

Angles

- ✓ A straight line: 180° ; around a point: 360°
- ✓ **Vertical angles** are congruent
- ✓ Parallel lines and a transversal: all acute angles congruent, all obtuse angles congruent, acute + obtuse = 180°
- ✓ Triangle: 180° (provided); quadrilateral: 360°
- ✓ Polygon: $(n - 2) \cdot 180^\circ$; each angle of a regular one: $\frac{(n-2) \cdot 180^\circ}{n}$
- ✓ π **radians** = 180° ; a circle is 2π radians (provided)
- ✓ Degrees to radians: $\times \frac{\pi}{180}$; radians to degrees: $\times \frac{180}{\pi}$

Triangles

- ✓ $A = \frac{1}{2}bh$ (provided); $a^2 + b^2 = c^2$ (provided)
- ✓ **Special right triangles** (provided):
 - 30° - 60° - 90° : $x : x\sqrt{3} : 2x$
 - 45° - 45° - 90° : $s : s : s\sqrt{2}$
- ✓ **Pythagorean triples**: 3-4-5, 5-12-13, 7-24-25, 8-15-17
- ✓ **Equilateral** area $\frac{s^2\sqrt{3}}{4}$
- ✓ **Similar**: two pairs of equal angles (AA); corresponding sides in one ratio
- ✓ **Congruent**: SSS, SAS, ASA, AAS
- ✓ The **largest angle** faces the **longest side**
- ✓ A triangle inscribed in a **semicircle** is a right triangle

Right triangle trigonometry

- ✓ **SOHCAHTOA**: $\sin = \frac{\text{opp}}{\text{hyp}}$, $\cos = \frac{\text{adj}}{\text{hyp}}$, $\tan = \frac{\text{opp}}{\text{adj}}$
- ✓ The adjacent side is a **leg**, never the hypotenuse
- ✓ $\sin \theta = \cos(90^\circ - \theta)$; $\sin 20^\circ = \cos 70^\circ$
- ✓ Trig values are **ratios**: similar triangles share them
- ✓ Sine and cosine are never more than 1

Circles

- ✓ $A = \pi r^2$, $C = 2\pi r$ (provided); a circle has 360° (provided)
- ✓ **Equation**: $(x - h)^2 + (y - k)^2 = r^2$, center (h, k) ; complete the square if it isn't in this form
- ✓ A **central angle** equals its arc; an **inscribed angle** is **half** its arc
- ✓ **Arc length** $\frac{\theta}{360} \cdot 2\pi r$; **sector area** $\frac{\theta}{360} \cdot \pi r^2$
- ✓ A **tangent** is perpendicular to the radius at the point of tangency
- ✓ Two radii make an **isosceles** triangle

Quadrilaterals and polygons

- ✓ Rectangle $A = lw$ (provided); perimeter $2l + 2w$
- ✓ Square $A = s^2$, perimeter $4s$; parallelogram $A = bh$; trapezoid $A = \frac{1}{2}(b_1 + b_2)h$
- ✓ Parallelogram: opposite angles equal, neighbors add to 180°
- ✓ Break odd shapes into **rectangles and triangles**: a regular hexagon is six equilateral triangles
- ✓ A square inscribed in a circle: its **diagonal** is the diameter

3D figures

- ✓ **Volume** (provided):
 - Rectangular prism lwh
 - Cylinder $\pi r^2 h$
 - Sphere $\frac{4}{3}\pi r^3$
 - Cone $\frac{1}{3}\pi r^2 h$
 - Pyramid $\frac{1}{3}lwh$
- ✓ **Cube**: $V = s^3$, surface area $6s^2$; edge = $\sqrt[3]{V}$
- ✓ **Cylinder** surface area $2\pi r^2 + 2\pi rh$

Coordinates and scale

- ✓ **Distance** $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$; **midpoint** $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$
- ✓ Multiply every length by k : **area** $\times k^2$, **volume** $\times k^3$
- ✓ Double a radius: a circle's area **quadruples**; a sphere's volume grows **eightfold**