

# Meteoroid, Asteroid, Comet

What are the differences between meteoroid, asteroid and comet?

What will happen to the Earth when it is hit by a meteoroid, asteroid or comet?

## Let's understand:

- Other objects in the solar system such as meteoroids, asteroids and comets

## SCIENCE BLOG

### The Largest Meteorite in the World

What is a meteorite? A meteorite is a shooting star that has fallen to the Earth. To date, the Hoba Meteorite has been recorded as the largest meteorite in the world. This meteorite is believed to have fallen to the Earth approximately 80 000 years ago.

The Hoba Meteorite was discovered near Grootfontein, Namibia in 1920 by a farmer while he was ploughing his land.

Uniquely, the impact of this meteorite did not create a crater around the site. Scientists believe the flat shape of the object may be responsible for its low velocity at impact.



#### Keywords

- ▶ Meteoroid
- ▶ Meteor
- ▶ Meteorite
- ▶ Asteroid
- ▶ Comet

## Other Objects in the Solar System, such as Meteoroids, Asteroids and Comets

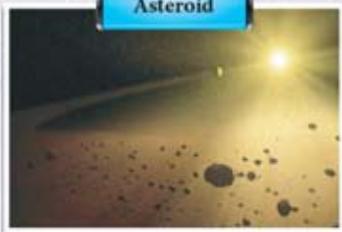
Besides the galaxy, stars and planets studied in Chapters 11 and 12, there are other objects present in our solar system. These objects are meteoroids, asteroids and comets. Let us discuss the characteristics of these three objects.

Meteoroid



A **meteoroid** is a floating piece of stone and metal that moves in space.

Asteroid



An **asteroid** is a large metal and rocky body that travels around the Sun in its own orbit.

Comet



A **comet** is a small body made up of a mixture of ice, gas and frozen dust. It travels around the Sun in its own orbit.

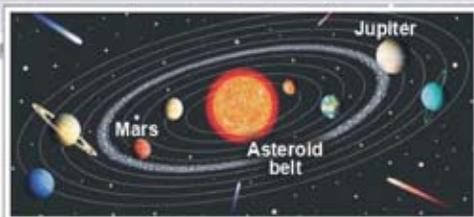
Figure 13.1 Characteristics of meteoroids, asteroids and comets

### Characteristics of a meteoroid

- Appears in various sizes, which is from  $10 \mu\text{m}$  to 1 m.
- Made up of **stones** and **metals** such as iron and nickel.
- Originates from fragments of asteroids and comets.
- Its surface temperature in outer space is about  $0^\circ\text{C}$ .
- Travels at varying speed. The fastest meteoroid travels at  $42 \text{ km s}^{-1}$ .

### Characteristics of an asteroid

- Size starts from 1 m to 1 000 km.
- Made up of **stones** and **metals** such as iron and nickel.
- Has a cold surface temperature, approximately  $-73^\circ\text{C}$ .
- Travels around the Sun at an average speed of  $25 \text{ km s}^{-1}$ .
- Asteroids form an **asteroid belt** between the orbits of **Mars** and **Jupiter** (Photograph 13.1).
- Large asteroids such as Ceres, Pallas, Juno and Vesta have diameters of a few kilometres to 1 000 kilometres.
- Asteroids are also known as small planets.



**Photograph 13.1** The asteroid belt between the orbits of Mars and Jupiter

### Characteristics of a comet

- Consists of two main parts, a **head** and a **tail**.
- The length of the tail of a comet can reach up to 150 000 000 km. The size of the head can reach up to 250 000 km.
- Comprises **gas** and **water** that freeze into **ice**, **dust** and **rocky** particles.
- Travels around the Sun in its own **elliptical orbit**.
- Travels at an average speed range of  $10 \text{ km s}^{-1}$  to  $70 \text{ km s}^{-1}$ .

#### Science Info

The first direct collision of a comet with objects in the solar system occurred in 1994, between the Shoemaker-Levy 9 comet and Jupiter.

#### Magical SCIENCE

The Halley Comet was recently seen passing the Earth in 1986 and is expected to pass the Earth again in 2061.

Can you differentiate between a meteoroid, asteroid and comet?

