

ANSWERS \rightarrow Trigonometry Worksheet #3

1.a) Missing Side.

$$c^2 = a^2 + b^2$$

$$c^2 = 10^2 + 8^2$$

$$c^2 = 100 + 64$$

$$c^2 = 164$$

$$c = 12.8$$

Missing Angle.

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan \theta = \frac{8}{10}$$

$$\tan \theta = 0.8000$$

$$\theta = \tan^{-1}(0.8000)$$

$$\theta = 39^\circ$$

b) $c^2 = a^2 + b^2$

$$25^2 = 20^2 + b^2$$

$$625 = 400 + b^2$$

$$625 - 400 = b^2$$

$$225 = b^2$$

$$15 = b$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin \theta = \frac{20}{25}$$

$$\sin \theta = 0.8000$$

$$\theta = \sin^{-1}(0.8000)$$

$$\theta = 53^\circ$$

$$\begin{aligned}
 \text{c) } c^2 &= a^2 + b^2 \\
 c^2 &= 24^2 + 41^2 \\
 c^2 &= 576 + 1681 \\
 c^2 &= 2257 \\
 c &= 47.5
 \end{aligned}$$

$$\begin{aligned}
 \tan \theta &= \frac{\text{opp}}{\text{adj}} \\
 \tan \theta &= \frac{41}{24} \\
 \tan \theta &= 1.7083 \\
 \theta &= \tan^{-1}(1.7083) \\
 \theta &= 60^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } c^2 &= a^2 + b^2 \\
 14^2 &= 8^2 + b^2 \\
 196 &= 64 + b^2 \\
 196 - 64 &= b^2 \\
 132 &= b^2 \\
 11.5 &= b
 \end{aligned}$$

$$\begin{aligned}
 \sin \theta &= \frac{\text{opp}}{\text{hyp}} \\
 \sin \theta &= \frac{8}{14} \\
 \sin \theta &= 0.5714 \\
 \theta &= \sin^{-1}(0.5714) \\
 \theta &= 35^\circ
 \end{aligned}$$

$$\begin{array}{l}
 \text{e) } c^2 = a^2 + b^2 \\
 17^2 = 12^2 + b^2 \\
 289 = 144 + b^2 \\
 289 - 144 = b^2 \\
 145 = b^2 \\
 12.04 = b
 \end{array}
 \quad
 \begin{array}{l}
 \sin \theta = \frac{\text{opp}}{\text{hyp}} \\
 \sin \theta = \frac{12}{17} \\
 \sin \theta = 0.7059 \\
 \theta = \sin^{-1}(0.7059) \\
 \theta = 45^\circ
 \end{array}
 \quad
 \begin{array}{l}
 * \text{ Isosceles} \\
 \text{Triangle}
 \end{array}$$

$$\begin{array}{l}
 \text{f) } c^2 = a^2 + b^2 \\
 c^2 = 13^2 + 20^2 \\
 c^2 = 169 + 400 \\
 c^2 = 569 \\
 c = 23.9
 \end{array}
 \quad
 \begin{array}{l}
 \tan \theta = \frac{\text{opp}}{\text{adj}} \\
 \tan \theta = \frac{20}{13} \\
 \tan \theta = 1.5385 \\
 \theta = \tan^{-1}(1.5385) \\
 \theta = 57^\circ
 \end{array}$$

$$\begin{aligned}
 \text{g) } c^2 &= a^2 + b^2 & \tan \theta &= \frac{\text{opp}}{\text{adj}} \\
 c^2 &= 11^2 + 24^2 & \tan \theta &= \frac{24}{11} \\
 c^2 &= 121 + 576 & \tan \theta &= 2.1818 \\
 c^2 &= 697 & \theta &= \tan^{-1}(2.1818) \\
 c &= 26.4 & \theta &= 65^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{h) } c^2 &= a^2 + b^2 & \cos \theta &= \frac{\text{adj}}{\text{hyp}} \\
 17^2 &= 15^2 + b^2 & \cos \theta &= \frac{15}{17} \\
 289 &= 225 + b^2 & \cos \theta &= 0.8824 \\
 289 - 225 &= b^2 & \theta &= \cos^{-1}(0.8824) \\
 64 &= b^2 & \theta &= 28^\circ \\
 8 &= b
 \end{aligned}$$

