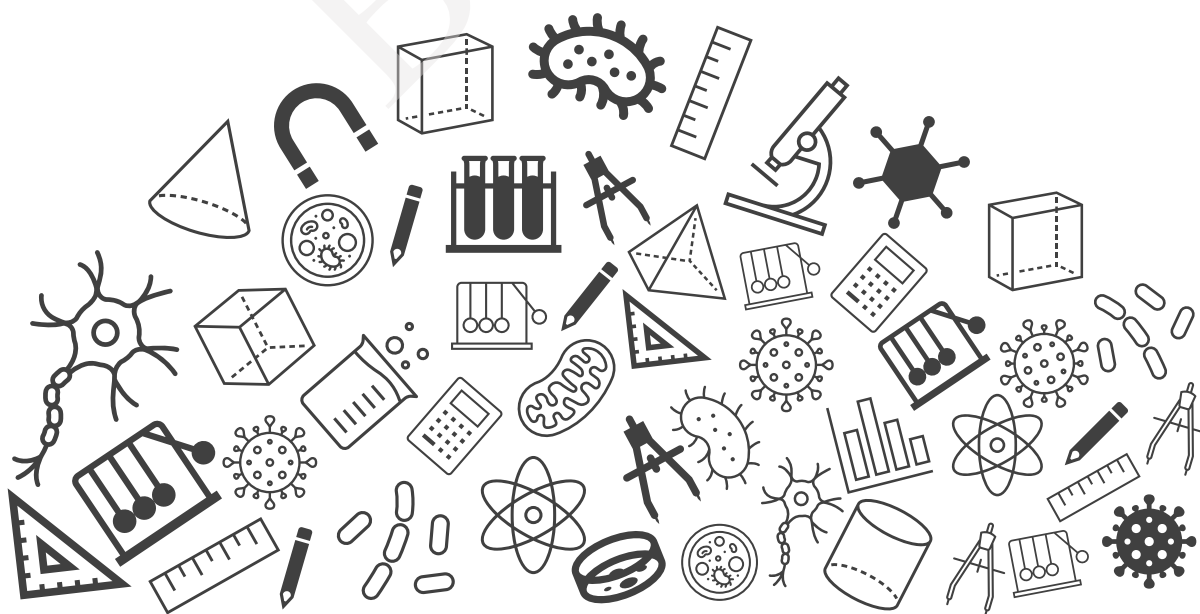




Grade 08

Chapter Notes



BYJU'S Classes

Class Notes

Friction

Grade 08



Topics to be Covered

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Causes of Friction

- 2.1 Interlocking of Irregularities
- 2.2 Bond Formation

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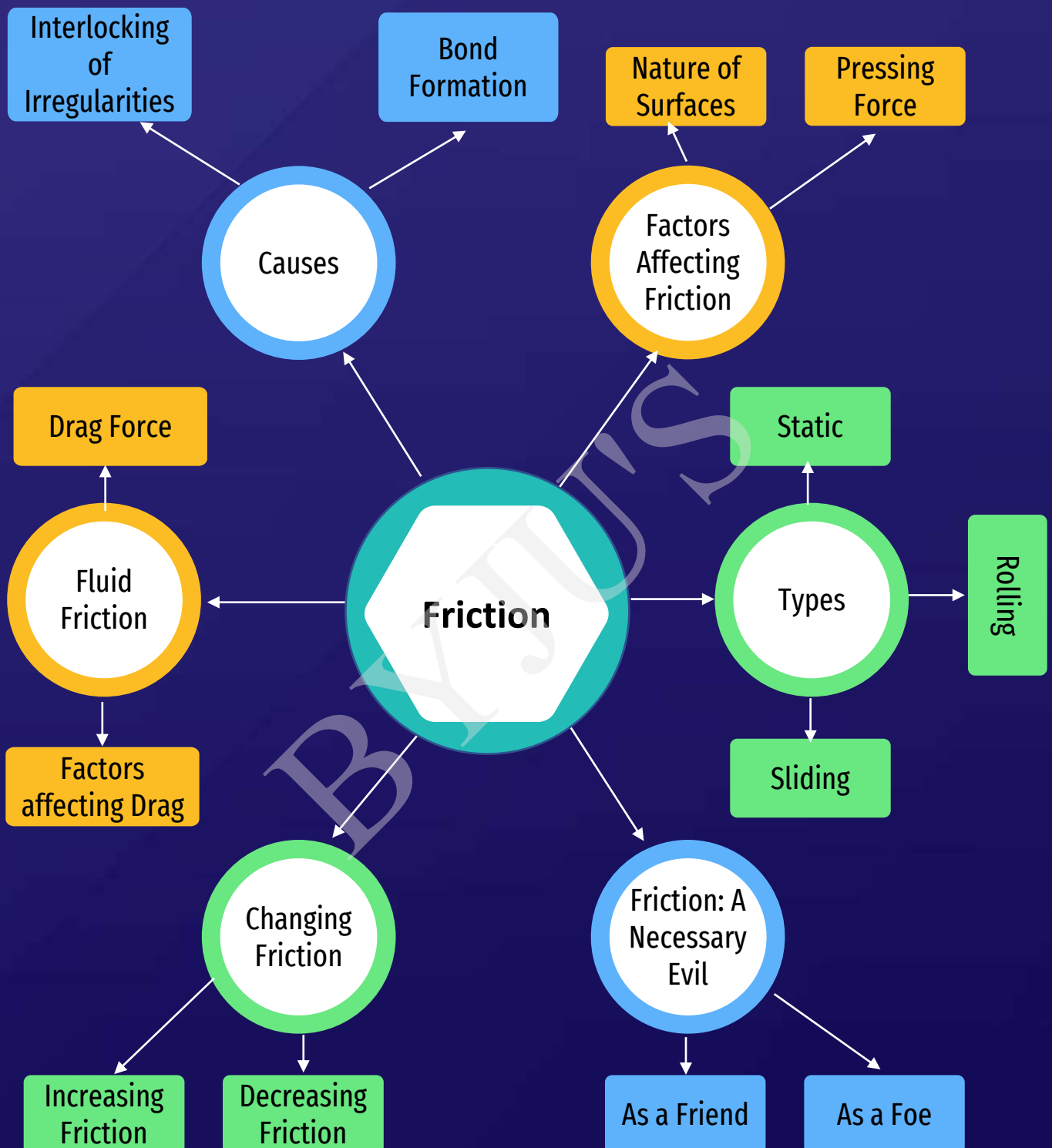
7