There are many differences in terms of size, structure and shape. Let's carry out Activity 13.1.



## Activity 13.1 STEM



## Career in STEM

**Aim:** To prepare a multimedia presentation on meteoroids, asteroids and comets.

### Instruction

1. Work in groups.
2. Collect information from the Internet, print media and electronic media about meteoroids, asteroids and comets.
3. Discuss the following:
  - (a) the similarities and differences between meteoroids, asteroids and comet.
  - (b) predict what will happen to the Earth if it is hit by a meteoroid, asteroid and comet.
4. Present your discussion using a multimedia presentation.

A petrologist, career in one of the fields of geology, studies the origin, composition, structure and changes in rocks. The study includes objects that reach the Earth, such as meteorites and asteroids.

## Movement of Meteoroids, Asteroids and Comets

Asteroids and comets move through their own orbit around the Sun. Meteoroids move freely in space and are influenced by the gravitational pull of planets, the moon and other objects around it. Due to the smaller size and mass of meteoroids, they are easily influenced by smaller gravitational pulls. How do the movement of meteoroids, asteroids and comets affect the Earth?

### Movement of a meteoroid

- 1 A **meteoroid** is a small fragment of rock and metal that floats in outer space and travels around the Sun.

#### METEOROID



- 3 Meteor showers happen when many meteors enter the Earth at the same time.

#### METEOR



METEOR SHOWER

- 4 Usually, meteors will burn out before they reach the Earth. However there are meteors that can reach the Earth. These meteors are known as **meteorites**. Craters will form as a result of meteorite impact.

#### METEORITE



- 2 When a meteoroid enters the Earth's atmosphere, it will be called a **meteor**. Molecular friction between air and the meteor produces heat until it burns, resulting in a streak of light.

Atmosphere of the Earth

Surface of the Earth

Figure 13.2 Movement of a meteoroid

### Science Info

A huge crater was formed due to a meteorite impact approximately 50 000 years ago in Arizona, United States. Its diameter is approximately 1.2 km.

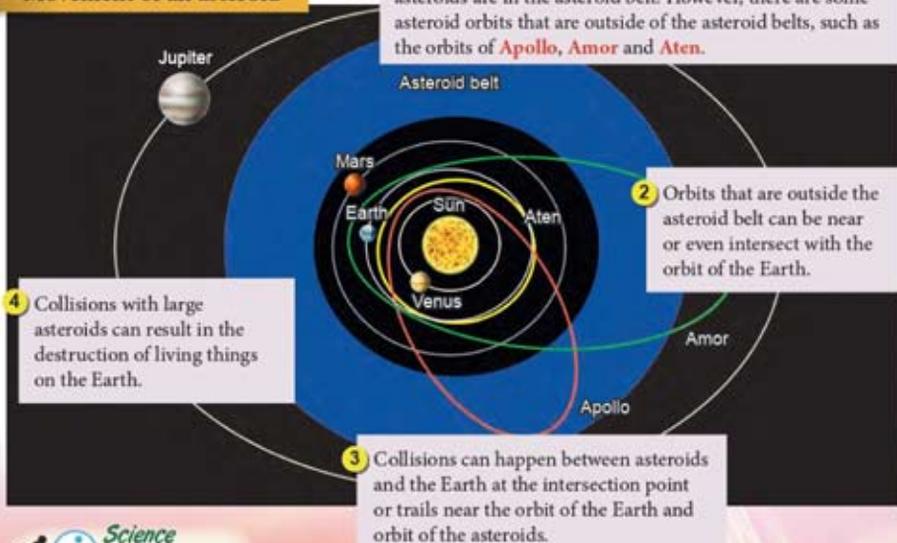


**Photograph 13.2** The meteorite crater in Arizona, United States  
(Photo source: NASA)

### Brain Teaser

What causes the moon to be hit by meteoroids more frequently as compared to the Earth and resulting in craters on its surface?

