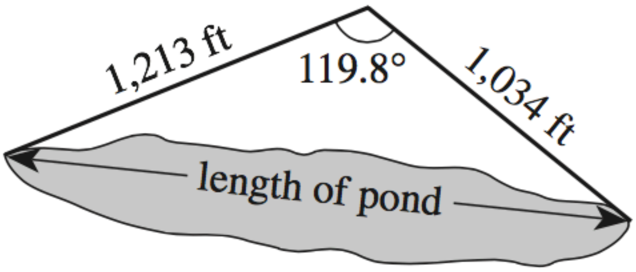
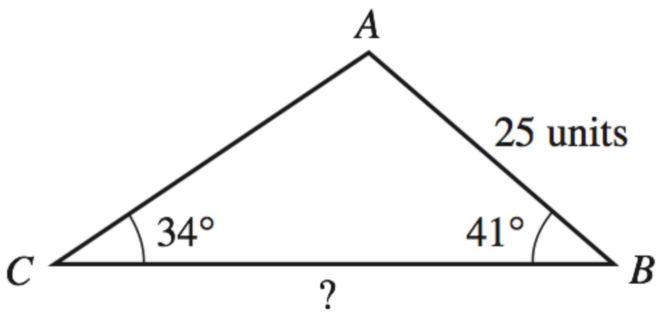
34. A surveyor took and recorded the measurements shown in the figure below. If the surveyor wants to use these 3 measurements to calculate the length of the pond, which of the following would be the most directly applicable?



F. The Pythagorean theorem
G. A formula for the area of a triangle
H. The ratios for the side lengths of 30°-60°-90° triangles
J. The ratios for the side lengths of 45°-45°-90° triangles
K. The law of cosines: For any $\triangle ABC$, where a is the length of the side opposite $\angle A$, b is the length of the side opposite $\angle B$, and c is the length of the side opposite $\angle C$, $a^2 = b^2 + c^2 - 2bc\cos(\angle A)$

45. In $\triangle ABC$, shown below, the measure of $\angle B$ is 41°, the measure of $\angle C$ is 34°, and $\overline{AB}$ is 25 units long. Which of the following is an expression for the length, in units, of $\overline{BC}$?

(Note: The law of sines states that, for any triangle, the ratios of the sines of the interior angles to the lengths of the sides opposite those angles are equal.)



A. $\dfrac{25 \sin 105°}{\sin 41°}$

B. $\dfrac{25 \sin 105°}{\sin 34°}$

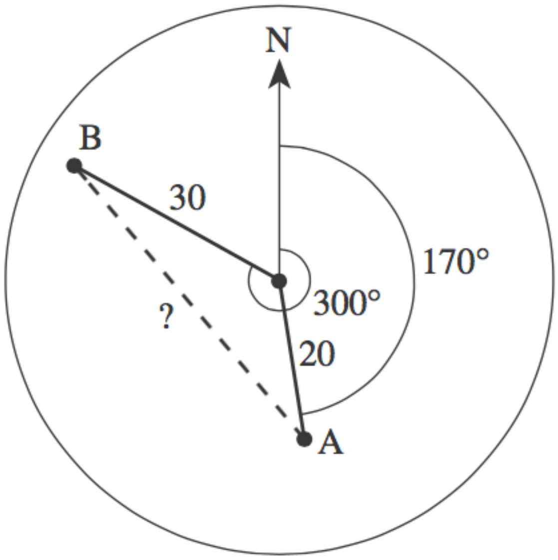
C. $\dfrac{25 \sin 75°}{\sin 41°}$

D. $\dfrac{25 \sin 41°}{\sin 105°}$

E. $\dfrac{25 \sin 34°}{\sin 75°}$

41. In the figure below, a radar screen shows 2 ships. Ship A is located at a distance of 20 nautical miles and bearing 170°, and Ship B is located at a distance of 30 nautical miles and bearing 300°. Which of the following is an expression for the straight-line distance, in nautical miles, between the 2 ships?

