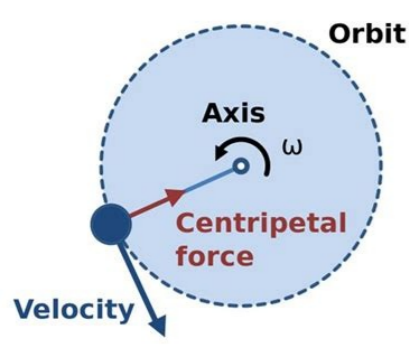


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**Forces**

Forces make things move, for example **push** and **pull**

Some pull and push forces are **contact** forces. Some pull and push forces are **non-contact** forces.

**BALANCED or UNBALANCED**

When the forces are **balanced**, the object **doesn't move**.

When the forces are **unbalanced**, the object **moves**.

1. Tick the words related to forces

evaporation   gravity   volume   non-contact  
push   pull   solution   unbalanced  
magnetism   balanced   contact   molecule

2. Select the type of forces:

Pull	Push	Pull	Pull	Pull
Contact	Contact	Contact	Contact	Contact
Non-contact	Non-contact	Non-contact	Non-contact	Non-contact
Balanced	Balanced	Balanced	Balanced	Balanced
Unbalanced	Unbalanced	Unbalanced	Unbalanced	Unbalanced

In an experiment, the acceleration due to gravity at the surface of the Earth is measured to be  $9.90 \text{ m/s}^2$ . Find the absolute error in the measurement using an accepted value of  $9.81 \text{ m/s}^2$ .

$$g_a = 9.81 \frac{\text{m}}{\text{s}^2} \quad g_m = 9.90 \frac{\text{m}}{\text{s}^2}$$

Abs. Err. = |accepted value - measured value|

$$|9.81 \frac{\text{m}}{\text{s}^2} - 9.90 \frac{\text{m}}{\text{s}^2}| = 0.09 \frac{\text{m}}{\text{s}^2}$$

## Newton's Law of Gravitation

$$F = \frac{GmM}{r^2}$$

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# Gravity

- A type of force that pulls everything down to the ground
- You can't see it but it keeps you on Earth



Gravity and sin both pull in the same direction

Gravitational force worksheets grade 9. Answer key gravitational force worksheet answers. Gravitational force worksheet for grade 4. Gravitational force worksheet with answers. Gravitational force worksheet for grade 6. Law of gravitational force worksheet. Gravitational force worksheet middle school. Gravitational force worksheet for kindergarten.

Live worksheets > English Finish!! Please allow access to the microphone Look at the top of your web browser. If you see a message asking for permission to access the microphone, please allow. Close In this worksheet, we will practice using Newton's law of gravitation to calculate the force due to gravity between two massive objects. Q1: Which of the following is the correct formula for Newton's law of gravitation?  $AF=G(m+m)r$   $BF=Gmmr$   $CF=Gmmr$   $DF=G(m+m)r$   $EF=Gmmr$  Q2: Titan is the largest moon of Saturn. It has a mass of  $1.35 \times 10^{22}$  kg. Saturn has a mass of  $5.68 \times 10^{26}$  kg. If the magnitude of the gravitational force between them is  $3.43 \times 10^8$  N, what is the distance between the centers of mass of Saturn and Titan? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer in scientific notation to two decimal places. A3.  $3.2 \times 10^8$  m B1.  $4.9 \times 10^8$  m C1.  $2.2 \times 10^8$  m D2.  $0.9 \times 10^8$  m E1.  $7.5 \times 10^8$  m Q3: Two asteroids, A and B, are in deep space. Asteroid A has a mass of  $5.75 \times 10^4$  kg, and asteroid B has a mass of  $1.39 \times 10^4$  kg. If the magnitude of the gravitational force between them is  $0.370$  N, what is the distance between the centers of mass of the two asteroids? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer in scientific notation to two decimal places. A1.  $9.7 \times 10^4$  m B1.  $2.0 \times 10^4$  m C1.  $4.4 \times 10^4$  m D1.  $8.8 \times 10^4$  m E3.  $8.9 \times 10^4$  m Q4: A man, who is standing on the surface of Earth, has a mass of  $72$  kg. Earth has a mass of  $5.97 \times 10^{24}$  kg and a radius of  $6,370$  km. What is the magnitude of the gravitational force between the man and Earth? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer to the nearest newton. Q5: Earth has a mass of  $5.97 \times 10^{24}$  kg, and the Moon has a mass of  $7.34 \times 10^{22}$  kg. The average distance between the center of Earth and the center of the Moon is  $384,000$  km. What is the magnitude of the gravitational force between Earth and the Moon? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer in scientific notation to two decimal places. A1.  $9.8 \times 10^8$  N B2.  $7.3 \times 10^8$  N C1.  $9.8 \times 10^8$  N D7.  $61 \times 10^8$  N E7.  $61 \times 10^8$  N Q6: Two objects, A and B, are in deep space. Object A has a mass of  $15,000$  kg and object B has a mass of  $26,000$  kg. The distance between the centers of mass of the two objects is  $25$  m. What is the acceleration of object B toward object A due to their gravitational interaction? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer in scientific notation to two decimal places. A4.  $1.6 \times 10^4$  m/s<sup>2</sup> B1.  $6.0 \times 10^4$  m/s<sup>2</sup> C4.  $0.0 \times 10^4$  m/s<sup>2</sup> D6.  $9 \times 10^4$  m/s<sup>2</sup> E2.  $7 \times 10^4$  m/s<sup>2</sup> Q7: Two spaceships are in deep space. The distance between the centers of mass of the two spaceships is  $300$  m, and the force between them is  $5.51 \times 10^8$  N. If one spaceship has a mass of  $24,000$  kg, what is the mass of the other spaceship? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer to the nearest kilogram. Q8: The figure shows two large rocks in outer space. Each rock has a mass of  $480$  kg. What is the magnitude of the gravitational force between the two rocks? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer in scientific notation to two decimal places. The grid lines on the grid are spaced  $1$  m apart. A1.  $5.4 \times 10^8$  N B1.  $5.4 \times 10^8$  N C3.  $2.0 \times 10^8$  N D3.  $2.0 \times 10^8$  N E1.  $7.1 \times 10^8$  N Q9: The figure shows two large rocks in outer space. Each rock has a mass of  $150$  kg. What is the magnitude of the gravitational force between the two rocks? Use a value of  $6.67 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$  for the universal gravitational constant. Give your answer in scientific notation to two decimal places. The grid lines on the grid are spaced  $1$  m apart. A7.  $5.0 \times 10^8$  N B1.  $6.7 \times 10^8$  N C3.  $7.5 \times 10^8$  N D2.  $5.0 \times 10^8$  N E5.  $0.0 \times 10^8$  N Q10: Which of the following relations shows how the magnitude of the gravitational force between two objects,  $F$ , varies with the masses of the two objects,  $m$  and  $m$ ?  $AF \propto mm$   $BF \propto m+m$   $CF \propto m \times m$   $DF \propto m-m$   $EF \propto mm$  In order to continue enjoying our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. Live worksheets > English Finish!! Please allow access to the microphone Look at the top of your web browser. If you see a message asking for permission to access the microphone, please allow. Close

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