#### Study Island

**Copyright © 2013 Study Island - All rights reserved.**

Generation Date: **02/01/2013**
Generated By: **Trish Angell**

**1.**



If the diameter of the sphere is 16 cm, what is the approximate surface area of the sphere?

Surface Area of a Sphere = 4![https://media.studyisland.com/cgi-bin/mimetex.cgi?\pi](data:None;base64...)*r*2

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 804.25 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 402.12 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 201.06 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 6,433.98 cm2 |

**2.**


*\*Note: Picture not drawn to scale.*

If *r* = 6 cm and *h* = 8 cm, what is the approximate surface area of the cone?

Surface Area of a Cone = ![https://media.studyisland.com/cgi-bin/mimetex.cgi?\pi](data:None;base64...)*r*(*l* + *r*), where *l* is the slant height

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 150.8 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 452.39 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 100.53 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 301.59 cm2 |

**3.**


Note: Figure not drawn to scale.

What is the volume of the cylinder shown above if the radius of the base is 6 units and the height is 11 units?

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 216https://www1.studyisland.com/userfiles/pi.gif cubic units |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 396https://www1.studyisland.com/userfiles/pi.gif cubic units |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 99https://www1.studyisland.com/userfiles/pi.gif cubic units |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 1,584https://www1.studyisland.com/userfiles/pi.gif cubic units |

**4.**



If *x* = 4 ft, *y* = 8 ft, and *z* = 12 ft, then what is the volume of the rectangular prism shown above?

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 96 ft3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 192 ft3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 768 ft3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 384 ft3 |

**5.**



If *L* = 18 in, *W* = 5 in, and *H* = 6 in, what is the surface area of the rectangular prism?

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 522 in2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 456 in2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 390 in2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 540 in2 |

**6.** Stephanie wants to cover a rectangular-shaped ottoman, in its entirety, with new fabric. The ottoman has a length of 40 inches, a height of 26 inches, and a width of 22 inches. How much fabric will she need, at minimum, to cover the ottoman?

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 4,836 square inches |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 22,880 square inches |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 2,492 square inches |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 4,984 square inches |

**7.** In the triangular pyramid below, the length of the base, *l*, is 12 cm, the height of the base, *w*, is 16 cm, and the height of the pyramid, *h*, is 28 cm. What is the volume of the pyramid?


Note: Figure not drawn to scale.

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 896 cm3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 448 cm3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 1,344 cm3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 1,792 cm3 |

**8.**



If *H* = 7 cm, *W* = 7 cm, and *L* = 21 cm, what is the approximate surface area of the prism?

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 597.8 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 646.8 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 427.77 cm2 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 550.89 cm2 |

**9.**


*\*picture not drawn to scale*

If *x* = 6 yd, *y* = 14 yd, and *z* = 3 yd, then what is the volume of the triangular prism shown above?

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | 504 yd3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | 252 yd3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | 23 yd3 |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | 126 yd3 |

**10.**


Note: Figure not drawn to scale.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\text%7bIf%20the%20height%20of%20the%20cone,%20%7dh\text%7b,%20is%20%7d6\text%7b%20millimeters%20and%20the%20diameter%20of%7d\\%20\text%7bthe%20base,%20%7dd\text%7b,%20is%20%7d18\text%7b%20millimeters,%20what%20is%20the%20volume%20of%20the%20cone?%7d](data:None;base64...)

|  |  |  |
| --- | --- | --- |
| Bubble | **A.** | https://media.studyisland.com/cgi-bin/mimetex.cgi?162\pi\%20\text%7bmillimeters%5e%7b3%7d%7d |

|  |  |  |
| --- | --- | --- |
| Bubble | **B.** | https://media.studyisland.com/cgi-bin/mimetex.cgi?54\pi\%20\text%7bmillimeters%5e%7b3%7d%7d |

|  |  |  |
| --- | --- | --- |
| Bubble | **C.** | https://media.studyisland.com/cgi-bin/mimetex.cgi?108\pi\%20\text%7bmillimeters%5e%7b3%7d%7d |

|  |  |  |
| --- | --- | --- |
| Bubble | **D.** | https://media.studyisland.com/cgi-bin/mimetex.cgi?486\pi\%20\text%7bmillimeters%5e%7b3%7d%7d |

