Name _____   Period <u>Key</u>   Aug. 2021

Accelerated Pre-Calculus

Unit 1 Packet

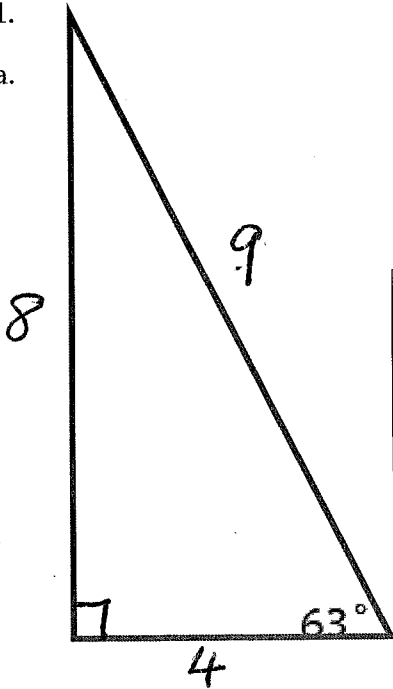# Introduction to Trigonometry

Accel Pre-Calculus Trig Ratio Investigation $S\overset{O}{H}$ $C\overset{A}{H}$ $T\overset{O}{A}$

Working with a partner, measure the side lengths of the following triangles (in cm) then find the sine, cosine, and tangent of theta for each triangle (remember SOHCAHTOA). Discuss the results with your partner.
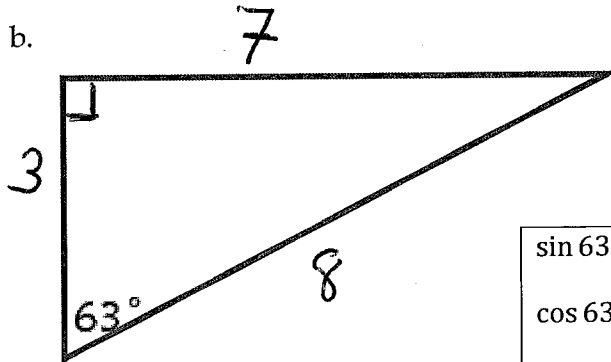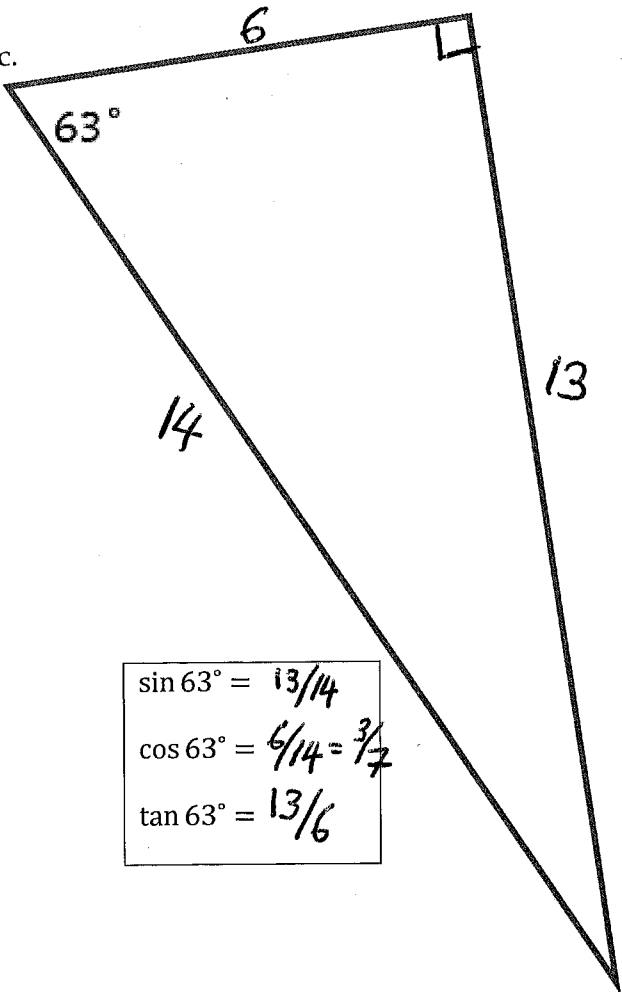
1.

a.