Fluid Friction

- 7.1 Introduction
- 7.2 Factors affecting Fluid Friction

Mind Map

B



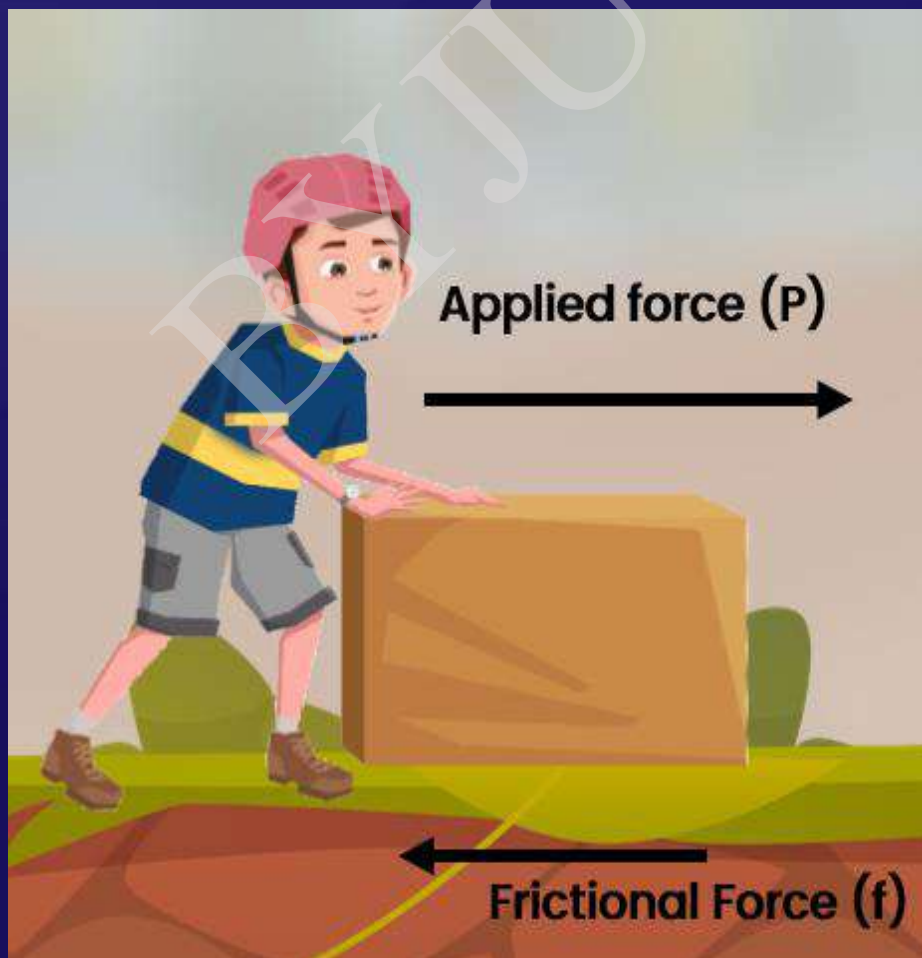
1. Introduction to Friction



Friction is a force which opposes relative motion between two surfaces in contact.

