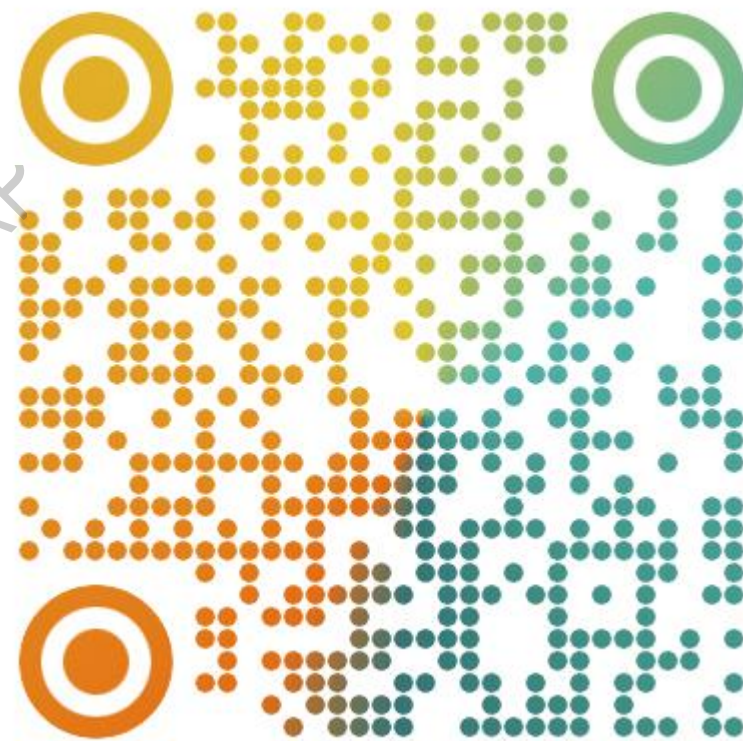
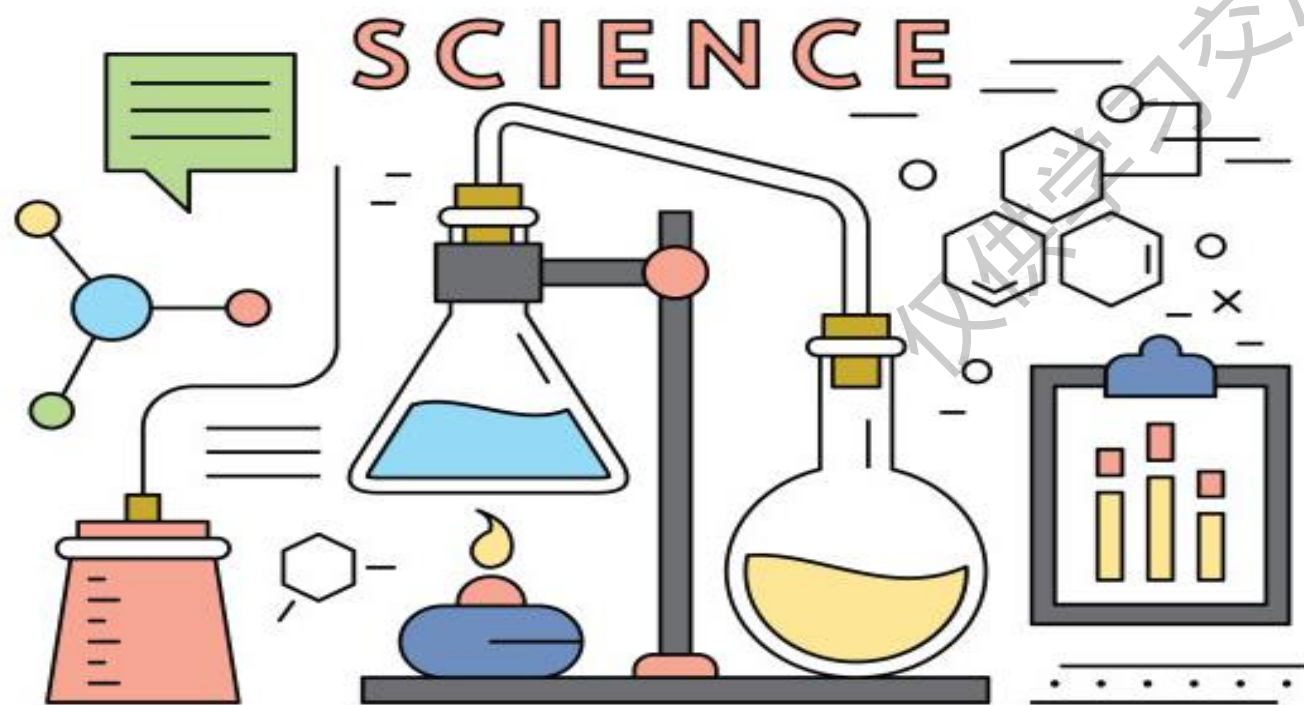


