

Key Stage 4

Answers / Planet Pavilion

1. Which planet is orbiting the Sun the quickest?

Mercury

2. Which planet is orbiting the Sun the slowest?

Neptune

3. What force is keeping the planets in their orbits?

Gravity

4. Approximately, how many times wider is the Sun, compared to the Earth?

Diameter of the Sun = 1,400,000 km

Diameter of the Earth = 13,000 km
($\approx 14,000$ km)

$1,400,000 \div 13,000 = 108$
($1,400,000 \div 14,000 = 100$)

\therefore **Sun is approximately 100 times wider**

5. In the Jodrell Bank Orrery, the model Sun has a diameter of 15 cm. If the Orrery were to scale, how big should the model Earth be?

Sun is approximately 100 times wider than Earth

\therefore **Diameter of Earth model = Diameter of Sun model \div 100**
 $= 15 \text{ cm} \div 100$
 $= 0.15 \text{ cm} = 1.5 \text{ mm}$


6. The real Earth is approximately 150,000,000 km from the real Sun.

If the Orrery were to scale, how far should the model Earth be from the model Sun?

The real Earth-Sun distance is \approx 100 times the diameter of the real Sun

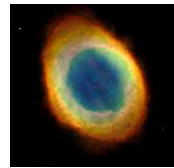
\therefore **The model Earth-Sun distance should be 100 x the diameter of the model Sun**

\therefore **Model Earth-Sun distance = $100 \times 15 \text{ cm} = 1,500 \text{ cm} = 15 \text{ m}$**

7.  A 3 light-year tall pillar where new stars are forming.

Name: **Carina Nebula.**

What is it made from? **Gas and dust**



A planetary nebula formed when a star like the Sun runs out of fuel.

Name: **Ring Nebula.**

At the centre: **White dwarf star**

8. The Orion nebula is the closest star-forming region to our Solar System. How far away is it?

1,300 lightyears

9. Which nebula is the remnant of a star which was seen to explode in 1054 AD?

Crab Nebula

10. Our Solar System is part of the Milky Way galaxy. What is the name of our nearest large spiral galaxy?

Andromeda

How far away is it?

2.5 million lightyears

11. At the centre of our Milky Way galaxy is a supermassive black hole called Sagittarius A*. How many times heavier than the Sun is this black hole?

4 million times

Black holes aren't holes! They are objects floating in space, made of matter. This means they have mass. When things fall into black holes, they become part of it, and black holes get bigger and heavier as they grow.

Key Stage 4

Answers / Space Pavilion

1. The telescopes at Jodrell Bank don't collect visible light. What do they collect?

Radio Waves

2. The dish of the Lovell telescope is a paraboloid shape (a bowl shape). Why is this shape important?

Reflects radio waves to a focus point

3. What is the diameter of the Lovell telescope?

76.2 metres

4. How many years after the Big Bang did the first atoms form?

380,000

5. How many years after the Big Bang did the Solar System form?

About 9 billion

6. Which animal can see infrared?

Snake

7. What part of the spectrum can a bee see?

Ultraviolet

8. What type of light does this camera see?

Infrared

9. Find the props near the screen.

- a. Which material is the worst insulator of heat?

Black plastic bag. How can you tell? **It appears transparent; infrared waves pass through it, transferring heat energy.**

- b. Try placing your hand on something which is not hot (like a piece of paper) for a few seconds. What form of heat transfer is occurring?

Conduction

- c. Remove your hand from the object and show it to the camera. After a while, the heat will fade. What form of heat transfer is occurring?

Radiation

10. Roll a ball into the black hole. Write down the main energy transfer occurring as it falls.

Gravitational potential > Kinetic

11. List any forms of wasted energy as the ball falls.

Heat & sound

12. Explain what happens in terms of a flow of charge when you touch the sphere.

Charge flows from the centre of the plasma ball through the gas, through the person touching the ball, to the ground.

13. Which astronomer first discovered pulsars?

Dame Jocelyn Bell Burnell

14. The amount of light from the star is measured by a camera (in the red circle) and shown on screen. What happens to the light level when a planet passes between the star and camera?

There is a dip in the recorded brightness level (some of the starlight is blocked by the planet)

15. Which planet (small or large) is easier to detect? Why?

Large. The observed dips in brightness are larger and more frequent (the planet is closer to its star so orbits quicker).

16. How many exoplanets have astronomers discovered so far?

Answer is updated every hour. Current figure (confirmed exoplanets) can be found at <http://exoplanetarchive.ipac.caltech.edu>

17. Choose two telescopes; write down their names, location, size and what EM wave they observe.

Answers will depend on students' choices.