

Solve each triangle:

(1.)  $a = 13; A = 41; B = 75$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 41}{13} = \frac{\sin 75}{b} \quad \text{make substitutions}$$

$$b \sin 41 = 13 \sin 75 \quad \text{cross multiply}$$

$$\frac{b \sin 41}{\sin 41} = \frac{13 \sin 75}{\sin 41} \quad \text{divide each side by } \sin 41$$

$$b = 19 \quad \text{use calculator and cancel}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$41 + 75 + C = 180 \quad \text{make substitutions}$$

$$C + 116 = 180 \quad \text{combine like terms}$$

$$C - 116 - 116 = 180 - 116 - 116 \quad \text{subtract 116 from each side}$$

$$C = 64 \quad \text{subtract}$$

$$\frac{\sin C}{c} = \frac{\sin A}{a} \quad \text{use the law of sines again}$$

$$\frac{\sin 64}{c} = \frac{\sin 41}{13} \quad \text{make substitutions}$$

$$c \sin 41 = 13 \sin 64 \quad \text{cross multiply}$$

$$\frac{c \sin 41}{\sin 41} = \frac{13 \sin 64}{\sin 41} \quad \text{divide each side by } \sin 41$$

$$c = 17.8 \quad \text{use calculator and cancel}$$

results:  $A = 41$ ;  $B = 75$ ;  $C = 64$

$$a = 13 ; b = 19 ; c = 17.8$$

(2.)  $A = 71$  ;  $a = 20$  ;  $C = 62$

$A + B + C = 180$  use the triangle sum theorem

$71 + B + 62 = 180$  make substitutions

$B + 133 = 180$  combine like terms

$-133 \quad -133$  subtract 133 from each side

$$\begin{array}{r} B = 47 \end{array}$$
 subtract

$\frac{\sin A}{a} = \frac{\sin B}{b}$  use the law of sines

$\frac{\sin 71}{20} = \frac{\sin 47}{b}$  make substitutions

$b \sin 71 = 20 \sin 47$  cross multiply

$\frac{b \sin 71}{\sin 71} = \frac{20 \sin 47}{\sin 71}$  divide each side by this

$b = 15.5$  use calculator and cancel

$\frac{\sin A}{a} = \frac{\sin C}{c}$  use the law of sines

$\frac{\sin 71}{20} = \frac{\sin 62}{c}$  make substitutions

$c \sin 71 = 20 \sin 62$  cross multiply

$$\underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$\sin 71$      $\sin 71$     divide each side by  $\sin 71$

$c = 18.7$     use calculator and cancel

results:  $A = 71$ ;  $B = 47$ ;  $C = 62$

$a = 20$  ;  $b = 15.5$  ;  $c = 18.7$

(3.)  $A = 71$  ;  $B = 42$ ;  $c = 15$

$A + B + C = 180$     use the triangle sum theorem

$71 + 42 + C = 180$     make substitutions

$C + 113 = 180$     combine like terms

$-113$      $-113$     subtract 113 from each side

$$\frac{C}{C} = \frac{67}{67} \quad \text{subtract}$$

$\frac{\sin A}{a} = \frac{\sin C}{c}$     use the law of sines

$\frac{\sin 71}{a} = \frac{\sin 67}{15}$     make substitutions

$a \sin 67 = 15 \sin 71$     cross multiply

$\frac{a \sin 67}{\sin 67} = \frac{15 \sin 71}{\sin 67}$     divide each side by  $\sin 67$

