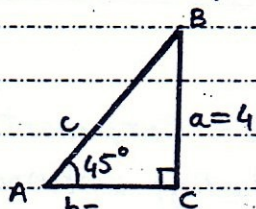


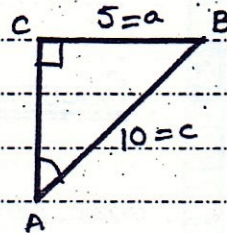
EXERCISE: 12.2

Q.1 Find the unknowns of the following triangles:

- (i) $a = 4$
 $m\angle A = 45^\circ$
 $m\angle C = 90^\circ$



- (iii) $a = 5$
 $c = 10$
 $m\angle C = 90^\circ$



$\therefore m\angle A + m\angle B + m\angle C = 180^\circ$
 $45^\circ + m\angle B + 90^\circ = 180^\circ$
 $m\angle B = 180^\circ - 90^\circ - 45^\circ = 45^\circ$

$m\angle B = 45^\circ$

Now $\sin m\angle A = \frac{a}{c}$
 $\sin 45^\circ = \frac{4}{c} \Rightarrow c = \frac{4}{\sin 45^\circ}$

$c = \frac{4}{(1/\sqrt{2})} = 4\sqrt{2}$

$c = 4\sqrt{2}$

Now $c^2 = a^2 + b^2$
 $\Rightarrow b^2 = c^2 - a^2 = (4\sqrt{2})^2 - (4)^2$
 $b^2 = 32 - 16 = 16$

$b = 4$

$\therefore c^2 = a^2 + b^2$
 $b^2 = c^2 - a^2$

$b^2 = 100 - 25 = 75$

$b = 5\sqrt{3}$

Now $\sin m\angle A = \frac{a}{c} = \frac{5}{10} = \frac{1}{2}$

$m\angle A = \sin^{-1}(1/2) = 30^\circ$

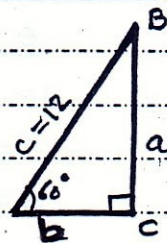
$\Rightarrow m\angle A = 30^\circ$

$\therefore m\angle A + m\angle B + m\angle C = 180^\circ$

$m\angle B = 180^\circ - 30^\circ - 90^\circ = 60^\circ$

$m\angle B = 60^\circ$

- (ii) $m\angle A = 60^\circ$
 $m\angle C = 90^\circ$
 $c = 12$



$\therefore m\angle A + m\angle B + m\angle C = 180^\circ$
 $60^\circ + m\angle B + 90^\circ = 180^\circ$
 $m\angle B = 180^\circ - 90^\circ - 60^\circ = 30^\circ$

$m\angle B = 30^\circ$

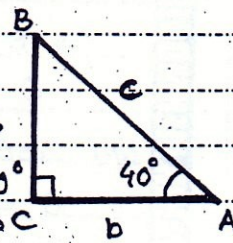
Now $\sin 60^\circ = \frac{a}{c}$
 $\Rightarrow a = 12 \cdot (\frac{\sqrt{3}}{2}) = 6\sqrt{3}$

$a = 6\sqrt{3}$

Now $c^2 = a^2 + b^2 \Rightarrow b^2 = c^2 - a^2$
 $b^2 = 144 - 108 = 36$

$b = 6$

- (iv) $a = 8$
 $m\angle A = 40^\circ$
 $m\angle C = 90^\circ$



$\therefore m\angle A + m\angle B + m\angle C = 180^\circ$
 $m\angle B = 180^\circ - 40^\circ - 90^\circ = 50^\circ$

$m\angle B = 50^\circ$

Now $\sin 40^\circ = \frac{a}{c} = \frac{8}{c}$
 $\Rightarrow c = \frac{8}{\sin 40^\circ} = \frac{8}{0.6425}$

$c = 12.45$

Now $c^2 = a^2 + b^2$
 $(12.45)^2 = (8)^2 + b^2$

$b^2 = 155.0025 - 64$

$b^2 = 91.0025$

$b = \sqrt{91.0025}$

$b = 9.5$

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(v) $c = 15$

$m\angle B = 56^\circ$

$m\angle C = 90^\circ$

$\therefore m\angle A + m\angle B + m\angle C = 180^\circ$

$m\angle A = 180^\circ - 90^\circ - 56^\circ$

$m\angle A = 34^\circ$

Now $\sin 34^\circ = \frac{a}{c} = \frac{a}{15}$

$a = 15 \times \sin 34^\circ$

$a = 15 \times 0.5592$

$a = 8.38$

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

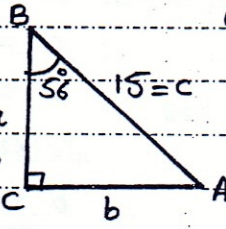
$b^2 = c^2 - a^2$

$b^2 = (15)^2 - (8.38)^2$

$b^2 = 225 - 70.2244$

$b^2 = 154.7756$

$b = 12.44$



Q.2

$a = 243$

$\alpha = 37^\circ 20'$

$\gamma = 90^\circ$

$\therefore \alpha + \beta + \gamma = 180^\circ$

$\beta = 180^\circ - 90^\circ - 37^\circ 20'$

$\beta = 52^\circ 40'$

Now

$\sin \alpha = \frac{a}{c}$

$\sin 37^\circ 20' = \frac{243}{c}$

$c = \frac{243}{\sin 37^\circ 20'} = \frac{243}{0.6065}$

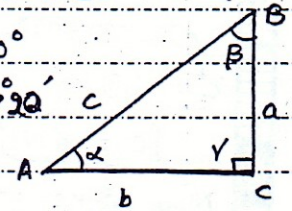
$c = 400.69$

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

$(400.69)^2 = (243)^2 + b^2$

$b^2 = 101,504.949$

$b = 318.60$



Q.3

$\alpha = 62^\circ 40'$

$b = 796$

$\gamma = 90^\circ$

$\therefore \alpha + \beta + \gamma = 180^\circ$

$\beta = 180^\circ - 90^\circ - 62^\circ 40'$

$\beta = 27^\circ 20'$

Now

$\cos \alpha = \frac{b}{c}$

$\cos 62^\circ 40' = \frac{796}{c} \Rightarrow c = \frac{796}{\cos 62^\circ 40'}$

