

Electrostatic charges and molecular view of matter

1/29/16

Electrical Charges

- How do you tell if something is charged?

It will be attracted to one type of charge and repelled by the other

Electrical Charges

- How do we know the charge type on a charged object? positive or negative?

Positive is defined as the charge that glass will get if it's rubbed.

So, you have to compare it to glass or another charged object if you know its charge type.

Electrical Charges

If something attracts both kinds of tape, does it have a net charge?

- A. Yes, positive
- B. Yes, negative
- C. No
- D. Not enough information

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Net Charge

https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html

Wendy Adams NHS Sharepoint HR Login Insight UNC Insight Reporting Mines UNC - Google D... LiveText Dreaming of Spring - a... ALI Sharepoint Office Depot Faculty Staff

PhET

Show all charges
Show no charges
Show charge differences

Reset Balloon

Remove Wall

Balloons and Static Electricity

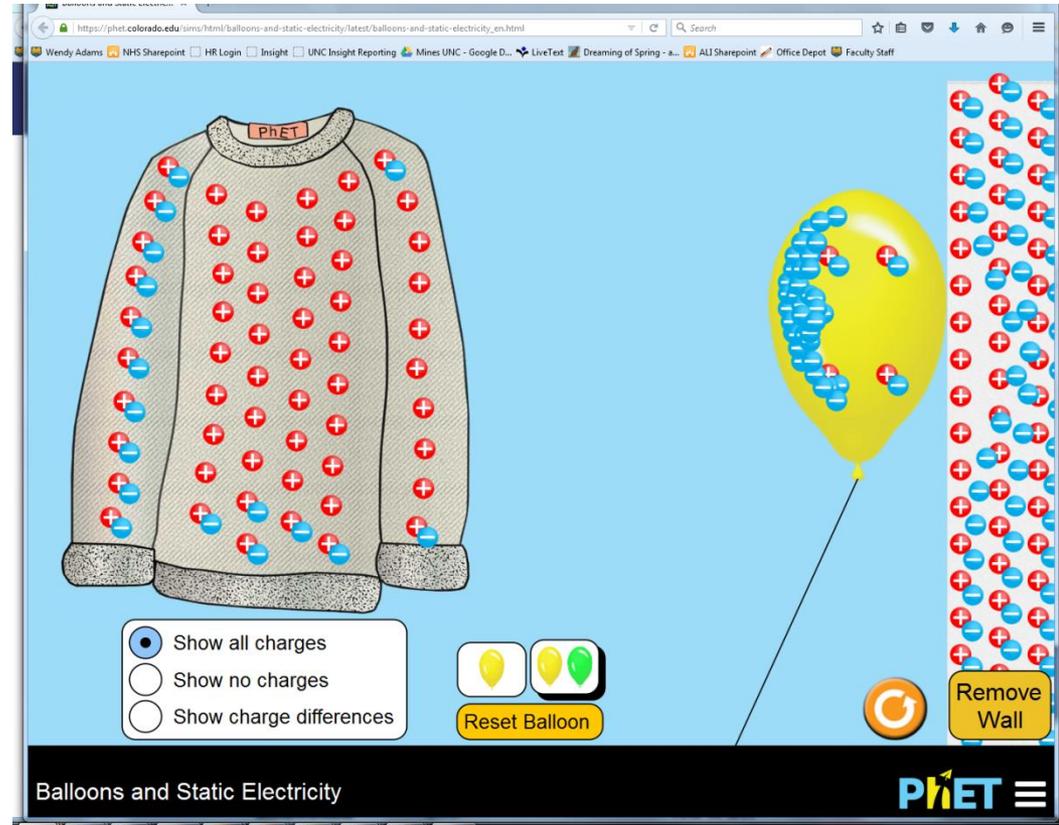
PhET

If a positively charged object were brought near the wall, it would

A. attract it

B. Repel it

C. neither

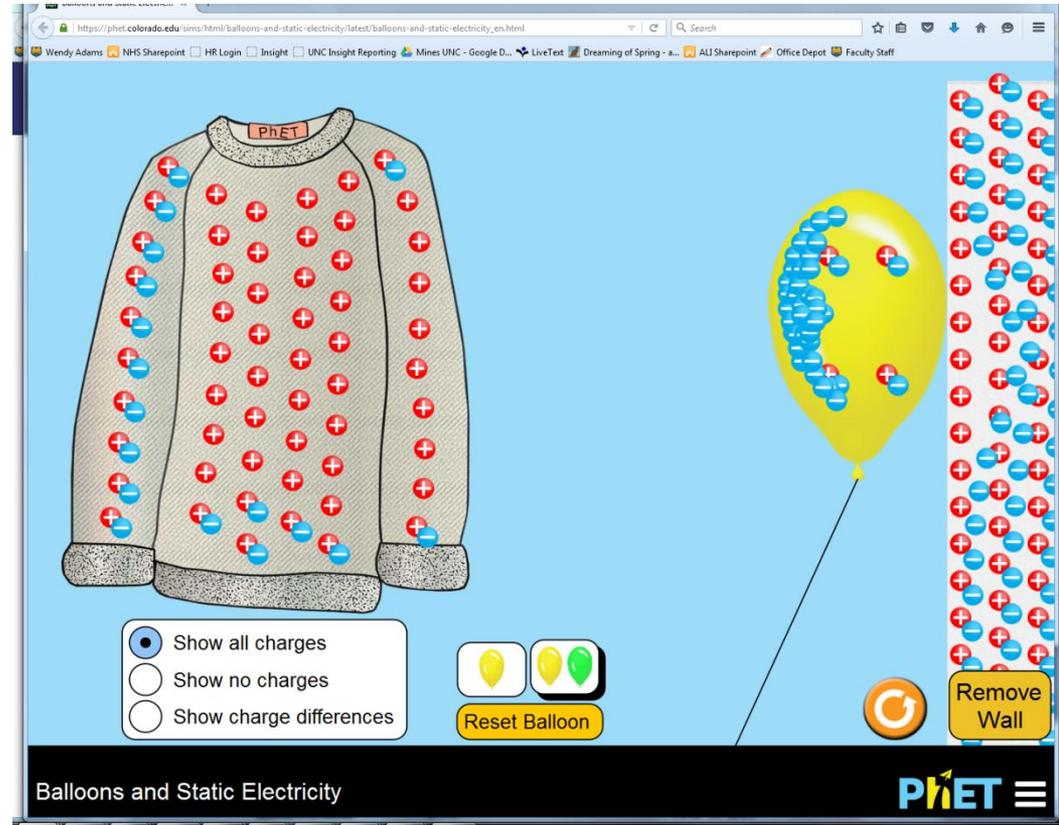


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Why are metals attracted to *both* types of charge?

FIGURE 20.6 Why a neutral metal object is attracted to a charged object.

The neutral sphere contains equal amounts of positive and negative charge.



Negative charge is attracted to the positive rod. This leaves behind positive charge on the other side of the sphere.



The rod doesn't touch the sphere

The negative charge on the sphere is close to the rod so it is strongly attracted to the rod.



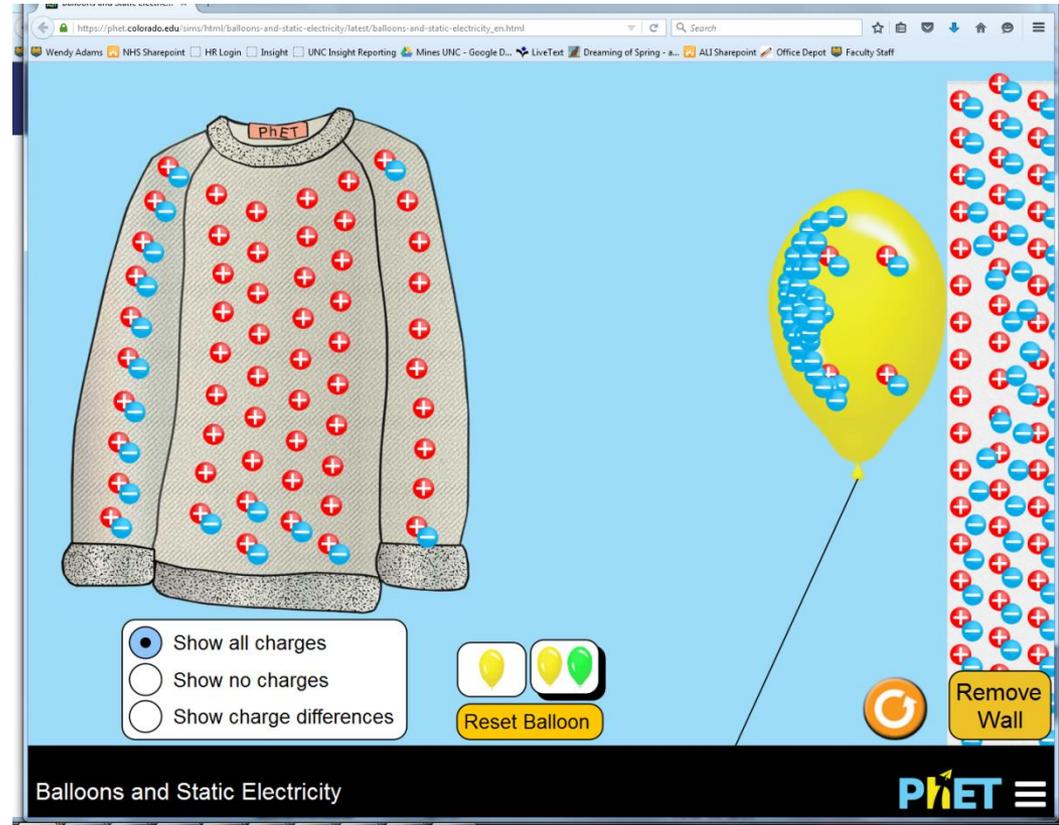
The *net* force is toward the rod.

