Covering and Surrounding UNIT
Main Focus: Two-Dimensional Measurement

Area and Perimeter:
- Deepen the understanding of area and perimeter of rectangular and nonrectangular shapes
- Relate area to covering a figure
- Relate perimeter to surrounding a figure
- Analyze what it means to measure area and perimeter
- Develop and use formulas for calculating area and perimeter
- Develop techniques for estimating the area and perimeter of an irregular figure
- Explore relationships between perimeter and area, including that one can vary considerably while the other stays fixed
- Visually represent relationships between perimeter and area on a graph
- Solve problems involving area and perimeter of rectangles

Area and Perimeter of Parallelograms and Triangles:
- Analyze how the area of a triangle and the area of a parallelogram are related to each other and to the area of a rectangle
- Recognize that a triangle can be thought of as half of a rectangle whose sides are equal to the base and height of the triangle
- Recognize that a parallelogram can be decomposed into two triangles. Thus the area of a parallelogram is twice the area of a triangle with the same base and height as the parallelogram
- Know that the choice of base of a triangle (or parallelogram) is arbitrary but that the choice of the base determines the height
- Recognize that there are many triangles (or parallelograms) that can be drawn with the same base and height
- Develop formulas and strategies, stated in words or symbols, for finding the area and perimeter of triangles and parallelograms
- Find the side lengths and area of polygons on a coordinate grid
- Solve problems involving area and perimeter of parallelograms and triangles
- Solve problems involving area and perimeter of polygons by composing into rectangles or decomposing into triangles

Surface Area of Prisms and Pyramids and Volume of Rectangular Prisms:
- Extend the understanding of the volume of rectangular prisms
- Relate volume to filling a three-dimensional figure
- Extend understanding of the strategies for finding the volume of rectangular prisms to accommodate fractional side lengths
- Relate finding area of two-dimensional shapes to finding the surface area of three-dimensional objects
- Develop strategies for finding the surface area of three-dimensional objects made from rectangles and triangles
- Solve problems involving surface area of prisms and pyramids and volume of rectangular prisms
Solve each problem.

1) The rectangle below has the dimensions 3×10. Create a rectangle with the same area, but a different perimeter.

2) The rectangle below has the dimensions 3×3. Create a rectangle with the same area, but a different perimeter.

3) The rectangle below has the dimensions 1×4. Create a rectangle with the same area, but a different perimeter.

4) The rectangle below has the dimensions 5×8. Create a rectangle with the same area, but a different perimeter.

5) The rectangle below has the dimensions 2×6. Create a rectangle with the same area, but a different perimeter.

Answers:

1. 5×6
2. 1×9
3. 2×2
4. 4×10
5. 3×4
Find the perimeter and area of each figure. Each figure is in inches (in). Not to scale.

1) \( \begin{array}{c} 4 \\ 5 \end{array} \) 2) \( \begin{array}{c} 8 \\ 10 \end{array} \) 3) \( \begin{array}{c} 10 \\ 3 \end{array} \)

4) \( \begin{array}{c} 2 \\ 4 \end{array} \) 5) \( \begin{array}{c} 4 \\ 4 \end{array} \) 6) \( \begin{array}{c} 2 \\ 3 \end{array} \)

7) \( \begin{array}{c} 5 \\ 5 \end{array} \) 8) \( \begin{array}{c} 7 \\ 9 \end{array} \) 9) \( \begin{array}{c} 9 \\ 10 \end{array} \)

10) \( \begin{array}{c} 4 \\ 9 \end{array} \) 11) \( \begin{array}{c} 6 \\ 7 \end{array} \) 12) \( \begin{array}{c} 8 \\ 5 \end{array} \)

13) \( \begin{array}{c} 6 \\ 5 \end{array} \) 14) \( \begin{array}{c} 4 \\ 7 \end{array} \) 15) \( \begin{array}{c} \_ \\ 2 \end{array} \)

Answers:

1. 18 in 20 in²
2. 36 in 80 in²
3. 26 in 30 in²
4. 12 in 8 in²
5. 16 in 16 in²
6. 10 in 6 in²
7. 20 in 25 in²
8. 32 in 63 in²
9. 38 in 90 in²
10. 26 in 36 in²
11. 26 in 42 in²
12. 26 in 40 in²
13. 22 in 30 in²
14. 22 in 28 in²
15. 24 in 20 in²
Identify and Calculate the Area and Perimeter for each Triangle.