$a = 15.4$     use calculator and cancel

$\frac{\sin B}{b} = \frac{\sin C}{c}$     use the law of sines again

$$\frac{\sin 42}{b} = \frac{\sin 67}{15} \quad \text{make substitutions}$$

$$b \sin 67 = 15 \sin 42 \quad \text{cross multiply}$$

$$\frac{b \sin 67}{\sin 67} = \frac{15 \sin 42}{\sin 67} \quad \text{divide each side by } \sin 67$$

$$b = 10.9 \quad \text{use calculator and cancel}$$

results:  $A = 71$  ;  $B = 42$  ;  $C = 67$

$$a = 15.4 \quad ; \quad b = 10.9 \quad ; \quad c = 15$$

(4.)  $a = 12$  ;  $B = 110$ ;  $C = 35$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$A + 110 + 35 = 180 \quad \text{make substitutions}$$

$$A + 145 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} -145 \quad -145 \\ A + 145 = 180 \\ \hline A = 35 \end{array} \quad \text{subtract 145 from each side}$$

$$A = 35 \quad \text{subtract}$$

$c = 12$  [c must equal the same as a, because

$\angle A = \angle C$  ][opposite angles are = . (geometry)]

[isosceles triangle]

$$b^2 = a^2 + a^2 - 2ab \cos B \quad \text{use the law of cosines}$$

$$b^2 = (12)^2 + (12)^2 - 2(12)(12)\cos 110 \quad \text{make substitutions}$$

$$b^2 = 386.5 \quad \text{use calculator}$$

$$b = 19.66 \quad \text{take square roots}$$

results:  $A = 35$  ;  $B = 110$  ;  $C = 35$

$a = 12$  ;  $b = 19.66$  ;  $c = 12$

(5.)  $b = 503$  ;  $A = 15$  ;  $B = 105$

$$\frac{\sin B}{b} = \frac{\sin A}{a} \quad \text{use the law of sines}$$

$$\frac{\sin 105}{503} = \frac{\sin 15}{a} \quad \text{make substitutions}$$

$$a \sin 105 = 503 \sin 15 \quad \text{cross multiply}$$

$$\frac{a \sin 105}{\sin 105} = \frac{503 \sin 15}{\sin 105} \quad \text{divide each side by } \sin 105$$

$$a = 134.8 \quad \text{use calculator and cancel}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$15 + 105 + C = 180 \quad \text{make substitutions}$$

$$C + 120 = 180 \quad \text{combine like terms}$$

$$C - 120 = 180 - 120 \quad \text{subtract 120 from each side}$$

$$C = 60 \quad \text{subtract}$$

$$\frac{\sin C}{c} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 60}{c} = \frac{\sin 105}{503} \quad \text{make substitutions}$$

$$c \sin 105 = 503 \sin 60 \quad \text{cross multiply}$$

$$\frac{c \sin 105}{\sin 105} = \frac{503 \sin 60}{\sin 105} \quad \text{divide each side by } \sin 105$$

$$c = 451 \quad \text{use calculator and cancel}$$

$$\text{results: } A = 15 ; B = 105 ; C = 60$$

$$a = 134.8 ; b = 503 ; c = 451$$

$$(6.) B = 125 ; A = 28 ; b = 14$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$28 + 125 + C = 180 \quad \text{make substitutions}$$

$$C + 153 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} -153 \quad -153 \\ C + 153 = 180 \\ \hline C = 27 \end{array} \quad \text{subtract 153 from each side}$$

$$C = 27 \quad \text{subtract}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 28}{a} = \frac{\sin 125}{14} \quad \text{make substitutions}$$

$$a \sin 125 = 14 \sin 28 \quad \text{cross multiply}$$

$$\frac{a \sin 125}{\sin 125} = \frac{14 \sin 28}{\sin 125} \quad \text{divide each side by } \sin 125$$

$$a = 8 \quad \text{use calculator and cancel}$$

$$\frac{\sin C}{c} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 27}{c} = \frac{\sin 125}{14} \quad \text{make substitutions}$$

$$c \sin 125 = 14 \sin 27 \quad \text{cross multiply}$$

$$\frac{\quad}{\sin 125} \quad \frac{\quad}{\sin 125} \quad \text{divide each side by } \sin 125$$

$$c = 7.76 \quad \text{use calculator and cancel}$$

$$\text{results: } A = 28 \quad ; \quad B = 125 \quad ; \quad C = 27$$

$$a = 8 \quad ; \quad b = 14 \quad ; \quad c = 7.76$$

$$(7.) \quad c = 16.5 \quad ; \quad A = 38 \quad ; \quad C = 54$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$38 + B + 54 = 180 \quad \text{make substitutions}$$

