

# Surface Area of Spheres

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 24

## Q Quick Review

A **sphere** is a perfectly round solid — every point on its surface is the same distance, the **radius**  $r$ , from the center. The **surface area** of a sphere is  $SA = 4\pi r^2$ . A handy way to remember it: a sphere's surface area is exactly four times the area of a flat circle with the same radius. If you're given the *diameter*, cut it in half first to get the radius. Keep  $\pi$  in your answer unless you're told to use  $\pi \approx 3.14$ , and remember surface area uses *square* units.

◊ **Example:** Find the surface area of a sphere with radius 5 cm. Leave your answer in terms of  $\pi$ .  
 ⇒ The surface area formula for a sphere is  $SA = 4\pi r^2$ . Here the radius is 5, so first square it:  $5^2 = 25$ . Then multiply by 4:  $4 \times 25 = 100$ . So the surface area is  $100\pi$  square centimeters. Leaving the  $\pi$  gives the exact value.

**Answer:**  $SA = 100\pi \text{ cm}^2$

## PRACTICE

Find the surface area of each sphere. Leave  $\pi$  in unless noted.

- |                     |       |   |       |
|---------------------|-------|---|-------|
| 1. Sphere: $r = 3$  | _____ | 11. Sphere: $r = 12$                          | _____ |
| 2. Sphere: $r = 5$  | _____ | 12. Sphere: $d = 6$                           | _____ |
| 3. Sphere: $r = 7$  | _____ | 13. Sphere: $d = 10$                          | _____ |
| 4. Sphere: $r = 10$ | _____ | 14. Sphere: $d = 14$                          | _____ |
| 5. Sphere: $r = 2$  | _____ | 15. Sphere: $d = 20$                          | _____ |
| 6. Sphere: $r = 6$  | _____ | 16. Sphere: $d = 4$                           | _____ |
| 7. Sphere: $r = 1$  | _____ | 17. Sphere: $r = 11$                          | _____ |
| 8. Sphere: $r = 4$  | _____ | 18. Sphere: $r = 15$                          | _____ |
| 9. Sphere: $r = 8$  | _____ | 19. Sphere: $r = 5$ , use $\pi \approx 3.14$  | _____ |
| 10. Sphere: $r = 9$ | _____ | 20. Sphere: $r = 10$ , use $\pi \approx 3.14$ | _____ |

## ◆ Word Problems

21. A globe has a radius of 7 inches. What is its surface area? Leave your answer in terms of  $\pi$ . \_\_\_\_\_
22. A spherical balloon has a diameter of 10 cm. Find the surface area of the balloon in terms of  $\pi$ . \_\_\_\_\_
23. A spherical water tank has a radius of 5 m. Using  $\pi \approx 3.14$ , how many square meters of paint are needed to coat its outside surface? \_\_\_\_\_
24. A sphere has radius 3 m and another sphere has radius 6 m. How many times larger is the surface area of the bigger sphere?  
 \_\_\_\_\_



## Answer Keys

- |              |                           |
|--------------|---------------------------|
| 1. $36\pi$   | 13. $100\pi$              |
| 2. $100\pi$  | 14. $196\pi$              |
| 3. $196\pi$  | 15. $400\pi$              |
| 4. $400\pi$  | 16. $16\pi$               |
| 5. $16\pi$   | 17. $484\pi$              |
| 6. $144\pi$  | 18. $900\pi$              |
| 7. $4\pi$    | 19. $314$                 |
| 8. $64\pi$   | 20. $1256$                |
| 9. $256\pi$  | 21. $196\pi \text{ in}^2$ |
| 10. $324\pi$ | 22. $100\pi \text{ cm}^2$ |
| 11. $576\pi$ | 23. $314 \text{ m}^2$     |
| 12. $36\pi$  | 24. 4 times larger        |

### Step-by-Step Explanations

- |   |   |
|---|---|
| <p>1. <math>SA = 4\pi r^2 = 4\pi(9) = 36\pi</math>.</p> <p>2. <math>SA = 4\pi(25) = 100\pi</math>.</p> <p>3. <math>SA = 4\pi(49) = 196\pi</math>.</p> <p>4. <math>SA = 4\pi(100) = 400\pi</math>.</p> <p>5. <math>SA = 4\pi(4) = 16\pi</math>.</p> <p>6. <math>SA = 4\pi(36) = 144\pi</math>.</p> <p>7. <math>SA = 4\pi(1) = 4\pi</math>.</p> <p>8. <math>SA = 4\pi(16) = 64\pi</math>.</p> <p>9. <math>SA = 4\pi(64) = 256\pi</math>.</p> <p>10. <math>SA = 4\pi(81) = 324\pi</math>.</p> <p>11. <math>SA = 4\pi(144) = 576\pi</math>.</p> <p>12. Radius is 3, so <math>SA = 4\pi(9) = 36\pi</math>.</p> <p>13. Radius is 5, so <math>SA = 4\pi(25) = 100\pi</math>.</p> | <p>14. Radius is 7, so <math>SA = 4\pi(49) = 196\pi</math>.</p> <p>15. Radius is 10, so <math>SA = 4\pi(100) = 400\pi</math>.</p> <p>16. Radius is 2, so <math>SA = 4\pi(4) = 16\pi</math>.</p> <p>17. <math>SA = 4\pi(121) = 484\pi</math>.</p> <p>18. <math>SA = 4\pi(225) = 900\pi</math>.</p> <p>19. <math>SA = 4(3.14)(25) = 314</math>.</p> <p>20. <math>SA = 4(3.14)(100) = 1256</math>.</p> <p>21. Use <math>SA = 4\pi r^2 = 4\pi(7^2) = 4\pi(49) = 196\pi</math> square inches.</p> <p>22. The radius is half the diameter: <math>r = 5</math> cm. Then <math>SA = 4\pi(5^2) = 4\pi(25) = 100\pi</math> square centimeters.</p> <p>23. <math>SA = 4\pi r^2 \approx 4(3.14)(5^2) = 4(3.14)(25) = 314</math> square meters.</p> <p>24. Small sphere: <math>SA = 4\pi(9) = 36\pi</math>. Big sphere: <math>SA = 4\pi(36) = 144\pi</math>. The ratio is <math>144\pi \div 36\pi = 4</math>, so it is 4 times larger.</p> |
|---|---|



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