Ch 7.4 Regular Polygons

Pp 316 – 317 (1– 4; 7; 10 – 13)

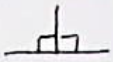
1) Find the measure of an exterior angle of each of the following equiangular polygons.

a) A triangle $\frac{360}{3} = \boxed{120^\circ}$

60 | 120

$n = 3$

b) A quadrilateral $\frac{360}{4} = \boxed{90^\circ}$



$n = 4$

c) An octagon $\frac{360}{8} = \boxed{45^\circ}$

$n = 8$

d) A pentadecagon $n = 15$ $\frac{360}{15} = \boxed{24^\circ}$

e) A 23-gon $n = 23$ $\frac{360}{23} = \boxed{15\frac{15}{23}^\circ}$ *

$23\overline{)360}$ R 15

-345

15

2) Find the measure of an angle of each of the following equiangular polygons.

a) A pentagon $n = 5$

$E = \frac{360}{5} = 72$

$I = 180 - 72$

$\boxed{108^\circ}$

b) A hexagon $n = 6$

$E = \frac{360}{6} = 60$

$I = 180 - 60$

$= \boxed{120^\circ}$

c) A nonagon $n = 9$

$E = \frac{360}{9} = 40$

$I = 180 - 40$

$= \boxed{140^\circ}$

d) A dodecagon $n = 12$

$E = \frac{360}{12} = 30^\circ$

$I = 180 - 30$

$= \boxed{150^\circ}$

e) A 21-gon $n = 21$

$E = \frac{360}{21} = 17\frac{1}{7}$

$I = 180 - 17\frac{1}{7}$

$= \boxed{162\frac{6}{7}^\circ}$

3) Find the number of sides an equiangular polygon has if each of its exterior angles is:

a) 60° $n = \frac{360}{60} = \boxed{6}$

b) 40° $n = \frac{360}{40} = \boxed{9}$

c) 36° $n = \frac{360}{36} = \boxed{10}$

d) 2° $n = \frac{360}{2} = \boxed{180}$

e) $7\frac{1}{2}^\circ$ $n = \frac{360}{7.5} = \boxed{48}$

4) Find the number of sides an equiangular polygon has if each of its angles is:

a) 144° $\frac{360}{36} = \boxed{10}$

$180 - 144 = 36$

b) 120° $\frac{360}{60} = \boxed{6}$

$180 - 120 = 60$

c) 156° $\frac{360}{24} = \boxed{15}$

$180 - 156 = 24$

Ch 7.4 Regular Polygons

Pp 316 – 317 (4; 7; 10 – 13)

4) (cont'd) Find the number of sides an equiangular polygon has if each of its angles is:

d) 162°

$180 - 162 = 18$

$n = \frac{360}{18} = \boxed{20}$

e) $172\frac{4}{5}$°

$179\frac{5}{5} - 172\frac{4}{5} = 7\frac{1}{5}$

$n = \frac{360}{7.2} = \boxed{50}$

7) In an equiangular polygon, the measure of each exterior angle is 25% of the measure of each interior angle. What is the name of the polygon?

$0.25\left[\frac{(n-2)180}{n}\right] = \frac{360}{n}$

(25% of each Interior) = (each Exterior)

$0.25(180n - 360) = 360$

$45n - 90 = 360 + 90$

$\frac{45n}{45} = \frac{450}{45}$

$\boxed{n = 10}$

Regular Decagon

10) The sum of the measures of the angles of a regular polygon is 5040. Find the measure of each angle.

$\frac{180(n-2)}{180} = \frac{5040}{180}$

$n - 2 = 28$

$n = 30$

$\frac{5040}{30}$

$\boxed{168°}$

11) The sum of a polygon's angle measures is nine times the measure of an exterior angle of a regular hexagon. What is the polygon's name?

$180(n-2) = 9\left(\frac{360}{6}\right)$

$180(n-2) = 9(60)$

$\frac{180(n-2)}{180} = \frac{540}{180}$

$n - 2 = 3$

$\boxed{n = 5}$ Regular Pentagon

12) What is the name of an equiangular polygon if the ratio of the measure of each interior angle to the measure of an exterior angle is 7 : 2? .

Short: $7x / 2x$ ($2(20) = 40°$)

$\frac{9x}{9} = \frac{180}{9}$

$x = 20$

$\frac{360}{40} = 9$

Long Way

$\frac{\frac{180(n-2)}{n}}{\frac{360}{n}} = \frac{7}{2}$

$2\left[\frac{180(n-2)}{n}\right] = 7\left[\frac{360}{n}\right]$

$\frac{2(180n - 360)}{2} = \frac{2520}{2}$

$180n - 360 = 1260$

$\frac{180n}{180} = \frac{1620}{180}$

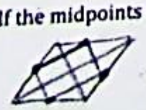
$\boxed{n = 9}$

Equiangular Nonagon

13) Tell whether each statement is true Always, Sometime, or Never (A, S, or N).

If the number of sides of an equiangular polygon is doubled, the measure of each exterior angle is halved.

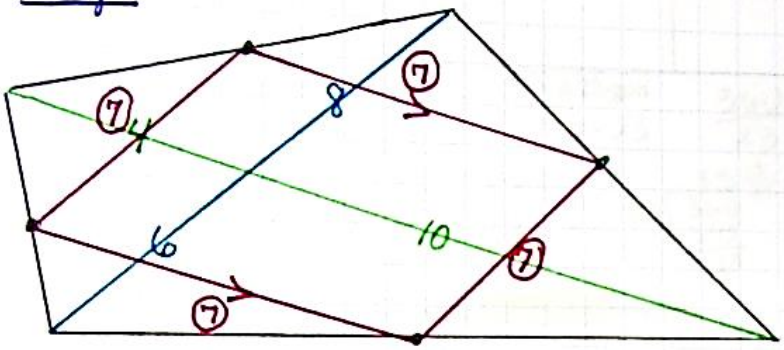
- __A__ a) If the number of sides of an equiangular polygon is doubled, the measure of each exterior angle is halved. (only if regular!)
- __S__ b) The measure of an exterior angle of a decagon is greater than the measure of an exterior angle of a quadrilateral. (180 – 36 =)
- __A__ c) A regular polygon is equilateral.
- __S__ d) An equilateral polygon is regular. (rhombus)
- __S__ e) If the midpoints of the sides of a scalene quadrilateral are joined in order, the figure formed is equilateral but not equiangular. *
- __N__ f) If the midpoints of the sides of a rhombus are joined in order, the figure formed is equilateral.



Use diagonals with midline theorem.

(13e) If the midpoints of the sides of a scalene quadrilateral are joined in order, the figure formed is SOMETIMES equilateral

Rough



More to Scale