$$B + 92 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} - 92 \quad -92 \\ \hline \end{array} \quad \text{subtract 92 from each side}$$

$$\begin{array}{r} B = 88 \\ \hline \end{array} \quad \text{subtract}$$

$$\frac{\sin B}{b} = \frac{\sin C}{c} \quad \text{use the law of sines}$$

$$\frac{\sin 88}{b} = \frac{\sin 54}{16.5} \quad \text{make substitutions}$$

$$b \sin 54 = 16.5 \sin 88 \quad \text{cross multiply}$$

$$\frac{\quad}{\sin 54} \quad \frac{\quad}{\sin 54} \quad \text{divide each side by } \sin 54$$

$$b = 204 \quad \text{use calculator and cancel}$$

$$\frac{\sin A}{a} = \frac{\sin C}{c} \quad \text{use the law of sines}$$

$$\frac{\sin 38}{a} = \frac{\sin 54}{16.5} \quad \text{make substitution}$$

$$a \sin 54 = 16.5 \sin 38 \quad \text{cross multiply}$$

$$\frac{\sin 54}{\sin 54} = \frac{16.5 \sin 38}{\sin 54} \quad \text{divide each side by } \sin 54$$

$$a = 12.5 \quad \text{use calculator and cancel}$$

results:  $A = 38$  ;  $B = 88$  ;  $C = 54$

$$a = 12.5 ; b = 204 ; c = 16.5$$

(8.)  $b = 14.4$  ;  $A = 72$  ;  $C = 19$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$72 + B + 19 = 180 \quad \text{make substitutions}$$

$$B + 91 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} -91 \quad -91 \\ \hline B = 89 \end{array} \quad \text{subtract 91 from each side}$$

$$B = 89 \quad \text{subtract}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 72}{a} = \frac{\sin 89}{14.4} \quad \text{make substitutions}$$

$$a \sin 89 = 14.4 \sin 72 \quad \text{cross multiply}$$

$$\frac{a \sin 89}{\sin 89} = \frac{14.4 \sin 72}{\sin 89} \quad \text{divide each side by } \sin 89$$

$$a = 13.7 \quad \text{use calculator and cancel}$$



$$\frac{\sin C}{c} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 19}{c} = \frac{\sin 89}{14.4} \quad \text{make substitutions}$$

$$c \sin 89 = 14.4 \sin 19 \quad \text{cross multiply}$$

$$\frac{c \sin 89}{\sin 89} = \frac{14.4 \sin 19}{\sin 89} \quad \text{divide each side by } \sin 89$$

$$c = 4.7 \quad \text{use calculator and cancel}$$

results:  $A = 72$ ;  $B = 89$ ;  $C = 19$

$$a = 13.7 \quad ; \quad b = 14.4 \quad ; \quad c = 4.7$$

(9.)  $b = 224$ ;  $A = 21$ ;  $B = 84$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$21 + 84 + C = 180 \quad \text{make substitutions}$$

$$C + 105 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} -105 \quad -105 \\ C + 105 = 180 \\ \hline C = 75 \end{array} \quad \text{subtract 105 from each side}$$

$$C = 75 \quad \text{subtract}$$

$$\frac{\sin C}{c} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 75}{c} = \frac{\sin 84}{224} \quad \text{make substitutions}$$

$$c \sin 84 = 224 \sin 75 \quad \text{cross multiply}$$

$$\frac{c \sin 84}{\sin 84} = \frac{224 \sin 75}{\sin 84}$$

$\sin 84$      $\sin 84$     divide each side by  $\sin 84$

$c = 217.5$     use calculator

$\frac{\sin A}{a} = \frac{\sin B}{b}$     use the law of sines

$\frac{\sin 21}{a} = \frac{\sin 84}{224}$     make substitutions

$a \sin 84 = 224 \sin 21$     cross multiply

$\frac{a \sin 84}{\sin 84} = \frac{224 \sin 21}{\sin 84}$     divide each side by  $\sin 84$

