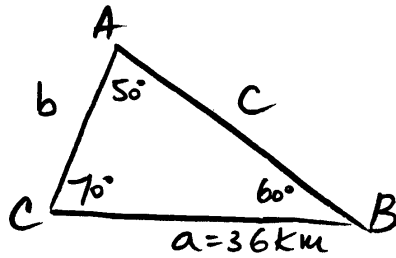


# SOLUTIONS

①  $A = 50^\circ$   
 $B = 60^\circ$   
 $a = 36 \text{ km}$   


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 $C = ?$   
 $b = ?$   
 $c = ?$



Solution

If  $A = 50^\circ$ ,  $B = 60^\circ$ , then  
 $C = 180^\circ - 50^\circ - 60^\circ$

$C = 70^\circ$

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

$\frac{b}{\sin 60^\circ} = \frac{36}{\sin 50^\circ} \Rightarrow b = \frac{36 \sin 60^\circ}{\sin 50^\circ}$

$b \approx 40.7 \text{ km}$

$b \approx 41 \text{ km}$

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

$\frac{c}{\sin 70^\circ} = \frac{36}{\sin 50^\circ} \Rightarrow c = \frac{36 \sin 70^\circ}{\sin 50^\circ}$

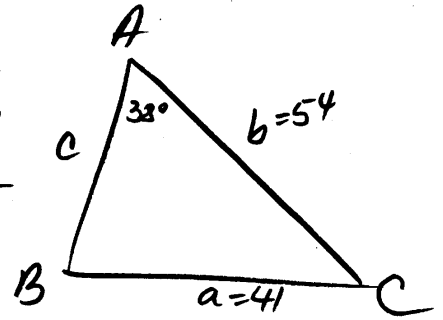
$c \approx 44.1$

$c \approx 44 \text{ km}$

②  $A = 38^\circ$   
 $a = 41 \text{ ft}$   
 $b = 54 \text{ ft}$   


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 $B = ?$   
 $C = ?$   
 $c = ?$



Solution

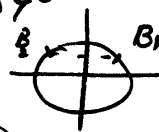
$B = ? \quad \frac{\sin B}{b} = \frac{\sin A}{a}$

$\frac{\sin B}{54} = \frac{\sin 38^\circ}{41} \Rightarrow$

$\sin B = \frac{54 \sin 38^\circ}{41} \approx 0.81$

$\sin B \approx 0.81$

$B_1 = \sin^{-1}(0.81) \text{ OR } B_2 = 180^\circ - B_1$   
 $B_1 \approx 54^\circ$   
 $B_2 \approx 180^\circ - 54^\circ$   
 $B_2 \approx 126^\circ$



Case I

$A = 38^\circ$

$B_1 = 54^\circ$

$C = 180^\circ - 38^\circ - 54^\circ$

$C = 88^\circ$

$c^2 = b^2 + a^2 - 2ba \cos C$   
 $c^2 = 54^2 + 41^2 - 2(54)(41) \cos 88^\circ$

$c \approx 66.7 \text{ ft}$

Case II

$A = 38^\circ$

$B_2 = 126^\circ$

$C = 180^\circ - 38^\circ - 126^\circ$

$C = 16^\circ$

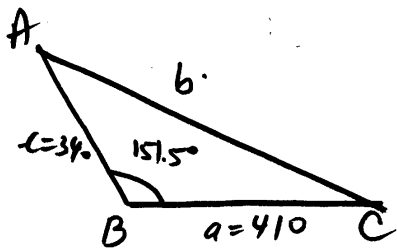
$c = \frac{41 \sin 16^\circ}{\sin 38^\circ} \approx 18.4$

$c \approx 18.4 \text{ ft}$

③  $a = 410 \text{ m}$   
 $c = 340 \text{ m}$   
 $B = 151.5^\circ$

---

$b = ?$   
 $A = ?$   
 $C = ?$



Solution

$b = ?$   $b^2 = a^2 + c^2 - 2ac \cos B$   
 $b^2 = (410)^2 + (340)^2 - 2(410)(340) \cos 151.5^\circ$   
 $b^2 \approx 528,714 \Rightarrow \boxed{b \approx 727 \text{ m}}$

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

$\sin A = \frac{a \sin B}{b} = \frac{410 \sin 151.5^\circ}{727}$

$\sin A \approx 0.27 \Rightarrow$

$A_1 = \sin^{-1} 0.27$  OR  $A_2 = 180^\circ - A_1$   
 $A_1 \approx 15.7^\circ$   $A_2 \approx 164.3^\circ$

not possible  
 (the sum of  $\angle$ 's  
 is  $> 180^\circ$ )

Therefore,  $\boxed{A \approx 15.7^\circ}$

$C = ?$

$C = 180^\circ - A - B$

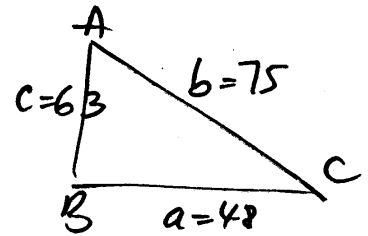
$C = 180^\circ - 15.7^\circ - 151.5^\circ$

$\boxed{C \approx 12.8^\circ}$

④  $a = 48$   
 $b = 75$   
 $c = 63$

---

$A, B, C = ?$



Solution

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

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

$= \frac{75^2 + 63^2 - 48^2}{2(75)(63)} \approx 0.77$

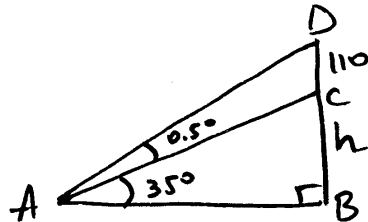
$A = \cos^{-1} 0.77$   $\boxed{A \approx 39.7^\circ}$

$\cos B = \frac{a^2 + c^2 - b^2}{2ac} \approx 0.11$

$B = \cos^{-1} 0.11$   $\boxed{B \approx 83.7^\circ}$

$C = 180^\circ - 39.7^\circ - 83.7^\circ$   $\boxed{C \approx 56.6^\circ}$

⑤



Solution

$\Delta ABC: \sin 35^\circ = \frac{h}{AC} \Rightarrow h = AC \sin 35^\circ$

$\angle ADB = 90^\circ - 35.5^\circ = 54.5^\circ$

$\Delta ADC: \frac{110}{\sin 0.5^\circ} = \frac{AC}{\sin 54.5^\circ} \Rightarrow$

$AC = \frac{110 \sin 54.5^\circ}{\sin 0.5^\circ} \approx 10,262 \text{ ft}$

$h = AC \sin 35^\circ$

$h = 10,262 \sin 35^\circ$   $\boxed{h \approx 5900 \text{ ft}}$