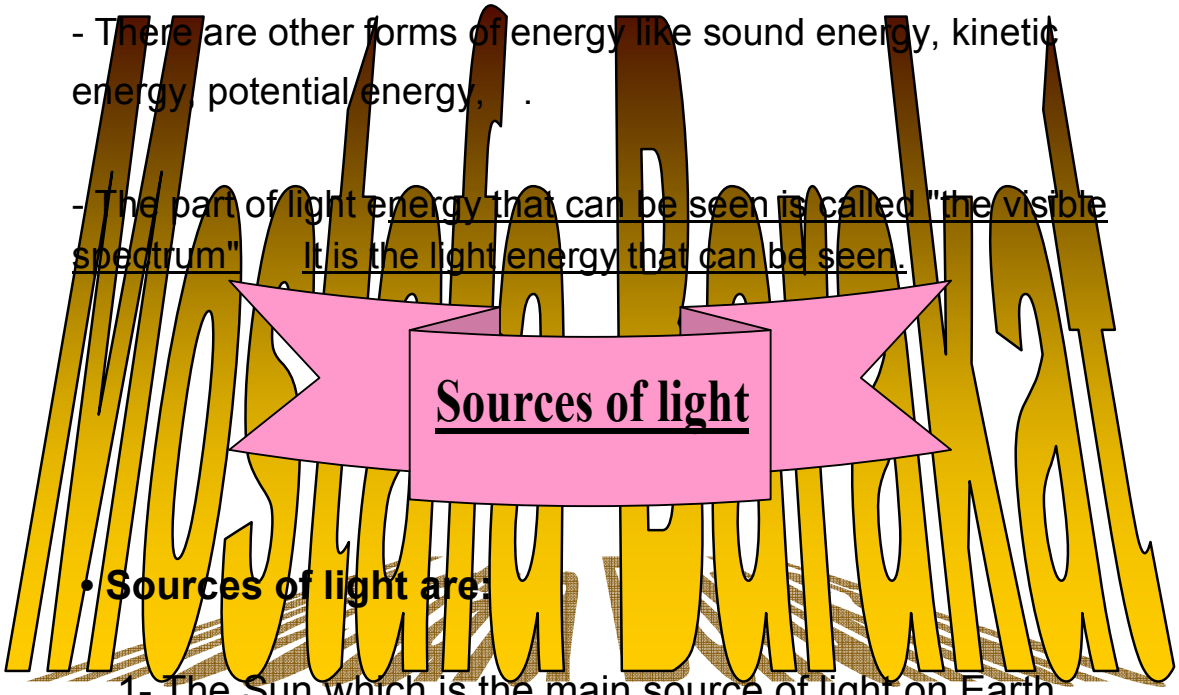
Light

Light is a form of energy

- Light is one of the necessary conditions for life.

- There are other forms of energy like sound energy, kinetic energy, potential energy, .

- The part of light energy that can be seen is called "the visible spectrum" It is the light energy that can be seen.



Sources of light

- **Sources of light are:**

1- The Sun which is the main source of light on Earth, where moonlight also is the reflection of sunlight that falls on the moon surface.

2- Lightened electric lamps, lightened candles and kerosene lamps.

The properties of light

First: Light travels in straight lines.
Second: Light transmits through different materials.
Third: Light reflection.
Fourth: Light refraction.
Fifth: Light separation (splitting).

first: light travels in straight lines.

~ To prove that light travels in straight lines.

Steps:

1. Bring three wooden or cartoon partitions (screens), each one containing a hole.
2. Put them in a row in front of a lightened candle, where all holes and the flame of the candle are on one straight line.
3. Look at the flame through the hole of the nearest screen.

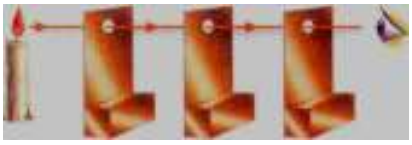
   You can see the flame of the candle.
4. Move any of the screens to the right side or the left side.