$a = 80.7$     use calculator and cancel

results:  $A = 21$  ;  $B = 84$  ;  $C = 75$

$a = 80.7$  ;  $b = 224$  ;  $c = 217.5$

(10.)  $c = 916$  ;  $A = 15$  ;  $B = 60$

$A + B + C = 180$     use the triangle sum theorem

$15 + 60 + C = 180$     make substitutions

$C + 75 = 180$     combine like terms

$- 75 \quad -75$     subtract 75 from each side

$\frac{C + 75}{-75} = \frac{180 - 75}{-75}$     subtract

$\frac{\sin A}{a} = \frac{\sin C}{c}$     use the law of sines

$\frac{\sin 15}{a} = \frac{\sin 105}{916}$     make substitutions

$$a \sin 105 = 916 \sin 15 \quad \text{cross multiply}$$

$$\frac{\quad}{\sin 105} = \frac{\quad}{\sin 105} \quad \text{divide each side by } \sin 105$$

$$a = 245.5 \quad \text{use calculator and cancel}$$

$$\frac{\sin B}{b} = \frac{\sin C}{c} \quad \text{use the law of sines}$$

$$\frac{\sin 60}{b} = \frac{\sin 105}{916} \quad \text{make substitutions}$$

$$b \sin 105 = 916 \sin 60 \quad \text{cross multiply}$$

$$\frac{\quad}{\sin 105} = \frac{\quad}{\sin 105} \quad \text{divide each side by } \sin 105$$

$$b = 821 \quad \text{use calculator and cancel}$$

results:  $A = 15$ ;  $B = 60$  ;  $C = 105$

$$a = 245.5 ; b = 821 ; c = 916$$

(11.)  $A = 101$  ;  $C = 37$  ;  $a = 23$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$101 + B + 37 = 180 \quad \text{make substitutions}$$

$$B + 138 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} - 138 \quad -138 \\ \hline \end{array} \quad \text{subtract 138 from each side}$$

$$\frac{\quad}{B} = 42 \quad \text{subtract}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 101}{23} = \frac{\sin 42}{b} \quad \text{make substitutions}$$

$$b \sin 101 = 23 \sin 42 \quad \text{cross multiply}$$

$$\frac{b \sin 101}{\sin 101} = \frac{23 \sin 42}{\sin 101} \quad \text{divide each side by } \sin 101$$

$$b = 15.7 \quad \text{use calculator and cancel}$$

$$\frac{\sin C}{c} = \frac{\sin A}{a} \quad \text{use the law of sines}$$

$$\frac{\sin 37}{c} = \frac{\sin 101}{23} \quad \text{make substitutions}$$

$$c \sin 101 = 23 \sin 37 \quad \text{cross multiply}$$

$$\frac{c \sin 101}{\sin 101} = \frac{23 \sin 37}{\sin 101} \quad \text{divide each side by this}$$

$$c = 14 \quad \text{use calculator and cancel}$$

results:  $A = 101$  ;  $B = 42$  ;  $C = 37$

$$a = 23 ; b = 15.7 ; c = 14$$

(12.)  $B = 152$ ;  $b = 95$ ;  $C = 12$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$A + 152 + 12 = 180 \quad \text{make substitutions}$$

$$A + 164 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} -164 \quad -164 \\ \hline A = 16 \end{array} \quad \text{subtract 164 from each side}$$

$$\frac{\sin B}{b} = \frac{\sin A}{a} \quad \text{subtract}$$

$$\sin B \quad \sin A$$

$$\frac{\quad}{b} = \frac{\quad}{a} \quad \text{use the law of sines}$$

$$\frac{\sin 152}{95} = \frac{\sin 16}{a} \quad \text{make substitutions}$$

$$a \sin 152 = 95 \sin 16 \quad \text{cross multiply}$$

$$\frac{\quad}{\sin 152} \quad \frac{\quad}{\sin 152} \quad \text{divide each side by } \sin 152$$

