UNIT 2 EXERCISES 1-5

3D Geometry

2007A

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

$$8000 = 4000h \quad \text{and} \quad h = 2 \text{ centimeters}$$

2003A

3. (D) The total volume of the eight removed cubes is $8 \times 3^3 = 216$ cubic centimeters, and the volume of the original box is $15 \times 10 \times 8 = 1200$ cubic centimeters. Therefore the volume has been reduced by $\left(\frac{216}{1200}\right)(100\%) = 18\%$.

2012A

3. **Answer (D):** The volume of the second box is $2 \cdot 3 = 6$ times the volume of the first box. Hence it can hold $6 \cdot 40 = 240$ grams of clay.

2009A 5. **Answer (D):** Let x be the side length of the cube. Then the volume of the cube was x^3, and the volume of the new solid is $x(x+1)(x-1) = x^3 - x$. Therefore $x^3 - x = x^3 - 5$, from which $x = 5$, and the volume of the cube was $5^3 = 125$.