It is a type of contact force.

For example, when we try to push a heavy block kept on ground by applying some force, it does not move because friction acts on the block in the opposite direction.



2. Causes of Friction

B

2.1 Interlocking of Irregularities

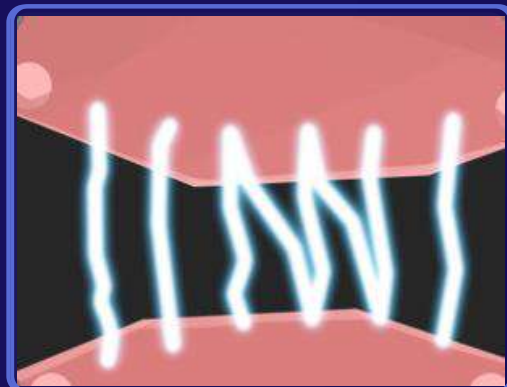
When we look under a microscope, even smooth looking surfaces have irregularities present on them. These irregularities get interlocked and offer resistance when the surfaces try to move relative to each other.



Interlocking of Irregularities

2.2 Bond Formation

When two surfaces are close to each other, weak bonds are formed between them. This also offers friction between the surfaces.



Bond Formation

3. Factors affecting Friction

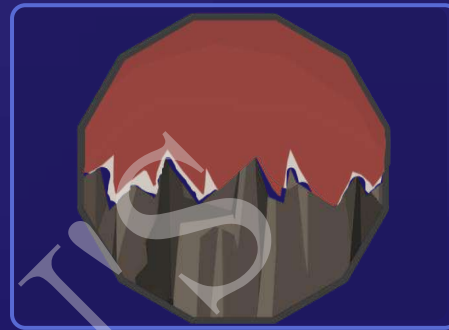
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3.1 Nature of Surfaces in Contact

Friction depends on the nature of surfaces in contact. Smooth surfaces have fewer irregularities and interlock less strongly compared to rough surfaces. Hence, friction is generally less if surfaces are smooth.



Smooth Surfaces
- Less Friction



Rough Surfaces
- More Friction

3.2 Pressing Force

If surfaces are pressed harder against each other, friction is more. This is because the irregularities get interlocked more strongly when the pressing force is more.



Less Pressing Force
- Less Friction



More Pressing Force
- More Friction

4. Types of Friction

B

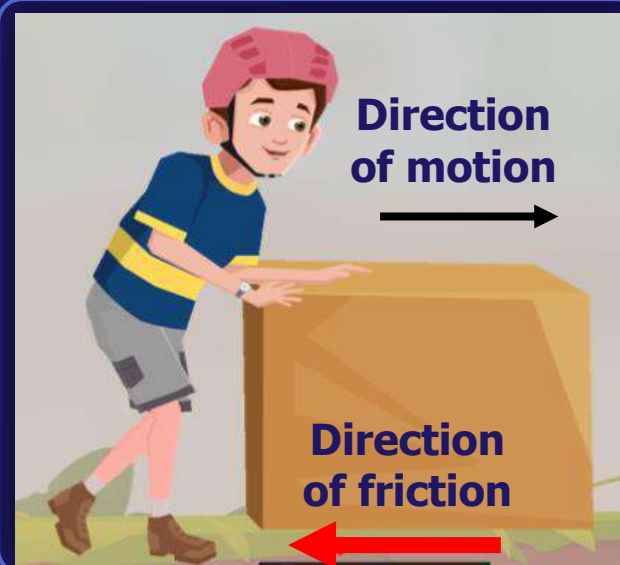
4.1 Static Friction

Static friction is a force that keeps an object at rest when we try to move it by applying an external force. With an increase in applied force, static friction increases to a limit, beyond which slipping starts.



4.2 Sliding Friction

When a body begins to slide on the surface, the force exerted by the surface on the object is called sliding friction or kinetic friction.