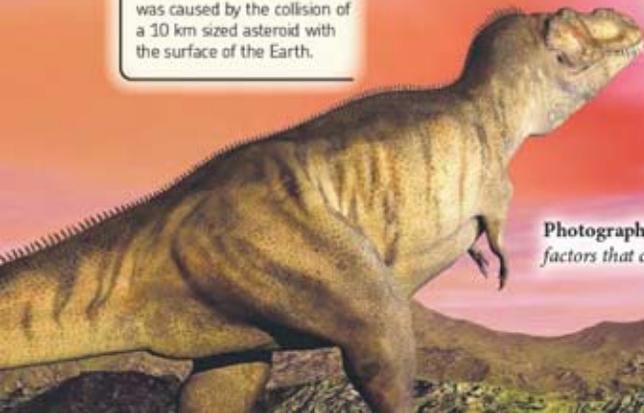
### Movement of an asteroid



**Figure 13.3** Movement of an asteroid

### Science Info

Paleontologists believe that the extinction of dinosaurs was caused by the collision of a 10 km sized asteroid with the surface of the Earth.



**Photograph 13.3** Asteroids are said to be one of the factors that contributed to the extinction of dinosaurs

## Movement of a comet

1 A comet moves at a speed range of 10 to 70 km s<sup>-1</sup>. Most comets are from the **Kuiper belt** and the **Oort cloud**.

5 A comet that is out of its orbit has a risk of colliding with the Earth at high speed.

2 When a comet gets closer to the Sun, it increases in speed, melts and appears to have a long tail.

4 Strong gravitational pull of outer planets causes the comet to easily slip out of its orbit.

3 The tail of a comet is always away from the Sun due to solar wind blowing from the Sun.

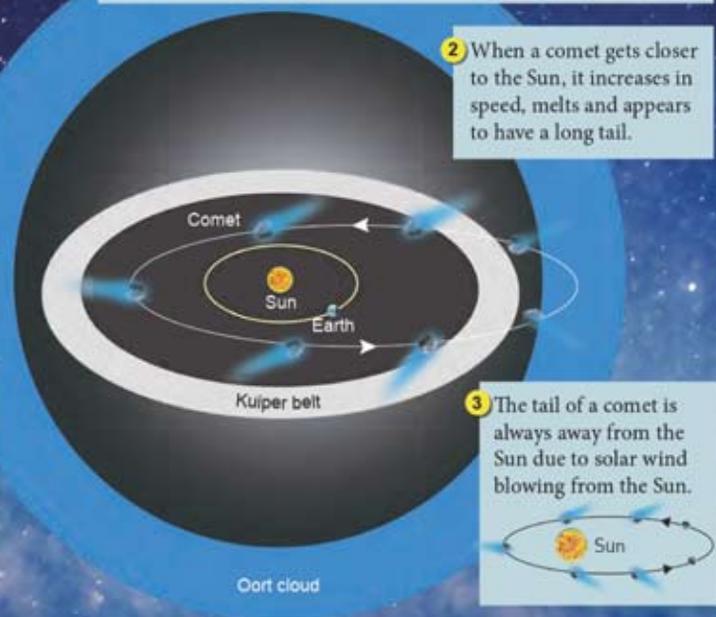


Figure 13.4 Movement of a comet

## Activity 13.2

**Aim:** To observe meteors.

### Instruction

1. Visit the National Planetarium.
2. Observe meteors using a space pod, which is a spaceship simulator that gives the impression just like you are in outer space.
3. Visit the following website to watch videos about movement of meteoroids.



Video of Meteor Shower  
<http://bukutekskssm.my/Science/Video7.mp4>

Video

## Protecting the Earth from Asteroid Impacts

Scientists are always monitoring asteroids in space to ensure that the orbits of the asteroids are at a safe distance from the orbit of the Earth. Warnings will be issued if there is a risk of an asteroid colliding with the Earth. Asteroids that approach the Earth may be destroyed or have its course changed.



Photograph 13.4 An asteroid approaching the Earth

### Brain Teaser

What are some problems that scientists may face in their effort to destroy or deflect the direction of an asteroid that comes close to the Earth?

### My Malaysia!

The National Space Agency (ANGKASA) is responsible to drive and monitor the development of space science in Malaysia.



Animation on Asteroid Impact



Near-Earth Object Programme  
<http://neo.jpl.nasa.gov>

Info

## Activity 13.3

**Aim:** To collect information and prepare a multimedia presentation about the phenomenon of the collision of asteroids and other objects with the Earth.

