|  |  |
| --- | --- |
| Area, Surface Area, & Volume | |
| |  |  | | --- | --- | | **1.** | *Note: Figure is not drawn to scale*  If *X* = 20 units, *Y* = 24 units, *Z* = 8 units, and *h* = 16 units, then what is the surface area of the triangular prism shown above? | |  |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 640 units2 |
|  | **B.** | 896 units2 |
|  | **C.** | 672 units2 |
|  | **D.** | 1,280 units2 |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **2.** | Note: Figure not drawn to scale.  If r = 8 units and X = 5 units, then what is the volume of the cylinder shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 144 cubic units |
|  | **B.** | 208 cubic units |
|  | **C.** | 512 cubic units |
|  | **D.** | 320 cubic units |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **3.** | Note: Figure not drawn to scale.  If **r** = 6 units and **X** = 13 units, then what is the total surface area of the cylinder shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 936 square units |
|  | **B.** | 228 square units |
|  | **C.** | 540 square units |
|  | **D.** | 192 square units |

Write your response here:  
(show your work)

|  |  |  |  |
| --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **4.** | The diagram shows a walkway surrounding four identical square picnic areas.  *Note: Figure not drawn to scale*  If the entire diagram is a square, what is the area, in square feet (sq ft), of the walkway?   |  | | --- | | Asquare = *s*2 | | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 2,500 sq ft |
|  | **B.** | 4,896 sq ft |
|  | **C.** | 7,396 sq ft |
|  | **D.** | 6,771 sq ft |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **5.** | *Note: Figure is not drawn to scale*  If *X* = 5 units, *Y* = 6 units, *Z* = 10 units, and *h* = 4 units, then what is the surface area of the triangular prism shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 208 units2 |
|  | **B.** | 114 units2 |
|  | **C.** | 104 units2 |
|  | **D.** | 184 units2 |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **6.** | Note: Figure not drawn to scale. Height has been rounded for computational ease.  If **h** = 9 units, **X** = 9 units, **Y** = 5 units, and **Z** = 16 units, then what is the volume of the triangular prism shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 360 cubic units |
|  | **B.** | 720 cubic units |
|  | **C.** | 648 cubic units |
|  | **D.** | 413 cubic units |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **7.** | Note: Figure not drawn to scale.  If r = 4 units and X = 7 units, then what is the volume of the cylinder shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 64 cubic units |
|  | **B.** | 72 cubic units |
|  | **C.** | 88 cubic units |
|  | **D.** | 112 cubic units |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **8.** | Note: Figure not drawn to scale.  If **r** = 4 units and **X** = 9 units, then what is the total surface area of the cylinder shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 176 square units |
|  | **B.** | 88 square units |
|  | **C.** | 288 square units |
|  | **D.** | 104 square units |

Write your response here:  
(show your work)

|  |  |  |  |
| --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **9.** | Francisco cut a circle with a radius of 1.5 inches out of a triangle, as shown.  *Note: Figure not drawn to scale*  What is the area of the remaining shaded region of the triangle?   |  | | --- | |  | | |

|  |  |  |
| --- | --- | --- |
|  | **A.** |  |
|  | **B.** |  |
|  | **C.** |  |
|  | **D.** |  |

Write your response here:  
(show your work)

|  |  |  |
| --- | --- | --- |
| |  |  | | --- | --- | | **10.** | *Note: Figure is not drawn to scale*  If *X* = 6 units, *Y* = 17 units, and *Z* = 5 units, then what is the surface area of the rectangular prism shown above? | |

|  |  |  |
| --- | --- | --- |
|  | **A.** | 510 units2 |
|  | **B.** | 217 units2 |
|  | **C.** | 434 units2 |
|  | **D.** | 502 units2 |

Write your response here:  
(show your work)

# Answers

|  |  |
| --- | --- |
| 1. | B896 units2 |
| 2. | D320 cubic units |
| 3. | B228 square units |
| 4. | B4,896 sq ft |
| 5. | D184 units2 |
| 6. | A360 cubic units |
| 7. | D112 cubic units |
| 8. | D104 square units |
| 9. | B |
| 10. | C434 units2 |

