Mr. Fitch's Math Classes Extended Spring Break Packet 3 (May 6-22, 2020)

ALL CLASSES: Continue to complete your journals, same requirements as the first two packets. Feel free to utilize this journal for other class requirements but make sure you meet the specific requirements for your "math" journal. The requirements for the "math" journal are as follows:

- Five (5) dated entries per week minimum, 10 entries minimum for the two weeks.
- Neatly organized with proper spelling, grammar, and punctuation, bullet points are fine.
- Include any math you used/saw in at least two (2) entries per week.

Each class has assignments listed below, use your time wisely (15-20 minutes per day) and spread these out over the next two weeks, don't wait until the last minute, all assignments will be due when we hopefully return or the next scheduled drop-off date. Answer all questions to the best of your abilities and use your resources to research and investigate. Complete the assignments in the order listed in order to best understand the material. Feel free to email me any questions you may have and I will get back to you as soon as possible (brandon.fitch@leonagroup.com or brandon.fitch@wildwoodisgreen.com).

Online Office Hours (ZOOM): Thursdays 3:00pm-3:50pm: You are not required to attend these.

ALGEBRA 1: (aox45os)

- Lessons 3 and 4: Advanced Factoring Strategies for Quadratic Expressions– Complete Notes and Problem Sets
- Lesson 5: The Zero Product Property – Complete Notes and Problem Set
- Solving Quadratic Equations by Factoring Worksheet – Use what you learned in the notes to complete the worksheet – SHOW ALL WORK

PRECALCULUS (tuhoisb)

- Chapter 4 Test and Trigonometric Functions Test – SHOW ALL WORK

ALGEBRA 2: (e5qngje)

- Lesson 39: Factoring Extended to the Complex Realm – Complete Notes and Problem Set
- Lesson 40: Obstacles Resolved – A surprising Result – Complete Notes and Problem Set
- Complex Numbers and Quadratics Worksheet – Use what you learned in the notes to complete the worksheet – SHOW ALL WORK

GEOMETRY: (m562cco)

- Lessons 25: Incredibly Useful Ratios - Complete Notes and Problem Set
- Trig Functions Powerpoint – Read the notes and answer the questions on the slides
- Lesson 26: Definition of Sine Cosine and Tangent – Complete the Notes and Problem Set
- Trigonometric Ratios Worksheet – Use what you learned in the notes to complete the worksheet.

These assignments will take us through the remainder of the school year. Thank you all for a fun first year at WEA. Seniors, best of luck in all you do and don't hesitate to reach out in the future. Underclassmen, I look forward to seeing you all in the fall when we can hopefully return to a normal school year. Everyone, get this packet done and start enjoying your summer!

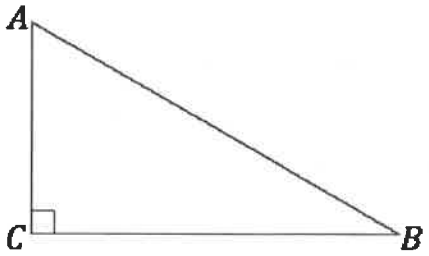
Mr Fitch

Lesson 25: Incredibly Useful Ratios

Classwork

Exercises 1–3

Use the right triangle $\triangle ABC$ to answer Exercises 1–3.



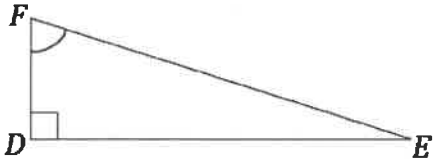
1. Name the side of the triangle opposite $\angle A$.

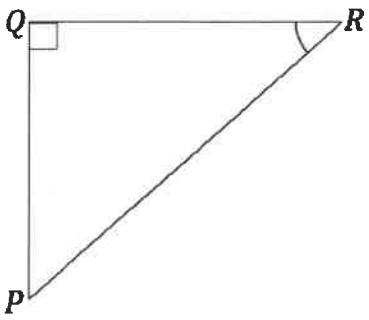
2. Name the side of the triangle opposite $\angle B$.

3. Name the side of the triangle opposite $\angle C$.

Exercises 4–6

For each exercise, label the appropriate sides as *adjacent, opposite,* and *hypotenuse,* with respect to the marked acute angle.

4. 

5. 

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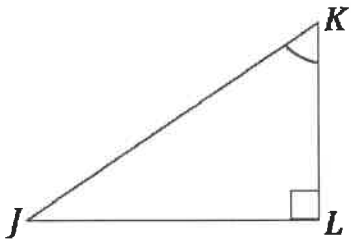


Exploratory Challenge

Note: Angle measures are approximations.

For each triangle in your set, determine missing angle measurements and side lengths. Side lengths should be measured to one decimal place. Make sure that each of the $\frac{\text{adj}}{\text{hyp}}$ and $\frac{\text{opp}}{\text{hyp}}$ ratios are set up and missing values are calculated and rounded appropriately.

