



MODERN SCIENCE ACADEMY

5. "GRAVITATION"

Sr.	Statements	A	B	C	D
1	Earth's gravitational force of attraction vanishes at:	6400 km	infinity	42300 km	1000 km
2	Value of g increases with the:	Increase in mass of body	Increase in altitude	Decrease in altitude	None of these
3	The value of g at a height one Earth's radius above surface of Earth is:	$2g$	$\frac{1}{2}g$	$\frac{1}{3}g$	$\frac{1}{4}g$
4	Value of g on moon's surface is 1.6 ms^{-2} . What will be the weight of a 100 kg body on the surface of moon?	100 N	160 N	1000 N	1600 N
5	The altitude of geostationary orbits in which communication satellites are launched above the surface of earth is:	850 km	1000 km	6400 km	42,300 km
6	Orbital speed of a low orbit satellite is:	zero	8 ms^{-1}	800 ms^{-1}	8000 ms^{-1}
7	The first man who came up with the idea of gravitation was:	Albert Einstein	Thomas Edison	Isaac Newton	Abu Rehan Al-Beruni
8	The value of gravitational field strength near earth's surface is:	3 Nkg^{-1}	10 Nkg	10 Nkg^{-1}	8 Nkg^{-1}
9	In S.I the value of G is:	$5.673 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$	$6.673 \times 10^{11} \text{ Nm}^2\text{kg}^{-2}$	$6.673 \times 10^{-11} \text{ Nm}^2\text{kg}^2$	$6.673 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$
10	Mass of earth can be calculated by using formula:	$m_E = \frac{G}{r_E^2 g}$	$m_E = \frac{r_E^2 g}{G}$	$m_E = G \frac{m}{d^2}$	$m_E = \frac{m_1 m_2}{d^2}$
11	The mass of Earth is equal to:	$6 \times 10^{24} \text{ kg}$	$6 \times 10^{-24} \text{ kg}$	$6 \times 10^{27} \text{ g}$	Both A & C
12	Radius of earth is:	$6.4 \times 10^6 \text{ m}$	$6.4 \times 10^6 \text{ km}$	$6 \times 10^{24} \text{ m}$	6400 m
13	Two identical balls of masses 1kg, each having distance of 1 m between their centers, the gravitational force between them is:	$667 \times 10^{-9} \text{ N}$	$6.67 \times 10^{-11} \text{ N}$	$667 \times 10^{11} \text{ N}$	$6.67 \times 10^{-13} \text{ N}$
14	The gravitational force between two objects is "F". If masses of bodies are doubled and distance between their centers is reduced to half then gravitational force is:	F	4 F	F/4	16 F
15	The force of gravity applied by earth on Sun is _____ that of Sun of Earth.	greater than	smaller than	sometimes greater	same as
16	The weight of a body on the earth is 100 N, what is its weight on the moon?	10 kg	10 N	100 N	16.67 N
17	The moon completes its one revolution around the earth in:	30 days	29.3 days	27.3 days	25.3 days
18	The total number of satellites in GPS:	12	24	36	48
19	The weight of an object is lowest at:	poles	Murree	moon	equator
20	Two satellites are revolving around the earth in the same orbit, which one will have the greater orbital speed?	heavier satellite	lighter satellite	same	controlled by person on ground
21	Two masses are separated by a distance r . If both masses are doubled, the force of interaction between two the masses changed by a factor:	2	4	$\frac{1}{2}$	$\frac{1}{4}$
22	An object is orbiting around a planet with orbital speed v . If the radius of planet is same and the mass is increased 4 times, by what factor the orbital speed will change?	2	4	$\frac{1}{2}$	$\frac{1}{4}$
23	The value of g at equator is:	same as at poles	larger than at poles	smaller than at poles	none
24	Newton's law of gravitation holds between every two objects on the:	on Earth	on Jupiter	on Moon	on Universe
25	Gravitational force is always:	repulsive	attractive	both	none



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26	Gravitation force is _____ of the medium between the objects.	dependent	independent	both	none
27	Newton's law of gravitation is consistent with Newton's _____ law of motion:	1 st	2 nd	3 rd	All of these
28	Your weight as measured on Earth will be _____ on Moon.	increased	decreased	remains the same	none of these
29	_____ is a natural satellite.	earth	mars	moon	jupiter
30	A communication satellite completes its one revolution around the Earth in _____ hours.	independent	equal	double	dependent
31	_____ are used to put satellites into orbits.	helicopter	rocket	aero plane	none

"Important Short Questions"

- 1) What is meant by force of gravitation? Also state law of gravitation.
- 2) Newton's law of gravitation suggests that gravitational force acts between any two material objects. Then why two chairs in your class room do not attract each other due to this force?
- 3) Define these terms: Field force, Gravitational field, Gravitational field strength, natural satellites and artificial satellites.
- 4) Why "G" is called universal gravitational constant?
- 5) Why is it difficult to measure the value of "G"?
- 6) Where will be your weight greater, at Murree hills or at Karachi? Where will be your mass greater?
- 7) If a man travels from the north pole to the equator, what will be the effect on his weight during this trip?
- 8) Earth and apple on a tree attract each other by the force of gravity. The apple falls on the earth but the earth does not move towards apple?
- 9) The mass of moon is 100 times less than the mass of earth and the radius of the moon is 4 times less than the radius of the earth. Show that value of g is 6 times less than value of g on earth?
- 10) If mass and radius of earth becomes double then what will be the effect on the value of g on the surface of earth?
- 11) If r_E is doubled, what will be change in g ?
- 12) What do you know about geostationary satellites and geostationary orbit?
- 13) What is "GPS"?
- 14) Do you attract the Earth or the Earth attracts you?
- 15) How can you say that gravitational force is a field force?
- 16) Why law of gravitation is important to us?
- 17) Define orbital velocity. On what factors it depends?
- 18) Why communication satellites are stationed at geostationary orbits?
- 19) For what purposes artificial satellites have been sent in space?
- 20) Artificial satellites do not have engines like cars then how can they keep on moving around the earth?
- 21) The orbital speed of a satellite orbiting very close to earth (at negligible height) is " v_o ". What will be the orbital speed of another satellite revolving at a height equal to the radius of earth (in term of v_o).
- 22) If Earth somehow expanded to a larger radius, with no change in mass, how would your weight be affected? How would it be affected if Earth instead shrunk?
- 23) Why lighter and heavier objects fall at the same rate toward the earth?
- 24) Why for same height larger and smaller satellites must have same orbital speeds?

"Important Long Questions"

1. Explain Newton's law of gravitation? How it relates with 3rd law of motion?
2. How can you calculate mass of Earth using gravitational law?
3. Derive an expression for orbital velocity of satellites.