Worksheet -12 Subject: - Mathematics Class: - VIII Teacher: - Ms. Nancy

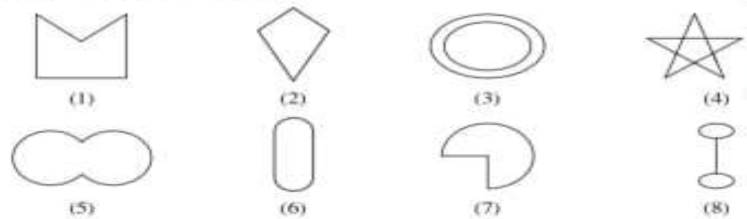
Name: _______________ Class & Sec: ________________ Roll No. ______ Date: 12.05.2020

C

Fig 3.7

EXERCISE 3.1

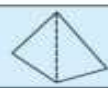
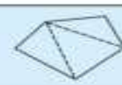
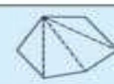
1. Given here are some figures.



Classify each of them on the basis of the following.

(a) Simple curve (b) Simple closed curve (c) Polygon
(d) Convex polygon (e) Concave polygon

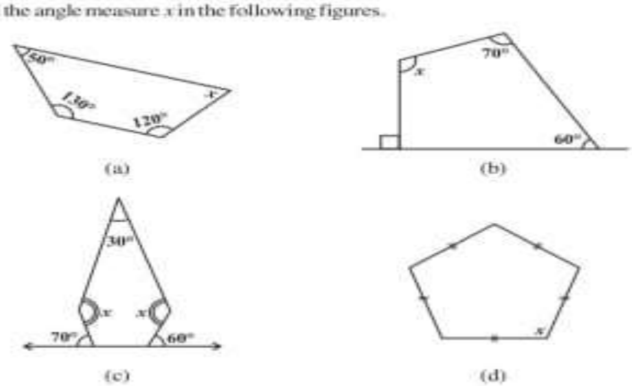
2. How many diagonals does each of the following have?
(a) A convex quadrilateral (b) A regular hexagon (c) A triangle
3. What is the sum of the measures of the angles of a convex quadrilateral? Will this property hold if the quadrilateral is not convex? (Make a non-convex quadrilateral and try!)
4. Examine the table. (Each figure is divided into triangles and the sum of the angles deduced from that.)

Figure				
Side	3	4	5	6
Angle sum	180°	$2 \times 180°$ $= (4-2) \times 180°$	$3 \times 180°$ $= (5-2) \times 180°$	$4 \times 180°$ $= (6-2) \times 180°$

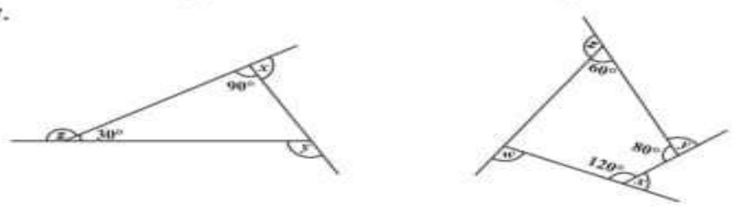
What can you say about the angle sum of a convex polygon with number of sides?

(a) 7 (b) 8 (c) 10 (d) n

5. What is a regular polygon?
State the name of a regular polygon of
(i) 3 sides (ii) 4 sides (iii) 6 sides
6. Find the angle measure x in the following figures.



7.



(a) Find $x + y + z$ (b) Find $x + y + z + w$

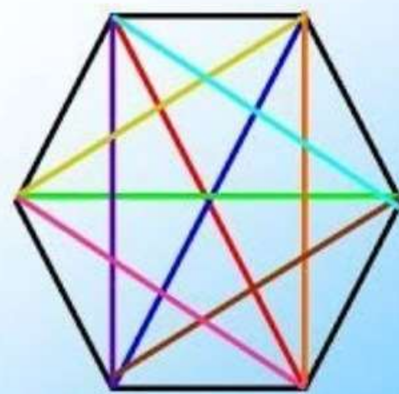
3.3 Sum of the Measures of the Exterior Angles of a

Formula to find the number of diagonals in a polygon:

