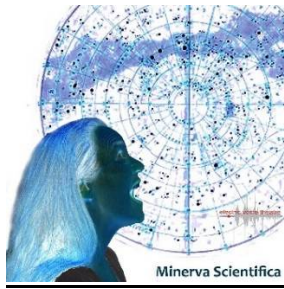


British Science Week 2016



Level three quiz answers

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Round one
Science and the performing arts

Questions set by
[Electric Voice Theatre](#)



1. Mary Anning was one of the most unusual and famous Victorian women – what was she famous for?

A. Palaeontologist

Why was she unusual?

Answer: The science community in Victorian Britain was dominated by men and it was very difficult for women to make their voice heard.

2. Ada Lovelace (Lady Ada King, Countess of Lovelace), a 19th Century mathematician and daughter of the poet Lord Byron, wrote the first what?

A. Machine algorithm (computer programme)

3. The Jacquard Loom, used to produce textiles (patterned cloth), inspired Babbage to design the analytical machine and Ada Lovelace to create the first programme for it in the 1830's (Ada thought it would be able to write music). The analytical machine would have been the first computer, but was never built. When was the first modern electronic computer built?

A. 1940's

Bonus question: A jacquard loom worked by using a card punched with holes to provide the instructions for the design to the loom. How is this similar to how a computer works and how music is played?

Answer: computer and music both use a kind of code. Computers use a code called binary; instructions are coded with 1 or 0. Music uses musical tablature to determine which notes are played when and how.

4. In 2015 Nicole Kidman starred as Rosalind Franklin in the play "Photograph 51" in London. Photo 51 was one of the most famous and important pictures of the 20th century and helped to work out the structure of the molecule of life. What is this molecule called?

Answer: DNA (deoxyribonucleic acid)

Bonus question: What were the names of the two scientists who discovered the structure of this molecule? (Rosalind Franklin's x-ray photo 51 helped them to get to the answer much quicker)

Answer: James Watson and Francis Crick

5. Composer Kate Whitley has composed some pieces for us to perform about the theories of quantum gravity and String Theory. We sing them acapella but if we could add instruments name five instruments which might help us perform **String Theory**?

Answer: violin, viola, cello bass guitar, harp, banjo, lyre, etc. i.e. any stringed instrument

Bonus questions: *What does acapella mean?*

Answer: singing in a group without any instruments playing

**Round two
Science and history**

Questions set by
[Historical Association](#)



1. Which new technology of the Industrial Revolution replaced water power?

The steam engine (A)

Bonus question: Which fossil fuel started to be used a lot more during the Industrial Revolution?

Answer: coal

2. What did Louis Pasteur discover?

Answer: a vaccine against small pox.

Bonus question: What type of (micro)organism is this caused by?

Answer: virus

3. If you visited a barber surgeon in the medieval period, what might you expect to receive?

All of the above (E)

4. During World War II Alan Turing was famous for cracking which code?

Answer: The Enigma code used by German U-boats (submarines) to send secret encrypted messages.



5. Who is this a picture of?

Answer: Isambard Kingdom Brunel

Bonus question: Name two famous things that he designed

Answers: SS Great Britain, SS Great Eastern, Clifton Suspension Bridge, Tamar Bridge, Box Tunnel, Hanwell Viaduct, Paddington Station, Temple Meads Station, Maidenhead Bridge, Thames Tunnel etc. there are a lot more!



**Round 3, Level 3
Science and dance**

Questions set by
[One Dance UK](#)



1. When dancing a muscles contract to make the bones of the body move. What is the name of the special connective tissue that joins muscle fibres to the bones?

Answer: tendons

Bonus question: what is the name of the tough fibres that join bones together?

Answer: ligaments

2. Dancing is very strenuous. When the body works hard it gets hot and starts to overheat. Name **two** ways that the body reacts to increasing temperature to keep cool?

Answer: sweat produced by the body evaporates using excess heat energy produced by the body. More blood flows the skin so it's closer to the outside so excess heat can be radiated away from the body.

3. When a dancer exercises their heart and breathing rates increase. Why do the heart and lungs work faster when doing exercise? Think about what job each of these organs do.

