

Practice sheet

Grade 9

Physical science

Term 1

Choose the best answer

Every object in the universe exerts a force on every other object. This

force is called \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** friction | **b.** gravity |

The measure of the gravitational force exerted by Earth on an object is the object’s \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** weight | **b.** mass |

The amount of gravitational force between two objects depends on

their \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** color and density | **b.** mass and distance |

Weight is measured in units called \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** Newton | **b.** kilograms |

The greater an object’s \_\_\_\_\_\_, the stronger the gravitational force on it.

|  |  |
| --- | --- |
| **a.** mass | **b.** velocity |

Mass is measured in units called \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** newtons and kilonewtons | **b.** grams and kilograms |

A weight reading on a scale shows the \_\_\_\_\_\_ exerted by the scale.

|  |  |
| --- | --- |
| **a.** upward force | **b.** downward force |

Earth exerts a stronger gravitational force than the moon because Earth has more \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** mass | **b.** density |

The masses of your hand and your notebook are quite small, so the

force of attraction between them is \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** zero | **b.** weak |

An object transported from the surface of Earth to the surface of the

Moon has its weight \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** decreased | **b.** stay the same |

In the absence of air, a penny and a feather dropped from the same height will \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** fall at different rates | **c.** fall at the same rates |
| **b.** float | **d.** not have momentum |

The amount of gravitational force between objects depends on their \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** frictional forces | **c.** inertia |
| **b.** speed and direction | **d.** masses and the distances between them |

If a 300-N action force is exerted to the right, the reaction force will be \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** 300 N to the right | **c.** 300 N to the left |
| **b.** 600 N to the right | **d.** 600 N to the left |

When a force is exerted on an object, an equal and opposite force is exerted by the object. These forces are referred to as \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** centripetal forces | **c.** gravitational forces |
| **b.** friction forces | **d.** action-reaction forces |

Acceleration due to gravity is \_\_\_\_\_\_.

|  |  |
| --- | --- |
| **a.** 98 m/s2 | **c.** 9.8 m/s |
| **b.** 9.8 m/s2 | **d.** 0.98 m/s |

Fill in each blank with a suitable term.

1. When one object exerts a force on a second object, the second object exerts a force that is equal in size and opposite in direction. \_Newton’s Third Law of motion

2.The backward “kick” of a rifle that is fired is an example of a(n) \_reaction\_ force.

3**.** Air rushing out of the neck of a balloon causes the balloon to move. The air that comes from the balloon is an example of a(n) \_\_\_action\_\_\_ force.

I. Newton’s Second Law

A. Defined as: net force acting on an object causes the object to accelerate in the direction of the net force; *F* = \_\_\_m x a\_\_\_

B. Types of forces

1. \_\_friction\_\_\_ which opposes motion

a. \_\_\_\_static friction\_\_\_—when neither object is moving

b. \_\_\_\_\_sliding friction\_\_\_—when one object is sliding across another

c. \_\_\_\_rolling friction\_\_—when one object is rolling across another

Determine whether the italicized term makes each statement true or false. If the statement is true, write the word **true** in the blank. If the statement is false, write in the blank the term that makes the statement true.

**1.** Objects fall toward Earth at a rate of 9.8 m/s2 because of

***centripetal force***. \_\_\_\_\_gravitational force\_\_\_\_

**2.** *F* = *ma* represents Newton’s ***second***law of motion. \_\_\_\_\_\_\_\_\_true\_\_\_\_\_\_

**3.** The force of gravity acting upon an object is the object’s ***mass*. \_\_\_\_\_weight\_\_\_\_**

**4. *Friction***is the force that opposes motion between surfaces that touch each other. \_\_\_\_\_\_\_true\_\_\_\_\_\_\_\_\_\_\_\_

**5.** To every action force there is an equal and opposite reaction force is *the* ***law of conservation of momentum***. \_\_Newton’s third law of motion\_\_\_

**6.** Micro-welds are the source of ***momentum***between two surfaces pressed together. \_\_\_\_\_\_\_fricition\_\_\_\_\_\_\_\_

**7.** Air resistance acts in the ***opposite*** direction to that of an object in motion. \_\_\_\_\_\_\_\_\_\_\_true\_\_\_\_\_\_\_\_\_\_\_

Calculate, solve or answer.

1. How much force is needed to accelerate a 1000-kg car at a rate of 3 m/s2?

Given: m= 1000 Kg, a= 3m/s2, f=?

F= m x a = 1000 x 3= 3000 N

1. If a 70-kg swimmer pushes off a pool wall with a force of 250 N, at what rate will the swimmer accelerate from the wall?

Given: m= 70 Kg, F= 250 N, a= ?

a = F/m= 250N/ 70 Kg= 3.57 m/s2

1. A weightlifter raises a 200-kg barbell with an acceleration of 3 m/s2. How much force does the weightlifter use to raise the barbell?

Given: m= 200Kg, a= 3 m/s2, f= ?

F= m x a= 200 x 3= 600 N

1. A dancer lifts his partner above his head with an acceleration of 2.5 m/s2. The dancer exerts a force of 200 N. What is the mass of the partner?

Given: a= 2.5 m/s2, F= 200 N, m=?

m= F/a= 200/2.5= 80Kg

1. What does Newton’s second law of motion state?

The acceleration of an object is in the same direction as the net force and

a=Fnet / m

1. What two factors affect the rate of acceleration of an object?

The rate of the acceleration is affected by the mass and the force exerted on an object since the force is directly proportional to acceleration and the mass is inversely proportional to acceleration.

1. What are the three types of friction?

Static friction, sliding friction and rolling friction

1. What is gravity?

Is the force of attraction between any two masses

1. What are two things that the amount of gravitational force between two objects depends on?

The gravitational fore depends on: mass of objects and the distance between these two objects.

1. Why does Earth exert a stronger gravitational force than the Moon?

Since Earth has a greater mass than the moon

1. If an object weighs 40 N on Earth, would it weigh more than 40 N on the Moon? Explain.

It will weigh less than 40 N since the gravity on the moon is less than the gravity on earth

1. What is the force of an object with a mass of 12 kg and an acceleration of 4 m/s2?

Given: m= 12Kg, a= 4 m/s2, F= ?

F= m x a= 12 x 4= 48 N

1. Calculate the acceleration of a 25-kg object that is moved with a force of 300 N.

Given: m= 25Kg, F= 300 N, a=?

a= Fnet/m= 300N/25Kg =12 m/s2

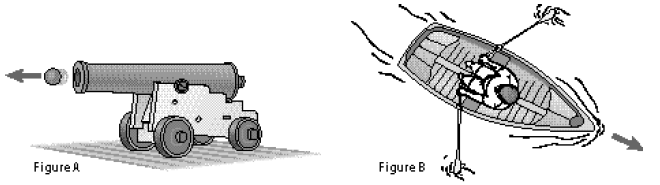
1. What is the mass of an object that is accelerating at 15 m/s2 when a force of 3000 N is exerted?

Given: a= 15m/s2, F= 3000N, m=?

m= Fnet/a = 3000/15 = 200Kg

NOTE: ACCELERATION CAN BE EXPRESSED AS **m/s2 or N/Kg**

Use the following illustration to answer the following questions.



1. Draw an arrow on Figure A to show the direction the cannon will move when the cannonball is fired.
2. Draw arrows on Figure B to show the direction the oars must move to propel the boat forward.
3. Does the arrow you drew on Figure A represent an action force or a reaction force?
4. Do the arrows you drew on Figure B represent an action force or a reaction force?
5. If the force that propels the cannonball forward is 500 N, how much force will move the cannon backward? Explain.