The positive charge on the sphere is far from the rod, so it is weakly repelled by the rod.

What moves?

After rubbing the balloon on the sweater, the sweater has a positive charge because,

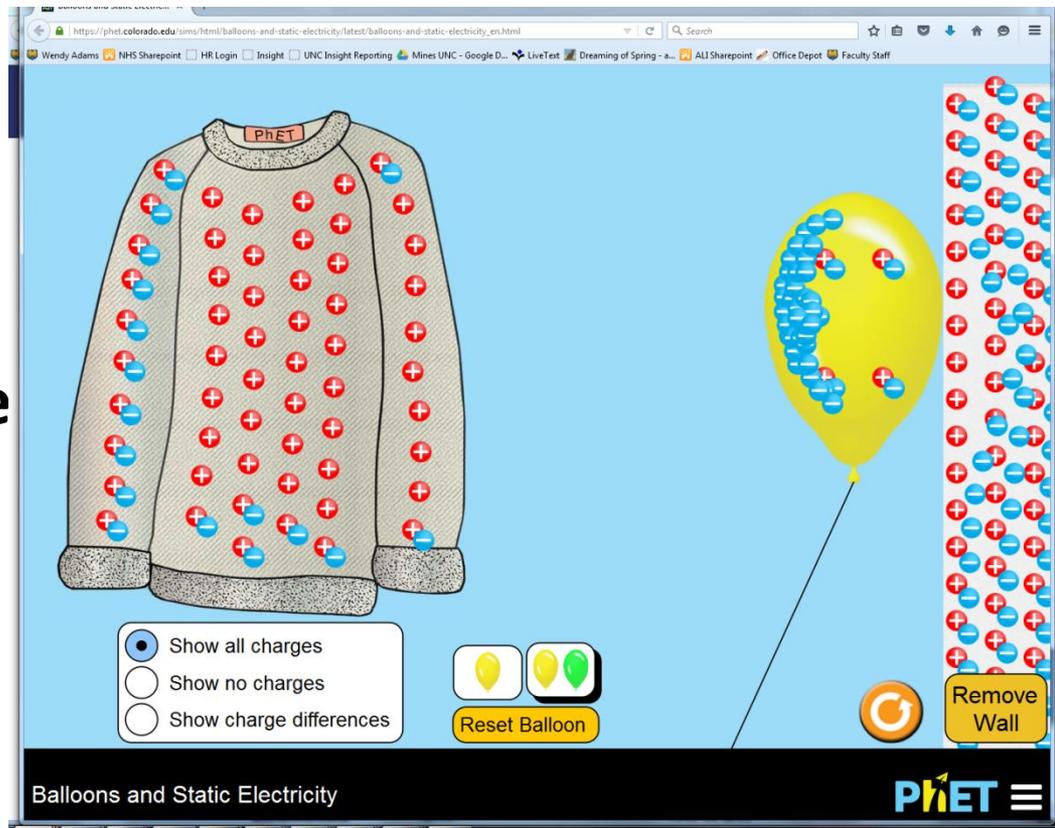
- A. Electrons moved to the balloon
- B. Protons moved to the balloon
- C. Electrons moved off of the balloon
- D. Protons moved off of the balloon.



