**BASIC ASTRONOMY CONCEPTS THREE TIER CONCEPTUAL TEST (BACTTIM) – for Grade 7 Students (Draft English Version)**

**Introduction:** In the following three-tier questions, at first answer the first (I) question. Then, answer the second (II) question that is related to reason of your answer in the first question. Finally, on the third (III) question, mark the degree of your certainty related to first two answers.

<table>
<thead>
<tr>
<th>QUESTION NO. 1</th>
<th>QUESTION NO. 2</th>
<th>QUESTION NO. 3</th>
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<tr>
<td><strong>I)</strong> Which one of the following statements related to the space is correct?</td>
<td><strong>I)</strong> The piece of stones, small rocky or metallic, travelling through outer space is called meteoroid. Which one of the following is correct related to meteor or meteorites?</td>
<td><strong>I)</strong> Which kind of celestial body is the Sun?</td>
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</table>
| A) We can see all stars in the sky at night. | A) There is not any difference between meteor and meteorites. | A) Star  
B) The color of the stars changes since they lose their energies through time. | B) Meteorites can cause significant damages when they fall.  
C) All the stars glimmer with the same brightness. | C) Asteroid  
| **II)** Which one of the followings is the reason for your answer to the previous question? | **II)** Which one of the followings is the reason for your answer to the previous question? | **II)** Which one of the followings is the reason for your answer to the previous question? |
| A) The space is huge enough and there are not any other stars that we couldn't see in the sky. | A) Meteors and meteorites are stones crashing to the Earth. | A) The Sun is a star, since it is a natural heat and light source.  
B) The brightness and color of the stars are related to their energies. Their color changes when their energies change. | B) If a meteoroid passes through the atmosphere and survives landing on the Earth, can burn the place and can create a huge pit where they fall.  
C) All the stars are at the same size; so they give similar energies and they all have same brightness. | C) The Sun is a highly-energetic asteroid.  
| **III)** Are you sure about your answer given to the previous question? | **III)** Are you sure about your answer given to the previous question? | **III)** Are you sure about your answer given to the previous question? |
| A) Yes, I am sure. | A) Yes, I am sure. | A) Yes, I am sure.  
B) No, I am not sure. | B) No, I am not sure.  

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QUESTION NO. 4

I) Which one of the followings reflects the incoming light back?
   A) Planet  B) Star  C) The Sun

II) Which one of the followings is the reason for your answer to the previous question?
   A) Planets are not natural light sources; they only reflect the incoming light.
   B) Stars reflect the light incoming from the Sun.
   C) The Sun reflects the light incoming from the Stars.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.

QUESTION NO. 5

I) Which one of the followings shows the correct order of astronomical objects from bigger to smaller with respect to the volume that they occupy in the universe?
   A) The Sun > The Milky Way > Jupiter > The Earth
   B) Jupiter > The Milky Way > The Sun > The Earth
   C) The Milky Way > The Sun > Jupiter > The Earth

II) Which one of the followings is the reason for your answer to the previous question?
   A) The Sun is the greatest celestial body. Milky Way, Jupiter and the Earth are small celestial bodies around the Sun.
   B) Jupiter is a large star. The Milky Way includes The Sun and the Earth.
   C) The Milky Way is a galaxy that contains many celestial bodies. The Sun is a star in the Milky Way and the Earth and Jupiter are planets revolving around it.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.

QUESTION NO. 6

I) Is there a center of the universe? If yes, where is it?
   A) Not exactly known.
   B) Yes, the center of the universe is the Milky Way.
   C) Yes, the center of the universe is the Sun.

II) Which one of the followings is the reason for your answer to the previous question?
   A) The Universe is an infinite space that is considered to grow continuously, the center cannot be determined.
   B) The Earth and the Sun are in the Milky Way galaxy. The Milky Way stands in the center. The Sun and the Earth revolves around it.
   C) The center of the Universe is the Sun. Because the Earth, other planets and other bodies revolve around it.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.
QUESTION NO. 7

I) What is the event of “shooting star”?  
   A) A shooting star is displacement of a star.  
   B) Shooting stars are visible comets.  
   C) Shooting stars are visible path of meteoroids that enter atmosphere and burn up.

II) Which one of the followings is the reason for your answer to the previous question?  
   A) A star dies as the result of the end-of-life. We call “shooting star” when the dead star falls down a gap.  
   B) We called comets travel through the sky as “shooting stars”.  
   C) The piece of stones from other celestial bodies have entered the Earth’s atmosphere and burned up because of friction. It emits light so we called it “shooting star”.

III) Are you sure about your answer given to the previous question?  
   A) Yes, I am sure.  
   B) No, I am not sure.