8

9

4

63°

$\sin 63° = 8/9$

$\cos 63° = 4/9$

$\tan 63° = 8/4 = 2$

b.

7

3

8

63°

$\sin 63° = 7/8$

$\cos 63° = 3/8$

$\tan 63° = 7/3$

c.

6

63°

14

13

$\sin 63° = 13/14$

$\cos 63° = 6/14 = 3/7$

$\tan 63° = 13/6$
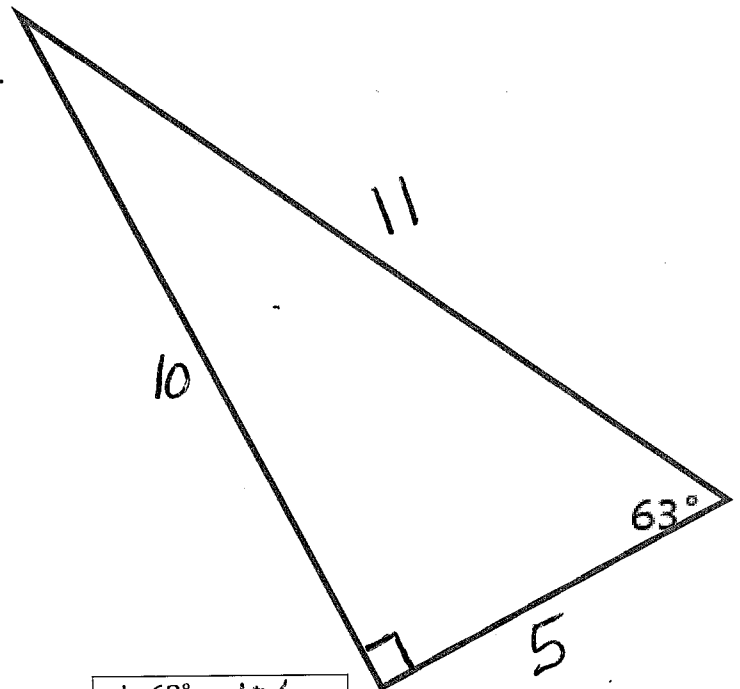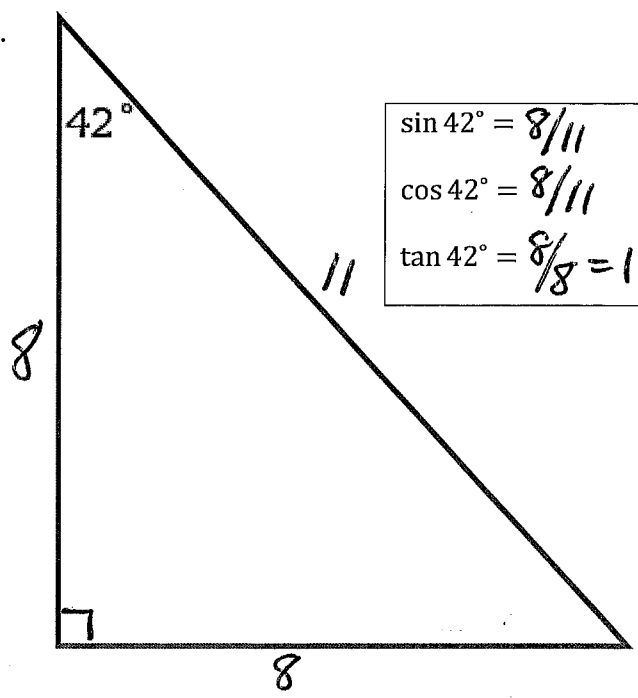
d.

11

10

63°

5

$\sin 63° = 10/11$

$\cos 63° = 5/11$

$\tan 63° = \dfrac{10}{5} = 2$

2

2.

a.

42°

8

11

8

$\sin 42° = 8/11$

$\cos 42° = 8/11$

$\tan 42° = 8/8 = 1$

b.

5

42°

4

7

$\sin 42° = 4/7$

$\cos 42° = 5/7$

$\tan 42° = 4/5$

c.

