Topic: Interior angles of polygons
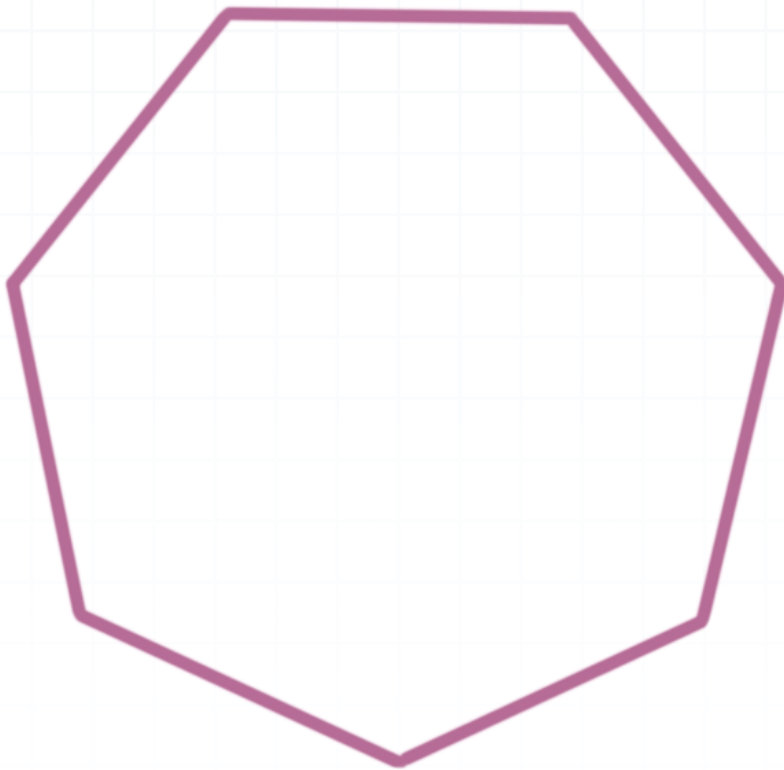
Question: A regular heptagon has all sides and all angles congruent. What is the measure of each interior angle, to the nearest tenth of a degree?

Answer choices:

A   128.6°

B   134.4°

C   139.7°

D   150.0°

Solution: A

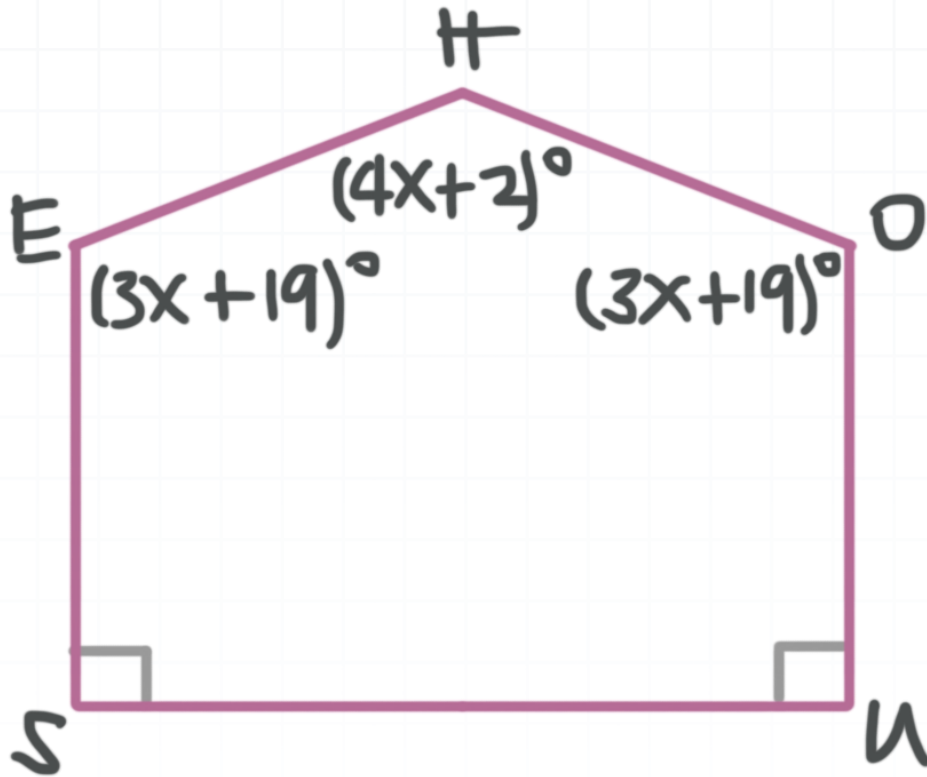The sum of the measures of the interior angles in a polygon is

$$(n-2)180°$$

where n is the number of sides in the polygon. For a heptagon, which is a seven-sided figure, that would be

$$(7-2)180° = 900°$$

There are seven angles, so

$$900° \div 7 = 128.6°$$

Topic: Interior angles of polygons

Question: Find $m\angle H$.

