Exercise 3.2

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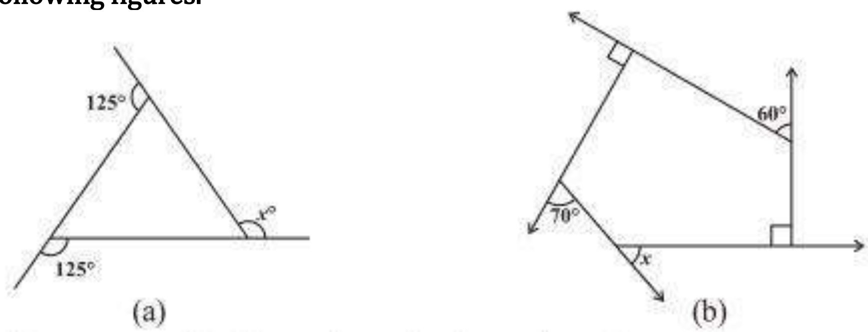
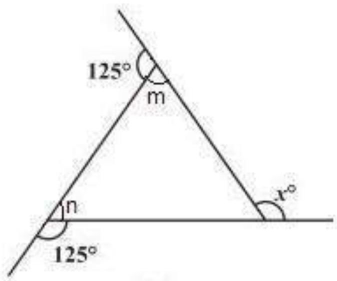
1. Find x in the following figures.



Solution:

a)



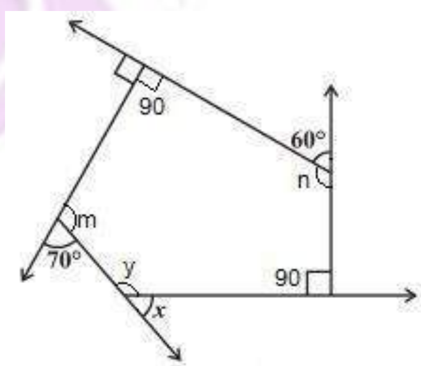
$125° + m = 180° \Rightarrow m = 180° - 125° = 55°$ (Linear pair)

$125° + n = 180° \Rightarrow n = 180° - 125° = 55°$ (Linear pair)

$x = m + n$ (exterior angle of a triangle is equal to the sum of 2 opposite interior 2 angles)

$\Rightarrow x = 55° + 55° = 110°$

b)



Two interior angles are right angles = 90°

$70° + m = 180° \Rightarrow m = 180° - 70° = 110°$ (Linear pair)

$60° + m = 180° \Rightarrow m = 180° - 60° = 120°$ (Linear pair)

The figure is having five sides and is a pentagon.

Thus, sum of the angles of pentagon = 540°

$90° + 90° + 110° + 120° + y = 540°$

$\Rightarrow 410° + y = 540° \Rightarrow y = 540° - 410° = 130°$

$x + y = 180°$ (Linear pair)

$\Rightarrow x + 130° = 180°$
$\Rightarrow x = 180° - 130° = 50°$

2. Find the measure of each exterior angle of a regular polygon of
(i) 9 sides (ii) 15 sides

Solution:

Sum of angles a regular polygon having side n = (n-2)×180°

(i) Sum of angles a regular polygon having side 9 = (9-2)×180°
= 7×180° = 1260°

Each interior angle = $\frac{1260}{9} = 140°$

Each exterior angle = 180° - 140° = 40°

Or,

Each exterior angle = $\frac{\text{Sum of exterior angles}}{\text{Number of sides}} = \frac{360}{9} = 40°$

(ii) Sum of angles a regular polygon having side 15 = (15-2)×180°
= 13×180° = 2340°

Each interior angle = $\frac{2340}{15} = 156°$

Each exterior angle = 180° - 156° = 24°

Or,

Each exterior angle = $\frac{\text{Sum of exterior angles}}{\text{Number of sides}} = \frac{360}{15} = 24°$

3. How many sides does a regular polygon have if the measure of an exterior angle is 24°?

Solution:

Each exterior angle $\frac{\text{Sum of exterior angles}}{\text{Number of sides}}$

$24° = \frac{360}{\text{Number of sides}}$

$\Rightarrow$ Number of sides $= \frac{360}{24} = 15$

Thus, the regular polygon have 15 sides.

4. How many sides does a regular polygon have if each of its interior angles is 165°?

Solution:

Interior angle = 165°

Exterior angle = 180° - 165° = 15°

Number of sides $= \frac{\text{Sum of exterior angles}}{\text{exterior angles}}$

$\Rightarrow$ Number of sides $= \frac{360}{15} = 24$

Thus, the regular polygon have 24 sides.

5.

a) Is it possible to have a regular polygon with measure of each exterior angle as 22°?

b) Can it be an interior angle of a regular polygon? Why?

Solution:

a) Exterior angle = 22°

Number of sides = $\frac{\text{Sum of exterior angles}}{\text{exterior angles}}$

$\Rightarrow$ Number of sides = $\frac{360}{22} = 16.36$

No, we can't have a regular polygon with each exterior angle as 22° as it is not divisor of 360.

b) Interior angle = 22°

Exterior angle = 180° - 22°= 158°

No, we can't have a regular polygon with each exterior angle as 158° as it is not divisor of 360.

6.

a) What is the minimum interior angle possible for a regular polygon? Why?

b) What is the maximum exterior angle possible for a regular polygon?

Solution:

a) Equilateral triangle is regular polygon with 3 sides has the least possible minimum interior angle because the regular with minimum sides can be constructed with 3 sides at least..

Since, sum of interior angles of a triangle = 180°

Each interior angle = $\frac{180}{3} = 60°$

b) Equilateral triangle is regular polygon with 3 sides has the maximum exterior angle because the regular polygon with least number of sides have the maximum exterior angle possible.

Maximum exterior possible = 180 - 60° = 120°