$$a = 55.8 \quad \text{use calculator and cancel}$$

$$\frac{\sin B}{b} = \frac{\sin C}{c} \quad \text{use the law of sines}$$

$$\frac{\sin 152}{95} = \frac{\sin 12}{c} \quad \text{make substitutions}$$

$$c \sin 152 = 95 \sin 12 \quad \text{cross multiply}$$

$$\frac{\quad}{\sin 152} \quad \frac{\quad}{\sin 152} \quad \text{divide each side by } \sin 152$$

$$c = 42 \quad \text{use calculator}$$

results:  $A = 16$  ;  $B = 152$  ;  $C = 12$

$$a = 55.8 ; b = 95 ; c = 42$$

(13.)  $a = 150$ ;  $B = 32$ ;  $C = 54$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$A + 32 + 54 = 180 \quad \text{make substitutions}$$

$$A + 86 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} - 86 \quad -86 \\ \hline \end{array} \quad \text{subtract 86 from each side}$$

$$A = 94 \quad \text{subtract}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 94}{150} = \frac{\sin 32}{b} \quad \text{make substitutions}$$

$$b \sin 94 = 150 \sin 32 \quad \text{cross multiply}$$

$$\frac{b \sin 94}{\sin 94} = \frac{150 \sin 32}{\sin 94} \quad \text{divide each side by } \sin 94$$

$$b = 80 \quad \text{use calculator and cancel}$$

$$\frac{\sin A}{a} = \frac{\sin C}{c} \quad \text{use the law of sines}$$

$$\frac{\sin 94}{150} = \frac{\sin 54}{c} \quad \text{make substitutions}$$

$$c \sin 94 = 150 \sin 54 \quad \text{cross multiply}$$

$$\frac{c \sin 94}{\sin 94} = \frac{150 \sin 54}{\sin 94} \quad \text{divide each side by } \sin 94$$

$$c = 121.6 \quad \text{use calculator and cancel}$$

results:  $A = 94$  ;  $B = 32$  ;  $C = 54$

$$a = 150 ; b = 80 ; c = 121.6$$

(14.)  $a = 75$  ;  $A = 18$  ;  $C = 32$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$18 + B + 32 = 180 \quad \text{make substitutions}$$

$$B + 50 = 180 \quad \text{combine like terms}$$

- 50    -50                    subtract 50 from each side

$$\frac{B}{\sin A} = \frac{130}{\sin 18}$$

subtract

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

use the law of sines

$$\frac{\sin 18}{75} = \frac{\sin 130}{b}$$

make substitutions

$$b \sin 18 = 75 \sin 130$$

cross multiply

$$\frac{b \sin 18}{\sin 18} = \frac{75 \sin 130}{\sin 18}$$

divide each side by sin 18

$$b = 186$$

use calculator and cancel

$$\frac{\sin C}{c} = \frac{\sin A}{a}$$

use the law of sines

$$\frac{\sin 32}{c} = \frac{\sin 18}{75}$$

make substitutions

$$c \sin 18 = 75 \sin 32$$

cross multiply

$$\frac{c \sin 18}{\sin 18} = \frac{75 \sin 32}{\sin 18}$$

divide each side by sin 18

$$c = 128.6$$

use calculator and cancel

Solve each triangle:

(5.)  $b = 40$  ;  $c = 45$  ;  $A = 51$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

use the law of cosines

$$a^2 = (40)^2 + (45)^2 - 2(40)(45)\cos 51$$

make substitutions

$$a^2 = 1359.44659222 \quad \text{use calculator}$$

$$a = 36.87 \quad \text{take the square root of each side}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 51}{36.87} = \frac{\sin B}{40} \quad \text{make substitutions}$$

$$40 \sin 51 = 36.87 \sin B \quad \text{cross multiply}$$

$$\frac{40 \sin 51}{36.87} = \frac{36.87 \sin B}{36.87} \quad \text{divide each side by this}$$

$$0.84312 = \sin B \quad \text{use calculator and cancel}$$

$$B = 57.5 \quad \text{take the arcsin of each side}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$51 + 57.5 + C = 180 \quad \text{make substitutions}$$

