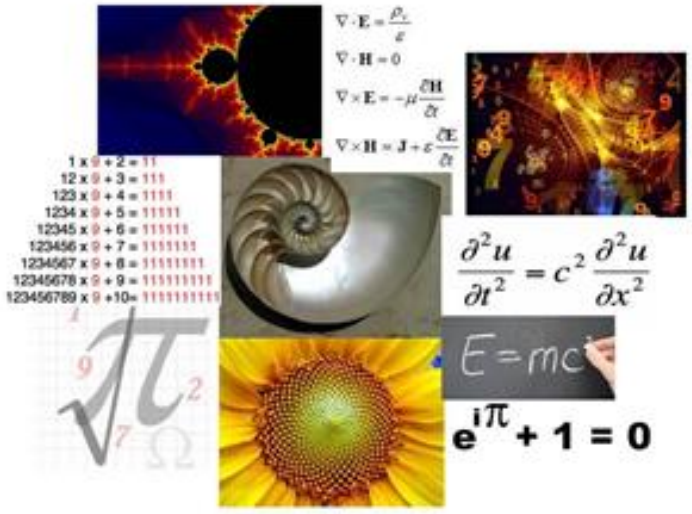
Science, Mathematics, and Beauty

This talk will deal with a number of examples of the intriguing beauty and power of mathematics. Mathematics is *more* than a language and a tool of logic. When used to describe the physics of one system it is surprising how many other disciplines reflect the same principles so that the form of the equations can be similar. But we need to get underneath this and start with an even more fundamental concept concerning number itself. As Lisle (see ref. 4 in reading list below) has said

> *"Numbers are concepts. Thus they are abstract in nature. They exist in the world of thought and are not material or physical. You cannot literally touch a number, or even see one, because they are not made of matter."*

We will consider firstly the nature of abstract thought – the reality / ontology of logic. We will then consider the nature of mathematics and its connection to reality. We will then examine the language of mathematics and show that the only consistent reality that is coherent and works in science is one which accepts mind as more than matter and that abstract truth, meaning and purpose are realities which are transcendent to the physical Universe. We will lastly consider some well known examples of mathematics which cross over from one discipline to another.



The elegance of mathematics and its astonishing power across many disciplines.

Andy McIntosh now retired from the University of Leeds, holds an emeritus chair in Thermodynamics and Combustion Theory, and has lectured and researched in these fields for over 30 years. He has a PhD in Combustion Theory from the Aerodynamics Department of what was then Cranfield Institute of Technology (now Cranfield University), a DSc in Applied Mathematics from the University of Wales and worked for a number of years at the Royal Aircraft Establishment. He is a Fellow of the Institute of Mathematics and its Applications, the Institute of Energy, the Institute of Physics, and the Royal Aeronautical Society. A chartered mathematician and engineer, and author of over 180 papers and articles, his research has been in combustion in fluids and solids. His work has also included investigations into the fundamental link between thermodynamics and information, and in the last few years he has been involved in research in the area of biomimetics where the minute combustion chamber of the bombardier beetle has inspired a patented novel spray technology. He now lectures widely on origins, and has authored the book *Genesis for Today* (Day One, 5th Edition, 2014), and contributed to the books *In Six Days* (Master Books, 2009),*Should Christians Embrace Evolution?* (IVP, 2009), and *Origins – Examining the evidence* (Truth in Science, 2011). He is and married with 3 children and 6 grandchildren.

1) The nature of abstract thought – the reality / ontology of logic.

2) The nature of mathematics – how is it real?

Abstract codes / information

a) Words
- code / language is NOT the defined by the medium
- message NOT defined by the code / language

b) Mathematics
- uses logic and symbols
- yet the message can be more powerful than words can explain
- there is the sense of it 'clicking' together.

3) The power and coherence of mathematics

a) The fundamental constants in many disciplines

b) The connections of geometry and ratios

c) The use of surds, complex numbers

4) The recurrence of famous equations

a) Laplace Equation / Poisson Equation

b) Wave Equation

c) The power of prediction

5) The beauty, elegance and simplicity of mathematical expressions

a) Newtonian Gravitation

b) Kepler's laws of planetary motion

c) Maxwell's equations

d) Einstein's equation $E=mc^2$

Such ability to rationally comprehend the world and the Universe argues strongly for a powerful Mind behind all.

That our minds can think rationally about abstract entities in a logical (mathematical) fashion and recognise it, argues strongly that the Mind behind all is transcendent to material and energy and that we are made in His image.

Some Quotes :

The most incomprehensible thing about the universe is that it is comprehensible
Albert Einstein, "Physics and Reality"(1936), in *Ideas and Opinions*, trans. Sonja Bargmann (New York: Bonanza, 1954), p292.