H

$(4x+2)°$

E

$(3x+19)°$

O

$(3x+19)°$

S

U

Answer choices:

A   115°

B   130°

C   140°

D   145°

Solution: B

The sum of the measures of the interior angles in a polygon with n sides is

$$(n - 2)180°$$

For a pentagon, that would be

$$(5 - 2)180° = 540°$$

Set the sum of the five angles equal to $540°$ and solve.

$$(4x + 2)° + (3x + 19)° + 90° + 90° + (3x + 19)° = 540°$$

$$(4x + 3x + 3x)° + (2 + 19 + 90° + 90° + 19)° = 540°$$

$$10x° + 220° = 540°$$

$$10x° = 320°$$

$$x = 32$$

Substitute $x = 32$ for x in $(4x + 2)°$ to find $m\angle H$.
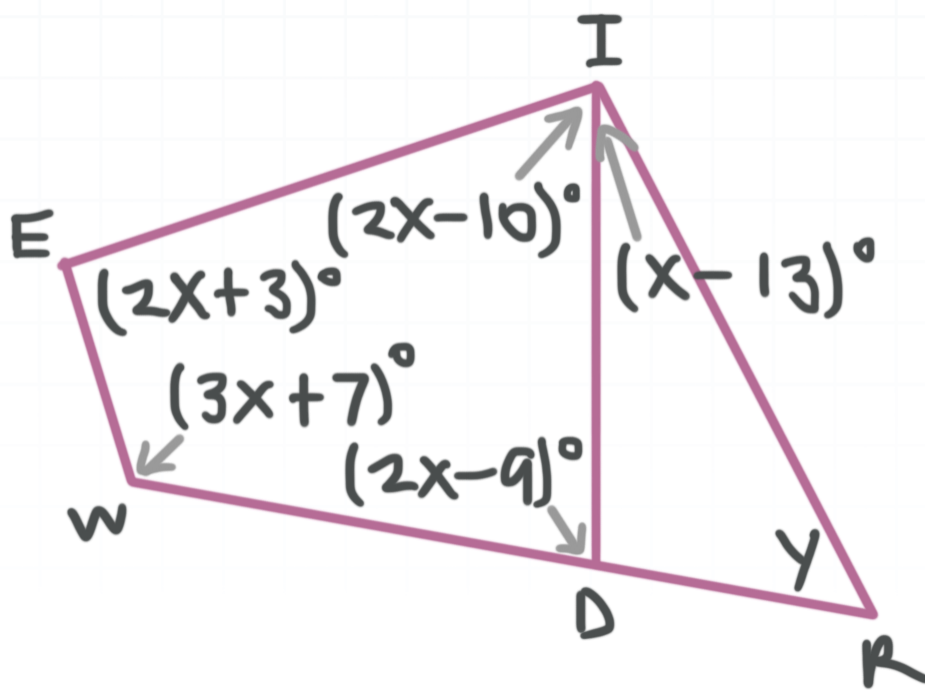
$$m\angle H = (4x + 2)°$$

$$m\angle H = [4(32) + 2]°$$

$$m\angle H = (128 + 2)°$$

$$m\angle H = 130°$$

Topic: Interior angles of polygons

Question: Find the value of y in degrees.

Hint: Any two adjacent angles that lie along the same line, like angles WDI and RDI, are supplementary, and the measures of every pair of supplementary angles always sums to $180°$.

Answer choices:

A   38°

B   43°

C   45°

D   48°

Solution: C

In quadrilateral $WEID$ set the sum of the measures of the four interior angles equal to $360°$ and solve.

$$(3x + 7)° + (2x + 3)° + (2x - 10)° + (2x - 9)° = 360°$$

$$(3x + 2x + 2x + 2x)° + (7 + 3 - 10 - 9)° = 360°$$

$$9x° - 9° = 360°$$

$$9x° = 369°$$

$$x = 41$$

Find $m\angle WDI$.

$$m\angle WDI = (2x - 9)°$$

$$m\angle WDI = [2(41) - 9]°$$

$$m\angle WDI = (82 - 9)°$$

$$m\angle WDI = 73°$$

In $\triangle RDI$ (triangle RDI), find $m\angle RDI$ and $m\angle DIR$. $\angle WDI$ and $\angle RDI$ are adjacent and together make a straight line, so they're supplementary.

$$73° + m\angle RDI = 180°$$

$$m\angle RDI = 180° - 73°$$

$$m\angle RDI = 107°$$

Find $m\angle DIR$.

$$m\angle DIR = (x - 13)°$$

$$m\angle DIR = (41 - 13)°$$

$$m\angle DIR = 28°$$

Now find y, using the fact that the interior angles in triangle RDI sum to $180°$.

$$m\angle RDI + m\angle DIR + m\angle IRD = 180°$$

$$107° + 28° + y = 180°$$

$$135° + y = 180°$$

$$y = 45°$$