11

42°

10

15
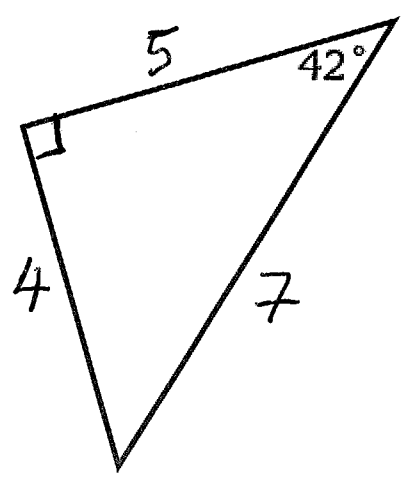
$\sin 42° = 10/15 = 2/3$

$\cos 42° = 11/15$

$\tan 42° = 10/11$

d.

12

8

42°

9

$\sin 42° = 8/12 = 2/3$

$\cos 42° = 9/12 = 3/4$

$\tan 42° = 8/9$

Warm-up:

1. Rationalize $\dfrac{2}{\sqrt{5}} \cdot \dfrac{\sqrt{5}}{\sqrt{5}} = \dfrac{2\sqrt{5}}{5}$

2. Solve for x.

$x=36$

$\dfrac{12}{1} = \dfrac{x}{3}$

$\boxed{x = 36}$

$\dfrac{20}{1} = \dfrac{5}{x}$

$20x = 5$

$\boxed{x = \dfrac{1}{4}}$
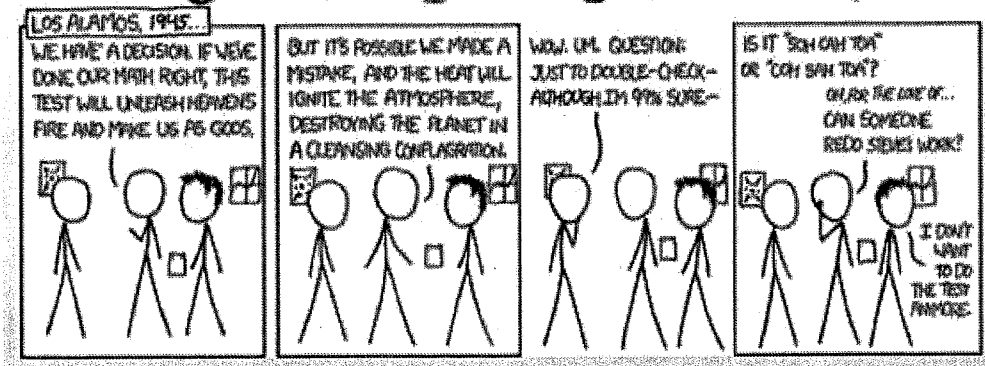
3. How do you solve for x?
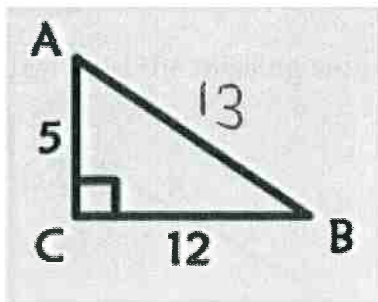
$x + 7 = 19$

$\boxed{x = 12}$

$x^2 = 30$

$\boxed{x = \pm\sqrt{30}}$

Right Triangle Trigonometry
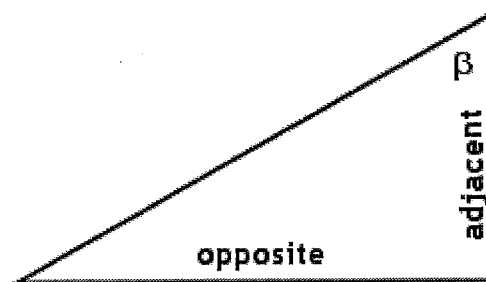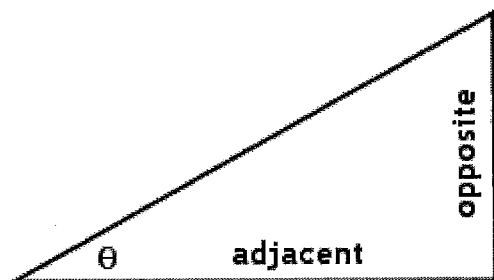
amples: Find sine, cosine, and tangent of Angle A.   ＊pythagorean theorem: $a^2+b^2=c^2$

1.

A, 13, 5, C, 12, B (right triangle)

$\sin A = \dfrac{12}{13}$

$\cos A = \dfrac{5}{13}$

$\tan A = \dfrac{12}{5}$

2.