Group 1					
	Triangle	**Angle Measures**	**Length Measures**	$\frac{\text{opp}}{\text{hyp}}$	$\frac{\text{adj}}{\text{hyp}}$
1.	$\triangle ABC$			$\frac{12}{13} \approx 0.92$	$\frac{5}{13} \approx 0.38$
2.	$\triangle DEF$	$m\angle D \approx 53^\circ$	$DE = 3$ cm $EF = 4$ cm $DF = 5$ cm		
3.	$\triangle GHI$	$m\angle I \approx 41^\circ$	$GH = 5.3$ cm	$\frac{5.3}{\quad} \approx 0.66$	$= 0.75$
4.	$\triangle JKL$		$KL = 6.93$ cm $JL = 8$ cm	$\frac{\quad}{8} =$	$\frac{\quad}{8} \approx 0.87$
5.	$\triangle MNO$			$\frac{4}{8.5} \approx 0.47$	$\frac{7.5}{8.5} \approx 0.88$

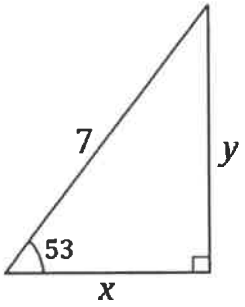
Group 2					
	Triangle	**Angle Measures**	**Length Measures**	$\frac{\text{opp}}{\text{hyp}}$	$\frac{\text{adj}}{\text{hyp}}$
1.	$\triangle A'B'C'$			$\frac{6}{6.5} \approx 0.92$	$\frac{2.5}{6.5} \approx 0.38$
2.	$\triangle D'E'F'$	$m\angle D' \approx 53°$	$D'E' = 6$ cm $E'F' = 8$ cm $D'F' = 10$ cm		
3.	$\triangle G'H'I'$	$m\angle I' \approx 41°$	$G'H' = 7.9$ cm	$\frac{7.9}{\quad} \approx 0.66$	$= 0.75$
4.	$\triangle J'K'L'$		$K'L' = 10.4$ cm $J'L' = 12$ cm	$\frac{\quad}{12} =$	$\frac{\quad}{12} \approx 0.87$
5.	$\triangle M'N'O'$			$\frac{8}{17} \approx 0.47$	$\frac{15}{17} \approx 0.88$

With a partner, discuss what you can conclude about each pair of triangles between the two sets.

Exercises 7–10

For each question, round the unknown lengths appropriately. Refer back to your completed chart from the Exploratory Challenge; each indicated acute angle is the same approximated acute angle measure as in the chart. Set up and label the appropriate length ratios, using the terms opp, adj, and hyp in the setup of each ratio.

7.



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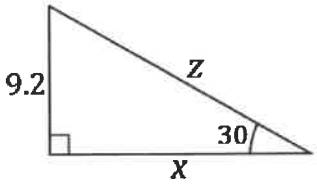

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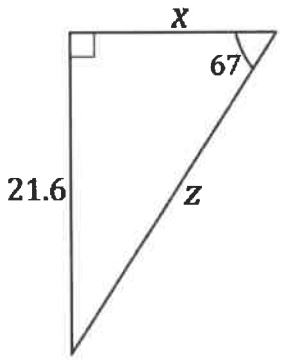
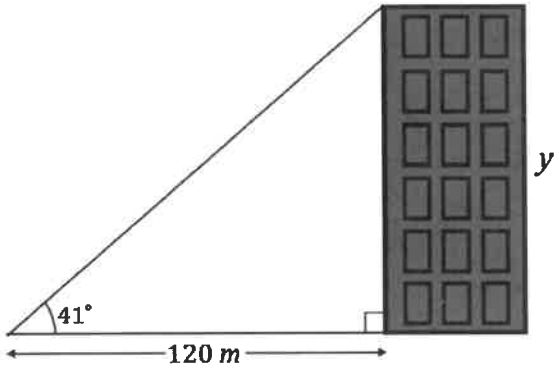


10. From a point 120 m away from a building, Serena measures the angle between the ground and the top of a building and finds it measures 41°.

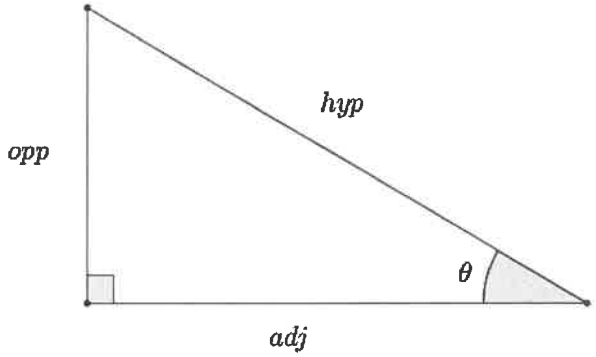
What is the height of the building? Round to the nearest meter.



Problem Set

The table below contains the values of the ratios $\frac{\text{opp}}{\text{hyp}}$ and $\frac{\text{adj}}{\text{hyp}}$ for a variety of right triangles based on a given acute angle, θ, from each triangle. Use the table and the diagram of the right triangle below to complete each problem.

