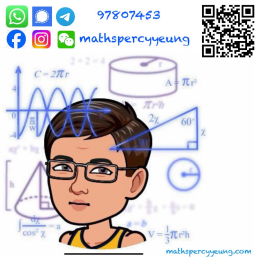
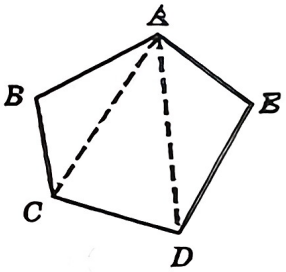


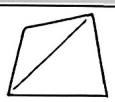
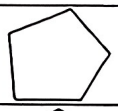
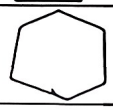
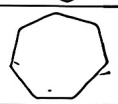
10.1 Sum of interior angles of a polygon

Example 1 (modified from Class Activity 10.1)

(a) In the figure, diagonals AC and AD are drawn from the vertex A of the pentagon $ABCDE$. How many triangles are formed when the pentagon is divided by these diagonals?



(b) In each of the following polygons, draw all the diagonals from one vertex (as in **(a)**) and complete the table below.

Polygon	*Figure*	*Number of sides*	*Number of triangles formed by the diagonals*	*Sum of all interior angles*
Quadrilateral		4	2	$2 \times 180°$
Pentagon				_____ $\times 180°$
Hexagon				_____ $\times 180°$
Heptagon				_____ $\times 180°$

(c) For an n-sided polygon, _____ triangles can be formed in this way.

□

The above investigation leads to the following conclusion:

> The sum of interior angles of an n-sided polygon is $(n-2)\times 180°$.
> ($\angle$ sum of polygon)

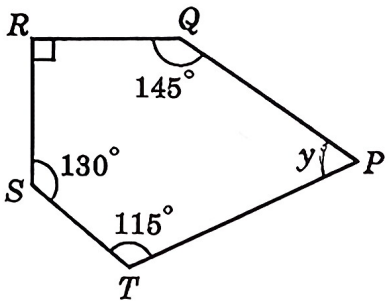
For instance, for a quadrilateral, the sum is 360°; for a dodecagon (12-sided), the sum is 1800°.

In particular, each angle in a *regular* polygon is $\dfrac{(n-2)\times 180°}{n}$.

Regular polygon	Square	Pentagon	Hexagon	Octagon	Decagon
Number of sides					
Each interior angle					

Example 2

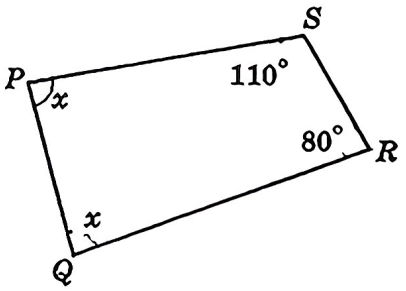
Find y in the figure.



□

Practice 2 (Instant Drill 1(b))

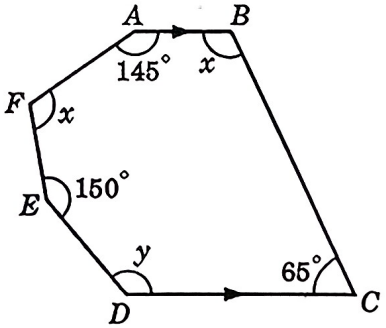
Find x in the figure.



□

Example 3

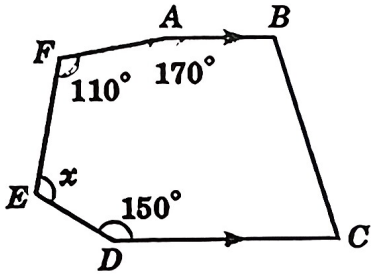
In the figure, $AB // DC$. Find x and y.



□

Practice 3 (Instant Drill 3)

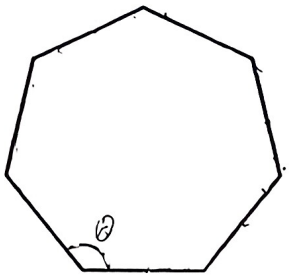
In the figure, $AB // DC$. Find x.



□

Example 4

The figure shows a regular heptagon. Find θ.



□

Example 5

If the size of each interior angle of a regular n-sided polygon is 135°, find the value of n.

□

Practice 5 (Instant Drill 4)

If the size of each interior angle of a regular n-sided polygon is 162°, find the value of n.

