



Using the Sine Rule to find missing angles

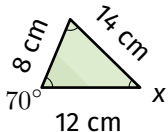
Mana Maths

Start Tasks

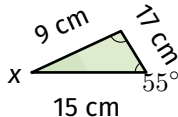


Match each angle to its opposite side, then write the two matched Sine Rule fractions.

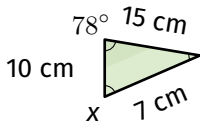
1.



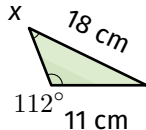
2.



3.



4.

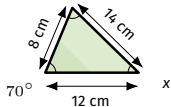


Start Tasks — Answers



Read across each triangle to match angles with opposite sides. Name the known pair and the x-pair, then write the two matched Sine Rule fractions.

1.

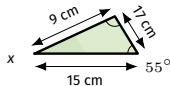


Solution

Opposite side is the one not touching x's vertex.

x is opposite the 8 cm side.

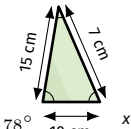
2.



Solution

x is opposite the 17 cm side.

3.

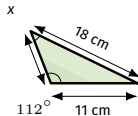


Solution

Known pair: 78° and 7 cm.

x-pair: x and 15 cm.

4.



Solution

x opposite 11; 112°
opposite 18.

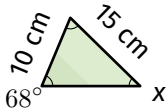
$$\frac{\sin x}{11} = \frac{\sin 112^\circ}{18}$$

Start Tasks

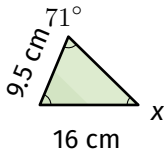


Substitute matching pairs, rearrange to $\sin x$, then use inverse sine to find x (1 d.p.).

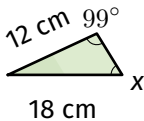
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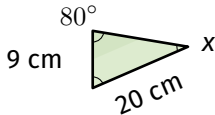
6.



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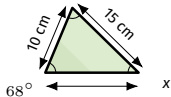


Start Tasks — Answers



Find the acute angle x in each triangle. Substitute matching pairs, rearrange to $\sin x$, then use inverse sine. Give x to 1 d.p.

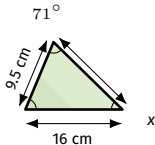
5.



Solution

$$\begin{aligned}\frac{\sin x}{10} &= \frac{\sin 68^\circ}{15} \\ \sin x &= \frac{10 \sin 68^\circ}{15} = 0.618 \\ x &= 38.2^\circ\end{aligned}$$

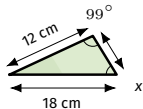
6.



Solution

$$\begin{aligned}\sin x &= \frac{9.5 \sin 71^\circ}{16} = 0.561 \\ x &= 34.2^\circ\end{aligned}$$

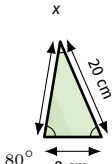
7.



Solution

$$\begin{aligned}\sin x &= \frac{12 \sin 99^\circ}{18} = 0.658 \\ x &= 41.2^\circ\end{aligned}$$

8.



Solution

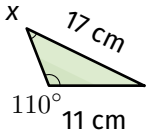
$$\begin{aligned}\sin x &= \frac{9 \sin 80^\circ}{20} = 0.443 \\ x &= 26.3^\circ\end{aligned}$$

Start Tasks

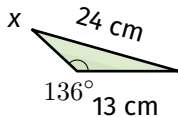


Find x , then check side order: the shorter side faces the smaller angle. Round the final angle.

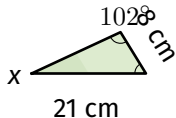
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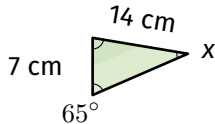
10.



11.



12.

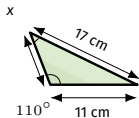


Start Tasks — Answers



Find x in each triangle and check using side order: the shorter side must be opposite the smaller angle. Round only the final angle.

9.



