$$s = \frac{a+b+c}{2}$$

$$\mathscr{A} = \sqrt{s(s-a)(s-b)(s-c)}. \qquad (20)$$

HERO'S FORMULA A_Δ

The use of this formula is illustrated in the following example.

Example 2

Find the area of ABC if $a = 27$ in., $b = 35$ in., and $c = 28$ in.

Solution

$$s = \frac{27 + 35 + 28}{2} = \frac{90}{2} = 45,$$

$$\mathscr{A} = \sqrt{(45)(18)(10)(17)}$$

$$= \sqrt{137{,}700} = 371.1 \text{ sq in.}$$

Exercises 5.5

Find the area of $\triangle ABC$ if the following is known. (Assume the given information is exact.)

1. $a = 25$ ft, $b = 32$ ft, $\gamma = 29°$.
2. $b = 84$ in., $c = 73$ in., $\alpha = 42°$.
3. $c = 65$ yds, $a = 128$ yds, $\beta = 104°$.
4. $a = 30$ ft, $b = 15$ ft, $\gamma = 60°$.
5. $a = 32$ in., $b = 48$ in., $c = 29$ in.
6. $a = 53$ yds, $b = 53$ yds, $c = 53$ yds.
7. $a = 74$ ft, $b = 29$ ft, $c = 58$ ft.
8. $a = 86$ in., $b = 93$ in., $c = 47$ in.
9. $\alpha = 35°$, $\beta = 64°$, $a = 28$ ft.
10. $\gamma = 64°$, $\beta = 57°$, $c = 16$ yds.
11. $\gamma = 103°$, $\alpha = 47°$, $a = 29$ in.
12. $\alpha = 37°$, $\beta = 83°$, $c = 329$ ft.
13. $\beta = 75°$, $\gamma = 35°$, $a = 806$ yds.
14. $\gamma = 75°$, $\alpha = 83°$, $b = 3$ in.
15. $a = 16$ ft, $b = 32$ ft, $\alpha = 28°$.
16. $b = 63$ in., $c = 87$ in., $\gamma = 69°$.
17. $c = 45$ yds, $a = 55$ yds, $\gamma = 58°$.

Exercises 5.5

1. 193.9 sq ft
3. 4036 sq yds
5. 450.8 sq in.
7. 778.6 sq ft
9. 606.7 sq ft
11. 280.2 sq in.
13. 191,500 sq yds
15. 170.9 sq ft or 253.6 sq ft
17. No solution
19. 105.8 sq ft
21. $128\sqrt{3}$ sq ft