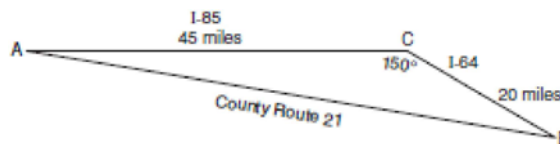
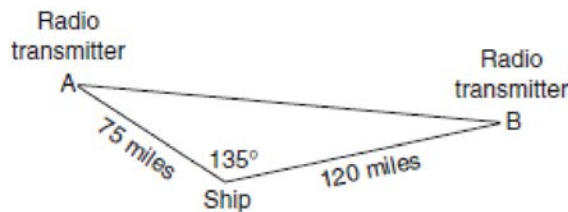


G.SRT.D.11: Law of Cosines 5

- 1 In a triangle, two sides that measure 6 cm and 10 cm form an angle that measures 80° . Find, to the *nearest degree*, the measure of the smallest angle in the triangle.
- 2 In a triangle, two sides that measure 8 centimeters and 11 centimeters form an angle that measures 82° . To the *nearest tenth of a degree*, determine the measure of the *smallest* angle in the triangle.
- 3 Kieran is traveling from city A to city B . As the accompanying map indicates, Kieran could drive directly from A to B along County Route 21 at an average speed of 55 miles per hour or travel on the interstates, 45 miles along I-85 and 20 miles along I-64. The two interstates intersect at an angle of 150° at C and have a speed limit of 65 miles per hour. How much time will Kieran save by traveling along the interstates at an average speed of 65 miles per hour?



- 4 As shown in the accompanying diagram, a ship at sea is 75 miles from radio transmitter A and 120 miles from radio transmitter B . The angle between the signals sent to the ship by the two transmitters measures 135° .



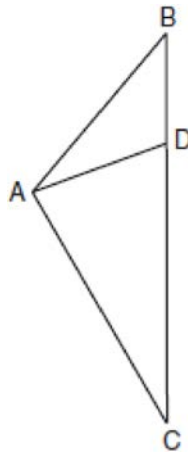
Find the distance between the transmitters to the *nearest mile*. Using this answer, find the measure of angle B to the *nearest degree*.

- 5 In $\triangle ABC$, side $a = 13$, side $b = 25$, and $m\angle C = 53.8$. Find the length of side c to the *nearest tenth*. Using this answer, find $m\angle A$ to the *nearest degree*.

6 In $\triangle ABC$, $AB = 14$, $AC = 20$, and $m\angle CAB = 49$. Find the length of \overline{BC} to the *nearest tenth*. Using this length, find $m\angle C$ to the *nearest degree*.

7 In triangle RST , $RS = 50$, $ST = 58$, and $m\angle S = 46$. Find RT , to the *nearest tenth*. Using your value for RT , find $m\angle R$, to the *nearest degree*.

8 In the accompanying diagram of $\triangle ABC$, $AB = 12$ feet, $DC = 17$ feet, $m\angle ABD = 40$, and $m\angle ADB = 110$. Find AC to the *nearest foot*.



9 In parallelogram $ABCD$, $AB = 14$, $BC = 20$, and $m\angle B = 54$. Find, to the *nearest tenth*, the length of diagonal \overline{BD} . Find $m\angle DBC$ to the *nearest degree*.

10 In $\triangle ABC$, $a = 10$, $b = 12$, and the measure of angle C is $41^\circ 30'$. Find the length of side c to the *nearest integer*. Find the area of $\triangle ABC$ to the *nearest tenth*.

11 In $\triangle ABC$, $m\angle A = 42^\circ 20'$, $AC = 2.0$ feet and $AB = 18$ inches. Find BC to the *nearest tenth*. [Indicate the unit of measure.] Find the area of $\triangle ABC$ to the *nearest tenth*. [Indicate the unit of measure.]

- 12 A surveyor is mapping a triangular plot of land. He measures two of the sides and the angle formed by these two sides and finds that the lengths are 400 yards and 200 yards and the included angle is 50° . What is the measure of the third side of the plot of land, to the *nearest yard*? What is the area of this plot of land, to the *nearest square yard*?
- 13 In $\triangle ABC$, $AB = 15$ cm, $BC = 10$ cm, and $AC = 6$ cm. Find the measure of angle B to the *nearest degree*. Using this angle, find the area of $\triangle ABC$ to the *nearest square centimeter*.
- 14 The sides of a triangular plot of land are 50, 80, and 100 meters. Find, to the *nearest degree*, the measure of the largest angle of the triangle. Using this answer, find the area of the triangle to the *nearest square meter*.
- 15 Find, to the *nearest degree*, the measure of the largest angle of a triangle whose sides measure 22, 34, and 50. Find, to the *nearest integer*, the area of this triangle.
- 16 The sides of a triangle have lengths 58, 92, and 124. Find, to the *nearest ten minutes*, the largest angle of the triangle. Find, to the *nearest integer*, the area of the triangle.
- 17 The lengths of the sides of $\triangle ABC$ are 9.5, 12.8, and 13.7. Find, to the *nearest hundredth of a degree* or the *nearest ten minutes*, the measure of the smallest angle in the triangle. Find, to the *nearest tenth*, the area of $\triangle ABC$.
- 18 In $\triangle ABC$, $a = 6$, $b = 7$, and $c = 10$. Find the measure of angle A to the *nearest ten minutes* or *nearest tenth of a degree*. Using this measure, find the area of $\triangle ABC$ to the *nearest tenth*.
- 19 In $\triangle ABC$, $AC = 8$, $BC = 17$, and $AB = 20$. Find the measure of the largest angle to the *nearest degree*. Find the area of $\triangle ABC$ to the *nearest integer*.