# Answers

1. A
2. D
3. B
4. D
5. B
6. D
7. A
8. D
9. D
10. A

1. 804.25 cm2
2. 301.59 cm2
3. 396 cubic units
4. 384 ft3

5. 456 in2
6. 4,984 square inches
7. 896 cm3
8. 550.89 cm2
9. 126 yd3

10. ![https://media.studyisland.com/cgi-bin/mimetex.cgi?162\pi\%20\text%7bmillimeters%5e%7b3%7d%7d](data:None;base64...)

# Explanations

1. Since the diameter of the sphere is 16 cm, the radius of the sphere is 8 cm.

Substitute the radius into the formula for surface area of a sphere.

|  |  |  |
| --- | --- | --- |
| 4https://media.studyisland.com/cgi-bin/mimetex.cgi?\pi*r*2 |  =  | 4https://media.studyisland.com/cgi-bin/mimetex.cgi?\pi(8 cm)2 |
|  |  =  | 4https://media.studyisland.com/cgi-bin/mimetex.cgi?\pi(64 cm2) |
|  |  https://www1.studyisland.com/userfiles/approx.gif  | **804.25 cm2** |

2. First, find the slant height, *l*.

Since the radius, height, and slant height of the cone form a right triangle, use the Pythagorean theorem to find the slant height.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7dl%5e%7b2%7d\%20&=&\%20r%5e%7b2%7d\%20+\%20h%5e%7b2%7d\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\l\%20&=&\%20\sqrt%7br%5e%7b2%7d\%20+\%20h%5e%7b2%7d%7d\\%20\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&\%20\sqrt%7b36\%20\text%7bcm%7d\,%5e%7b2%7d\%20+\%2064\%20\text%7bcm%7d\,%5e%7b2%7d%7d\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&\%2010\%20\text%7bcm%7d\end%7beqnarray%7d](data:None;base64...)

Next, substitute the radius and slant height into the equation for surface area.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7d\text%7bSurface%20Area%7d\%20&=&\%20\pi(6\%20\text%7bcm%7d)(10\%20\text%7bcm%7d\%20+\%206\%20\text%7bcm%7d)\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&\%2096\pi\%20\text%7bcm%7d%5e%7b2%7d\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&\approx&\%20301.59\%20\text%7bcm%7d%5e%7b2%7d\end%7beqnarray%7d](data:None;base64...)

3. Multiply the area of the base and the height of the cylinder.

|  |  |  |
| --- | --- | --- |
| Volume | = | https://www1.studyisland.com/userfiles/pi.gifr2h |
|  | = | https://www1.studyisland.com/userfiles/pi.gif(6 units)2(11 units) |
|  | = | **396https://www1.studyisland.com/userfiles/pie.gif cubic units** |

4. To find the volume of the rectangular prism, use the formula shown below.

*V = Bh*

Find the area of the base, *B*.

|  |  |  |
| --- | --- | --- |
| *B* | = | (*x*)(*z*) |
|   | = | (4 ft)(12 ft) |
|   | = | 48 ft2 |

Multiply the area of the base by the altitude, *h*.

|  |
| --- |
| 48 ft2 × 8 ft = **384 ft3** |

5. The formula for the surface area of the given rectangular prism is

*SA* = 2*HW* + 2*HL* + 2*LW*.

The prism has a height of *H* = 6 in, a length of *L* = 18 in, and a width of *W* = 5 in. Substitute the values into the surface area formula.

|  |  |  |
| --- | --- | --- |
| *SA* |  =  | 2*HW* + 2*HL* + 2*LW* |
|  |  =  | 2(6 in)(5 in) + 2(6 in)(18 in) + 2(18 in)(5 in) |
|  |  =  | 60 in2 + 216 in2 + 180 in2 |
|  |  =  | **456 in2** |

6. Since she is going to cover the entire ottoman, the amount of fabric she will need to cover the ottoman is equal to the surface area of the ottoman.