QUESTION NO. 8

I) When we look at the sky, how do we identify that a celestial body is a planet or a star?  
   A) The stars gives off light and heat, but the planets cannot be seen.  
   B) There is no difference between stars and planets.  
   C) The light from the stars appear to twinkle, but from the planets it is not.

II) Which one of the followings is the reason for your answer to the previous question?  
   A) Stars can be seen, since they are light and heat sources, but we cannot see the planets since they are not light sources.  
   B) When we look at the sky, we cannot identify a celestial body is whether a planet or a star.  
   C) Stars are light sources and flash (twinkle) since they are so far away. The planets shine more steadily since they were so close and reflect light from the Sun.

III) Are you sure about your answer given to the previous question?  
   A) Yes, I am sure.  
   B) No, I am not sure.

QUESTION NO. 9

I) What type of pit shown in the picture that is taken on the Earth’s surface?  
   A) Meteorite pit  
   B) Asteroid pit  
   C) Meteor pit

II) Which one of the followings is the reason for your answer to the previous question?  
   A) A meteoroid piece survives to reach the Earth's surface is called meteorite. It forms a meteorite pit.  
   B) When an asteroid crashes to the Earth, it forms an asteroid pit.  
   C) When a meteor crashes to the Earth, it forms a meteor pit.

III) Are you sure about your answer given to the previous question?  
   A) Yes, I am sure.  
   B) No, I am not sure.
QUESTION NO. 10

<table>
<thead>
<tr>
<th>Properties</th>
<th>X</th>
<th>Y</th>
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<tbody>
<tr>
<td>It is not a light source.</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>The light sources from which the light appear to blink or twinkle.</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

I) With respect to properties given in the table, which one of the followings are the pictures of X and Y celestial bodies?

A) Planet | Stars
B) Comets | Planet
C) Stars | The Sun

II) Which one of the followings is the reason for your answer to the previous question?

A) X; does not produce heat and light like a planet, Y; is a star since it is a light source and its light is twinkling.
B) X; does not produce heat and light Y; is a light source that the light is twinkling. Comets do not produce their own light, whereas planets do.
C) X; is a star and Y; is the Sun since the light from the Sun is twinkling. Stars produce their own light, whereas The Sun does not.

III) Are you sure about your answer given to the previous question?

A) Yes, I am sure.
B) No, I am not sure.

QUESTION NO. 11

I) The above numbered pictures correspond to several celestial bodies. Which one of the followings is the correct order of magnitude relation of these bodies?

A) 1>3>2
B) 2>1>3
C) 3>1>2

II) Which one of the followings is the reason for your answer to the previous question?

A) The first picture is a galaxy. A galaxy is one of the biggest celestial bodies it is bigger than either the Sun or the comets.
B) The second picture is a comet. Comets are bigger than either the Sun or Galaxy.
C) Third picture is the Sun. The Sun is the biggest celestial body. Therefore, it is bigger than either the Galaxy or the comets.

III) Are you sure about your answer given to the previous question?

A) Yes, I am sure.
B) No, I am not sure.

QUESTION NO. 12

I) Meteoroids that affected by Earth’s gravity enters and travel through the atmosphere by emitting light. Which one of the followings is the reason for emitting light from a meteor when it enters the atmosphere?

A) As it is a star, so it gives off light in the atmosphere.
B) When it enters Earth’s atmosphere it burns up.
C) It reflects the Sun’s beams.

II) Which one of the followings is the reason for your answer to the previous question?

A) The stars can emit light in the space. While travelling through the atmosphere the meteors behave like a star.
B) Meteor travels through the atmosphere at high speed so the resistance of the air makes it extremely hot and instant temperature change causes it to burn up and to emit light.
C) Meteors are not natural light sources. However, when they approach to the Earth’s surface they reflect light incoming from the Sun.

III) Are you sure about your answer given to the previous question?

A) Yes, I am sure.
B) No, I am not sure.
QUESTION NO. 13

I) In the sky, why cannot we see the stars of the same size?
   A) The size, energy of the stars and their distance to us are different.
   B) All stars are the same size.
   C) Because the amount of light taken in from the Sun by different stars is not the same.

II) Which one of the followings is the reason for your answer to the previous question?
   A) The size, distance and energy of a star affect the amount of light transmitting to the Earth, so they shine differently.
   B) In fact, all stars have the same size, seeing them in different size is related to our perceptions.
   C) Because the amount of light taken in from the Sun by different stars is not the same, the amount of light emitted from those stars is different, as well.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.

QUESTION NO. 14

I) Infinite vast beyond the Earth is called….1……; together with all celestial bodies within this infinite vast is called ……2…… .

