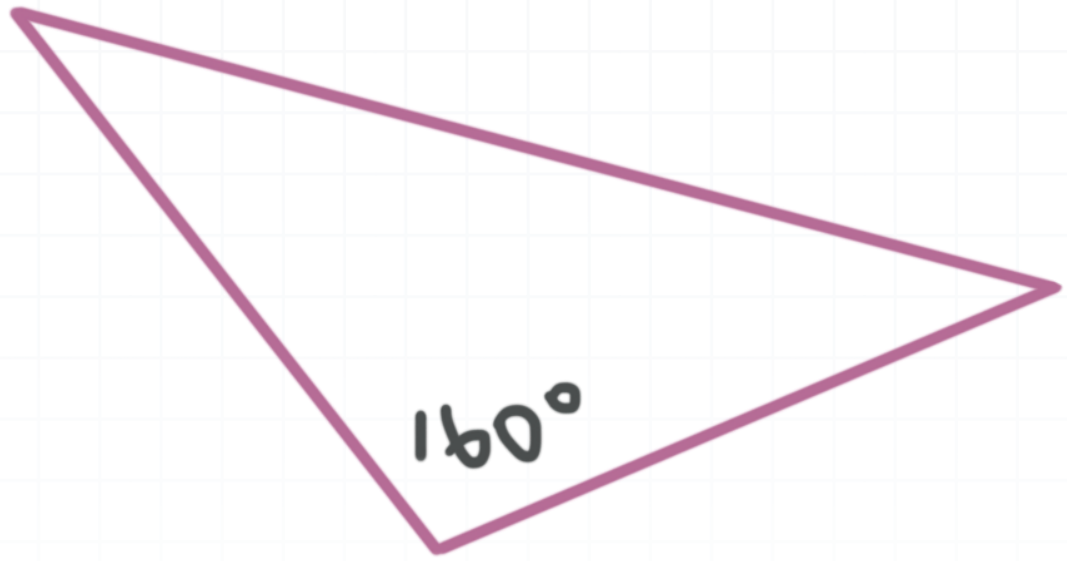
Topic: Pythagorean inequalities

Question: Classify the triangle.



Answer choices:

A Equilateral

B Acute

C Right

D Obtuse

Solution: D

The triangle is obtuse, because it has an obtuse angle, which is an angle that's greater than $90°$.

Topic: Pythagorean inequalities

Question: Each of the triangles below is obtuse and has sides of length a, b, and c, with $a < b < c$. In which triangle is the measure of the obtuse angle the largest?

Triangle	a	b	c
I	9	12	16
II	9	12	17
III	9	12	18
IV	9	12	19

Answer choices:

A I

B II

C III

D IV

Solution: D

In every triangle ABC with obtuse angle C, the inequality $c^2 > a^2 + b^2$ must be satisfied, but you don't need to do any calculations for this one.

The lengths of the two shortest sides ($a = 9$ and $b = 12$) are the same in all four triangles, so the larger the length of the third side (c) is, the larger the measure of angle C is. In the table, Triangle IV has the largest value of c, so it will have the obtuse angle C with the largest measure.

Topic: Pythagorean inequalities

Question: Each of the following triangles has sides of length a, b, and c, with $a \leq b \leq c$. Which triangles are right triangles?

Triangle	a	b	c
I	5	$5\sqrt{3}$	10
II	9	12	15
III	$\sqrt{2}$	$\sqrt{2}$	2

Answer choices:

A II and III

B I and III

C I, II, and III

D None of these

Solution: C

For each triangle in the table, we need to check to see if $a^2 + b^2 = c^2$.

For triangle I:

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

$$5^2 + (5\sqrt{3})^2 = 10^2$$

$$25 + 25(3) = 100$$

$$25 + 75 = 100$$

$$100 = 100$$

For triangle II:

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

$$9^2 + 12^2 = 15^2$$

$$81 + 144 = 225$$

$$225 = 225$$

For triangle III:

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

$$(\sqrt{2})^2 + (\sqrt{2})^2 = 2^2$$

$$2 + 2 = 4$$

$$4 = 4$$

Because all three of these equations were true, all three triangles are right triangles.