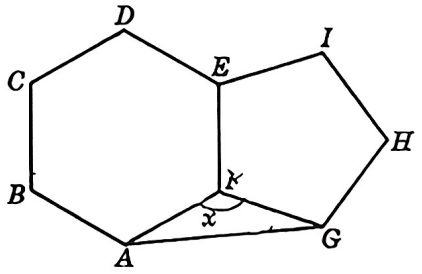
□

Example 6

In the figure, $ABCDEF$ is a regular hexagon and $EFGHI$ is a regular pentagon.

(a) Find x.

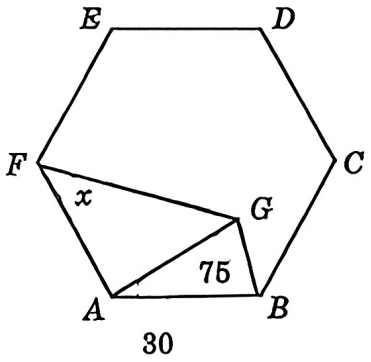
(b) Determine whether ΔAFG is isosceles. Hence find y.



□

Practice 6 (modified from Instant Drill 5)

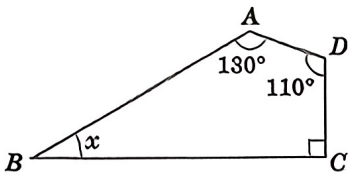
In the figure, $ABCDEF$ is a regular hexagon. If $\angle AGB = 75°$ and $\angle GAB = 30°$, find x.



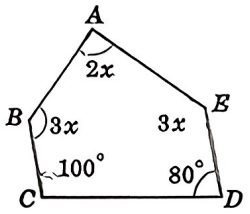
Classwork: Class Practice 10.1

Find the unknowns in each of the following figures. **[Nos. 2-4]**

2.



4.



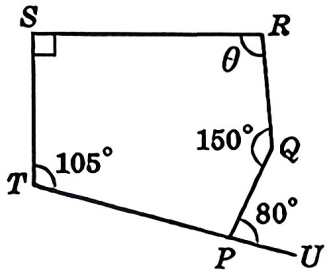
5. (a) Find the size of each interior angle of a regular nonagon (9-sided polygon).

6. If the sum of interior angles of an n-sided polygon is 2160°, find the value of n.

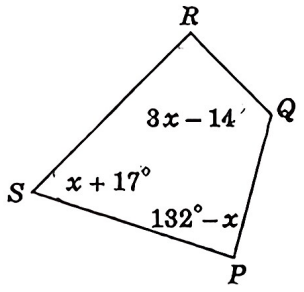
Classwork: Exercise 10A

Find the unknowns in each of the following figures. **[No.12-25]**

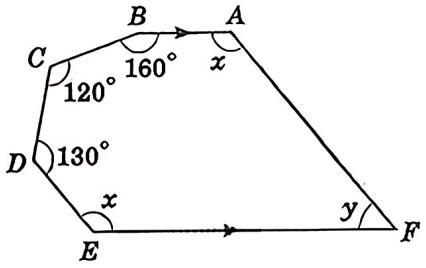
12. (*TPU* is a straight line.)



22.

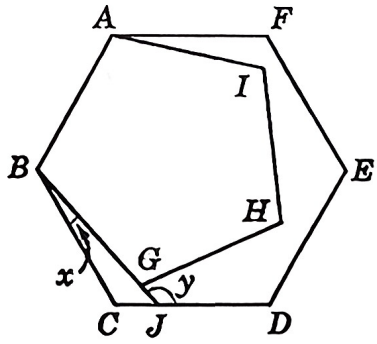


25.



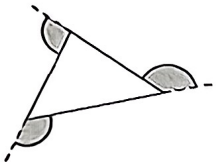
26. It is given that the sum of interior angles of an n-sided polygon is 3 times that of a pentagon. Find the value of n.

31. In the figure, $ABCDEF$ is a regular hexagon, $ABGHI$ is a regular pentagon and BGJ is a straight line. Find x and y.

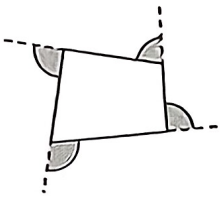


10.2 Sum of exterior angles of a convex polygon

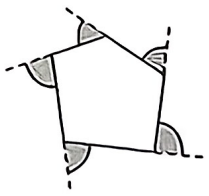
Each of the following shows a set of exterior angles of the given polygon.



Triangle

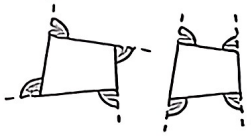


Quadrilateral



Pentagon

◀ A polygon has more than one set of exterior angles.
e.g.

