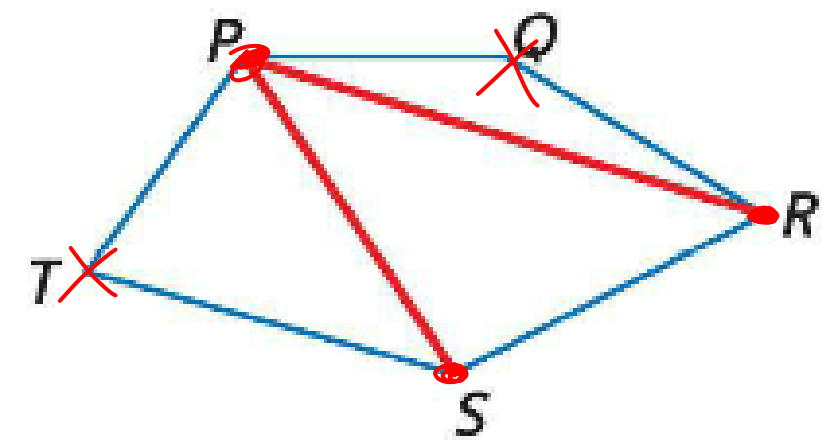
PROPERTIES OF POLYGONS

DIAGONAL

A DIAGONAL OF A POLYGON IS A SEGMENT THAT CONNECTS ANY TWO *NONCONSECUTIVE* VERTICES.



POLYGON INTERIOR ANGLES SUM

- THE SUM OF THE ANGLE MEASURES OF A POLYGON IS THE SUM OF THE ANGLE MEASURES OF THE TRIANGLES FORMED BY DRAWING ALL THE POSSIBLE DIAGONALS FROM ONE VERTEX.
- THE SUM OF THE INTERIOR ANGLE MEASURES OF AN *N*-SIDED CONVEX POLYGON IS (N-2)*180

EXAMPLES

- **FIND THE SUM OF THE MEASURES OF THE INTERIOR ANGLES OF A CONVEX OCTAGON.**

$N = 8$

$(N-2)180$

$(8-2)180$

$6 \cdot 180$

1080

EXAMPLES

- FIND THE SUM OF THE MEASURES OF THE INTERIOR ANGLES OF A CONVEX OCTAGON.

- OCTAGON = 8 SIDES
- (8 - 2) * 180 = 6 * 180 = 1080

EXAMPLES

- **FIND THE SUM OF THE MEASURES OF THE INTERIOR ANGLES OF A CONVEX 32-GON.**

$N = 32$

$(N-2)180$

$(32-2)180$

$30 \cdot 180$

5400

EXAMPLES

- FIND THE SUM OF THE MEASURES OF THE INTERIOR ANGLES OF A CONVEX 32-GON.

- 32 SIDES
- (32 - 2) * 180 = 30 * 180 = 5400

$10x+170=540$

EXAMPLES

- **FIND THE MEASURE OF EACH INTERIOR ANGLE OF PENTAGON *HJKLM*.**

$N=5$

$(5-2)180$

$3 \cdot 180$

540

$2x$

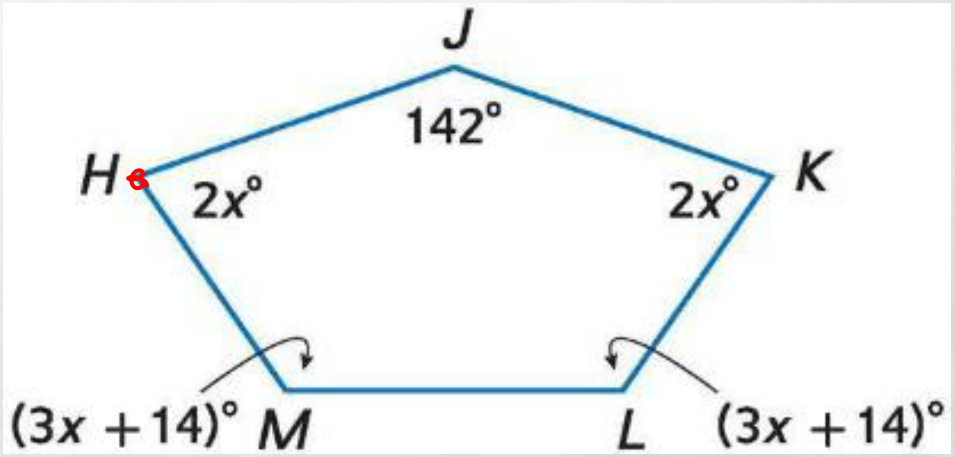
142

$2x$

$3x+14$

$3x+14$

$10x+170$



EXAMPLES

- FIND THE MEASURE OF EACH INTERIOR ANGLE OF PENTAGON *HJKLM*.

