

Faith-based Unit on Isaac Newton

Gravity explains the motions of the planets, but it cannot explain who set the planets in motion. God governs all things and knows all that is or can be done. – Isaac Newton

It is widely held that Isaac Newton was one of the greatest scientists who ever lived. Unfortunately, less is written about his devotion to God. From a very early age, he learned to read from the Bible and in his lifetime, spent more time on theology than on science. Newton's driving force; behind all of his discoveries and inventions, was to know God and God's Creation. Sarah Dry in *The Newton Papers* writes, "Newton wrote roughly 10 million words. He in fact wrote over 10,000 letters. Only 3 million words are related to science and math. Over half of the writing, 5 million of the 10 million words, are about God." Christianity Today add, "Newton wrote more than 1.3 million words on biblical subjects.

Isaac Newton Pursued God

"'You shall love the Lord your God with all your heart, with all your soul, and with all your mind.' This is the first and great commandment. And the second is like it: 'You shall love your neighbor as yourself.' On these two commandments hang all the Law and the Prophets." (Matthew 22:37-39)

Introduction: More than 300 years ago, very early on a Christmas morning, a baby boy was born on a farm in England. His mother, Mrs. Newton, named him Isaac after his father who had died shortly before the baby's birth. Isaac was a small boy and not very much HELP to his mother on their farm. It wasn't that Isaac didn't want to HELP his mother. He would start out to do his chores, then completely forget about them because he had so many wonderful ideas and questions filling his mind.

Isaac loved making little models of things that worked just like the big things they represented with wheels that turned and sails that moved. Once, Isaac made a model windmill that turned around and around even inside where there was no wind. He called it "mouse power," because inside the mill Isaac had made a little treadmill and had put a tiny mouse to run on the treadmill and turn the wheel.

Well, little Isaac grew up studying and studying about science and math until he was famous for all the wonderful things he learned and taught other people about the planets, about colors, about gravity, motion, and many other things. And Isaac Newton became Sir Isaac Newton. Even our space ships that have gone to the moon and our space shuttles that travel around the earth are able to function because of the studies and experiments of this HERO of science and mathematics. So next time your teacher asks you to follow the scientific method, think about that little boy born long ago.

Isaac Newton, Scientist and Christian

Part 1 A Character story about endurance.

Isaac Newton was a scientist with an unusually good mind. Legrange, the French mathematician said, "Newton was the greatest genius that ever existed." During his lifetime, Isaac Newton formulated three famous laws of motion, developed a whole new branch of mathematics, invented a new and better telescope, and even uncovered a counterfeiting ring in England! Most of all, he loved God and the Bible and did his best to please his Heavenly Father. In the next few weeks we will learn more about the life of this amazing man.

"Hurry!" an old lady ordered her young friend as they trudged through the snow Christmas morning, 1642. "The child's life is hanging by a thread as it is."

"Perhaps the medicine from Lady Pakenham will help . . . Perhaps."

"The poor dear," the first lady continued, her cheeks red from the winter wind. "Mrs. Newton, I mean, of course. Lost her husband two months ago, and now probably will lose her only child. Life is hard at times, isn't it?"

"Indeed. But the child isn't gone yet."

When the women finally were able to see Mrs. Newton, the new mother spoke weakly. "Pray for my baby, won't you? I have asked God for a son, and he has heard by prayer. I will name him after his dead father, Isaac Newton."

Many were surprised as Isaac gained strength and grew steadily, but slowly. Though the Civil War in England brought no peace to beautiful Witham River valley, Isaac still loved the outdoors. But with no income, the Woolsthorpe Manor suffered. Stone walls crumbled, trees needed cutting, and the roof leaked. Farm animals strayed away and were taken by hungry soldiers. Widow Newton and Grandmother Hannah Ayscough tried to keep the farm running, but they simply didn't have the money to do so.

A few months before Isaac was three, a gentleman came to call on Hannah Newton. "I come in behalf of Reverend Barnabas Smith," he fidgeted. "He wishes to propose marriage to you."

Mrs. Newton was taken back. "Why, Reverend Smith is 60 years old!"

"Quite true, and never married. But he is a wealthy man and well able to take care of you."

"And why doesn't he speak for himself?"

Rev. Mr. Smith is too shy to come in person. He would not know how to respond if you turned him down to his face. What shall I tell him?"