Answer: The heart pumps faster to move blood faster around the body to:

- **Deliver more food (glucose) to the muscles**
- **Deliver more oxygen to the muscles**
- **Remove carbon dioxide and other wastes from muscles**

Lungs work faster to:

- **Put more oxygen in to the blood (for delivery to the muscles)**
- **Remove carbon dioxide from the blood**

4. When a ballet dancer performs a pointe (standing on their toes) the pressure on the floor increases. Use the information and formula below to calculate how much the pressure increase by:

Pressure (Nm) = force (in Newtons (N) = weight of dancer) ÷ area (metres (m) = area of the foot in contact with the ground)

Weight = 450N

Area of one foot flat on the ground = 0.025m²

Area of one foot on tip toes = 0.0008m²

Answer:

Pressure on (one) flat foot = $450 \div 0.18 = 18,000\text{Pa}$

Pressure on (one) pointe foot = $450 \div 0.0008 = 562,500\text{Pa}$

Difference = $562,500 - 18,000 = 544,500\text{Pa}$

5. Balance is very important to dancers. Which organ, other than your eyes, plays a big part in helping a dancer, and you, to keep balance?

Answer: Your inner ear contains special sensors that play a big part in helping your brain decide whether you are off-balance. sensors in your muscle also sense how stretched muscles and tendons are which can mean you're starting to topple off balance.

**Round four
Science and geography**

Questions set by
[Geographical Association](http://www.geographical.com)



1. What happens when warm and cold air meet? (Clue: it might make you feel down or sad.)

Answer: A depression (low pressure) forms.

2. What two things happen when an ocean floor earthquake occurs to create a tsunami?

Answer:

- 1. movement of ocean floor upwards,**
- 2. with consequent displacement of the water above.**

3. Why is the interior of Antarctica sometimes called a polar desert?

Answer: c) it experiences low levels of precipitation (less than 250mm a year)

4. What product of a volcanic eruption beneath glacial ice caused air travel chaos in 2010?

Answer: Volcanic Ash, Ash Cloud or (most accurate) Fine Volcanic Ash.

Bonus: In which country did this eruption take place?

Answer: Iceland

Double bonus: Can you name the volcano?

Answer: Eyjafjallajökull

5. What causes the west coast of the British Isles to have a relatively mild climate in winter?

Answer: a) The Gulf Stream

Challenge Question

In what ways are 'fracking' and erosion resulting from the impact of waves on a coastal cliff similar?

A = Both processes create pressure on the rock which widens the fractures in the rock.

Mention that both processes are termed 'hydraulic' could also be credited (i.e. fracking is 'hydraulic fracturing' and wave impact is 'hydraulic action').

**Round 5: level 3
Science and sport**

Questions set by
[Youth Sport Trust](http://www.youthsporttrust.org)



1. At the 2012 London Olympics Mo Farah won gold in the 10,000m and 5,000m. How many laps of the 400m track did he run in total to win both his finals? Show your working for a bonus point

Answer: $10,000 + 5,000 = 15,000\text{m}/400\text{m} = \underline{37.5 \text{ laps}}$

2. Which of these foods would be most useful to a marathon runner?

Answer: c) Carbohydrates

3. Soft tissue injuries are common in sports performers. Can you match these muscles to the correct part of the body?

1 + c (Quadriceps = leg)

2 + a (Triceps = arm)

3 + b (Latissimus Dorsi = back)

1. In the world of sport speed is king! Which do you think was faster – The fastest shot (free kick) recorded in a football match or the fastest cricket bowl recorded in a test match?

Answer: (a) football

Bonus question: how fast, to the closest mile per hour, was the ball travelling?

Answer: 131mph (football), 100mph (cricket)

Double bonus: which sportsman did this?

Answer: Ronny Heberon - Sporting Lisbon (Shoaib Akhtar - Pakistan)

Triple bonus: what year did this happen in?

Answer: 2006 (2003 for cricket record)

2. In a triathlon athletes have to swim, cycle and run to complete their race. For each section of the race can you name two different forces (resistance) that they will have to work against?

Answer:

Swimming: frontal water resistance (drag moving forwards), skin resistance (water clinging to body and slowing the swimmer down) and eddy or turbulence

Cycling: air/wind resistance (drag), rolling resistance/contact friction (between the tyres and the road), gravity pulling the bike down onto the road

Running: wind resistance, contact friction (between the runner's shoes and the ground), gravity

Bonus question: can you suggest an item of equipment that might help them to reduce resistance? You must state the method and how it reduces resistance.

Answer: swim caps, swim suits – cycle helmets, drop handlebars, oil/lubrication (wheels)