- (5 - 2) * 180 = 3 * 180 = 540
- 2X + 2X + (3X + 14) + (3X + 14) + 142 = 540
- 10X + 28 + 142 = 540
- 10X = 370
- X = 37
- 74, 74 , 125, 125, 142

$4x + 224 = 720$

EXAMPLES

- **FIND THE MEASURE OF EACH INTERIOR ANGLE OF ~~PENTAGON *HJKLM*~~.**

$(6-2)180$

$4 \cdot 180$

720

x

$x + 22$

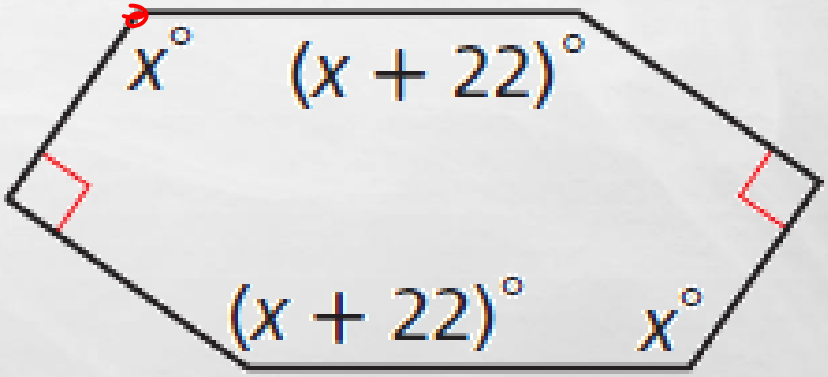
90

x

$x + 22$

90

$4x + 224$



EXAMPLES

- FIND THE MEASURE OF EACH INTERIOR ANGLE OF ~~PENTAGON *HJKLM*~~

- (6 - 2) * 180 = 4 * 180 = 720
- X + X + (X + 22) + (X + 22) + 90 + 90 = 720
- 4X + 224 = 720
- 4X = 496
- X = 124
- 124, 124 , 146, 146, 90, 90

EXAMPLES

- THE MEASURE OF AN INTERIOR ANGLE OF A REGULAR POLYGON IS 135. FIND THE NUMBER OF SIDES IN THE POLYGON.

$$(N-2)180 = 135N$$

$$180N - 360 = 135N$$

$$180N - 135N = 360$$

$$\frac{45N}{45} = \frac{360}{45}$$

$$N = 8$$

EXAMPLES

- THE MEASURE OF AN INTERIOR ANGLE OF A REGULAR POLYGON IS 135. FIND THE NUMBER OF SIDES IN THE POLYGON.

- $135N = (N - 2) * 180$
- $135N = 180N - 360$
- $360 = 45N$
- $N = 8$

EXAMPLES

- THE MEASURE OF AN INTERIOR ANGLE OF A REGULAR POLYGON IS 108. FIND THE NUMBER OF SIDES IN THE POLYGON.

$$180N - 360 = 108N$$

$$180N - 108N = 360$$

$$\frac{72N}{72} = \frac{360}{72}$$

$$N = 5$$

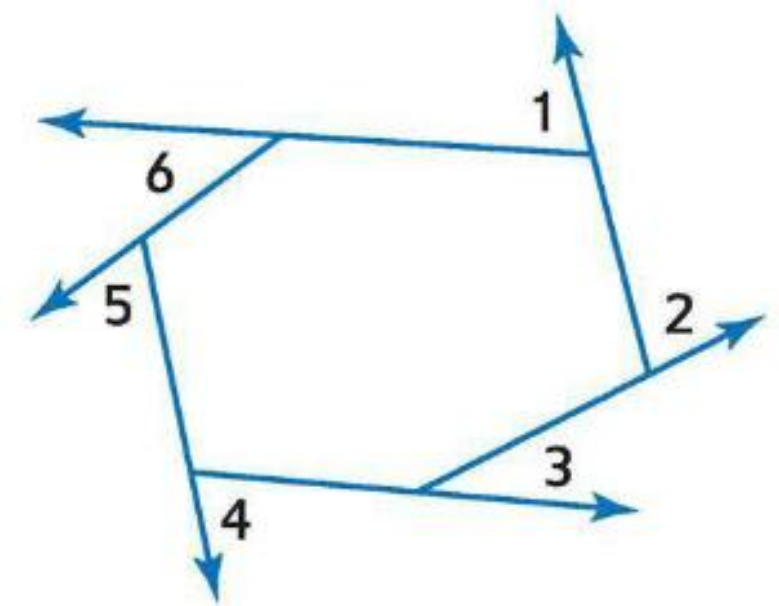
EXAMPLES

- THE MEASURE OF AN INTERIOR ANGLE OF A REGULAR POLYGON IS 108. FIND THE NUMBER OF SIDES IN THE POLYGON.

