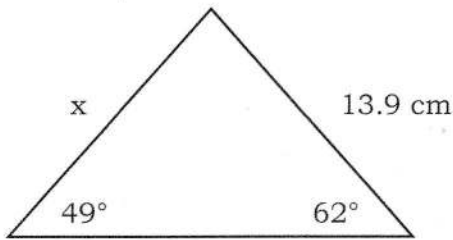


SINE AND COSINE RULES - PRACTICE QUESTIONS



metatutor

1.
Use sine rule to find x to 1 decimal place.



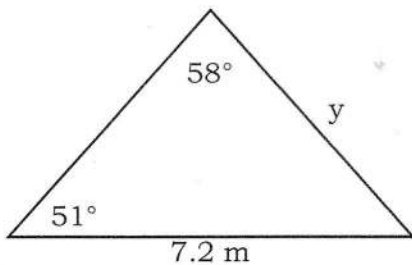
$$\frac{x}{\sin 62} = \frac{13.9}{\sin 49}$$

$$x = \frac{13.9 \times \sin 62}{\sin 49}$$

$$= 16.261\dots$$

$$= \underline{16.3 \text{ cm}}$$

2.
Use sine rule to find y to 1 decimal place.



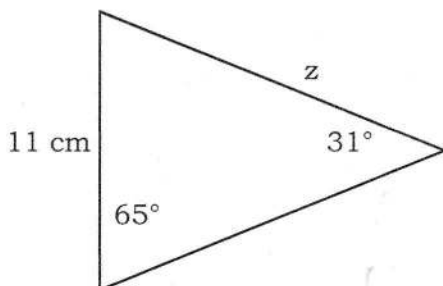
$$\frac{y}{\sin 51} = \frac{7.2}{\sin 58}$$

$$y = \frac{7.2 \times \sin 51}{\sin 58}$$

$$= 6.598\dots$$

$$= \underline{6.6 \text{ m}}$$

3.
Use sine rule to find z to 2 significant figures.



$$\frac{z}{\sin 65} = \frac{11}{\sin 31}$$

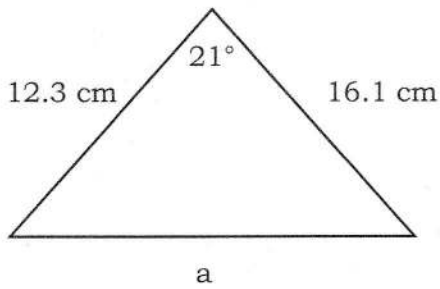
$$z = \frac{11 \times \sin 65}{\sin 31}$$

$$= 19.356\dots$$

$$= \underline{19 \text{ cm}}$$

4.

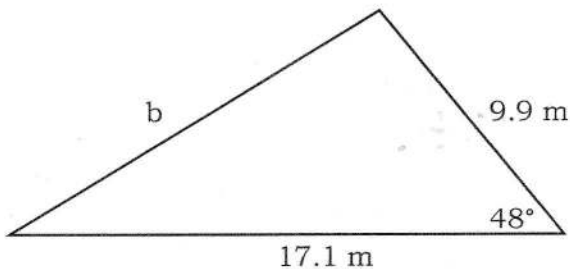
Use cosine rule to find a to the nearest centimetre.



$$\begin{aligned} a^2 &= 12.3^2 + 16.1^2 - 2 \times 12.3 \times 16.1 \times \cos 21^\circ \\ &= 40.746 \dots \\ a &= \sqrt{40.746 \dots} \\ &= 6.3832 \dots \\ &= \underline{6 \text{ cm}} \end{aligned}$$

5.