θ (degrees)	0	10	20	30	40	45	50	60	70	80	90
$\frac{\text{opp}}{\text{hyp}}$	0	0.1736	0.3420	$\frac{1}{2} = 0.5$	0.6428	0.7071	0.7660	0.8660	0.9397	0.9848	1
$\frac{\text{adj}}{\text{hyp}}$	1	0.9848	0.9397	0.8660	0.7660	0.7071	0.6428	$\frac{1}{2} = 0.5$	0.3420	0.1736	0

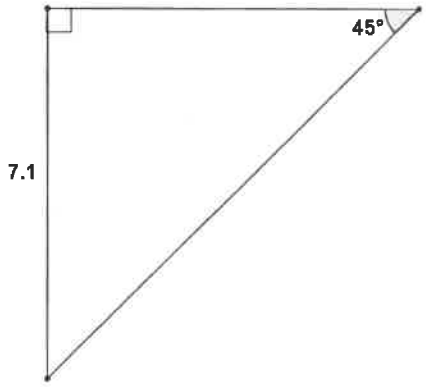


NOT DRAWN TO SCALE

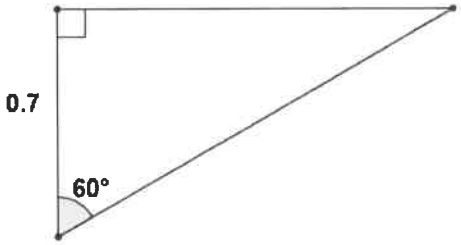
For each problem, approximate the unknown lengths to one decimal place. Write the appropriate length ratios using the terms opp, adj, and hyp in the setup of each ratio.

1. Find the approximate length of the leg opposite the 80° angle.

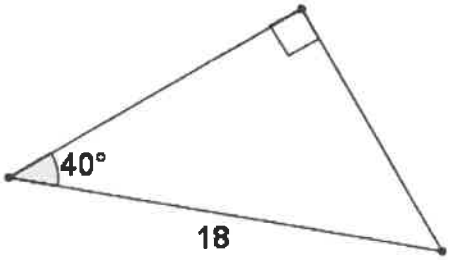
2. Find the approximate length of the hypotenuse.



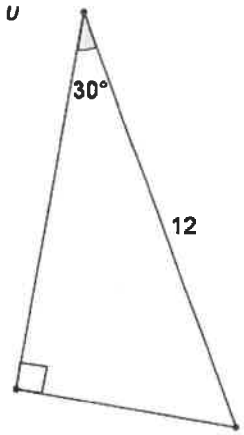
3. Find the approximate length of the hypotenuse.



4. Find the approximate length of the leg adjacent to the 40° angle.

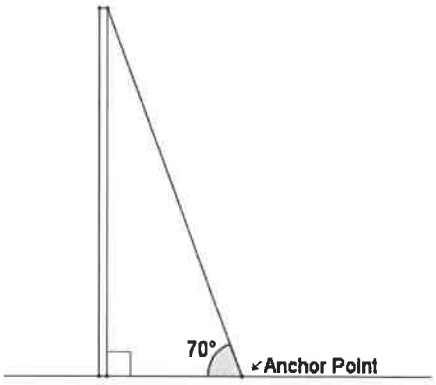


5. Find the length of both legs of the right triangle below. Indicate which leg is adjacent and which is opposite the given angle of 30°.



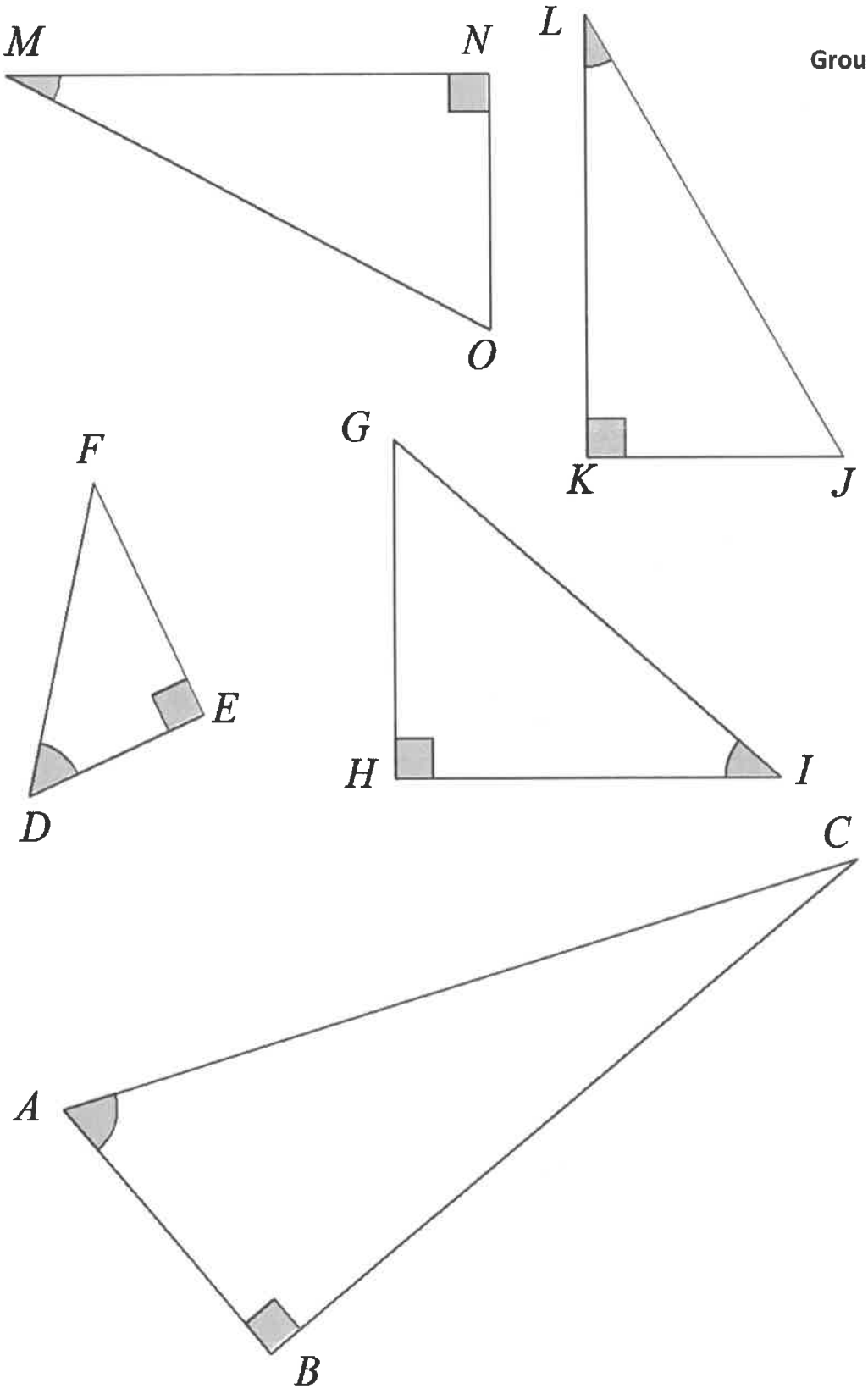
6. Three city streets form a right triangle. Main Street and State Street are perpendicular. Laura Street and State Street intersect at a 50° angle. The distance along Laura Street to Main Street is 0.8 mile. If Laura Street is closed between Main Street and State Street for a festival, approximately how far (to the nearest tenth) will someone have to travel to get around the festival if they take only Main Street and State Street?

