

STUDY COURSE MATERIAL

SCIENCE

SESSION-2020-21

CLASS -VIII

TOPIC: FRICTION

DAY-1

NCERT MATERIAL

<http://ncert.nic.in/textbook/textbook.htm?hesc1=12-18>

TEACHING MATERIAL

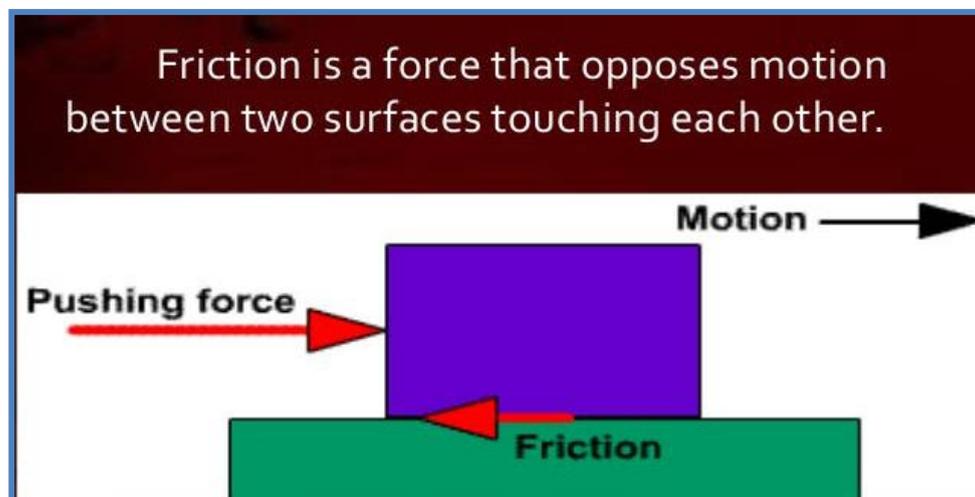
Introduction

What is Friction?

“Friction is a force that slows down moving objects or prevents stationary objects from moving.”

Or

“Friction is a force that comes into play when two surfaces come in contact with each other.”



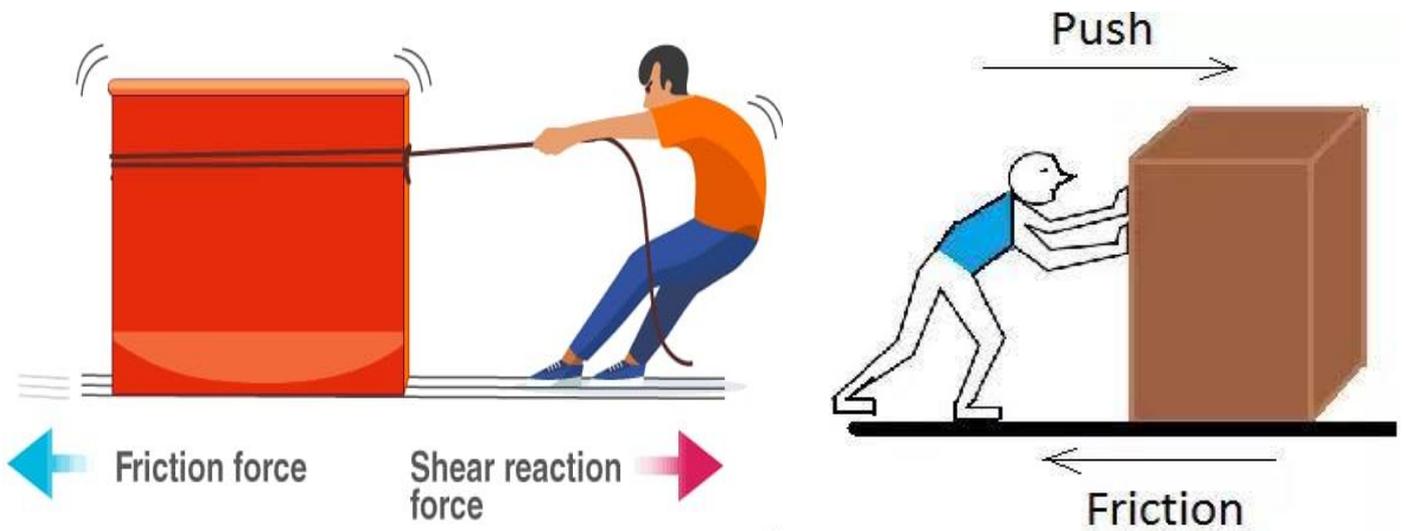


Figure: Force of Friction

NOTES:

- ✚ The force of friction always opposes the motion of an object.
- ✚ It tends to stop a moving object
- ✚ It also tends to prevent a stationary object moving.

