerg/tidal.htm
http://www.earthonlinemedia.com/ebooks/tpe_3e/coastal_systems/spring_neap_tides.html
Clarifying Questions:

1. Define Tides.

2. When are tides great or very high?

3. Why are tides higher when the Moon and Sun aligned?

4. Which has a stronger influence on tides? Remember! It may take 76 million moon to fill up the Sun but the moon is very near Earth.

5. When do we have Spring Tides?

6. When do we have Neap Tides?

7. Spring tide happens when the alignment of the Sun-moon-earth is ______ degrees or straight angle while during neap tide the alignment is ______ degrees or right angle.

8. What is tidal power? Think!

9. What is a turbine?

10. How are tides used to produce electricity?

11. Why is tidal energy considered as sustainable energy?

12. Use the boxes below to draw the positions of the Sun-moon-earth during spring and neap tide.

   Spring tide

   Neap Tide

13. Why is spring tide called high-high tide? Observe and think!

14. How many high tides and low tides do we have each day?
A. two high tides and two low tides
B. 1 high tide and three low tides
On average four tides occur in a 24 hours period. Two low and two high ones. First higher one is caused by gravitational force of the moon pulling the ocean's water toward the moon. The second lower high, happening after a lower low one, is the effect of water rebounding, similar to rebounding experienced by pendulum of a clock. Due to gravity pendulum is forced to return to the original position, and overshoots because of its mass and velocity (check inertia term in answers.com).