Since the ottoman is a rectangular prism, the formula for the surface area is:

SA = 2(*length* × *height*) + 2(*width* × *height*) + 2(*width* × *length*).

Therefore, the surface area of the ottoman is:

|  |  |  |
| --- | --- | --- |
| SA | =  | 2(40 in × 26 in) + 2(22 in × 26 in) + 2(22 in × 40 in) |
|  | =  | 2,080 in2 + 1,144 in2 + 1,760 in2 |
|  | =  | 4,984 in2. |

So, Stephanie will need **4,984 square inches** of fabric to cover her ottoman.

7. To find the volume of a pyramid, use the following formula.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?V\%20=\%20\frac%7b1%7d%7b3%7dBh](data:None;base64...)

In this case, the base is a right triangle; therefore, the area of the base is given below.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?B\%20=\%20\frac%7b1%7d%7b2%7dbh](data:None;base64...)

Thus, the volume formula becomes the following.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?V\%20=\%20\frac%7b1%7d%7b6%7dlwh](data:None;base64...)

Use the given values to find the volume of the pyramid.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7dV%20&=&%20\frac%7b1%7d%7b6%7dlwh\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&%20\frac%7b1%7d%7b6%7d(12\%20\text%7bcm%7d)(16\%20\text%7bcm%7d)(28\%20\text%7bcm%7d)\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&%20\frac%7b1%7d%7b6%7d\left(5,376\%20\text%7bcm%5e%7b3%7d%7d\right)\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&%20896\%20\text%7bcm%5e%7b3%7d%7d\end%7beqnarray%7d](data:None;base64...)

8. The formula for the surface area of the given triangular prism is

![https://media.studyisland.com/cgi-bin/mimetex.cgi?SA%20\%20=%20\%202\left(\text%7barea_%7bbase%7d%7d\right)%20\%20+%20\%20HL%20\%20+%20\%20WL%20\%20+%20\%20XL.](data:None;base64...)

Find the length of the hypotenuse of the base, *X*. The base of the prism is a right triangle with congruent legs; therefore, the base is a 45°-45°-90° triangle. The hypotenuse of a 45°-45°-90° triangle is found using the following formula, where *s* is the length of the congruent legs of the triangle.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7d%20\text%7bhypotenuse_%7bbase%7d%7d%20\%20&=&%20\%20s\sqrt%7b2%7d\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20X%20\%20&=&%20\%20\left(7%20\%20\text%7bcm%7d\right)\sqrt%7b2%7d\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20X%20\%20&=&%20\%207\sqrt%7b2%7d%20\%20\text%7bcm%7d\\%20\end%7beqnarray%7d](data:None;base64...)

To find the area of the triangular base, use the formula for the area of a triangle.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7d%20\text%7barea_%7bbase%7d%7d%20\%20&=&%20\%20\frac%7b1%7d%7b2%7d%20bh\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20\frac%7b1%7d%7b2%7dWH\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20%20\frac%7b1%7d%7b2%7d\left(7%20\%20\text%7bcm%7d\right)\left(7%20\%20\text%7bcm%7d\right)\\\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20%20\frac%7b49%7d%7b2%7d%20\%20\text%7bcm%7d%5e%7b2%7d\end%7beqnarray%7d](data:None;base64...)

So, the area of the base is ![https://media.studyisland.com/cgi-bin/mimetex.cgi?\frac%7b49%7d%7b2%7d](data:None;base64...)cm2.

Find the area of the rectangular sides.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7d%20HL%20\%20&=&%20\%20\left(7%20\%20\text%7bcm%7d\right)\left(21%20\%20\text%7bcm%7d\right)\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20147%20\%20\text%7bcm%7d%5e%7b2%7d\\%20\vspace*%7b\huge%209%20\hspace*%7b-20%7d%7d\\%20WL%20\%20&=&%20\%20\left(7%20\%20\text%7bcm%7d\right)\left(21%20\%20\text%7bcm%7d\right)\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20147%20\%20\text%7bcm%7d%5e%7b2%7d\\%20\vspace*%7b\huge%209%20\hspace*%7b-20%7d%7d\\%20XL%20\%20&=&%20\%20\left(7\sqrt%7b2%7d%20\%20\text%7bcm%7d\right)\left(21%20\%20\text%7bcm%7d\right)\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20147\sqrt%7b2%7d%20\%20\text%7bcm%7d%5e%7b2%7d\\%20\end%7beqnarray%7d](data:None;base64...)