$$C + 108.5 = 180 \quad \text{combine like terms}$$

$$- 108.5 \quad -108.5 \quad \text{subtract 108.5 fr ea side}$$

$$\frac{C}{C} = \frac{71.5}{71.5} \quad \text{subtract}$$

$$\text{results: } A = 51 ; B = 57.5 ; C = 71.5$$

$$a = 36.87 ; b = 40 ; c = 45$$

$$(16.) \quad a = 20 ; c = 24 ; B = 47$$

$$b^2 = a^2 + c^2 - 2ac \cos B \quad \text{use the law of cosines}$$

$$b^2 = (20)^2 + (24)^2 - 2(20)(24)\cos 47 \quad \text{make substitutions}$$



$$b^2 = 321.28 \quad \text{use calculator}$$

$$b = 18 \quad \text{take the square root of each side}$$

$$\frac{\sin B}{b} = \frac{\sin A}{a} \quad \text{use the law of sines}$$

$$\frac{\sin 47}{18} = \frac{\sin A}{20} \quad \text{make substitutions}$$

$$18 \sin A = 20 \sin 47 \quad \text{cross multiply}$$

$$\frac{18 \sin A}{18} = \frac{20 \sin 47}{18} \quad \text{divide each side by 18}$$

$$\sin A = 0.812615224 \quad \text{use calculator}$$

$$A = 54 \quad \text{take the arcsin of each side}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$54 + 47 + C = 180 \quad \text{make substitutions}$$

$$C + 101 = 180 \quad \text{combine like terms}$$

$$C - 101 = 180 - 101 \quad \text{subtract 101 from each side}$$

$$\frac{C - 101}{-101} = \frac{180 - 101}{-101} \quad \text{subtract}$$

$$\text{results: } A = 54 ; B = 47 ; C = 79$$

$$a = 20 ; b = 18 ; c = 24$$

$$(17.) \quad a = 5 ; b = 6 ; c = 7 \quad \text{here is the problem}$$

$$c^2 = a^2 + b^2 - 2ab \cos C \quad \text{use the law of cosines}$$

$$(7)^2 = (5)^2 + (6)^2 - 2(5)(6) \cos C \quad \text{make substitutions}$$

$$49 = 25 + 36 - 60 \cos C \quad \text{multiply}$$

$$49 = 61 - 60 \cos C \quad \text{combine like terms}$$

$$-49 = -61 + 60 \cos C \quad \text{multiply thru by -1}$$

$$+ 61 \quad +61 \quad \text{add 61 to each side}$$

$$\frac{12 = 60 \cos C}{\quad \quad \quad} \quad \text{add}$$

$$60 \cos C = 12 \quad \text{just rearrange like this}$$

$$\frac{60}{60} \quad \frac{60}{60} \quad \text{divide each side by 60}$$

$$\cos C = 0.2 \quad \text{divide and cancel}$$

$$C = 78.5 \quad \text{take the arccos of each side}$$

$$\frac{\sin C}{c} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 78.5}{7} = \frac{\sin B}{6} \quad \text{make substitutions}$$

$$7 \sin B = 6 \sin 78.5 \quad \text{cross multiply}$$

$$\frac{7 \sin B}{7} = \frac{6 \sin 78.5}{7} \quad \text{divide each side by 7}$$

$$\sin B = 0.84 \quad \text{use calculator and cancel}$$

$$B = 57 \quad \text{take the arcsin of each side}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$A + 57 + 78.5 = 180 \quad \text{make substitutions}$$

$$A + 135.5 = 180 \quad \text{combine like terms}$$

$$-135.5 \quad -135.5 \quad \text{subtract 135.5 from each side}$$

$$\overline{A} = 44.5 \quad \text{subtract}$$

results:  $A = 44.5$  ;  $B = 57$ ;  $C = 78.5$

$$a = 5 \quad ; \quad b = 6 \quad ; \quad c = 7$$

(18.)  $a = 5$  ;  $b = 12$ ;  $c = 13$  here is the problem

$$C = 90 \quad [\text{this is a right triangle}]$$

$$\sin A = 5/13 \quad \text{use this equation to find A}$$

$$A = \arcsin (5/13) \quad \text{take the arcsin of each side}$$

$$A = 22.6 \quad \text{use calculator}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$22.6 + B + 90 = 180 \quad \text{make substitutions}$$

