

## Welcome Back MYP Math 9!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
<b>Monday</b> Date: <u>11/13</u> Topic: <u>20E Problem Solving</u>	0   1   2	
<b>Tuesday</b> Date: <u>11/14</u> Topic: <u>Quiz 3.1 Review</u>	0   1   2	
<b>Wednesday</b> Date: <u>11/15</u> Topic: <u>Quiz 3.1 - No homework</u>	0   1   2	
<b>Thursday</b> Date: _____ Topic: _____	0   1   2	
<b>Friday</b> Date: _____ Topic: _____	0   1   2	

## Class Plan:

1. Warm-up - Opening Problem
2. Introduction to Trigonometry  
\*Investigate!
3. Joke Break
3. Practice!

Chapter

# 13

## Trigonometry

**Contents:**

- A** Labelling right angled triangles
- B** The trigonometric ratios
- C** Finding side lengths
- D** Finding angles
- E** Problem solving with trigonometry
- F** Bearings
- G** 3-dimensional problem solving



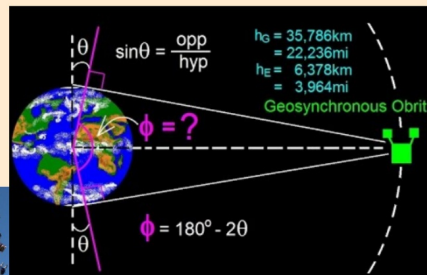
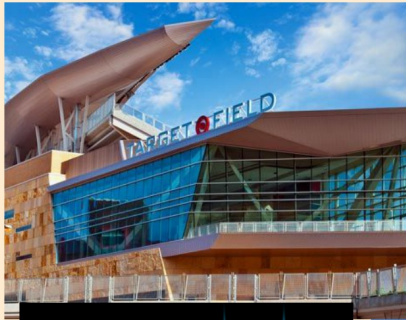
Relationship of sides & angles

## Questions we will explore in Unit 3:

How can you measure without direct measuring tools?

How are angles measured?

Where is trigonometry applied?



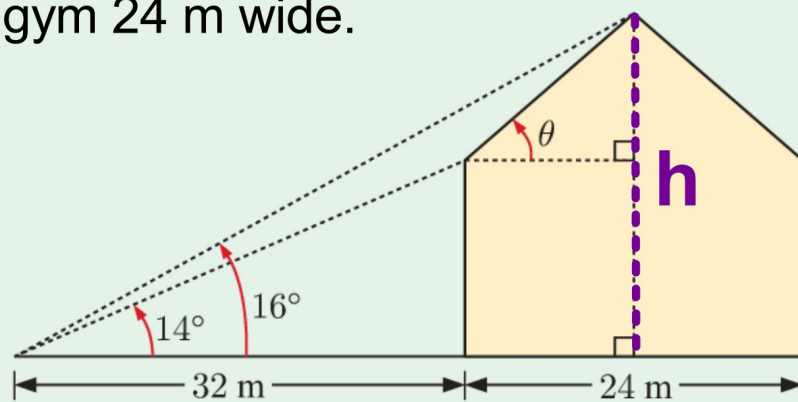
# What is trigonometry?

**T**rigonometry is the study of the relationships between the sides and the angles of triangles. In this lesson you will discover some of these relationships for right triangles.



## Warm-up - Opening Problem, Page 252

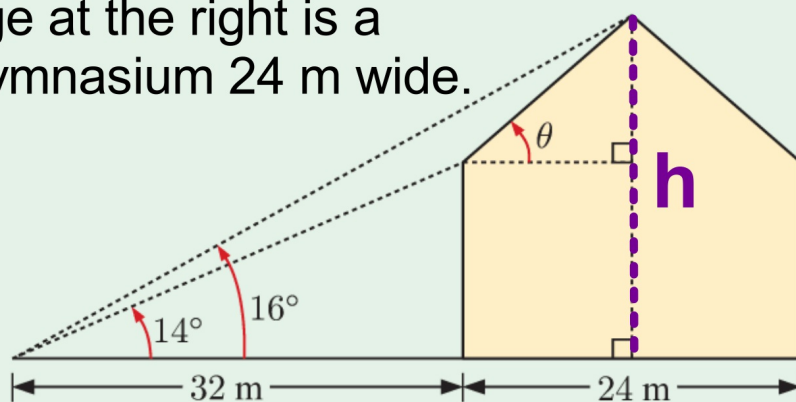
A school gym 24 m wide.



