FEATURES: Sir Isaac Newton, Giant of Science

PROF.: When I mention Sir Isaac Newton, what comes to your mind?

VOICE: Well, I think of a great scientific genius. Yet a man who modestly said, "If I have seen further than other men, it is because I have stood on the shoulders of giants."

PROF.: Well, that's a good start. Let's explore more about one of the greatest natural scientists of all time!

FORMAT: THEME AND ANNOUNCEMENT

VOICE: Albert Einstein called Sir Isaac Newton one of the three greatest scientists of all time. The late Professor Isaac Asimov said he was "judged by many to have been ***the greatest intellect who ever lived."***

PROF.: Newton's greatness is even more surprising in light of his family background. He grew up in a rural area. His family thought no other knowledge mattered except knowledge about agriculture. His family didn't value schooling, and most of his ancestors apparently couldn't write even their own names.

Newton reportedly didn't begin elementary school until age 12. Yet by age 19 he was ready to enter the world-famous Cambridge University!

VOICE: Among the first things we learn in science class are Newton's three laws of motion. He was one of two men who developed the calculus.

In the field of optics, his most famous experiment involved using a prism to discover that sunlight is composed of the entire rainbow of light colors, all blended together.

PROF.: There's an interesting sidelight on his optical experiments. When he performed the prism experiment and saw the various colors come out, he wondered if the prism was actually ***generating*** the colors. His ingenious answer was to use a second prism. The first prism separated sunlight into the colors of the rainbow. The second prism to take the colored light and ***recombined them*** into their original condition – the white light radiated by the sun.

VOICE: Newton came surprisingly close to formulating atomic theory. He wrote of what he called "the small particles of bodies." And he wrote that the forces that hold these particles together may be electrical.

PROF.: At a conference shortly after World War II honoring the 300th anniversary of Newton's birth, the late Russian Academic S. I. Vavilov delivered a lecture entitled, "Newton and the Atomic Theory." Referring to Newton's concept of electrical charges within the atom, Vavilov spoke of Newton's "extraordinary intuition in conjecturing the main features of natural phenomena."

Newton didn't have words like "electron," "proton" and "neutron" to develop his idea further. But Vavilov stated that Newton's words "could be used in full, and without any alteration whatever, as the summary for any work of today on the structure of matter."

VOICE: I've often heard that Newton thought of the law of gravitation when he saw an apple fall from a tree. Is that true?

PROF.: Yes. The late Prof. Isaac Asimov verified it in Newton's own writings. Asimov says, "He watched an apple fall to the ground and began to wonder if the same force that pulled the apple downward, also held the moon in its grip. …Following the philosophy of Aristotle, it had been believed that things earthly and things heavenly obeyed two different sets of natural laws… It was therefore a daring stroke of intuition to conceive that the same force held both moon and apple."

VOICE: That demonstrates the opposite side of the statement he made about standing on the shoulders of intellectual giants of the past and merely learning new facts on top of past knowledge. Newton knew when to discard a concept that a giant like Aristotle had taught, and to learn directly from observing nature.

PROF.: Newton took time for other things besides theoretical science. He spent several years in government service, directing the English Mint. He made its operations much more efficient and became "a terror to counterfeiters."

VOICE: Several biographers mention that the Bible was very important to Newton. Prof. Edward Andrade says the library that Newton left at his death contained books by "the Church Fathers," the early scholars of Christianity. His library also contained a large number of other books about Christ and the Bible.

PROF.: Yes. Newton had a dozen different copies of the Bible. In the margins of some of them, he wrote notes and comments. He wrote a million and a half words about the Bible and his understanding of it.

Even in his scientific works, Newton often referred to God. For example, in his book about optics, he asked, "Was the Eye contrived[1] without skill in Optics, and the Ear without Knowledge of Sounds? …How come the Bodies of Animals to be contrived with so much art,[2] and for what ends[3] were their several parts? …[D]oes it not appear from Phenomena[4] that there is a Being…living [and] intelligent…?"