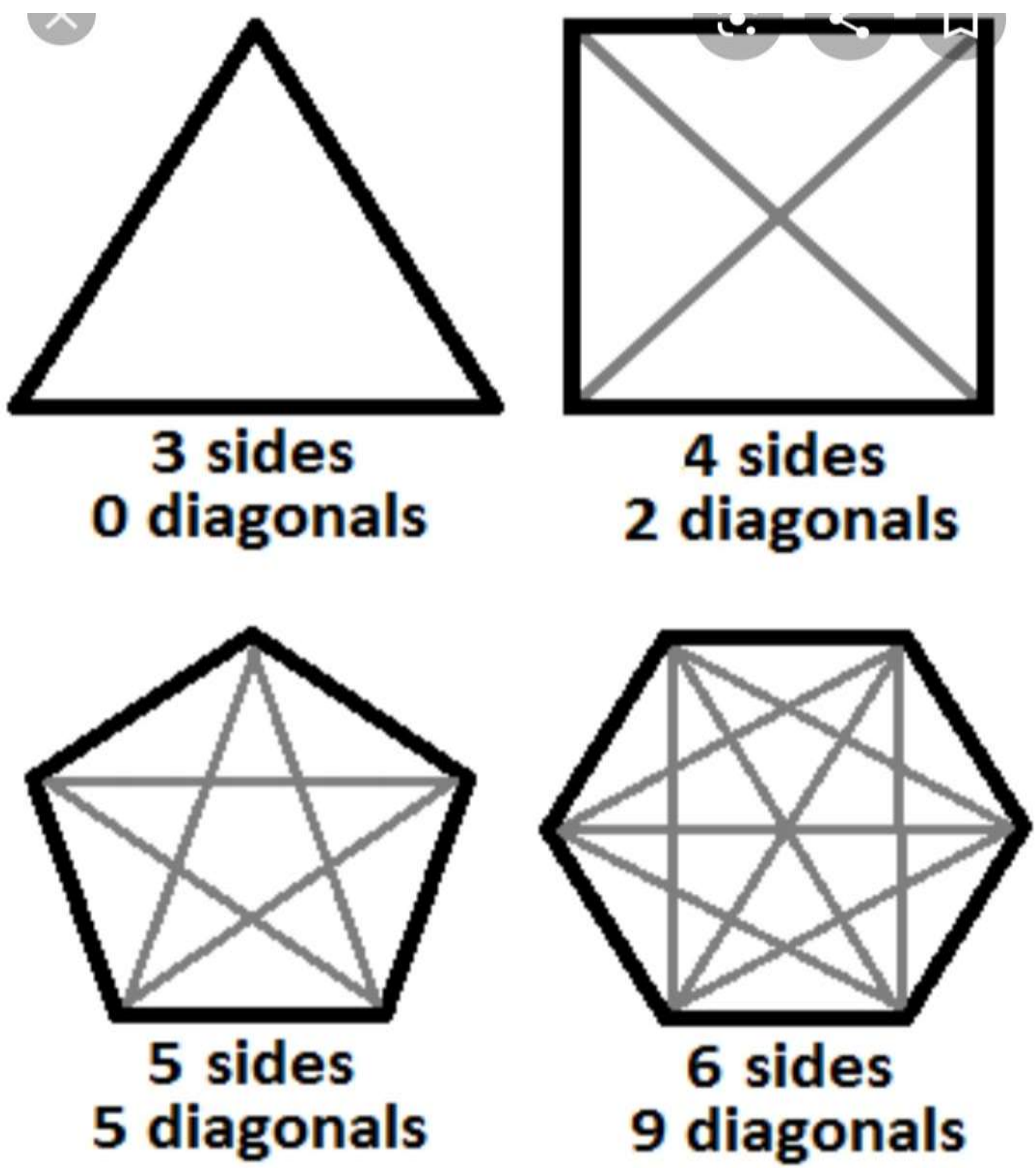
When n = number of sides in the polygon