### Instruction

1. Work in groups.
2. Collect information on the phenomenon of the collision of asteroids and other objects with the Earth.
3. Present your discussion using a multimedia presentation.

## Formative Practice 13.1

1. Explain the stages and names of a meteoroid as it enters the atmosphere of the Earth.
2. How does the collision between an asteroid and the Earth happen? Explain your answer.
3. Why does the tail of a comet always face away from the Sun?





## SELF-REFLECTION

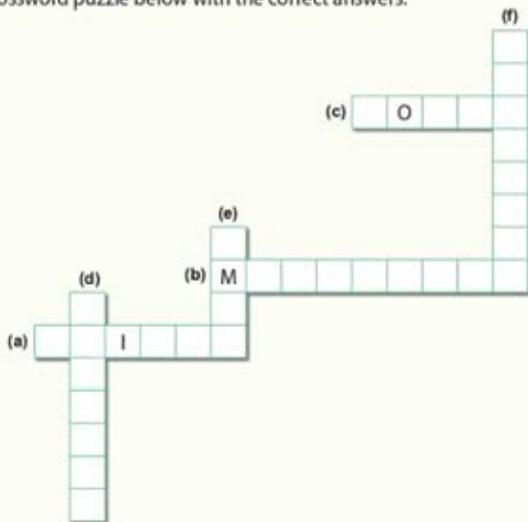
After learning this chapter, you are able to:

### 13.1 Other objects in the Solar System, such as Meteoroids, Asteroids and Comets

- Communicate on other objects in the solar system, such as meteoroids, asteroids and comets.
- Discuss the movement of meteoroids, asteroids and comets and their effects on the Earth based on data.
- Generate ideas on how to reduce or prevent the possibility of asteroids colliding with the Earth.

## Summative Practice 13

1. Complete the crossword puzzle below with the correct answers.



### Across

- (a) Most comets originate from this belt.
- (b) This object originates from asteroids and comets.
- (c) This object is made up mostly of gas and water that freezes into ice

### Down

- (d) Planet that is close to the asteroid belt.
- (e) One of the asteroid orbits that is outside the asteroid belt.
- (f) This object is also known as a small planet.

2. Between a meteor and a meteorite, which would you most likely find in a museum? Give one reason for your answer.
3. Nicol saw a shower of light crossing the sky while she was looking at the stars. Then this shower of light disappeared. What object did Nicol see? Explain your answer. 
4. Asteroids are among the objects in the solar system.
  - (a) Predict the effects on the Earth if a large asteroid enters the atmosphere of the Earth.
  - (b) How do we avoid a large asteroid from entering the Earth? Explain your answer.
  - (c) One of the theories of the extinction of dinosaurs is that it was due to a large asteroid impact 65 million years ago.
    - (i) Suggest a way that the asteroid may have caused the death of dinosaurs. 
    - (ii) Some scientists disagree with this theory because of the discovery of evidence that states there were a few dinosaur species that became extinct 20 million years before the impact of this asteroid. Justify these scientists' opinion. 
5. In your opinion, can an asteroid become a planet within 100 million years? Why? 
6. Why are meteors more dangerous to astronauts in space as compared to humans on the Earth? Explain your answer. 

## HOTS Mastery 13

7. A few astronauts would like to go to Saturn in a spaceship. They are taking precautionary measures due to the risk of colliding with an asteroid. In your opinion, where can this collision happen? 
8. In your opinion, will the Earth be pushed out of its orbit by large chunks of asteroids? Why? 

# ANSWERS

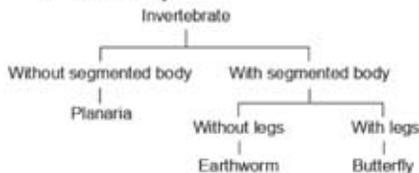
## ONLY SELECTED ANSWERS ARE PROVIDED HERE

### Chapter 1

#### Summative Practice 1

- (a) Biodiversity (d) Vertebrates  
(b) Poikilothermic (e) Gills  
(c) Dichotomous (f) Iguana
- (a) ✗ (b) ✓ (c) ✓
- (a) (i) Without wings  
(ii) Thick, hard wings  
(iii) Dragonfly (Q)  
(iv) More than three pairs of legs  
(v) Body with many segments  
(b) Have legs  
(c) Animal P has three pairs of legs, animal S has four pairs of legs whereas animal T has more than four pairs of legs.
- (a) Root, leaf, stem, number of cotyledons  
(b) (i) Leaves with parallel veins  
(ii) Fibrous root  
(iii) Both have non-woody stem
- Correct. The animals are invertebrates because all three have no backbone.
- Differences:  
(i) Segmented body, not segmented  
(ii) Has legs, no legs

