PHYSICS

BOOKS - CHETANA PHYSICS (MARATHI ENGLISH)

GRAVITATION

Exersice

1. The gravitational force of attraction betweeen two objects is given by____

A. `F alpha frac(m_1m_2)(d^2)

B. $F\alpha\frac{d^2}{m_1m_2}$

C. $F\alpha\frac{m_1m_2}{\sqrt{d^2}}$

D. $F\alpha\frac{m_1m_2}{d^3}$

Answer:

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2. If the distance between two bodies becomes half,the fravitational force between them becomes____.

A. half

B. one forth

C. 4 times

D. 2 times

Answer:

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3. If the distance between two objects increases 5 time,the gravitational force becomes ___times.

A. 5

B. 15

C. $\frac{1}{25}$

D. 25

Answer:

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4. The gravitational force on the surface of th Moon is _____ times than that on the surface of the Earth.

A. five

B. one fifth

C. one sixth

D. six

Answer:

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5. The gravitational force causes _____ .

A. Tides

B. circular motion of moon

C. None of these

D. both a and b

Answer:

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6. The Earth attrats moon with a force of 10^{20} N.The moon atracts Earth with a force of ___.

A. less than 10^{20}N

B. $10^{20} N$

C. greater than 10^{20} N

D. 10^{20} N

Answer:

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7. The SI unit of gravitational constant is _____ .

A. Nm^2 / kg^2

B. Nkg^2 / m^2

C. Nkg^2 / m^2

D. Ncm^2 / g^2

Answer:

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8. The value of acceleration due to gravity at the height 'h' from the ground is _____ .

A. $g = \frac{GM}{R+h}$

B. $g = \frac{GM}{\sqrt{R+h}}$

C. $g = \frac{GM}{R+h}^2$

D. `g-GM(R+h)^2

Answer:

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9. The value of 'g' is maximum at poles and it is _____.

A. $9.72m/s$

B. $9.83m/s^2$

C. $9.83m/s$

D. $9.72m/s^2$

Answer:

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10. The value of 'g' for Earth is zero at _____ .

A. Centre of Earth

B. Poles

C. Infinite distance

D. Both a and b

Answer:

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11. When an object is thrown upward,the force of gravity____.

A. is opposite to the direction of motion

B. is in the same idrection as that of motion

C. becomes zero at higher point

D. increase as is rise up

Answer:

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12. The value of 'g' ___as the depth from surface increase .

A. increases

B. fluctuates

C. decreases

D. varies

Answer:

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13. As the height of the object from the surface of the Earth increases,value of 'g' becomes __.

A. more

B. less

C. equal

D. cant'say

Answer:

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14. The mass of objects ___at any place on the surface on the Earth

A. remains constant

B. is non-uniform

C. changes

D. increase

Answer:

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15. Acoording to Newton's first law,if mass is more,then the inertia of the body is _____.

A. less than 10^{20}N

B. very lass

C. more

D. cant'say

Answer:

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16. The weight of body gradually decreases from_____.

A. equator poles

B. poles to equator

C. pole to pole

D. height to surface

Answer:

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17. A body of mass 1 kg is attracted by the Earth with a force which is equal to____.

A. 9.8 N

B. $6.67 \times 10^{-(11)}$

C. 1 N

D. $9.8m/a$

Answer:

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18. The gravitational potenital energy at the height of 'h' form the ground is ____.

A. $\frac{-GMm}{R+h}$

B. $\frac{-GMm_1}{R^2+h}$

C. $\frac{-GMm_1}{R^2+h^2}$

D. $\frac{-GMm}{R^2+h}$

Answer:

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19. The orbit of of planet is an ellipse with the Sun at one of the ____.

A. foci

B. centre

C. middle surface

D.

Answer:

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20. The straight line joining the planet and the sun sweeps equal___in equal interval of time

A. volume

B. angle

C. density

D. area

Answer:

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21. The square of time period of revolution around the sun is diretly proportional to the _____of the planet from the sun .

A. mean distance

B. square of the distance

C. cube to the distance

D. cube of the mean distance

Answer:

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22. Which of the following is not an example of free fall?