# Explanations

|  |  |
| --- | --- |
| 1. | In the triangular prism there are 2 congruent triangular faces and 3 rectangular faces, one of which is the base. Since the two upper rectangular faces have the same length and width they will have the same area.   To find the surface area, multiply the area of one of the triangular faces by 2, multiply the area of one of the rectangular faces by 2, and then add those numbers and the area of the rectangular base together.  Now, use these to find the surface area in the way described above. |
| 2. | To find the volume of the cylinder, use the formula shown below.  Volume = (radius)2 × height  In the picture of the cylinder, r represents the radius and X represents the height. Use the values given for these variables in the question to find the volume of the cylinder.   |  |  |  | | --- | --- | --- | | Volume | = | (radius)2 × height | |  | = | (r2)(X) | |  | = | (8 units)2(5 units) | |  | = | **320 cubic units** | |
| 3. | The surface area of a cylinder can be found using the formula given below.  Surface Area of a Cylinder = 2 × (radius)2 + 2 × radius × height  In the picture given in the question, **r** represents the radius of the cylinder and **X** represents the height of the cylinder. Use the values for these variables given in the question and the formula above to find the surface area of the cylinder.   |  |  |  | | --- | --- | --- | | Surface Area | = | 2 × (radius)2 + 2 × radius × height | |  | = | 2**r**2 + 2**rX** | |  | = | 2(6 units)2 + 2(6 units)(13 units) | |  | = | 72 square units + 156 square units | |  | = | **228 square units** | |
| 4. | First, find the area of the entire diagram.   |  |  |  | | --- | --- | --- | | Asquare | = | *s*2 | |  | = | (86 ft)2 | |  | = | 7,396 sq ft |   Next, find the area of one picnic area.   |  |  |  | | --- | --- | --- | | Asquare | = | *s*2 | |  | = | (25 ft)2 | |  | = | 625 sq ft |   Then, subtract the area of the four picnic areas from the area of the entire diagram.   |  |  |  | | --- | --- | --- | | 7,396 sq ft - 4(625 sq ft) | = | 7,396 sq ft - 2,500 sq ft | |  | = | 4,896 sq ft |   Therefore, the area of the walkway is **4,896 sq ft**. |
| 5. | In the triangular prism there are 2 congruent triangular faces and 3 rectangular faces, one of which is the base. Since the two upper rectangular faces have the same length and width they will have the same area.   To find the surface area, multiply the area of one of the triangular faces by 2, multiply the area of one of the rectangular faces by 2, and then add those numbers and the area of the rectangular base together.  Now, use these to find the surface area in the way described above. |
| 6. | To find the volume of the triangular prism, use the formula shown below.  Volume = Area of the Base × length  In this case, the base is a triangle and the length is represented by **Z**. To find the volume, first find the area of the triangular base.   |  |  |  | | --- | --- | --- | | Area of the Triangular Base | = | 1/2 × base × height | |  | = | 1/2 × **Y** × **h** | |  | = | 1/2 × 5 units × 9 units | |  | = | 22.5 square units |   Now use the volume formula given above to find the volume.   |  |  |  | | --- | --- | --- | | Volume | = | Area of the Base × length | |  | = | 22.5 square units × 16 units | |  | = | **360 cubic units** | |
| 7. | To find the volume of the cylinder, use the formula shown below.  Volume = (radius)2 × height  In the picture of the cylinder, r represents the radius and X represents the height. Use the values given for these variables in the question to find the volume of the cylinder.   |  |  |  | | --- | --- | --- | | Volume | = | (radius)2 × height | |  | = | (r2)(X) | |  | = | (4 units)2(7 units) | |  | = | **112 cubic units** | |
| 8. | The surface area of a cylinder can be found using the formula given below.  Surface Area of a Cylinder = 2 × (radius)2 + 2 × radius × height  In the picture given in the question, **r** represents the radius of the cylinder and **X** represents the height of the cylinder. Use the values for these variables given in the question and the formula above to find the surface area of the cylinder.   |  |  |  | | --- | --- | --- | | Surface Area | = | 2 × (radius)2 + 2 × radius × height | |  | = | 2**r**2 + 2**rX** | |  | = | 2(4 units)2 + 2(4 units)(9 units) | |  | = | 32 square units + 72 square units | |  | = | **104 square units** | |
| 9. | First, find the area of the triangle.  Next, find the area of the circle.  Then, subtract the area of the circle from the area of the triangle.  Therefore, the area of the remaining shaded region is **28 - 2.25 square inches**. |
| 10. | A rectangular prism is made of 3 pairs of congruent rectangles.  The top and bottom faces are congruent, left and right faces are congruent, and front and back faces are congruent.  To find the surface area, find the area of one of the faces from each of these pairs and then multiply each of them by 2. Then, add the numbers together.   |  |  |  | | --- | --- | --- | | Area of Top Face | = | *X* × *Z* | |  | = | 6 units × 5 units | |  | = | 30 units2 | |  | | | | Area of Right Face | = | *Y* × *Z* | |  | = | 17 units × 5 units | |  | = | 85 units2 | |  | | | | Area of Front Face | = | *X* × *Y* | |  | = | 6 units × 17 units | |  | = | 102 units2 |   Now, use these calculations to find the surface area in the way described above.   |  |  |  | | --- | --- | --- | | Surface Area | = | 2 × 30 units2 + 2 × 85 units2 + 2 × 102 units2 | |  | = | 434 units2 |   Therefore, the surface area is **434 units2**. |

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