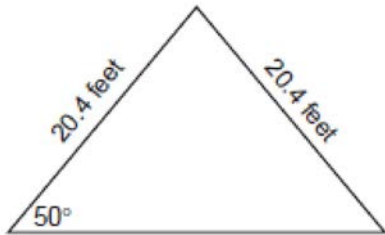
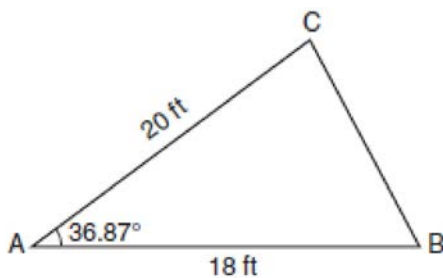


G.SRT.D.9: Using Trigonometry to Find Area 4

- 1 The accompanying diagram shows the peak of a roof that is in the shape of an isosceles triangle. A base angle of the triangle is 50° and each side of the roof is 20.4 feet. Determine, to the *nearest tenth of a square foot*, the area of this triangular region.

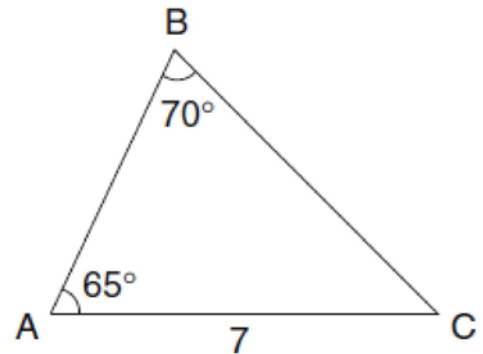


- 2 Gregory wants to build a garden in the shape of an isosceles triangle with one of the congruent sides equal to 12 yards. If the area of his garden will be 55 square yards, find, to the *nearest tenth of a degree*, the *three angles* of the triangle.
- 3 The accompanying diagram shows a triangular plot of land that is part of Fran's garden. She needs to change the dimensions of this part of the garden, but she wants the area to stay the same. She increases the length of side AC to 22.5 feet. If angle A remains the same, by how many feet should side AB be *decreased* to make the area of the new triangular plot of land the same as the current one?

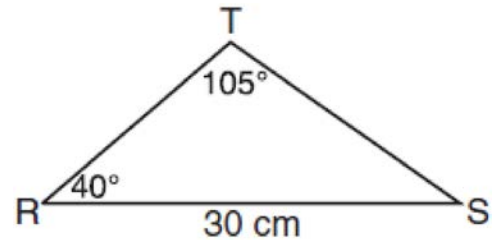


- 4 In $\triangle ABC$, $AC = 18$, $BC = 10$, and $\cos C = \frac{1}{2}$. Find the area of $\triangle ABC$ to the *nearest tenth of a square unit*.

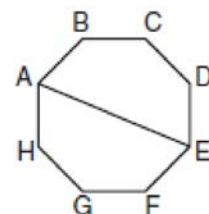
- 5 In the accompanying diagram of $\triangle ABC$, $m\angle A = 65$, $m\angle B = 70$, and the side opposite vertex B is 7. Find the length of the side opposite vertex A , and find the area of $\triangle ABC$.



- 6 In the accompanying diagram of $\triangle RST$, $RS = 30$ centimeters, $m\angle T = 105$, and $m\angle R = 40$. Find the area of $\triangle RST$, to the *nearest square centimeter*.



- 7 A ranch in the Australian Outback is shaped like triangle ACE , with $m\angle A = 42$, $m\angle E = 103$, and $AC = 15$ miles. Find the area of the ranch, to the *nearest square mile*.
- 8 A picnic table in the shape of a regular octagon is shown in the accompanying diagram. If the length of \overline{AE} is 6 feet, find the length of one side of the table to the *nearest tenth of a foot*, and find the area of the table's surface to the *nearest tenth of a square foot*.



G.SRT.D.9: Using Trigonometry to Find Area 4
Answer Section

1 ANS:

204.9. Because the triangle is isosceles, both base angles are 50° and the included angle is 80° .

$$K = \frac{1}{2}(20.4)(20.4) \sin 80^\circ \approx 204.9$$

REF: 060825b

2 ANS:

$$55 = \frac{1}{2}(12)(12) \sin C$$

$$49.8^\circ, 65.1^\circ, 65.1^\circ. \quad \sin C = \frac{55}{72} \quad \frac{180^\circ - 49.8^\circ}{2} \approx 65.1^\circ$$

$$C \approx 49.8^\circ$$

REF: 060121b

3 ANS:

$$108 \approx \frac{1}{2}(22.5)(c) \sin 36.87^\circ$$

$$2. \quad K = \frac{1}{2}(20)(18) \sin 36.87^\circ \approx 108. \quad c \approx \frac{9.6}{\sin 36.87^\circ} \quad \text{Side AB should be decreased from 18 to 16,}$$

$$c \approx 16$$

or by 2 feet.

REF: 080628b

4 ANS:

$$77.9. \quad C = \cos^{-1} \frac{1}{2} \quad K = \frac{1}{2}(20)(18) \sin 60^\circ \approx 77.9$$

$$C = 60^\circ$$

REF: 010723b

5 ANS:

$$\frac{a}{\sin 65} = \frac{7}{\sin 70}$$

$$6.75, 16.71. \quad a = \frac{7 \sin 65}{\sin 70}. \quad C = 180 - (65 + 70). \quad K = (6.75)(7) \sin 45$$

$$a \approx 6.75 \quad \approx 16.71$$

REF: 080131b

6 ANS:
172

REF: 011027b

7 ANS:

$$\frac{15}{\sin 103} = \frac{a}{\sin 42} \cdot \frac{1}{2} (15)(10.3) \sin 35 \approx 44$$

$$a \approx 10.3$$

REF: 061337a2

8 ANS:

2.3, 25.5. If \overline{BF} , \overline{CG} and \overline{DH} are drawn, they also measure 6 feet each and intersect at point O , such that $m\angle EOF = 45 \left(\frac{360}{8}\right)$. Since \overline{FO} and \overline{EO} each measures 3 feet, $\triangle FEO$ is an isosceles triangle.

$m\angle EFO$ and $m\angle FEO = 67.5 \left(\frac{180-45}{2}\right)$. Use the Law of Sines to find the length of one side of the table:

$$\frac{3}{\sin 67.5} = \frac{x}{\sin 45} \quad \text{To find the area of } \triangle FEO: \quad A = \frac{1}{2} ab \sin C$$

$$x \approx 2.3 \quad \approx \frac{1}{2} \times 3 \times 3 \times \sin 45. \quad \text{To find the area of the octagon, multiply the}$$

$$\approx 3.18$$

area of the triangle by 8, or about 25.5.

REF: 010330b