

Discover

KS4



Name

Date:

MAP

Follow the trail around We The Curious. These are the exhibits you'll need to find on your journey: (we regularly maintain our exhibits and apologise if some are unavailable)



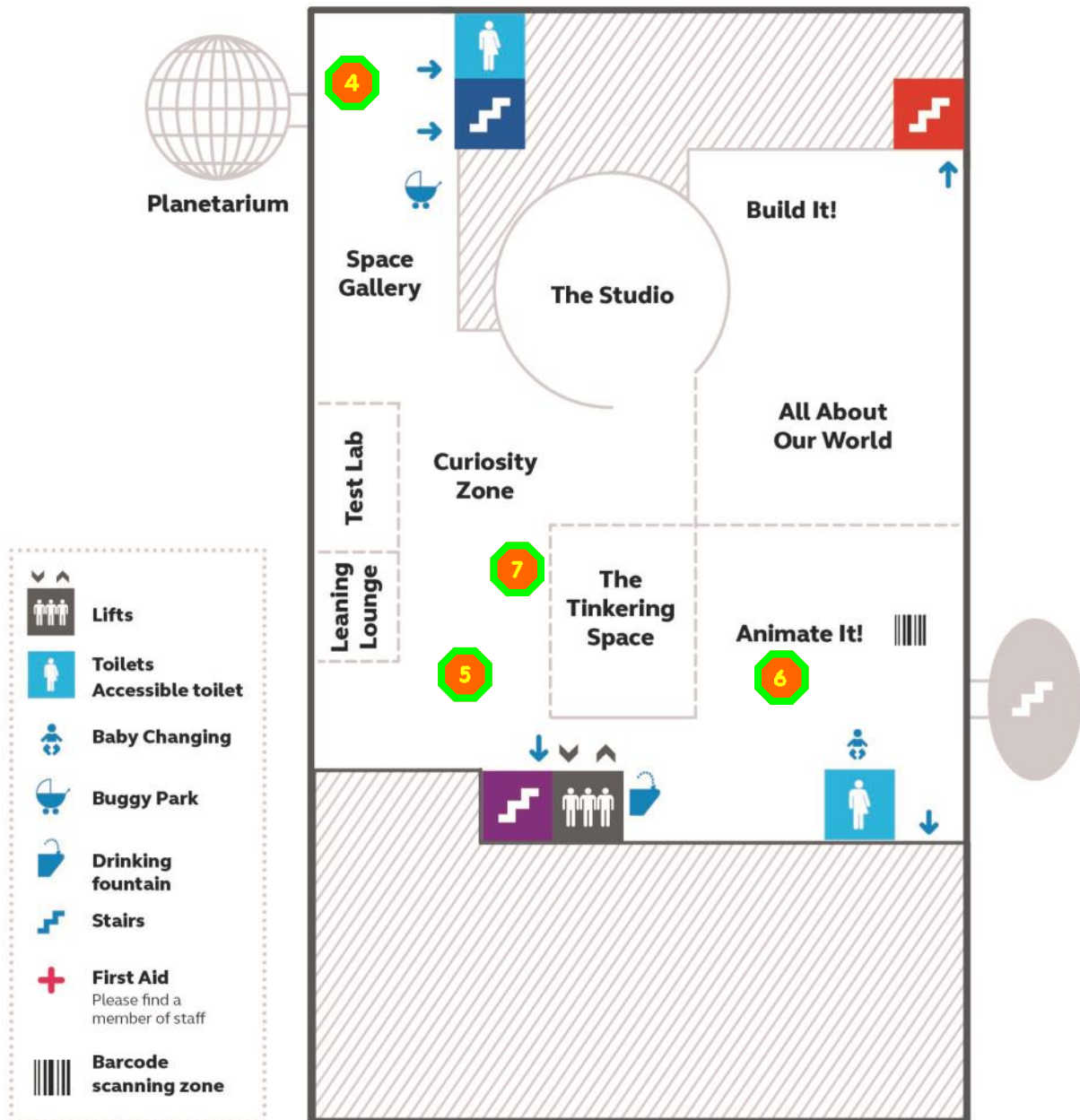
1 STARTLE

2 MUTATION STATION

3 MOVE IT

MAP

First Floor



4 SPACE INVADERS

5 SPECTRA

6 ANIMATE-IT

7 CURIOSITY ZONE

STARTLE

How do you react when you are startled?

- Press the button to start.
What were you startled by?



- After watching your video, how do you know that you were startled?



- Our bodies respond and adjust to internal and external changes so that our bodies always remain in an optimal state. With a classmate, brainstorm some reflexes (besides blinking) that we use to protect ourselves and stay in an optimal state. List your answers below:



- Read through the information on this and other exhibits in All About Us and complete the following blanks:



Your brain is always active. Your brain sends chemical and/or _____ signals along and between the _____ (brain cells) in your nervous system. If you are startled, neurons will send signals to your muscles so that your body _____ before you even have time to think about it.