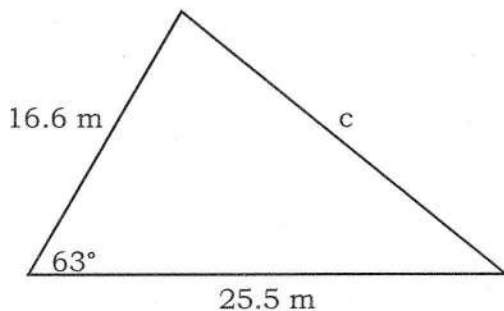
Use cosine rule to find b to 3 significant figures.



$$\begin{aligned} b^2 &= 17.1^2 + 9.9^2 - 2 \times 17.1 \times 9.9 \times \cos 48^\circ \\ &= 163.86 \dots \\ b &= \sqrt{163.86 \dots} \\ &= 12.801 \dots \\ &= \underline{12.8 \text{ m}} \end{aligned}$$

6.

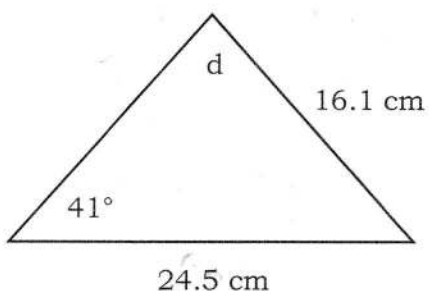
Use cosine rule to find c to 2 decimal places.



$$\begin{aligned} c^2 &= 16.6^2 + 25.5^2 - 2 \times 16.6 \times 25.5 \times \cos 63^\circ \\ &= 541.46 \dots \\ c &= \sqrt{541.46 \dots} \\ &= 23.269 \dots \\ &= \underline{23.27 \text{ m}} \end{aligned}$$

7.

Use sine rule to find d to 2 significant figures.



$$\frac{\sin d}{24.5} = \frac{\sin 41}{16.1}$$

$$\sin d = \frac{\sin 41 \times 24.5}{16.1} = 0.998\dots$$

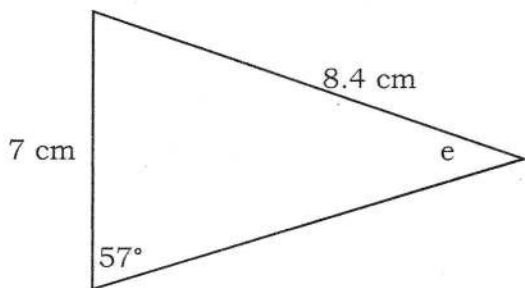
$$d = \sin^{-1}(0.998\dots)$$

$$= 86.70\dots$$

$$= \underline{87^\circ}$$

8.

Use sine rule to find e to the nearest degree.



$$\frac{\sin e}{7} = \frac{\sin 57}{8.4}$$

$$\sin e = \frac{\sin 57 \times 7}{8.4}$$

$$= 0.698\dots$$

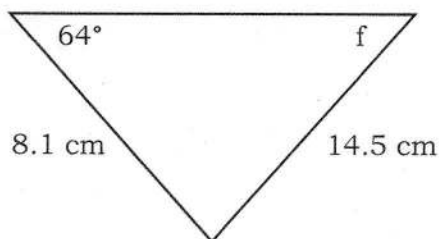
$$e = \sin^{-1}(0.698\dots)$$

$$= 44.33\dots$$

$$= \underline{44^\circ}$$

9.

Use sine rule to find f to 2 significant figures.



$$\frac{\sin f}{8.1} = \frac{\sin 64}{14.5}$$

$$\sin f = \frac{\sin 64 \times 8.1}{14.5}$$

$$= 0.502\dots$$

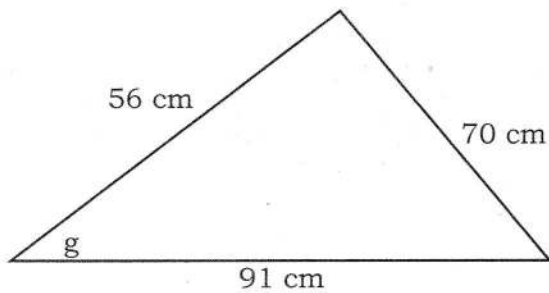
$$f = \sin^{-1}(0.502\dots)$$

$$= 30.138\dots$$

$$= \underline{30^\circ}$$

10.

