

Trigonometric Ratios



A **RATIO** is a comparison of two numbers. For example;
boys to girls
cats : dogs
right : wrong.

In Trigonometry, the comparison is between **sides of a triangle.**



We need to do some
housekeeping before we
can proceed...

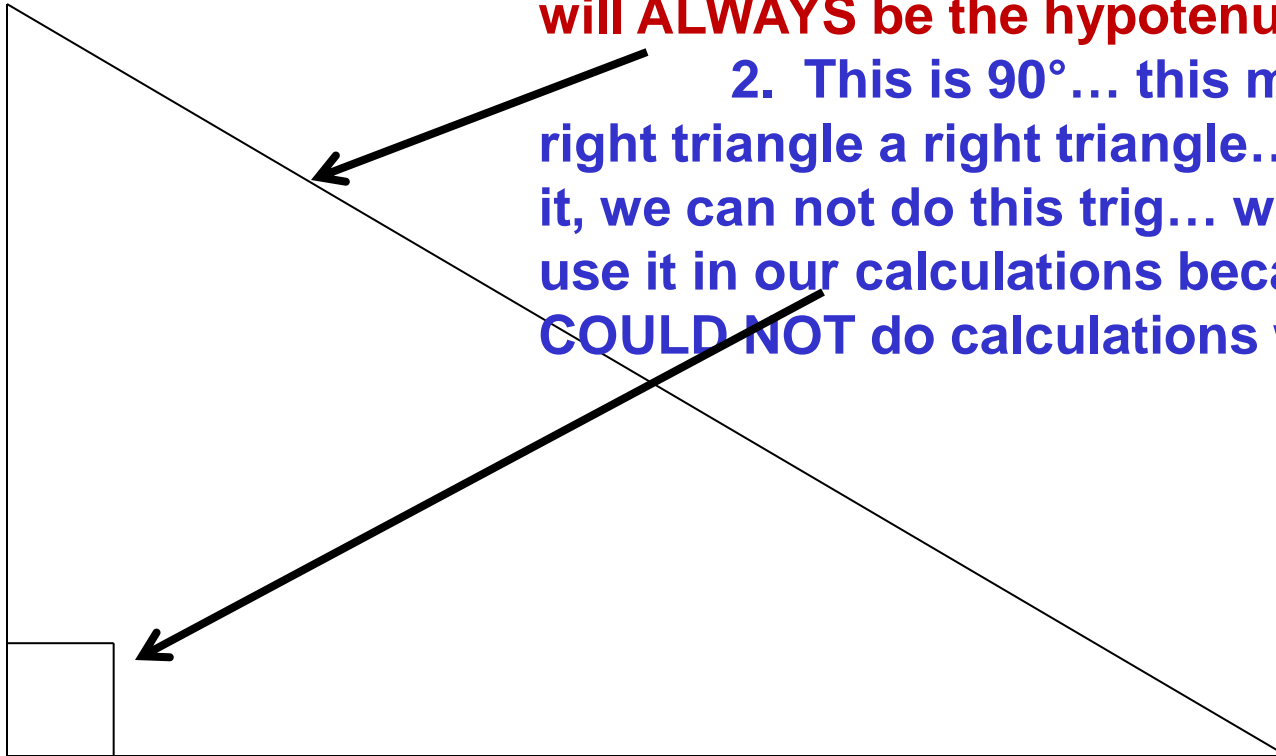


In trigonometry, the ratio we are talking about is the comparison of the sides of a **RIGHT TRIANGLE**.