A.Moon revolving around the Earth B. Earth revolving around the Sun C. Parachute jumping D. Artificial statellites revolving around the Earth

A. Moon revolving arounf the Earth

B. Earth revolving around the Sun

C. Parachute jumping

D. Artificial statellites revolving around the Earth

Answer:

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23. The centre of mass of an object having uniform density is at its_____. A. Centre of Earth B. geometrical centre C. centroid D. Circumference

A. Centre of Earth

B. geometrical centre

C. centroid

D. Circumference

Answer:

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24. Find the Odd word out:Acceleration,mass,force,weight

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25. Find the Odd word out: Change in value of 'g' at surface,change in vlaue of 'g' at height,change in vlaue of 'g' at depth,change in value of 'g' on thickness

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26. Find the Odd word out: Light,sound,heat laws of planetary motion

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27. Find the Odd word out: Mass,potential energy,radius,weight.

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28. Find the Odd word out: $9.83\frac{m}{s^2}, 9.8m/s^2, 980cm/s^2, 9.77m/s^2.$

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29. Find the Odd word out: Weight,Thrust,Force,Pressure.

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30. Find the Odd word out: Newton's first law,Newton's law of gravity,Newton's third law,Newton's second law

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31. Find the Odd word out: Newton,Ohm,Kepler,Galileo

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32. Find the Odd word out: `983m//s^2.Ohter are values is CGS system. 983 cm/s^2 , 978 cm/s^2,980cm/s^2

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33. Find the Odd word out: $9.83m/s^2$,9.83 m/s, 9.83 m/h, 9.83km/h. Other are not values of 'g'

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34. Complete the aology:

$6 \times 10^{24}kg$: mass of the Earth: : $6.4 \times 10^{6}m$ _ _ _ .

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35. Complete the anology:

Height of a weather statelitte : 8.7m/s^2 : : Height of communication satellite:_____

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36. Complete the anology:

Mass:Scalar quantity: : weight:_____

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37. Complete the aology:

At poles :$9.83m/^2$: : At equator:____.

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38. Complete the aology:

Shape of the Earth at equator:Bulged: : Shape of the Earth at Poles:____

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39. Complete the aology:

Kinetic energy:$\frac{1}{2}mv^2$: : Gravitational potential energy :_____

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40. Complete the aology:

Force : ma : : Gravitational force:_____

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41. Complete the anology:

Force: Vector: : weight: _____

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42. State whether the following statements are True of False,Correct the false statement .

Force =mass $\times$ velocity

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43. State whether the following statements are True of False,Correct the false statement .

'G' is called gravitational acceleration.

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44. Acceleration is a scalar quantity .

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45. State whether the following statements are True of False,Correct the false statement .

Gravittional force at the Moon is double than the Earth's gravitational force.

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46. State whether the following statements are True of False,Correct the false statement .

$1N = 1kgxx1m//s^2`$

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47. State whether the following statements are True of False,Correct the false statement .

1 dyne =10^5 N

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48. State whether the following statements are True of False,Correct the false statement .

The force towards the centre of the circular orbit is called centripetal force.

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49. State whether the following statements are True of False,Correct the false statement .

The gravitational acceleration does not become zero at the centre fo the Earth

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50. State whether the following statements are True of False,Correct the false statement .

At the poles,the acceleration due to gravit is $9.77 m / s^2$.

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51. State whether the following statements are True of False,Correct the false statement .

'g' is called universal constant

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52. State whether the following statements are True of False,Correct the false statement .

Mass is a scalar quantity .

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53. State whether the following statements are True of False,Correct the false statement .

Beyond the surface of the Earth,g$a \frac{1}{R+h}^2$

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54. State whether the following statements are True of False,Correct the false statement .

Weight is a vector quantity .

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55. State whether the following statements are True of False,Correct the false statement .

The mass of the Earth is $6.4 \times 10^6 kg$

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56. State whether the following statements are True of False,Correct the false statement .

At a heighty of 'h' from the grounf,the gravitational potential energy is $\frac{-GMm}{R+h}$

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57. Find the weight of a man whose mass is 50 kg.

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58. Find the gravitatinal force between man of mass 60 kg and the Earth

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59. A stone of mass 2 kg is falling from a certain height.find the force of attraction between the Earth and the stone.Also,find the acceleration.

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60. The planet in space has mass twice as that of the Earth and a radus thrice as that of the Earth If the weight of ta book is 90 N the Earth .what would be the weight on that planet?

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61. Calculate the value of 'g' on the Moon,if its mas is 7.4×10^{22}kg and radius is 1740 km.