"Tell him I need a week to think this over."

During the week Hannah's brother checked the character of Rev. Smith. "I have found him to be a sincere and honest man," James said. "And he would certainly be able to help you keep up the farm."

At the end of the week, Hannah told the man to ask Rev. Smith to call on her to work out a marriage contract.

When he did come, they talked stiffly for a few moments. Then Rev. Smith looked around the farm. "The old house needs much repair. You will, of course, come to live with me in North Witham. I will pay for the repairs on the house and will hire someone to run the farm."

"That is very generous," Hannah agreed. "I'm sure that Isaac and I will be happy in North Witham."

"I-I am an old man stuck in my ways," the old man replied hesitantly. "It would not be fair to Isaac to force him into the mold of my strict routine. I-I would like you to leave him here at Woolsthorpe Manor with his

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grandmother. I will be sure they are taken care of."

Leave Isaac behind? Hannah surely didn't want to do that. But what choice did she have? She had no money, and, after all, she would only be a mile and a half away. Reluctantly she agreed.

The big house seemed very lonely for Isaac with mother gone. Still, she visited him often and the sound of the carpenters, and masons fixing the house made him glad. And anyway, he could see the steeple of his stepfather's church from the window.

Time passed. One day Grandmother Ayscough announced, "Isaac, you have a new half-sister. Her name is Mary." Later Isaac also got a step-brother Benjamin. He liked to visit them and to teach them things he was learning. But he most enjoyed making working models of his ideas.

"Well, the school term is over," Grandmother said to Isaac one day. "How did you do?"

"O.K." Isaac answered. "Some of the subjects are interesting, but mostly they skip teaching what I enjoy."

"I fear you spend too much time dreaming, my boy. You are not neglecting your arithmetic, are you?"

"Oh no. Numbers are easy. I use them all the time to make my scale models. But in school I love to copy verses from the Bible in my free time. That's the Bible my father left me. Copying verses helps with my writing and teaches me more about God's Word. And for reading, I have a book that stepfather Smith gave me about Daniel."

When his uncle James saw the models, he was amazed. He wanted to show his brother William. "Isaac's wooden toys of houses and carts and windmills actually move. Doors open, wheels turn, and sails spin," he said.

"Isaac's mind picks up ideas like a sponge," William replied. "The boy has ability. But he needs training. The only school where he would get proper training and still be taught about God would be King's School in Grantham."

"That would be seven miles away!" Hannah protested. "That is too far to walk each day."

"True. But my friend Ralf Clark has a drug store there. Isaac could room with him."

Hannah sighed. She hated to have him move even further away, but she also wanted Isaac to amount to something. "Very well. Next term, Isaac will go to King's School."

Part 2 A Character story about perseverance.

Isaac was nervous as he and his mother neared Grantham, England. He had been there before, but never to stay long. Now, at 11 years old, he would be living with a strange family, attending a strange school. The year was 1654.

When they arrived at the drug store, Isaac was introduced to his new family. "This is Ralf Clark, the druggist, Mrs. Clark, and this is Catherine."

"How do you do," responded the bright-eyed 9 year old girl. "May I show you to your room?"

Isaac said nothing but followed Catherine to the room in the attic. "Will there be room for my models?" he

Marbles For Good Downloads are a work in progress. Please send your ideas and feedback to author Rich Maxwell. Marblekeeper@gmail.com asked as they climbed the stairs.

"Oh, yes. Lots of room. You'll see," she answered. Indeed, the room was freshly cleaned and had plenty of shelves. He also noticed a large dresser and writing desk with a burning candle for light. Isaac began to unpack his models. "What beautiful toys," said the brown haired, brown eyed girl.

"They are not toys, they are models," Isaac corrected.

"You seem quite good with tools. Do you think you could repair my toys? I have no brothers or sisters and it gets quite lonely playing by myself all the time." When Isaac easily fixed her toys, he could see in her eyes that he had made a real friend in this new place.

That night, after the house was quiet, Isaac began to look around the attic. Besides the mice, he found a number of old books. One was entitled *Mathematicall Magick* by John Wilkins, another *Mysteryes of Nature and Art* by John Bate. He resolved then and there to ask permission the very next morning to read them.

He awoke to the smell of hot oats and freshly baked bread. "Good morning," Mrs. Clark greeted as he entered. "What do you usually have for breakfast?"