Unit 1 Forces

Lesson 3 Friction



合肥市师范附属第四小学 许秀

Tug of war

**There is a force between your hands and the rope.
What is it?**

An illustration of four children, two boys and two girls, participating in a tug-of-war competition. They are all wearing light blue short-sleeved shirts and red shorts. They are pulling on a thick brown rope with great effort, their faces showing strain and determination. The background is a simple outdoor setting with green bushes and a brown ground. A watermark '仅供学习' is visible across the middle of the illustration.

Friction



The **surface** of the hand is smooth.

The **surface** of the glove is rough.





Bob is looking out of the window. It's time for the football game. But it's snowy outside.

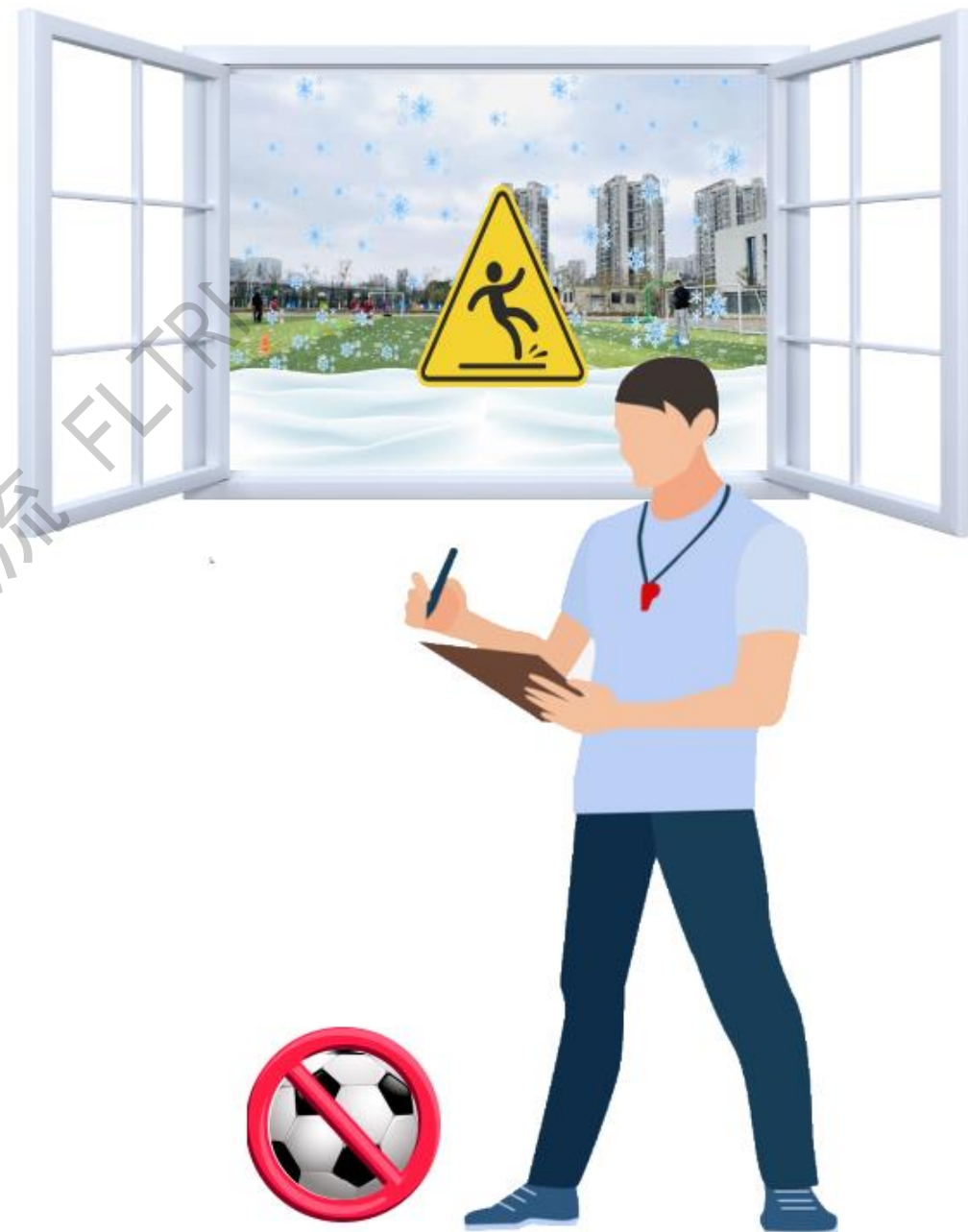
“I want to play football.
Can I go outside?”

