Chapter 10 Notes – Right Triangles and Trigonometry Name ANSWER KEY
Basic Geometry

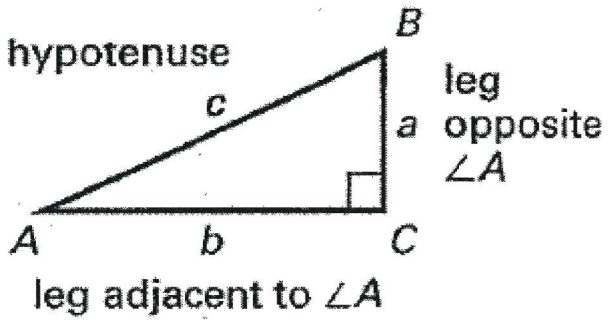
10.4 Tangent Ratio

Goal: Use the tangent ratio to find missing sides of right triangles.

Trigonometric ratio: a ratio of the lengths of two sides of a right triangle

Tangent Ratio

$\tan = \frac{\text{opposite}}{\text{adjacent}}$

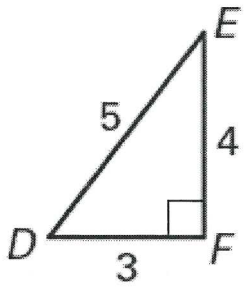


$\tan A = \frac{a}{b}$ $\tan B = \frac{b}{a}$

Find tan D and tan E as fractions ~~in simplified form~~.

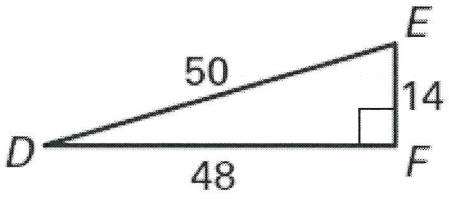
a) tan D = 4/3

tan E = 3/4



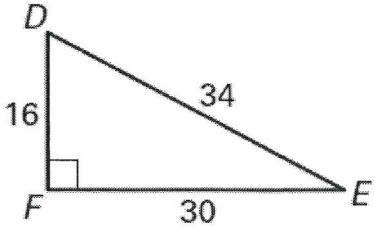
b) tan D = 14/48

tan E = 48/14



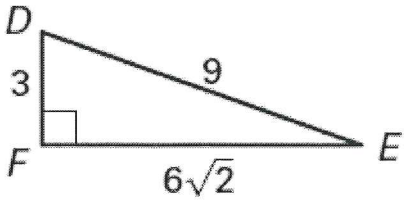
c) tan D = 30/16

tan E = 16/30



d) tan D = $\frac{6\sqrt{2}}{3}$

tan E = $\frac{3}{6\sqrt{2}}$



Use a calculator to approximate the value to two decimal places.

a) tan 34° 0.67

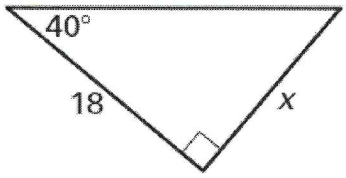
b) tan 71° 2.90

c) tan 45° 1

d) tan 20° 0.36

Use the tangent ratio to find the value of x. Round to the nearest tenth.