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62. If the acceleration due to gravity on the surface of the Earth is $9.8m/s^2$,What will be the acceleration due to ravity on the surface of the planet whose mass and radius both are two times the corresponding quantites for the Earth

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63. The escape velocity for mass is `5.02km//s.f its radius is 3390 km,What is the value of g on its surface

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64. A planet orbits the Sun in time T at a distance of R from it.Another planet orbits the Sun in a time of 8 T What is its distance R' from the sun.

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65. A ball thrown up vertically returns to the person after 6 s.Find the velocity with which it was thrown up

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66. A boy drops a coin form the top of a building with is 49m high. Find the velocity with which the coin strikes. Calculate total time (t) it takes to return to the surface of earth .

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67. A stone is thorwn vertically upwards with initial velocity of $40m/s$. Taking $g = 10m/s^2$find the maximum height and total distance covered by stone

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68. According to Newton's law of gravitation,every object attracts every other object means if the Earth attracts an apple towards it,then an apple also attracts the Earth with the same force,then why an apple falls down but the earth doen not move towards the apple?

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69. Correct and rewrite kepler's third law.The period of revoluiton of a planet arround the sun is directly proportional to the cube of the distance of the planet from the sun.

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70. An elephant and a matchbox fall from a height of 200m.if they are in a state of free fall,which of them will reach the ground first and why?

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71. An artificial satellite is shifted from LEO to HEO,how will the value of 'g' vary?

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72. How will the value of 'g' change if a person travels from Delhi to Moscow ?

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73. If a traveler in a spacecraft orbiting the Earth releases an object from his hand,it remains stationary and appears to be in a state of weightlessness.Does this mean there is no force of gravity acting on the object?

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74. Will the velocity of a stone thrown vertically upwards remain constant or will it change with time? How will it change ?

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75. Why doensn't the stone move up all the time? Why does it fall down after reaching a certain height?

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76. What does the stones maximum height depend on when it thrown vertically upward direction?

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77. How many times does the sea level at the coast change?

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78. How does sea level get changed?

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79. Where is high tide and low tide caused ?

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80. Where can the total mass of an object be assumed to be concentrated?

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81. Where is the centre of mass located for an object ?

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82. What was the basis of Kepler's laws?

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83. What are the different types of electro magnetic waves ?

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84. What are the waves on the fabric of space-time called ?

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85. Is it easy to detect Gravitational waves?

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86. What is the dvice used to detect Gravitational waves?

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87. Is the value of g zero in the space station?

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88. Why is weightlessness caused in a spaceraft?

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89. Why dosen't the spacecraft fall towards the Earth?

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90. If a traveller releases an object from her hand in the spacecraft,what will happen?

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91. The impressed force on the stone is in which direction ?

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92. What happens if the string is released?

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93. Define : Centripetal force

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94. What is centripetal force?

Watch Video Solution

95. Which force acts on the stone in free fall after you release it?

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96. Which force acts on the stone in free fall after you release it?

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97. What is free fall?

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98. What is the initial velocity and what is the effect of gravitational acceleration on the object in free fall ?

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99. Write kinematic equations used in free fall?

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100. The gravitational force of attraction between two objects is gives by ____

A. $F\alpha\frac{m_1m_2}{d^2}$

B. $F\alpha\frac{m_1m_2}{d^3}$

C. $F\alpha(m_1m_2)$(d^2)D. F alpha frac(m_1m_2)(d)`

A. $F\alpha\frac{m_1m_2}{d^2}$

B. $F\alpha\frac{d^2}{m_1m_2}$

C. $F\alpha\frac{m_1m_2}{}$(sqrtd^2)`

D. `F alpha frac(m_1m_2(d^3)

Answer:

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101. The gravitational force on the surface of th moon is ____times than that on the surface of the Earth A. Five B. one fifth C. one sixth D. none

A. Five

B. one fifth

C. one sixth

D. six

Answer:

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102. Find odd one out:Acceleration,mass force,weight

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103. State true or false:

Force=mass $\times$ velocity

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104. Complete the aology:

At poles :$9.83 m/^2$: : At equator:____.

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105. Mahendra and Virat are sitting at a distance fo 1 metre form each other.Their masses are 75 kg and 80 kg respectively.What is the gravitational force between them?

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106. Define: Centre of mass

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107. Distinguish between: Weight and mass

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108. If a person weighs 750 N on Earth,how much would be his weight on the Moon given that Moon's mass is $\frac{1}{81}$ of that Earth and its radius is $\frac{1}{3.7}$ of that of Earth

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109. Define The Universal of gravitational Law and Derive mathematically

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110. Write the laws given by Kepler.How did they help Newton to arrive at the inverse square law of gravity ?