Bob asks the PE teacher.

What's the weather like?
It's snowy outside.



The PE teacher says. “The surface of the playground is smooth now. It’s slippery. How to make it rough? Let me think about it.”



E-bag



First, what is friction?
Of course, I know!
Let's try activity 1.

Activity 1

**Rub your hands.
Can you feel a force?**



**Rub two toothbrushes.
Can you feel a force?**



When you rub things, you can feel a force .
This is friction.



E-bag



Don't worry.
Let's try activity 2 !



Activity 2



sandpaper



paper



towel



smooth



rough

The surface of the... is...



paper



sandpaper



towel

Problem

Which surface has the most (最大的) friction?



paper



sandpaper



towel



Let's do a test!

仅供学习参考 FLTRP

You need...

ramp

paper

toy car

towel

tape measure

sandpaper




- 1 Put the toy car at the top of the ramp.
Let the car go.**



- 2 Measure the distance at the bottom.
Repeat and measure the distance again.**





Surface	Distance 1 (cm)	Distance 2 (cm)	Average (cm)
Paper			
Towel			
Sandpaper			

Decorative yellow dots in the bottom-left corner.

+

=

÷

=



3

**Start the car in the same position.
Repeat the experiment with the towel
and the sandpaper.**





**How far does the car move?
Write the results.**




Surface	Distance 1 (cm)	Distance 2 (cm)	Average (cm)
Paper			
Towel			
Sandpaper			





Surface	Distance 1 (cm)	Distance 2 (cm)	Average (cm)	Surface	Distance 1 (cm)	Distance 2 (cm)	Average (cm)
Paper	29	27	23	Paper	23	26	24.5
Towel	5	3	4	Towel	4	4	4
Sandpaper	18	14	16	Sandpaper	20	22	21

Which surface stops the car in the shortest distance?
The towel.







Conclusion

The towel has the most friction.

There is more friction on rough surfaces.

There is less friction on smooth surfaces.