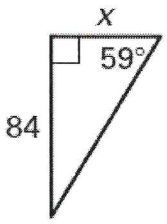
a) x = 15.1



$\tan(40) = \frac{x}{18}$

$x = 18 \cdot \tan(40)$

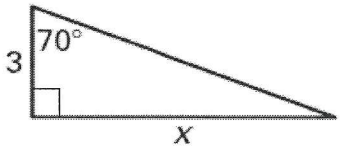
b) x = 50.5



$\tan(59) = \frac{84}{x}$

$x = \frac{84}{\tan(59)}$

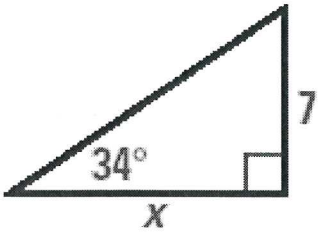
c) x = 8.2



$\tan(70) = \frac{x}{3}$

$x = 3 \cdot \tan(70)$

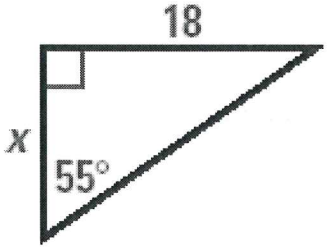
d) x = 10.4



$\tan(34) = \frac{7}{x}$

$x = \frac{7}{\tan(34)}$

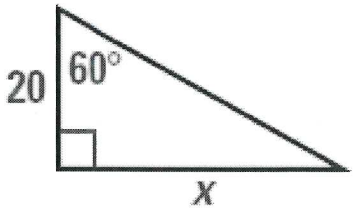
e) x = 12.6



$\tan(55) = \frac{18}{x}$

$x = \frac{18}{\tan(55)}$

f) x = 34.6



$\tan(60) = \frac{x}{20}$

$x = 20 \cdot \tan(60)$

10.5 Sine and Cosine Ratios

Goal: Use the sine and cosine ratios to find missing sides of right triangles.

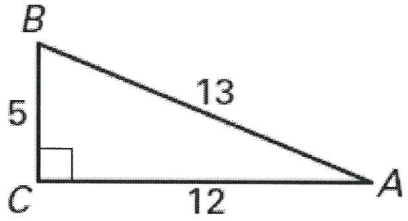
Sine Ratio	Cosine Ratio
$\sin = \frac{\text{opposite}}{\text{hypotenuse}}$	$\cos = \frac{\text{adjacent}}{\text{hypotenuse}}$

To remember the trigonometric ratios, just remember SOH-CAH-TOA

Find the indicated ratios. Write your answer as fractions.

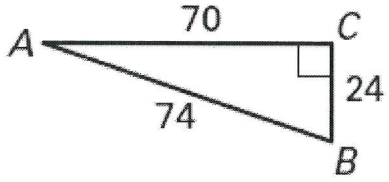
a) sin A = 5/13 sin B = 12/13

cos A = 12/13 cos B = 5/13



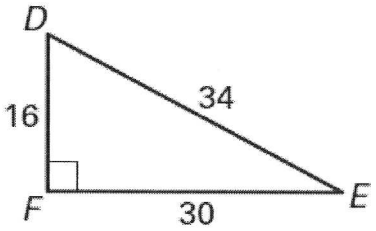
b) sin A = 24/74 sin B = 70/74

cos A = 70/74 cos B = 24/74



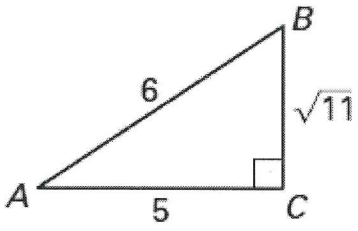
c) sin D = 30/34 sin E = 16/34

cos D = 16/34 cos E = 30/34



d) sin A = $\sqrt{11}/6$ sin B = 5/6

cos A = 5/6 cos B = $\sqrt{11}/6$



Use a calculator to approximate the value to two decimal places.

a) sin 33° 0.54

b) cos 33° 0.84

c) sin 8° 0.14

d) cos 67° 0.39

e) sin 85° 1.00

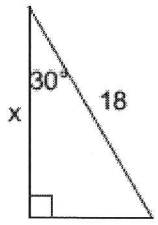
f) cos 13° 0.97

g) sin 0° 0

h) cos 0° 1

Find the value of x. Round to the nearest tenth.

