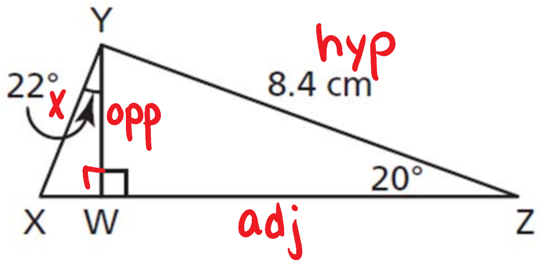
Solving Problems Involving More than One Triangle

When we have problems that involve more than one right triangle, we need to decide which triangle to start with. We can use all of the same methods used when solving a single right triangle.

Examples:

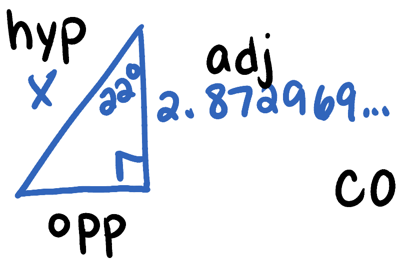
1) Calculate the length of XY to the nearest tenth of a centimetre.



solve WY: $\sin\theta = \dfrac{opp}{hyp}$

$(8.4)\sin 20 = \dfrac{WY}{8.4}(8.4)$

$WY = 2.872969\ldots cm$



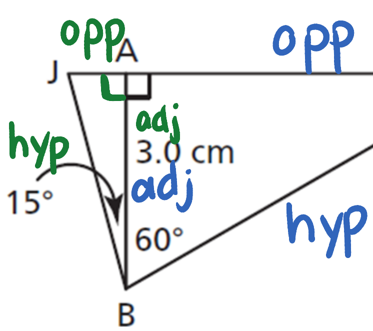
$\cos\theta = \dfrac{adj}{hyp}$

$\cos 22 = \dfrac{2.872969\ldots}{XY}$

$XY = \dfrac{2.872969\ldots}{\cos 22}$

$\boxed{XY = 3.1 cm}$

2) Calculate the length of JK to the nearest tenth of a centimetre.



AJ: $\tan\theta = \dfrac{opp}{adj}$

$(3.0)\tan 15 = \dfrac{AJ}{\cancel{3.0}}\cancel{(3.0)}$

$AJ = 0.80 \ cm$

AK: $\tan\theta = \dfrac{opp}{adj}$

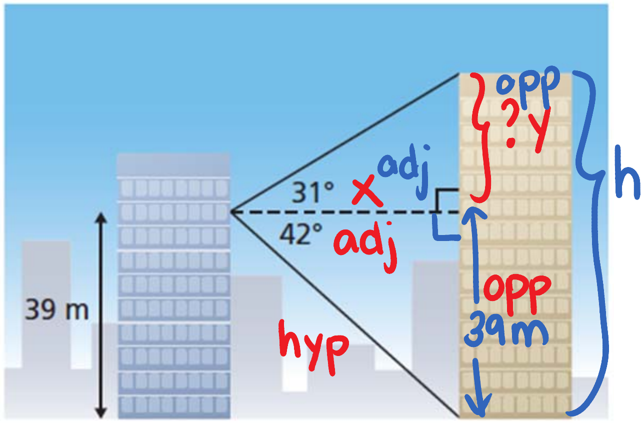
$(3.0)\tan 60 = \dfrac{AK}{\cancel{3.0}}\cancel{(3.0)}$

$AK = 5.196 cm$

$JK = 0.80 + 5.196$

$\boxed{JK = 6.0 cm}$

3) A surveyor stands at a window on the 9th floor of an office tower. The measure the angles of elevation and depression of the top and the base of a taller building. Determine the height of the taller building to the nearest tenth of a metre.



x: $\tan\theta = \frac{opp}{adj}$

$\tan 42 = \frac{39}{x}$

$x = \frac{39}{\tan 42} = 43.3138...$

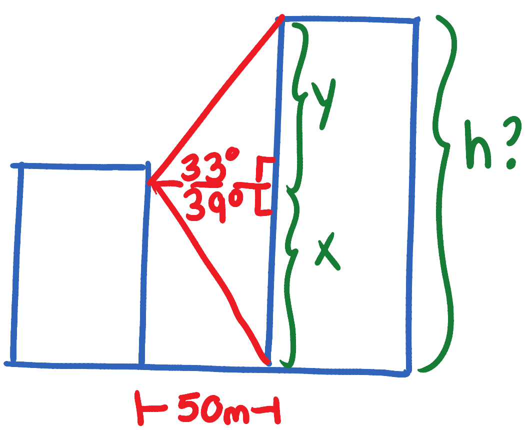
y: $\tan\theta = \frac{opp}{adj}$

$\tan 31 = \frac{y}{43.3138}$

$y = 26.0\text{ m}$

$h = 26.0 + 39 = \boxed{65.0\text{ m}}$

4) Two towers are 50 m apart. From the 14th floor of the shorter building the angle of elevation to the top of the taller tower is 33˚. The angle of depression to the base of the taller tower is 39˚. Find the height of the taller tower.



x: $\tan 39 = \frac{x}{50}$

$50\tan 39 = x$

$x = 40.4892...$

$x + y = \boxed{72.96\text{m}}$

y: $\tan 33 = \frac{y}{50}$

$50\tan 33 = y$

$y = 32.4704...$

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