What cause friction?

As we know that friction is a contact force. Hence, when one surface moves or tries to move over another surface then friction will be generated between these two surfaces.

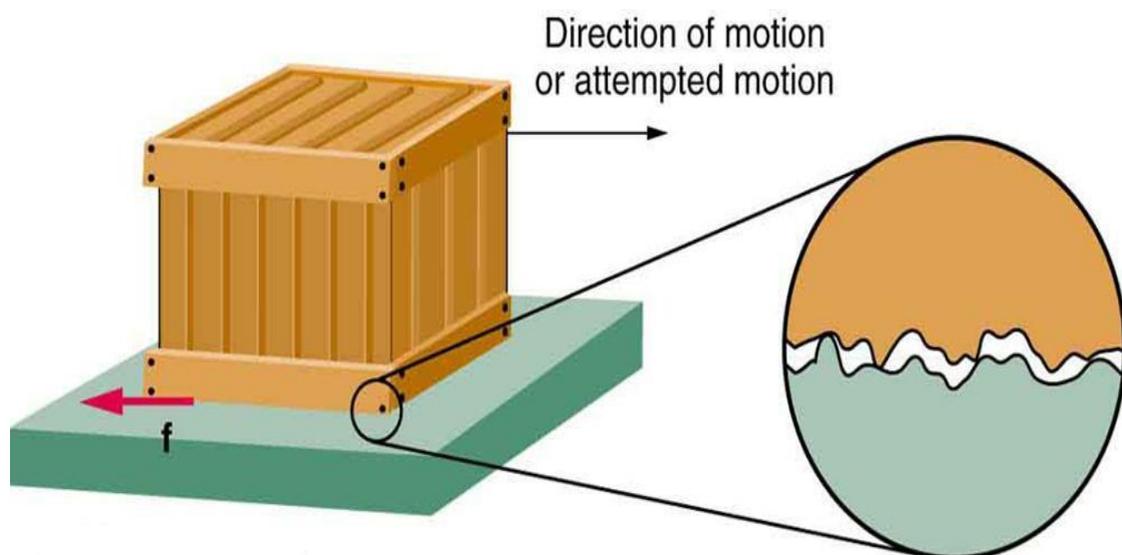


Figure: Microscopic view of Contact between two surfaces

1. The irregularities of a surface:

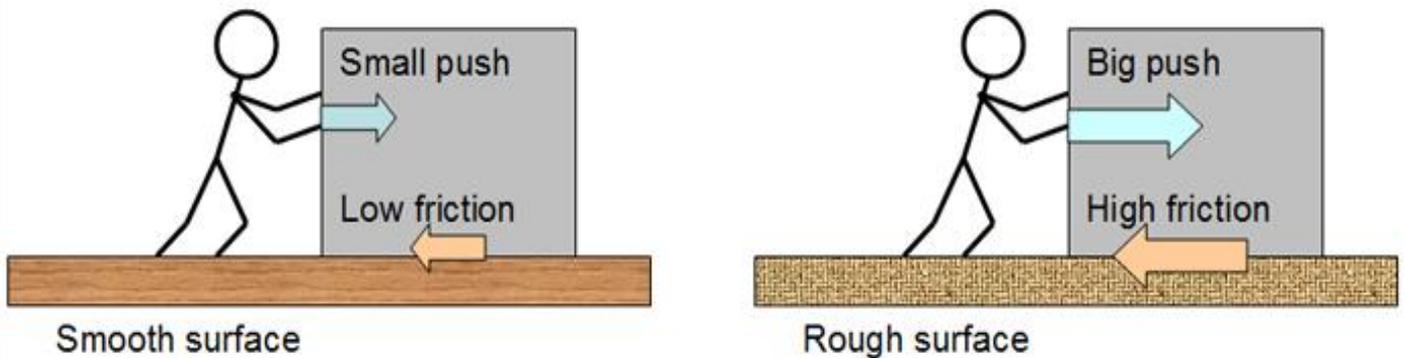
If we move an object with has an irregular or rough surface on another surface which is also irregular, the force of Friction will be high in this case and the movement of the object would be restricted.