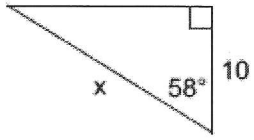
a) x = 15.6



$\cos(30) = \frac{x}{18}$

$x = 18 \cdot \cos(30)$

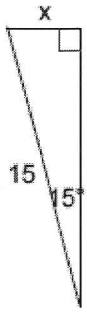
b) x = 18.9



$\cos(58) = \frac{10}{x}$

$x = \frac{10}{\cos(58)}$

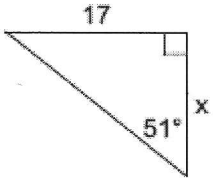
c) x = 3.9



$\sin(15) = \frac{x}{15}$

$x = 15 \cdot \sin(15)$

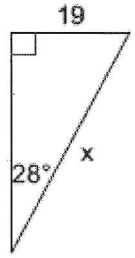
d) x = 13.8



$\tan(51) = \frac{17}{x}$

$x = \frac{17}{\tan(51)}$

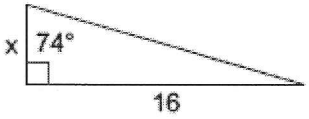
e) x = 40.5



$\sin(28) = \frac{19}{x}$

$x = \frac{19}{\sin(28)}$

f) x = 4.6

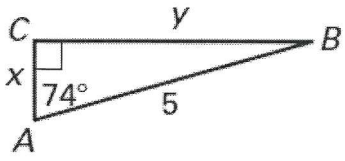


$\cos(74) = \frac{x}{16}$

$x = 16 \cdot \cos(74)$

Find the lengths of the legs of the triangle. Round your answers to the nearest tenth.

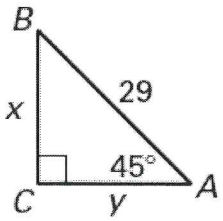
a) x = 1.4 y = 4.8



$\cos(74) = \frac{x}{5}$ $\sin(74) = \frac{y}{5}$

$x = 5 \cdot \cos(74)$ $y = 5 \cdot \sin(74)$

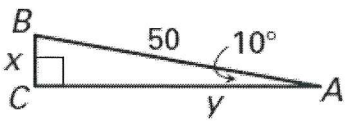
b) x = 20.5 y = 20.5



$\sin(45) = \frac{x}{29}$ $\cos(45) = \frac{y}{29}$

$x = 29 \sin(45)$ $y = 29 \cos(45)$

c) x = 8.7 y = 49.1



$\sin(10) = \frac{x}{50}$

$x = 50 \cdot \sin(10)$

$\cos(10) = \frac{y}{50}$

$y = 50 \cos(10)$

10.6 Solving Right Triangles – Day 1

Goal: Use inverse trigonometric functions to find missing angles

Inverse tangent: a function available on a calculator as $\tan^{-1} x$, which can be used to find the measure of an angle when you know the tangent of the angle

Inverse sine: a function available on a calculator as $\sin^{-1} x$, which can be used to find the measure of an angle when you know the sine of the angle

Inverse cosine: a function available on a calculator as $\cos^{-1} x$, which can be used to find the measure of an angle when you know the cosine of the angle

To find missing sides we use: sin, cos, tan

To find missing angles we use: $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$

$\angle A$ is an acute angle. Use a calculator to approximate the measure of $\angle A$ to the nearest degree.