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111. Define:Escape velocity and derive mathematically .

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Example

1. Mahendra and Virat are sitting at a distance fo 1 metre form each other.Their masses are 75 kg and 80 kg respectively.What is the gravitational force between them?

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2. The mass of the Earth and Moon are 6×10^{34} kg and 7.4×10^{22} kg respectively.The distance between them is 3.84×10^{5} km.Calculate the gravitational force of attraction between the two? G=$6.7 \times 10^{11} Nm^2 / kg^2$.

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3. The mass of the earth is 6×10^2 4kg.The distance between the Earth and the sun is $1.5 \times 10^{11} m. If the gravitational f$ or $ce between the two is$ 3.5xx10^22 N,W $\hat{i}$ $s the mass of the sun? g$ =6.7xx10^-11Nm^2//kg^2`.

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4. In the previous example,assuming that the bench on which Mahendra is sitting is frictioless,starting,with zero velocity.What will be Mahendra's velocity after 1s

and how will is change with time? Mass of Mahendra (75kg) and force (4.002xx10^-7N)`

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5. Assuming that acceleration remains constant (`5.34xx10^-9m/s^2),How long will Mahendra take to move 1 cm towards Viral if he starts from rest.?

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6. A truck starts from rest and rolls down a hill with a constant accelration.It treavles a distance of 400 m in 20s. Find its acceleration.Also find the force acting on it if its mass is 7000 kg .

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7. Karan and Arjun are two friedns of mass m_1 and m_2 respectively,separated by a distance d.What would happen to the force between them if: Mass of Arjun is doubled.

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8. Karan and Arjun are two friedns of mass m_1 and m_2 respectively,separated by a distance d.What would happen to the force between them if: Mass of both Karan and Arjun is doubled.

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9. Karan and Arjun are two friedns of mass m_1 and m_2 respectively,separated by a distance d.What would happen to the force between them if: Distance between

them is doubled.

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10. Karan and Arjun are two friedns of mass m_1 and m_2 respectively,separated by a distance d.What would happen to the force between them if: value of G doubled .

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11. Two boys are sitting very close to each other at a distance of 0.5 m from each other.If the mass of one boy is 40 kg and other is 50 kg,find the fravitational force between them.

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12. If the force of gravitation between the Earth and an object of mass 'm' is $9 \times 10^7 N$. Find the mass of an object if the mass ofhte Earth 6×10^{24}kg and its radius is 6.4×10^6 m.

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13. If two objects of masses 500kg and 84kg resprecitvley are at a distance of 2m apart from each other.Find gravitational force between them?

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14. If two objects of 45 kg and 47 kg respectively are attracted towards each other by a gravitational force fo 250×10^{-7}N,find the distance between their centres.

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15. Calculate the gravitational force due to the Earth on Mahendra,if mass of Earth is 6×10^{24}kg,Radius is $6.4 \times 10^{6} m$, $g = 9.77 m / s^{2}$ and mass of Mahendra is 75 kg .

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16. Starting from rest,due to the gravitational ofrce of the Earth i.e.733 N,What is the speed of Mahendra after 1 second?If his mass is 75 kg.

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17. If a person weighs 750 N on Earth,how much would be his weight on the Moon given that Moon's mass is $\frac{1}{81}$ of that Earth and its radius is $\frac{1}{3.7}$ of that of Earth

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18. The radius of the planet A is half the radius of planet B.If the mass of A is M_a,what must be the mass of B so that the vlaue of g on B is half that of its value of A?

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19. The mass and weight of an object on Earth is 5 kg and 49 N respectively.What will be their values on the Moon? Assume that the acceleration due to gravity on the Moon is $\frac{1}{6}$ th of that on the Earth

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20. Suppose you are standing on a tall ladder.If your from the centre of the Earth is 2R,what will be your weight?

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21. What would be the value of g on othe surface of the earth if tis mass was twice as large and its radius half of what it is now?

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22. Calculate the escape velocity on the surface of the Moon given the amss and radius of the Moon to be 7.4×10^{22} kg and 1.74×10^{6}m respectively

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23. Let the period of revolution of a planet at a distance R from a star be T.Prove that if it was at a distance of $2Rf$ or $mthe \star , itsperiodofrevolutionwillbe$sqrt8T`.

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24. An object takes 5s to reach the ground froma height of 5m on a planet.What is the value of g on the planet?