What do you notice? Wonder?

## Warm-up - Opening Problem, Page 252

The image at the right is a school gymnasium 24 m wide.



- 1) What questions can be answered from the diagram?
- 2) What additional information is needed to find the **height** of the gym?





## Investigate!

### 1) Answer questions 1 - 4 using $\triangle ABC$



1) Find angle  $\theta$ . Which other **letter** could this angle be called? \_\_\_\_

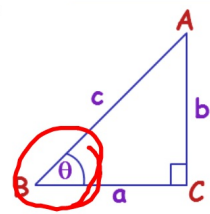
2) Name the **hypotenuse** in right  $\triangle ABC$ . \_\_\_\_\_

3) Name the side **across from**  $\angle \theta$ . \_\_\_\_\_

This side is called the side \_\_\_\_\_ angle  $\angle \theta$ .

4) Name the side **next to**  $\angle \theta$ ? \_\_\_\_\_

This side is called the side \_\_\_\_\_ to angle  $\angle \theta$ .



2) **Done:** Find a different angle in  $\triangle ABC$  and find the hypotenuse, side across from the angle, and side next to the angle.

3) **Whole group:** Define!

### 3) Whole group: Define!

1) Find angle  $\theta$ . Which other *letter* could this angle be called? \_\_\_\_\_

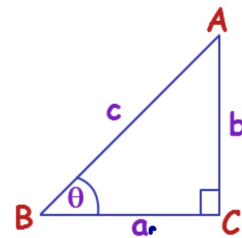
2) Name the **hypotenuse** in right  $\triangle ABC$ . c or  $\overline{BA}$ ,  $\overline{AB}$

3) Name the side **across from**  $\angle\theta$ . b or  $\overline{CA}$ ,  $\overline{AC}$

This side is called the side opposite angle  $\angle\theta$ .

4) Name the side **next to**  $\angle\theta$ ? a or  $\overline{BC}$  or  $\overline{CB}$

This side is called the side adjacent to angle  $\angle\theta$ .



### 3) Whole group: Define!

1) Find angle  $\theta$ . Which other **letter** could this angle be called? B

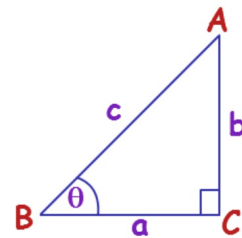
2) Name the **hypotenuse** in  $\triangle ABC$ .  $\overline{AB}$  or  $c$

3) Name the side **across from**  $\angle \theta$   $\overline{AC}$  or  $b$

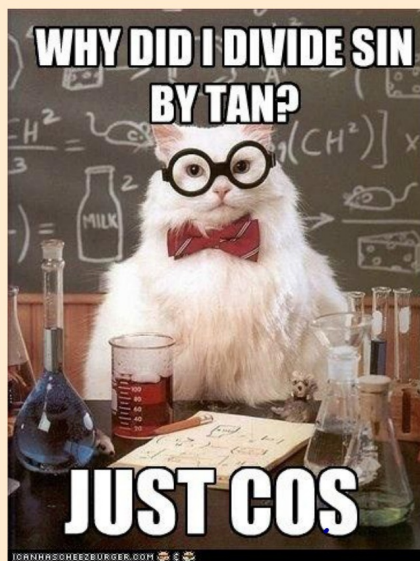
This side is called the side OPPOSITE angle  $\angle \theta$ .

4) Name the side is **next to**  $\angle \theta$   $\overline{BC}$  or  $a$

This side is called the side ADJACENT to angle  $\angle \theta$ .



## Joke break!



I'll do algebra, I'll  
do trig, and I'll  
even do statistics,  
but  
graphing is where I  
draw the line!

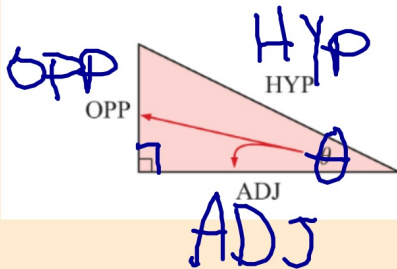


# A

## LABELLING RIGHT ANGLED TRIANGLES

### Draw diagram in your notebook

In trigonometry, there is a convention for labelling the sides of a right angled triangle.