a) $\tan A = 3.5$

$\tan^{-1}(3.5) = m\angle A$

$m\angle A =$ 74°

b) $\tan A = 2$

$\tan^{-1}(2) = m\angle A$

$m\angle A =$ 63°

c) $\tan A = 0.4402$

$\tan^{-1}(0.4402) = m\angle A$

$m\angle A =$ 24°

d) $\sin A = 0.5$

$\sin^{-1}(0.5) = m\angle A$

$m\angle A =$ 30°

e) $\cos A = 0.92$

$\cos^{-1}(0.92) = m\angle A$

$m\angle A =$ 23°

f) $\sin A = 0.1149$

$\sin^{-1}(0.1149) = m\angle A$

$m\angle A =$ 7°

g) $\cos A = \frac{2.4}{4}$

$\cos^{-1}\left(\frac{2.4}{4}\right) = m\angle A$

$m\angle A =$ 53°

h) $\cos A = \frac{15}{17}$

$\cos^{-1}\left(\frac{15}{17}\right) = m\angle A$

$m\angle A =$ 28°

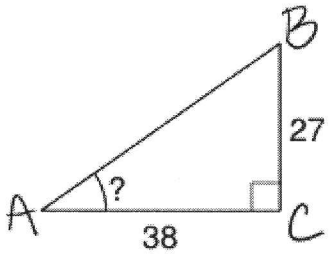
i) $\tan A = \frac{11}{7}$

$\tan^{-1}\left(\frac{11}{7}\right) = m\angle A$

$m\angle A =$ 58°

Use the inverse trigonometry functions to find the measure of each missing angle. Round to the nearest degree.

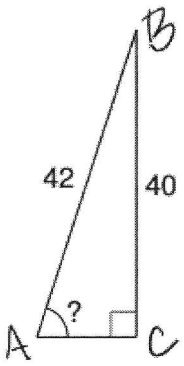
a) $m\angle A =$ 35° $m\angle B =$ 55°



tan A = $\frac{27}{38}$ m∠B = 90 − 35

tan⁻¹($\frac{27}{38}$) = m∠A

b) $m\angle A =$ 72° $m\angle B =$ 18°

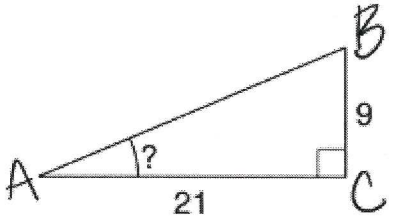


Sin A = $\frac{40}{42}$

Sin⁻¹($\frac{40}{42}$) = m∠A

m∠B = 90 − 72

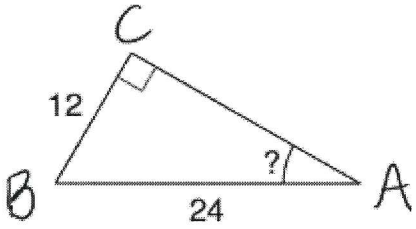
c) $m\angle A =$ 23° $m\angle B =$ 67°



tan A = $\frac{9}{21}$ m∠B = 90 − 23

tan⁻¹($\frac{9}{21}$) = m∠A

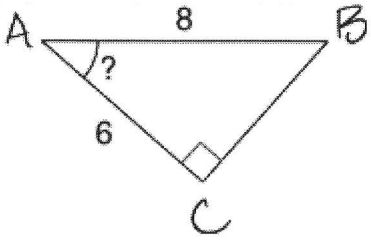
d) $m\angle A =$ 30° $m\angle B =$ 60°



Sin A = $\frac{12}{24}$ m∠B = 90 − 60

Sin⁻¹($\frac{12}{24}$) = m∠A

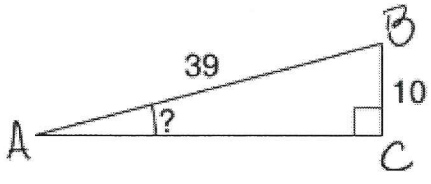
e) $m\angle A =$ 41° $m\angle B =$ 49°



COS A = $\frac{6}{8}$ m∠B = 90 − 41

COS⁻¹($\frac{6}{8}$) = m∠A

f) $m\angle A =$ 15° $m\angle B =$ 75°



Sin A = $\frac{10}{39}$ m∠B = 90 − 15

Sin⁻¹($\frac{10}{39}$) = m∠A

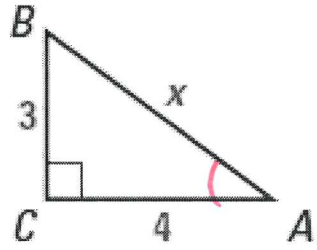
10.6 Solving Right Triangles – Day 2

Goal: Use inverse trigonometric functions to solve right triangles.