2. The regularity of a surface or its smoothness:

If the surfaces of either the objects or are smooth, the force of Friction would be less and the object would move easily over the surface. Even smooth surfaces have a certain irregularity.

3. If two surfaces are pressed hard:

The force of Friction increases between two surfaces if they are pressed hard and hence the movement of the object becomes restricted. However, if there is no pressure the object can easily move



Notes:

- + Friction depends on the nature of surfaces in contact.
- + Friction depends on the mass of the moving object.

VIDEO LINK

LINK1

<https://www.youtube.com/watch?v=dv5z2lmiEPo>

LINK 2

<https://www.youtube.com/watch?v=LckOqpEkPZQ&t=27s>

PPT LINK

<https://www.slideshare.net/BhaveshKhandelwal1/class-8-chapter-12-friction>

ASSIGNMENT

1. What is friction?
2. An object is moving from north to south. What is the direction of the force of friction on the object?

DAY-2

TEACHING MATERIAL

Types of Friction

1. **Static Friction:** The Frictional force that comes into play until an object starts moving is called static Friction.

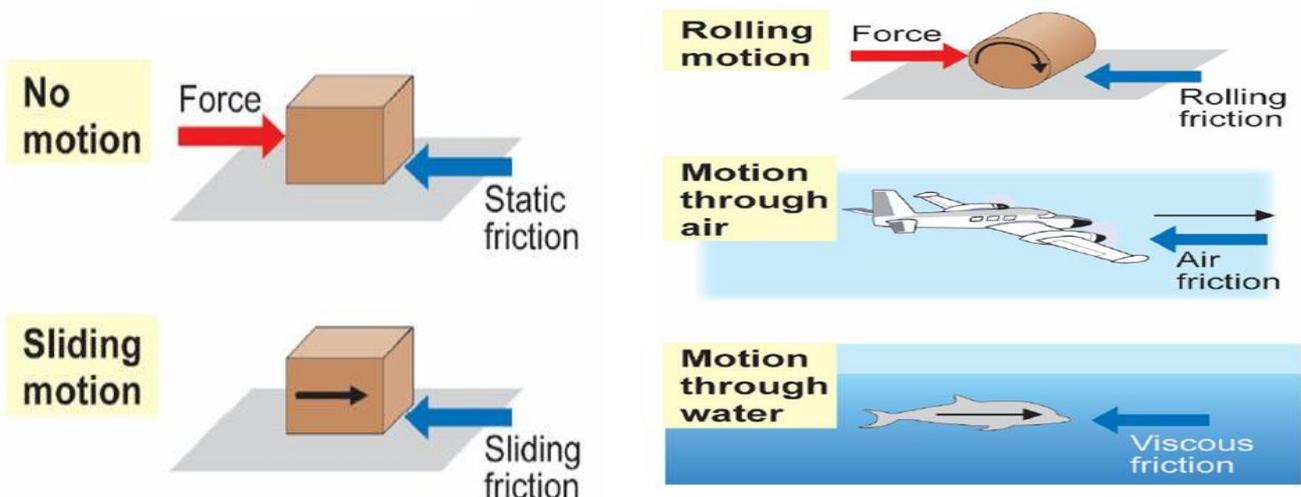
An object has to overcome the static Friction force in order to start its movement.

2. **Sliding Friction:** Sliding Friction comes into play whenever an object moves along the surface of another object. Such a movement is called 'slide'. Hence, sliding Friction is the force that opposes the movement or slide of an object.

3. **Rolling Friction:** When an object is rolling on a surface the force of Friction which acts upon it is called rolling Friction.

4. **Fluid Friction:** When an object moves in a fluid, the fluid exerts a fluid Friction upon the object. It is also called **air Friction** (when the medium of travel is air) and **viscous Friction** (when the medium of travel is water).

Note: Rolling Friction < Sliding Friction < Static Friction



Advantages of Frictional Force

Frictional force is necessary for various purposes in our daily lives such as:

- It allows us to walk on the earth surface.
- It allows us to write with a pen on a surface or a paper.
- It allows us to fix a nail in the wall.
- A moving object would never be able to come to the state of rest without the Frictional force.
- It would not be possible to drive any automobiles on the road without the Friction force.
- It would not be possible to light a matchstick by rubbing it against the matchbox if there is no friction.



