

THE UNIVERSE: A SUMMARY

1. What is the universe?

The visible universe is huge and contains everything – time, space, and matter – but at the same time is largely empty because it keeps expanding at high speed.

2. How did the universe begin?

Fourteen billion years ago, the universe began in a split-second explosion, a Big Bang: energy changed into matter and anti-matter; 300,000 years later, most of the particles had destroyed each other and the temperature had dropped to 3000 degrees Celsius, leaving hydrogen and helium atoms.

3. What are galaxies and how did they form?

Most of the universe was invisible for the first 300,000 years until in some places, hot dense gaseous areas coalesced – due to gravity - to form visible stars; some of those stars came together to form galaxies, some of which coalesced to form larger galaxies.

4. How is distance measured in space?

The universe is huge; the second nearest star – Proxima Centauri - is 38 trillion kilometres away, so astronomical units – the distance between the earth and the sun – are too large to easily read; instead, astronomers measure in light years – the distance light travels in one year, which is 300,000 kilometres per second or over nine trillion km.

5. What is a black hole?

When heavy-weight stars collapse in supernova explosions, invisible black holes are created; they can be more massive than the sun, have no surface and are very dense with such gravitational force that anything that comes near is stretched to the breaking point and cannot escape, not even light; these black holes give off x-rays and help keep galaxies in balance.

6. How did life on earth begin?

Ancient rocks show that life on earth began 3,800 million years ago, but scientists are not sure how it began; some think life may have come from space via comets and meteorites containing carbon-based chemicals, while others think perhaps it started in hot springs under the oceans where heat provided necessary energy.

7. What is ordinary matter?

Ordinary matter – 15% of the universe - makes everything we can see, smell or touch; it includes all solids, liquids and gases and is made of atoms.

8. What is dark matter?

Dark matter – 85% of the universe - doesn't absorb, emit, or reflect light; it is made of subatomic particles and is spread throughout the universe, reacting only weakly on ordinary matter.

Date:

Name:

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/ 65 (You will lose 0.5 points for each spelling mistake.)

Bonus =

1. What is the universe? / 6

The visible universe is huge and contains everything – _____, _____, and _____ – but at the same time is largely _____ because it keeps _____ at high _____.

2. How did the universe begin? / 9

_____ billion years ago, the universe began in a split-second explosion, a _____: energy changed into m_____ and a _____; _____ years later, most of the p_____ had destroyed each other and the temperature had dropped to 3000 degrees Celsius, leaving h_____ and h_____ atoms.

3. What are galaxies and how did they form? / 8

Most of the universe was i_____ for the first _____ years until in some places, h_____ d_____ gaseous areas coalesced – due to g_____ - to form v_____ stars; some of those stars came together to form g_____, some of which c_____ to form larger galaxies.

4. How is distance measured in space? / 8

The universe is huge; the second nearest star – _____ - is _____ trillion kilometres away, so a _____ units – the distance between the _____ and the _____ – are too large to easily read; instead, astronomers measure in _____ years – the distance _____ travels in one year, which is _____ kilometres per second or over nine trillion km.

5. What is a black hole? / 9

When heavy-weight _____ collapse in supernova explosions, i_____ black holes are created; they can be more m_____ than the sun, have no s_____ and are very d_____ with such g_____ force that anything that comes near is stretched to the

breaking point and cannot escape, not even light; these black holes give off radiation and help keep galaxies in shape.

6. How did life on earth begin? / 9

Ancient rocks show that life on earth began about 3.8 billion years ago, but scientists are not sure how it began; some think life may have come from comets via carbon and methane containing carbon-based chemicals, while others think perhaps it started in hydrothermal vents under the oceans where sulfur provided necessary energy.

7. What is ordinary matter? / 8

Ordinary matter – about 4% of the universe - makes everything we can see, smell or taste; it includes all solids, liquids and gases and is made of atoms.

8. What is dark matter? / 5

Dark matter – about 23% of the universe - doesn't absorb, emit, or reflect light; it is made of unknown particles and is spread throughout the universe, reacting only weakly on ordinary matter.

BONUS: Can you name 20 elements on the periodic table?