Observation :

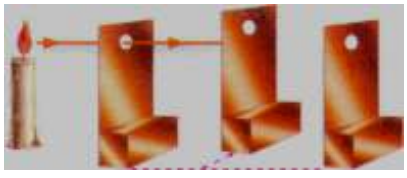
You can't see the flame.

Conclusion

Light travels in straight lines.



Formation of images through narrow holes. d Formation of

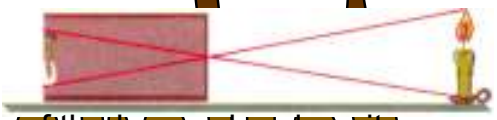


shadow.

(Formation of images through narrow holes.)

~ To prove that formation of images through narrow **holes is due to traveling of light in straight lines.**

' **Steps**



1. Bring a cartoon box, then remove one side of the box and replace it with a piece of semi-transparent paper.
2. Move the candle forwards and backwards until you see a clear picture for the candle on the semi-transparent paper.

' **Obseruation :**

A minimized and inverted image for the candle is formed on the semi-transparent paper.

' **Inference (conclusion) :**

Formation of images through narrow holes is due to the traveling of light in straight lines.

The idea of the camera depends on the idea of the previous activity.

The formation of images through narrow holes.

Because light travels in straight lines.

Inference :

Formation of shadow is due to travelling of light in straight lines.

Shadow: It is the darkened area which is formed as a result of falling of light on an opaque object.

- The nearer object to the light source has the bigger shadow.

-

" Complete the following statements:

1.Light is a form of ..... .

2.. is the light energy that can be seen.

3.. is the main source of light on Earth.

4..., ... and ..... are examples of,the sources of light.

5.Light travels in ..... .

6.. , ... and ..... are from the properties of light.

7.Formation of ..... through narrow holes and formation of ..... are from the applications of travelling light in straight lines.

8.The idea of the camera depends on .....

9.The object image that is formed through narrow hole is ..... and .....

10 ..... is a darkened area that is formed when light falls on an opaque object.

11.Shadow is a .....area that is formed because light travels in ..... .

12.The nearer object to the light source has the ..... shadow.

Choose the correct answer:

1.The .....is the light energy that can be seen.

a. visible spectrum **b. regular reflection**

c. shadow **d. transparent material**

2.The main source of light on the Earth's surface is .....

a. the Sun. **b. the Moon.**

c. stars. **d. the candle.**

3... is (are) from the light sources.

a. Electric lamps **b. Lightened candles**

c. The-Sun **d. All the previous answers**

4.W Light transmits in .....lines.

a. curved **b. broken**

c. straight **d. zigzag**

5.Formation of images through narrow holes is due to .....

a. travelling light in straight lines. **b. light reflection.**

c. light refraction. **d. separation of light.**

- Laser is a light beam that travels long distances without fainting.

- Laser lights are used in means of communication, medicine and computers.

Second: light transmits through different materials.

Materials can be classified according to their ability to transmit light into:

a. Transparent material:

It is the material which lets most light pass through and objects can be seen clearly (with full details) through it.

Examples: The clear glass in a window. - Air.

b. Semi-transparent (translucent) materials.

It is the material which lets some light pass through and objects can be seen through it less clearly than the transparent one.

EX. Frosted light bulbs

C- Opaque materials:

It is the material that does not don't allow light to pass through and we can't see objects through them.

Give reasons for:

Cartoon is an opaque material.

Because it doesn't allow light to transmit through and objects can't be seen behind it.

1- Transparent materials allow most light to pass through and we can see objects through them.

2- Translucent materials allow some light to pass through and objects can be seen through them less clearly.

3- Opaque materials don't allow light to pass through and we can't see objects through them.

Third: The light reflection.

It is the bouncing (returning back) of light rays when light falls on a surface.

• Types of light reflection:

Regular reflection:

It is the reflection of light on a smooth and shiny reflecting surface, where the light rays are reflected directly in one direction.