Figure: Advantages of Frictional force

VIDEO-LINK

1. <https://www.youtube.com/watch?v=HRe90ySP38U>
2. [youtube.com/watch?v=9SMp-jnh8lg](https://www.youtube.com/watch?v=9SMp-jnh8lg)
3. <https://www.youtube.com/watch?v=ZjlBIUvqnPo>

PPT LINK

<https://www.slideshare.net/BhavesKhandelwall1/class-8-chapter-12-friction>

ASSIGNMENT

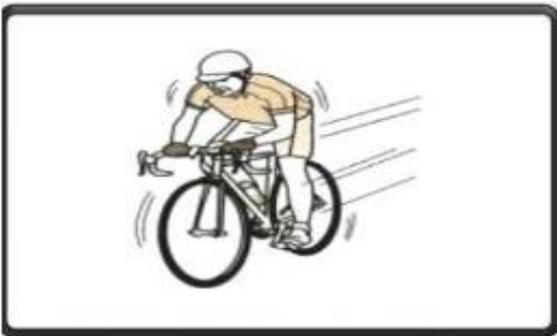
- Q1 Define Static friction, sliding friction, rolling friction and fluid friction.
Q2 Explain advantages of friction in our daily life.
Q3 Does air exert friction on an object moving through it? Explain with example.

DAY-3

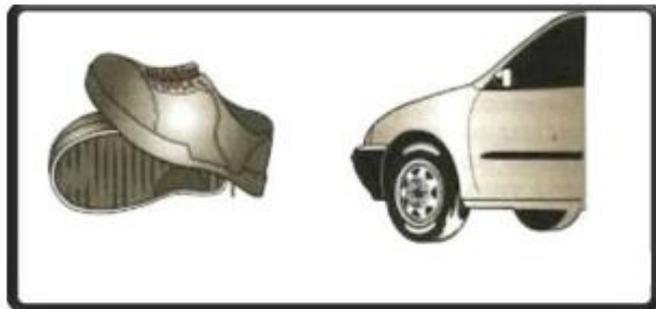
TEACHING MATERIAL

Disadvantages of Frictional Force

- Friction causes **wastage of energy**. This is because any object that moves, has to overcome the force of friction.
- Frictional force results in **wear and tear of objects** such as the moving parts of a machine, the tyres of a vehicle, sole of the shoes etc.
- It also results in the **production of heat**. In the case of machines, the production of heat leads to wastage of energy.
- The Frictional force also leads to a **decrease in the speed** of a moving object or some time stops it.
- It can lead to **noise pollution** in certain cases. For instance, aircrafts produce loud sound due to the resistance of the air.



More force is required to drive



Wear and Tear of materials



Causes noise pollution



Causes fires in forests

Figure: Disadvantages of Frictional force

How can we reduce friction (or minimize friction)

As friction is due to roughness of surfaces, any process that makes the contact surfaces smooth will reduce friction.

- **By polishing:** Polishing a rough surface smoothen it and reduces friction.
- The powder is sprinkled over the carrom board to decrease the Friction between the board's surface and the striker. In this way, the surface of the carrom board becomes smooth.
- Grease is used in bicycles and other motors or different parts of a machine to reduce Friction and increase their efficiency.
- Oil is applied on the hinges of the door so that they can move easily.



Figure: Decreasing Friction

By lubrication:

Applying substances like oil, grease or powder allows in smooth movement as they block the irregularities of a surface. The substances that can reduce the amount of Friction between different objects are called lubricants.



By using wheels and ball bearings – rolling friction :

- We know that when an object rolls over a surface rolling Friction is produced which resists its motion on the surface. However, its magnitude is lesser than the static and sliding Friction.
 - Wheels are circulating objects that turn around a center point.
 - The wheels allow an object to roll over a surface rather than allowing them to slide over the surface.
 - This results in less Friction and hence easy movement of the object.
 - Rolling Friction is also used in the parts of machines that are moving continuously.
 - In this way, the sliding Friction is removed with the help of rolling Friction and therefore the adverse effects of Friction such as the production of heat or wear and tear of the mechanical parts are also reduced.
 - For instance, ball bearings are being used in fans and bicycles to reduce Friction.