For the right angled triangle with angle  $\theta$ :

- the **hypotenuse (HYP)** is the longest side
- the **opposite (OPP)** side is opposite  $\theta$
- the **adjacent (ADJ)** side is adjacent to  $\theta$ .

The hypotenuse is opposite the right angle.

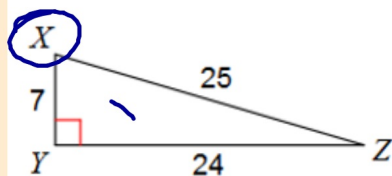
**Remember:**



## A Practice! LABELLING RIGHT ANGLED TRIANGLES

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.

1)



Hypotenuse name XZ length = 25

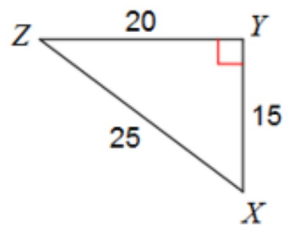
Opposite  $\angle X$  name YZ length = 24

Adjacent to  $\angle X$  name XY length = 7

## A Practice! LABELLING RIGHT ANGLED TRIANGLES

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.

2)



**Hypotenuse** name \_\_\_\_\_ length = \_\_\_\_\_

**Opposite**  $\angle Z$  name \_\_\_\_\_ length = \_\_\_\_\_

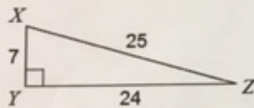
**Adjacent** to  $\angle Z$  name \_\_\_\_\_ length = \_\_\_\_\_

## A Practice! LABELLING RIGHT ANGLED TRIANGLES

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.

1)

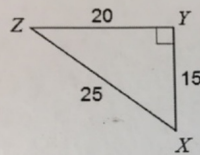


Hypotenuse name  $\overline{XZ}$  length = 25

Opposite  $\angle X$  name  $\overline{YZ}$  length = 24

Adjacent to  $\angle X$  name  $\overline{XY}$  length = 7

2)



Hypotenuse name  $\overline{XZ}$  length = 25

Opposite  $\angle Z$  name  $\overline{XY}$  length = 15

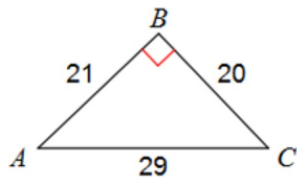
Adjacent to  $\angle Z$  name  $\overline{ZY}$  length = 20



## A Practice! LABELLING RIGHT ANGLED TRIANGLES

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.

3)



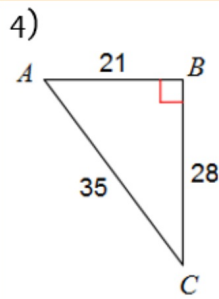
**Hypotenuse** name \_\_\_\_\_ length = \_\_\_\_\_

**Opposite**  $\angle A$  name \_\_\_\_\_ length = \_\_\_\_\_

**Adjacent** to  $\angle A$  name \_\_\_\_\_ length = \_\_\_\_\_

## A Practice! LABELLING RIGHT ANGLED TRIANGLES

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.



**Hypotenuse** name \_\_\_\_\_ length = \_\_\_\_\_

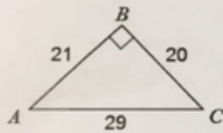
**Opposite**  $\angle C$  name \_\_\_\_\_ length = \_\_\_\_\_

**Adjacent** to  $\angle C$  name \_\_\_\_\_ length = \_\_\_\_\_

## A Practice! LABELLING RIGHT ANGLED TRIANGLES

Practice! For the triangles below, name the: **Hypotenuse** and give its length, side **opposite** the indicated angle and give its length, and finally side **adjacent** to the indicated angle and give its length.

3)

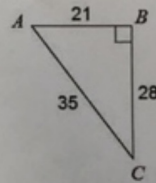


Hypotenuse name  $\overline{AC}$  length = 29

Opposite  $\angle A$  name  $\overline{BC}$  length = 20

Adjacent to  $\angle A$  name  $\overline{AB}$  length = 21

4)



Hypotenuse name  $\overline{AC}$  length = 35

Opposite  $\angle C$  name  $\overline{AB}$  length = 21

Adjacent to  $\angle C$  name  $\overline{BC}$  length = 28

# A

## LABELLING RIGHT ANGLED TRIANGLES

Practice!