B, 25, 7, C, 24, A (right triangle)
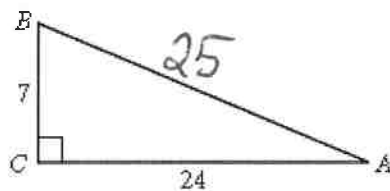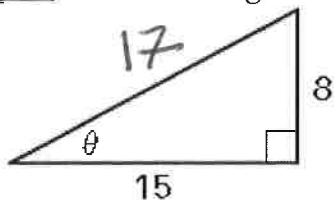
$\sin A = \dfrac{7}{25}$

$\cos A = \dfrac{24}{25}$

$\tan A = \dfrac{7}{24}$

Examples: Find all 6 trig ratios from Angle A.
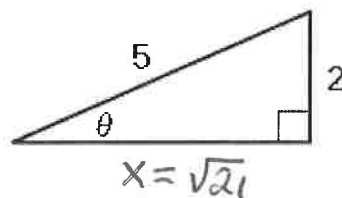
1.

17, 8, 15, θ (right triangle)

$\sin\theta = \dfrac{8}{17}$ $\csc\theta = \dfrac{17}{8}$

$\cos\theta = \dfrac{15}{17}$ $\sec\theta = \dfrac{17}{15}$

$\tan\theta = \dfrac{8}{15}$ $\cot\theta = \dfrac{15}{8}$

2.

5, 2, θ, $x=\sqrt{21}$ (right triangle)

$x^2+2^2=5^2$

$x^2=21$

$x=\sqrt{21}$

$\sin\theta = \dfrac{2}{5}$ $\csc\theta = \dfrac{5}{2}$

$\cos\theta = \dfrac{\sqrt{21}}{5}$ $\sec\theta = \dfrac{5\sqrt{21}}{21}$

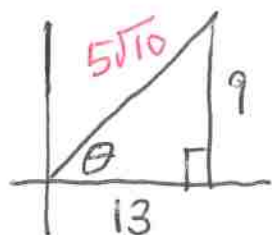$\tan\theta = \dfrac{2}{\sqrt{21}}\cdot\dfrac{\sqrt{21}}{\sqrt{21}}$ $\cot\theta = \dfrac{\sqrt{21}}{2}$

$\boxed{\dfrac{2\sqrt{21}}{21}}$

Example: Given $\cot\theta = \dfrac{13}{9}$, find the other 5 trig ratios from θ.

$\cot\theta \to \dfrac{adj}{opp.} \to \dfrac{13}{9}$

$5\sqrt{10}$, 9, θ, 13 (right triangle)

$13^2+9^2=c^2$

$250=c^2$

$\sqrt{c^2}=\sqrt{250}$

$c=\sqrt{250}$

$25\cdot 10$

$c=5\sqrt{10}$

$\dfrac{9\sqrt{10}}{50}$

$\sin\theta = \dfrac{9}{5\sqrt{10}}\cdot\dfrac{\sqrt{10}}{\sqrt{10}}$ $\csc\theta = \dfrac{5\sqrt{10}}{9}$

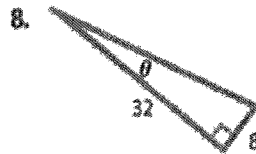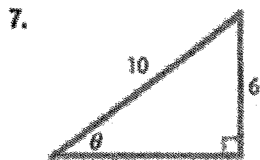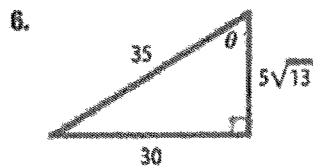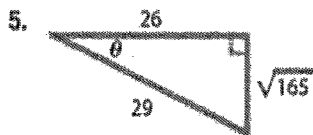$\cos\theta = \dfrac{13\sqrt{10}}{50}$ $\sec\theta = \dfrac{5\sqrt{10}}{13}$

$\tan\theta = \dfrac{9}{13}$ $\cot\theta = \dfrac{13}{9}$

5

Find the exact values of the six trigonometric functions of θ.

1.

18   θ   8√2   14

2.

13   θ   2√14   15

3.

9   4   θ   √97

4.

12   37   θ   35

5.

26   θ   √165   29

6.

35   θ   5√13   30

7.

10   6   θ

8.