Solve a right triangle: to find the measures of both acute angles and all three sides

Solve the right triangle. Find all missing sides and angles. Round sides to the nearest tenth and angles to the nearest degree.

a) x = 5 $m\angle A =$ 37° $m\angle B =$ 53°



$3^2+4^2=x^2$

$\sqrt{25}=\sqrt{x^2}$

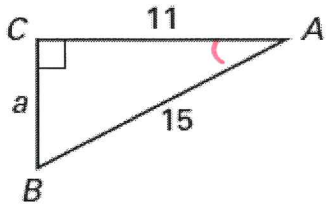
$x=5$

$\tan A=\frac{3}{4}$

$\tan^{-1}\left(\frac{3}{4}\right)=m\angle A$

$m\angle B=90-53$

b) a = 10.2 $m\angle A =$ 43° $m\angle B =$ 47°



$a^2+11^2=15^2$

$\sqrt{a^2}=\sqrt{104}$

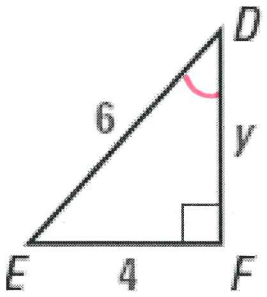
$a=10.2$

$\cos A=\frac{11}{15}$

$\cos^{-1}\left(\frac{11}{15}\right)=m\angle A$

$m\angle B=90-47$

c) y = 4.5 $m\angle D =$ 42° $m\angle E =$ 48°



$y^2+4^2=6^2$

$\sqrt{y^2}=\sqrt{20}$

$y=4.5$

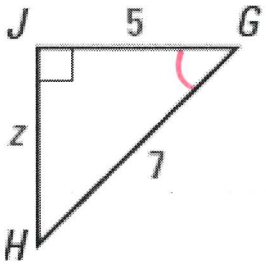
$\sin D=\frac{4}{6}$

$\sin^{-1}\left(\frac{4}{6}\right)=m\angle D$

$m\angle D=42$

$m\angle E=90-42$

d) z = 4.9 $m\angle G =$ 44° $m\angle H =$ 46°



$z^2+5^2=7^2$

$\sqrt{z^2}=\sqrt{24}$

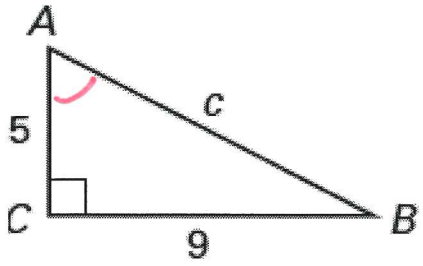
$z=4.9$

$\cos G=\frac{5}{7}$

$\cos^{-1}\left(\frac{5}{7}\right)=m\angle G$

$m\angle H=90-44$

e) c = 10.3 $m\angle A =$ 61° $m\angle B =$ 29°



$5^2+9^2=c^2$

$\sqrt{106}=\sqrt{c^2}$

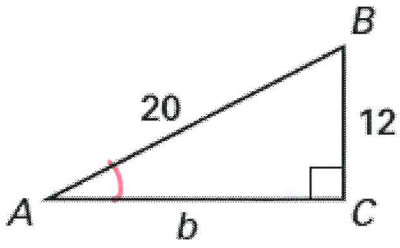
$c=10.3$

$\tan A=\frac{9}{5}$

$\tan^{-1}\left(\frac{9}{5}\right)=m\angle A$

$m\angle B=90-61$

f) b = 16 $m\angle A =$ 37° $m\angle B =$ 53°



$12^2+b^2=20^2$

$\sqrt{b^2}=\sqrt{256}$

$b=16$

$\sin A=\frac{12}{20}$

$\sin^{-1}\left(\frac{12}{20}\right)=m\angle A$

$m\angle B=90-37$