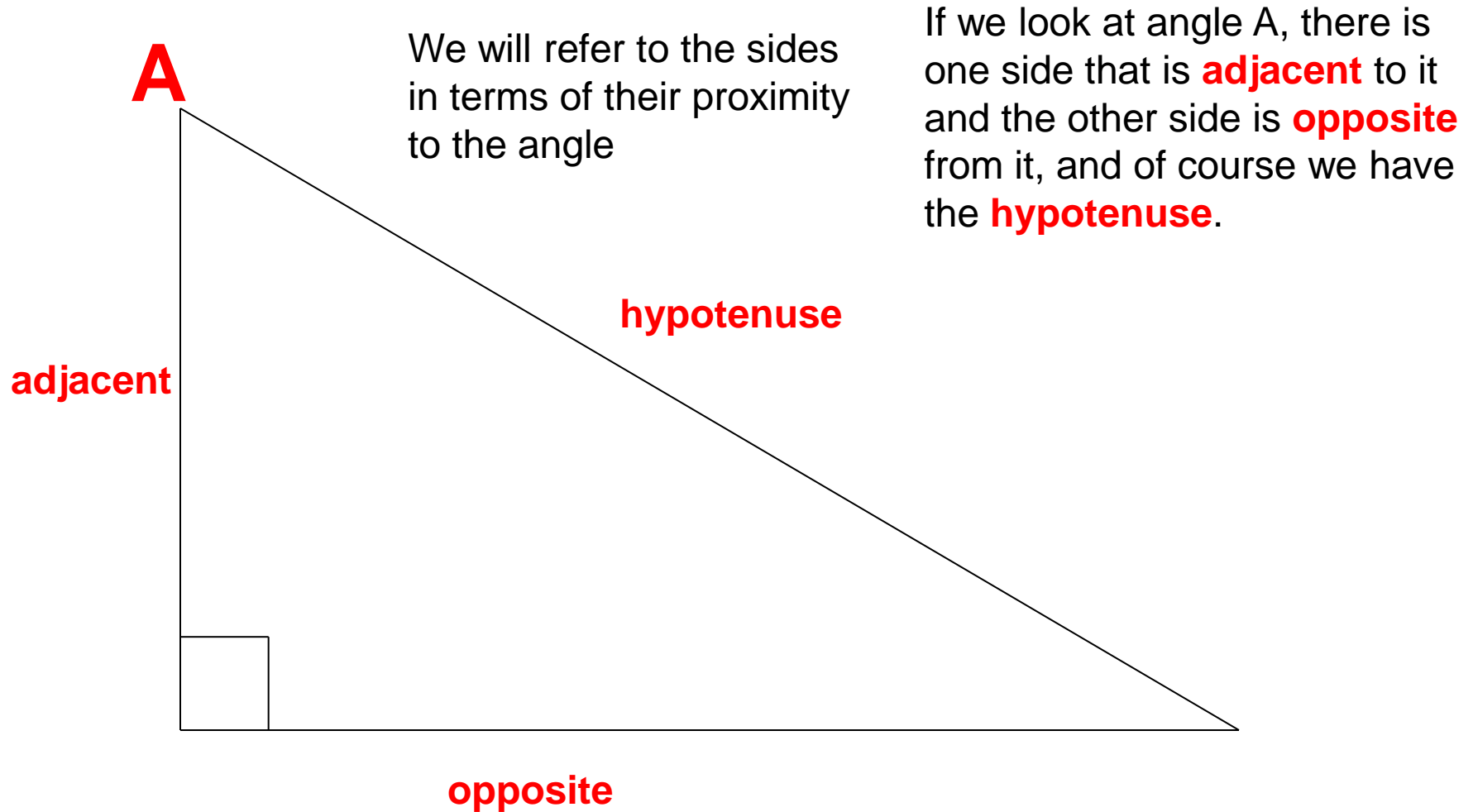
Two things MUST BE understood:

1. This is the hypotenuse.. This will ALWAYS be the hypotenuse

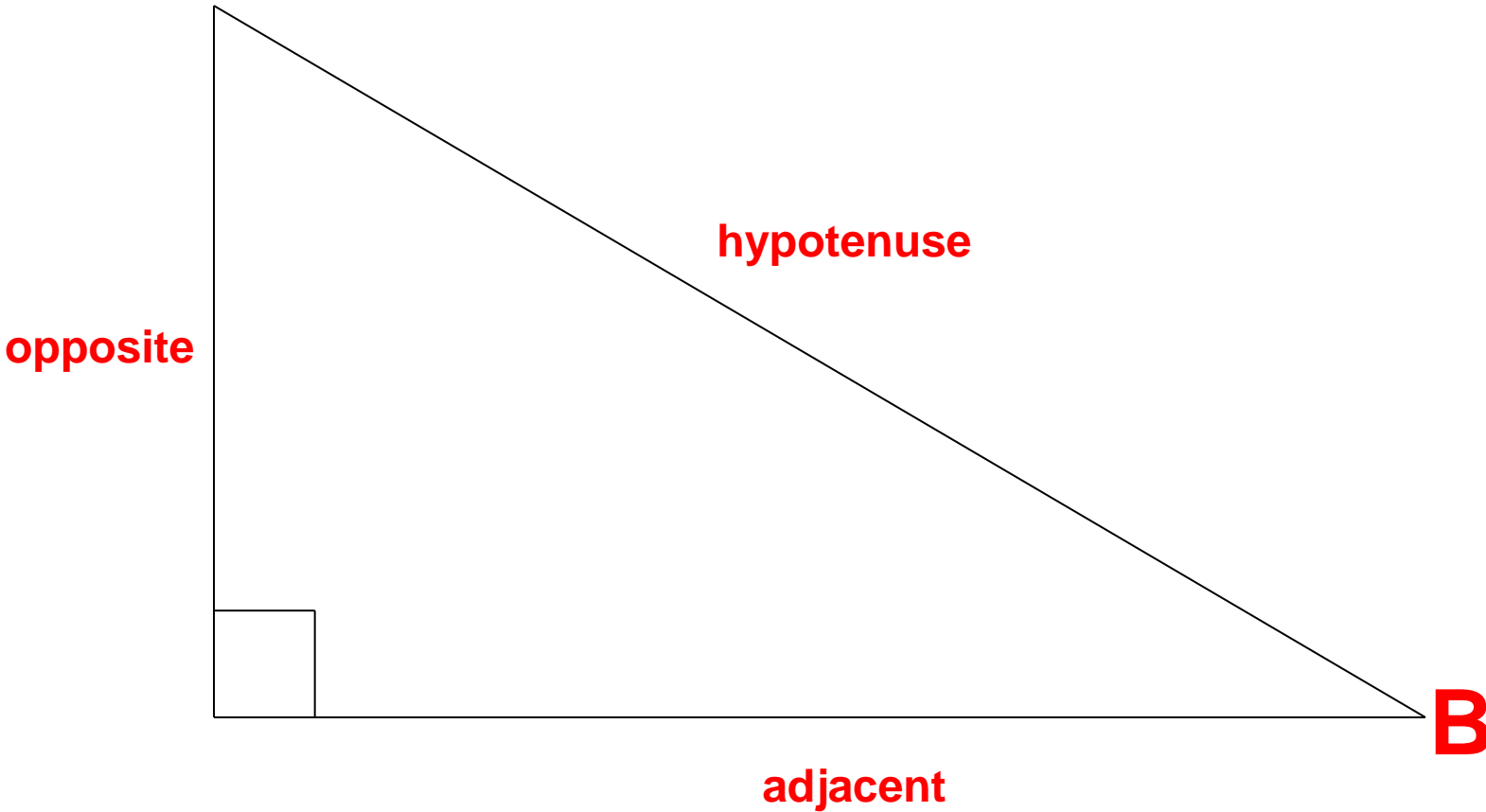
2. This is 90° ... this makes the right triangle a right triangle.... Without it, we can not do this trig... we WILL NOT use it in our calculations because we COULD NOT do calculations without it.



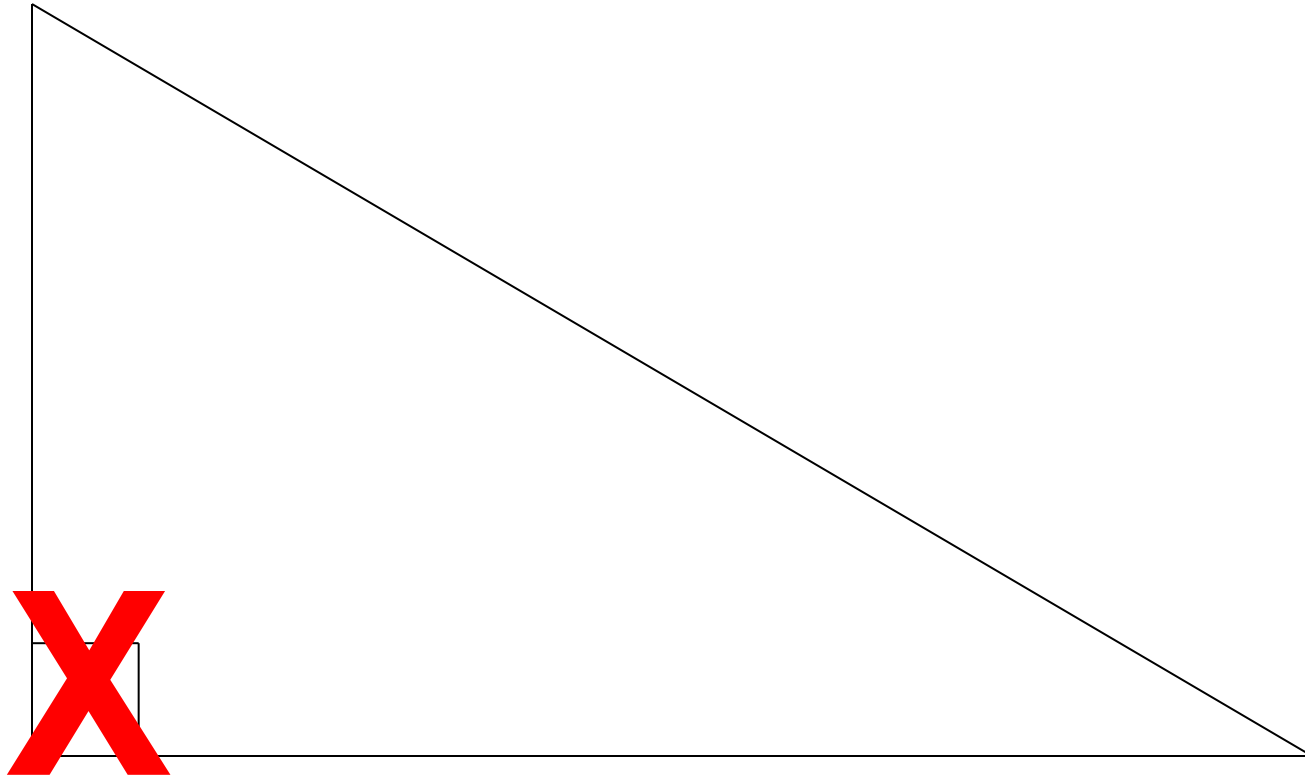
Now that we agree about the hypotenuse and right angle, there are only 4 things left; the 2 other angles and the 2 other sides.