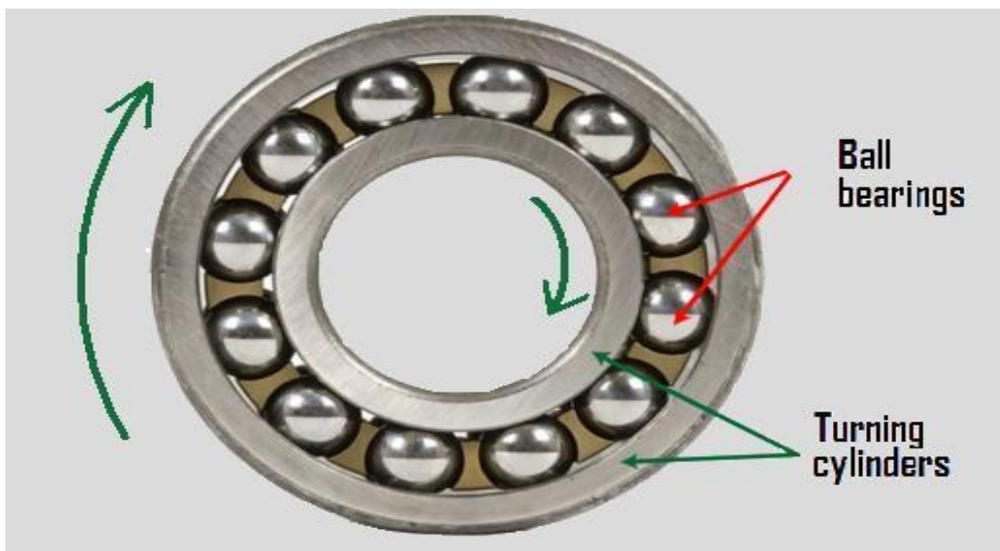
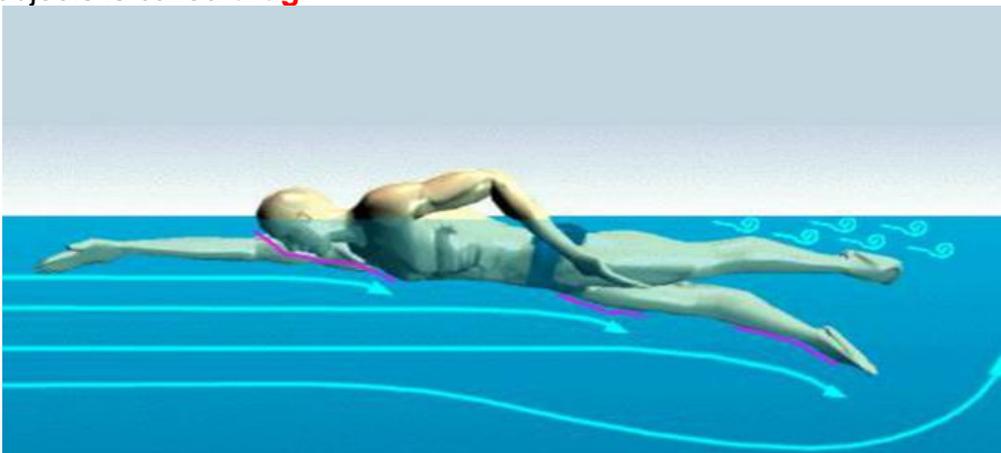


Figure: Ball Bearings

By streamlining to reduce fluid friction:

Fluids such as water and air also exert friction on objects moving from them .This frictional force that fluids exert on objects is called **drag**.



The amount of Frictional force by a fluid on an object depends upon the following:

1. The speed of the object with respect to the fluid.
2. The nature of the fluid, its viscosity or its tendency to resist the flow.
3. The shape of the object.

Friction is minimum for streamlined shape, which is rounded in the front and narrows at the back.

- Nature has given birds and fish streamlined bodies.
- The bodies of aeroplanes, missiles, rockets, cars are streamlined to reduce friction with air, called air resistance.
- Ships also have streamlined shape to reduce friction with water.