"Hot bread and butter, and tea made from orange peels boiled in water and sweetened with sugar. Grandmother says that orange peels drive off sickness in the winter cold."

"I've heard that," Ralf Clark answered. "I'll have to add that to my list of remedies."

"Will you show me around your drug store when we finish breakfast?" Isaac asked eagerly.

Isaac was fascinated by the color and smell of all the 'stuff' in the jars- oil of amiseeds, alum water, purple foxglove, belladonna and balsam, sulfur, cinnabar, quicksilver and rock crystals. "What do they each do? How do you know how to mix them? How could-"

"Enough questions," Ralf laughed. "There will be time for all that. Right now it is time for school. My brother teaches mathematics at Kings School. He will take you and introduce you to the headmaster, Henry Stokes."

When he arrived, the headmaster's son showed him around. "Important classes are in the morning," he explained. "First we have logic, then Latin and Bible, then ancient history and arithmetic. Once or twice a week old Barley comes in for art lessons."

But after some months, it was obvious that Isaac was not a good student. "He has a wonderful memory," Dr. Clark told his brother. "He can recite strings of Bible verses like he is reading them. But he is often alone dreaming, like in another world. Most of the other students just leave him alone."

But one day Isaac got into a fight with a bully who ridiculed him because of his small size. Afterward he felt terrible that he had gotten so angry. That night he told Catherine, "I'll show the others I can do more than fight. I'm going to be the top student at Kings School." Isaac worked hard to keep that promise. But his favorite class remained the Bible class.

One day when he was about 12, Isaac sat down under a tree and read to Catherine a poem he had written.

A secret art my soul requires to try,

If prayers can give me, what the wars deny.
Three crowns distinguished here in order do
Present their objects to my knowing view.
Earth's crown, thus at my feet, I can disdain,
Which heavy is, and, at the best, but vain.
But now a crown of thorns I gladly greet,
Sharp is this crown, but not so sharp as sweet.
A crown of glory that I yonder see
Is full of bliss and of eternity.

"It-it's beautiful," she said. "How do you manage to spend so much time reading the Bible and writing poetry and still stay at the top of your class?"

"If I work too much on something outside of school, like my models, then I put them aside and study hard for a while until I'm at the top again. Let me show you my scale model of the new Gunnerby Road windmill." They took it outdoors and Catherine squealed with glee as the wind turned the stone and ground some grain. Then they took it inside, caught a mouse, and harnessed it to turn the wheel.

"It works just like the wind," she said with a smile, "except the miller eats all the grain."

That night Isaac took Catherine outside to show her another new invention. "I made these lanterns of crinkled paper and put a candle inside. When I attach it to a kite, it will look just like a comet at night." But when they launched the kite, the people in the village screamed with terror, for they thought the sight of a comet meant bad things were going to happen. "I can't understand why people are frightened of a comet," Isaac commented to Catherine as they walked back to the house. "God uses simple rules to run His kingdom. This is true of comets as well."

When Isaac was 13 he learned that his stepfather, Barnabas Smith, had died leaving Isaac his entire 300 book library. "What will mother do now?" he asked.

"She and the children will return to Woolsthorpe Manor I imagine," Ralf Clark told him. "When all is settled, then she will need you to help her take care of the farm."

Soon after Isaac turned 15 the day came to say good-bye to Kings School and to the Clarks and return to the farm. "Do come to visit us whenever you are in town," they all said.

"I will," he replied with a smile. But he found it much more difficult to say good-bye to Catherine. She had tears in her eyes as well.

Part 3 A Character story about patience.

Isaac Newton returned home to Woolsthorpe from Kings School to take care of the farm. His widowed mother also had with her Mary (11), Benjamin (8) and Hannah jr.(6), Isaac's step-brother and sisters.

Isaac determined to do his best to learn the skills of farming. But one day a hired hand said to his mother, "I do not think Isaac will ever make a farmer, Ma'am."

"What would make you say such a thing?" Hannah asked, shocked.

"For one thing, when we go to the market in Grantham, he is more interested in learning from the druggist than of trading our produce."

"I'm afraid he's right," her brother William added. "I saw the sheep wandering away one day and found Isaac under a tree, working out formulas for calculating the size of the field."

