

Sir Isaac Newton

(1642 - 1727)

A Scientific Genius



Isaac Newton is well known as one of the greatest scientists who ever lived. Less well known is his deep belief in God and his conviction that scientific investigation leads to a greater knowledge of God the Creator of the universe.

EARLY STRUGGLE

Isaac Newton was born at Woolthorpe, Lincolnshire, England on Christmas Day 1642. On that cold winter night, the sick, premature baby seemed unlikely to live. Gradually, however, he gained strength to survive. But Isaac's first few years were a struggle. His mother had become a widow two months before Isaac was born. Even with the help of her own mother, she had difficulty caring for Isaac in addition to running their farm while the Civil War in England raged around them.

Several years later, his mother married the minister from nearby North Witham, but Isaac remained at Woolthorpe with his grandmother. As he grew, however, he visited his mother frequently. He eagerly read books from his stepfather's well stocked library, in addition to reading the Bible regularly.

Isaac attended school at King's College in nearby Grantham. Rather than playing outdoor games as a boy, he preferred to make models of such things as windmills and carts. Not only were these in exactly the right proportions, but all of the moving parts actually worked.

Isaac's mother was widowed for the second time when he was 14 years old. Isaac was taken out of school to run the family farm to support his mother and her three younger children. However, Isaac missed his studies greatly and his mother recognised this. When King's College offered to waive tuition fees because of his ability and poor circumstances, Isaac returned and completed his schooling. Teachers and other students were impressed with the boy's knowledge of the Bible.

INTENDED TO BECOME MINISTER

Isaac then went to Trinity College at Cambridge University with the intention of becoming a Church of England minister. Again, life was not easy for him. As he was unable to afford the tuition fees, he worked many hours each day serving

meals and doing other jobs for the professors in order to pay his way. Isaac's knowledge of the Bible continued to impress those around him.

At that time the ideas of the ancient Greek scholars still dominated what was taught in science, and recent scientific discoveries were largely ignored. This greatly annoyed Isaac Newton who firmly believed that ideas in science should be tested and only accepted if their usefulness could be demonstrated. He was committed to the experimental method of science.

Isaac graduated in 1665, shortly before an outbreak of Black Death swept through London. All universities were closed while the plague raged. During this time, Isaac returned to his family's farm, now run by his young half-brother. He continued his study and research, working on the binomial theorem, light, telescopes, calculus and theology. After supposedly seeing an apple fall in the garden, he investigated gravity, but was unable to solve the puzzle until some years later. (It should be noted that some authorities question this 'apple' story. They say that the first mention of it came

through the anti-religious French philosopher and sceptic, Voltaire, who reputedly heard it from Newton's grandniece).

REVOLUTION IN MATHEMATICS

Newton applied his binomial theorem to infinite series and from there developed calculus, a revolutionary new form of mathematics. For the first time it was possible to accurately calculate the area inside a shape with curved sides, and to calculate the rate of change of one physical quantity with respect to another. A similar system of mathematics was developed by German mathematician Gottfried Leibniz. For a long time there was great confusion, with each being accused of stealing the other's work. It was a distressing time for both. Many years later, it was established that each had developed calculus independently at roughly the same time. Neither was a cheat.

OPTICS

When Cambridge University reopened in 1667, Isaac Newton returned to do a Masters Degree, while teaching and doing research.

Newton used prisms to show that sunlight was made up of all the colours of the rainbow. This proved that the ancient Greeks' ideas about light were wrong. In Newton's time, astronomy was severely hampered because lenses in telescopes broke some of the light into unwanted colours, causing a somewhat unclear view. Although not the first to consider using a curved mirror instead of a lens, Newton was the first to successfully construct a telescope using this principle - a principle still used today in many telescopes.

THE ROYAL SOCIETY

In 1672, Newton became a member of the Royal Society - a group of scientists committed to the experimental method. He presented one of his new telescopes to the Royal Society along with his findings on light. The Royal Society set up a committee led by physicist Robert Hooke to evaluate Newton's findings. Hooke was a scientist employed by the Royal Society to evaluate new inventions. However, Hooke had his own ideas on light and was slow to accept the truth of

Newton's findings. This surprised and disappointed Newton, who even considered not circulating his discoveries in the future.

While it is sometimes said that Newton was too sensitive to critical evaluation of his work, he was merely concerned that the time spent justifying past findings was preventing him from making new discoveries.

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POLITICAL INTERFERENCE

Isaac Newton lived at a time when politics, religion and education were not separated. King Charles II commanded that everyone who taught at places such as Trinity College, where Church of England ministers were trained, must themselves be ordained as Church of England ministers after seven years. This included people such as Newton who taught only mathematics and science, not theology.