$$B + 112.6 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} - 112.6 \quad -112.6 \\ B + 112.6 = 180 \\ \hline B = 67.4 \end{array} \quad \text{subtract 112.6 from each side}$$

$$\overline{B} = 67.4 \quad \text{subtract}$$

results:  $A = 22.6$ ;  $B = 67.4$ ;  $C = 90$

$$a = 5 \quad ; \quad b = 12 \quad ; \quad c = 13$$

(19.)  $b = 16$  ;  $c = 19$ ;  $A = 35$  here is the problem

$$a^2 = b^2 + c^2 - 2bc \cos A \quad \text{use the law of cosines}$$

$$a^2 = (16)^2 + (19)^2 - 2(16)(19)\cos 35 \quad \text{make substitutions}$$

$$a^2 = 119 \quad \text{use calculator}$$

$$a = 11 \quad \text{take square root of each side}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{use the law of sines}$$

$$\frac{\sin 35}{11} = \frac{\sin B}{16} \quad \text{make substitutions}$$

$$11 \sin B = 16 \sin 35 \quad \text{cross multiply}$$

$$\frac{11 \sin B}{11} = \frac{16 \sin 35}{11} \quad \text{divide each side by 11}$$

$$\sin B = (16 \sin 35)/11 \quad \text{cancel}$$

$$B = \arcsin [(16 \sin 35)/11] \quad \text{take arcsin of each side}$$

$$B = 56.5 \quad \text{use calculator}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$35 + 56.5 + C = 180 \quad \text{make substitutions}$$

$$C + 91.5 = 180 \quad \text{combine like terms}$$

$$- 91.5 \quad -91.5 \quad \text{subtract 91.5 from each side}$$

$$\hline C = 88.5 \quad \text{subtract}$$

results:  $A = 35$  ;  $B = 56.5$  ;  $C = 88.5$

$$a = 11; \quad b = 16; \quad c = 19$$

$$(20.) \quad b = 13; \quad a = 11; \quad C = 76$$

$$c^2 = a^2 + b^2 - 2ab \cos C \quad \text{use the law of cosines}$$

$$c^2 = (11)^2 + (13)^2 - 2(11)(13)\cos 76 \quad \text{make substitutions}$$

$$c^2 = 220.8 \quad \text{use calculator}$$

$$c = 14.8 \quad \text{take square roots}$$

$$\frac{\sin C}{c} = \frac{\sin A}{a} \quad \text{use the law of sines}$$

$$\frac{\sin 76}{14.8} = \frac{\sin A}{11} \quad \text{make substitutions}$$

$$14.8 \sin A = 11 \sin 76 \quad \text{cross multiply}$$

$$\frac{14.8 \sin A}{14.8} = \frac{11 \sin 76}{14.8} \quad \text{divide each side by 14.8}$$

$$\sin A = (11 \sin 76)/14.8 \quad \text{cancel}$$

$$A = \arcsin [(11 \sin 76)/14.8] \quad \text{take arcsin of each side}$$

$$A = 46 \quad \text{use calculator}$$

$$A + B + C = 180 \quad \text{use the triangle sum theorem}$$

$$46 + B + 76 = 180 \quad \text{make substitutions}$$

$$B + 122 = 180 \quad \text{combine like terms}$$

$$\begin{array}{r} -122 \quad -122 \\ B + 122 = 180 \\ \hline B \end{array} \quad \text{subtract 122 from each side}$$

$$B = 58 \quad \text{subtract}$$

results:  $A = 46$  ;  $B = 58$  ;  $C = 76$

$$a = 11; \quad b = 13; \quad 14.8$$