2 MUTATION STATION

What happens if a base pair or chromosome is altered?

- Choose two organisms to look at on the exhibit. What effect does changing one base pair or duplicating a chromosome have on the organism?



| Organism | Effect of changing one base pair |
|----------|----------------------------------|
| | |
| | |



- The ability to understand which parts of our genes are responsible for certain traits has led to large gains in health and technology. However, there are also arguments about the ethical, legal, and social implications of this knowledge. Tick the technologies that in your opinion help to advance society.



- ☐ Gene therapy (replacing defective genes with functional genes)
- ☐ Cloning
- ☐ Creation of bacteria that remove toxic wastes
- ☐ Genetically modified food (improved yields and nutrition)
- ☐ DNA databases

4 SPACE INVADERS

What types of radioactive particles can you observe?

- There are many types of radiation, some of which are safe and beneficial to us such as visible light, infrared (heat) and radio waves. However, there is also ionising radiation which is harmful to us in large amounts. Ionising radiation can take the form of radioactive particles, including beta particles and alpha particles. The cloud chamber shows us the naturally occurring trace amounts of radioactivity around us.

Observe the cloud box for a few minutes.

Tick all of the types of particle that you are able to see.
(The type of trail that each particle leaves is shown on the exhibit.)

☐

Protons

☐

Beta particles (electrons)

☐

Alpha particles

☐

Muons

- Draw one of the trails that you observe in the box below.



- What type of particle does the trail belong to?





SPACE INVADERS

What types of radioactive particles can you observe?

- Why is it helpful for scientists to be able to view the radioactive particles that are all around us but invisible? Discuss your ideas with classmates and write your best thought here:



- We are struck by radioactive particles once a second for each cm^2 on our body. There are more types of radiation than what we can see in the cloud chamber. Ionising radiation is found in three different forms: alpha particles, beta particles and gamma rays. Gamma rays are not visible in the cloud chamber. Of the three particle types, alpha particles are easily blocked, while gamma rays effortlessly pass through many materials. Complete the chart by placing the three types of ionising radiation in the appropriate boxes.



| Type of ionising radiation | Materials that radioactive particles cannot pass through |
|----------------------------|----------------------------------------------------------|
| | Lead, concrete |
| | Sheet of paper, skin |
| | Aluminium (thin metal), plastic |

- Harmful radiation can come from natural sources or can be man-made. Tick the boxes which are sources of man-made radiation:

☐

Cosmic rays

☐

X-ray machine

☐

Atmospheric radiation

☐

Fossil fuel emission

☐

Nuclear power

☐

Rocks/the ground

☐

Volcanoes

5 SPECTRA

The properties of elements and compounds often guide their uses.

- Press each button to see how the elements behave when exposed to electricity or high heats.
What do you observe happening?



- Why is each element a different colour?
Fill in the blanks with the words below that best explain what you observe.



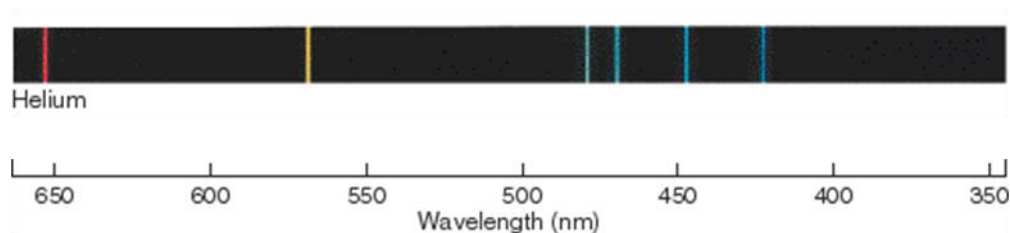
electricity energy lower electron emission
photon higher orbitals absorption

Every element has a series of energy levels (called _____) where electrons reside. When _____ is applied to an element, the electrons become excited, causing them to jump to _____ energy levels. When electrons return to their ground state (normal energy level orbit), the energy is released as a _____, which produces light. The energy that is emitted and the light that is released is unique to each element in the periodic table and is dependent upon the electronic structure of the element. The released photons form what is known as an _____ spectrum and create the visible light and colours that we observe.

5 SPECTRA

The properties of elements and compounds often guide their uses.

- Now view each element through the viewer. The viewer is a diffraction grating that allows us to see the emission pattern that each element forms.
Here is the emission spectrum of helium:



- The ability to appear coloured when exposed to electricity or high heats has made some of the elements that you see in the exhibit popular for use in neon signs.



- Discuss with a classmate other applications/uses of the elements that you see in the exhibit. List your ideas here. Can you think of applications based on other properties of the elements, not just colour?



3 6 7 8 TRY IT OUT

Find out about these other exhibits.

- Go to Move it (Ground floor) and determine how all of the Water works parts are connected.

☐

Completed

- Go to Animate It! (First floor) and create a clip on the animation stations.

☐

Completed

- Go to Curiosity zone (First floor) and discover what different types of music feel like using Good vibrations.

☐

Completed