Which of the following concepts should be used for 1st and 2nd blanks?

   1   2
   A) Space   Galaxy
   B) Universe Galaxy
   C) Space   Universe

II) Which one of the followings is the reason for your answer to the previous question?
   A) The infinite space outside of the Earth is defined as Space; within this infinite space all of the celestial bodies are defined as the Galaxy.
   B) The infinite space outside of the Earth is defined as the Universe; within this infinite space all of the celestial bodies are defined as the Galaxy.
   C) The space and universe are different concepts. The space is the vast 3-D region beyond the Earth’s atmosphere occurring between celestial bodies. Universe is all of the time, space and its contents including the Earth.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.

QUESTION NO. 15

I) Which one of the followings is the only star - always-visible during the daylight hours?
   A) Moon   B) The Sun   C) North Star/Polaris

II) Which one of the followings is the reason for your answer to the previous question?
   A) The only star that is visible during the daylight hours is the Moon. Moon is a type of star.
   B) The closest star to the Earth is the Sun. The Sun is the only star always visible during the daylight hours.
   C) The only star that is visible during the daylight hours is the North Star.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.
QUESTION NO. 16

I) The distances of the planets within the solar system were measured in terms of “Astronomic Unit (AU)”. What does the astronomical unit represent?

A) One astronomic unit is the distance between the Earth and the Mars
B) One astronomic unit is the distance between the Sun and the Earth
C) One astronomic unit is the distance between Mars and the Sun

II) Which one of the followings is the reason for your answer to the previous question?

A) The Earth and Mars are two closest planets, so scientists determine the distance with respect to these two planets.
B) The scientists are on the Earth, so the distance to the Sun is one of the first distances that have been measured by the early scientists.
C) Mars is farther to the Sun than the Earth, so the scientists calculate all the distances with respect to the distance between Mars and the Sun.

III) Are you sure about your answer given to the previous question?

A) Yes, I am sure.
B) No, I am not sure.

QUESTION NO. 17

I) What is the place of our Earth in the Universe?

A) The Earth is among the stars in the solar system.
B) The Earth is the only planet around the Sun in the Milky-Way Galaxy.
C) The Earth is between the Venus and the Mars in the Solar System.

II) Which one of the followings is the reason for your answer to the previous question?

A) As we observe many stars from the Earth; it is placed within the stars in the solar system.
B) The Sun is within the Milky Way galaxy and the Earth is the only planet that is revolving around the Sun.
C) It is revolving around the Sun together with other seven planets in the solar system within the Milky Way galaxy.

III) Are you sure about your answer given to the previous question?

A) Yes, I am sure.
B) No, I am not sure.

QUESTION NO. 18

I) Which one of the followings is the correct order of the inner planets starting from closest to the Sun?

A) Mercury-Venus-Earth-Mars
B) Mercury-Venus-Mars-Earth
C) Mercury-Earth-Venus-Mars

II) Which one of the followings is the reason for your answer to the previous question?

A) Earth is the third planet from the Sun.
B) Mars is smaller than the Earth, so the planets were ordered from smaller to bigger.
C) Earth is closer to the Sun than the Venus. Venus is the third planet from the Sun.

III) Are you sure about your answer given to the previous question?

A) Yes, I am sure.
B) No, I am not sure.
QUESTION NO. 19

I) If the distance from the Earth to Pluto is 1 cm, then which one of the followings is the distance between the stars we see at night and the Earth?
   A) If the distance from the Earth to Pluto is 1 cm, then the stars we see at night are more than 1 cm distant from the Earth.
   B) If the distance from the Earth to Pluto is 1 cm, then the stars we see at night are also 1 cm distant from the Earth.
   C) If the distance from the Earth to Pluto is 1 cm, then the stars we see at night are less than 1 cm distant from the Earth.

II) Which one of the followings is the reason for your answer to the previous question?
   A) The stars are far from us and they are outside the Solar System.
   B) The stars are around Pluton near the edge of the solar system.
   C) The Stars are placed between the Earth and the Pluton in the solar system.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.

QUESTION NO. 20

I) Which one of the following interpretations is correct for the light-year?
   A) A light year is a unit of time.
   B) The distance covered by light within one year.
   C) A light year is smaller than an astronomic unit.

II) Which one of the followings is the reason for your answer to the previous question?
   A) It is the time duration for the light rays needed to cover the distance from the Sun to the Earth.
   B) It is a distance, not time duration. It is described as, in the vacuum, the distance covered by light within one year.
   C) 1 astronomic unit = 150,000,000 km and it is almost 500 times greater than light-year.

III) Are you sure about your answer given to the previous question?
   A) Yes, I am sure.
   B) No, I am not sure.