Although a devout Christian, Newton was not in full agreement with all the doctrines of the Church of England. Thus, his conscience would not allow him to accept ordination. He was also strongly opposed to political involvement in both religious matters and education. The only way for Newton to keep his job was for the king to make an exception in his case. Others who had previously asked for this had been refused.

So Newton headed south to London for six weeks to plead his case before the king. During his time in London, he became better acquainted with other scientists in the Royal Society. Those who had known him only through his letters defending his discoveries had mistaken his confidence in his work

for arrogance. His impatience to get on with new work had been mistaken for bad temper. Now the scientists realised what a friendly and considerate person he was and they rallied to his aid. Fortunately, for Newton and for science, the king granted Newton's request to continue at Trinity College without being ordained.

FOCUSED ON GRAVITY

In Newton's day, many people were superstitious or afraid of what they could not understand - such as the appearance of a comet, which was considered a sign of coming disaster. Even scientists generally considered the motion of planets and the motion of bodies on the earth as separate problems. In contrast, Newton reasoned that since the same God created the heavens as well as the earth, the same laws should apply throughout.

In 1684, Newton again began to consider gravity. He developed his theory of universal gravitation which used what is known as the inverse square law. He developed his three laws of motion (movement) and proved mathematically that the same laws did, in fact, apply both to the heavens and the earth. His faith had focused his thoughts in the right direction.

When Newton was investigating the movement of the planets, he quite clearly saw the hand of God at work. He wrote, "This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent Being... This Being governs all things... as Lord of all."

Again Newton encountered difficulties with his old rival Robert Hooke. A number of scientists believed that an inverse square law probably applied, but they had not been able to prove that this would produce the elliptical orbits observed by famous German astronomer Johannes Kepler. Despite Hooke's boasts to the contrary, he too failed to be forthcoming with proof. In contrast, Newton succeeded; but Hooke wanted some of the credit.

The Royal Society did not wish to be seen to take sides. This, together with shortage of finances, made the Royal Society reluctant to publish Newton's landmark book 'Principia Mathematica'. Newton's friend, astronomer Edmond Halley, came to his aid and privately financed the publication of Newton's three part book in 1687. (Halley later used Newton's laws in his work on comets which, like the planets, move in elliptical orbits around the sun.)

ROYAL OPPOSITION

After 1685, Newton again encountered the problem of a monarch who tried to mingle politics, religion and education. The new king, James II, wanted Trinity College to award unearned degrees to those whose religious beliefs agreed with his own. Because they would not do this, Newton and eight other teachers from Trinity College were brought before the High Court on trumped-up charges. Although the charges were rightfully dismissed, the episode had been a great strain on the men.

Isaac Newton's times of hardship and struggle throughout his lifetime did not produce bitterness. Instead, Newton's own words show that this brought him closer to God. "Trials are medicines which our gracious and wise physician gives because

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we need them; and he proportions the frequency and weight of them to what the case requires. Let us trust his skill and thank him for the prescription."

NERVOUS BREAKDOWN

Isaac Newton represented Cambridge University as a Member of Parliament in 1689 and 1690. In 1690, his health failed. This illness was probably a nervous breakdown brought on by many years of working long hours and enduring too much stress. Eventually he fully recovered. For the next few years, Newton pursued his other great love - studying the Bible. The books he wrote included 'Chronology of Ancient Kingdoms and Observations Upon the Prophecies of Daniel.'

In 1696, the government appointed Newton to the post of Warden of the Mint. He supervised the replacement of England's old and damaged coins with those which were new and more durable, and even helped break up a counterfeiting ring.

In 1701, Newton began another short term as parliamentarian. Two years later he was elected

president of the Royal Society. His re-election to that position every year for the rest of his life showed the high esteem in which he was held by fellow scientists. Now that he had returned to science, Newton published his earlier work on light. His book 'Optiks' contained both his own findings and suggestions for further research. His country officially recognised his work in 1705 when he became the first person to receive a knighthood for scientific achievement.

Newton died in 1727, at the age of 84. He was buried in Westminster Abbey.

Isaac Newton's contributions to science were many and varied. They covered revolutionary ideas and practical inventions. His work in physics, mathematics and astronomy is of importance even today. His contributions in any one of these fields would have made him famous; collectively, they make him truly outstanding. But Newton remained a modest man who loved his Lord and Saviour.

He loved God and believed God's Word - all of it. He wrote, "I have a fundamental belief in the Bible as the Word of God, written by men who were inspired. I study the Bible daily." He also wrote, "Atheism is so senseless. When I look at the solar system, I see the earth at the right distance from the sun to receive the proper amounts of heat and light. This did not happen by chance."

(Quotes by Newton are taken from the book by J. H. Tiner, 'Isaac Newton - Inventor, Scientist, and Teacher', Mon Media, Milford (Michigan), 1975.)

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