1) \(\text{a} = 74 \text{ ft} \quad \text{b} = 51 \text{ ft} \quad \text{c} = 89.87 \text{ ft}\)

- Area: \(1887 \text{ sq ft}\)
- Perimeter: \(214.87 \text{ ft}\)
- Type: Right Triangle

2) \(\text{a} = 86 \text{ yds} \quad \text{b} = 42 \text{ yds} \quad \text{c} = 95.71 \text{ yds}\)

- Area: \(1806 \text{ sq yds}\)
- Perimeter: \(223.71 \text{ yds}\)
- Type: Right Triangle

3) \(\text{s} = 72 \text{ mm} \quad \text{h} = 62.4 \text{ mm}\)

- Area: \(2246.4 \text{ sq mm}\)
- Perimeter: \(216 \text{ mm}\)
- Type: Equilateral Triangle

4) \(\text{s} = 53 \text{ cm} \quad \text{h} = 45.9 \text{ cm}\)

- Area: \(1216.35 \text{ sq cm}\)
- Perimeter: \(159 \text{ cm}\)
- Type: Equilateral Triangle

5) \(\text{a} = 85 \text{ mm} \quad \text{b} = 60 \text{ mm} \quad \text{c} = 104.04 \text{ mm}\)

- Area: \(2550 \text{ sq mm}\)
- Perimeter: \(249.04 \text{ mm}\)
- Type: Right Triangle

6) \(\text{a} = 50.99 \text{ yds} \quad \text{b} = 94.84 \text{ yds} \quad \text{c} = 99 \text{ yds} \quad \text{h} = 48 \text{ yds}\)

- Area: \(2376 \text{ sq yds}\)
- Perimeter: \(244.83 \text{ yds}\)
- Type: Common Triangle

7) \(\text{s} = 66 \text{ ft} \quad \text{h} = 57.2 \text{ ft}\)

- Area: \(1887.6 \text{ sq ft}\)
- Perimeter: \(198 \text{ ft}\)
- Type: Equilateral Triangle

8) \(\text{s} = 60 \text{ inches} \quad \text{h} = 52 \text{ inches}\)

- Area: \(1560 \text{ sq inches}\)
- Perimeter: \(180 \text{ inches}\)
- Type: Equilateral Triangle

9) \(\text{a} = 51.79 \text{ inches} \quad \text{b} = 88.12 \text{ inches} \quad \text{c} = 90 \text{ inches} \quad \text{h} = 49 \text{ inches}\)

- Area: \(2205 \text{ sq inches}\)
- Perimeter: \(229.91 \text{ inches}\)
- Type: Common Triangle
Join each shape to the matching net.
Name the solid shape that can be formed by each net.

- Cone
- Cube
- Cylinder
- Square pyramid
- Triangular pyramid
- Triangular prism

Printable Math Worksheets @ www.mathworksheets4kids.com
1. Find the Surface Area of the Rectangular Prism.

Example:

\[ A = 15 \times 15 \]
\[ A = 225 \]
\[ A = 15 \times 33 \]
\[ A = 495 \]
\[ A = 15 \times 15 \]
\[ A = 225 \]
\[ A = 15 \times 33 \]
\[ A = 495 \]

Surface Area = 2430 cm\(^2\)

2. Find the Surface Area of the Triangular Prism.

Example:

\[ A = \frac{4 \times 3.5}{2} \]
\[ A = 7 \]
\[ A = \frac{4 \times 3.5}{2} \]
\[ A = 7 \]
\[ A = 4.8 \]
\[ A = 32 \]
\[ A = 4.8 \]
\[ A = 32 \]

Surface Area = 110 in\(^2\)
4. Find the Surface Area of the Square Pyramid.

\[ A = \frac{5 \cdot 12}{2} \]
\[ A = 30 \text{ ft}^2 \]

Total Surface Area: \[ 145 \text{ ft}^2 \]

3. Find the Surface Area of the Rectangular Prism.

\[ A = 20 \cdot 3 \]
\[ A = 60 \text{ ft}^2 \]

Surface Area: \[ 948 \text{ ft}^2 \]
1. Find the Surface Area of the Rectangular Prism.

\[ A = \text{b} \cdot \text{h} \]

\[
\begin{array}{ccc}
3 & 3 & 3 \\
12 & 36 & 72 \\
3 & 3 & 3 \\
6 & 18 & 72 \\
6 & 18 & 72 \\
\end{array}
\]

\[ 36 + 72 = 108 \text{ ft}^2 \]

\[ 12 \times \frac{108}{2} = 648 \text{ ft}^2 \]

Find the Surface Area of the Regular Triangular Pyramid.

\[ A = \frac{\text{b} \cdot \text{h}}{2} \]

\[ A = 12 \cdot 10.4 \]

\[ A = 62.4 \]

\[ A = 12 \cdot \frac{15.4}{2} \]

\[ A = 92.4 \]

\[ A = 92.4 \]

\[ 92.4 + 62.4 = 339.6 \text{ m}^2 \]
Find the volume of each rectangular prism.

1) Volume = \(144 \text{ ft}^3\)

2) Volume = \(100 \text{ in}^3\)

3) Volume = \(420 \text{ yd}^3\)

4) Volume = \(1728 \text{ in}^3\)

5) Volume = \(384 \text{ yd}^3\)

6) Volume = \(570 \text{ ft}^3\)

7) Volume = \(616 \text{ yd}^3\)

8) Volume = \(1300 \text{ ft}^3\)

9) Volume = \(748 \text{ in}^3\)

10) A bath tub in the shape of a rectangular prism is 20 feet long, 10 feet wide and 5 feet deep. How much water can it hold?

Volume = \(1600 \text{ ft}^3\)