7. A cable anchors a utility pole to the ground as shown in the picture. The cable forms an angle of 70° with the ground. The distance from the base of the utility pole to the anchor point on the ground is 3.8 meters. Approximately how long is the support cable?

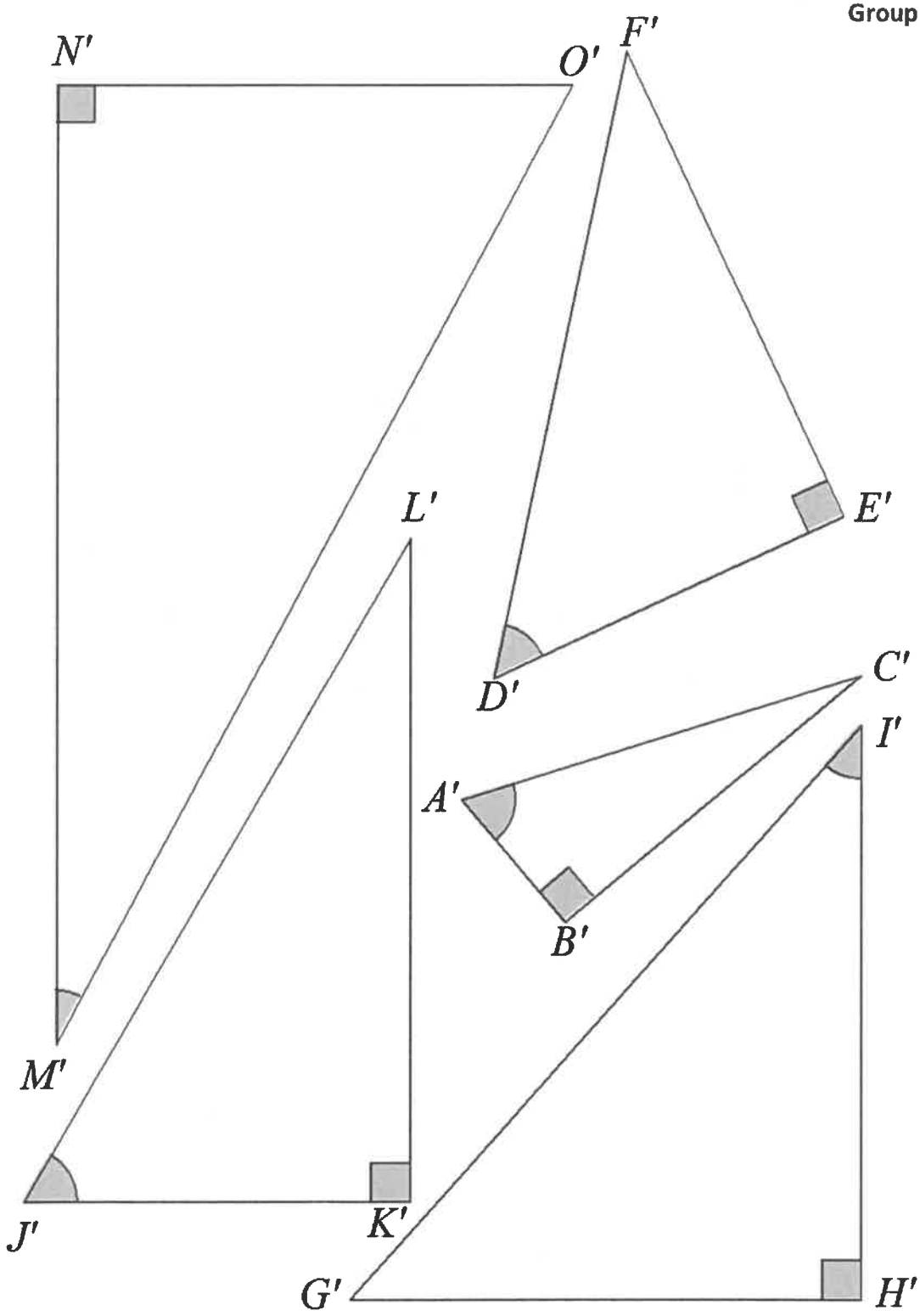


8. Indy says that the ratio of $\frac{\text{opp}}{\text{adj}}$ for an angle of 0° has a value of 0 because the opposite side of the triangle has a length of 0. What does she mean?

Group 1

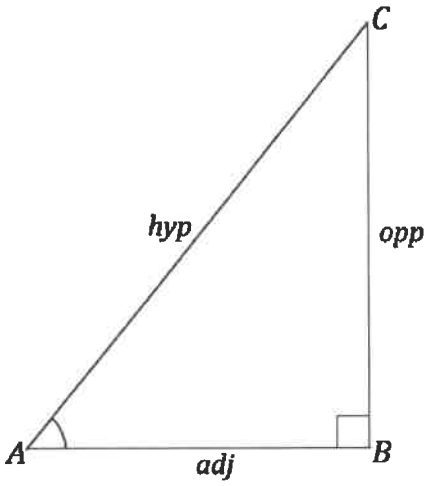


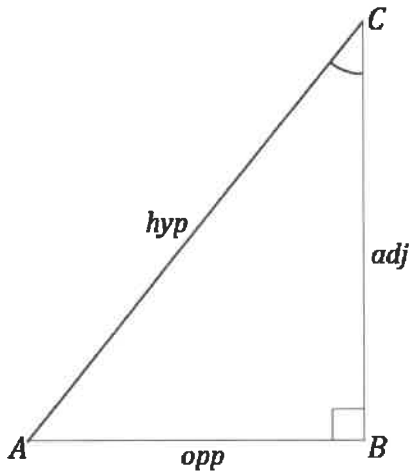
Group 2



Identifying Sides of a Right Triangle with Respect to a Given Acute Angle

Poster

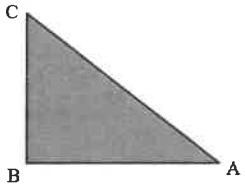




• With respect to $\angle A$, the opposite side, opp, is side $\overline{BC}$. • With respect to $\angle A$, the adjacent side, adj, is side $\overline{AB}$. • The hypotenuse, hyp, is side $\overline{AC}$ and is always opposite from the 90° angle.	• With respect to $\angle C$, the opposite side, opp, is side $\overline{AB}$. • With respect to $\angle C$, the adjacent side, adj, is side $\overline{BC}$. • The hypotenuse, hyp, is side $\overline{AC}$ and is always opposite from the 90° angle.

