Module 13   Perimeter, Area, and Volume
Lesson 3   Area: Irregular Shapes

Lesson Objectives

- Estimate and calculate the area of irregular two-dimensional shapes.
- Estimate and calculate the area of more complex or irregular two-dimensional shapes by dividing them into more basic shapes.
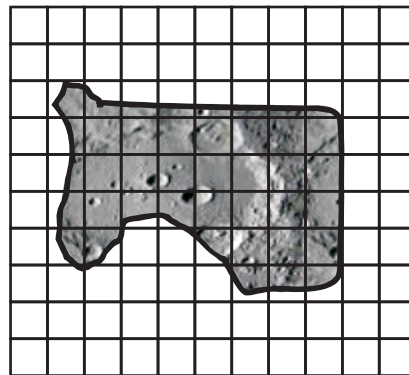
Subtopic 1   Estimating Areas of Irregular Shapes

To estimate the area of an irregular shape:
- Cover shape with a **grid of squares** of known side length.
- Let c = squares **completely** inside the boundary.
- Let b = squares through which **boundary** passes.
- $A \approx c + \dfrac{1}{2}b$
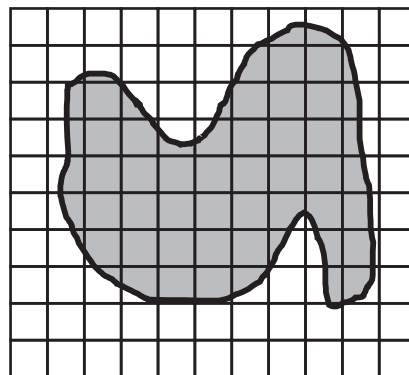
1 Estimate the area of the lunar region.

$$A \approx c + \frac{1}{2}b = 22 + \frac{1}{2}b$$

$$\approx 22 + \frac{1}{2}(19)$$

$$\approx 22 + 9.5$$

$$\approx 31.5 \text{ mi}^2$$

Each ☐ is 1 mi^2.

2 Estimate the area of the shape.

$$A \approx c + \frac{1}{2}b$$

$$A \approx 27 + \frac{1}{2}(34)$$

$$A \approx 27 + 17$$

$$A \approx 44 \text{ km}^2$$

Each ☐ is 1 km^2.

3 Find the area of the shape.

4 in.	
16 in.	12 in.
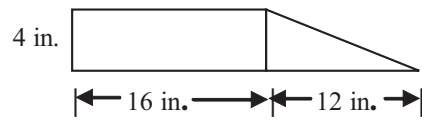
Area of rectangle	4 in. × 16 in.	64 in.^{2}
+ Area of triangle	$\frac{1}{2}$(12 in. × 4 in.)	24 in.^{2}
Total area	**Total Area**	88 in.^{2}

4 Find the area of the gray region.

15 m

3 m

3 m   9 m
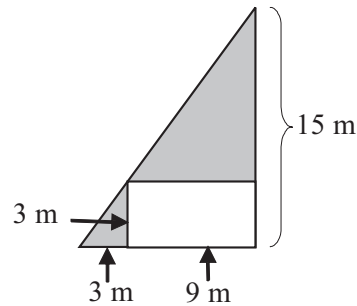
Area of triangle	$\frac{1}{2}$(12 m × 15 m)	90 m^2
− Area of rectangle	− 9 m × 3 m	− 27 m^2
Gray area	**Gray area**	63 m^2

5 Estimate the area of the gray region where the diameter of the circle is 13 inches.

5 in.   12 in.   13 in.
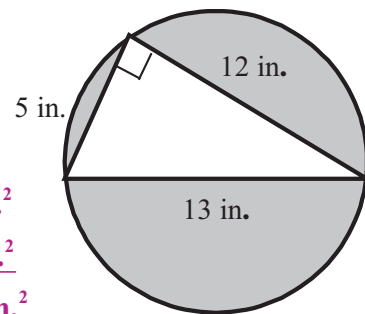
Area of circle	π (6.5 in.)^2	132.67 in.^{2}
− Area of triangle	− $\frac{1}{2}$(12 in. × 5 in.)	− 30 in.^{2}
Gray area	**Gray area**	≈ 102.67 in.^{2}