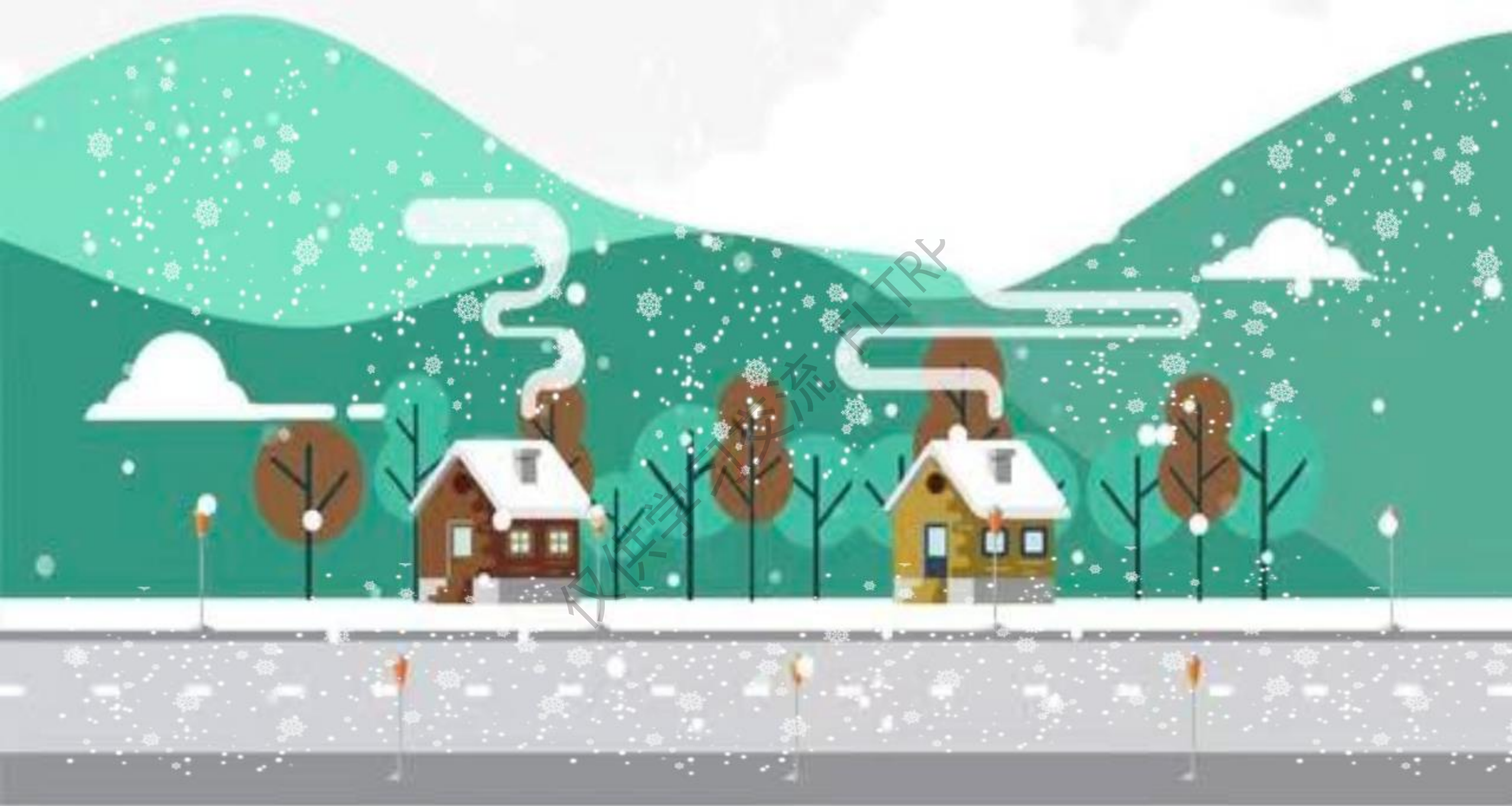
Bob says. "Now I know.
We can change the
surfaces, so we can
change the friction.
I have an idea..."