Use cosine rule to find g to 2 significant figures.



$$70^2 = 56^2 + 91^2 - 2 \times 56 \times 91 \times \cos(g)$$

$$4900 = 11417 - 10192 \times \cos(g)$$

$$-6517 = -10192 \times \cos(g)$$

$$0.639... = \cos(g)$$

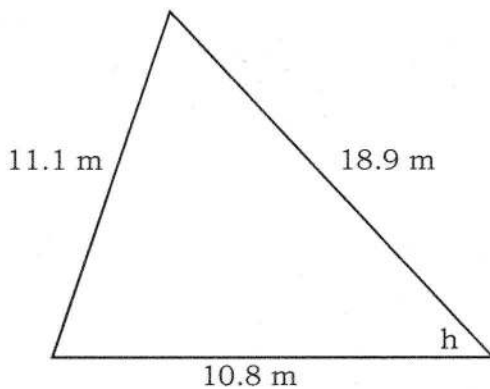
$$g = \cos^{-1}(0.639...)$$

$$= 50.25...$$

$$= \underline{50^\circ}$$

11.

Use cosine rule to find h to 2 significant figures.



$$11.1^2 = 18.9^2 + 10.8^2 - 2 \times 18.9 \times 10.8 \times \cos(h)$$

$$123.21 = 473.85 - 408.24 \times \cos(h)$$

$$-350.64 = -408.24 \times \cos(h)$$

$$0.8589... = \cos(h)$$

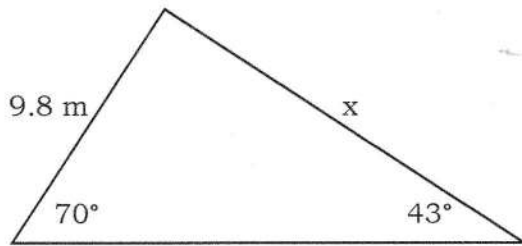
$$h = \cos^{-1}(0.8589...)$$

$$= 30.80...$$

$$= \underline{31^\circ}$$

12.

Find x to 3 significant figures.



$$\frac{x}{\sin 70} = \frac{9.8}{\sin 43}$$

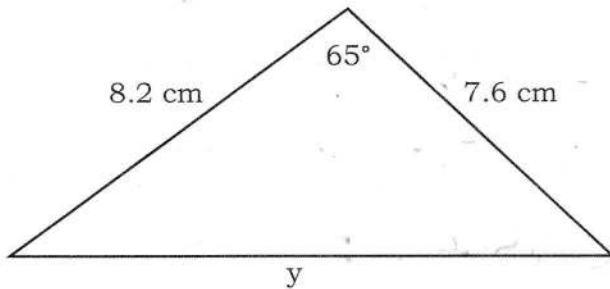
$$x = \frac{9.8 \times \sin 70}{\sin 43}$$

$$= 13.502 \dots$$

$$= \underline{13.5 \text{ m}}$$

13.

Find y to 1 decimal place.



$$y^2 = 8.2^2 + 7.6^2 - 2 \times 8.2 \times 7.6 \times \cos 65$$

$$= 72.32 \dots$$

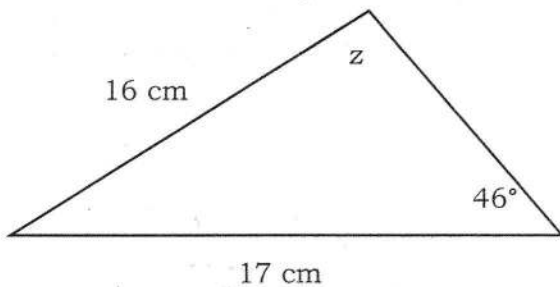
$$y = \sqrt{72.32 \dots}$$

$$= 8.5044 \dots$$

$$= \underline{8.5 \text{ cm}}$$

14.

