

## Problems

### ORAL EXERCISES

1. a. What is the ratio of the lengths of the sides of a 45-45-90 triangle?  
b. If the lengths of the sides of a triangle have this ratio, must the triangle be a 45-45-90 triangle? Explain.
2. a. What is the ratio of the lengths of the sides of a 30-60-90 triangle?  
b. Explain why a triangle the lengths of whose sides have this ratio must be a 30-60-90 triangle.

If the three sides of a triangle have the given lengths, state whether the triangle is a 45-45-90 triangle, a 30-60-90 triangle, or neither.

3.  $3, 3, 3\sqrt{2}$
4.  $3, 4, 5$
5.  $\sqrt{2}, \sqrt{2}, 2$
6.  $2, 2\sqrt{3}, 4$
7.  $5\sqrt{2}, 5\sqrt{2}, 10$
8.  $\sqrt{3}, 2\sqrt{3}, 2\sqrt{3}$
9.  $\sqrt{3}, 3, 2\sqrt{3}$
10.  $\sqrt{2}, 2\sqrt{2}, \sqrt{6}$

11. What is the length of a diagonal of a square each of whose sides has length 2?
12. What is the length of an altitude of an equilateral triangle each of whose sides has length 2?
13. If the lengths of two sides of a rectangle are 4 and  $4\sqrt{3}$ , what is the measure of an angle formed by a diagonal and the longer side?

### WRITTEN EXERCISES

Give all answers in simplest form.

Find the length of the hypotenuse of an isosceles right triangle each of whose legs has the given length.

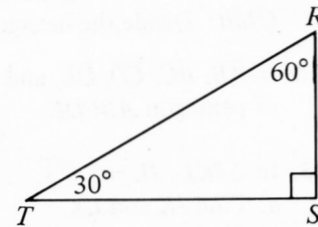
- A 1. 6                      2. 4                      3.  $5\sqrt{2}$                       4.  $\sqrt{6}$

Find the length of one leg of an isosceles right triangle whose hypotenuse has the given length.

5.  $10\sqrt{2}$                       6.  $\frac{\sqrt{2}}{3}$                       7. 12                      8. 16

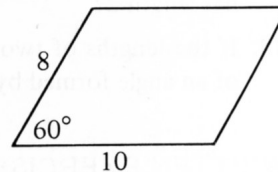
Complete.

	9.	10.	11.	12.	13.	14.	15.	16.
<i>RS</i>	5	?	?	?	?	$15\sqrt{3}$	$\sqrt{2}$	?
<i>ST</i>	?	$8\sqrt{3}$	?	?	12	?	?	$\sqrt{2}$
<i>RT</i>	?	?	14	$2\sqrt{3}$	?	?	?	?

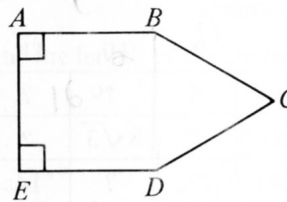


17. The length of one side of a square is  $\sqrt{2}$ . Find the length of a diagonal of the square.
18. The length of a diagonal of a square is  $\sqrt{6}$ . Find the length of each side of the square.
19. The length of each side of an equilateral triangle is 6. What is the length of each altitude of the triangle?

20. The length of each altitude of an equilateral triangle is 6. What is the length of each side of the triangle?
21. The length of each altitude of an equilateral triangle is 4.5. Find the perimeter of the triangle.
22. The perimeter of an equilateral triangle is  $15\sqrt{3}$ . Find the length of each altitude of the triangle.
23. A rhombus has a  $60^\circ$  angle and a side whose length is 2. How long are its diagonals?
24. One angle of a rhombus has measure 120. If the length of the longer diagonal is 12, find the length of the shorter diagonal and the perimeter of the rhombus.
25. Each base angle of an isosceles triangle has measure 30. The length of the base is 2. Find the height, area, and perimeter of the triangle.
26. A base angle of an isosceles triangle has measure 30, and the side opposite it has length 10. Find the perimeter and the area of the triangle.
27. Two adjacent sides of a parallelogram have lengths 8 and 10, respectively. If the angle determined by these sides has measure 60, find the area of the parallelogram.
28. Two adjacent sides of a parallelogram meet at a  $45^\circ$  angle. The lengths of the two sides are 12 and  $16\sqrt{2}$ . Find the area of the parallelogram.
29. An equilateral triangle has a side of length  $s$ .
- Find the height of the triangle in terms of  $s$ .
  - State a formula for the area of the triangle in terms of  $s$ .
  - If the area of an equilateral triangle is  $4\sqrt{3}$ , find the length of each side of the triangle.
30. The length of a diagonal of a square is  $x$ .
- State a formula for the area of the square in terms of  $x$ .
  - If the area of a square is 20, find the length of a diagonal of the square.
31. Each side of a regular hexagon has length 10. Find the area of the hexagon. (*Hint*: Divide the hexagon into triangles.)



32. If  $\overline{AB}$ ,  $\overline{BC}$ ,  $\overline{CD}$ ,  $\overline{DE}$ , and  $\overline{EA}$  each have length 4, find the area of pentagon  $ABCDE$ .
33. In  $\triangle JKL$ ,  $JL = 8\sqrt{3}$ .
- Find  $JK$  and  $LK$ .
  - Find the perimeter of  $\triangle JKL$ .
  - Find the area of  $\triangle JKL$ .
34. In  $\triangle JKL$ ,  $LK = 12$ .
- Find  $JL$  and  $JK$ .
  - Find the perimeter of  $\triangle JKL$ .
  - Find the area of  $\triangle JKL$ .



Exs. 33, 34