$c = 1733.58$

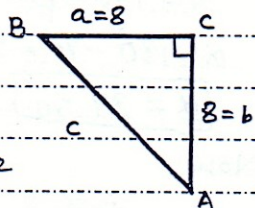
Now $c^2 = a^2 + b^2$

$a^2 = c^2 - b^2$

$a^2 = (1733.58)^2 - (796)^2$

$a^2 = 2371670.174$

$a = 1540.02$



$a = 8$

$b = 8$

$m\angle C = 90^\circ$

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

$c^2 = 64 + 64 = 128$

$c = \sqrt{128} = 8\sqrt{2}$

$\sin m\angle A = \frac{a}{c}$

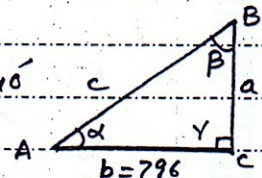
$\sin m\angle A = \frac{8}{8\sqrt{2}} = \frac{1}{\sqrt{2}}$

$m\angle A = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right) = 45^\circ$

Now $m\angle A + m\angle B + m\angle C = 180^\circ$

$m\angle B = 180^\circ - 90^\circ - 45^\circ$

$m\angle B = 45^\circ$



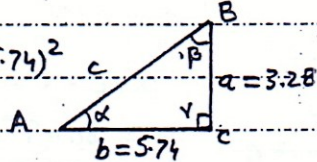
Q.4 $a = 3.28$ $b = 5.74$ $\gamma = 90^\circ$

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

$c^2 = (3.28)^2 + (5.74)^2$

$c^2 = 43.706$

$c = 6.61$



Now $\sin \alpha = \frac{a}{c} = \frac{3.28}{6.61}$

$\sin \alpha = 0.4961$

$\alpha = \sin^{-1}(0.4961)$

$\alpha = 29^\circ 45'$

$\alpha + \beta + \gamma = 180^\circ$

$\beta = 180^\circ - 90^\circ - 29^\circ 45'$

$\beta = 60^\circ 15'$

Q.6 $a = 5429$ $c = 6294$ $\gamma = 90^\circ$

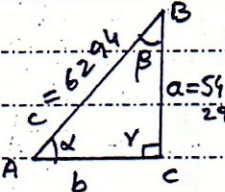
$\therefore c^2 = a^2 + b^2$

$b^2 = c^2 - a^2$

$b^2 = (6294)^2 - (5429)^2$

$b^2 = 10146395$

$b = 3184.40$



Now $\sin \alpha = \frac{a}{c} = \frac{5429}{6294} = 0.8626$

$\alpha = \sin^{-1}(0.8626)$

$\alpha = 59^\circ 36'$

$\alpha + \beta + \gamma = 180^\circ$

$\beta = 180^\circ - \alpha - \gamma$

$\beta = 180^\circ - 59^\circ 36' - 90^\circ$

$\beta = 30^\circ 24'$

Q.5 $b = 68.4$ $c = 96.2$ $\gamma = 90^\circ$

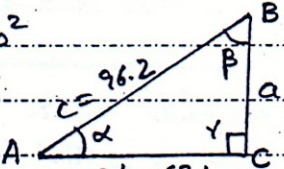
$\therefore c^2 = a^2 + b^2$

$a^2 = c^2 - b^2$

$a^2 = (96.2)^2 - (68.4)^2$

$a^2 = 4575.88$

$a = 67.65$



Now

$\sin \alpha = \frac{a}{c}$

$\sin \alpha = \frac{67.65}{96.2} = 0.7032$

$\alpha = \sin^{-1}(0.7032)$

$\alpha = 44^\circ 41'$

Now

$\alpha + \beta + \gamma = 180^\circ$

$\beta = 180^\circ - \alpha - \gamma$

$\beta = 180^\circ - 90^\circ - 44^\circ 41'$

$\beta = 45^\circ 19'$

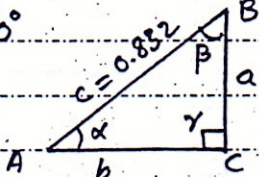
Q.7 $\beta = 50^\circ 10'$ $c = 0.832$ $\gamma = 90^\circ$

$\therefore \alpha + \beta + \gamma = 180^\circ$

$\alpha = 180^\circ - \beta - \gamma$

$\alpha = 180^\circ - 90^\circ - 50^\circ 10'$

$\alpha = 39^\circ 50'$



Now

$\sin \alpha = \frac{a}{c}$

$\sin 39^\circ 50' = \frac{a}{0.832}$

$a = 0.832 \times \sin 39^\circ 50'$

$a = 0.533$

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

$b^2 = c^2 - a^2$

$b^2 = (0.832)^2 - (0.533)^2$

$b^2 = 0.40819$

$b = 0.639$

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