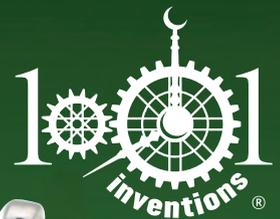
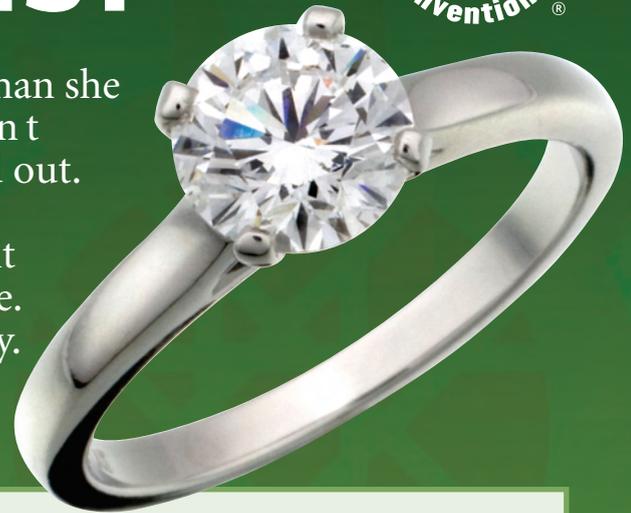


Genuine gems?



Sarah bought a diamond ring. It was cheaper than she expected. Later, she worried the gemstone wasn't genuine. She took it to another jeweller to find out.

The jeweller looked at the gemstone. She said it could be diamond, cubic zirconia or Moissanite. Of these three, only diamond is found naturally. The others are manufactured, and are not as valuable.



Scientists have devised many tests to identify gemstones. The jeweller used some of the properties below:

- **Colour**
- **Powder colour**
- **Dispersion, or 'fire'**
(how much does white light split up into the colours of the rainbow when it goes through the gemstone?)
- **Hardness**
- **Crystal shape**
- **Density**
- **Refractive index**
(how much does the direction of a light ray change when it goes into the gemstone?)
- **Thermal conductivity**
(how well does the gemstone conduct heat?)
- **Electrical conductivity**
(how well does the gemstone conduct electricity?)
- **X-ray diffraction**
(what happens to X-rays when they travel through the gemstone?)

Muslims scientists used some of these tests more than a thousand years ago. Scientists developed other tests more recently. For example, scientists could only use refractive index once they had found a way of measuring it. X-ray diffraction could only be used once X-rays were discovered. Apparatus to measure gemstone electrical conductivity quickly was invented after 1998. Before then, there was no need for it as there was no Moissanite jewellery to pass off as diamond!

The jeweller found that Sarah's gemstone split white light into the colours of the rainbow very well. It conducted heat well. It did not conduct electricity. What was the gemstone?



	Diamond	Cubic zirconia	Moissanite
When was it first discovered or made?	Discovered thousands of years ago	Large amounts first made in 1976	Gemstones first made in 1998
What's in it?	The element carbon, C	The compound zirconium dioxide, ZrO ₂	The compound silicon carbide, SiC
Colour	Most have a yellow/brown tinge	Colourless	Many have a green tinge
Dispersion (biggest value has most 'fire')	0.04	0.06	0.10
Hardness	10.0	8.5-9.0	9.0
Density in g/cm³	3.6	6.1	3.2
Refractive index (biggest value changes light direction most)	2.4	2.2	2.7
Does it conduct heat well?	Yes	No	Yes
Does it conduct electricity?	No	No	Yes

In solving this problem you've probably put together several pieces of evidence, just as Muslim experts did when identifying gemstones more than a thousand years ago.