If we look at angle B, there is one side that is **adjacent** to it and the other side is **opposite** from it, and of course we have the **hypotenuse**.



Remember we won't
use the right angle



One more thing...

θ this is the symbol for an unknown angle measure.

It's name is 'Theta'.

Don't let it scare you... it's like 'x' except for angle measure... it's a way for us to keep our variables understandable and organized.

The equation configuration

Example:

$$\sin \theta = \frac{a}{b}$$

The length of a side of the right triangle

b

The length of a side of the right triangle

The measure of the angle in degrees

Here we
go!!!!



Trigonometric Ratios

Name "say"	Sine	Cosine	tangent
Abbreviation Abbrev.	Sin	Cos	Tan
Ratio of an angle measure	$\sin\theta = \frac{\text{opposite side}}{\text{hypotenuse}}$	$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$	$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$

One more
time...
Here are the
ratios:

$$\text{S} \sin \theta = \frac{\text{O} \text{ (opposite side)}}{\text{H} \text{ (hypotenuse)}}$$

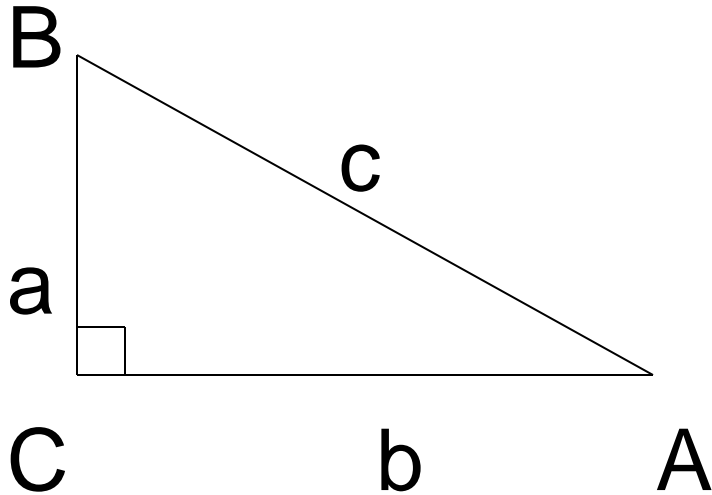
$$\text{C} \cos \theta = \frac{\text{A} \text{ (adjacent side)}}{\text{H} \text{ (hypotenuse)}}$$

$$\text{T} \tan \theta = \frac{\text{O} \text{ (opposite side)}}{\text{A} \text{ (adjacent side)}}$$

SOH CAH TOA



Let's practice...



Let's switch angles:
Find the sin, cos and
tan for Angle B:

$$\text{Sin B} = \frac{b}{c}$$

$$\text{Cos B} = \frac{a}{c}$$

$$\text{Tan B} = \frac{b}{a}$$

Write the ratio for sin A

$$\text{Sin A} = \frac{a}{c}$$

Write the ratio for cos A

$$\text{Cos A} = \frac{b}{c}$$

Write the ratio for tan A

$$\text{Tan A} = \frac{a}{b}$$

Make sure you have a calculator...

Given	Ratio of sides	Angle, side
Looking for	Angle measure	Missing side
Use	SIN ⁻¹ COS ⁻¹ TAN ⁻¹	SIN, COS, TAN

Set your calculator to 'Degree'.....

