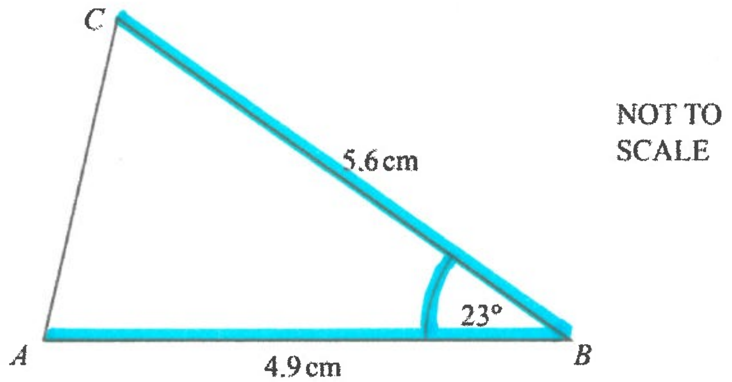
20



Calculate the area of triangle *ABC*.

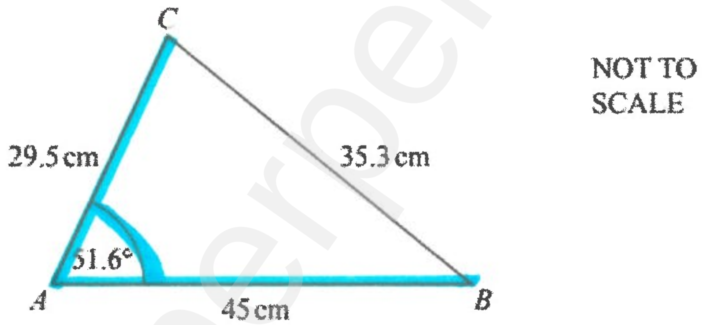
Area = $\frac{1}{2}ab\sin C$

$= \frac{1}{2} \times 4.9 \times 5.6 \times \sin 23$

$= 5.36$

5.36 .... cm^2 [2]

4 **(a)**



In triangle *ABC*, *AB* = 45 cm, *AC* = 29.5 cm, *BC* = 35.3 cm and angle *CAB* = 51.6°.

(ii) Calculate the area of triangle *ABC*.

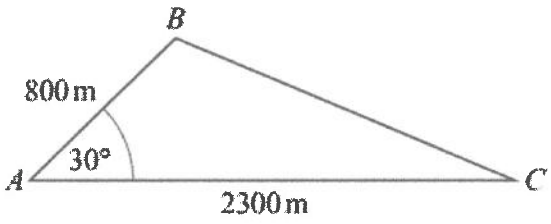
Area = $\frac{1}{2}ab\sin C$

$= \frac{1}{2} \times 45 \times 29.5 \times \sin 51.6$

$= 520$

520 .... cm^2 [2]

18



NOT TO SCALE

The diagram shows some land in the shape of a triangle ABC.
Houses are built on this land.
Each house requires $400\,\text{m}^2$ of land.

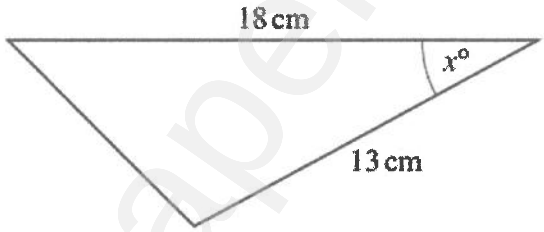
Find the greatest number of houses that can be built on this land.

$$\text{Area} = \frac{1}{2}ab\sin C$$
$$= \frac{1}{2} \times 800 \times 2300 \times \sin 30$$
$$= 460\,000\,\text{m}^2$$

$$460\,000 \div 400$$
$$= 1150$$

........1150........ [3]

17



NOT TO SCALE

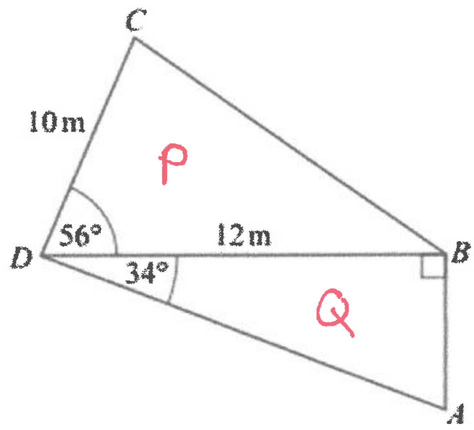
The area of the triangle is $50\,\text{cm}^2$.

Calculate the value of $\sin x$.

$$\text{Area} = \frac{1}{2}ab\sin C$$
$$50 = \frac{1}{2} \times 18 \times 13 \times \sin C$$
$$50 = 117 \sin C$$

$$\sin C = \frac{50}{117}$$

$\sin x =$ .... $\frac{50}{117}$ .... [2]

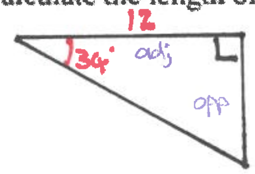


NOT TO SCALE

The diagram shows a quadrilateral *ABCD*.
CD = 10 m and *DB* = 12 m.
Angle *DBA* = 90°, angle *CDB* = 56° and angle *ADB* = 34°.

(a) Calculate the length of *AB*.

SOH CAH TOA



$\tan 34 = \frac{AB}{12}$ $\times 12$ $\times 12$

$AB = 12 \tan 34$

AB = 8.09 m [2]

STORE unrounded answer

(b) Calculate the area of the quadrilateral *ABCD*.