What moves?

After rubbing the balloon on the sweater, the sweater has a positive charge because,

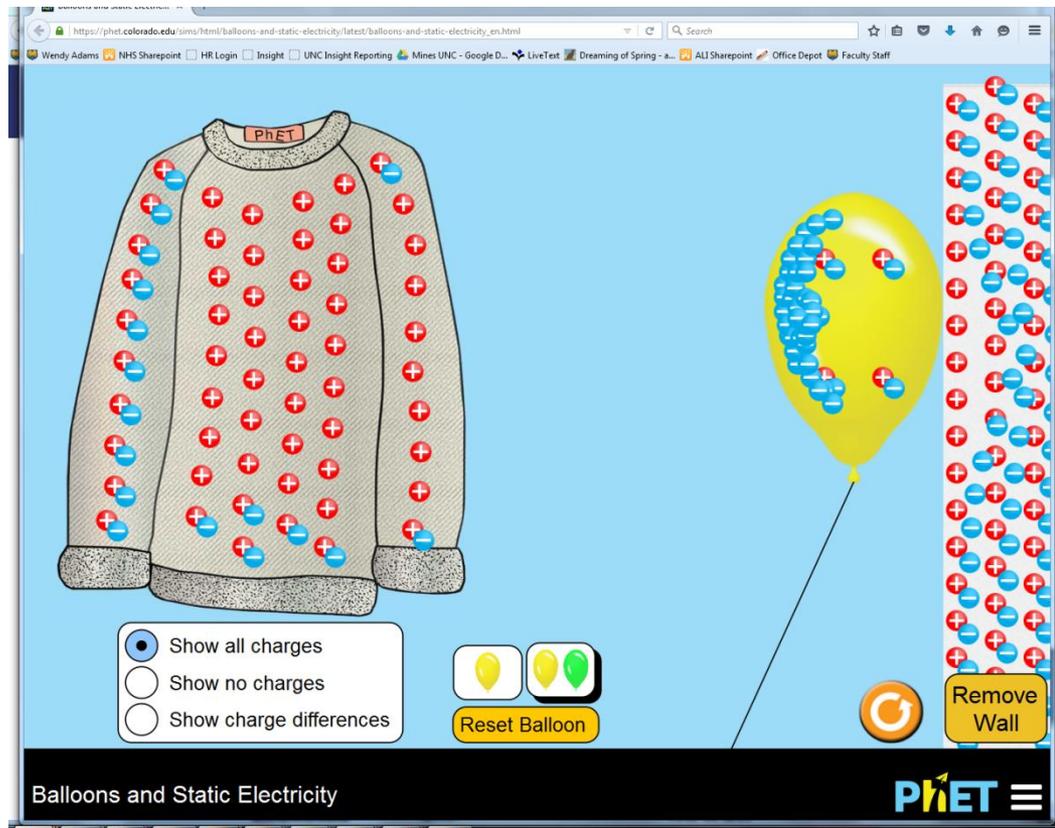
- A. **Electrons moved to the balloon**
- B. Protons moved to the balloon
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- D. Protons moved off of the balloon.



What moves?

If a plastic spoon is rubbed on the sweater and then has a positive charge, it is because

