

Red shift Blue shift Game

This game is designed to practice answering Radiation and the Universe questions. They are based on the AQA P1b Module but other syllabuses may group these topics differently.

This game can be played with 2 or 3 players. The following pages contain the game board, and 3 question sheets with 3 separate sets of true and false questions. Rules for playing the game are included on the playing board.

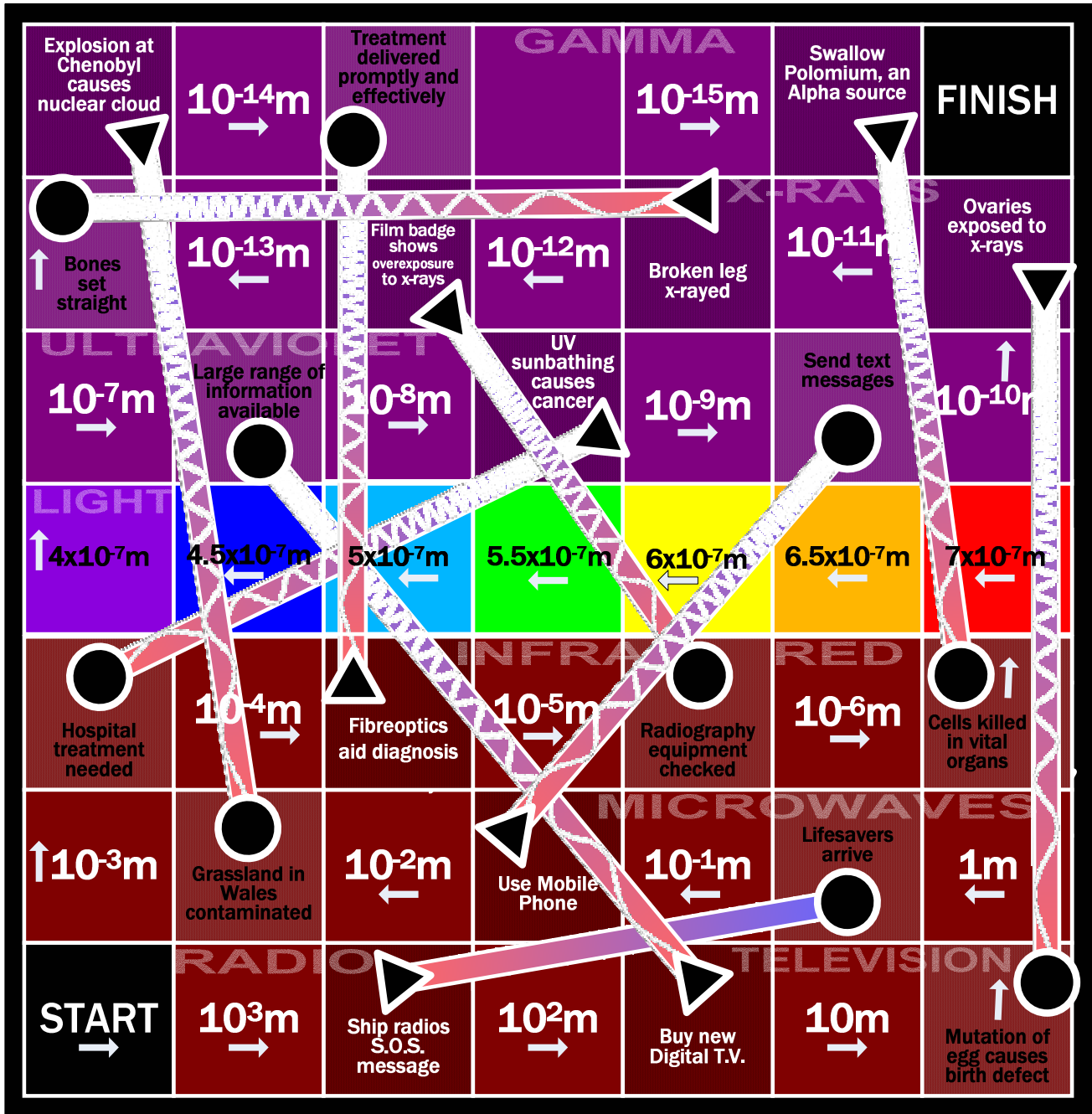
There are 3 games in this series available from GamePlan Games. All the games use the same 'True or False' questions, but each game offers a different playing objective. You can renew your motivation for learning the same facts by playing a different game. If you would like some new questions, why not buy the "Round the Block" game from our website?

