Chapter 10: Perimeter, Area & Circumference

SECTION 2: CIRCLES & REGULAR POLYGONS
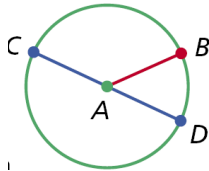
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I Can

❑ Develop and apply the formulas for the area & circumference of a circle

❑ Develop and apply the formula for the area of a regular polygon

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Circles

A **circle** is the locus of points in a plane that are a fixed distance from a point called the **center of the circle**. A circle is named by the symbol ⊙ and its center. ⊙**A** has radius **r** = **AB** and diameter **d** = **CD**.

Circles

The irrational number π is defined as the ratio of the circumference C to the diameter d, or $\pi = \dfrac{C}{d}$.
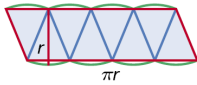
Object: _____

Diameter: _____

Circumference: _____

Ratio: _____

Solving for C gives the formula $C = \pi d$.
Also $d = 2r$, so $C = 2\pi r$.

Area of a Circle

You can use the circumference of a circle to find its area. Divide the circle and rearrange the pieces to make a shape that resembles a parallelogram.

The base of the parallelogram is about half the circumference, or πr, and the height is close to the radius r. So A ≅ πr · r = π r².
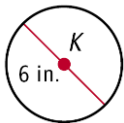
Area & Circumference

Circumference and Area (Circle)

A circle with diameter *d* and radius *r* has circumference $C = \pi d$ or $C = 2\pi r$ and area $A = \pi r^2$.

Examples

Find the area of ⊙K in terms of π.

6 in.

Examples

Find the radius of ⊙J if the circumference is (65x + 14)π m.
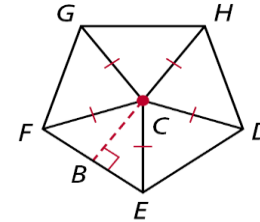
Regular Polygons

The **center of a regular polygon** is equidistant from the vertices.

The **apothem** is the distance from the center to the midpoint of a side (perpendicular).

A **central angle of a regular polygon** has its vertex at the center, and its sides pass through consecutive vertices. Each central angle measure of a regular n-gon is $\dfrac{360°}{n}$.

Regular Polygons

Regular pentagon *DEFGH* has a center *C*, apothem *BC*, and central angle $\angle DCE$.
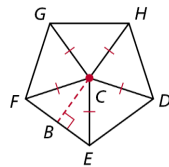
Area & Perimeter

To find the area of a regular n-gon with side length s and apothem a, divide it into n congruent isosceles triangles.

The perimeter is P = ns.

area of each triangle: $\dfrac{1}{2}as$

total area of the polygon: $A = n\left(\dfrac{1}{2}as\right)$, or $A = \dfrac{1}{2}a\,ns$

Area & Perimeter

Area (**Regular Polygon**)

The area of a regular polygon with apothem a and perimeter P is $A = \dfrac{1}{2}aP$.

Examples

Find the area of regular heptagon with side length 2 ft to the nearest tenth.

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