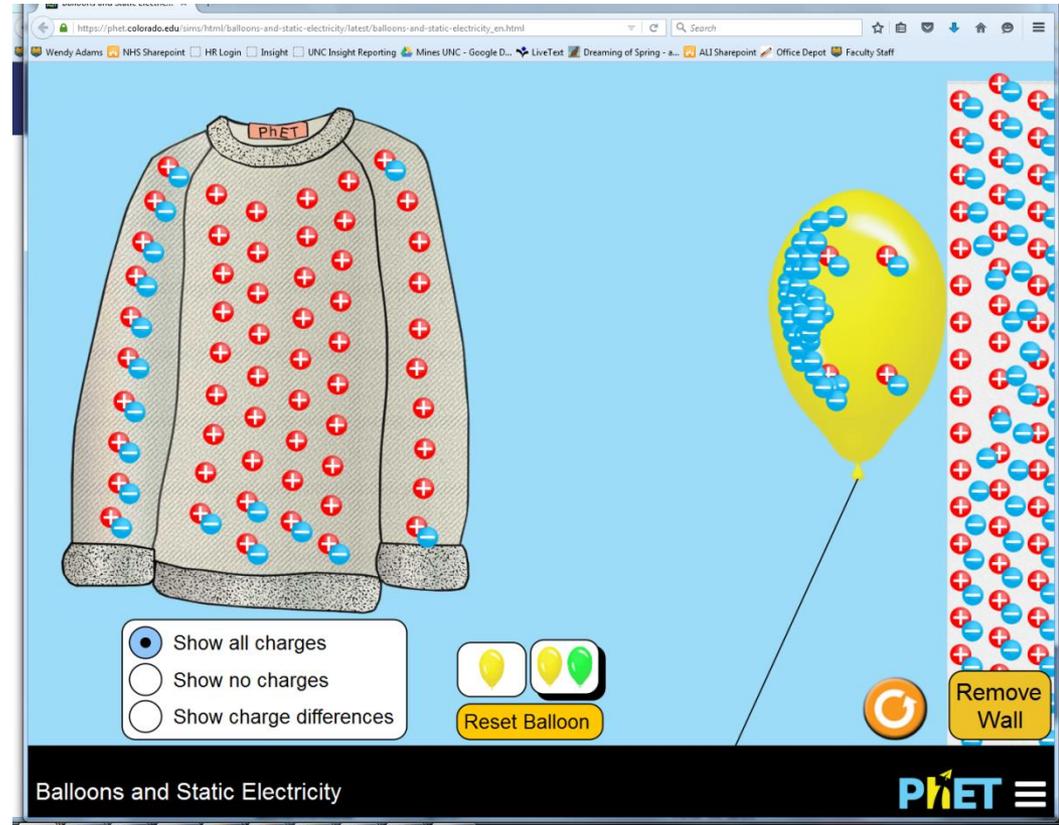
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An Atomic View of Charging

Electrons and protons are the basic charges in ordinary matter. **There are no other sources of charge.** Consequently, the various observations we made in Section 20.1 need to be explained in terms of electrons and protons.

Experimentally, it's found that electrons and protons have charges of opposite sign but *exactly* equal magnitude. Thus, because charge is due to electrons and protons, **an object is charged if it has an unequal number of electrons and protons.** An object with a negative charge has more electrons than protons; an object with a positive charge has more protons than electrons. Most macroscopic objects have an *equal number* of protons and electrons. Such an object has no *net* charge; we say it is *electrically neutral*.

In practice, objects acquire a positive charge not by gaining protons but by losing electrons. Protons are *extremely* tightly bound within the nucleus and cannot be added to or removed from atoms. Electrons, on the other hand, are bound much more loosely than the protons and can be removed with little effort.

Magnets

In class, magnets *strongly* attracted

- A. Nail, paper clip
- B. Nail, Paper Clip and Aluminum rod
- C. PVC Pipe, plexiglass, glass
- D. A and C
- E. B and C