Area of Q:

$\text{Area} = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 12 \times 8.09\ldots$

$= 48.56$

Area of P:

$\text{Area} = \frac{1}{2} ab \sin C$

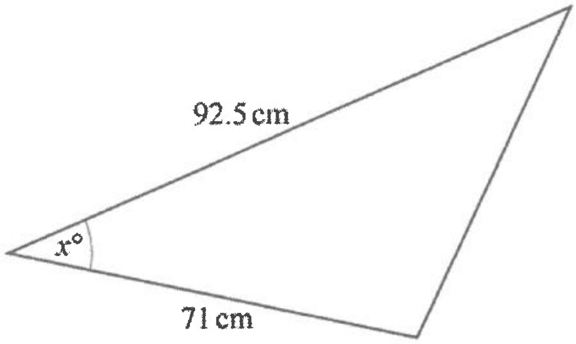
$= \frac{1}{2} \times 10 \times 12 \times \sin 56$

$= 49.74$

Total:

$48.56 + 49.74 =$ 98.3 m² [3]

17



NOT TO SCALE

The diagram shows a triangle with an acute angle marked $x°$.
The area of the triangle is $2143\ \text{cm}^2$.

Work out the value of x.

$$\text{Area} = \frac{1}{2}ab\sin C$$

$$2143 = \frac{1}{2} \times 71 \times 92.5 \sin C$$

$$2143 = 3283.75 \sin C$$

$$\div 3283.75 \qquad \div 3283.75$$

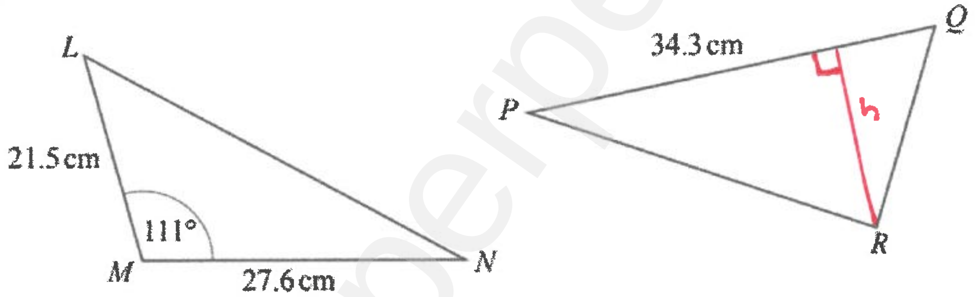
$$\sin C = \frac{2143}{3283.75}$$

$$C = \sin^{-1}\left(\frac{2143}{3283.75}\right)$$

$$= 40.7°$$

$x =$ ....40.7°........ [2]

(b)



NOT TO SCALE

Triangle PQR has the same area as triangle LMN.

Calculate the shortest distance from R to the line PQ.

LMN:

$$\text{Area} = \frac{1}{2}ab\sin C$$

$$= \frac{1}{2} \times 27.6 \times 21.5 \times \sin 111$$

$$= 276.99$$

PQR:

$$\text{Area} = \frac{1}{2} \times b \times h$$

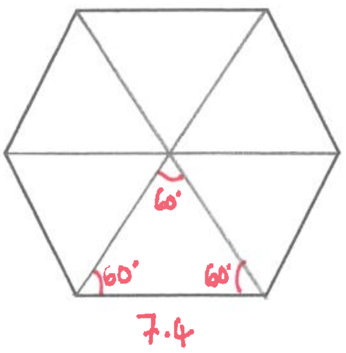
$$276.99 = \frac{1}{2} \times 34.3 \times h$$

$$276.99 = 17.15h$$

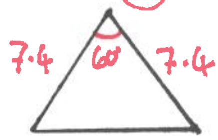
$$\div 17.15 \qquad \div 17.15$$

$h =$ ....16.2........ cm [3]

22 Find the area of a regular hexagon with side length 7.4 cm.



Each triangle:



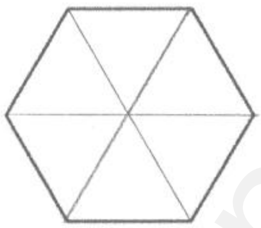
$$\text{Area} = \frac{1}{2}ab\sin C$$
$$= \frac{1}{2} \times 7.4 \times 7.4 \times \sin 60$$
$$= 27.38 \sin 60$$

6 triangles: $6 \times 27.38 \sin 60$
$$= 142.3$$

142 .... cm² [3]

(3sf)

(b)

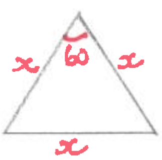


NOT TO SCALE

The diagram shows a regular hexagon.
The area of the hexagon is 127.3 cm².

(i) Show that the length of one side of the hexagon is 7.0 cm, correct to 1 decimal place.

One triangle:



Area of one triangle:
$$127.3 \div 6 = 21.2167$$

$$\text{Area} = \frac{1}{2}ab\sin C$$
$$21.2167 = \frac{1}{2} \times x \times x \times \sin 60$$
$$21.2167 = \frac{1}{2}x^2 \sin 60$$
$\times 2$ $\times 2$
$$42.433 = x^2 \sin 60$$
$\div \sin 60$ $\div \sin 60$

$$x^2 = \frac{42.433}{\sin 60}$$
$$x = \sqrt{\frac{42.433}{\sin 60}}$$
$$x = 7.0\text{cm}$$

[4]