2. To find x :

a)

$$\cos 32^\circ = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 32^\circ = \frac{120}{x}$$

$$x \cos 32^\circ = 120$$

$$\frac{x (\cancel{0.8480})}{\cancel{0.8480}} = \frac{120}{0.8480}$$

$$x = 141.5$$

Missing angle:

$$180^\circ - 90^\circ - 32^\circ = 58^\circ$$

To find x :

b)

$$\sin 63^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 63^\circ = \frac{x}{15}$$

$$15 \sin 63^\circ = x$$

$$15 (0.8910) = x$$

$$13.4 = x$$

Missing angle:

$$180^\circ - 90^\circ - 63^\circ = 27^\circ$$

$$c) \tan 42^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 42^\circ = \frac{32}{x}$$

$$x \tan 42^\circ = 32$$

$$x (0.9004) = 32$$

$$\frac{0.9004}{0.9004} \quad \frac{0.9004}{0.9004}$$

$$x = 35.5$$

$$d) \sin 71^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 71^\circ = \frac{85}{x}$$

$$x \sin 71^\circ = 85$$

$$x (0.9455) = 85$$

$$\frac{0.9455}{0.9455} \quad \frac{0.9455}{0.9455}$$

$$x = 90$$

Missing angle: $180^\circ - 90^\circ - 42^\circ = 48^\circ$

Missing angle: $180^\circ - 90^\circ - 71^\circ = 19^\circ$

$$e) \tan 78^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 78^\circ = \frac{x}{11}$$

$$11 \tan 78^\circ = x$$

$$11 (4.7046) = x$$

$$51.8 = x$$

Missing angle: $180^\circ - 90^\circ - 78^\circ = 12^\circ$

$$f) \sin 70^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 70^\circ = \frac{x}{25}$$

$$25 \sin 70^\circ = x$$

$$25 (0.9397) = x$$

$$23.5 = x$$

$$g) \tan 27^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 27^\circ = \frac{x}{22}$$

$$22 \tan 27^\circ = x$$

$$22 (0.5095) = x$$

$$11.2 = x$$

Missing angle:

$$180^\circ - 90^\circ - 70^\circ = 20^\circ$$

Missing angle:

$$180^\circ - 90^\circ - 27^\circ = 63^\circ$$

$$h) \sin 69^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 69^\circ = \frac{150}{x}$$

$$x \sin 69^\circ = 150$$

$$\frac{x (0.9336)}{0.9336} = \frac{150}{0.9336}$$

$$x = 160.7$$

Missing angle:

$$180^\circ - 90^\circ - 69^\circ = 21^\circ$$

$$\begin{aligned} 3. a) \quad c^2 &= a^2 + b^2 \\ c^2 &= 20^2 + 25^2 \\ c^2 &= 400 + 625 \\ c^2 &= 1025 \\ c &= 32 = AC \end{aligned}$$

To find $\angle A$:

$$\tan A = \frac{\text{opp}}{\text{adj}}$$

$$\tan A = \frac{20}{25}$$

$$\tan A = 0.8000$$

$$A = \tan^{-1}(0.8000)$$

$$A = 39^\circ$$

To find $\angle C$:

$$\tan C = \frac{\text{opp}}{\text{adj}}$$

$$\tan C = \frac{25}{20}$$

$$\tan C = 1.2500$$

$$C = \tan^{-1}(1.2500)$$

$$C = 51^\circ$$

b) To find $\angle A$:
 $180^\circ - 90^\circ - 45^\circ$
 $= 45^\circ$

SIDE AB:
 $\sin 45^\circ = \frac{\text{opp}}{\text{hyp}}$

$$\frac{\sin 45^\circ}{1} = \frac{x}{114}$$

$$(\sin 45^\circ)(114) = x$$
$$80.6 = x$$

SIDE CB:
 $\cos 45^\circ = \frac{\text{adj}}{\text{hyp}}$

$$\frac{\cos 45^\circ}{1} = \frac{y}{114}$$
$$(\cos 45^\circ)(114) = y$$
$$80.6 = y$$