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"He daydreams too much," Mary commented. "Yesterday he came in after walking the horse, dragging only a bridle behind him. The horse had slipped out of the bridle and he never noticed!"

"But he comes from a long line of farmers. I don't know what else he would do," Hannah protested.

"Perhaps the Lord wants him to be a minister," James suggested. "He is very knowledgeable in the Scriptures." And then there was the night of the storm. As the wind blew and the lightning flashed, Isaac went to check on the animals. When he did not return for an hour, his mother braved the storm to look for him. She found him jumping into the wind, trying to measure its force while in the air!

"Headmaster Stokes wants Isaac to finish his work at Kings," William reported. "He says it would be a shame to waste such a mind on the farm. He is probably even smart enough to go to Cambridge." Reluctantly Hannah agreed.

On June 5, 1661, Isaac headed for Cambridge University, some 55 miles from home. He had been top of his class at Kings, but could he keep up the pace at Cambridge? Isaac enrolled in Trinity College, the part of the large university which trained young men to be ministers. Each student at Cambridge wore a long gown all the time and the gown's colors told in which college they were enrolled. Isaac was shocked to see Trinity men drunk and staggering on the streets.

Isaac enrolled at Trinity College as a Sizar. This meant he could not afford the tuition so he worked his way through school by serving one of the faculty members. Since all the faculty members were single men, Isaac would do chores and serve meals to his assigned professor.

Isaac didn't mind the work. But the loud parties carried on by his roommate were too much for a young man who was often deep in thought. One evening, when he could stand it no longer, Isaac went for a walk. Another student was out walking as well. "What brings you out in the late evening?" Isaac asked.

The man sighed. "My roommate. He is playing cards and making all kinds of racket. I can't study. And you?"

"Same reason," Isaac replied.

"My name is John Wickins. I have an idea. Let's ask our roommates if they would want to room together. Then you and I could have a quiet room together."

"That's a splendid idea!" Isaac beamed. As the months passed, John and Isaac became the best of friends. They both loved God and wanted to please Him in every way.

Whenever Isaac visited home, he would travel to Grantham to visit Catherine. They shared each other's lives for hours, and her mother noticed. "I suppose when Isaac finishes school he will be asking for Catherine's hand in marriage."

"Yes," said her brother, "and no finer man could she find."

"Catherine will need to collect all she can for her dowry. The time will pass quicker than we realize."

In 1665 Isaac graduated from Trinity College. Only one person saw the unusual ability Isaac had. This was Professor Barrow, a famous preacher and mathematics professor. Isaac was not sure what to do next- continue his school or.. But the decision was made for him. The Black Death (bubonic plague) had been reported in London and was now moving to Cambridge. Ships would set sail and then be seen a few days later wandering aimlessly, the entire crew dead. A poem arose during this time:

Ring a ring o' roses, A pocket full of posies. Ashes to ashes, We all fall down!

A bring red ring circling a black dot on the skin was a sure sign of the disease. Some people stuffed their pockets with flowers (posies) to keep from it, but this did nothing. The victim's skin turned the colour of ashes and death struck, sometimes within 24 hours. The plague forced Cambridge University to close for a while. During that summer Isaac went home but his family would not allow him to help with the chores. "You rest and study," his mother said. Isaac spent much time in the orchard, studying the Bible, especially Daniel. He developed a new mathematics which he called fluxions. (later it was called Calculus) He also studied theology, Bible history, optics, telescopes, and gravity. Studying gravity was not easy. Many had theories about gravity but no one could prove their theories. Then one day an apple fell from a tree overhead and banged onto his work table. Isaac picked up the apple. Suddenly he got an idea.

Part 4. A Character story about diligence.

Isaac had been studying at home during the years of the Black Death in England. During this he discovered many important ideas in mathematics and science. One day an apple fell from a tree and hit his work table. As he picked up the apple, he looked at the moon and got an idea. "Maybe the moon stays in orbit for the same reason this apple fell down- gravity." This was a brand-new idea. Others said that the laws in space were different from those on earth. But Isaac knew that God made both and he felt that they both followed the same laws.

Though some laughed at Isaac's new ideas, Dr. Barrow, his teacher, believed in him. And after two years, the Black Death left, and Trinity college reopened. Nine openings arose in the school as a teaching student. Isaac was accepted as one of them!