Solution

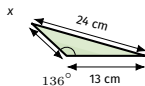
$$\sin x = \frac{11 \sin 110^\circ}{17} =$$

$$0.608$$

$$x = 37.4^\circ$$

$$11 < 17 \text{ so } x < 110^\circ. \checkmark$$

10.



Solution

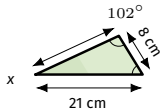
$$\sin x = \frac{13 \sin 136^\circ}{24} =$$

$$0.376$$

$$x = 22.1^\circ$$

$$13 < 24 \text{ so } x < 136^\circ. \checkmark$$

11.



Solution

$$\sin x = \frac{8 \sin 102^\circ}{21} = 0.373$$

$$x = 21.9^\circ$$

$$8 < 21 \text{ so } x < 102^\circ. \checkmark$$

12.



Solution

$$\sin x = \frac{7 \sin 65^\circ}{14} = 0.453$$

$$x = 26.9^\circ$$

$$7 < 14 \text{ so } x < 65^\circ. \checkmark$$

Build Tasks

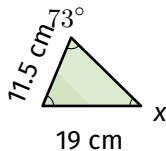


Choose the opposite pair, rearrange, then use inverse sine to find x (1 d.p.).

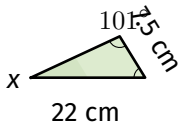
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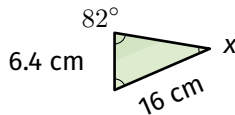
2.



3.



4.

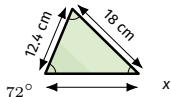


Build Tasks – Answers



Find x in each triangle. Choose the complete opposite pair yourself, rearrange, use inverse sine, and give x to 1 d.p.

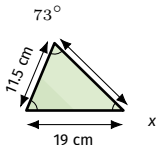
1.



Solution

$$\begin{aligned}\frac{\sin x}{12.4} &= \frac{\sin 72^\circ}{18} \\ \sin x &= \frac{12.4 \sin 72^\circ}{18} = 0.655 \\ x &= 40.9^\circ\end{aligned}$$

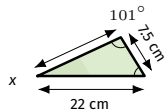
2.



Solution

$$\begin{aligned}\sin x &= \frac{11.5 \sin 73^\circ}{19} = 0.579 \\ x &= 35.4^\circ\end{aligned}$$

3.



Solution

$$\begin{aligned}\sin x &= \frac{7.5 \sin 101^\circ}{22} = 0.335 \\ x &= 19.6^\circ\end{aligned}$$

4.



Solution

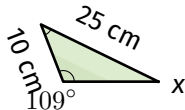
$$\begin{aligned}\sin x &= \frac{6.4 \sin 82^\circ}{16} = 0.396 \\ x &= 23.3^\circ\end{aligned}$$

Build Tasks

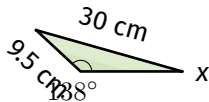


Find x : show the substitution and isolate $\sin x$ before using $\sin^{-1}$.

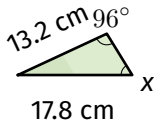
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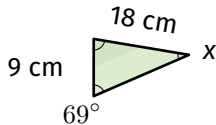
6.



7.



8.

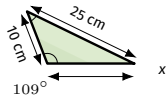


Build Tasks — Answers



Find x in each triangle. Show the substitution and the line with $\sin x$ isolated before using $\sin^{-1}$.

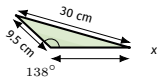
5.



Solution

$$\begin{aligned}\frac{\sin x}{10} &= \frac{\sin 109^\circ}{25} \\ \sin x &= \frac{10 \sin 109^\circ}{25} = 0.378 \\ x &= 22.2^\circ\end{aligned}$$

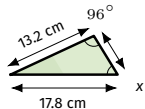
6.



Solution

$$\begin{aligned}\sin x &= \frac{9.5 \sin 138^\circ}{30} = 0.212 \\ x &= 12.2^\circ\end{aligned}$$

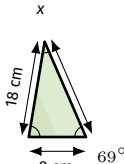
7.