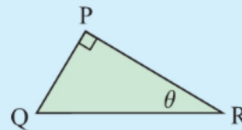
Draw triangle PQR in notebook.

### Example 1

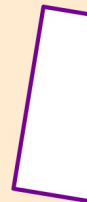
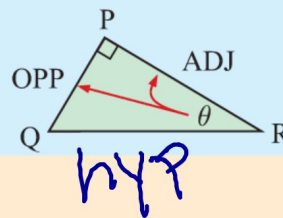
Self Tutor

For the triangle alongside, name the:

- a hypotenuse
- b side opposite  $\theta$
- c side adjacent to  $\theta$ .



- a The hypotenuse is [QR].
- b The side opposite  $\theta$  is [PQ].
- c The side adjacent to  $\theta$  is [PR].



## Exercises 13A page 253 # 1 & #2

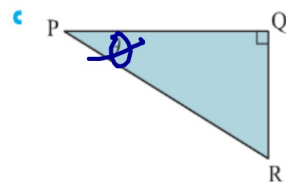
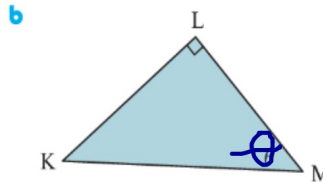
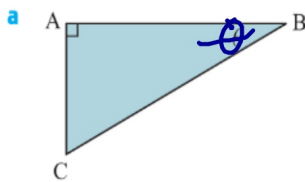
Draw into your notebook.

1 For the triangles given, name the:

i hypotenuse

ii side opposite angle  $\theta$

iii side adjacent to  $\theta$ .



In relation to  $\theta$ :

HYP: ' .

HYP:

HYP:

OPP:

OPP:

OPP:

ADJ:

ADJ:

ADJ:

After-school help: Garages!

2 For the triangles given, name the:

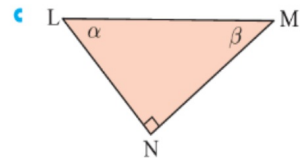
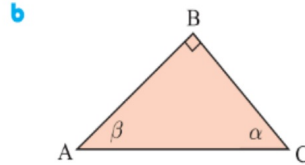
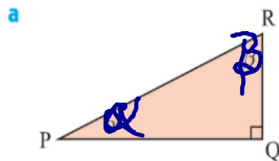
i hypotenuse

iv side opposite  $\beta$

ii side opposite  $\alpha$

v side adjacent to  $\beta$ .

iii side adjacent to  $\alpha$



*In relation to  $\alpha$ :*

HYP:

OPP:

ADJ:

HYP:

OPP:

ADJ:

HYP:

OPP:

ADJ:

*In relation to  $\beta$ :*

HYP:

OPP:

ADJ:

HYP:

OPP:

ADJ:

HYP:

OPP:

ADJ:

# Solutions

## EXERCISE 13A

- |          |          |               |                |                 |                |               |
|----------|----------|---------------|----------------|-----------------|----------------|---------------|
| <b>1</b> | <b>a</b> | <b>i</b> [BC] | <b>ii</b> [AC] | <b>iii</b> [AB] |                |               |
|          | <b>b</b> | <b>i</b> [KM] | <b>ii</b> [KL] | <b>iii</b> [LM] |                |               |
|          | <b>c</b> | <b>i</b> [PR] | <b>ii</b> [QR] | <b>iii</b> [PQ] |                |               |
| <b>2</b> | <b>a</b> | <b>i</b> [PR] | <b>ii</b> [QR] | <b>iii</b> [PQ] | <b>iv</b> [PQ] | <b>v</b> [QR] |
|          | <b>b</b> | <b>i</b> [AC] | <b>ii</b> [AB] | <b>iii</b> [BC] | <b>iv</b> [BC] | <b>v</b> [AB] |
|          | <b>c</b> | <b>i</b> [LM] | <b>ii</b> [MN] | <b>iii</b> [LN] | <b>iv</b> [LN] | <b>v</b> [MN] |