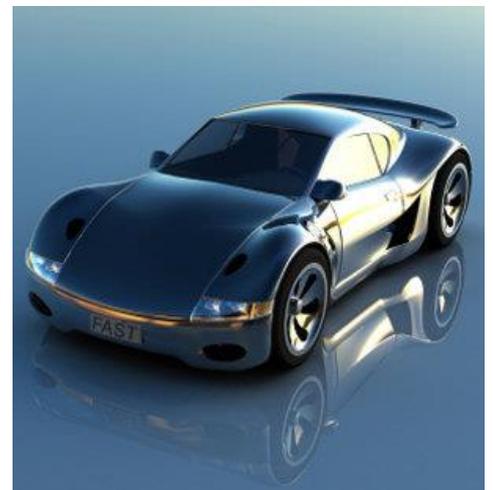
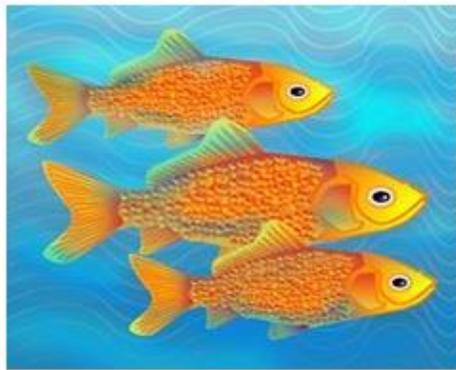


Figure: Objects can resist Fluid Friction because of their special Shape

VIDEO-LINK

<https://www.youtube.com/watch?v=6QOE56E1YKI>

PPT LINK

<https://www.slideshare.net/BhaveshKhandelwal1/class-8-chapter-12-friction>

ASSIGNMENT

Q1- Explain Disadvantages of friction in our daily life.

Q2- Explain why objects moving in fluids must have streamlined shapes.

Q3- State few methods for reducing friction.

DAY-4

TEACHING MATERIAL

How can we increase Friction?

Increasing Friction: Sometimes we need to increase Friction so as to avoid slipping of objects, for example:

1. The sole of the shoes is grooved so that the Friction between our feet and ground increases and we can walk safely
2. The tyres are treaded so that they can have a better grip over the ground and allow the smooth movement of the vehicles.
3. Brake pads are used in bikes to stop them suddenly from moving by increasing the amount of Friction.
4. Kabaddi players rub their hands with soil which helps in increasing the Friction between the hands and allows them to have an easy grip of the opponent.
5. Gymnasts also apply a coarse substance so that they can have a better grip due to increased Friction in their hands.



Patterns on the surfaces of tyres are made to increase friction between the tyres and the road surface.



Patterns on the soles of shoes help to increase friction with the ground and reduce chances of slipping.

Figure: Increasing Friction

VIDEO-LINKS

1 <https://www.youtube.com/watch?v=6QOE56E1YKI>

PPT LINK

<https://www.slideshare.net/BhaveshKhandelwal1/class-8-chapter-12-friction>

ASSIGNMENT

1. Explain why sportsmen use shoes with spikes?
2. How can we increase friction? Explain.

DAY-5

EXERCISE:

Choose the correct option:

1. Friction always _____
 - a. helps the motion
 - b. opposes the motion
 - c. both of these
 - d. none of these
2. Which one of these characteristics does a smooth surface has?
 - a. Less frictional force
 - b. More frictional force
 - c. Sometimes less and sometimes more force
 - d. All of above
3. Friction is a _____
 - a. Contact force
 - b. Non-contact force
 - c. Magnetic force
 - d. None of these
4. What kind of substances are known as lubricants
 - a. Increase friction
 - b. Decrease friction
 - c. Increase or decrease friction
 - d. None of these

- 5. Fluid are _____**
 a. Gases
 b. Liquids
 c. Gases and liquids both
 d. None of these
- 6. On what force of friction depends?**
 a. Smoothness of surface
 b. Roughness of surface
 c. Inclination of surface
 d. All of above
- 7. Friction is a /an _____**
 a. Evil
 b. Foe
 c. Both (a) and (b)
 d. None
- 8. Lubricants _____**
 a. Increase friction
 b. Reduce friction
 c. Both (a) and (b)
 d. None
- 9. Rolling friction is smaller than?**
 a. Sliding friction
 b. Static friction
 c. Fluid friction
 d. All of the above
- 10. The shape of the airplane is like a**
 a. Bird
 b. Car
 c. Dog
 d. All