Warm-Up

Use angle A as a reference angle. Draw the triangle and label the sides as hypotenuse, opposite, or adjacent.



Trig Ratio:

A ratio of the lengths of two sides in a right triangle.

The Trigonometric Functions we will be looking at

SINE

COSINE

TANGENT

The Trigonometric Functions

SINE

COSINE

TANGENT

SINE

Prounounced
"sign"

COSINE

Prounounced
"co-sign"

TANGENT

Prounounced "tan-gent"

Greek Letter θ

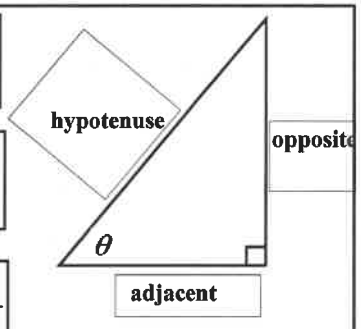
Prounounced "theta"

Represents an unknown angle

$$Sin\theta = \frac{Opp}{Hyp}$$

$$Cos\theta = \frac{Adj}{Hyp}$$

$$Tan\theta = \frac{Opp}{Adj}$$



OHCAHTOA

Sin
Opp
Hyp

Cos
Adj
Hyp

Tan
Opp
Adj

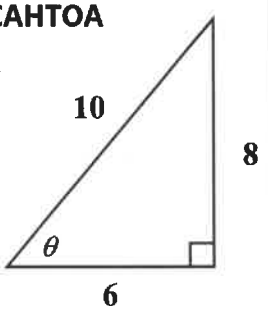
Finding sin, cos, and tan

SOHCAHTOA

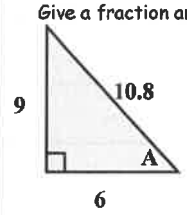
$Sin\theta = \frac{Opp}{Hyp}$ $\frac{8}{10} = \frac{4}{5}$

$Cos\theta = \frac{Adj}{Hyp}$ $\frac{6}{10} = \frac{3}{5}$

$Tan\theta = \frac{Opp}{Adj}$ $\frac{8}{6} = \frac{4}{3}$



Find the sine, the cosine, and the tangent of angle A.
Give a fraction and decimal answer (round to 4 places).

