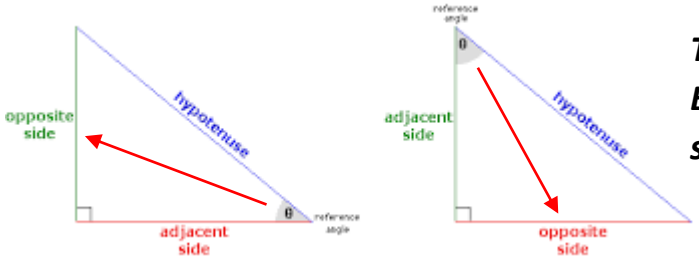
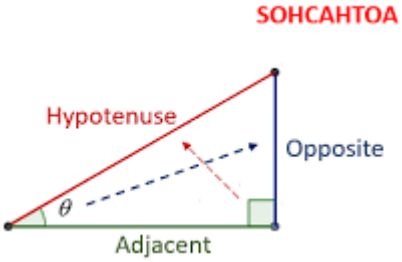
The Trig Ratios

- ***Every right triangle has 2 legs and a hypotenuse.***
- ***The legs are called the opposite and adjacent.***
- ***The angle that you start at determines the opposite and adjacent***
- ***From these … we can create the 3 primary trig ratios***



The hypotenuse doesn't change
But the legs get renamed depending on starting angle

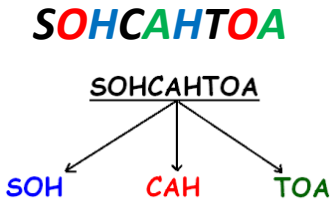
So, using the triangle below – we can produce the following ratios



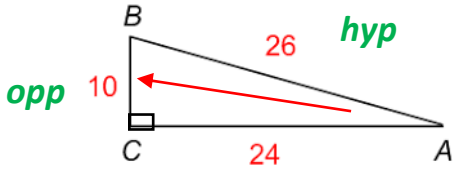
SOH $\sin\theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$

CAH $\cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$

TOA $\tan\theta = \frac{\text{Opposite}}{\text{Adjacent}}$



Notice how the ratios are related for the following triangle (we will start from A)



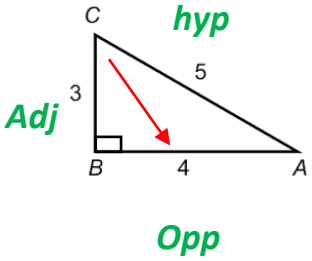
$\sin A = \frac{10}{26}$ $\cos A = \frac{24}{26}$ $\tan A = \frac{10}{24}$

but if we start from B … 24 is the opposite

$\sin B = \frac{24}{26}$ $\cos B = \frac{10}{26}$ $\tan B = \frac{24}{10}$

Write the exact trig ratios for the following triangles

a)



For angle C

$\sin C = \frac{4}{5}$ $\cos C = \frac{3}{5}$ $\tan C = \frac{4}{3}$

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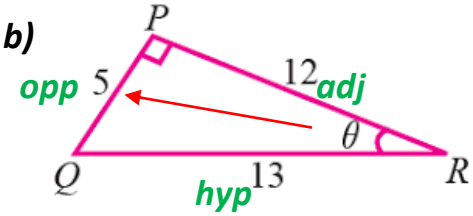
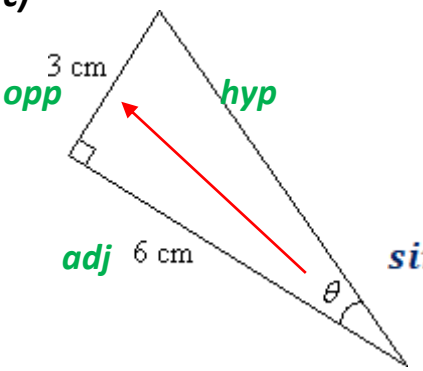
b)



$\sin\theta = \frac{5}{13}$ $\cos\theta = \frac{12}{13}$ $\tan\theta = \frac{5}{12}$

c)



Here we are missing a side … find it first

$3^2 + 6^2 = h^2$ $h = \sqrt{45}$ *or* $3\sqrt{5}$

$sin\,\theta = \frac{3}{3\sqrt{5}}$ *or* $\frac{1}{\sqrt{5}}$ $cos\,\theta = \frac{6}{3\sqrt{5}}$ *or* $\frac{2}{\sqrt{5}}$ $Tan\,\theta = \frac{3}{6}$ *or* $\frac{1}{2}$

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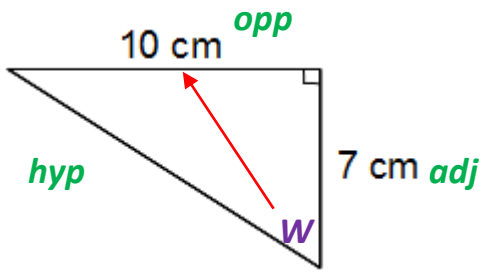
d)