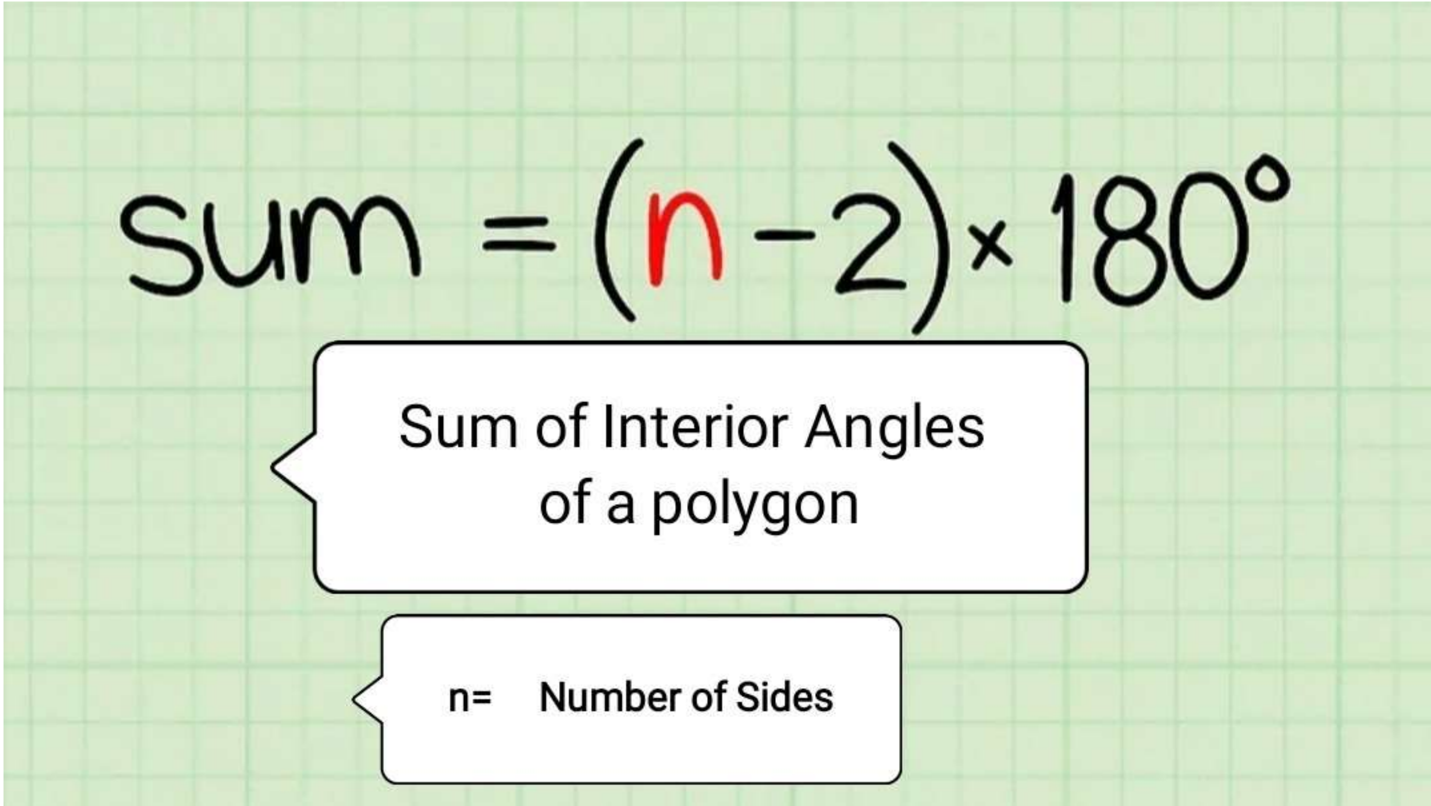
$$diagonals = \frac{n(n-3)}{2}$$

