

1. **Answer (C):** Susan pays  $(4)(0.75)(20) = 60$  dollars. Pam pays  $(5)(0.70)(20) = 70$  dollars, so she pays  $70 - 60 = 10$  more dollars than Susan.
2. **Answer (D):** The brick has a volume of  $40 \cdot 20 \cdot 10 = 8000$  cubic centimeters. Suppose that after the brick is placed in the tank, the water level rises by  $h$  centimeters. Then the additional volume occupied in the aquarium is  $100 \cdot 40 \cdot h = 4000h$  cubic centimeters. Since this must be the same as the volume of the brick, we have
- $$8000 = 4000h \quad \text{and} \quad h = 2 \text{ centimeters}$$
3. **Answer (A):** Let the smaller of the integers be  $x$ . Then the larger is  $x + 2$ . So  $x + 2 = 3x$ , from which  $x = 1$ . Thus the two integers are 1 and 3, and their sum is 4.
4. **Answer (A):** Kate rode for 30 minutes  $= 1/2$  hour at 16 mph, so she rode 8 miles. She walked for 90 minutes  $= 3/2$  hours at 4 mph, so she walked 6 miles. Therefore she covered a total of 14 miles in 2 hours, so her average speed was 7 mph.
5. **Answer (D):** After paying the federal taxes, Mr. Public had 80% of his inheritance money left. He paid 10% of that, or 8% of his inheritance, in state taxes. Hence his total tax bill was 28% of his inheritance, and his inheritance was  $\$10,500/0.28 = \$37,500$ .
6. **Answer (D):** Because  $\triangle ABC$  is isosceles,  $\angle BAC = \frac{1}{2}(180^\circ - \angle ABC) = 70^\circ$ .

7. **Answer (C):** Let  $D$  be the difference between consecutive terms of the sequence. Then  $a = c - 2D$ ,  $b = c - D$ ,  $d = c + D$ , and  $e = c + 2D$ , so

$$a + b + c + d + e = (c - 2D) + (c - D) + c + (c + D) + (c + 2D) = 5c.$$

Thus  $5c = 30$ , so  $c = 6$ .

To see that the values of the other terms cannot be found, note that the sequences 4, 5, 6, 7, 8 and 10, 8, 6, 4, 2 both satisfy the given conditions.

8. **Answer (C):** Consider the two chords with an endpoint at 5. The arc subtended by the angle determined by these chords extends from 10 to 12, so the degree measure of the arc is  $(2/12)(360) = 60$ . By the Central Angle Theorem, the degree measure of this angle is  $(1/2)(60) = 30$ . By symmetry, the degree measure of the angle at each vertex is 30.
9. **Answer (B):** Let  $w$  be Yan's walking speed, and let  $x$  and  $y$  be the distances from Yan to his home and to the stadium, respectively. The time required for Yan to walk to the stadium is  $y/w$ , and the time required for him to walk home is  $x/w$ . Because he rides his bicycle at a speed of  $7w$ , the time required for him to ride his bicycle from his home to the stadium is  $(x + y)/(7w)$ . Thus

$$\frac{y}{w} = \frac{x}{w} + \frac{x + y}{7w} = \frac{8x + y}{7w}.$$

As a consequence,  $7y = 8x + y$ , so  $8x = 6y$ . The required ratio is  $x/y = 6/8 = 3/4$ .

OR

$$\sum_{n=2}^{2007} \sqrt[n]{n} = \sum_{n=2}^{2007} \left( n + \frac{1}{4} \right)^{-1/4} = \frac{1}{2} \left( \frac{2008}{3} + 2008 \right)^{3/4} - 50 \approx 2,016,532.$$