$10^2 + 7^2 = h^2$ $h = \sqrt{149}$

$sin\,W = \frac{10}{\sqrt{149}}$ $cos\,W = \frac{7}{\sqrt{149}}$ $TanW = \frac{10}{7}$

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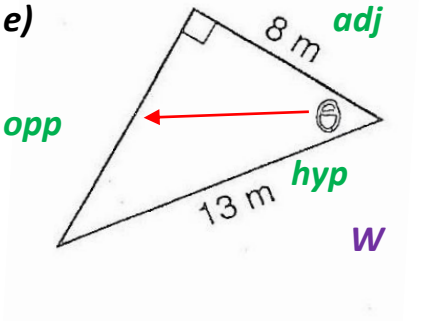
e)



$13^2 - 8^2 = O^2$ $O = \sqrt{105}$

$sin\,\theta = \frac{\sqrt{105}}{13}$ $cos\,\theta = \frac{8}{13}$ $Tan\,\theta = \frac{\sqrt{105}}{8}$

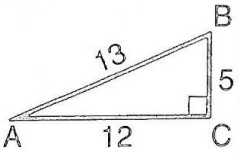
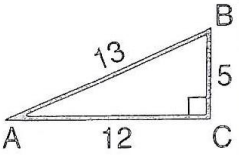
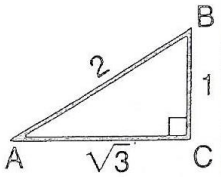
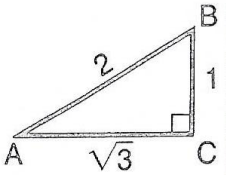
Notice if you use your calculator for any ratio – you can solve for the angle

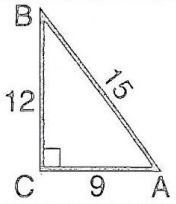
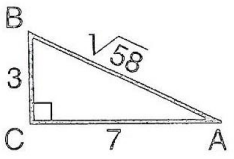
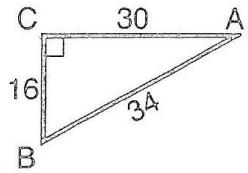
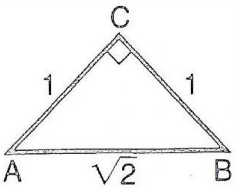
$2^{nd}\ sin(\frac{\sqrt{105}}{13}) = 52.0°$ *and* $2^{nd}\ cos(\frac{8}{13}) = 52.0°$

Assignment = worksheet

Why did Klutz lift off the manhole cover and dive in?

3	10	22	8	14	21	4	7	18	1	9	20	6	11	16	19	13	23	2	15	24	12	17	5

(1) sin A (2) cos A (3) tan A	(E) $\frac{12}{13}$ (H) $\frac{5}{12}$	(I) $\frac{5}{13}$ (V) $\frac{13}{5}$	
(4) sin B (5) cos B (6) tan B	(N) $\frac{13}{5}$ (O) $\frac{12}{13}$	(E) $\frac{5}{13}$ (I) $\frac{12}{5}$	
(7) sin A (8) cos A (9) tan A	(A) $\frac{\sqrt{3}}{2}$ (S) 2	(M) $\frac{1}{2}$ (T) $\frac{1}{\sqrt{3}}$	
(10) sin B (11) cos B (12) tan B	(I) $\sqrt{3}$ (E) $\frac{\sqrt{3}}{2}$	(N) $\frac{1}{2}$ (P) $\frac{1}{\sqrt{3}}$	

(13) sin A (14) cos A (15) tan A	(U) $\frac{5}{3}$ (R) $\frac{4}{3}$	(S) $\frac{3}{5}$ (E) $\frac{4}{5}$	
(16) sin B (17) cos B (18) tan B	(D) $\frac{3}{\sqrt{58}}$ (G) $\frac{7}{\sqrt{58}}$	(B) $\frac{3}{7}$ (M) $\frac{7}{3}$	
(19) sin A (20) cos A (21) tan A	(T) $\frac{15}{17}$ (R) $\frac{17}{8}$	(S) $\frac{8}{17}$ (C) $\frac{8}{15}$	
(22) sin A (23) cos A (24) tan A	(W) $\frac{1}{\sqrt{2}}$ (C) 1	(W) $\frac{1}{\sqrt{2}}$ (L) $\sqrt{2}$	