θ   32   8

1. $\sin\theta = \frac{4\sqrt{2}}{9}$ $\csc\theta = \frac{9\sqrt{2}}{8}$
$\cos\theta = \frac{7}{9}$ $\sec\theta = \frac{9}{7}$
$\tan\theta = \frac{4\sqrt{2}}{7}$ $\cot\theta = \frac{7\sqrt{2}}{8}$

2. $\sin\theta = \frac{2\sqrt{14}}{15}$ $\csc\theta = \frac{15\sqrt{14}}{28}$
$\cos\theta = \frac{13}{15}$ $\sec\theta = \frac{15}{13}$
$\tan\theta = \frac{2\sqrt{14}}{13}$ $\cot\theta = \frac{13\sqrt{14}}{28}$

3. $\cos\theta = \frac{4\sqrt{97}}{97}$ $\sec\theta = \frac{\sqrt{97}}{4}$
$\sin\theta = \frac{9\sqrt{97}}{97}$ $\csc\theta = \frac{\sqrt{97}}{9}$
$\tan\theta = \frac{9}{4}$ $\cot\theta = \frac{4}{9}$

4. $\sin\theta = \frac{12}{37}$ $\csc\theta = \frac{37}{12}$
$\cos\theta = \frac{35}{37}$ $\sec\theta = \frac{37}{35}$
$\tan\theta = \frac{12}{35}$ $\cot\theta = \frac{35}{12}$
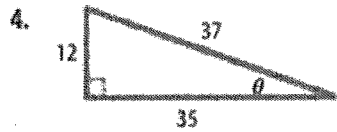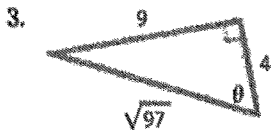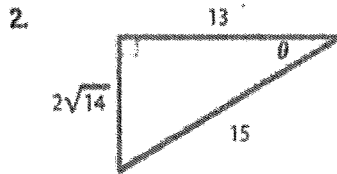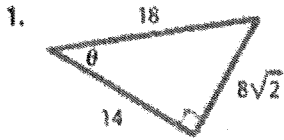
5. $\sin\theta = \frac{\sqrt{165}}{29}$ $\csc\theta = \frac{29\sqrt{165}}{165}$
$\cos\theta = \frac{26}{29}$ $\sec\theta = \frac{29}{26}$
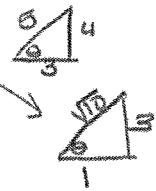$\tan\theta = \frac{\sqrt{165}}{26}$ $\cot\theta = \frac{26\sqrt{165}}{165}$

6. $C = \frac{\sqrt{13}}{7}$ $\sec = \frac{7\sqrt{13}}{13}$
$S = \frac{6}{7}$ $\csc = \frac{7}{6}$
$t = \frac{6}{\sqrt{13}} = \frac{6\sqrt{13}}{13}$ $\cot = \frac{\sqrt{13}}{6}$

7. $S = \frac{3}{4}$ $\csc = $
$C = \frac{4}{5}$ $\sec = $
$t = \frac{3}{4}$ $\cot = $

8. $S = $ $\csc = \sqrt{17}$
$C = $ $\sec = 4\sqrt{17}$
$t = $ $\cot = 4$

Use the given trigonometric function value of the acute angle θ to find the exact values of the five remaining trigonometric function values of θ. (Example 2)

9. $\sin\theta = \frac{4}{5}$

10. $\cos\theta = \frac{6}{7}$

11. $\tan\theta = 3$

12. $\sec\theta = 8$

13. $\cos\theta = \frac{5}{9}$

14. $\tan\theta = \frac{1}{4}$

15. $\cot\theta = 5$

16. $\csc\theta = 6$

17. $\sec\theta = \frac{9}{2}$

18. $\sin\theta = \frac{8}{13}$

9. $\cos\theta = \frac{3}{5}$ $\sec = \frac{5}{3}$
$\tan = \frac{4}{3}$ $\cot = \frac{3}{4}$
$\csc = \frac{5}{4}$

11. $\sin\theta = \frac{3\sqrt{10}}{10}$ $\csc\theta = \frac{\sqrt{10}}{3}$
$\cos\theta = \frac{\sqrt{10}}{10}$ $\sec\theta = \sqrt{10}$
$\cot = \frac{1}{3}$