9.1 Asteroids

1. Complete the puzzle and write the hidden word in the box.

a						
b						
c						
d						
e						
f						
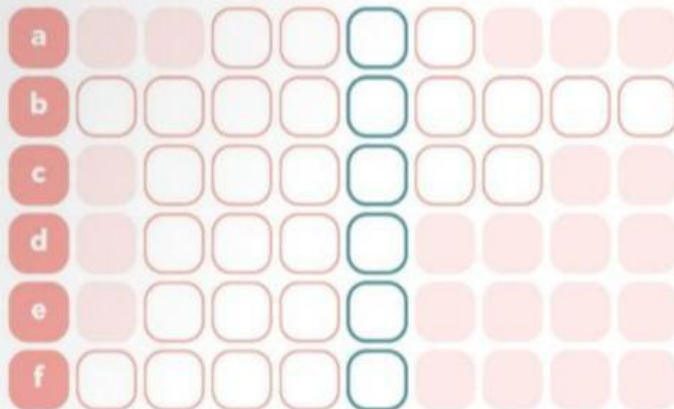
A. ROCK
B. ASTEROIDS
C. IMPACT
D. BELT

Hidden word: CRATER

E. POSE
F. SOLAR

a. Asteroids are lumps made of _____ with an irregular shape.

b. _____ along with comets and meteoroids are some of the smallest objects that make up our solar system.

c. An asteroid _____ with Earth can cause craters on the Earth's surface.

d. Most of the asteroids are located in the asteroid _____.

e. Most of the asteroids discovered to date do not _____ a threat to Earth.

f. Asteroids were formed in the early stages of the formation of our _____ system.

2. Circle the correct answer.

a. **Planets** / **Asteroids** are the leftovers of the nebula from which our solar system was born 4.6 **million** / **billion** years ago.

b. Asteroids **like** / **unlike** planets have a(n) **irregular** / **spherical** shape.

c. The asteroid belt is a region between the orbits of **Earth** / **Mars** and **Jupiter** / **Saturn**.

d. Asteroids orbit the **Sun** / **planets**, and **most** / **all** of our known asteroids are located in the asteroid belt.

e. Asteroids are some of the **larger** / **smaller** objects of our solar system.

f. **Small-sized** / **Medium-sized** asteroids may hit the Earth and cause little or local damage.

g. The larger the size of the asteroid, the **larger** / **smaller** the size of the crater it forms.

h. The higher the speed of the asteroid, the **larger** / **smaller** the size of the crater it forms.

3. Read the text and look at the picture. Then answer the questions.

Ceres is an object of our solar system that was discovered in 1801 by Giuseppe Piazzi. It is located between the orbits of Mars and Jupiter, and it was the first object found in the asteroid belt region.

The diameter of Ceres is almost 946 km. This makes Ceres the largest object in the asteroid belt. Ceres is so massive compared to its neighbours in the asteroid belt that its mass alone is one-third of the total mass of the asteroid belt. Despite that, it remains a small object. Its mass is 1.3% of that of the Moon.

Ceres has a large gravity, which causes it to have an almost spherical shape. The structure of the interior of Ceres has layers. Ceres is mainly composed of rock and ice. Almost 25% of Ceres may consist of water.

Over the years Ceres has changed which group it was classified into. It has been classified as an asteroid, planet, and dwarf planet.
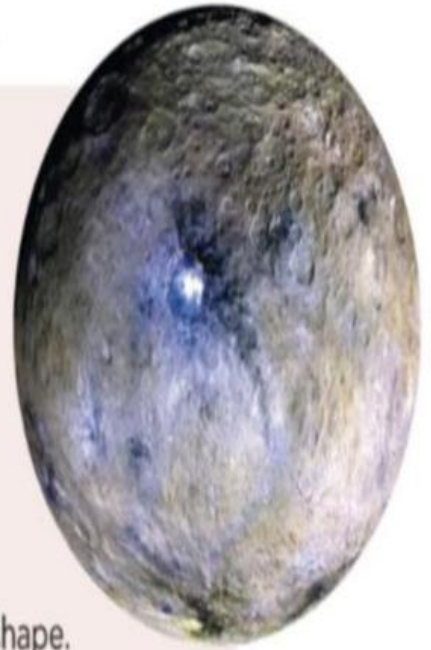
a. Where is Ceres located in our solar system?

CERES IS LOCATED BETWEEN THE ORBITS OF MARS AND JUPITER

b. If the diameter of Ceres is 1.8 times larger than that of asteroid Vesta, an asteroid that is the second largest object in the asteroid belt, what is Vesta's diameter? Round of your calculations to 1 decimal place.

946/1.8 = 525.6 KM

c. If the Earth's radius is 6371 km, approximately how many times larger is the Earth's diameter than that of Ceres? Round of your calculations to 1 decimal place.

12.742 / 946 = 13.5

d. Is there any evidence of impacts by objects on Ceres? If so what kind of objects might these have been?

WE CAN OBSERVE CRATERS ON CERES´ SURFACE.

e. Based on the characteristics of Ceres, would you classify Ceres as an asteroid, planet, or dwarf planet? Explain your thinking.

CERES IS A DWARF PLANET. CERES IS MUCH LARGER THAN AN ASTEROID.