c) To find $\angle A$:
 $180^\circ - 90^\circ - 65^\circ$
 $= 25^\circ$

SIDE AC:
 $\sin 65^\circ = \frac{\text{opp}}{\text{hyp}}$

$$\frac{\sin 65^\circ}{1} = \frac{x}{15}$$

$$(\sin 65^\circ)(15) = x$$
$$13.6 = x$$

SIDE BC:
 $\cos 65^\circ = \frac{\text{adj}}{\text{hyp}}$

$$\frac{\cos 65^\circ}{1} = \frac{y}{15}$$

$$(\cos 65^\circ)(15) = y$$
$$6.3 = y$$

d) SIDE AB°

$$c^2 = a^2 + b^2$$

$$(19)^2 = (15)^2 + b^2$$

$$361 = 225 + b^2$$

$$361 - 225 = b^2$$

$$136 = b^2$$

$$11.7 = b$$

To find $\angle C$ °

$$\cos C = \frac{\text{adj}}{\text{hyp}}$$

$$\cos C = \frac{15}{19}$$

$$\cos C = 0.7895$$

$$C = \cos^{-1}(0.7895)$$

$$C = 38^\circ$$

To find $\angle B$ °

$$\sin \angle B = \frac{15}{19}$$

$$\sin \angle B = 0.7895$$

$$\angle B = \sin^{-1}(0.7895)$$

$$\angle B = 52^\circ$$

e) To find side AC:

$$c^2 = a^2 + b^2$$

$$c^2 = (3.5)^2 + (4.1)^2$$

$$c^2 = 12.25 + 16.81$$

$$c^2 = 29.06$$

$$c = 5.4 = AC$$

To find $\angle A$:

$$\tan \angle A = \frac{\text{opp}}{\text{adj}}$$

$$\tan \angle A = \frac{4.1}{3.5}$$

$$\tan \angle A = 1.1714$$

$$\angle A = \tan^{-1}(1.1714)$$

$$\angle A = 50^\circ$$

To find $\angle C$:

$$\tan \angle C = \frac{\text{opp}}{\text{adj}}$$

$$\tan \angle C = \frac{3.5}{4.1}$$

$$\tan \angle C = 0.8537$$

$$\angle C = \tan^{-1}(0.8537)$$

$$\angle C = 40^\circ$$

$$\begin{aligned}
 f) \quad c^2 &= a^2 + b^2 \\
 c^2 &= (3.0)^2 + (2.5)^2 \\
 c^2 &= 9 + 6.25 \\
 c^2 &= 15.25 \\
 c &= 3.91 = AB
 \end{aligned}$$

$$\begin{aligned}
 \text{To find } \angle A: \\
 \tan \angle A &= \frac{\text{opp}}{\text{adj}} \\
 \tan \angle A &= \frac{2.5}{3.0}
 \end{aligned}$$

$$\begin{aligned}
 \tan \angle A &= 0.8333 \\
 \angle A &= \tan^{-1}(0.8333) \\
 \angle A &= 40^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{To find } \angle B: \\
 \tan \angle B &= \frac{\text{opp}}{\text{adj}}
 \end{aligned}$$

$$\tan \angle B = \frac{3.0}{2.5}$$

$$\tan \angle B = 1.2000$$

$$\angle B = \tan^{-1}(1.2000)$$

$$\angle B = 50^\circ$$

g) To find $\angle A$:
 $180^\circ - 90^\circ - 63^\circ = 27^\circ$

To find side AB:
 $\sin 63^\circ = \frac{x}{8.2}$

To find side BC:

$$8.2 (\sin 63^\circ) = x$$
$$8.2 (0.8910) = x$$
$$7.3 = x$$

$$\cos 63^\circ = \frac{y}{8.2}$$

$$8.2 (\cos 63^\circ) = y$$
$$8.2 (0.4540) = y$$
$$3.7 = y$$

h) To find $\angle B$:
 $180^\circ - 90^\circ - 40^\circ = 50^\circ$

To find side BC :

$$\sin 40^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 40^\circ = \frac{5.7}{y}$$

$$y \sin 40^\circ = 5.7$$

$$y (0.6428) = 5.7$$

$$\cancel{0.6428} \quad 0.6428$$

$$y = 8.9$$

To find side AC :

$$\tan 40^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 40^\circ = \frac{5.7}{x}$$

$$x \tan 40^\circ = 5.7$$

$$x (0.8391) = 5.7$$

$$\cancel{0.8391} \quad 0.8391$$

$$x = 6.8$$