Find z to 1 decimal place.



$$\frac{\sin z}{17} = \frac{\sin 46}{16}$$

$$= \frac{\sin 46 \times 17}{16}$$

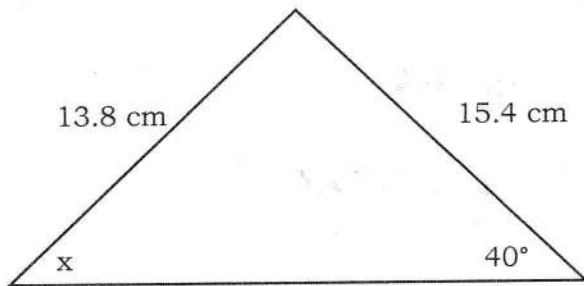
$$= 0.764 \dots$$

$$z = \sin^{-1}(0.764 \dots)$$

$$= 49.844 \dots$$

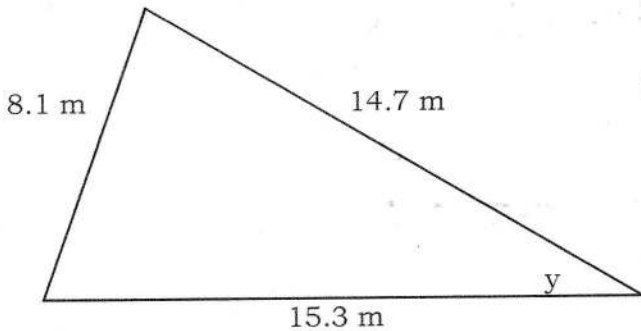
$$= \underline{49.8^\circ}$$

15.
Find x to 3 significant figures.



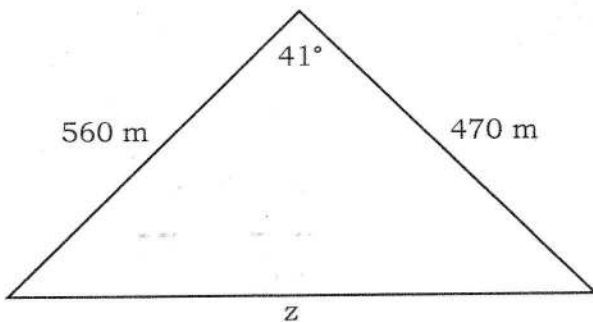
$$\begin{aligned} \frac{\sin x}{15.4} &= \frac{\sin 40}{13.8} \\ &= \frac{\sin 40 \times 15.4}{13.8} \\ &= 0.717... \\ x &= \sin^{-1}(0.717...) \\ &= 45.833... \\ &= \underline{45.8^\circ} \end{aligned}$$

16.
Find y to 1 decimal place.



$$\begin{aligned} 8.1^2 &= 14.7^2 + 15.3^2 - 2 \times 14.7 \times 15.3 \times \cos(y) \\ 65.61 &= 450.18 - 449.82 \times \cos(y) \\ -384.57 &= -449.82 \times \cos(y) \\ 0.8549... &= \cos(y) \\ y &= \cos^{-1}(0.8549...) \\ &= 31.2466... \\ &= \underline{31.2^\circ} \end{aligned}$$

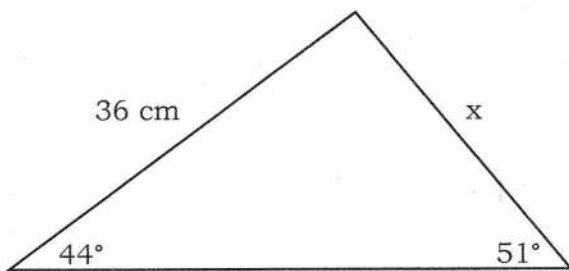
17.
Find z to 2 significant figures.



$$\begin{aligned} z^2 &= 560^2 + 470^2 - 2 \times 560 \times 470 \times \cos 41 \\ &= 137220.877 \\ z &= \sqrt{137220.877} \\ &= 370.433... \\ &= \underline{370 \text{ m}} \end{aligned}$$

18.

