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|  | Gravitational | Electrical |
| 1.  | What is the gravitational field strength at the surface of a planet if 5.3 kg of mass experiences 67.2 N of downward force due to gravity? (13 N/kg) |  What is the electrical field strength near a charged object if 2.3 μC of charge experiences 0.018 N of upward force due to the electric field? (7.8x103 N/C) |
| 2.  | What force does a 34 N/kg gravitational field exert on a 72.5 kg mass? (2500 N) | What force does a 5200 N/C electrical field exert on a proton?(8.3x10-16 N) |
| 3. |  What is the force of gravity between a 674 kg object that is 7.15x106 m from earth’s center? (Earth has a mass of 5.97x1024 kg) (5250 N) |  A 34.8 μC charge is 45.0 cm to the right of a -12.7 μC charge. What is the force on the leftmost charge?(19.6 N rt) |
| 4. | At what distance from the center of the moon is the force of gravity on a 100.0 kg mass 5.00 N? (The moon has a mass of 7.35x1022 kg) (9.90x106 m) | How far apart do two 1.00 C charges need to be so that they experience a force of repulsion of 1.00 N(94.8 km) |
| 5. |  What is the gravitational field strength on the surface of the moon with a radius of 1.737x106 m, and a mass of 7.35x1022 kg? (1.62 N/kg) |  What is the electric field 3.5 cm to the right of a 0.0137 μC charge? (1.0x105 N/C rt) |
| 6. | What is the radius of a neutron star with a gravitational field strength of 3.4x1013 N/kg, and a mass of 8.13x1031 kg? (13 km) | There is a 12,350 N/C upward electric field 15.6 cm below what charge? (-3.34x10-8 C) |
| 7. |  What is the change in gravitational potential (in J/kg) if it takes 812 J of energy to lift a 34 kg object from the floor to a shelf? If g is 9.81 N/kg, what is the shelf height? (24 J/kg 2.4 m) |  What is the change in electrical potential if it takes 812 J of energy to move a 15 μC charge from point A to point B? (5.4x107 V) |
| 8. |  A 117 kg mass falls freely from rest through a gravitational potential difference of 45 J/kg. What potential energy in J does it turn into kinetic energy, and what is its final velocity? (5.3x103 J 9.5 m/s) |  A proton accelerates from rest through an electric potential of 24.0 V. What is its change in potential energy, and what is its final velocity? (3.84x10-18 J 6.78x104 m/s) |
| 9. | What is the gravitational potential (in J/kg) 12 cm from the center of a 212 kg ball of lead? (-1.2x10-7 J/kg) |  What is the electrical potential 7.8 cm from the center of a 0.215 μC charge? (2.5x104 V) |
| 10. | What is the gravitational potential (in J/kg) at the surface of the moon? (The moon has a mass of 7.35x1022 kg and a radius of 1.737x106 m) (-2.82x106 J/kg) | A sphere has a 2.1 μC charge spread evenly over its surface. What is the sphere’s radius if the electric potential on the surface is 48,000 V? (39 cm) |
| 11. |  The earth has a mass of 5.97x1024 kg, and a radius of 6.38x106 m. What work does it take to bring a 5.00 kg object from the surface of the earth to an elevation of 4.15x106 m above the earth’s surface? How does that compare to the same calculation using ΔEp =mgΔh, where we assume g is a uniform 9.81 N/kg (1.23x108 J 2.04x108 J) |   A 25.1 μC charge is 67.0 cm to the right of a 16.8 μC charge. What work would it take to bring them closer so that they are separated by only 45.0 cm? If they each have a mass of 12.1 grams, what is their speed when they are very far away, if they are released from a distance of 45.0 cm? (Neglect other forces. They would each have half the total energy) (26.4 m/s) |
| 12. | An object approaches the moon. ( Moon’s mass: 7.35 x 1022 kg, radius: 1.737 x 106 m) If the object is going 1210 m/s when it is 2.26 x 106 m from the moon’s center, what is its speed when it strikes the surface? (1660 m/s) | Three 115 gram 25.0 μC charges occupy the corners of an equilateral triangle 30.0 cm on a side. If the charges are released simultaneously, what is their speed when they are very far away, assuming no other force acts on them? (Bring the charges in from infinity one by one, add the work together…) (18.0 m/s) |
| 13. | How much work does it take to move two 4.5x106 kg spheres whose centers are separated by 3.5 m initially, so that their centers are separated by 7.8 m? (210 J) | How much work does it take to move two 4.5 μC spheres whose centers are separated by 3.5 m initially, so that their centers are separated by 7.8 m? (-0.029 J) |
| 14. |  The top of a hill is 420 J/kg higher in gravitational potential than the bottom. What work does it take to lift a 5.0 kg object from the bottom of the hill to the top? If the g is 9.81 N/kg, how high is the hill? (2100 J 43 m) | Two parallel plates have a potential of 600. Volts across them. What work does it take to move 2.3 C of charge from one plate to the other? If the plates have an electric field intensity of 14,500 V/M between them, what is their separation? (1380 J 4.14 cm) |
| 15 | On the planet Zot, a hill 23.1 m high represents a potential change of 416 J/kg of gravitational potential. What is the g on planet Zot? (18 N/kg) | Two parallel plates are separated by 3.1 mm, and have 710. Volts of electric potential across them. What is the electrical field intensity between the plates? (2.3x105 N/C) |
| 16. |   What is the potential energy of the earth and the moon system? The earth has a mass of 5.97x1024 kg, the moon 7.35x1022 kg, and their centers are separated by 3.84x108 m? (-7.62x1028 J) |   What is the potential energy of two -1.20 µC charges that are separated by 12.0 cm? (0.108 J) |