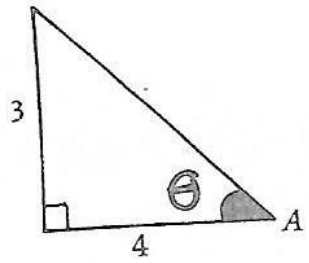
Find the unknown side and then write the exact ratios for the sin θ , cos θ, and tan θ.

a)

sin θ =

cos θ =

tan θ=

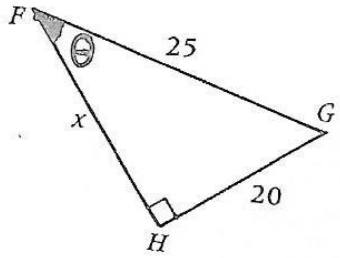


b)

sin θ =

cos θ =

tan θ=

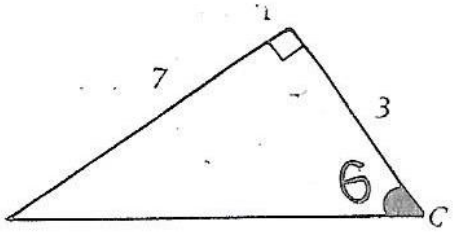


c)

sin θ =

cos θ =

tan θ=

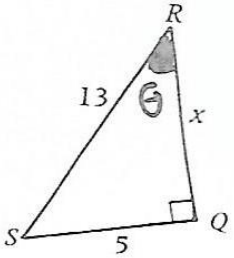


d)

sin θ =

cos θ =

tan θ=

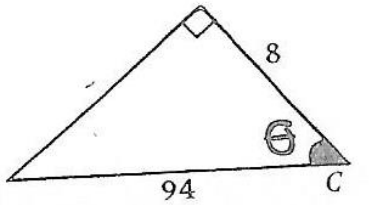


e)

sin θ =

cos θ =

tan θ=

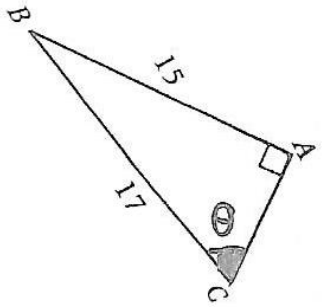


f)

sin θ =

cos θ =

tan θ=

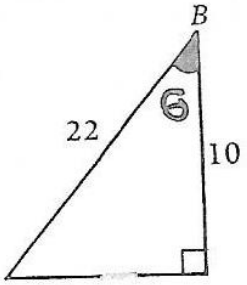


g)

sin θ =

cos θ =

tan θ=

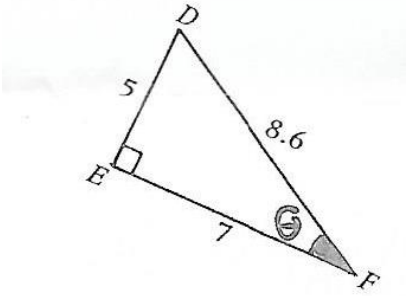


h)

sin θ =

cos θ =

tan θ=

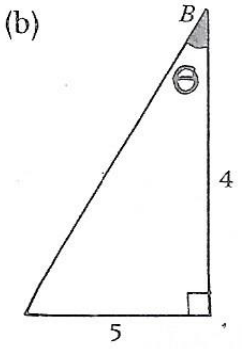


i)

sin θ =

cos θ =

tan θ=

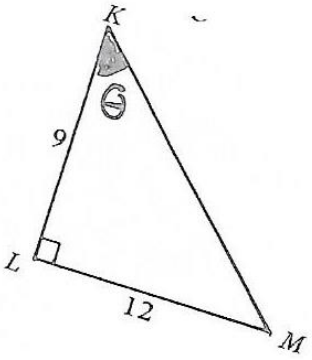


j)

sin θ =

cos θ =

tan θ=

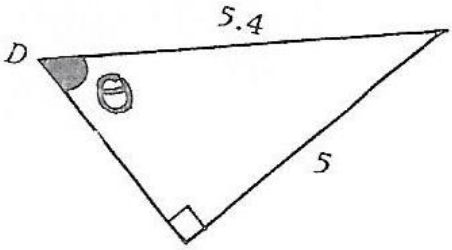


k)

sin θ =

cos θ =

tan θ=

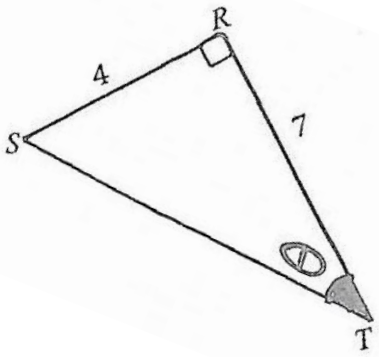


l)

sin θ =

cos θ =

tan θ=



Use your calculator so find θ in:

e) **f)** **g)** **h)**

i) **j)** **k)** **l)**