SCIENCE OLYMPIAD : THE UNIVERSE
SAMPLE PAPER FOR GRADE 5 – GRADE 6

1. What is the Big Bang Theory?
   A) A theory about the formation of galaxies
   B) A theory about the creation of the universe
   C) A theory about the formation of stars
   D) A theory about the evolution of life on Earth

2. According to the Big Bang Theory, how old is the universe?
   A) Millions of years old
   B) Billions of years old
   C) Trillions of years old
   D) Thousands of years old

3. Who proposed the Big Bang Theory?
   A) Albert Einstein
   B) Isaac Newton
   C) Edwin Hubble
   D) Georges Lemaître

4. What is the main idea of the Big Bang Theory?
   A) The universe is static and unchanging
   B) The universe is constantly expanding from a hot, dense state
   C) The universe is shrinking back to a single point
   D) The universe is filled with many small bangs

5. What evidence supports the Big Bang Theory?
   A) The discovery of black holes
   B) The observation of cosmic microwave background radiation
   C) The formation of stars
   D) The existence of dark matter

6. What is cosmic microwave background radiation?
   A) Radiation emitted by black holes
   B) Radiation from distant stars
   C) Leftover radiation from the early universe
   D) Radiation from supernova explosions

7. What is the name of the event that marks the beginning of the Big Bang?
   A) Singularity
   B) Explosion
   C) Black hole formation
   D) Galaxy formation

8. What was the name of the first American woman in space?
   A) Sally Ride
   B) Valentina Tereshkova
   C) Mae Jemison
   D) Eileen Collins

9. When did Sally Ride make her historic spaceflight?
   A) 1983 B) 1992 C) 1978 D) 2001

10. What was the name of the first American space station?
   A) Skylab
   B) Mir
   C) ISS (International Space Station)
   D) Salyut 1

11. Approximately how long after the Big Bang did the first stars begin to form?
   A) Millions of years
   B) Billions of years
   C) Thousands of years
   D) Trillions of years

12. What role did gravity play in the early universe according to the Big Bang Theory?
   A) It caused the expansion of the universe
   B) It prevented the formation of stars
   C) It caused the formation of galaxies
   D) It had no effect on the early universe

13. What is the estimated age of the universe according to the Big Bang Theory?
   A) 4.5 billion years
   B) 13.8 billion years

C) 1 trillion years
D) 10,000 years

14. What type of galaxy is the Milky Way?
A) Elliptical galaxy
B) Spiral galaxy
C) Irregular galaxy
D) Dwarf galaxy

15. What is the shape of the Milky Way galaxy?
A) Round
B) Oval
C) Spiral
D) Irregular

16. What is found at the center of most galaxies?
A) Black hole
B) Nebula
C) Star cluster
D) Red giant

17. What is a supermassive black hole?
A) A black hole with a small mass
B) A black hole with a medium mass
C) A black hole with a large mass found at the center of a galaxy
D) A black hole with no mass

18. What is the Andromeda Galaxy?
A) A type of black hole
B) A dwarf galaxy
C) The closest spiral galaxy to the Milky Way
D) A type of star

19. How many arms does the Milky Way galaxy have?
A) 1
B) 2
C) 3
D) 4

20. What are the arms of a spiral galaxy made of?

A) Stars
B) Gas and dust
C) Planets
D) Black holes

21. What is a quasar?
A) A type of star
B) A type of black hole
C) An active galactic nucleus
D) A type of nebula

22. What causes a quasar to emit large amounts of energy?
A) Nuclear fusion
B) Black hole feeding
C) Supernova explosion
D) Planetary formation

23. What is a nebula?
A) A group of stars
B) A cloud of gas and dust in space
C) A type of black hole
D) A type of galaxy

24. What is a dwarf galaxy?
A) A small, dim galaxy containing a few billion stars
B) A massive galaxy containing trillions of stars
C) A type of black hole
D) A type of nebula

25. What is the Local Group?
A) A group of galaxies that includes the Milky Way
B) A group of stars within the Milky Way
C) A type of black hole
D) A type of nebula

26. What is the closest galaxy to the Milky Way?
A) Andromeda Galaxy
B) Triangulum Galaxy
C) Large Magellanic Cloud
D) Small Magellanic Cloud

27. What happens to objects that cross the event horizon of a black hole?
A) They are stretched into long, thin strands
B) They are compressed into a tiny point
C) They are pulled into the singularity
D) They remain suspended at the event horizon

28. What is the escape velocity of a black hole?
A) The speed required for an object to escape the event horizon
B) The speed of light
C) The speed of sound
D) The speed of a rocket

29. How do scientists detect black holes?
A) By observing their gravitational effects on nearby objects
B) By observing their emissions of light
C) By observing their size and shape
D) By observing their magnetic fields

30. What is a stellar-mass black hole?
A) A black hole with the mass of a star
B) A black hole found in a star
C) A black hole formed from the collapse of a massive star
D) A black hole found in a galaxy

