35. A cargo ship is 4.2 miles from a lighthouse, and a fishing boat is 5.0 miles from the lighthouse, as shown below. The angle between the straight lines from the lighthouse to the 2 vessels is 5°. The approximate distance, in miles, from the cargo ship to the fishing boat is given by which of the following expressions?

(Note: The law of cosines states that for any triangle with vertices A, B, and C and the sides opposite those vertices with lengths a, b, and c, respectively, $c^2 = a^2 + b^2 - 2ab \cos C$.)
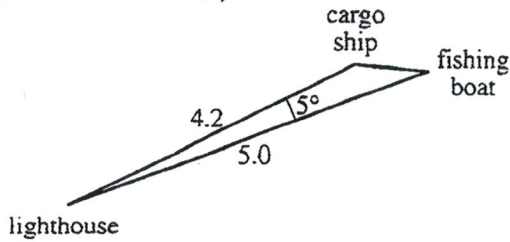

A. $\sqrt{(5.0)^2 - (4.2)^2}$

B. $\sqrt{(4.2)^2 + (5.0)^2 - 2 \cdot 4.2 \cdot 5.0 \cos 5°}$

C. $\sqrt{(4.2)^2 + (5.0)^2 + 2 \cdot 4.2 \cdot 5.0 \cos 5°}$

D. $\sqrt{(4.2)^2 + (5.0)^2 - 2 \cdot 4.2 \cdot 5.0 \cos 85°}$

E. $\sqrt{(4.2)^2 + (5.0)^2 + 2 \cdot 4.2 \cdot 5.0 \cos 85°}$

36. Which of the following equations expresses c in terms of a for all real numbers a, b, and c such that $a^3 = b$ and $b^2 = c$?

F. $c = a^6$

G. $c = a^5$

H. $c = 2a^3$

J. $c = \frac{1}{2}a$

K. $c = a$

38. In the standard (x,y) coordinate plane below, the points $(0,0)$, $(10,0)$, $(13,6)$, and $(3,6)$ are the vertices of a parallelogram. What is the area, in square coordinate units, of the parallelogram?

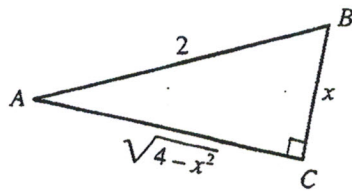F. 30
G. 60
H. $30\sqrt{3}$
J. $30\sqrt{5}$
K. $60\sqrt{5}$
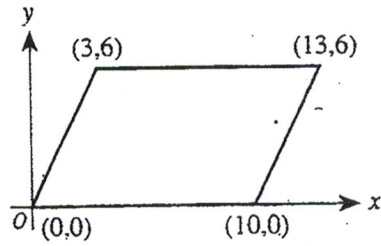
41. $\left(\frac{1}{2}x - y\right)^2 = ?$

A. $\frac{1}{4}x^2 + y^2$

B. $\frac{1}{4}x^2 - xy + y^2$

C. $\frac{1}{2}x^2 - xy + y^2$

D. $x^2 + y^2$

E. $x^2 - xy + y^2$

45. The lengths, in feet, of the sides of right triangle $\triangle ABC$ are as shown in the diagram below, with $x > 0$. What is the cotangent of $\angle A$, in terms of x?
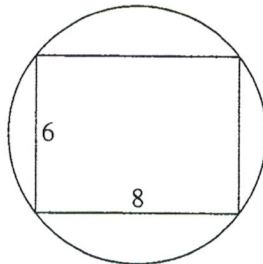
A. $\sqrt{4 - x^2}$

B. $\frac{2}{x}$

C. $\frac{x}{2}$

D. $\frac{x}{\sqrt{4 - x^2}}$

E. $\frac{\sqrt{4 - x^2}}{x}$

51. In the figure below, all line segments are either horizontal or vertical and the dimensions given are in inches. What is the perimeter, in inches, of the figure?
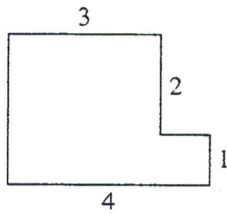
- A. 10
- B. 12
- C. 13
- D. 14
- E. 16

52. A 6-inch-by-8-inch rectangle is inscribed in a circle as shown below. What is the area of the circle, in square inches?

- F. 5π
- G. 16π
- H. 25π
- J. 48π
- K. 96π

3

58. A simple pendulum consists of a small mass suspended from a string that is fixed at its upper end and has negligible mass. The length of time, t seconds, for a complete swing of a simple pendulum can be modeled by the equation $t = 2\pi\sqrt{\dfrac{L}{32}}$, where L is the length, in feet, of the string. If the time required for a complete swing of Pendulum 1 is triple the time required for a complete swing of Pendulum 2, the length of Pendulum 1's string is how many times the length of Pendulum 2's string?

F. $\dfrac{1}{3}$

G. 3

H. 6

J. 9

K. 27

60. Jennifer's best long jump distance increased by 10% from 1990 to 1991 and by 20% from 1991 to 1992. By what percent did her best long jump distance increase from 1990 to 1992 ?

F. 32%
G. 30%
H. 20%
J. 15%
K. 2%

DO YOUR FIGURING HERE.

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.

60. Whenever $\dfrac{2 \cos \alpha \sin \alpha}{\cos^2\alpha + 1 - \sin^2\alpha}$ is defined, it simplifies to:

F. $\tan \alpha$

G. $\cot \alpha$

H. 2

J. $\dfrac{2}{\cos \alpha - \sin \alpha}$

K. $\sin \alpha \, \cos \alpha$