Seeing your image in the mirror.

Because the mirror reflects the light rays falling on it.

Irregular reflection:

It is the reflection of light on a rough reflecting surface, where the light rays are reflected and scattered in different directions.

Fourth: light refraction.

It is the change in the direction of light rays when light passes through the separating surface between two transparent media, due to the change in the light speed.

Give reasons for:

A spoon appears broken when you put it in a transparent cup of water

Due to the refraction of light.

Fifth: Separation of light:

It is the separation of white light into seven colors

called spectrum colors.

The formation of spectrum colors.

To prove that white light consists of seven **spectrum colors.**

Steps:

1. Bring a white paper and let the sun rays shine on it.
2. Face a glass prism to the sunlight, then move the prism to receive the sunlight coming from it on a white paper.

Obseruation :

Seven spectrum colors are formed on the paper.

Inference:

Sunlight (white light) is formed of seven spectrum colors which are Red – Orange – Yellow – Green – Blue – Indigo – Violet.

Give reasons for:

The formation of spectrum colors.

Due to splitting of white light into seven spectrum colors.

Rainbow is produced when white sunlight passes from the drops of rain water to air, then its splitting into seven spectrum colors, so the rain water acts as a prism.

"Complete the following statements:

1 Light is a form of ..... .

2. is the light energy that can be seen.

3. is the main source of light on Earth.

4.. , ... and ....are examples of,the sources of light.

5.Light travels in ..... .^

6.. , ... and ....are from the properties of light.

7. Formation of ..... through narrow holes and formation of .....

8- are from the applications of travelling light in straight lines.

9. The idea of the camera depends on ..... .

10.The object image that is formed through narrow hole is ..... and .

11- ..... is a darkened area that is formed when light falls on an opaque object.

13.Shadow is a ..... area that is formed because light travels in ..... .

14.The nearer object to the light source has the .....shadow.

15-Materials can be classified according to their ability to transmit light into and materials.

14. The material which allows most light to transmit through is called ..... .

15. Light can easily transmit through ..... and materials.

16. The material which we can see objects clearly behind it is called……

17.The clear glass in a window is an example of…… materials.

18 …. ..... lets some light pass through and we can see objects through it less clearly.

Seeing colored objects

The prism: **can separate the visible light (white light) into seven light spectrum colors**

When the seven light colors are mixed together,
the white light is produced

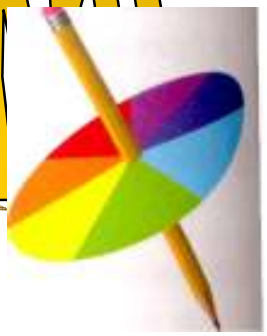
0. **Tools:**

A piece of construction white paper - colors - scissors - a protractor .

.0. Steps:

The colored disk seems white.

1. **Bore a small hole at the centre of the disk, then pass your pencil through it.**
2. **Rotate the disk quickly . .0.**



Observation :

The colored disk seems white

Seeing the colored opaque objects:)

the white light strikes the colored transparent or translucent, this object absorbs all colors of light and permits its own

The red transparent ruler appears red when white light falls on it.

Because it absorbs all the light colors and allows the red light only to transmit through it.

G.R:

- The opaque objects don't allow light to transmit through them.

- The opaque objects are divided into:

1- White objects 2- Black objects 3- Colored objec

G.R:

1-We can see the white paper as it is.

Because the white paper reflects all the light colors.

2-We see the blackboard as it is.

- **3-We must wear black (dark) clothes in winter.**

Because it absorbs all the. light colors.