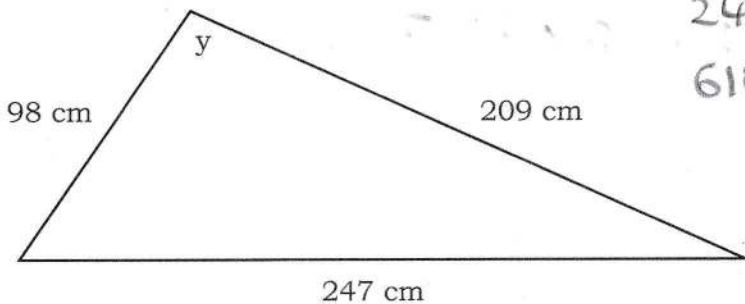
Find x to 3 significant figures.



$$\begin{aligned}\frac{x}{\sin 44} &= \frac{36}{\sin 51} \\ &= \frac{36 \times \sin 44}{\sin 51} \\ &= 32.1788\dots \\ &= \underline{\underline{32.2 \text{ cm}}}\end{aligned}$$

19.

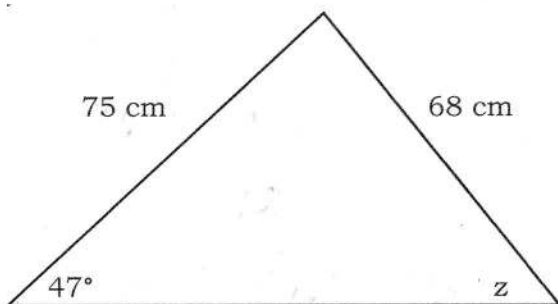
Find y to 3 significant figures.



$$\begin{aligned}247^2 &= 209^2 + 98^2 - 2 \times 209 \times 98 \times \cos(y) \\ 61009 &= 53285 - 40964 \times \cos(y) \\ 7724 &= -40964 \cos(y) \\ -0.1885\dots &= \cos(y) \\ y &= \cos^{-1}(-0.1885\dots) \\ &= 100.86\dots \\ &= \underline{\underline{101^\circ}}\end{aligned}$$

20.

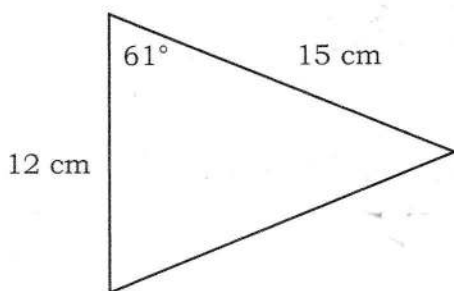
Find z to 2 significant figures.



$$\begin{aligned}\frac{\sin z}{75} &= \frac{\sin 47}{68} \\ &= \frac{\sin 47 \times 75}{68} \\ &= 0.8066\dots \\ z &= \sin^{-1}(0.8066\dots) \\ &= 53.768\dots \\ &= \underline{\underline{54^\circ}}\end{aligned}$$

21.

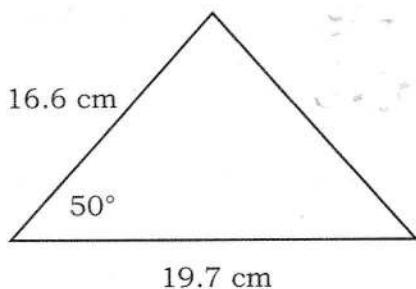
Find the area of the triangle. Give your answer to 3 significant figures.



$$\begin{aligned} & \frac{1}{2} \times 15 \times 12 \times \sin 61 \\ & = 78.7157\dots \\ & = \underline{78.7 \text{ cm}^2} \end{aligned}$$

22.

Find the area of the triangle. Give your answer to the nearest square centimetre.