- 20 A hiking trail is planned in the shape of a triangle with sides 2.3 miles, 8.1 miles, and 6.2 miles. Find, to the *nearest tenth of a degree* or the *nearest ten minutes*, the angle between the 2.3-mile side and the 6.2-mile side. Find the area of the triangle to the *nearest tenth of a square mile*.
- 21 Firefighters dug three trenches in the shape of a triangle to prevent a fire from completely destroying a forest. The lengths of the trenches were 250 feet, 312 feet, and 490 feet. Find, to the *nearest degree*, the *smallest* angle formed by the trenches. Find the area of the plot of land within the trenches, to the *nearest square foot*.
- 22 Two adjacent sides of a parallelogram are 10 and 12 centimeters. The angle included between these sides has a measure of 60° . Find, to the *nearest centimeter*, the length of the shorter diagonal of the parallelogram. What is the area of the parallelogram to the *nearest square centimeter*?
- 23 In parallelogram $ABCD$, $AB = 12$ cm, $AD = 20$ cm, and $m\angle A = 50$. Find the length of the longer diagonal of the parallelogram to the *nearest centimeter*. Find the area of the parallelogram to the *nearest square centimeter*.
- 24 Two consecutive sides of a parallelogram are 8 centimeters and 10 centimeters, respectively. If the length of the longer diagonal of the parallelogram is 14 centimeters, find the measure of the largest angle of the parallelogram to the *nearest degree*. Using your answer, find the area of the parallelogram to the *nearest square centimeter*.
- 25 In parallelogram $ABCD$, $AD = 8$, $AB = 12$, and diagonal $BD = 15$. Find $\angle BAD$ to the *nearest degree*. Using this angle, find the area of parallelogram $ABCD$ to the *nearest tenth*.

G.SRT.D.11: Law of Cosines 5**Answer Section**

1 ANS:

$$33. a = \sqrt{10^2 + 6^2 - 2(10)(6)\cos 80} \approx 10.7. \angle C \text{ is opposite the shortest side. } \frac{6}{\sin C} = \frac{10.7}{\sin 80}$$

$$C \approx 33$$

REF: 061039a2

2 ANS:

$$a = \sqrt{8^2 + 11^2 - 2(8)(11)\cos 82} \approx 12.67. \text{ The angle opposite the shortest side: } \frac{8}{\sin x} = \frac{12.67}{\sin 82}$$

$$x \approx 38.7$$

REF: 081536a2

3 ANS:

$$c^2 = 20^2 + 45^2 - 2(20)(45)\cos 150$$

9 minutes. $c^2 \approx 3984$. If Kieran drives from A to B along County Route 21, the trip will

$$c \approx 63$$

take 1.15 hours, $\frac{63 \text{ miles}}{55 \text{ mph}}$. If she travels from A to B along the interstates, the trip will take 1 hour, $\frac{65 \text{ miles}}{65 \text{ mph}}$.

She will save 0.15 hours or 9 minutes by taking the interstates.

REF: 060232b

4 ANS:

181, 17

REF: 010442siii

5 ANS:

20.3, 31

REF: 060341siii

6 ANS:

15.1, 44

REF: 069741siii

7 ANS:

$$s = \sqrt{50^2 + 58^2 - 2(50)(58)\cos 46} \approx 42.8. \frac{42.8}{\sin 46} = \frac{58}{\sin R}$$

$$R \approx 77$$

REF: 061033b

8 ANS:
16

REF: 010139siii

9 ANS:
30.4, 22

REF: 089840siii

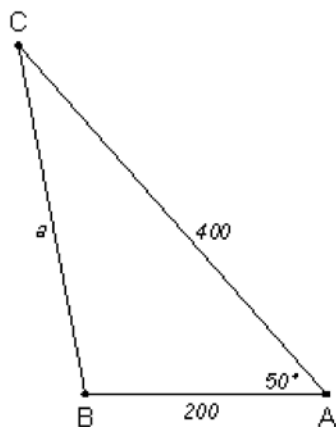
10 ANS:
8, 39.8

REF: 018438siii

11 ANS:
16.2 in or 1.3 ft, 145.5 in² or 1.0 ft²

REF: 019538siii

12 ANS:



$$a^2 = 400^2 + 200^2 - 2(400)(200) \cos 50$$

$$a^2 \approx 97154$$

$$a \approx 312$$

312, 30,642.

$$K = \frac{1}{2}(400)(200) \sin 50 \approx 30642$$

REF: 060434b

13 ANS:
16, 21

REF: 068539siii

14 ANS:
98, 1981

REF: 089040siii

15 ANS:
125, 306

REF: 069539siii

16 ANS:
109°30', 2515

REF: 089541siii

17 ANS:
41.84° or 41°50', 58.5

REF: 069642siii

18 ANS:
36.2 or 36°10', 20.7

REF: 019941siii

19 ANS:
100, 67

REF: 019940siii

20 ANS:
140.1° or 140°10', 4.6

REF: 010340siii

21 ANS:
26 and 33,509 or 33,443. The smallest angle is opposite the smallest side, so let $\alpha = 250$, and find A .

$$250^2 = 312^2 + 490^2 - 2(312)(490)\cos A$$

$$-274944 = -305760\cos A$$

$$\cos A = \frac{274944}{305760}$$

$$A \approx 26$$

$$K = \frac{1}{2}(312)(490)\sin 26^\circ \approx 33509$$

REF: 080934b

22 ANS:
11, 104

REF: 088541siii

23 ANS:
29, 184

REF: 068739siii

24 ANS:
102, 78

REF: 068039siii

25 ANS:
95, 95.6

REF: 010038siii