(Note: For $\triangle ABC$ with side of length a opposite $\angle A$, side of length b opposite $\angle B$, and side of length c opposite $\angle C$, the law of cosines states $c^2 = a^2 + b^2 - 2ab \cos \angle C$.)



A. $\sqrt{20^2 + 30^2 - 2(20)(30)\cos 60°}$

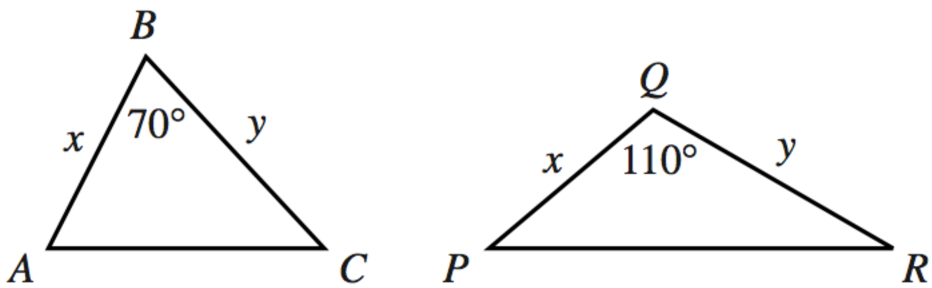
B. $\sqrt{20^2 + 30^2 - 2(20)(30)\cos 130°}$

C. $\sqrt{20^2 + 30^2 - 2(20)(30)\cos 170°}$

D. $\sqrt{20^2 + 30^2 - 2(20)(30)\cos 300°}$

E. $\sqrt{20^2 + 30^2 - 2(20)(30)\cos 470°}$

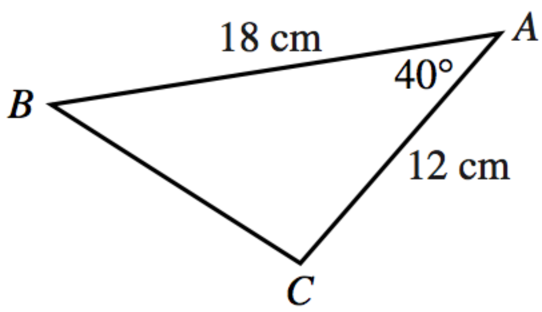
56. Triangles $\triangle ABC$ and $\triangle PQR$ are shown below. The given side lengths are in centimeters. The area of $\triangle ABC$ is 30 square centimeters. What is the area of $\triangle PQR$, in square centimeters?



F. 15
G. 19
H. 25
J. 30
K. 33

57. Triangle $\triangle ABC$ is shown in the figure below. The measure of $\angle A$ is 40°, $AB = 18$ cm, and $AC = 12$ cm. Which of the following is the length, in centimeters, of $\overline{BC}$?

(Note: For a triangle with sides of length a, b, and c opposite angles $\angle A$, $\angle B$, and $\angle C$, respectively, the law of sines states $\frac{\sin \angle A}{a} = \frac{\sin \angle B}{b} = \frac{\sin \angle C}{c}$ and the law of cosines states $c^2 = a^2 + b^2 - 2ab \cos \angle C$.)



A. $12 \sin 40°$

B. $18 \sin 40°$

C. $\sqrt{18^2 - 12^2}$

D. $\sqrt{12^2 + 18^2}$

E. $\sqrt{12^2 + 18^2 - 2(12)(18) \cos 40°}$

60. The sides of an acute triangle measure 14 cm, 18 cm, and 20 cm, respectively. Which of the following equations, when solved for θ, gives the measure of the smallest angle of the triangle?

(Note: For any triangle with sides of length a, b, and c that are opposite angles A, B, and C, respectively, $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ and $c^2 = a^2 + b^2 - 2ab \cos C$.)

F. $\frac{\sin \theta}{14} = \frac{1}{18}$

G. $\frac{\sin \theta}{14} = \frac{1}{20}$

H. $\frac{\sin \theta}{20} = \frac{1}{14}$

J. $14^2 = 18^2 + 20^2 - 2(18)(20)\cos \theta$

K. $20^2 = 14^2 + 18^2 - 2(14)(18)\cos \theta$