Solution

$$\begin{aligned}\sin x &= \frac{13.2 \sin 96^\circ}{17.8} = 0.738 \\ x &= 47.5^\circ\end{aligned}$$

8.



Solution

$$\begin{aligned}\sin x &= \frac{9 \sin 69^\circ}{18} = 0.467 \\ x &= 27.8^\circ\end{aligned}$$

Build Tasks

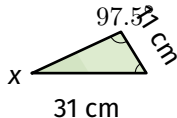


Find x , then justify its size by comparing it with the known angle via opposite sides.

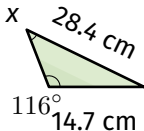
9.



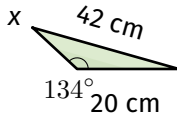
10.



11.



12.

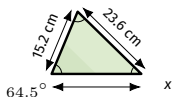


Build Tasks — Answers



Find x in each triangle and justify its relative size. Use full calculator values, then compare x with the known angle using their opposite sides.

9.



Solution

$$\sin x = \frac{15.2 \sin 64.5^\circ}{23.6} =$$

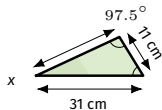
$$0.581$$

$$x = 35.5^\circ$$

$$x < 64.5^\circ \text{ since}$$

$$15.2 < 23.6.$$

10.



Solution

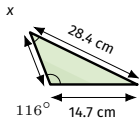
$$\sin x = \frac{11 \sin 97.5^\circ}{31} =$$

$$0.352$$

$$x = 20.6^\circ$$

$$x < 97.5^\circ \text{ since } 11 < 31.$$

11.



Solution

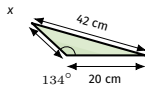
$$\sin x = \frac{14.7 \sin 116^\circ}{28.4} =$$

$$0.465$$

$$x = 27.7^\circ$$

$$x < 116^\circ \text{ since } 14.7 < 28.4.$$

12.



Solution

$$\sin x = \frac{20 \sin 134^\circ}{42} =$$

$$0.343$$

$$x = 20.0^\circ$$

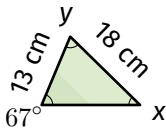
$$x < 134^\circ \text{ since } 20 < 42.$$

Push Tasks

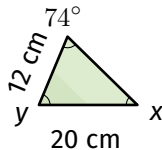


Find x with the Sine Rule, then use the angle sum to find y . Give both to 1 d.p.

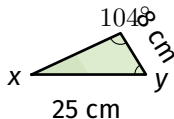
1.



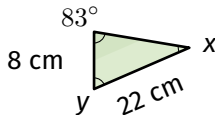
2.



3.



4.

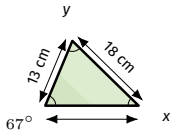


Push Tasks — Answers



Find x with the Sine Rule, then use the angle sum of a triangle to find y . Give both to 1 d.p.

1.



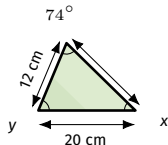
Solution

$$\sin x = \frac{13 \sin 67^\circ}{18} = 0.665$$

$$x = 41.7^\circ$$

$$y = 180^\circ - 67^\circ - x = 71.3^\circ$$

2.



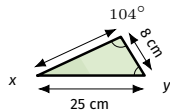
Solution

$$\sin x = \frac{12 \sin 74^\circ}{20} = 0.577$$

$$x = 35.2^\circ$$

$$y = 180^\circ - 74^\circ - x = 70.8^\circ$$

3.



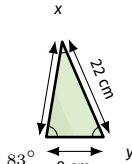
Solution

$$\sin x = \frac{8 \sin 104^\circ}{25} = 0.310$$

$$x = 18.1^\circ$$

$$y = 180^\circ - 104^\circ - x = 57.9^\circ$$

4.



