

Geometry (H)
Section 3.5 – Angles of a Polygon More Problems

Name: KEY & Notes

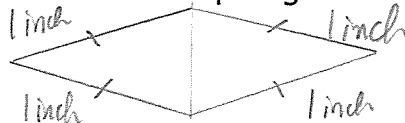
1. Sketch the polygon described. If no such polygon exists, write *not possible*.

a. A quadrilateral that is equiangular but not equilateral.



Text
p104
12-15

b. A quadrilateral that is equilateral but not equiangular.



c. A regular pentagon, one of whose angles has measure 120.

$$\frac{(5-2)180}{5} = \frac{540}{5} = 108^\circ$$

NOT possible b/c each angle must be 108° .
for a regular polygon

d. A regular polygon, one of whose angles has measure 130.

$$\frac{(n-2)180}{n} = 130 \rightarrow$$

$$180n - 360 = 130n$$

$$50n = 360$$

$$n = 7.2 \text{ sides}$$

NOT possible

2. The sum of the measures of the interior angles of a polygon is five times the sum of the measures of its exterior angles, one angle at each vertex. How many sides does the polygon have?

$$(n-2)180 = 5(360)$$

$$180n - 360 = 1800$$

$$n = 12$$

12 sides

3. The measure of each interior angle of a regular polygon is eleven times that of an exterior angle. How many sides does the polygon have?

$$\frac{(n-2)180}{n} = 11\left(\frac{360}{n}\right)$$

24 sides

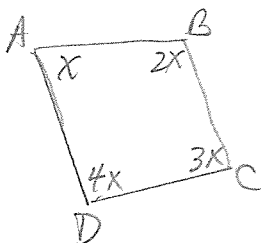
4. What is the measure of each interior angle of a regular pentagon? Can you tile the floor with tiles shaped like regular pentagons? Why or why not?

$$\frac{(5-2)180}{5} = 108^\circ \leftarrow \text{each interior angle}$$

$$\frac{360^\circ}{108^\circ} = 3\frac{1}{3}$$

No; 3 tiles will leave gaps; 4 tiles will overlap.

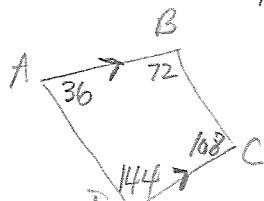
5. In quadrilateral ABCD, $m\angle A = x$, $m\angle B = 2x$, $m\angle C = 3x$ and $m\angle D = 4x$. Find the value of x and then state which pair of sides of ABCD must be parallel.



$$x + 2x + 3x + 4x = 360$$

$$10x = 360$$

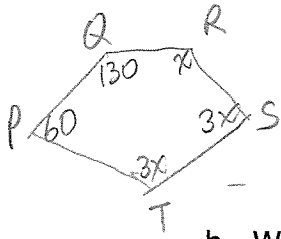
$$x = 36$$



$\overline{AB} \parallel \overline{CD}$

6. In pentagon PQRST, $m\angle P = 60$ and $m\angle Q = 130$. $\angle S$ and $\angle T$ are each three times as large as $\angle R$.

- a. Find the measures of $\angle R$, $\angle S$ and $\angle T$.



Sum of \angle s of pentagon = 540

$$60 + 130 + x + 3x + 3x = 540$$

$$7x = 350$$

$$x = 50$$

$$m\angle R = 50$$

$$m\angle S = 150$$

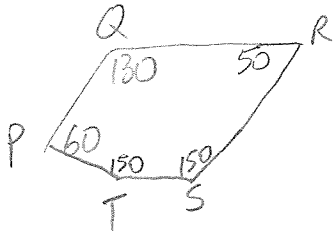
$$m\angle T = 150$$

Do a check:

$$50 + 150 + 150 + 130 + 60 = 540$$

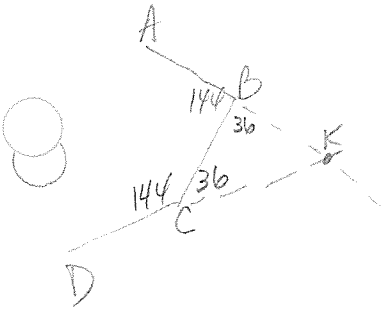
text #22

- b. Which pair of sides of PQRST must be parallel?



$$\overline{PQ} \parallel \overline{SR}$$

7. ABCDEFGHIJ is a regular decagon. If sides \overline{AB} and \overline{CD} are extended to meet at K, find the measure of $\angle K$.



$$\frac{(10-2)180}{10} = 144^\circ \text{ angle}$$

$$m\angle K = 108^\circ$$

text #23

8. The measure of each interior angle of a regular n -gon is x times that of an exterior angle.

- a. Express x in terms of n .

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

$$x = \frac{(180n - 360)n}{n \cdot 360}$$

$$x = \frac{1}{2}n - 1$$

text #28

- b. For what values of n will x be an integer?

All even numbers greater than 2.



9. Find the sum of the measures of the interior angles of a 40-gon.

$$(40-2)180 = 6840^\circ$$

10. How many sides does a polygon have if the sum of the measures of its interior angles is 2880?

$$\begin{aligned}(n-2)180 &= 2880 \\ n-2 &= 16 \\ n &= 18\end{aligned}$$

18 sides

11. Find the measure of each exterior angles of a 20-gon.

$$\frac{360}{20} = 18^\circ$$

12. How many sides does a regular polygon have if each exterior angle is 2° ?

$$\frac{360}{n} = 2$$

$$2n = 360$$

$$n = 180 \text{ sides}$$

13. How many sides does a polygon have if each interior angles measures 162?

$$\begin{aligned}\frac{(n-2)180}{n} = 162 &\rightarrow 180n - 360 = 162n && 20 \text{ sides} \\ 18n = 360 & \\ n = 20 &\end{aligned}$$

14. If the sum of the measures of the angles on the interior of a polygon increases by 900, how many sides will have been added to the polygon?

$$\begin{aligned}(n-2)180 &= 900 \\ n-2 &= 5 \\ n &= 7\end{aligned}$$

7 sides added

⑬ another method

162 / 18 = exterior \angle

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

$$18n = 360$$

$$n = 20 \text{ sides}$$

$$\textcircled{3} \quad \frac{(n-2)180}{n} = 11\left(\frac{360}{n}\right)$$

OR use a diagram

$$n(n-2)180 = 3960n$$

$$180n^2 - 360n = 3960n$$

$$180n^2 - 4320n = 0$$

$$n(180n - 4320) = 0$$

$$\begin{array}{l|l} n=0 & 180n - 4320 = 0 \\ & 180n = 4320 \\ & n = 24 \end{array}$$



$$x + 11x = 180$$

$$x = 15$$

↳ each exterior angle = 15

$$\text{So, } \frac{360^\circ}{15} = 24 \text{ angles} \rightarrow \underline{\underline{24 \text{ sides}}}$$