Seeing the colored opaque objects.) - When the white light strikes the colored opaque object . it absorbs all the light colors and reflects its own color only.

mixing the colored lights

There are other colors can be produced by mixing the three primary colored lights which are called "secondary colored lights" - The secondary

- Red light is a primary colored light. Because it can't be produced by mixing any of the other colored lights.
- Magenta is called a secondary colored light.

colored lights

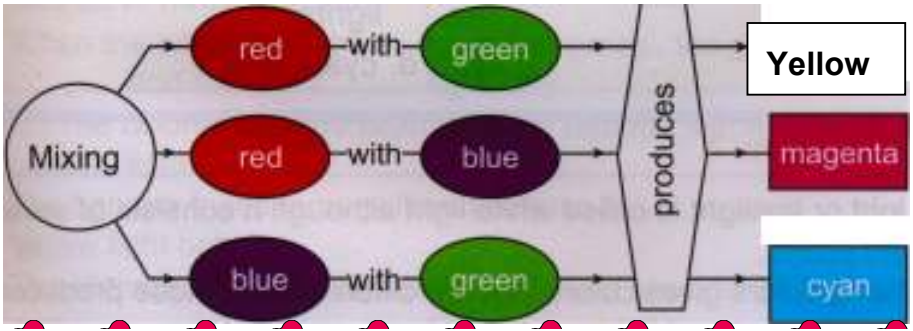
are *Yellow* , magenta (purple) and cyan.

Give reasons:

Because it is produced by mixing two of the primary colored

1. **Light or sunlight is called white light although it consists of seven light colors.**
2. **Mixing colors gives colors that are different from those produced by mixing colored lights.**

_Red, blue and yellow are the basic colored paints



Magnetism

- **2000 years ago, the ancient Greeks found a type of black rocks located in an area named "Magnesia"**
- **This type of rocks has an attractive force to any material made of iron.**
- **scientists called this black rock "natural magnet" and its attractive force "Magnetism"**
- **Types of magnet:**

Natural magnet – It is a black rock.

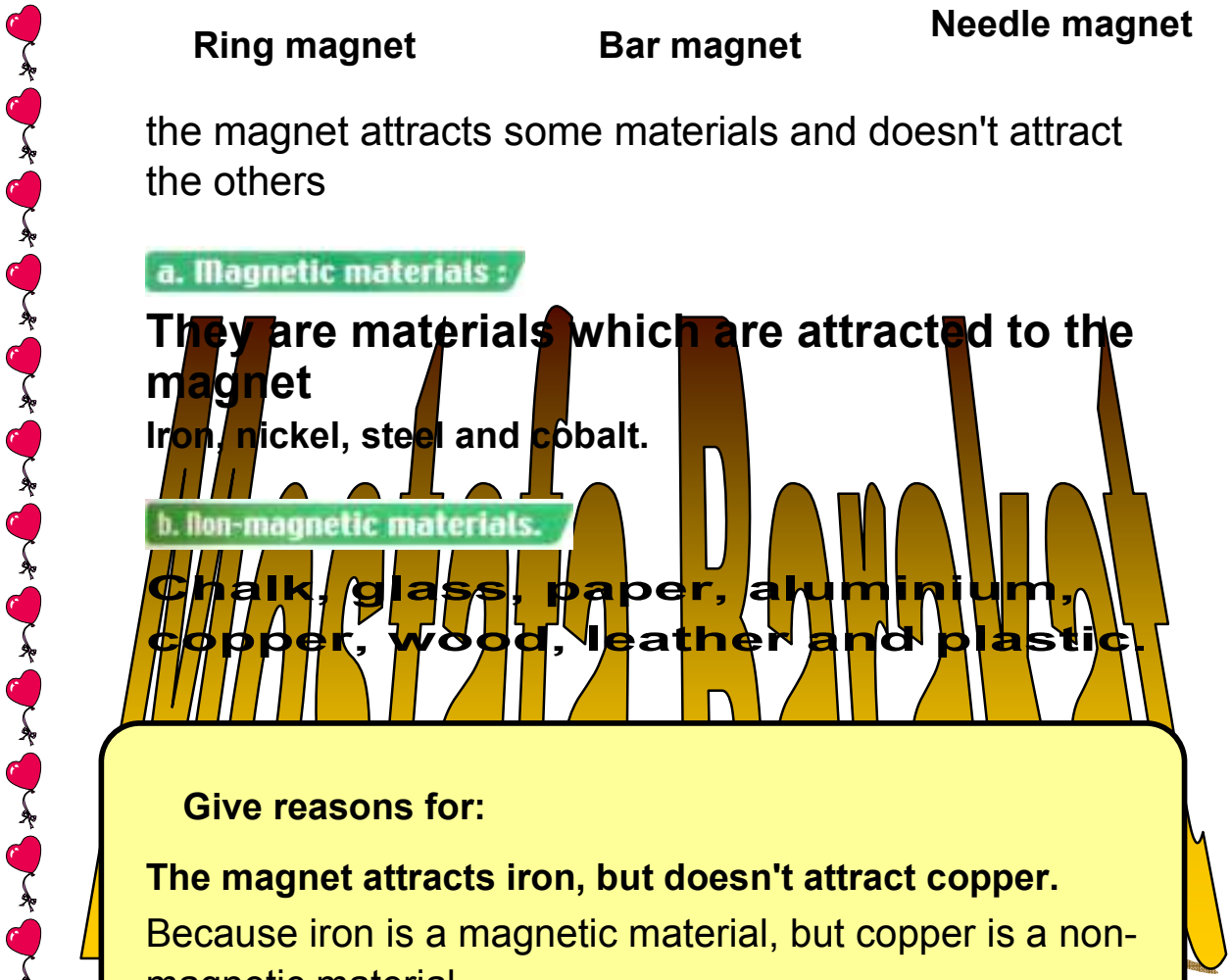
- It is one of the iron ores which is known as "Magnetite"