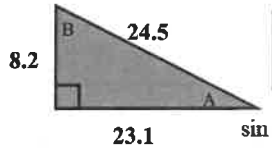


$$\sin A = \frac{opp}{hypo} = \frac{9}{10.8} \approx .8333$$

$$\cos A = \frac{adj}{hypo} = \frac{6}{10.8} \approx .5555$$

$$\tan A = \frac{opp}{adj} = \frac{9}{6} \approx 1.5$$

Find the sine, the cosine, and the tangent of angle A



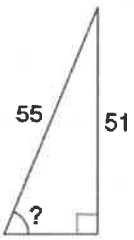
Give a fraction and decimal answer (round to 4 decimal places).

$$\sin A = \frac{opp}{hypo} = \frac{8.2}{24.5} \approx .3347$$

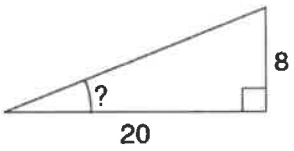
$$\cos A = \frac{adj}{hypo} = \frac{23.1}{24.5} \approx .9429$$

$$\tan A = \frac{opp}{adj} = \frac{8.2}{23.1} \approx .3550$$

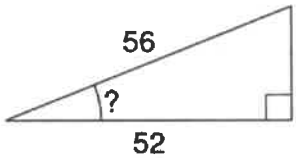
Using Trig to find Angles



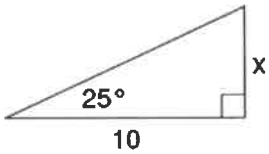
Using Trig to find Angles



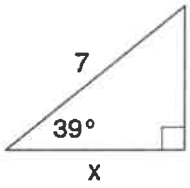
Using Trig to find Angles



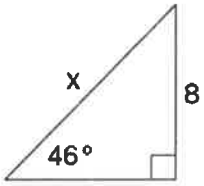
Using Trig to find a Side



Using Trig to find a Side



Using Trig to find a Side

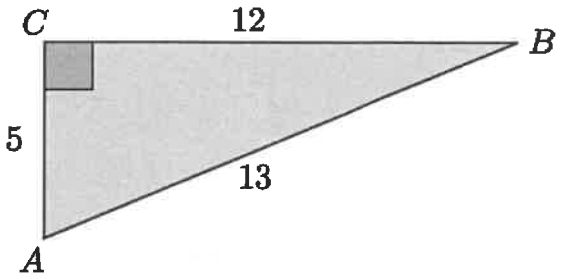


Lesson 26: Definition of Sine, Cosine, and Tangent

Classwork

Exercises 1–3

1. Identify the $\frac{\text{opp}}{\text{hyp}}$ ratios for $\angle A$ and $\angle B$.

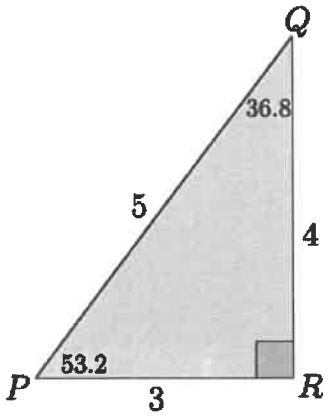


2. Identify the $\frac{\text{adj}}{\text{hyp}}$ ratios for $\angle A$ and $\angle B$.

3. Describe the relationship between the ratios for $\angle A$ and $\angle B$.

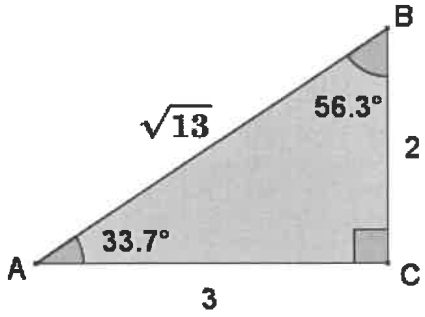
Exercises 4–9

4. In $\triangle PQR$, $m\angle P = 53.2°$ and $m\angle Q = 36.8°$. Complete the following table.



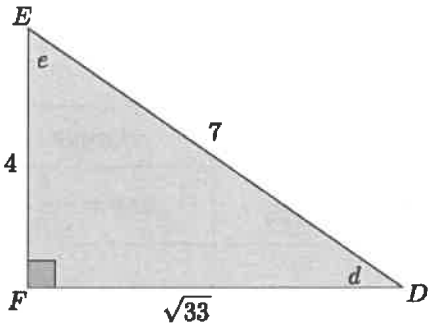
Measure of Angle	Sine $\left(\frac{\text{opp}}{\text{hyp}}\right)$	Cosine $\left(\frac{\text{adj}}{\text{hyp}}\right)$	Tangent $\left(\frac{\text{opp}}{\text{adj}}\right)$
53.2			
36.8			

5. In the triangle below, $m\angle A = 33.7°$ and $m\angle B = 56.3°$. Complete the following table.



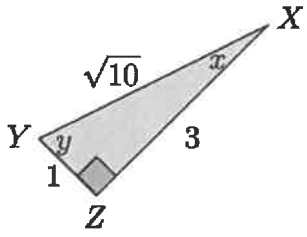
Measure of Angle	Sine	Cosine	Tangent
33.7			
56.3			

6. In the triangle below, let e be the measure of $\angle E$ and d be the measure of $\angle D$. Complete the following table.



