

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 π 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 π .
 ⇒ 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 100π square centimeters. Leaving the π gives the exact value.

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

PRACTICE

Find the surface area of each sphere. Leave π 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 π . _____
22. A spherical balloon has a diameter of 10 cm. Find the surface area of the balloon in terms of π . _____
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. 36π | 13. 100π |
| 2. 100π | 14. 196π |
| 3. 196π | 15. 400π |
| 4. 400π | 16. 16π |
| 5. 16π | 17. 484π |
| 6. 144π | 18. 900π |
| 7. 4π | 19. 314 |
| 8. 64π | 20. 1256 |
| 9. 256π | 21. $196\pi \text{ in}^2$ |
| 10. 324π | 22. $100\pi \text{ cm}^2$ |
| 11. 576π | 23. 314 m^2 |
| 12. 36π | 24. 4 times larger |

Step-by-Step Explanations

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