

GEOMETRY FORMULAS AND RULES TO KNOW FOR MIDTERM

Slope-Intercept Formula $y = mx + b$

Point-Slop Formula $y - y_1 = m(x - x_1)$

Horizontal Lines have a slope of 0

Vertical Lines have a slope that is undefined

Parallel lines have the same slope, never meet, no solution meaning no intersection

Perpendicular lines slopes are opposite signs & reciprocals

Slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ with points (x_1, y_1) and (x_2, y_2)

A point is always (x, y)

y-intercept is where $x=0$ (this is somewhere on the y axis)

x-intercept is where $y=0$ (this will be somewhere on the x-axis).

Distance Formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint formula $M = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$

Proofs:

To prove triangle is right, find slopes of the two line segments and show they are opposite sign, reciprocals (flipped fractions)

To prove type of triangle (isosceles, equilateral, or scalene) use distance formula to find side lengths

$(n-2)180$ total degrees in a polygon (where n is the number of sides)

Area of circle πr^2

Circumference of Circle $2\pi r$

Area triangle $\frac{1}{2}bh$

Area rectangle $l \times w$

Area trapezoid $\frac{1}{2}h(b_1 + b_2)$

Area parallelogram $h \times l$

Perimeter add all sides

Triangle Properties

In a right triangle the largest side is always across from the right angle and is called the hypotenuse. In the Pythagorean Theorem the hypotenuse gets the letter c. The other two sides are considered legs and are given the letters a and b.

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

In a triangle the smallest side will be across from the smallest angle. The largest side will be across from the largest angle.

Types of triangles

Equilateral-all sides equal, all angles equal (60 degrees)

Isosceles- two sides are equal

Scalene- no sides are equal

Types of Angles

Acute less than 90 degrees **Obtuse** greater than 90 degrees **Right** 90 degrees

Complementary add up to 90 degrees

Supplementary angles add up to 180 degrees

Collinear angles lay on the same line and sum to 180

Vertical angles are across from each other and are congruent

Congruent means equal

Similar triangles have the same 3 angles but their sides are in proportion not congruent

Corresponding, Alternate interior and alternate exterior angles are congruent

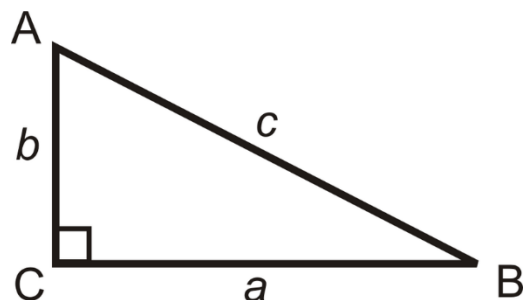
Same side interior and same side exterior angles are supplementary

Trigonometry SOH CAH TOA

$$\text{SOH sine} = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{CAH cosine} = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{TOA tangent} = \frac{\text{opposite}}{\text{adjacent}} = \frac{\sin}{\cos}$$



$$\sin A = \cos B = \frac{a}{c} \qquad \sin B = \cos A = \frac{b}{c}$$

sine and cosine are complementary

Transformations

RIGID MOTIONS – preserve length so the post-image is congruent to the pre-image

Translations (T)

Rotations (R)

Reflections (r)

Dilations- preserve angle size but are similar not congruent

Property-sides and perimeter are same as dilation factor

areas are the Dilation factor squared

Congruence Theorems

AAS angle angle side

SAS side angle side

ASA angle side angle

SSS side side side

HL Hypotenuse leg (in right triangles only)

CPCTC Corresponding Parts of Congruent Triangles are Congruent

Similar Triangles

AA two angles are congruence makes the two triangles similar

CPSTP Corresponding Parts of Similar Triangles are Proportional