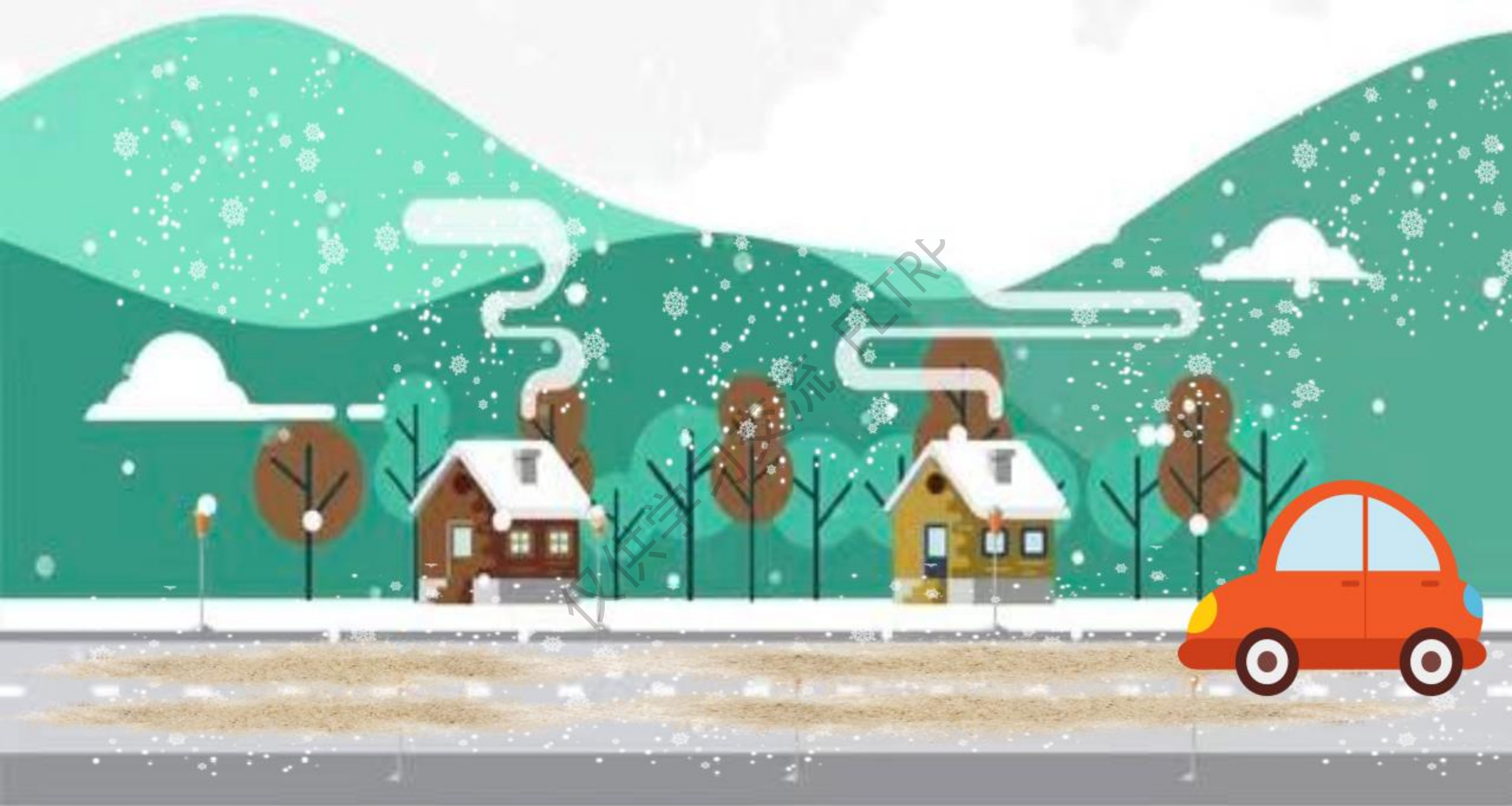










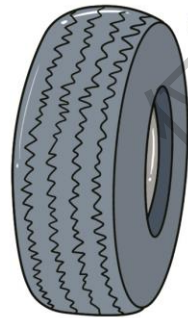






Activity 3

**Look! Car tyres
have patterns.**



**This shoe has
patterns too!
Why?**



Activity 3



Patterns make surfaces (rough / smooth).
Patterns can give surfaces (more / less) friction.

Let's design your shoes!

1. Talk in groups.
2. Write down the reasons.
3. Draw your design.



Now I Know ...

Friction

What?

When you rub things, you can feel a force. This is friction.

Surface

Rough

There is more friction on rough surfaces.

Smooth

There is less friction on smooth surfaces.

Pattern

Patterns can give surfaces more friction.



How I Know ...

I did a fair test.

I tested different surfaces.





Homework

1. Can you find friction in your life?

Take a photo and share with your friends.

2. What else can change the friction?

You can ask your science teacher, read books,
surf the Internet...