Measure of Angle	Sine	Cosine	Tangent
d			
e			

7. In the triangle below, let x be the measure of $\angle X$ and y be the measure of $\angle Y$. Complete the following table.



Measure of Angle	Sine	Cosine	Tangent
x			
y			

8. Tamer did not finish completing the table below for a diagram similar to the previous problems that the teacher had on the board where p was the measure of $\angle P$ and q was the measure of $\angle Q$. Use any patterns you notice from Exercises 1–4 to complete the table for Tamer.

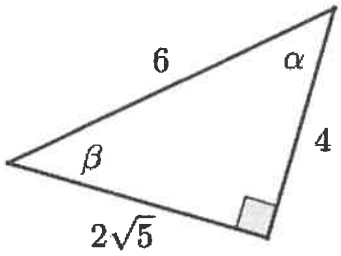
Measure of Angle	Sine	Cosine	Tangent
p	$\sin p = \frac{11}{\sqrt{157}}$	$\cos p = \frac{6}{\sqrt{157}}$	$\tan p = \frac{11}{6}$
q			

9. Explain how you were able to determine the sine, cosine, and tangent of $\angle Q$ in Exercise 8.

Problem Set

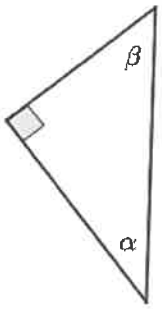
1. Given the triangle in the diagram, complete the following table.

Angle Measure	sin	cos	tan
α			
β			



2. Given the table of values below (not in simplest radical form), label the sides and angles in the right triangle.

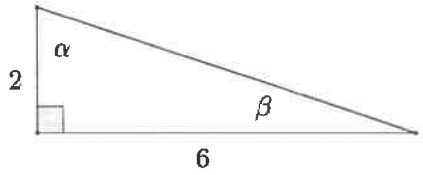
Angle Measure	sin	cos	tan
α	$\frac{4}{2\sqrt{10}}$	$\frac{2\sqrt{6}}{2\sqrt{10}}$	$\frac{4}{2\sqrt{6}}$
β	$\frac{2\sqrt{6}}{2\sqrt{10}}$	$\frac{4}{2\sqrt{10}}$	$\frac{2\sqrt{6}}{4}$



3. Given $\sin \alpha$ and $\sin \beta$, complete the missing values in the table. You may draw a diagram to help you.

Angle Measure	sin	cos	tan
α	$\frac{\sqrt{2}}{3\sqrt{3}}$	$\frac{5}{3\sqrt{3}}$	
β			

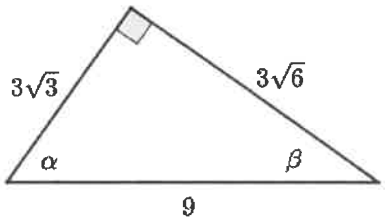
4. Given the triangle shown to the right, fill in the missing values in the table.



Angle Measure	sin	cos	tan
α			
β			

5. Jules thinks that if α and β are two different acute angle measures, then $\sin \alpha \neq \sin \beta$. Do you agree or disagree? Explain.

6. Given the triangle in the diagram, complete the following table.



Angle Measure	sin	cos	tan
α			
β			

Rewrite the values from the table in simplest terms.

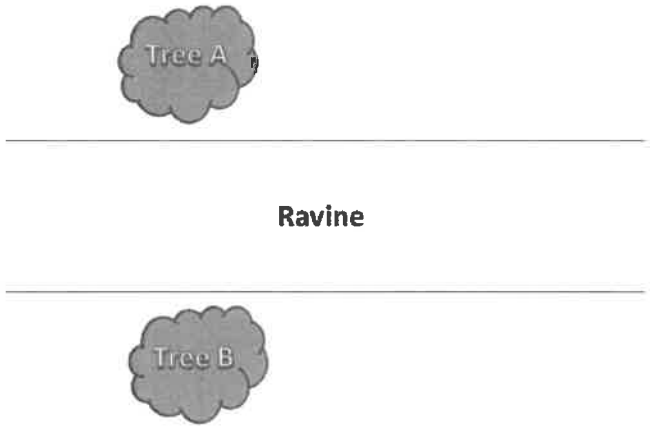
Angle Measure	sin	cos	tan
α			
β			

Draw and label the sides and angles of a right triangle using the values of the ratios sin and cos. How is the new triangle related to the original triangle?