Artificial (man-made) magnet - It has different shapes and sizes.

-

Rectangular magnet

Horse shoe magnet



the magnet attracts some materials and doesn't attract the others

a. Magnetic materials :

They are materials which are attracted to the magnet

Iron, nickel, steel and cobalt.

b. Non-magnetic materials.

Chalk, glass, paper, aluminium, copper, wood, leather and plastic.

Give reasons for:

The magnet attracts iron, but doesn't attract copper.

Because iron is a magnetic material, but copper is a non-magnetic material.

The properties of the magnet)

The magnet has two poles.

The freely moving (suspended) magnet always takes a fixed direction, which is North-south direction.

The like (similar) magnetic poles repel each other, but the unlike (opposite) magnetic poles attract each other.

The magnet is surrounded by an area called "Magnetic field".

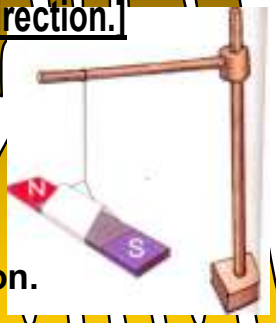
Magnetic Poles

The regions (areas) of magnet at which most of the magnetic materials are attracted.

Or

The regions of magnet at which most of the attraction force (magnetism) is concentrated.

The freely suspended magnet always takes a fixed direction.]



The freely suspended magnet always takes a fixed direction which is "North-south" direction.

The pole of magnet which points to the north direction is called "north pole(N)", but which points to the south direction is called "south pole(S)"

The like magnetic poles repel each other, but the unlike magnetic poles attract each other.

Give reasons for:
The north pole of a magnet attracts the south pole of another magnet, but repels the North Pole.

Because the opposite magnetic poles attract each other, while the similar magnetic poles repel each other.

Magnetic field

It is the space around the magnet in which the effect of magnetic force appears.

Magnetic Force

It is the ability of the magnet to attract the magnetic materials existed in its field.

Complete the following:

1.The similar magnetic poles ..... , while the opposite magnetic poles .....

2 .....is the ability of magnet to attract the magnetic materials existed in its field.

3 .....is the space around the magnet in which the effect of magnetic force appears.

4.The greatest magnetic force is concentrated at .....of magnet

The uses of the magnet

(The magnet is used in our daily life in some applications such as in making "the magnetic compass".