To find the total surface area, add the areas of the individual sections together. There are two triangular bases and three rectangular sides.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7d%20SA%20&=&%202\left(\text%7barea_%7bbase%7d%7d\right)%20\%20+%20\%20HL%20\%20+%20\%20WL%20\%20+%20\%20XL\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%202\left(\frac%7b49%7d%7b2%7d%20\%20\text%7bcm%5e%7b2%7d%7d\right)%20\%20+%20\%20147%20\%20\text%7bcm%5e%7b2%7d%7d%20\%20+%20\%20147%20\%20\text%7bcm%5e%7b2%7d%7d%20\%20+%20\%20147\sqrt%7b2%7d%20\%20\text%7bcm%5e%7b2%7d%7d\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&=&%20\%20343%20\%20\text%7bcm%5e%7b2%7d%7d%20\%20+%20\%20147\sqrt%7b2%7d%20\%20\text%7bcm%5e%7b2%7d%7d\\%20\vspace*%7b,%20\hspace*%7b-10%7d%7d\\%20&\approx&%20\%20550.89%20\%20\text%7bcm%5e%7b2%7d%7d\\%20\end%7beqnarray%7d](data:None;base64...)

9. To find the volume of the triangular prism, use the formula shown below.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?V\%20=\%20Bh](data:None;base64...)

Find the area of the base, *B*.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?\begin%7beqnarray%7dB%20&=&%20\left(\frac%7b1%7d%7b2%7d\right)(x)(z)\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&%20\left(\frac%7b1%7d%7b2%7d\right)(6\%20\text%7byd%7d)(3\%20\text%7byd%7d)\\\vspace*%7b9%20\hspace*%7b-10%7d%7d\\&=&\%209\%20\text%7byd%7d%5e%7b2%7d\end%7beqnarray%7d](data:None;base64...)

Multiply the area of the base by the altitude, *h*.

![https://media.studyisland.com/cgi-bin/mimetex.cgi?9\%20\text%7byd%7d%5e%7b2%7d\%20\times\%2014\%20\text%7byd%7d\%20=\%20126\%20%20\text%7byd%7d%5e%7b3%7d](data:None;base64...)

Therefore, the volume of the triangular prism is **126 yd3**.

10. ![https://media.studyisland.com/cgi-bin/mimetex.cgi?\text%7bMultiply%20%7d\frac%7b1%7d%7b3%7d\%20\text%7btimes%20the%20area%20of%20the%20base%20times%20the%20height%20to%20find%20the%7d\\%20\text%7bvolume%20of%20the%20cone.%7d\\%20\vspace*%7b9%20\hspace*%7b-10%7d%7d\\%20\begin%7beqnarray%7d%20\hspace%7b250%7d&%20&\\%20\text%7bVolume%7d\%20&=&\%20\frac%7b1%7d%7b3%7d\pi%20r%5e%7b2%7dh\\%20\vspace*%7b9%20\hspace*%7b-10%7d%7d\\%20&=&\%20\frac%7b1%7d%7b3%7d\pi\left(9\%20\text%7bmillimeters%7d\right)%5e%7b2%7d\left(6\%20\text%7bmillimeters%7d\right)\\%20\vspace*%7b9%20\hspace*%7b-10%7d%7d\\%20&=&\%20\frac%7b1%7d%7b3%7d\left(486\pi\%20\text%7bmillimeters%5e%7b3%7d%7d\right)\\%20\vspace*%7b9%20\hspace*%7b-10%7d%7d\\%20&=&\%20162\pi\%20\text%7bmillimeters%5e%7b3%7d%7d\%20\end%7beqnarray%7d](data:None;base64...)