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25. A ball falls of a table and reahes the grounf in 1 s.Assuming g=$10m/s^2$,Calculate its speed on reching

the ground and the height of the table

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26. An iron ball of mass of 3 kg is released from height of 125 m and falls freely to the fround Assuming that the vlaue of g is $10m/s^2$,calculate: (i)time taken by the ball to reach the ground.

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27. An iron ball of mass of 3 kg is released from height of 125 m and falls freely to the fround Assuming that

the vlaue of g is $10m/s^2$,calculate: velocity of the ball on reaching the ground.

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28. An iron ball of mass of 3 kg is released from height of 125 m and falls freely to the fround Assuming that the vlaue of g is $10m/s^2$,calculate: the height of the ball at half the time it takes to reach the ground.

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29. A tennis ball is thrownb up and reahces a height of 4.05 m before coming down.What was its initial velocity? How much total time will it take to come down? Assumeg=$10m/s^2$

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30. An object thrown vertically upwards reahces a height of 500m.What was its initial velocity? How long will the object take to come back to the Earth?assume g=$10m/s^2$

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31. Find a formula for maximum height attained by object

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32. A stone thrown vertically upwards with initaial velocity u reaches a height 'h' before coming down.Show that the time takes to go up is same as time taken to come down

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33. Define write the laws: force

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34. Define write the laws: Newton's universal law of gravitation

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35. Define write the laws: Universal constant of gravitation(G)

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36. Define write the laws: Centre of mass

Watch Video Solution

37. Define write the laws: Gravitional acceleration (g)OR Acceleration due to gravity

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38. Define : Free fall

Watch Video Solution

39. Define: Mass (m)

Watch Video Solution

40. Define: weight(W)

Watch Video Solution

41. Define : Centripetal force

Watch Video Solution

42. Define : Uniform circular motion

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43. Define: Gravitational Potential energy

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44. Define: Escape velocity

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45. Will the direction of the gravitational force change as we go inside the earth?

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46. What would happen if there were no gravity?

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47. What would happen if the value of g was twice as large?

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48. What is the value of 'g' at the centre of the Earth?

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49. Will the mass and weight of an object on the earth be same as their values on Mars? Why?

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50. Define Earth's gravitational force

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51. Define Earth's gravitational acceleration

Watch Video Solution

52. Explain Variation in the value of g.

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53. Distiguish between:

Gravitational constant and Gravitational acceleration

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54. Distiguish between:

Weight and Mass

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55. High and low tides are regular phenomena

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56. In the spacecraft,travellers and objects appear floating

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57. weight of an object changes from place to place on the surface of the Earth

Watch Video Solution

58. Explain the terms: Free fall

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59. Explain the terms: Acceleration due to gravity

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60. Explain the terms: escape velocity

Watch Video Solution

61. What is centripetal force?

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62. Explain the terms: Gravitational Potential energy

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63. Define : The Universal law of gravitation and derive mathematically .

Watch Video Solution

64. Define:Acceleration due to gravity and derive mathematically

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65. The value of 'g' at the centre of the Earth is zero Explain ?

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66. Write the laws given by Kepler.How did they help Newton to arrive at the inverse square law of gravity ?

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67. State Kepler's thrid law and derive mathematically to obtain constant

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68. If the value of g suddenly becomes twice its value,it will become two time more difficult to pull a heavy object along the floor.Why?

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69. Explain centripetal force with suitable example

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70. Define:Escape velocity and derive mathematically .

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71. Is there a gravitational force between two objects kept on a table or between you and your friend sitting next to you?If yes,why don't the two move towards each other ?

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72. Will you weight remain constant as you go above the surface of the earth?

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73. According to Newton's law of gravitation,earth's gravitational force is higher on an object of larger

mass.Why doesn't that object fall down with higher velocity as compared to an object with lower mass?

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74. The force of Graviation between two bodies having irregular shape is taken to be the distance between their :

A. centre of the mass

B. centre of the body

C. edge f the body

D. None of These

Answer:

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75. If the distance between the two bodies is tripled, what will be the Gravitational force between them

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76. The mass of m_2 was reduced to 50% and the force exerted by $m_1$on m_2 is 20 N. what is the force exerted by $m_2$on m_1?

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77. Why gravitational constant is called universal constant ?

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78. what will happen to gravitational force if mass of one of the objects is doubled?

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79. What is the value of universal constant in SI?

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