- $108N = (N - 2) * 180$
- $108N = 180N - 360$
- $360 = 72N$
- $N = 5$

POLYGON EXTERIOR ANGLE SUM

- THE SUM OF THE EXTERIOR ANGLE MEASURES OF A CONVEX POLYGON IS 360.



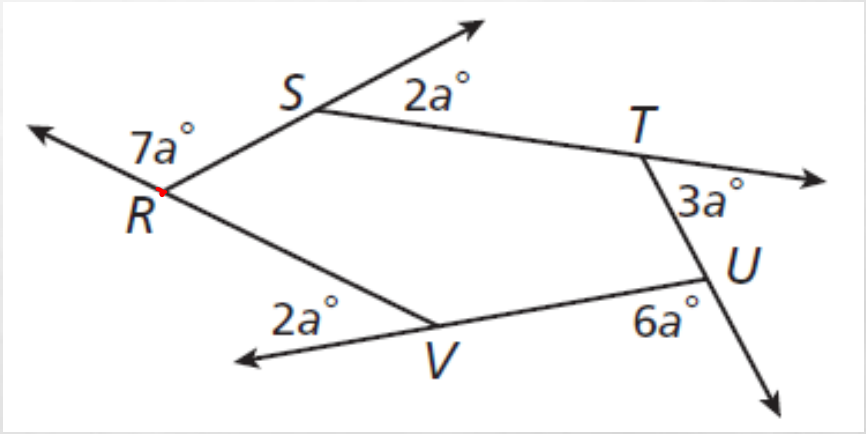
EXAMPLES

- **FIND THE VALUE OF *A* IN POLYGON *RSTUV*.**

$7a$
$2a$
$3a$
$6a$
$+\ 2a$
$20a$

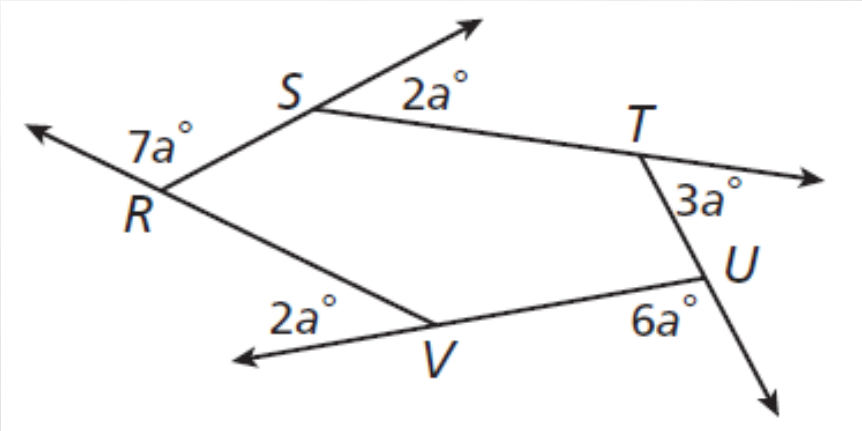
$\frac{20a}{20} = \frac{360}{20}$

$a = 18$



EXAMPLES

- **FIND THE VALUE OF *A* IN POLYGON *RSTUV*.**



- **7A + 2A + 3A + 6A + 2A = 360**
- **20A = 360**
- **A = 18**

EXAMPLES

- A PENTAGON HAS EXTERIOR ANGLE MEASURES OF $5A°$, $4A°$, $10A°$, $3A°$, AND $8A°$. FIND THE VALUE OF A.

$$\begin{array}{r} 5A \\ 4A \\ 10A \\ 3A \\ +\ 8A \\ \hline 30A \end{array}$$

$$\frac{30A}{30} = \frac{360}{30}$$

$$A = 12$$

EXAMPLES

- A PENTAGON HAS EXTERIOR ANGLE MEASURES OF $5A^\circ$, $4A^\circ$, $10A^\circ$, $3A^\circ$, AND $8A^\circ$. FIND THE VALUE OF A.

- $5A + 4A + 10A + 3A + 8A = 360$
- $30A = 360$
- $A = 12$