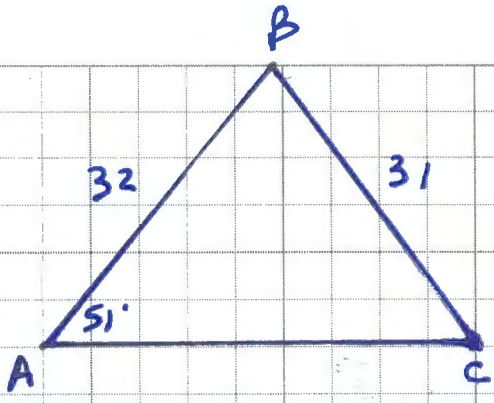
① $m\angle A = 51°$
$c = 32$
$a = 31$
Find b.



· Since we know both A & a, that will form the left side of the proportion.

· we don't know either B or b so we'll find b by way of C & c. This will form the right side of our proportion.

· Using the Triangle sum Theorem...

$m\angle A + m\angle B + m\angle C = 180°$

$51° + m\angle B + 53.3° = 180°$

$m\angle B + 104.3° = 180°$

$m\angle B = 75.7°$

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

$\frac{\sin 51°}{31} = \frac{\sin C}{32}$

$32 \cdot \frac{\sin 51°}{31} = \frac{\sin C}{32} \cdot 32$

$\sin C = \frac{32 \cdot \sin 51°}{31}$

$\sin C = 0.8022151\ldots$

$C = \sin^{-1}(0.8022151\ldots)$

$C = 53.342160\ldots$

$C \approx 53.3°$

#1 continued

·Using the Law of Sines again...

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

$$\frac{\sin 51^\circ}{31} = \frac{\sin 75.7^\circ}{b}$$

cross-multiply

$$b \cdot \sin 51^\circ = 31 \cdot \sin 75.7^\circ$$

$$\frac{b \cdot \sin 51^\circ}{\sin 51^\circ} = \frac{31 \cdot \sin 75.7^\circ}{\sin 51^\circ}$$

$$b = \frac{31 \cdot \sin 75.7^\circ}{\sin 51^\circ}$$

$$b = 38.\overline{65}35\ldots$$

$$\boxed{b \approx 38.7}$$

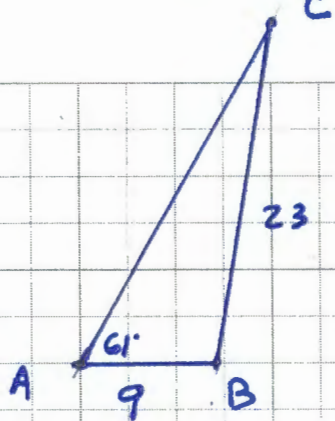
Note! Another triangle may be formed with dimensions given. This is due to the Ambiguous Case which we will explore next class.

② $m\angle A = 61°$

$c = 9$

$a = 23$

Find $m\angle C$



- We know A & a, so that will form the left side of our proportion
- We're looking for $m\angle C$
- We know c. That and $\angle C$ will form the right side of our proportion.

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

$$\frac{\sin 61°}{23} = \frac{\sin C}{9}$$

$$9 \cdot \frac{\sin 61°}{23} = \frac{\sin C}{9} \cdot 9$$

$$\sin C = \frac{9 \cdot \sin 61°}{23}$$

$$\sin C = 0.342242\ldots$$

$$C = \sin^{-1}(0.342242\ldots)$$

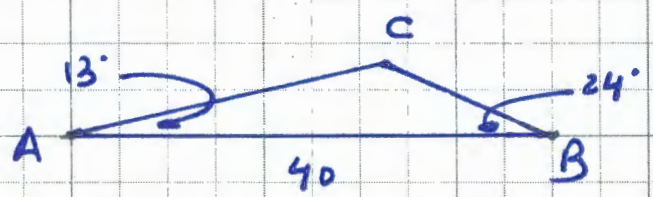
$$C = 20.013\,5579\ldots$$

$$C \approx 20°$$

(3) $m\angle A = 13^\circ$

$m\angle B = 24^\circ$

$c = 40$



Find

$m\angle C$

a

b

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

$13^\circ + 24^\circ + m\angle C = 180^\circ$

$37^\circ + m\angle C = 180^\circ$

$\boxed{m\angle C = 143^\circ}$

• Since we know C & c we can find a (or b really) ⟹

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

$\frac{\sin 143^\circ}{40} = \frac{\sin 13^\circ}{a}$

cross-multiply

$a \cdot \sin 143^\circ = 40 \cdot \sin 13^\circ$

$\frac{a \sin 143^\circ}{\sin 143^\circ} = \frac{40 \cdot \sin 13^\circ}{\sin 143^\circ}$

$a = 14.951508\ldots$

$\boxed{a \approx 15}$

$\frac{\sin C}{c} = \frac{\sin B}{b}$

$\frac{\sin 143^\circ}{40} = \frac{\sin 24^\circ}{b}$

cross-multiply

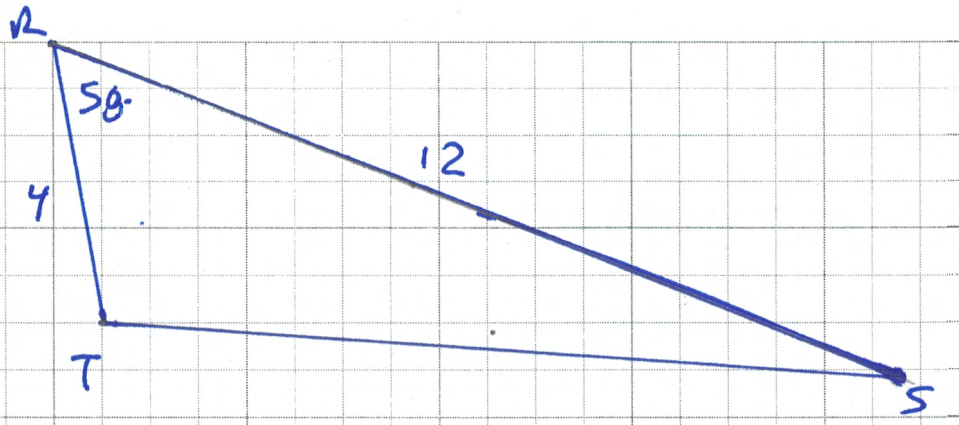
$b \cdot \sin 143^\circ = 40 \cdot \sin 24^\circ$

$\frac{b \cdot \sin 143^\circ}{\sin 143^\circ} = \frac{40 \cdot \sin 24^\circ}{\sin 143^\circ}$

$b = 27.033\,9573\ldots$

$\boxed{b \approx 27}$

(4)



$A = \frac{1}{2} s t \sin R$

$A = \frac{1}{2} \cdot 12 \cdot 4 \cdot \sin 58$

$A = 40.706308\ldots$

$A \simeq 40.7$