Chapter Audio Summary for McDougal Littell
Geometry

Chapter 12 Surface Area and Volume

In Chapter 12 you learned to distinguish polyhedra from other solids and to classify polyhedra. Then you identified the Platonic solids and used Euler's Theorem. You used formulas to find the surface area of prisms, cylinders, pyramids, and cones. Then you found the volume of prisms, cylinders, pyramids, and cones. After that you studied similar solids.

Turn to the lesson-by-lesson Chapter Review that starts on p. 774 of the textbook.

Lesson 12.1 Exploring Solids

Important words to know are: *polyhedron, face, edge, vertex, regular polyhedron, convex, cross section, Platonic solids, tetrahedron, octahedron, dodecahedron,* and *icosahedron.*

The first goal of Lesson 12.1 is to use properties of polyhedra, or solids bounded by polygons. Among the five basic types of solids, prism, pyramid, cone, cylinder, and sphere, only prisms and pyramids are polyhedra.

The second goal of Lesson 12.1 is to use Euler's Theorem in real-life situations. In the Example, the number of vertices can be found using Euler's theorem: $F+V=E+2$. Substitute 6 for F, the number of faces, and 10 for E, the number of edges, to get $6+V=10+2$. Simplify to find that $V=6$.

Now try Exercises 1 through 3. If you need help, go to the worked-out Examples on pages 719 through 722.

Lesson 12.2 Surface Area of Prisms and Cylinders

Important words to know are: *prism, bases, lateral faces, right prism, oblique prism, surface area of a polyhedron, lateral area of a polyhedron, net, cylinder, right cylinder, lateral area of a cylinder,* and *surface area of a cylinder.*

The first goal of Lesson 12.2 is to find the surface area of a prism. Remember that the surface area S of a right prism can be found using the formula $S = 2B + Ph$. In the first Example, the area of the base B is 44. The perimeter P of the base is 30, and the height h is 9. Use the formula to get $S=2(44)+30(9)$. Simplify to get $S=358$ in.^{2}.

The second goal of Lesson 12.2 is to find the surface area of a cylinder. The surface area of a cylinder can be found by adding twice the area of the bases to the lateral area.

Now try Exercises 4 through 6. If you need help, go to the worked-out Examples on pages 728 through 731.

Lesson 12.3 Surface Area of Pyramids and Cones

Important words to know are: *pyramid, regular pyramid, circular cone, lateral surface of a cone,* and *right cone.*

The first goal of Lesson 12.3 is to find the surface area of a pyramid. Start with the formula $S = B + 1/2Pl$. For the figure in the example, substitute 15.6 in.[2] for the base B, 18 for the perimeter P, and 7 for the slant height l. Then solve the equation: $S \approx 15.6 + 1/2(18)(7)$, to get 78.6 in.[2].

The second goal of Lesson 12.3 is to find the surface area of a cone. You need to find the sum of the base area and the lateral area. Here the area of the base is 36π and the lateral area is 60π, so the surface area is about 301.6 cm[2].

Now try Exercises 7 through 9. If you need help, go to the worked-out Examples on pages 735 through 737.

Lesson 12.4 Volume of Prisms and Cylinders

Important words to know are: *volume of a solid.*

The first goal of Lesson 12.4 is to use volume postulates. To find the volume of the rectangular prism, use the formula $V = Bh$, where B is the area of the base and h is the height. Here the area of the base is 7 • 9, and the height is 5, so the volume equals 315 cm[3]. Follow a similar process to find the volume of the right cylinder: write the formula for volume of a cylinder, substitute given values, and simplify.

The second goal of Lesson 12.4 is to find the volume of prisms and cylinders in real-life. Remember that the volume of a solid is measured in cubic units.

Now try Exercises 10 through 12. If you need help, go to the worked-out Examples on pages 743 through 745.

Lesson 12.5 Volume of Pyramids and Cones

The first goal of Lesson 12.5 is to find the volume of pyramids and cones. Remember that the formula for the volume V of a pyramid is $V = 1/3Bh$, where B is the area of the base and h is the height. Substitute values into the formula. Substitute 11 • 8 for the area of the base and 6 for the height. So the volume equals 176 in.[3].

Now try Exercises 13 through 15. If you need help, go to the worked-out Examples on pages 752 through 754.

Lesson 12.6 Surface Area and Volume of Spheres

Important words to know are: *sphere, center of a sphere, radius of a sphere, chord of a sphere, diameter of a sphere, great circle,* and *hemisphere.*

The first goal of Lesson 12.6 is to find the surface area of a sphere. To find the surface area of a sphere with a radius of 7 in., use the formula $S = 4\pi r^2$. Substitute 7 for *r*, to get 196π, or approximately 615.8 in.[2].

The second goal of Lesson 12.6 is to find the volume of a sphere in real-life. To find the volume of the sphere in the Example, use the formula $V = \frac{4}{3}\pi r^{3.}$. Substitute 7 for *r*, so the volume equals approximately 1436.8 in.[3].

Now try Exercises 16 and 17. If you need help, go to the worked-out Examples on pages 759 through 761.

Lesson 12.7 Similar Solids

Important words to know are: *similar solids.*

The first goal of Lesson 12.7 is to find and use the scale factor of similar solids. In the Examples, the ratios of the corresponding linear measurements are all equal to 3/4. So the solids are similar with a scale factor of 3:4.

The second goal of Lesson 12.7 is to use similar solids to solve real-life problems. Remember the Similar Solids Theorem: If two similar solids have a scale factor of *a*:*b*, then corresponding *areas* have a ratio of a^2:b^2, and corresponding *volumes* have a ratio of a^3:b^3. You can use that theorem to find volumes of similar solids and to compare similar solids.

Now try Exercises 18 and 19. If you need help, go to the worked-out Examples on pages 766 through 768.