Here is a summary of Radiation and the Universe games, which are available for FREE download from www.GamePlanGames.co.uk

Game	No. of players	No. of sheets	Playing objective
Red shift Blue shift	2 or 3	1	To be first to get from the bottom to the top of the board.
Half-Life Beetle	1, 2 or 3	1 each	To answer up to 8 questions correctly in a row.
Battle of the Heavens	2	1 each	To guess positions of your opponent's 3 Space objects

You can also download and print off the Revision Sheet which is designed to help you to understand why an answer you thought was right is actually wrong.

Red shift Blue shift Game



Scoring

Players take it in turns to ask their opponent True or False questions from the question sheets. Each player needs a counter which is initially placed at the start (bottom left hand corner).

A player answering correctly moves forwards one square, but stays on the same square for an incorrect answer, except when:-

- a) the player is on an **upwards** pointing arrow head, A correct answer sends the player up the **blue shift** arrow to the circle, but if the answer was incorrect the player just moves forward one square.
- b) the player is on a **downward** pointing arrow head, an incorrect answer sends the player down the **red shift** arrow as far as the circle, but a correct answer moves the player forward one square.

Note that the 'forward' direction reverses on each row, so check the direction after doing a **red or blue shift**.

The object of the game is to move up the board through the electromagnetic spectrum in a race to get to the top. The winner is the person who finishes first.



Radiation and the Universe A – True or false?

1. Infra-red radiation has a longer wavelength than gamma radiation.
2. The speed of a wave = wavelength ÷ frequency.
3. The earth's ozone layer absorbs ultra-violet radiation.
4. Light can pass straight through metal objects.
5. The number of waves passing a point each second is the frequency.
6. Infra-red rays can travel through optical fibres.
7. Analogue signals are a series of 'on's and 'off's.
8. Digital signals are continuously varying.
9. TV remote controls use infra-red waves.
10. Toasters give out ultra-violet rays.
11. All the waves in the electromagnetic spectrum travel at the same speed.
12. Yellow light has the highest frequency of all the colours.
13. The wave speed for light is 300 m/s.
14. Cricketers protect their noses with cream that absorbs gamma rays.
15. Microwaves can travel from Earth to a satellite.
16. Gamma radiation travels no further than 10cm in air.
17. Beta radiation consists of a high speed electron.
18. Beta radiation has no charge.
19. Health workers reduce their exposure to radiation by wearing a lead lined apron.
20. The nucleus of an atom contains neutrons and electrons.
21. Neutrons have a negative charge.
22. Radioactive decay goes quicker at high temperatures.
23. Ionisation is when an atom loses or gains an electron.
24. Beta particles are not deflected by a magnetic field.
25. Gamma particles are not deflected by a magnetic field because they are too heavy.
26. Half life is the time for ½the atoms to decay.
27. The purpose of injecting patients with radioactive tracers is to track a patient's movements in the hospital.
28. Carbon 14 dating cannot be used to date things older than 45,000 years because it would take too long to take the measurement.
29. When electromagnetic radiation is absorbed, the energy makes the substance hotter.
30. An isotope of Americium would have a different number of protons.
31. Jupiter is bigger than our moon.
32. Light from a distant galaxy is shifted to the red end of the spectrum.
33. Nearer galaxies are moving away from us faster than distant ones.
34. Bigger telescopes see further into space.
35. You should never look at the sun through a telescope because it would damage your eye.
36. The galaxies are the main source of energy for the Earth.
37. Some telescopes can detect radio waves.
38. Telescopes in orbit are better because the light is not distorted by the atmosphere.
39. Ancient Greeks were not able to observe Uranus because it is on the other side of the Sun.
40. Light from a galaxy with very large red-shift indicates it is very distant and is moving towards Earth.

Answers

True	False
1, 3, 5, 6, 9, 11, 15, 17, 19, 23, 26, 29, 31, 32, 34, 35, 37, 38	2, 4, 7, 8, 10, 12, 13, 14, 16, 18, 20, 21, 22, 24, 25, 27, 28, 30, 33, 36, 39, 40

Radiation and the Universe B- True or false?

