TRUE FALSE

If two triangles have the same base and height, their areas are equal.

If two triangles have the same base and height, their areas are equal.

True. The area of a triangle is calculated as ½ × base × height. Equal base and height guarantee equal areas, regardless of the triangle's orientation or type.

TRUE FALSE

Heron's formula can be applied to any triangle as long as the lengths of all three sides are known.

Heron's formula can be applied to any triangle as long as the lengths of all three sides are known.

True. Heron's formula ($\sqrt{s(s-a)(s-b)(s-c)}$) works for any valid triangle where the sides satisfy the triangle inequality. The formula does not depend on angles or type of triangle.

TRUE FALSE

The area of a right-angled triangle with legs 5 and 12 is 30.

The area of a right-angled triangle with legs 5 and 12 is 30.

True. For right-angled triangles, area = $\frac{1}{2} \times \text{leg}_1 \times \text{leg}_2 = \frac{1}{2} \times 5 \times 12 = 30$.

TRUE FALSE

The area of a triangle with vertices at (0,0), (3,0), and (0,4) is 6.

The area of a triangle with vertices at (0,0), (3,0), and (0,4) is 6.

True. This is a right-angled triangle with base 3 and height 4. Area = $\frac{1}{2} \times 3 \times 4 = 6$.

TRUE FALSE

A triangle with sides 7, 24, 25 has an area of 84.

A triangle with sides 7, 24, 25 has an area of 84.

True. This is a right-angled triangle ($7^2 + 24^2 = 25^2$). Area = $\frac{1}{2} \times 7 \times 24 = 84$.

TRUE FALSE

The maximum area of a triangle with two sides 8 and 9 is 36.

The maximum area of a triangle with two sides 8 and 9 is 36.

True. Maximum area occurs when the included angle is 90°. Area = $\frac{1}{2} \times 8 \times 9 = 36$.

TRUE FALSE

A triangle with base 10 and height 5 has the same area as a triangle with base 5 and height 10.

A triangle with base 10 and height 5 has the same area as a triangle with base 5 and height 10.

True. Both areas equal 25 ($\frac{1}{2} \times 10 \times 5 = 25$ and $\frac{1}{2} \times 5 \times 10 = 25$).

TRUE FALSE

The formula $\frac{1}{2}ab \sin\theta$ correctly calculates the area of a triangle with sides a and b and included angle θ.

The formula $\frac{1}{2}ab \sin\theta$ correctly calculates the area of a triangle with sides a and b and included angle θ.

True. This is the standard trigonometric formula for area when two sides and the included angle are known.

TRUE FALSE

The area of an equilateral triangle with side length 'a' is $(\sqrt{3}/4)a^2$.

The area of an equilateral triangle with side length 'a' is $(\sqrt{3}/4)a^2$.

True. Derived from the general formula for area using height $(\sqrt{3}/2\ a)$, substituting into $\frac{1}{2} \times \text{base} \times \text{height}$.

TRUE FALSE

If all sides of a triangle are doubled, its area becomes four times larger.

If all sides of a triangle are doubled, its area becomes four times larger.

True. Scaling linear dimensions by a factor k scales area by k^2. Here, $k = 2$, so area scales by 4.

TRUE FALSE

The area of a triangle is base times height.

The area of a triangle is base times height.

False. The correct formula is ½ × base × height.

Omitting the ½ is a common error.

TRUE FALSE

Heron's formula can calculate the area of a triangle with sides 2, 3, and 6.

Heron's formula can calculate the area of a triangle with sides 2, 3, and 6.

False. These sides violate the triangle inequality ($2 + 3 \leq 6$), so they do not form a valid triangle.

TRUE FALSE

In a triangle, the product of the base and hypotenuse gives the area.

In a triangle, the product of the base and hypotenuse gives the area.

False. Hypotenuse is specific to right-angled triangles, but height (not hypotenuse) is required. Area = ½ × base × height.

TRUE FALSE

The area of a triangle with vertices (1,2), (4,5), and (6,7) is 3.

The area of a triangle with vertices (1,2), (4,5), and (6,7) is 3.

False. The determinant method yields zero area because the points are collinear.

TRUE FALSE

A triangle with sides 5 and 7 and included angle 30° has an area of 17.5.

A triangle with sides 5 and 7 and included angle 30° has an area of 17.5.

False. Correct area = $\frac{1}{2} \times 5 \times 7 \times \sin(30°) = \frac{1}{2} \times 35 \times 0.5 = 8.75$.

TRUE FALSE

If two triangles have the same perimeter, their areas are equal.

If two triangles have the same perimeter, their areas are equal.

False. Perimeter equality does not guarantee area equality. Different side configurations can yield different areas.

TRUE FALSE

The area of a triangle equals its inradius multiplied by its perimeter.

The area of a triangle equals its inradius multiplied by its perimeter.

False. Area = inradius × semi-perimeter, not full perimeter.

TRUE FALSE

The height of a triangle must always be shorter than its hypotenuse.

The height of a triangle must always be shorter than its hypotenuse.

False. 'Hypotenuse' applies only to right-angled triangles. In other triangles, height can exceed side lengths depending on the base chosen.

TRUE FALSE

The formula ½ × base × hypotenuse calculates the area of a right-angled triangle.

The formula ½ × base × hypotenuse calculates the area of a right-angled triangle.

False. For right-angled triangles, area = $\frac{1}{2} \times \text{leg}_1 \times \text{leg}_2$. The hypotenuse is not used as a height unless specified otherwise.

TRUE FALSE

Tripling all sides of a triangle makes its area six times larger.

Tripling all sides of a triangle makes its area six times larger.

False. Area scales with the square of the linear scaling factor. Tripling sides increases area by 9 times, not 6.