Dichotomous key:



### Chapter 2

#### Summative Practice 2

- (a) Sapling → Rat → Fox  
Sapling → Rabbit → Fox  
Grass → Rabbit → Fox  
(b) Because grass can make its own food  
(c) Parasitism  
(d) The number of rabbits and rats will increase  
The number of grass and saplings will decrease
- (a) Outbreak of diseases  
(b) Disposal of rubbish, especially food scraps in an unsystematic way  
(c) (i) Scheduled collection of garbage/ fines

- (ii) Organise community clean-up events and cleaning campaigns. Take care of the cleanliness of the house environment and business premises.
- Azah is correct. Without decomposers, nutrients such as phosphorus and nitrogen will remain in the dead body of organisms and cannot be used by plants. Plants become infertile and may eventually die without enough nutrients.
- The rat population increased because its predator, the eagles, had been shot. Razak needs to breed owls at his farm as a biological control to destroy the rats.

### Chapter 3

#### Summative Practice 3

- (a) Eggs, meat, soy bean, chicken, fish  
(Any other answers are accepted)  
(b) For growth/ To build cells and body tissues  
(c) (i) Practise healthy intake of food// Exercise// Drink more plain water  
(ii) Breed, chocolate milk and half-boiled eggs  
(Any other answers are accepted)  
(iii) Amri probably had too much snacks and carbonated drinks. Snacks have high content of fat. Carbonated drinks contain a lot of sugar. Excessive fat can cause obesity and excessive sugar can cause diabetes.
- (a) Consume a diet that is high in fat.  
(b) To keep her warm. Excess fat will be stored under the skin as heat insulator.
- (a) P: Mouth  
Q: Liver  
R: Large intestine  
S: Oesophagus  
T: Stomach  
U: Duodenum  
V: Small intestine  
W: Anus  
(b) (i) Mouth  
(ii) Stomach  
(iii) Duodenum
- (a) (i) Food sample is placed into a boiling tube  
(ii) 2 ml of Benedict's solution is added  
(iii) The mixture is heated using a water bath  
(iv) A change of colour is observed.

Food	Test	Observation
Rice	Iodine	
	Benedict	
Honey	Iodine	
	Benedict	

- (c) Rice contains starch. Honey contains reducing sugars
5. (a) Temperature of amylase  
 (b) Volume of amylase and volume of starch suspension  
 (c) Yes. When heated, Benedict's solution does not form a brick red precipitate in boiling tube A. This shows that there is no reducing sugar present. The high temperature destroys amylase. Starch cannot be broken down into maltose.

## Chapter 4

### Summative Practice 4

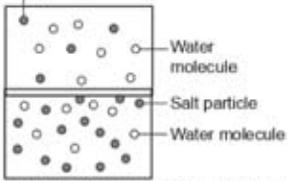
1. (a) Group 1: Diabetes, hypertension, heart attack, cancer  
 Group 2: Flu, chickenpox, Leptospirosis, Zika, cholera, tinea  
 (b) Non-infectious diseases and infectious diseases  
 (c) (i) Tinea  
 (ii) Leptospirosis  
 (iii) Flu  
 (iv) Diabetes// hypertension// heart attack  
 (d) Chickenpox
2. (a) Dengue virus, Aedes mosquito  
 (b) Zika// Chikungunya  
 (c) Dengue haemorrhagic fever spreads when an Aedes mosquito bites and sucks the blood of a patient who has dengue virus. The mosquito will transmit the virus to another individual that it bites.
3. Besides producing unpleasant smell, the exposed garbage will attract cockroaches, flies and rats. These animals can be the vectors for diseases such as cholera, typhoid and leptospirosis.
4. (a) The body reacts to fight viral infection by producing antibodies in the blood to kill the virus.  
 (b) 16 to 17 days after the infection.  
 (c) The virus is killed and the body gets immunity against the disease.
5. (a) Similarity: Both mechanisms function to prevent infection of diseases.  
 Difference: Specific defence mechanism attacks certain pathogens whereas non-specific defence mechanism attacks all pathogens.  
 (b) (i) Pathogens are destroyed by antibodies produced by white blood cells.  
 (ii) The entrance of pathogens is prevented by the skin and mucous

membranes, whereas pathogens that have successfully entered the body are destroyed through phagocytosis.

