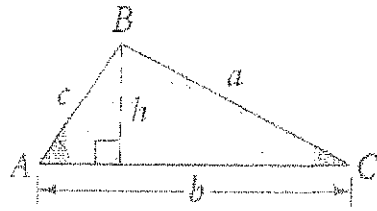Suppose you want to find the area of $\triangle ABC$, but you know only $m\angle A$ and the lengths b and c. To use the formula Area $= \frac{1}{2}bh$, you need to know the height. You can find the height by using the sine ratio.

$\sin A = \dfrac{h}{c}$ Use the sine ratio.
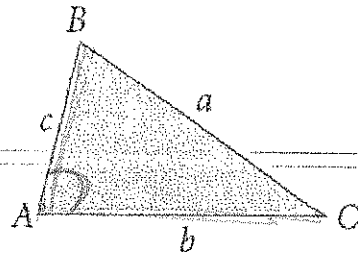
$h = c(\sin A)$ Solve for h.

Now substitute for h in the formula Area $= \frac{1}{2}bh$.

Area $= \frac{1}{2}bc(\sin A)$

Theorem 9-1   **Area of a Triangle Given SAS**

The area of a triangle is one half the product of the lengths of two sides and the sine of the included angle.
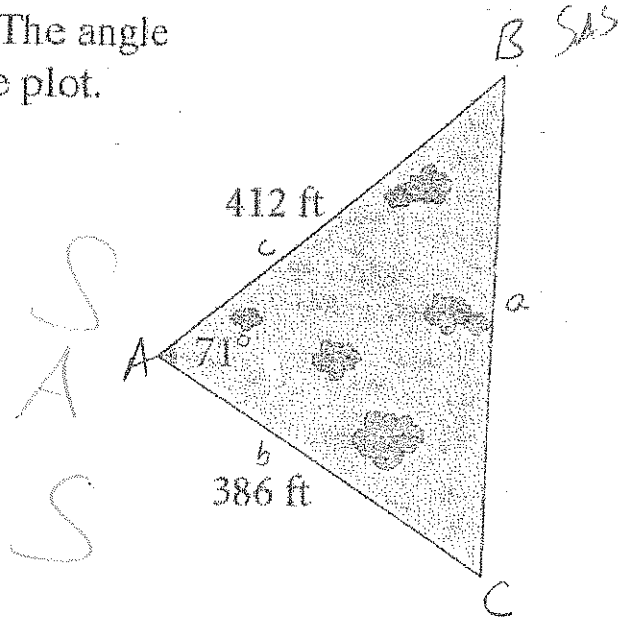
Area of $\triangle ABC = \frac{1}{2}bc(\sin A)$

Surveying The surveyed lengths of two adjacent sides of a triangular plot of land are 412 ft and 386 ft. The angle between the sides is 71°. Find the area of the plot.
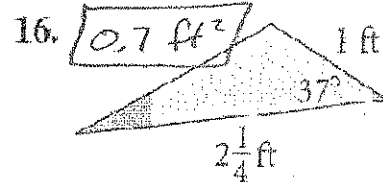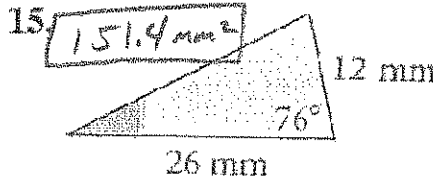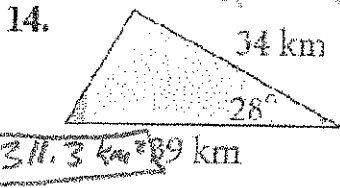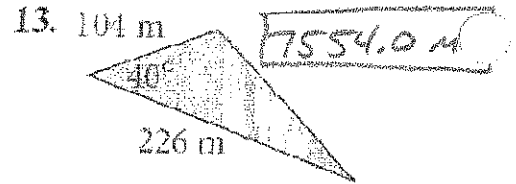
$A = \frac{1}{2}(386)(412)\sin(71)$

$\boxed{A \approx 75183.9 \; ft^2}$

412 ft

386 ft

71°

$$A = \frac{1}{2}(6)(11)\sin(57)$$

Find the area of each triangle. Give answers to the nearest tenth.

11. $\boxed{27.7 \, m^2}$

11 m 57° 6 m

12. $\boxed{18.0 \, ft^2}$ 12 ft

33° $5\frac{1}{2}$ ft

13. 104 m 40° $\boxed{7554.0 \, m}$

226 m

14. 34 km 28°

$\boxed{311.3 \, km^2}$ 89 km

15. $\boxed{151.4 \, mm^2}$ 12 mm

76° 26 mm

16. $\boxed{0.7 \, ft^2}$ 1 ft 37°

$2\frac{1}{4}$ ft
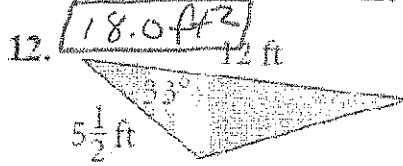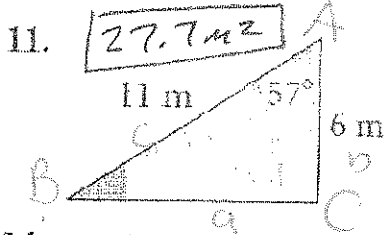
17. **Surveying** A surveyor marks off a triangular parcel of land. One side of the triangle extends 80 yd. A second side of 150 yd forms an angle of 67° with the first side. Determine the area of the parcel of land to the nearest square yard.

80 yd

67°

150 yd

$$A = \frac{1}{2}(80)(150)\sin(67)$$

$$\boxed{A \approx 5523 \, yd^2}$$