1. Radio waves have a longer wavelength than microwaves.
2. The speed of a wave = wavelength x frequency.
3. The earth's ozone layer absorbs infra-red radiation.
4. Gamma rays pass through metal objects.
5. The number of waves passing a point each second is the wavelength.
6. All the waves in the electromagnetic spectrum are the same wavelength.
7. Shadow pictures of bones can be produced by microwaves.
8. Ultra-violet rays are used to sterilise surgical instruments.
9. Light rays can travel through optical fibres.
10. Analogue signals are continuously varying.
11. Noise only occurs in digital signals.
12. Ultra-violet waves have a shorter wavelength than x-rays.
13. The wavelength of red light is 700nm, and violet light is 300nm, so yellow must be about 250nm.
14. The wave speed for light is 300 million m/s.
15. Alpha radiation can pass through lead.
16. Beta particles can be stopped by aluminium but not by paper.
17. Gamma radiation consists of a Helium nucleus.
18. Health workers monitor their exposure to radiation by wearing a photographic film badge.
19. Electrons orbit the nucleus of an atom.
20. Electrons have a negative charge.
21. The nucleus of a medium sized atom is a group of protons, neutrons and electrons.
22. Radioactive decay is not affected by external conditions.
23. Smoke detectors in houses contain alpha emitters.
24. Gamma particles are not deflected by a magnetic field because they move too fast.
25. Radioactive tracers can be injected into a patient's body.
26. Increasing the number of patients surveyed will make the data more reliable.
27. The best radioactive tracer for hospital patients is alpha with a short half life.
28. A beta particle from an atom of carbon 14 is a helium nucleus.
29. An isotope of Americium would have a different number of neutrons.
30. The Milky Way is a name for our own galaxy.
31. Light from a distant moon is shifted to the red end of the spectrum.
32. Light that has been shifted towards the red end of the spectrum has been squashed up.
33. Distant galaxies are moving away from each other.
34. The Universe is thought to have been created in a massive explosion called 'big bang'.
35. The Hubble telescope gives better images than earth based ones.
36. Astronomers believe the Universe has always been the same size.
37. A galaxy consists of a central star orbited by planets.
38. Telescopes in orbit are better because they are closer to the stars
39. Ancient Greeks were able to observe Venus because it is bright.
40. Observations of space using visible light are best from Earth.

Answers

True	False
1, 2, 4, 9, 10, 14, 16, 18, 19, 20, 22, 23, 25, 26, 29, 30, 33, 34, 35, 39	3, 5, 6, 7, 8, 11, 12, 13, 15, 17, 21, 24, 27, 28, 31, 32, 36, 37, 38, 40

Radiation and the Universe C- True or false?

1. The speed of a wave = frequency ÷ wavelength.
2. An ordinary light bulb gives out infra-red radiation.
3. Ultra violet light damages the skin but not the eyes.
4. The number of waves passing a point each second is the amplitude.
5. All the waves in the electromagnetic spectrum are the same frequency.
6. Shadow pictures of bones are produced by x-rays.
7. TV remote controls use microwaves.
8. Gamma rays are used to sterilise surgical instruments.
9. Ultra-violet rays can travel through optical fibres.
10. Digital signals are a series of 'on's and 'off's.
11. Noise only occurs in analogue signals
12. The wave speed for light is 300 thousand m/s.
13. Skiers have an increased risk of damage from the sun because the snow reflects the sun's rays.
14. Alpha radiation will not pass through aluminium.
15. Alpha radiation consists of a high speed electron.
16. Beta radiation consists of a Helium nucleus.
17. Gamma radiation is uncharged.
18. The nucleus of an atom contains protons and neutrons.
19. Radioactive decay goes quicker under pressure.
20. Neither alpha nor beta radiation get through paper.
21. Alpha particles are very ionising.
22. Alpha particles do not damage human cells
23. Gamma particles are not deflected by a magnetic field because they have no charge.
24. Half life is the time for the radiation to reduce to $\frac{1}{2}$ its original value.
25. Medical tracers need to have a short half life.
26. The purpose of injecting patients with radioactive tracers is to identify a patient's blood group.
27. The best radioactive tracer for hospital patients is gamma with a short half life.
28. A gold brooch could be dated using the Carbon 14 method.
29. Electromagnetic radiation creates alternating current in an aerial.
30. Radioactive Americium oxide in smoke alarms emits electrons into the air.
31. Jupiter is bigger than our sun.
32. Light that has been shifted towards the red end of the spectrum has been stretched out.
33. The Universe is expanding.
34. 'Big bang' happened thirteen million years ago.
35. The Hubble telescope is a satellite.
36. Astronomers believe the Universe is getting smaller.
37. Planets reflect light from the Sun.
38. Telescopes can detect x-rays.
39. Ancient Greeks were able to observe Jupiter because it is large.
40. The red-shift in light from stars provides evidence for the 'big bang' theory.

Answers

True	False
2, 6, 8, 10, 13, 14, 17, 18, 21, 23, 24, 25, 27, 29, 32, 33, 35, 37, 38, 39, 40	1, 3, 4, 5, 7, 9, 11, 12, 15, 19, 20, 22, 26, 28, 30, 31, 34, 36