**Section 2.3 Page 108 Question 6**

**a)** Given $\angle A = 39°$, $a = 10$ cm, and $b = 14$ cm:
$b \sin A = 14 \sin 39°$
$b \sin A = 8.810\ldots$
Then, $b \sin A < a < b$ so there are two solutions.

**b)** Given $\angle A = 123°$, $a = 23$ cm, and $b = 12$ cm:
$\angle A$ is obtuse and $a > b$ so there is one solution.

**c)** Given $\angle A = 145°$, $a = 18$ cm, and $b = 10$ cm:
$\angle A$ is obtuse and $a > b$ so there is one solution.

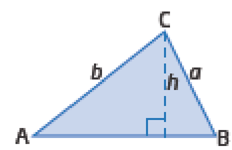
**d)** Given $\angle A = 124°$, $a = 1$ cm, and $b = 2$ cm:
$\angle A$ is obtuse and $a < b$ so there is no solution.

**Section 2.3 Page 108 Question 7**

**a)** $\sin A = \dfrac{h}{b}$

$$h = b \sin A$$

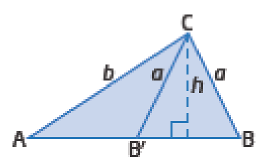
Then, from the diagram, $a > b \sin A$, or $a > h$ and b $> h$.




**b)** $\sin A = \dfrac{h}{b}$

$$h = b \sin A$$

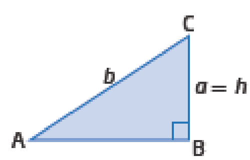
Then, from the diagram, $b \sin A < a < b$.




**c)** $\sin A = \dfrac{h}{b}$

$$h = b \sin A$$

Also, from the diagram, $a = b \sin A$.



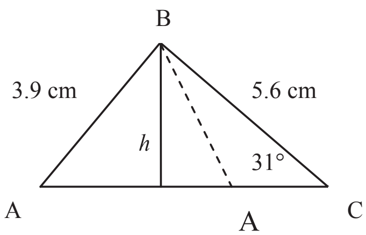

**d)** $\sin A = \dfrac{h}{b}$

$$h = b \sin A$$

From the diagram, $a \geq b > b \sin A$.

## Section 2.3 Page 109 Question 8

**a)** The diagram shows the given information.
This is an ambiguous case, since $h = 5.6 \sin 31° = 2.884…$
Because $h$ is less than 5.6 and 3.9, two solutions are possible.




$$\frac{\sin A}{5.6} = \frac{\sin 31°}{3.9}$$
$$\sin A = \frac{5.6 \sin 31°}{3.9}$$
$$\angle A = \sin^{-1}\left(\frac{5.6 \sin 31°}{3.9}\right)$$
$$\angle A = 47.692...$$
Or, $\angle A = 180° - 47.692…°$
$\angle A = 132.308…°$

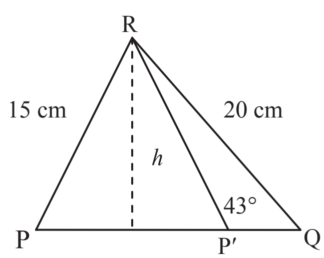
$\angle B = 180° - (31° + 48°)$ or $\angle B = 180° - (31° + 132°)$
$\angle B = 101°$ $\angle B = 17°$

Determine $b$ for each measure of $\angle B$:

$$\frac{b}{\sin 101°} = \frac{3.9}{\sin 31°} \qquad \frac{b}{\sin 17°} = \frac{3.9}{\sin 31°}$$
$$b = \frac{3.9 \sin 101°}{\sin 31°} \qquad b = \frac{3.9 \sin 17°}{\sin 31°}$$
$$b = 7.433... \qquad b = 2.213...$$

In $\Delta ABC$, $b = 7.4$ cm, to the nearest tenth of a centimetre, and $\angle A = 48°$ and $\angle B = 101°$, both to the nearest degree, or
$b = 2.2$ cm, to the nearest tenth of a centimetre, and $\angle A = 132°$ and $\angle B = 17°$, both to the nearest degree.

**b)**




$h = 20 \sin 43° = 13.639…$
Since this is less than 15 and less than 20, two solutions are possible, as shown in the diagram.

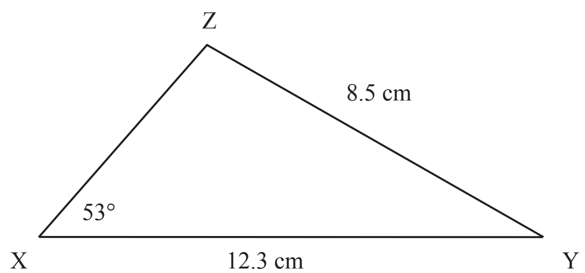
$$\frac{\sin P}{20} = \frac{\sin 43°}{15}$$
$$\sin P = \frac{20 \sin 43°}{15}$$
$$\angle P = \sin^{-1}\left(\frac{20 \sin 43°}{15}\right)$$
$$\angle P = 65.413...$$
So $\angle P = 65°$, or $\angle P = 180° - 65° = 115°$.
Then, $\angle R = 180° - (65° + 43°) = 72°$, or $\angle R = 180° - (115° + 43°) = 22°$.

Now determine $r$ for each value of $\angle R$:

$$\frac{r}{\sin 72°} = \frac{15}{\sin 43°} \qquad \text{or} \qquad \frac{r}{\sin 22°} = \frac{15}{\sin 43°}$$
$$r = \frac{15 \sin 72°}{\sin 43°} \qquad\qquad r = \frac{15 \sin 22°}{\sin 43°}$$
$$r = 20.917... \qquad\qquad r = 8.239...$$

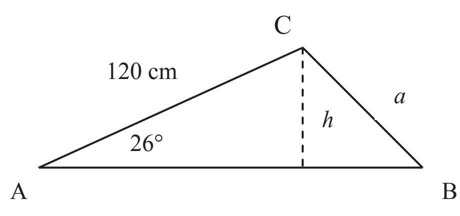
Therefore, in $\Delta PQR$, $\angle P = 65°$, $\angle R = 72°$, and PQ = 20.9 cm, or
$\angle P = 115°$, $\angle R = 22°$, and PQ = 8.2 cm.

**c)**




$h = 12.3 \sin 53° = 9.823…$
Since $8.5 < h$, no solution is possible.

**Section 2.3 Page 109 Question 9**




$h = 120 \sin 26°$
$h = 52.604…$

**a)** There is one oblique triangle if $a \geq 120$ cm.