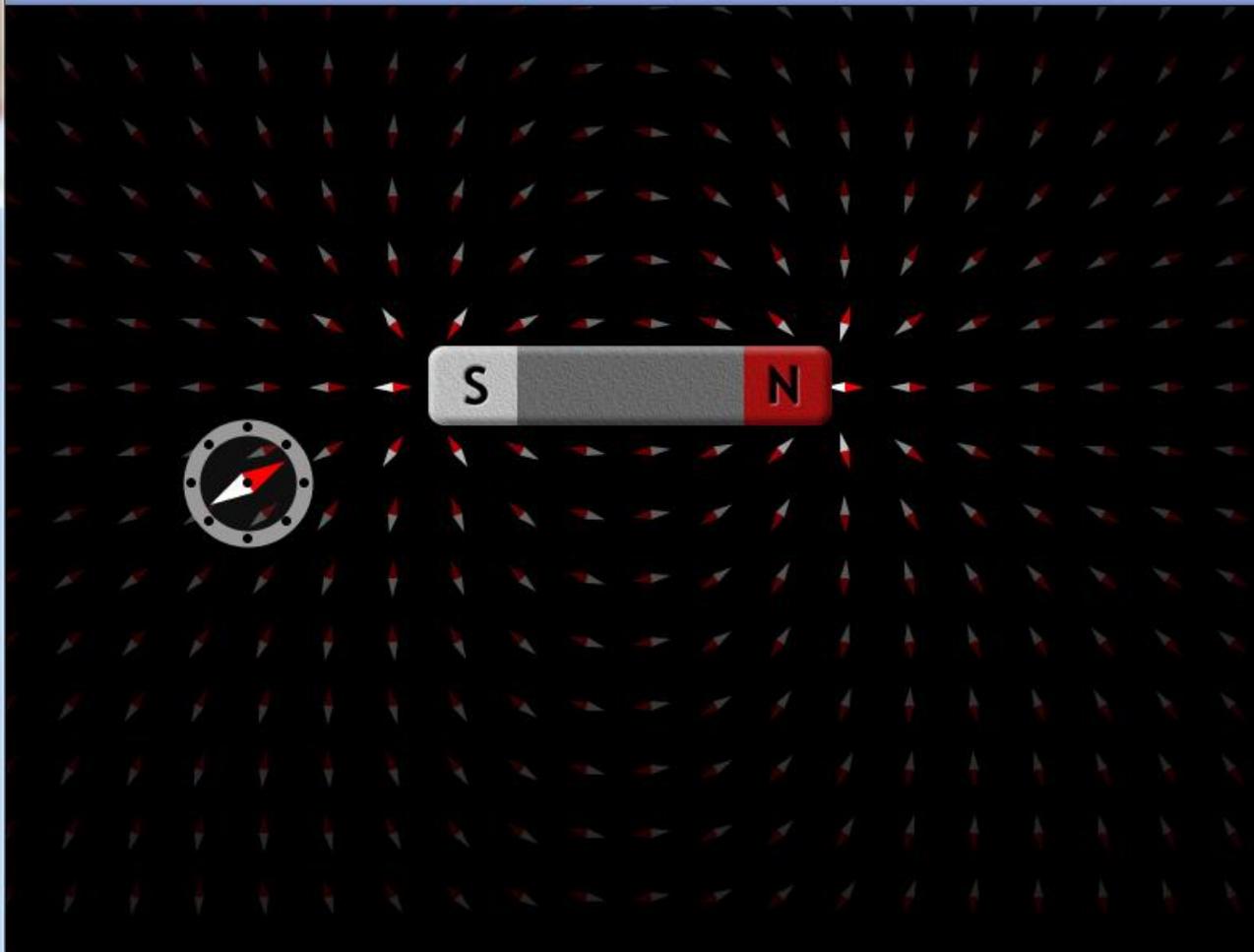
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Magnets

1. Magnets are not due to electrical charges.
2. Magnets always have a North pole and a South pole. North attracts South and North repels North.
3. Students often confuse magnets with electric charges because they follow the basic rule of opposites attract and likes repel. However, it's for different reasons.



Bar Magnet

Strength: 75 %

0 50 100

Flip Polarity

See Inside Magnet

Show Field

Show Compass

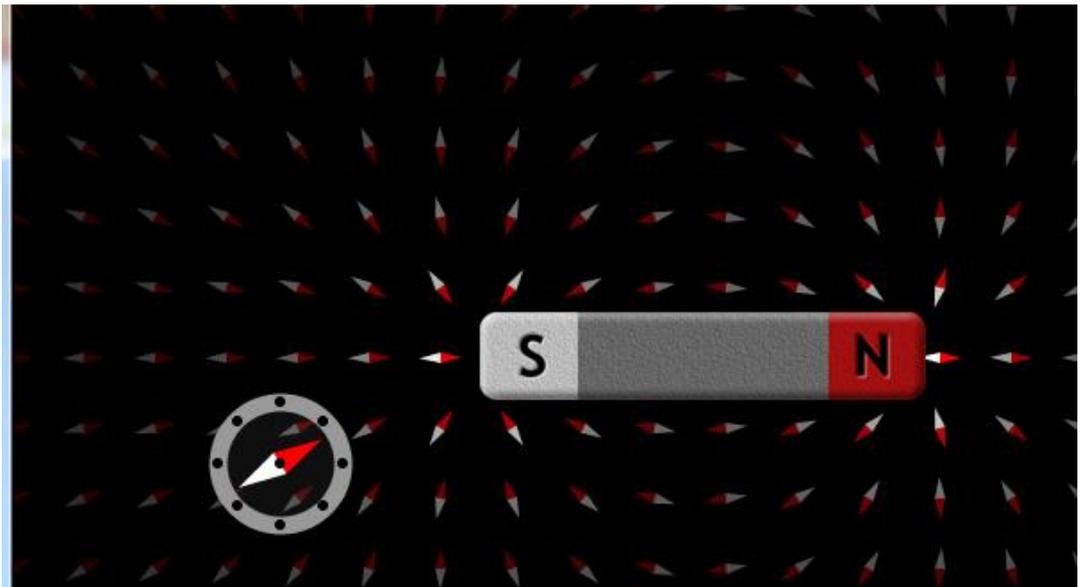
Show Field Meter

Reset All

Magnets

Which end of the compass is attracted to the Magnet?