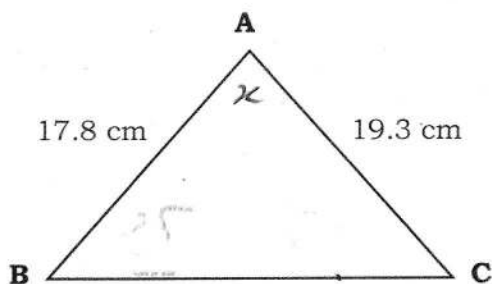
$$\begin{aligned} & \frac{1}{2} \times 16.6 \times 19.7 \times \sin 50 \\ & = 125.255\dots \\ & = \underline{125 \text{ cm}^2} \end{aligned}$$

23.

ABC is a triangle.

The area of ABC is 96 cm^2 .

Find the size of angle BAC to the nearest unit.

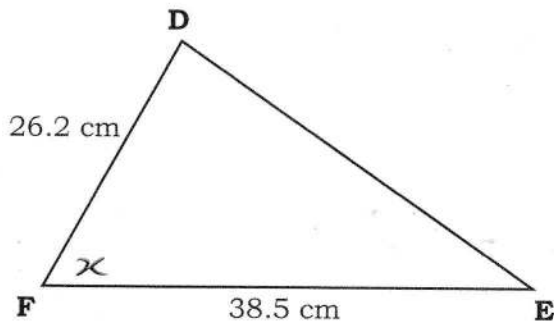


$$\begin{aligned} 96 &= \frac{1}{2} \times 17.8 \times 19.3 \times \sin(x) \\ &= 171.77 \times \sin(x) \\ \sin(x) &= 0.5588\dots \\ x &= \sin^{-1}(0.5588\dots) \\ &= 33.97\dots \\ &= \underline{34^\circ} \end{aligned}$$

24.

DEF is a triangle, with an area of 225 cm^2 .

Find the size of angle DFE. Give your answer to 2 significant figures.

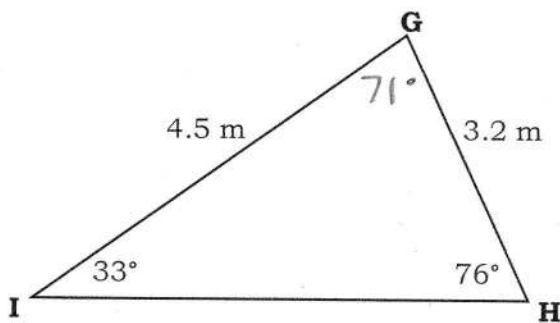


$$\begin{aligned}
 225 &= \frac{1}{2} \times 26.2 \times 38.5 \times \sin(x) \\
 &= 504.35 \times \sin(x) \\
 0.4461\dots &= \sin(x) \\
 x &= \sin^{-1}(0.4461\dots) \\
 &= 26.4949\dots \\
 &= \underline{26^\circ}
 \end{aligned}$$

25.

Find the area of triangle GHI.

Give your answer to the nearest square centimetre.

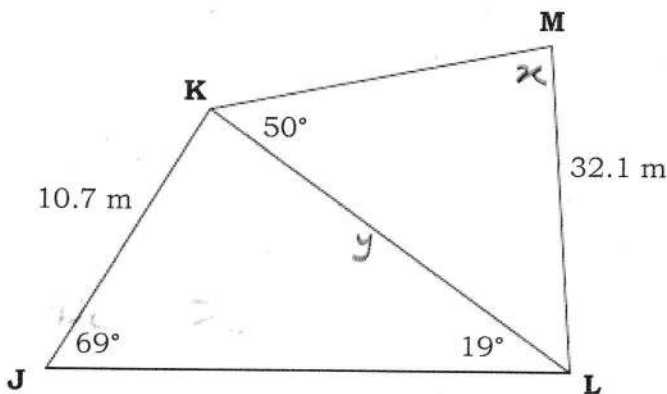


$$\begin{aligned}
 180 - 76 - 33 &= 71^\circ \\
 \frac{1}{2} \times 4.5 \times 3.2 \times \sin 71 \\
 &= 6.8077\dots \\
 &= \underline{7 \text{ cm}^2}
 \end{aligned}$$

26.