Answers

1. B	2. A	3. A	4. B	5. C
6. D	7. C	8. B	9. D	10. A

MUST WATCH

<https://www.youtube.com/watch?v=LckOqpEkPZQ>

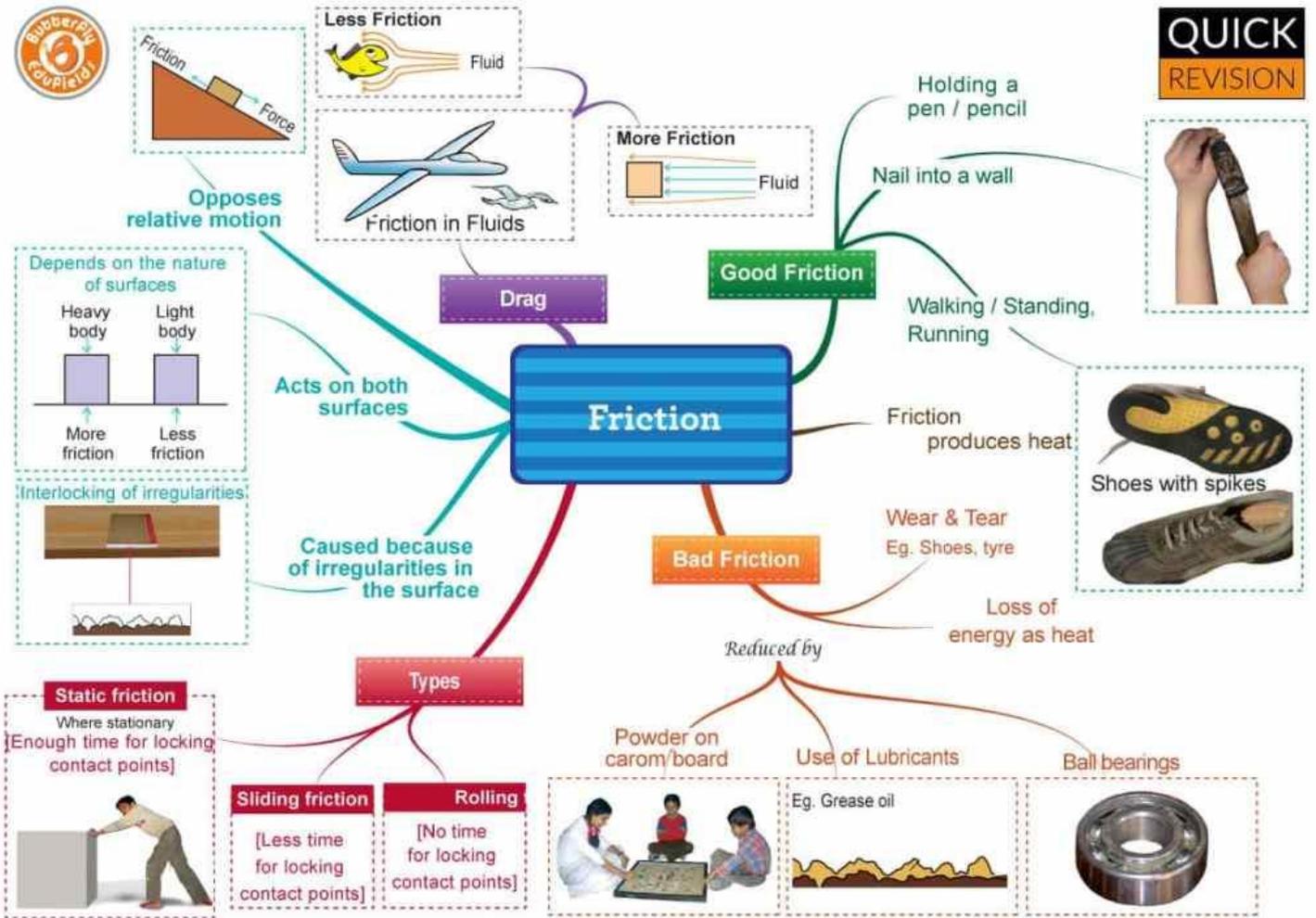
NCERT QUESTION

<https://www.careerlauncher.com/cbse-ncert/class-8/Science/CBSE-Friction-NCERTSolutions.html>

ASSIGNMENT QUESTIONS

1. What is the effect of friction on motion?
2. What cause friction between two surfaces in contact?
3. How does lubrication reduce friction?
4. on what principal do ball bearings works?

MIND MAP



QUICK REVISION