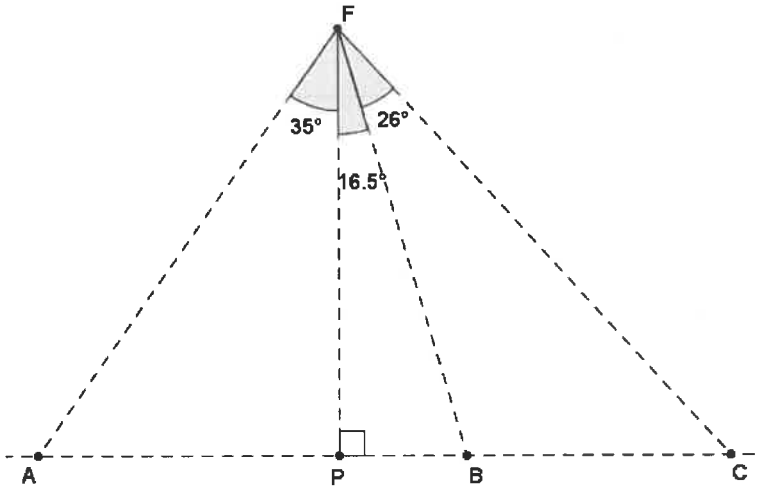
7. Given $\tan \alpha$ and $\cos \beta$, in simplest terms, find the missing side lengths of the right triangle if one leg of the triangle has a length of 4. Draw and label the sides and angles of the right triangle.

Angle Measure	sin θ	cos θ	tan θ
α			
β			

8. Eric wants to hang a rope bridge over a small ravine so that it is easier to cross. To hang the bridge, he needs to know how much rope is needed to span the distance between two trees that are directly across from each other on either side of the ravine. Help Eric devise a plan using sine, cosine, and tangent to determine the approximate distance from tree A to tree B without having to cross the ravine.



9. A fisherman is at point F on the open sea and has three favorite fishing locations. The locations are indicated by points A, B, and C. The fisherman plans to sail from F to A, then to B, then to C, and then back to F. If the fisherman is 14 miles from $\overline{AC}$, find the total distance that he will sail.



Kuta Software - Infinite Geometry

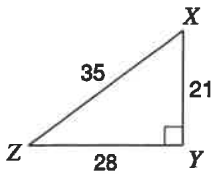
Name_____

Trigonometric Ratios

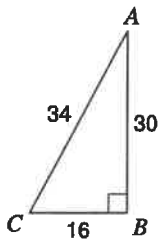
Date_____ Period____

Find the value of each trigonometric ratio.

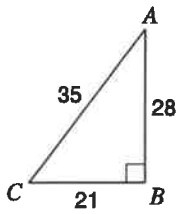
1) tan Z



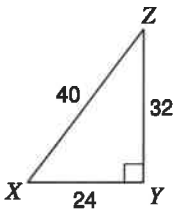
2) cos C



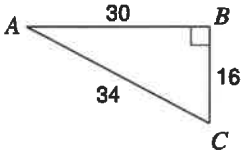
3) sin C



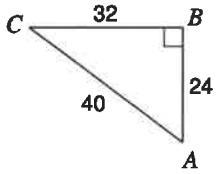
4) tan X



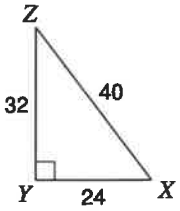
5) cos A



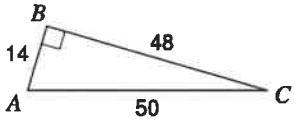
6) sin A



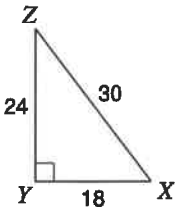
7) sin Z



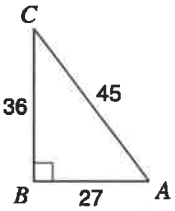
8) sin C



9) cos Z

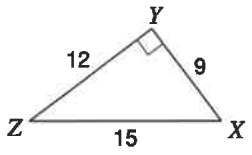


10) tan C

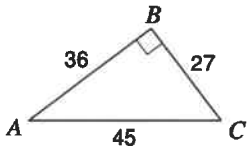


Find the value of each trigonometric ratio to the nearest ten-thousandth.

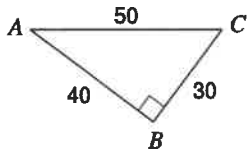
11) cos Z



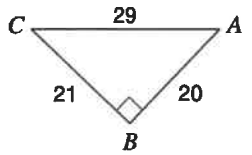
12) cos C



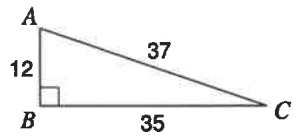
13) tan C



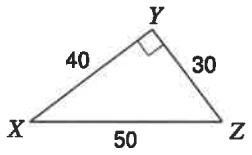
14) tan A



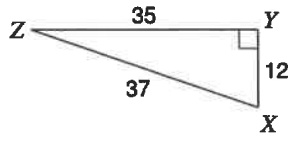
15) tan C



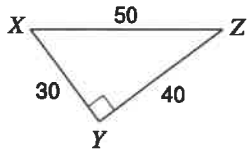
16) tan X



17) sin Z



18) sin Z



19) sin 48°

20) sin 38°

21) cos 61°

22) cos 51°

Critical thinking questions:

23) Can the sine of an angle ever equal 2? Why or why not?

24) $\sin x = \frac{1}{3}$

Find cos x.