A beautiful idea has a much greater chance of being a correct idea than an ugly one
Roger Penrose, *The Emperor's New Mind*, p. 544, Vintage, 1990

…if I have been concentrating hard for some while on mathematics and someone would engage me suddenly in conversation, then I would find myself almost unable to speak for several seconds. This is not to say that I do not sometimes think in words, it is just that I find words almost useless for mathematical thinking.
Roger Penrose, *The Emperor's New Mind*, p. 549, Vintage, 1990

Mathematics, rightly viewed, possesses not only truth, but supreme beauty - a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exaltation,

the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as in poetry.
Bertrand Russell (1872-1970), *The study of Mathematics*, p. 60, 1919

The great mathematician fully, almost ruthlessly, exploits the domain of permissible reasoning and skirts the impermissible. That his recklessness does not lead him into a morass of contradictions is a miracle in itself: certainly it is hard to believe that our reasoning power was brought, by Darwin's process of natural selection, to the perfection which it seems to possess.
Eugene Wigner (1902-1995) famous for his deep exploration into quantum physics -"The Unreasonable Effectiveness of Mathematics in the Natural Sciences" Comm. in Pure and Applied Maths, 13, 1-14, Feb. 1960

'If the value of our reasoning is in doubt, you cannot try to establish it by reasoning. If, as I said above, a proof that there are no proofs is nonsensical, so is a proof that there are proofs. Reason is our starting point. There can be no question either of attacking or defending it. If by treating it as a mere phenomenon you put yourself outside it, there is then no way , except by begging the question, of getting inside again.…Nature is quite powerless to produce rational thought: not that she never modifies our thinking but the moment she does so, it ceases (for that very reason)to be rational. For, as we have seen, a train of thought loses all rational credentials as soon as it can be shown to be wholly the result of non-rational causes.'
C. S. Lewis, *Miracles*, Harper Collins, pp. 35-39, 1947 (recent reprint 2012)

If my mental processes are determined solely by the motions of atoms in my brain, I have no reason to suppose that my beliefs are true ... …And hence I have no reason for supposing my brain to be composed of atoms."
J. B. S. Haldane, *Possible Worlds*, 1927, page 209

The great delusion of modernity is that the laws of nature explain the universe for us. The laws of nature describe the universe, they describe the regularities. But they explain nothing.
Ludwig Wittgenstein – Interview with *Wirstscaftswoche*, August 2007, in Lennox, *Gunning for God*, p.228

'My brain is only a lump of meat'
- said by Richard Dawkins in a conversation with J. Hawley, in Market Street Oxford, June 2012

…a mighty wizard has arisen who wishes by his own magic (what he [Dawkins] calls The Magic of Reality) to rob the world of Christmas. Standing on Mount Improbable, he waves

his wand at the sun, at earth and living things. He summons lofty words to describe all these in wondrous detail so that all are caught in his spell and sense not the sleight of hand when he then tells them that this is all there is – no transcendence, no supernature, no Creator, no God. The spell is strong, for nature is wonderful indeed and many of the wizard's words are true. And yet the mighty wand of science that he waves did not create the sun, the earth and living things. That wand of science was forged long before the wizard's day by those who believed that the universe was worthy of attention because God had created it. The wizard tells us of the greatness of Newton, but not about the God of Newton. <u>He dares not disclose that his chosen weapon is borrowed from his enemy</u>…..
Prof. John Lennox, reviewing Dawkins "The Magic of Reality", Washington Post 24/12/11

Some suggested further reading which may be found helpful:

1. Gitt, W., "Information: the third fundamental quantity", Siemens Review 56 (6):36-41, 1989.
2. McIntosh, A.C., *Genesis for Today*, Day One, 4th Edition, 2010. See Appendix A "Fundamental Scientific evidence concerning order and design"
3. McIntosh A.C., "Information and Entropy – Top-down or bottom-up development in living systems?" Int. J. of Design & Nature and Ecodynamics 4(4):351-385, 2009.
4. Lisle, J., Evolutionary Math? Acts and Facts, ICR, Dec 2012, pp. 11-13.
5. Penrose, R., *The Emperor's New Mind*, Vintage, 1990
6. Penrose, R., *Shadows of the Mind*, Vintage, 2005
7. Lewis, C.S., *Miracles*, Harper Collins, 1947 (recent reprint 2012).
8. Lewis, C.S., *The Abolition of Man*, Macmillan, 1978
9. Schaeffer, F., *Escape from Reason*, IVP USA 2006.
10. Schaeffer, F., *Death in the City*, Crossway USA 2002.
11. Schaeffer, F., *The God who is there*, IVP USA, 1998.
12. Roberts, M. *Francis Schaeffer*, Evangelical Press, 2012.
13. Lennox, J. *God's Undertaker – Has science buried God?*, Lion, 2007.
14. Lennox, J. *Gunning for God – why the new atheists are missing their target*, Lion, 2011.