Solution

$$\sin x = \frac{8 \sin 83^\circ}{22} = 0.361$$

$$x = 21.2^\circ$$

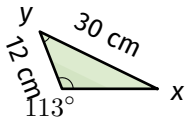
$$y = 180^\circ - 83^\circ - x = 75.8^\circ$$

Push Tasks

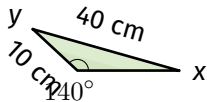


Find x and y ; keep the unrounded x when finding $y = 180^\circ - (\text{known angle}) - x$.

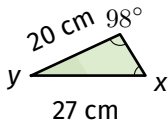
5.



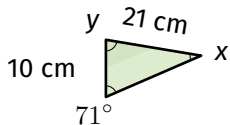
6.



7.



8.

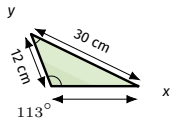


Push Tasks — Answers



For each triangle, find x and y . Keep the unrounded value of x when calculating $y = 180^\circ - (\text{known angle}) - x$.

5.



Solution

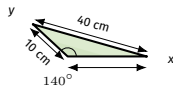
$$\sin x = \frac{12 \sin 113^\circ}{30} =$$

$$0.368$$

$$x = 21.6^\circ$$

$$y = 180^\circ - 113^\circ - x = 45.4^\circ$$

6.



Solution

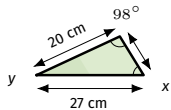
$$\sin x = \frac{10 \sin 140^\circ}{40} =$$

$$0.161$$

$$x = 9.2^\circ$$

$$y = 180^\circ - 140^\circ - x = 30.8^\circ$$

7.



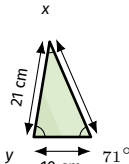
Solution

$$\sin x = \frac{20 \sin 98^\circ}{27} = 0.734$$

$$x = 47.2^\circ$$

$$y = 180^\circ - 98^\circ - x = 34.8^\circ$$

8.



Solution

$$\sin x = \frac{10 \sin 71^\circ}{21} = 0.450$$

$$x = 26.8^\circ$$

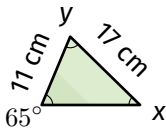
$$y = 180^\circ - 71^\circ - x = 82.2^\circ$$

Push Tasks

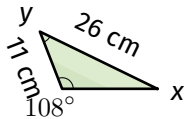


Find x and y , then justify x by comparing the two relevant opposite sides.

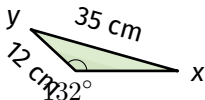
9.



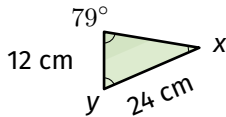
10.



11.



12.

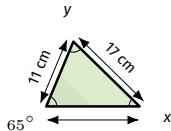


Push Tasks — Answers



For each triangle, find x and y , then justify why x is reasonable by comparing the two relevant opposite sides.

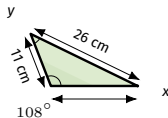
9.



Solution

$$\sin x = \frac{11 \sin 65^\circ}{17} = 0.586$$
$$x = 35.9^\circ, y = 79.1^\circ$$
$$x < 65^\circ \text{ since } 11 < 17.$$

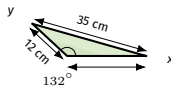
10.



Solution

$$\sin x = \frac{11 \sin 108^\circ}{26} = 0.402$$
$$x = 23.7^\circ, y = 48.3^\circ$$
$$x < 108^\circ \text{ since } 11 < 26.$$

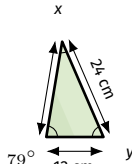
11.



Solution

$$\sin x = \frac{12 \sin 132^\circ}{35} = 0.255$$
$$x = 14.8^\circ, y = 33.2^\circ$$
$$x < 132^\circ \text{ since } 12 < 35.$$

12.



Solution

$$\sin x = \frac{12 \sin 79^\circ}{24} = 0.491$$
$$x = 29.4^\circ, y = 71.6^\circ$$
$$x < 79^\circ \text{ since } 12 < 24.$$