Now Isaac began to do experiments with light. Up to this time, most everyone believed that sunlight was pure light and contained no color at all. However, with a simple experiment, Isaac proved this to be false. "Watch this," he said to his roommate John Wickins. "When I hold this prism up to the sunlight, it casts a colored spectrum on the wall. This proves that sunlight contains all colors." But when he showed it to other scientists, many laughed, saying, "The prism is creating the light. I still believe that sunlight is without color." Today we know that Isaac was correct. In fact, spectrum rings are sometimes called 'Newton's rings.'

Isaac also made a new telescope that was better than any of the 6 feet ones, though it was only 6 inches long! Students and professors came to look through his telescope at night. Isaac would remind them, "The heavens declare the glory of God." (Psalm 19:1)

When Isaac finished his education at Trinity, he learned that Dr. Barrow would be leaving to give his full time to studying the Bible. "I can't imagine Trinity without you, Dr. Barrow," Isaac remarked. "Who would ever take your place?"

"I have chosen a successor already," Dr. Barrow answered. "I have chosen you to take the job as Lucasian Professor."

"Me?!" Isaac stood speechless. How could he measure up to the great and beloved Dr. Barrow? Isaac was now 27. Though the offer was a great honour, it included a great disappointment as well. All the professors were single. To accept it meant he must call off his engagement to Catherine.

"I knew this was coming," she told him when he announced the offer. "You were made by God to do great things for the world. I could not be selfish and keep you from that." A few months later, Catherine married another man.

During the next years, Isaac taught the new students and also did many experiments and made many models. He would get so wrapped up in his work that he would at times do strange things. Once someone stopped him on the way to supper and talked with him. When he finished he went back to his room and forgot he hadn't eaten! His lectures (held just once a week) were often too deep to understand. One time a student arrived and found he was alone in the class. Isaac delivered the lecture just the same, and didn't even seem to notice he had only one student that day!

One day a man named Edmund Halley came to see Isaac. "I am told that your experiments and thoughts are on scraps of paper all over the place. I have come to urge you to collect them in a book. I promise to pay for the printing out of my own pocket."

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Isaac reluctantly agreed to this idea and began to write a book containing all that he had discovered so far. He wrote day and night for six months, eating and sleeping little. He chose to write in Latin so that scientists in many different countries could read it. When it was completed, it was not one book but three, which he called Principia Mathematica Philosophiae Naturalis, or Mathematical Principles of Natural Philosophy. Among other things, these books contained the detailed ideas which we call Newton's three laws of motion. Here they are the two most famous ones:

1) a body in motion tends to stay in motion in the same direction and at the same speed, unless acted upon by an outside force. Because of this law, we lean to the right when going around a left corner. When the astronauts traveled to the moon, they did not need to keep pushing their craft through space once it left earth's gravity. It continued to travel at 24,000 miles/hour without using any fuel at all. How this can be is explained in Newton's first law.

3) For every action there is an equal and opposite reaction. When you shoot a gun, for example, the 'kick' of the gun (backward) is directly related to the size and force of the bullet or shot (forward). This is also the law that governs a rocket's force for as the force comes out the bottom of the rocket, the craft travels up (the opposite direction) with the same force.

When Isaac finished the last volume, many called it the greatest scientific work ever written. Some have said that nothing new was discovered for over a hundred years after. But Halley had another question. "You say that the laws of gravity work everywhere in the universe?"

"Of course, because the same God made the earth and universe," Isaac replied.

"Then might it govern comets as well as planets?"

"Of course. It is a universal law," Isaac answered.

"True, planets can be predicted with great accuracy. But comets suddenly appear and then disappear never to be seen again."

"But how do you know they are never seen again?" Isaac asked him. "Perhaps some that appear now are the same ones reappearing. This would be natural if they are traveling in ellipses as the planets do."

Edmund Halley took this idea and began to study a comet that appeared in 1682. He found that a similar bright comet appeared in 1531, 1607 and 1682- exactly 76 years apart. On the basis of what Isaac had told him, Halley suggested that it was not three separate comets but the same comet appearing three times. Further, he predicted that it would appear again in 1758. Though this was 16 years after Halley's death, the comet was right on time and was, of course, named after him- Halley's comet. The last time it appeared was 1986. When is it scheduled to appear again?

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The cartoon video about Isaac Newton <https://www.youtube.com/watch?v=1vTbtna25j8>