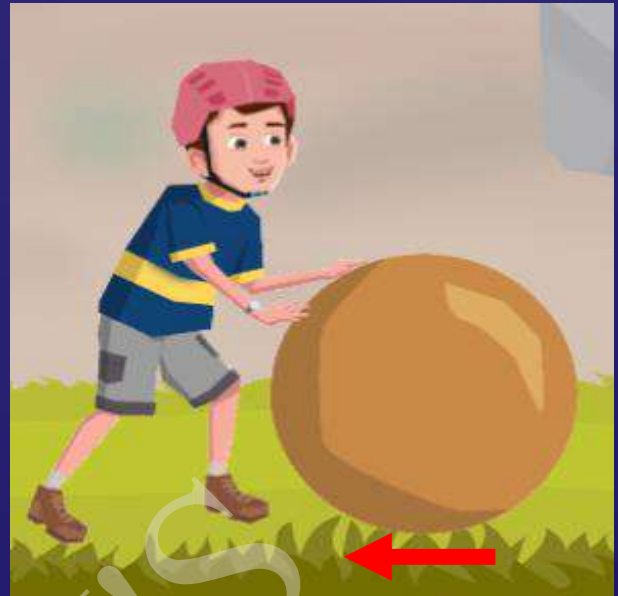


4. Types of Friction

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4.3 Rolling Friction

Rolling friction acts when an object rolls over a surface. In rolling, the surfaces in contact don't rub against each other as they do while sliding.



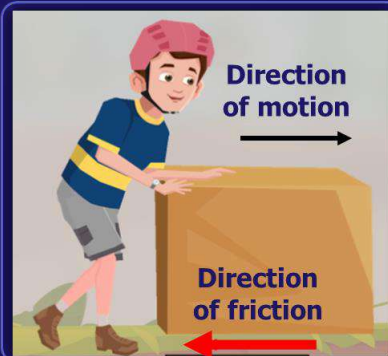
4.4 Comparison of Types of Friction

In general, static friction is greater than sliding friction which in turn is greater than rolling friction between two surfaces.



Static
Friction

>



Sliding
Friction

>



Rolling
Friction

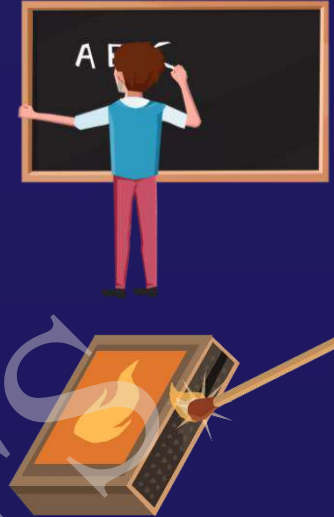
5. Friction: A Necessary Evil

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Friction can both act as a friend and a foe.

5.1 As a friend

In some situations, friction is desirable. For example, it enables us to hold objects, write using a chalk or light a matchstick.



5.2 As a foe

In other scenarios, friction is undesirable. For example, it causes wear and tear of shoes and tyres, reduces efficiency of machines because of heat loss, etc.



6. Changing Friction

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In some situations, friction is desirable whereas in others, it is undesirable. Accordingly, we need to increase or decrease friction.

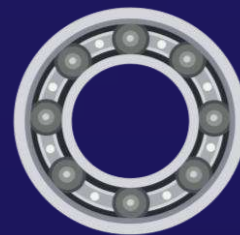
6.1 Increasing Friction

Friction is favorable for getting better grip on roads, hence tyres are provided with treads. Similarly, bats have grips on the handle to increase friction.



6.2 Decreasing Friction

To reduce friction between sliding parts, we use ball bearings. Similarly, the use of lubricants between machine parts reduces friction.



7. Fluid Friction

7.1 Introduction

- Fluids (liquids and gases) also offer friction when there is relative motion of an object through the fluid.
- The frictional force exerted by the fluids is called fluid friction or drag.
- For example, an aircraft experiences drag while flying, a deep-sea diver experiences water drag, etc.



Air Drag



Water Drag

7. Fluid Friction

B

7.2 Factors affecting Fluid Friction

Fluid friction is affected by the following factors:

Relative Speed of Object with respect to Medium

Fluid friction on an object moving through a fluid depends on its relative speed with respect to the fluid. More the relative speed, more is the drag. For example, rockets might catch fire while re-entering the atmosphere with high speeds whereas passenger planes don't catch fire because of their lower speeds



More Speed -
More Drag



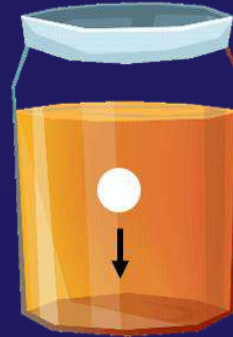
Less Speed -
Less Drag

7. Fluid Friction

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Nature of the Medium

Fluid friction also depends upon nature of the fluid. Denser the fluid, more is the drag. For example, drag offered by honey is more than that offered by water.



Thin Fluid – Less Drag



Thick Fluid – More Drag

Shape of the Object

Fluid friction depends on shape of the object as well. Streamlined bodies experience less drag as compared to non-streamlined bodies.

1. Non – Streamlined Car



2. Streamlined Car

