

## Christiaan Huygens 1629 - 1695

Huygens is known as the inventor of the pendulum clock. In the last days of 1656 he showed how a pendulum can be driven by 'wheel-work', and how at the same time the wheel-work can be regulated by the pendulum's regular swing. He used a trick - a trick that made him famous in his century.

After 3 centuries we prefer to remember Huygens as the discoverer of the law of centrifugal force. He was aware of such a force in the circular motion of the pendulum and wanted to understand it. In his treatise of November 15th, 1659, we find his result that the force is proportional to the square of the velocity and inversely proportional to the circle radius. Familiar, isn't it? But important! Here we see a force defined, for the first time in history, and given as an acceleration, more than 5 years before Newton came to the same conclusion.

Huygens should also be remembered as the inventor of a principle in the kinetics of waves: *each* point of a wave front acts as the centre of a secondary wave, and the secondary waves add up in their envelope, which is the new wave front. We still call it the 'Huvgens principle'. He found the decisive proof of its validity in the explanation of double refraction of light on August 6, 1677. Another reason to remember him is his discovery of Saturn's rings and its major satellite, Titan, in the springtime of 1655.



Huygens was the inventor of the pendulum clock



In 1666, when the quality of his work was widely recognized, he got a job as a member of the French Academy of Science. So he moved to Paris, advised on technical projects, lectured about his theories, published a grand book on the clock ('Horologium oscillatorium'), corresponded with men abroad like Hooke, Leibniz and Newton and became, in short, the dean of European science. But he could not be happy with his fame in Paris. Quite often he left for The Hague and stayed there a year, or longer, to recover from his deep melancholies. The war of France with Holland (1672 - 1678) didn't do much good either. When he left France in 1681 it turned out to be for good, since this time, as a Protestant, he was not called back.

Huygens had an eye for women but never married. He seems to have been small. Portraits show a handsome face with quiet eyes. He could be angry though : 'I dislike being attacked by a blockhead' he wrote when someone had dared to criticise 'Horologium oscillatorium'. Other letters show a witty man. He shaped and molded the text of his letters as if he were grinding a lens. The mastery of mathematics gave him access to the physical world, the mastery of his passions gave him access to himself.



He discovered Saturn's rings and its satellite Titan



All Huygens's major work was done in The Hague, where he was born and died. His father was wealthy, being a diplomat of the Dutch Republic and councillor of the House of Orange. His mother, who died from an infective disease after the birth of her fifth child (Christiaan being her second), was good in accountancy. As a quiet lad he visited Leiden to learn Cartesian mathematics, then he obediently went back to his father's mansion and waited there for the job, as lawyer or diplomat, that never came, meanwhile enjoying the free decade of his genius (1650

C.D.A.