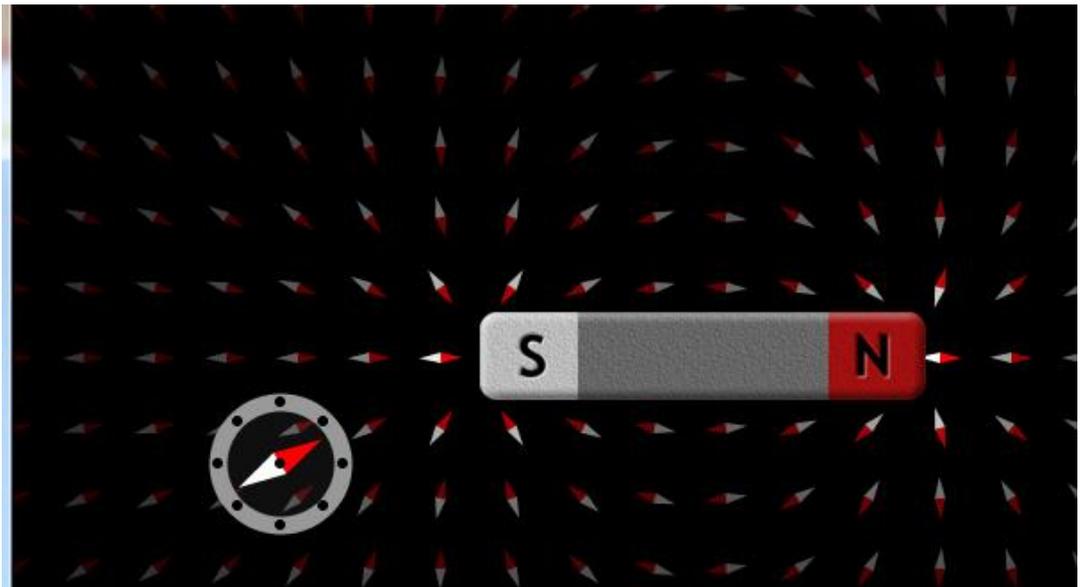
- A. Same color
- B. Opposite Color
- C. Both
- D. Not attracted

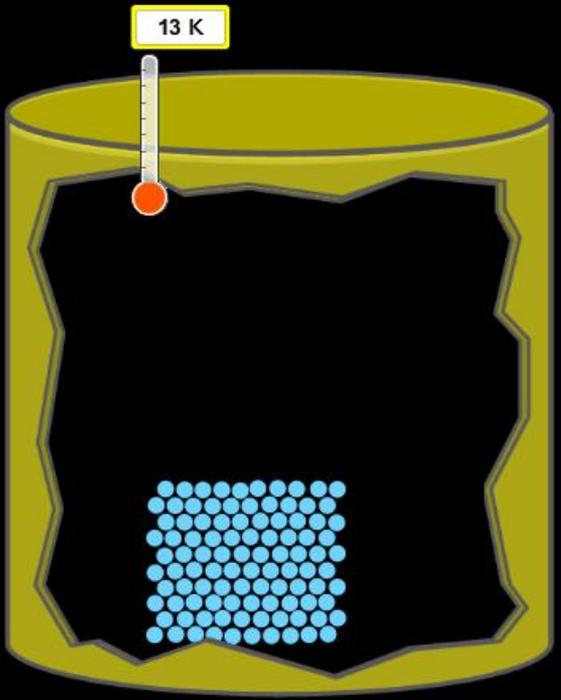


Magnets

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- B. **Opposite Color**
- C. Both
- D. Not attracted





- Atoms & Molecules**
- Neon
 - Argon
 - Oxygen
 - Water

- Change State**
- Solid
 - Liquid
 - Gas



Reset All