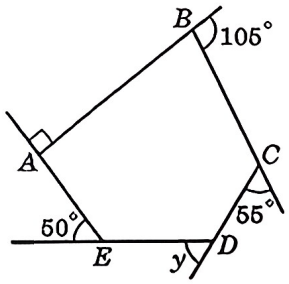


The sum of exterior angles of an n-sided polygon is 360°. (sum of ext. ∠s of polygon)

Note that only ***convex polygons*** possess exterior angles.

Example 7

Find y in the figure.

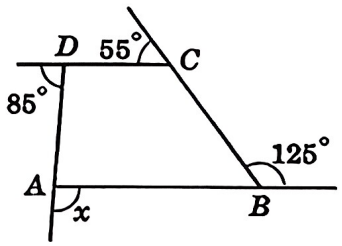


□

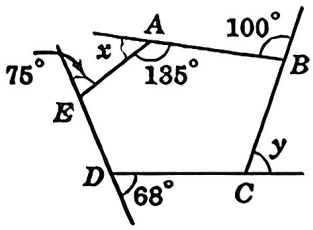
Practice 7 (Instant Drill 6)

Find the unknown(s) in each of the following figures.

(a)



(b)



□

Example 8

If the sum of interior angles of a regular polygon is 7 times the sum of its exterior angles, find the size of each exterior angle of the polygon.

□

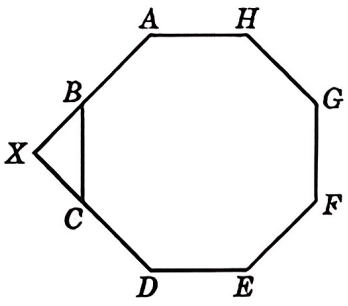
Practice 8 (Instant Drill 7)

In a regular polygon, if the size of each interior angle is 9 times that of each exterior angle, find the size of each exterior angle.

□

Example 9

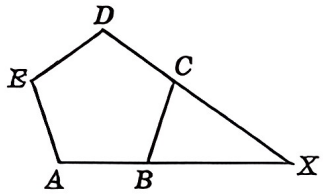
In the figure, $ABCDEFGH$ is a regular octagon. AB produced and DC produced intersect at X. Find $\angle BXC$.



□

Practice 9 (Instant Drill 8)

In the figure, $ABCDE$ is a regular pentagon. AB produced and DC produced intersect at X. Find $\angle BXC$.

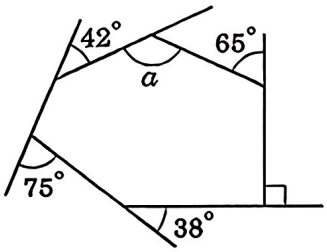


□

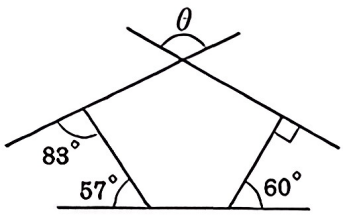
Classwork: Exercise 10B

Find the unknowns in each of the following figures..**[Nos. 8-19]**

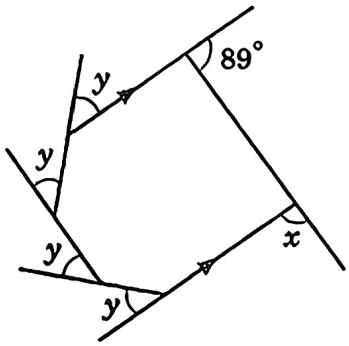
8.



9.

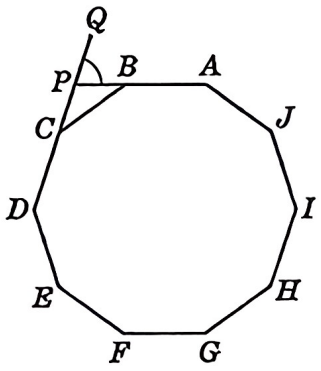


19.



21. In a regular polygon, if each interior angle is greater than each exterior angle by 90°, find the number of sides of the polygon.

23. In the figure, $ABCDEFGHIJ$ is a regular decagon. ABP and $DCPQ$ are straight lines. Find $\angle BPQ$.



Classwork: Past Public Examinations Question

1. (HKDSE 2015 – II – 22)

If an interior angle of a regular polygon is 5 times an exterior angle of the polygon, which of the following is/are true?

I. An interior angle of the polygon is 150°.

II. The number of diagonals of the polygon is 6.

III. The number of folds of rotational symmetry of the polygon is 6.

A. I. only

B. II. only

C. I. and III. only

D. II. and III. only