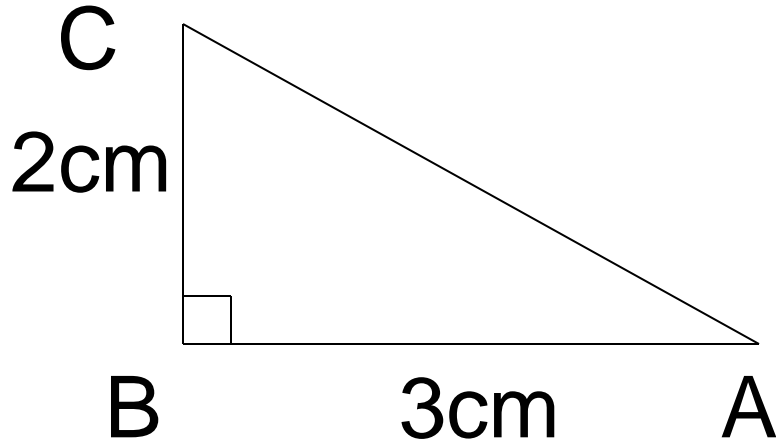
MODE (next to 2nd button)

Degree (third line down... highlight it)

2nd

Quit

Let's practice...



Find an angle that has a tangent (ratio) of $\frac{2}{3}$

3

Round your answer to the nearest degree.

Process:

I want to find an ANGLE

I was given the sides (ratio)

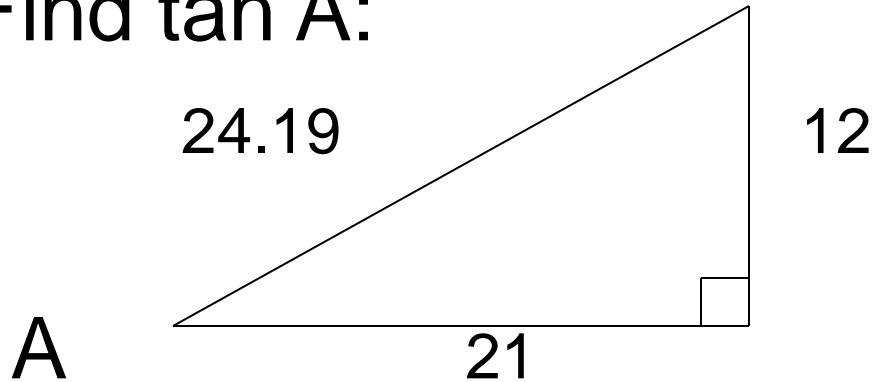
Tangent is $\frac{\text{opp}}{\text{adj}}$

adj

$$\text{TAN}^{-1}\left(\frac{2}{3}\right) = 34^\circ$$

Practice some more...

Find tan A:

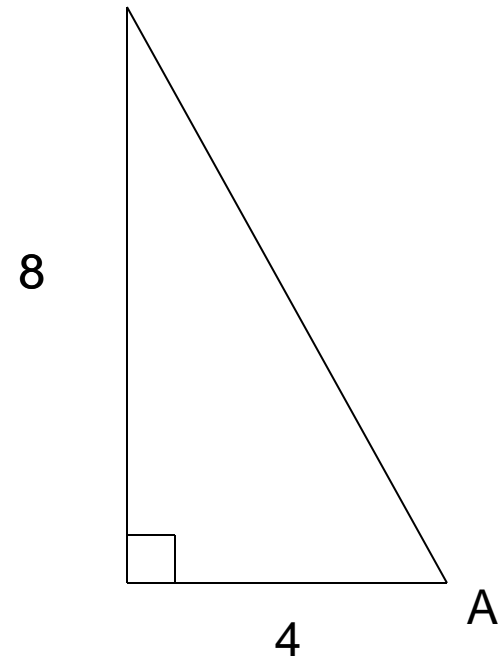


$$\text{Tan } A = \text{opp/adj} = 12/21$$

$$\text{Tan } A = .5714$$

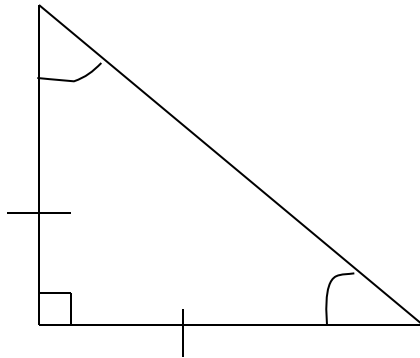
Find tan A:

$$\text{Tan } A = 8/4 = 2$$



Trigonometric Ratios

- When do we use them?
 - On right triangles that are **NOT** 45-45-90 or 30-60-90



Find: $\tan 45$

1

Why?

$$\tan = \frac{\text{opp}}{\text{hyp}}$$

$$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$$

Whiteboards



Your assignment



8.3 Practice
Exit pass