(The magnetic compass

• The structure of magnetic compass:
It consists of :

The compass is used to locate (determine) the main four directions.

A light and small magnet that can spin freely around a fixed axis, where its north pole refers to the north direction of Earth and its south pole refers to the south direction of Earth.

• The importance of the magnetic compass:

It is used to identify the four geographical directions.

Give reasons for:

The compass is used to determine the four main directions

Because the north and south poles' of its magnetic needle

always point to the north and south directions of the Earth.

Choose the correct answer:

1. The natural magnet was discovered more than ..... years ago.
   a.2000 b.3500 c.2050 d.2500
2. The natural magnet is a ..... colored rock.
   a. red b. blue c. black d. green
3. The natural magnet is made of one of the iron ores called ..... :
   a. magnetite. b. magnetism. c. magnesia. d. hematite.
4. Magnets are divided into ..... types.
   a. three b. two c. four d. five
5. .. is (are) from the shapes of artificial magnet.
   a. Bar b. Round c. Rectangular d. (a),(b) and (c)
6. All the following materials are attracted to the magnet except .....
   a. iron. b. nickel. c. cobalt. d. chalk.
7. The ..... materials are not attracted to the magnet.
   a. magnetic b. non-magnetic
   c. magnetism d. all the previous answers
8. All the following materials are not attracted to the magnet except ..... .
   a. plastic. b. paper. c. glass. d. nickel.
9. If you put a magnet near a magnetic material, it will ....
   a. repel it. b. attract it.
   c. have no effect on it. d. eat it.
10. The magnet has pole(s).
    a. one b. two c. three d. four
11. The similar magnetic poles ..... each other.

a. attract b. repel

c. do not affect d. replace

1. The unlike magnetic poles ..... each other.

a. attract b. repel

c. do not affect d. eat

13. The most attraction force of the magnet exists at ..... .

a. its middle. b. its two poles.

c. near to its middle. d. only one pole.

14. When a magnet is hanged freely, its north pole is directed towards the ..... direction of Earth.

a. north b. south c. east d. west

15. If you hang a magnet to move freely, it will take ..... direction.

a. north-west b. north-east

c. north-south d. east-south

16. The south pole is usually ..... colored.

a. red b. blue c. yellow d. brown

17. If you put the north pole of a magnet near the south pole of another magnet, they will ..... .

a. repel. b. attract.

c. have no effect. d. (a) , (b) and (c).

18. If you put the north pole of a magnet near the north pole of another magnet, they will ..... .

a. repel. b. attract.

c. have no effect. d. color each other.

19. The area that is around the magnet, where its magnetic properties appear is called a ..... .

a magnetic pole. b. magnetic substance.

c. non-magnetic substance. d. magnetic field.

Write the scientific term for each of the following statements:

1. A black rock of iron ores known as magnetite.
2. The materials that are attracted to the magnet.

3. The materials that are not attracted to the magnet.
4. The regions of the magnet, where the magnetic force is most powerful.
5. The pole of the magnet which points to the north direction of the Earth.
6. The pole of the magnet that repels with the north pole of another magnet.
7. The two ends of the magnet, where the magnetic force is most powerful.
8. The pole of the magnet which points to the south direction of the Earth.
9. The space around a magnet in which, the magnetic force appears.
10. The pole of the magnet that attracts with the north pole of another magnet.
11. The ability of the magnet to attract the magnetic materials existed in its field.
12. A set is used for locating the main four geographical directions.
13. An object that consists of a small light magnetic needle that can spin freely around a fixed axis.

(A)	(B)
1. Plastic	1. is the pole which directs to the geographical south direction of the Earth.
2. Steel	2. is a ma : material.
3. C ss	3. is the surrounding the magnet where, the magnetic force appears.
4. T ith p	4. is a non-magnetic material.
5. Magnetic field	5. is a set used to identify the four geographical directions.

Q *Choose from column (B) what suits in column (A) :*


Mostafa Barakat