VOICE: It sounds as if Sir Isaac Newton believed that when he examined the world, he was learning about the God who made it.

PROF.: Yes, definitely. Newton saw an example of God's wisdom in his formula of gravitational attraction among the stars and planets.

Two factors determine how strongly heavenly bodies[5] attract each other. The ***more massive*** a body is, the ***more gravitational attraction*** it exerts on other objects. But the ***more distance*** there is between bodies, the ***less attraction*** exists between them.

VOICE: Therefore, if the planets are to remain in stable orbits around the sun and other stars, they must orbit at precise distances. And the distance at which their orbit will be stable, is determined by the mass of the planet and the sun.

PROF.: Many scholars consider Newton's classic book, *Mathematical Principles of Natural Philosophy*,[6] [to be] the greatest scientific work ever written. In it Newton provided a theological interpretation of how the heavenly bodies achieved such stability.

VOICE: A theology of astronomy?

PROF.: Judge for yourself from Newton's words:

"This most beautiful system of the sun, planets, and comets could only proceed from the counsel[7] and dominion[8] of an intelligent and powerful Being. …Lest[9] the [solar, planetary] systems of the fixed stars should, by their gravity, fall on[10] each other, he hath [has] placed those systems at immense distances from one another."

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1 Designed and built.
2 Skill.
3 Purposes.
4 Phenomena, plural of phenomenon.
5 Stars, planets, etc.
6 Originally written in Latin as *Philosophiae Naturalis Principia Mathematica*.
7 Wisdom.
8 Power and control.
9 So they will not.
10 Collide with.

VOICE: In other words, God compensated for the large gravitational masses of each heavenly body, by placing them far enough apart that their mutual gravitation would not pull each other together.

PROF.: Yes. Isaac Newton also inferred God's hand in the design of the human body. In a manuscript entitled, "A Short Scheme[11] of the True Religion,"[12] he asked, "Did blind chance know that there was light, and what its refraction, and fit the eyes of all creatures after the most curious [13] manner to make use of it?"

VOICE: Is he saying that since the lens of the eye brings light into precise focus on the retina, we have to ask whether blind chance made the eye that way, or whether a wise God made it?

PROF.: Yes. He continued, "These and suchlike[14] considerations…prevail with[15] mankind to believe that there is a Being who made all things and has all things in his power, and who is therefore to be feared…"

VOICE: That's a new angle. Newton not only said God has power and wisdom, but that God is to be feared. What did he mean by that?

PROF.: Most biblical scholars define "fear of God" [16] as, quote, "A loving reverence for God that includes submission to his lordship and to the commands of his word."

VOICE: A high degree of respect.

PROF.: Yes. And the rest of the definition says this reverence "includes submission to his lordship and to the commands of his word."

VOICE: Do you mean "fear of God" is ***obedience*** to God?

PROF.: Yes, especially obeying the things God commands in his Word, the Bible.

VOICE: So the first step in obeying God's Word would have to be reading His Word, the Bible, to learn what it says.

PROF.: Correct. During the moment we have left, I would suggest reading a book of the Bible that says a lot about "the fear of the Lord."

The book of Proverbs says, "The fear of the Lord is the beginning of knowledge…" (1:7a). Later it says, "The fear of the Lord is the beginning of wisdom, and knowledge of the Holy One is understanding." (9:10).

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11 Plan, outline.
12 TRANSLATOR: Since this was written in English, we suggest saying it first in English, then in your language.
13 Amazing.
14 Similar.
15 Persuade.
16 The phrase appears in Proverbs 1:7.

VOICE: Sir Isaac Newton considered the Bible to be a book worthy of a large amount of his time.

PROF.: Yes. And we encourage our listeners to read the first nine chapters of the Bible's book of Proverbs this week. Those chapters can be called “the beginning of wisdom” for the rest of one's life.

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