31. What is a supermassive black hole?
A) A black hole with the mass of a star
B) A black hole found in a star
C) A black hole formed from the collapse of a massive star
D) A very large black hole found at the center of galaxies

32. What is the name of the supermassive black hole at the center of our galaxy?
A) Andromeda
B) Sagittarius A*
C) Cygnus X-1
D) Centaurus A

33. What is Hawking radiation?
A) Radiation emitted by stars

B) Radiation emitted by black holes
C) Radiation emitted by galaxies
D) Radiation emitted by planets

34. What causes Hawking radiation?
A) The intense gravity of a black hole
B) The collision of particles near a black hole's event horizon
C) The escape of virtual particles from the event horizon
D) The fusion of hydrogen into helium

35. What effect does Hawking radiation have on a black hole?
A) It makes the black hole grow larger
B) It makes the black hole shrink over time
C) It has no effect on the black hole
D) It causes the black hole to emit light

36. What is the name of the theory proposed by Stephen Hawking to explain black hole radiation?
A) Quantum mechanics
B) General relativity
C) String theory
D) Hawking's theory of black hole evaporation

37. What happens when two black holes merge?
A) They explode
B) They create a supernova
C) They form a larger black hole
D) They create a white dwarf

38. What is an accretion disk?
A) A disk-shaped region of gas and dust orbiting a black hole
B) A disk-shaped region of stars orbiting a black hole
C) A disk-shaped region of dark matter surrounding a black hole
D) A disk-shaped region of light emitted by a black hole

39. What is spaghettification?
A) The stretching of an object into long, thin strands by a black hole's gravity
B) The compression of an object into a tiny point by a black hole's gravity
C) The escape of particles from a black hole's event horizon

D) The emission of light from a black hole

40. What is a light-year?
A) A unit of time
B) A unit of distance
C) A unit of speed
D) A unit of energy

41. How far does light travel in one light-year?
A) Approximately 300,000 kilometers
B) Approximately 9.46 trillion kilometers
C) Approximately 1.5 million kilometers
D) Approximately 10 billion kilometers

42. Which of the following is the largest cosmic scale?
A) Light-year
B) Parsec
C) Megaparsec
D) Kilometer

43. What is a parsec?
A) A unit of time
B) A unit of distance
C) A unit of speed
D) A unit of energy

44. How many light-years are in one megaparsec?
A) Approximately 3.26 light-years
B) Approximately 1.5 million light-years
C) Approximately 3.09 trillion light-years
D) Approximately 9.46 trillion light-years

45. What is the observable universe?
A) The part of the universe that we can see with telescopes
B) The entire universe
C) The part of the universe that is observable by humans
D) The part of the universe that is not hidden by other objects

46. How large is the observable universe?
A) Approximately 4.5 billion light-years in radius

B) Approximately 13.8 billion light-years in radius
C) Approximately 1 trillion light-years in radius
D) Approximately 10,000 light-years in radius

47. What is the cosmic microwave background radiation?
A) Radiation emitted by black holes
B) Radiation emitted by galaxies
C) Leftover radiation from the early universe
D) Radiation emitted by stars

48. What does the cosmic microwave background radiation tell us about the early universe?
A) It tells us that the early universe was hot and dense
B) It tells us that the early universe was cold and empty
C) It tells us that the early universe had no radiation
D) It tells us that the early universe had no stars

49. How do scientists study cosmic time and scale?
A) By using telescopes to observe distant objects
B) By measuring the speed of light
C) By studying the motion of planets
D) By analyzing rocks from space

50. What is the Hubble constant?
A) The rate at which the universe is expanding
B) The speed of light
C) The age of the universe
D) The rate at which galaxies collide

51. Who discovered the expansion of the universe?
A) Edwin Hubble
B) Albert Einstein
C) Stephen Hawking
D) Georges Lemaître

52. What is a galaxy cluster?
A) A group of stars within a galaxy
B) A group of galaxies bound together by gravity
C) A type of black hole
D) A group of nebulae

53. How are galaxy clusters distributed throughout the universe?
A) Randomly
B) In regular patterns
C) In spiral shapes
D) In chains or filaments

54. Who was the first human to journey into space?
A) Yuri Gagarin
B) Neil Armstrong
C) Buzz Aldrin
D) John Glenn

55. When did Yuri Gagarin make his historic spaceflight?
A) 1957
B) 1961
C) 1969
D) 1975

56. What was the name of the first manned mission to land on the Moon?
A) Apollo 11
B) Mercury 7
C) Gemini 4
D) Soyuz 1

57. Who was the first person to set foot on the Moon?
A) Yuri Gagarin
B) Neil Armstrong
C) Buzz Aldrin
D) John Glenn

58. When did the Apollo 11 mission land on the Moon?
A) 1961
B) 1969
C) 1975
D) 1981

59. What was the name of the space shuttle program operated by NASA?
A) Apollo
B) Mercury

C) Challenger
D) Space Transportation System (STS)

60. How many space shuttles were built as part of NASA's Space Shuttle program?
A) 2 B) 5 C) 6 D) 7