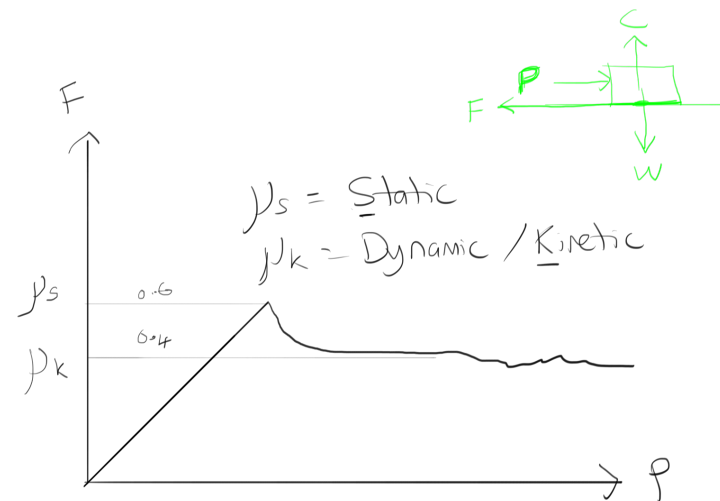**Section Introduction**

An Overview Of Friction

In This Video...

- Why friction is so important.
- About physics materials and friction.
- How static and dynamic friction relate.
- Using the Friction Direction 2 setting.
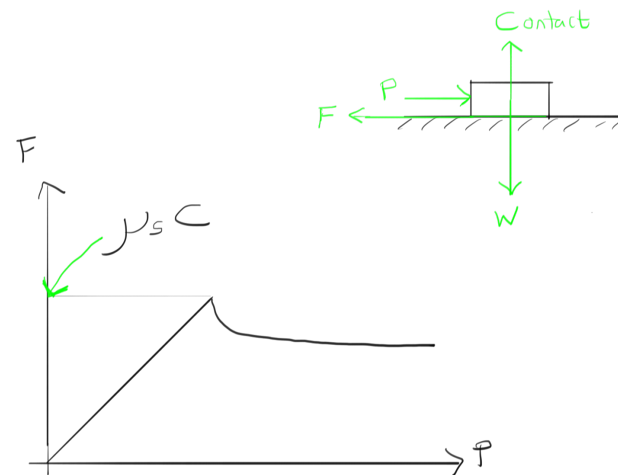- Limitations of Unity's friction, and to improve it.
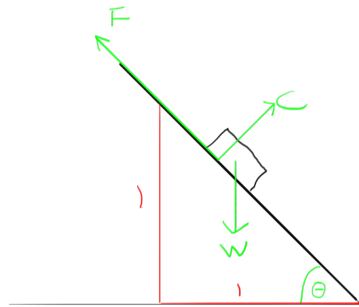
Setup A Default Physics Material

Create a new material.

Set Dynamic Friction to 0.4.

Call it Default.physicMaterial.

Set it in the Project Settings.

Save your project.

Static Friction & Critical Angle

In This Video...

- Welcome "Mu-s", the coefficient of static friction.

- What the static friction coefficient means.

- How this coefficient relates to slope angle.

- Two triangle trigonometry take-home tricks.

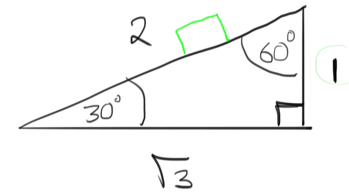- Testing critical angle in Unity Editor.

$$\mu_s = \tan\theta = \frac{1}{1} = 1$$

SOH CAH TOA

$1^2 + (\sqrt{3})$
$1 + 3$

$$\mu_s = \tan 30° = \frac{1}{\sqrt{3}} = C$$

Populate This Table

Predicted Angle	Mu Setting	Actual Angle
30 degrees	1 / sqrt(3) = 0.577 = tan (30)	
45 degrees	1 / 1 = 1 = tan (45)	
60 degrees	sqrt(3) / 1 = 1.73 = tan (60)	

Make A Friction Test Rig

In This Video...

- Discover slipping angle.
- Try three different static friction coefficients.
- About rolling, and "impulsing" the block.
- Generally horsing around with blocks and slopes.

Populate This Table

Predicted Angle	Mu Setting	Actual Angle
30 degrees	1 / sqrt(3) = 0.577 = tan (30)	42
45 degrees	1 / 1 = 1 = tan (45)	55
60 degrees	sqrt(3) / 1 = 1.73 = tan (60)	70

Friction Combine In Unity

In This Video...

- Why we care about friction combine.
- The limitations of Unity's model.
- How friction combine precedence works.

Friction Combine Precedence

	Block Max	Block Mult	Block Min	Block Mean
Ground Max	Max	Max	Max	Max
Ground Mult	Max	Mult	Mult	Mult
Ground Min	Max	Mult	Min	Min
Ground Mean	Max	Mult	Min	Mean

Imagine a block on sloping ground

About Dynamic Friction

In This Video...

- What is dynamic friction.
- How it relates to terminal velocity on a slope.
- A look at some Stribeck curves.

Setup Dynamic Friction

Chose a game project you are working on.

Think where you can use dynamic friction.

Add it, and tune it to improve the game.

How Friction Direction 2 Works

In This Video...

- What the Friction Direction 2 setting does.
- How it might be useful.
- A note on using unit vectors.
- Friction Direction 2 doesn't work in Unity 5!

Vote In The Discussions

Do you want Friction Direction 2 to work?

Ask in the discussions, I may show you how.

How about making a fix yourself?

Section Wrap-Up

Further reading

- <u>Wikipedia friction article</u> including lookup table.
- <u>Engineering Toolbox</u> friction table.
- <u>Stribeck curve images</u>.
- <u>Unity's Physic* Material page</u>
- *yes they really spell it like that!*

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