- (c) (i) Active natural immunity  
 (ii) Active artificial immunity  
 (iii) Passive natural immunity  
 (iv) Passive artificial immunity
6. (a) Sever the transmission of infection by detecting the cases actively and passively such as giving initial treatment to the patients and separating the patients from others.  
 (b) (i) What activities did you do within the two weeks before the infection?  
 (ii) Did you go into the forest or swim in the waterfall before getting sick?  
 (Any other answers are accepted)
- (c) (i) Avoid meeting the patients  
 (ii) Take precautionary steps when meeting the patients like wearing a face mask to cover the nose and mouth.  
 (iii) Improve personal hygiene, and cleanliness of house and environment.  
 (iv) Take vector control measures  
 (Any other answers are accepted)
- (d) Quarantine the patients is a wise step to prevent the public from meeting the patients. This is because transmission of bacteria or viruses can occur through air, water, vectors and also through contact.

## Chapter 5

### Summative Practice 5

1. Water has a strong surface tension due to the cohesive force between the molecules of water at the surface. Johan should have dived into the water by keeping his hands together straight to the front, and both legs together straight to the back. This can reduce the effect of surface tension of water on him.
2. (a) (i)  (ii) 
- (b) Yes, Heat can increase the rate of movement of salt particles. Hence, the salt particles can move faster to fill the spaces between the water molecules.
3. (a) The water particles at the surface of water vibrate faster upon gaining heat energy from the surrounding and escape from the water surface.  
 (b) Humidity, movement of air, surrounding temperature and exposed surface area.  
 – The higher the humidity, the lower the rate

of evaporation of water.

- The higher the surrounding temperature, the higher the rate of evaporation of water.
- The faster the movement of air, the higher the rate of evaporation of water.
- The wider the surface area exposed, the higher the rate of evaporation of water.

(Choose any two answers)

- (c) (i)
4. Colloid: (a) (c) (f)  
Suspension: (b) (e)  
Solution: (d) (g)
5. Alcohol
6. (a) *N, K, M, L*  
(b) Alum - To coagulate suspended particles in water  
Slaked lime - To reduce the acidity of water  
Chlorine - To kill the microorganisms in water.  
(Choose any two answers)  
(c) Alum is added to coagulate suspended particles in water. Slaked lime is added to reduce the acidity of water.  
(d) Suspended particles mix with the water and the water becomes cloudy.
7. (a) Sample C  
(b) Sample B and D  
(c) Sample C  
(d) Sample B, C and D

## Chapter 6

### Summative Practice 6

1. (a) Formic acid, malic acid  
(b) (i) Formic acid  
(ii) Malic acid  
(c) No changes
2. (a) Flow the ammonia gas into water. Test the solution with a suitable indicator. Record the pH of the solution.  
(b) pH paper can determine the pH value of a substance tested. Litmus paper cannot determine the pH value of a substance tested.  
(c) (i) Yes. Phenolphthalein remains colourless in acidic and neutral conditions and turns pink in alkaline condition.  
(ii) Put red and blue litmus papers into solution *M*. If the colour of blue litmus paper changes to red, solution *M* is acidic. If the colour of red litmus paper does not change colour, solution *M* is acidic.  
(Any other answers are accepted)
3. (a) Acidic: *P* and *R*  
Alkaline: *Q*  
(b) *P, R*  
- Tastes sour  
- pH value less than 7

*Q*

- Tastes bitter
  - pH value more than 7
- (c) i) *P* - Vinegar/ Lime juice  
ii) *Q* - Shampoo/ Soap/ Detergent  
(Any other answers are accepted)
4. (a) Jellyfish's sting venom is alkaline, therefore soap and toothpaste which are alkaline cannot neutralise the venom, but will increase the pain caused by the venom.  
(b) Apply pineapple juice/ vinegar/ acidic substance to neutralise the alkaline venom.