JKL and KML are triangles.

Find the size of the angle KML. Give your answer to 2 significant figures.



$$\begin{aligned}
 \frac{y}{\sin 69} &= \frac{10.7}{\sin 19} \\
 y &= \frac{10.7 \times \sin 69}{\sin 19} \\
 &= 30.68270169
 \end{aligned}$$

$$\begin{aligned}
 \frac{\sin x}{30.68\dots} &= \frac{\sin 50}{32.1} \\
 &= \frac{\sin 50 \times 30.68\dots}{32.1} \\
 &= 0.73222\dots
 \end{aligned}$$

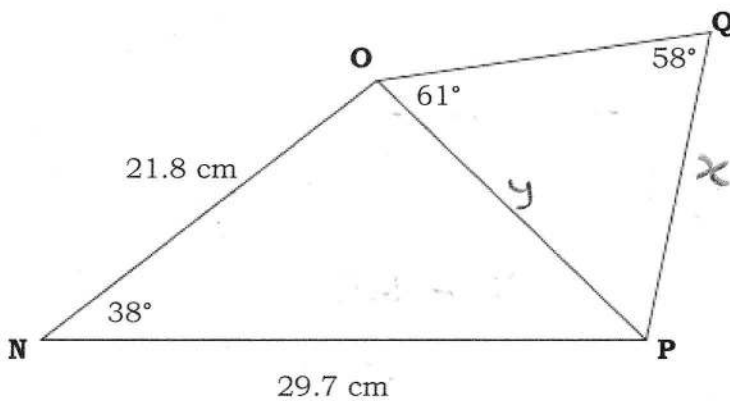
$$\sin^{-1}(0.73222\dots) = x$$

$$\begin{aligned}
 x &= 47.072\dots \\
 &= \underline{47^\circ}
 \end{aligned}$$

27.

NOP and OQP are triangles.

Find the size of QP, to 3 significant figures.



$$y^2 = 21.8^2 + 29.7^2 - 2 \times 21.8 \times 29.7 \times \cos 38$$

$$= 336.919 \dots$$

$$y = \sqrt{336.919 \dots}$$

$$= 18.35535657$$

$$\frac{x}{\sin 61} = \frac{18.355}{\sin 58}$$

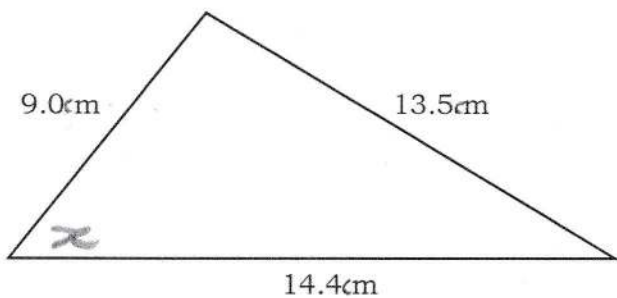
$$= \frac{18.355 \dots \times \sin 61}{\sin 58}$$

$$= 18.930 \dots$$

$$= \underline{18.9 \text{ cm}}$$

28.

Find the area of the triangle. Give your answer to the nearest square centimetre.



$$13.5^2 = 9^2 + 14.4^2 - 2 \times 9 \times 14.4 \times \cos(x)$$

$$182.25 = 288.36 - 259.2 \cos(x)$$

$$-106.11 = -259.2 \cos(x)$$

$$0.409375 = \cos(x)$$

$$x = \cos^{-1}(0.409375)$$

$$= 65.83442067^\circ$$

$$\text{Area} = \frac{1}{2} \times 9 \times 14.4 \times \sin(65.83442067)$$

$$= 59.121 \dots$$

$$= \underline{59 \text{ cm}^2}$$