Geometry Summarization

Solids, Shells, and Skeletons

- **A solid** is an object that is completely filled up
- **A shell** is a three dimensional object with an empty interior
- **A skeleton** is the framework of a three dimensional object (the edges of the polyhedron)
- **A net** is a pattern used to make a polyhedron
- **A face** is one flat surface on a polyhedron
- **An edge** is where two faces meet
- **A vertex** is where the edges of the polyhedron meet

Polygons

- **A polygon** is a 2-dimensional shape. It is made of straight lines, and the shape is "closed"
  
  Ex.

- **A regular polygon** is a polygon, and all it’s sides are equal, meaning all of the polygon’s sides are the same length
  Ex.

How to find the **sum of the interior angles of a polygon**

1. Divide the polygon into triangles using **diagonals** that do not intersect with each other
   Ex.

2. Then multiply the number of triangles you get by 180 degrees
   Ex. $180 \times 4 = 720^\circ$
• A diagonal is a straight line joining two opposite corners of a square, rectangle, or other straight-sided shape

• An exterior angle is the angle between a side of a rectilinear figure and an adjacent side extended outward

Lines of Symmetry

• A line of symmetry is the imaginary line where you could fold the image and have both halves match exactly
  Ex. This shape has three lines of symmetry

• An object is symmetrical when it has more than one line of symmetry

Rotation or Turn Symmetry

• A shape has rotational symmetry if it can be made to fit exactly onto the original when it is rotated less than one complete cycle on it’s exact center
• The order of rotational symmetry is the number of times the figure matches itself in a 360 degree turn
• A point symmetry is when the order of the turn symmetry is two

Angles

• Naming angles: You must put the angle sign in front of the lettered angle
• Acute angle: An angle that is less than 90°
• Right angle: An angle that is exactly 90°
• Obtuse angle: An angle that is less than 180° but more than 90°
• Straight angle: An angle that is exactly 180° (looks like a line)
• Congruent angles: Two or more angles that have the exact same measurement
• Complementary angles: Two and angles that add up to 90°
• Supplementary angles: Two angles that add up to 90°
• Angles on a line: One of the reasons you can use to explain the answer of an angle. All angles on a line equal to 180°
• Angles at a point: One of the reasons you can use to explain the answer of an angle. All angles at a point equal to 360°
• Vertically opposite angles: These angles are formed when two lines cross. The vertically opposite angles are always equal.

Triangles

• Line segment: part of a line bounded by 2 end points
• Congruent Lines: line segments with equal lengths
- **Congruent angles**: angles with equal measure
- **Scalene triangle**: no sides or angles are equal
- **Isosceles triangle**: 2 equal sides, 2 opposite angles are equal
- **Equilateral triangle**: all sides and angles are equal
- **Right triangle**: has 1 right angle
  - **Circle**:
    - **Radius**: line segment from center to edge
    - **Diameter**: line segment that passes through center
    - **Circumference**: distance around circle
- **Angles in triangle** add up to 180°
- **Angles in equilateral triangle** are 60°

**Parallel Lines and Transversals**

- **Parallel lines**: lines that never intersect; arrows on line segment indicate parallel lines
- **Transversal**: crosses through parallel lines
- **Alternate interior angles (Z)**: equal; created by transversal across 2 parallel lines; form “z”
- **Corresponding angles (F)**: equal; form “f”
- **Interior on the same side of the transversal (C)**: supplementary; form “c”
Skills for Geometry

- Addition
- Subtraction
- Division
- Multiplication
- Algebra
- Basic knowledge of shapes
The Questions

Solids, Shells and Skeletons

Q. Identify if this object is a solid, shell, or a skeleton.

Hint: this is an EMPTY cardboard box

A. It is a shell

Q. What is this net’s three-dimensional shape?

A. It is a pentagonal prism

Polygons

Q. What is this polygon’s name?

A. Because it has 10 sides, it’s a decagon

Q. What is the sum of the all the interior angles of this shape?

A. Since you can draw 4 triangles in one hexagon,
   \[4 \times 180° = 720°\] all the angles would add up to 720°

Lines of Symmetry

Q. How many lines of symmetry does this shape have?

A. 0
Rotation or Turn Symmetry

Q. Find the order of rotational symmetry.

A. 2 or point symmetry

Angles

Q. What do you call these two angles?

A. They are called congruent angles

Q. What do you call angle a and angle c?

A. They are called vertically opposite angles

Triangles

Q: Find the measure of angle w.

A: 30 + 30 + w = 180
60 + w = 180
w = 120

Q: Find the measure of angle p. (triangle is equilateral)
A: angles in equilateral triangle are 60°
\[60 \div 2 = 30\]
\[p = 30°\]

**Parallel Lines and Transversals**

Q: which angle is alternate interior to b?

A: it forms a z shape; the angles are equal

Answer: angle c

Q: what is the measure of angle d if angle b is 60°?

A: \[180 - 60 = 120\]

They are interior on the same side of the transversal; they add up to \[180°\]
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