## Chapter 7

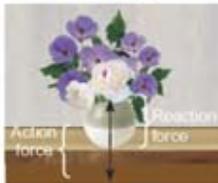
### Summative Practice 7

1. (c)
2. (a) Imran will feel a mild electric shock caused by the electricity discharged from his body.  
(b) By wearing shoes with rubber soles.
3. (a) The large amount of water vapour formed in the air during damp weather prevents the gathering of charges on an object.  
(b) The current from the Van de Graaff generator is less compared to the domestic electric power supply.
4. (a) - Current (d) - Parallel  
(b) - Conductor (e) - Resistor  
(c) - Ohm
5. Parallel circuit. So, the alarm can be switched on by a heat detecting switch from any different locations in the same building.
6.  $A_1 = 2.4 \text{ A}$   
 $A_2 = 1.2 \text{ A}$   
 $V_1 = V_2 = 12 \text{ V}$

## Chapter 8

### Summative Practice 8

1. (a) Elastic force  
(b) Gravitational force
2. Measuring device: Spring balance  
S.I. unit: newton (N)

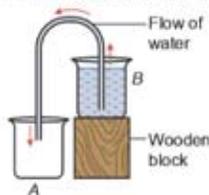


4. Inhaling air into lungs and drinking water from a straw
5.  $0.75 \text{ N m}$
6. (a)  $2\,500 \text{ N m}^{-2}$   
Total pressure by car  
 $= \frac{1\,000}{4(0.1)} = 2\,500 \text{ N m}^{-2}$

- (b) Pressure exerted by each tyre

$$= \frac{2\,500}{4} = 625 \text{ N m}^{-2}$$

7. (a) 5 N  
(b) 5 N  
(c) Weight of stone is greater than the upthrust force.
8. Close the hole with her finger to prevent atmospheric pressure from entering the straw so that water will rise when sucked.
9. Shoe Q because it has bigger surface area which will decrease the pressure exerted on the field. The shoe will not sink into the soft ground.
10. The tube is not filled with water and the end of tube in beaker A is higher than in beaker B.  
Modification:  
1. Make the position of beaker B higher.  
2. Fill the tube with water until full.



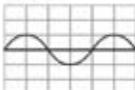
## Chapter 9

### Summative Practice 9

1. (a) The windscreen of the car cracked because a sudden change in the temperature causes a non-uniform contraction of the layer of the windscreen.  
(b) Wind down the windows of the car before turning on the air conditioner to allow the hot air from inside the car to escape first.
2. High heat caused by hot weather or burning of rubbish would increase the pressure inside the can and cause it to explode.
3. Switch on a bulb inside a vacuum flask. After a few minutes the flask will become hot. This proves that heat can transfer without a medium through radiation.
4. (a) The convection current is caused by the change in the density of fluid particles. The hot fluid particles will expand, become lighter, then rise. Whereas, the cold fluid particles become more dense and move downwards. The continuous flow of this fluid causes convection.  
(b) Radiation is the fastest heat transfer method because it does not need any medium for propagation.

## Chapter 10

### Summative Practice 10

1. Use two polystyrene cups connected with a string.  
– The polystyrene cups trap sound waves.  
– The string will help to transfer the sound waves.
2. (a)  (b) 
3. Sound will propagate faster in air of higher temperature because transfer of sound energy can occur faster due to the higher kinetic energy of air molecules.
4. (a) Sound is reflected by a hard surface, such as the wall.  
(b) Furniture will absorb some sounds and reduce the effect of reflection.
5. (a) – Ultrasound waves are transmitted by a scanner probe that is moved across the belly of a pregnant mother.  
– The ultrasound waves are reflected when it hits the foetus in the womb.  
– Information from the reflection will be shown as an image on the monitor screen.  
(b) Advantages of ultrasound:  
– Not harmful to the foetus in the womb.  
– Can be done more often or repeatedly.  
– Painless  
– Does not use radiation  
– Results can be obtained immediately  
(c) – To determine the depth of sea.  
– To locate schools of fish in the sea.  
– To detect cracks inside engines  
– To clean jewellery  
(Any other answers are accepted)
6. (a) Pitch of sound increases because tighter guitar string produces higher frequency of vibration.  
(b) Strength of sound increases because amplitude of vibration increases.