4. Molly wants to make a model of the asteroid Vesta.
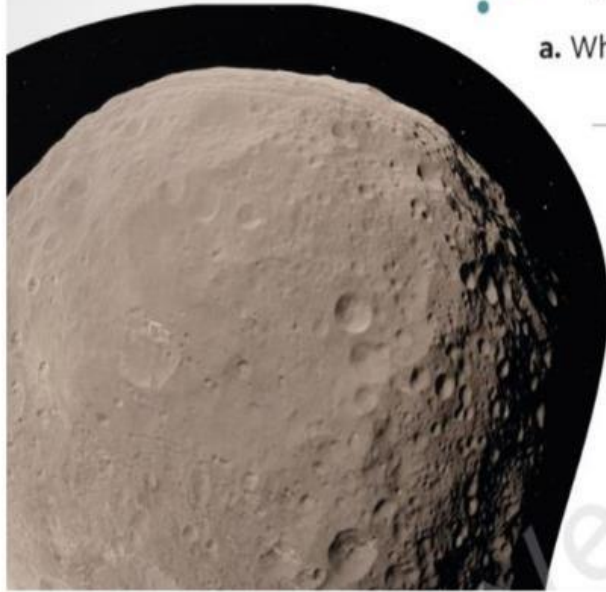
a. What materials should she use?

b. What steps should she follow in order to make the model of the asteroid?

9.2 Galaxies

1. Write the name of each type of galaxy depending on its shape. Then answer the questions.

A ELLIPTICAL

B IRREGULAR

C SPIRAL

a. What is the name of our home galaxy?

MILKY WAY

b. What is the type of our home galaxy?

SPIRAL

2. Tick (✔) to complete the table.

Characteristic	Spiral galaxy	Elliptical galaxy	Irregular galaxy
have more of an oval shape with a bulge		X	
more than two thirds of known galaxies	X		
a large number in the early universe			X
have a bright bulge in the centre of a flat and wide disc and whirled arms	X		
don't have a defined shape or structure			X
about one third of our known galaxies		X	

3. Circle the correct answer to complete the sentences.

a. A galaxy is __2__ .

    1. all of space including everything that the space contains

    2. a vast collection of stars, dust and gas

9.2 Galaxies

b. Most of the stars that are visible in the night sky __1__ .

    1. are parts of our own galaxy   **2.** are parts of other galaxies

c. The Milky Way contains __1__ .

    1. 100-400 billion stars   **2.** about 250 million stars

d. Scientists __2__ the number of stars in the Milky Way and the number of galaxies in the universe.

    1. have already counted   **2.** can only estimate

e. Our solar system is located in one of the arms of the Milky Way __1__ .

    1. approximately half the distance between our galaxy's centre and its outer edge and rotates around its centre   **2.** close to the centre of the Milky Way and it stays still

4. Read the text and then answer the questions.

Nothing can travel faster than light. The speed at which light travels is 300 000 km/s which means that it covers approximately 300 000 km per second. This makes the light from the Sun, which is 1.5×10^8 km away from the Earth, reach the Earth in about 8.32 min. If we measure time in years, the speed of light is about 10^{13} km/year.

a. It takes 4 years for light from Proxima Centauri, the closest star to Earth, to reach Earth. How far from the Earth is Proxima Centauri?

_____

_____

b. The Milky Way has a diameter of 1018 km. How long does it take for light to travel from one side of our galaxy to the other?

_____

_____

When we have to divide 2 powers with the same bases, we keep the same base and subtract the exponent of the denominator from the exponent of the numerator.

tip!

9.3 Exploring the universe

1. Read the sentences and write **Yes** or **No**.

   a. The universe was once packed into a tiny hot spot, that expanded very fast. **YES**

   b. A light year is a unit of time. **NO**

   c. The universe is about 13.8 billion years old. **YES**

   d. There is no evidence yet that supports the expansion of the universe. **NO**

   e. The farther away a galaxy is, the slower it moves away from us. **NO**

   f. After the Big Bang, matter began to appear slowly over time. **NO**

   g. The universe is still expanding and cooling. **YES**

2. Match. Write **1-4** in the boxes.

galaxy GN-z11, the farthest galaxy ever seen	A	**3**
Proxima Centauri, the closest star to Earth after the Sun	B	**4**
Andromeda, the closest galaxy to the Milky Way	C	**1**
the diameter of the observable universe	D	**2**

   1. 2.5 million ly
   2. 94 billion ly
   3. 32 billion ly
   4. 4.3 ly

3. Circle the correct answer.

a. How long does it take for light from the star Betelgeuse to reach Earth if it is 550 ly away?

(550 years)   5203 years 550×10^{12} km

b. If light from Sirius, the brightest star in the night sky, takes 8.6 years to reach the Earth, what is Sirius' distance from the Earth?

8.6 km   (81×10^{12} km) 9.46×10^{12} km

4. Look at the picture. Explain how we can use a chocolate chip muffin as an analogy of the expansion of the universe.

THE CHOCOLATE CHIPS WITHIN THE MUFFIN REPRESENT GALAXIES IN THE UNIVERSE WHILE THE DOUGH THE SPACE BETWEEN GALAXIES.

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