## Chapter 11

### Summative Practice 11

1. (a) A star  
(b) 6 000 K to 7 500 K  
(c) When the temperature and pressure at the core become too high, a nuclear reaction will take place. Hydrogen gas is converted into helium. A lot of heat and light energy will be released.
2. (a) Yes, the Sun emits its own light.  
(b) This is because the Sun is the closest star to Earth.
3. In my opinion, the mission would not be successful because the diameter of a galaxy such as the Milky Way can reach up to hundreds of light years. In addition the distance between the Milky Way

galaxy and the Andromeda galaxy can also reach up to thousands of light years. Therefore, taking into consideration the factor of human age that can only reach approximately 100 years, an astronaut would not be able to stay alive and make it to the Andromeda Galaxy  
(Any other answers are accepted)

## Chapter 12

### Summative Practice 12

- Eight planets
    - The planet that is closest to the Sun is Mercury and the planet that is furthest from the Sun is Neptune.
    - Mercury is the closest planet to the Sun. The closer the planet is to the Sun, the faster the planet orbits the Sun.
  - The Earth rotates from west to east.
    - On Venus, the Sun rises in the west and sets in the east.
    - If the Earth stops rotating,
      - longer days occur on the surface that faces the Sun while longer nights occur on the surface that is away from the Sun.
      - the area of the Earth that faces the Sun will experience dry seasons.
  - Distance = 4.37 ly  
Distance in km  
= Distance in ly  $\times 9.5 \times 10^{12}$  km  
=  $4.37 \times 9.5 \times 10^{12}$   
=  $4.15 \times 10^{13}$  km
    - Distance =  $4.15 \times 10^{13}$  km  
Distance in A.U. =  $\frac{4.15 \times 10^{13} \text{ km}}{1.5 \times 10^8 \text{ km}}$   
=  $2.76 \times 10^5$  A.U.
  - (Student's answer. All products may be accepted if it uses recyclable materials).
  - The hottest planet is planet P, the coldest planet is planet Q. This is because planet P is the closest to the Sun while planet Q is the furthest from the Sun.
    - Planet Q. The further a planet is from the Sun, the more time it needs to travel around the Sun in one orbit.
- impact and about 100 kilometres around the area will be destroyed. However, if the asteroid is 10km or bigger in size, the entire species on the Earth will face extinction (as what happened to the dinosaurs ).
- It can be avoided by changing the course of the asteroid or breaking it into smaller rock fragments.
    - A spaceship can be used to attach explosives to the asteroid or shoot it with bombs that have strong explosive powers before it reaches Earth.
  - The asteroid impact 65 million years ago destroyed living things and caused a change in temperature. The temperature in one area reduced drastically while the temperature in another area increased drastically, causing the death of dinosaurs.
    - This opinion is acceptable. This is because scientists have their own opinion and theory about events that happened millions of years ago. If there are any signs or evidence, a theory can be debated and scientists can study it again.
- Yes, it can. This is because some asteroids have their own gravity while some don't. For an asteroid that has its own gravity, its mass has the ability to continue expanding and attracting other asteroids nearby to combine. When the asteroid becomes too large, this asteroid can become a planet.
  - Meteors in space are larger in size and have higher speeds. When they reach the Earth, their size and speeds reduce due to the friction with the atmosphere. Therefore, the effects of collision will be worse in space as compared to the Earth.

## Chapter 13

### Summative Practice 13

- Jupiter
  - Amor
  - Asteroid
  - Kuiper
  - Meteoroid
  - Comet
- Meteorite. A meteorite is a rock that hits the surface of the Earth. A meteor would not reach the Earth as it would have burned out before it reaches the Earth.
- Meteor. A meteor shower happens when many meteors enter the Earth at the same time.
- If a large asteroid less than 10 km in size enters the atmosphere, the species at the area of



Full answers for teachers,  
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