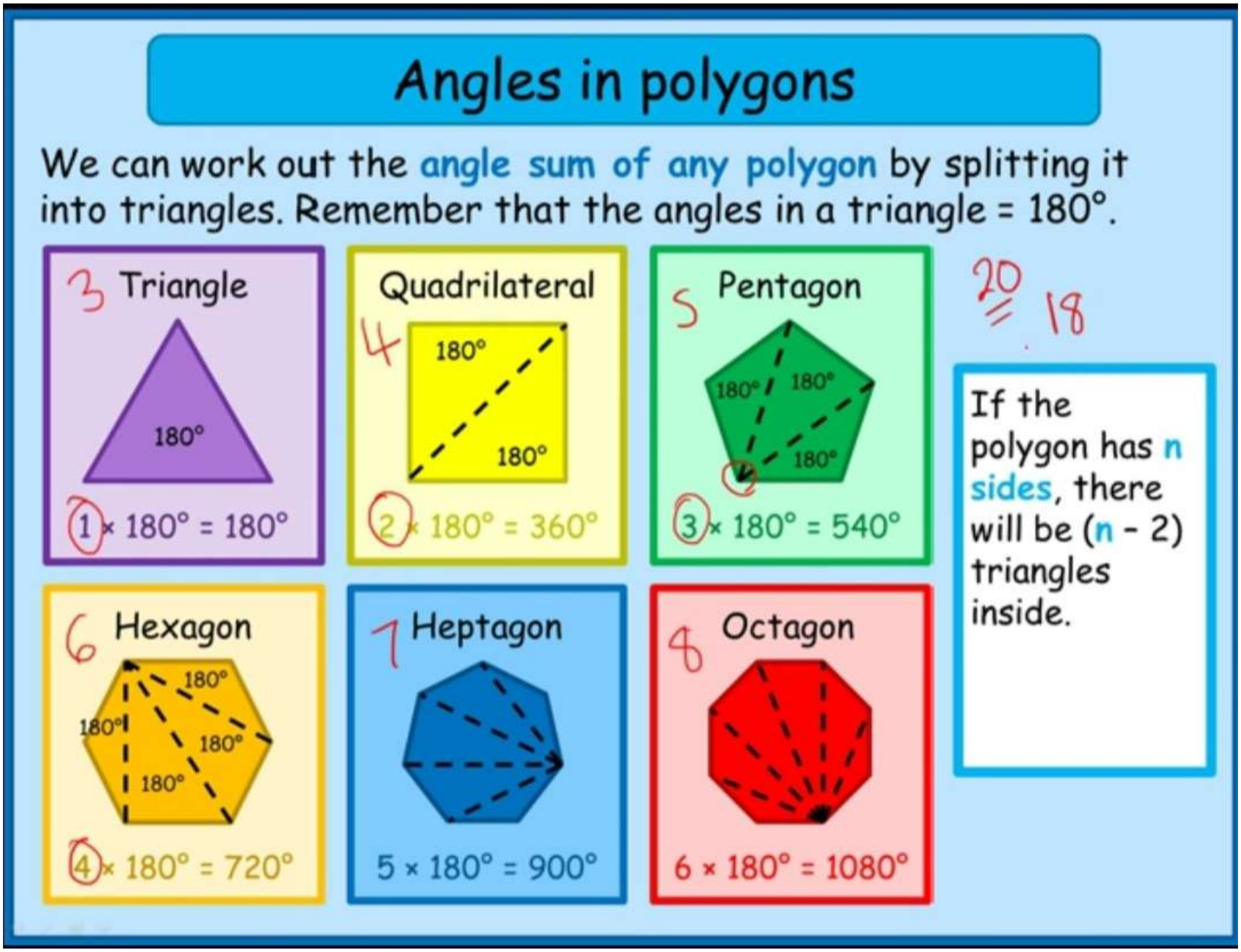
For example in a hexagon:

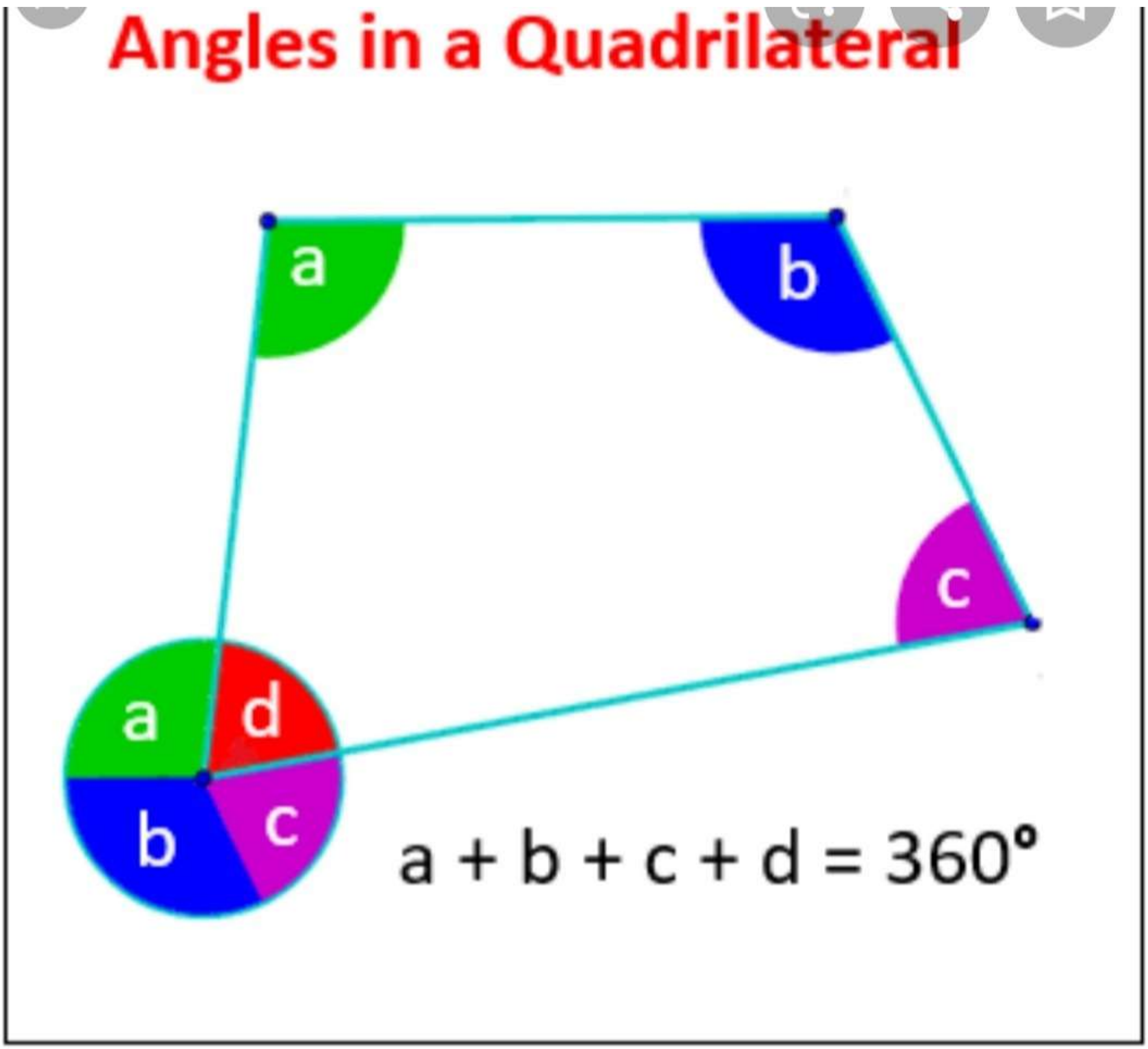


$$= \frac{6(6-3)}{2} = \frac{6(3)}{2} = \frac{18}{2} = 9$$


3 sides
0 diagonals
4 sides
2 diagonals
5 sides
5 diagonals
6 sides
9 diagonals


sum = (n − 2) × 180°
Sum of Interior Angles of a polygon
n= Number of Sides


Angles in polygons
We can work out the angle sum of any polygon by splitting it into triangles. Remember that the angles in a triangle = 180°.
Triangle
180°
1 × 180° = 180°
Quadrilateral
180°
180°
2 × 180° = 360°
Pentagon
180°
180°
180°
3 × 180° = 540°
Hexagon
180°
180°
180°
180°
4 × 180° = 720°
Heptagon
5 × 180° = 900°
Octagon
6 × 180° = 1080°
If the polygon has n sides, there will be (n – 2) triangles inside.


Angles in a Quadrilateral
a
b
c
a
d
b
c
a + b + c + d = 360°

uestion 2

ow many diagonals does each of the following have?

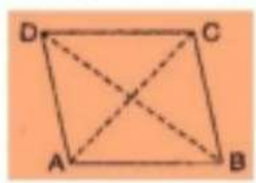
(a) A convex quadrilateral (b) A regul

(c) A triangle

nswer 2

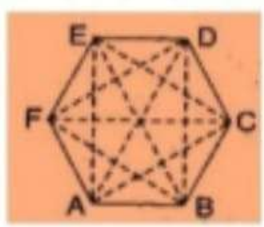
(a) A convex quadrilateral has two diagonals.

Here, AC and BD are two diagonals.



(b) A regular hexagon has 9 diagonals.

Here, diagonals are AD, AE, BD, BE, FC, FB, AC, EC and FD.



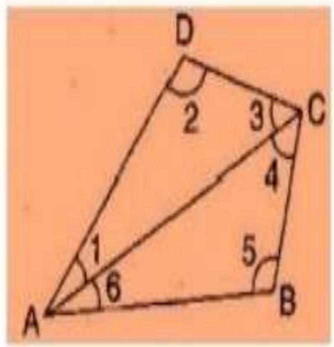
(c) A triangle has no diagonal.

Question 3

What is the sum of the measures of the angles of a convex quadrilateral? Will this property hold if the quadrilateral is not convex? (Make a non-convex quadrilateral and try)

Answer 3

Let ABCD is a convex quadrilateral, then we draw a diagonal AC which divides the quadrilateral in two triangles.



$\angle A + \angle B + \angle C + \angle D = \angle 1 + \angle 6 + \angle 5 + \angle 4 + \angle 3 + \angle 2$

$= (\angle 1 + \angle 2 + \angle 3) + (\angle 4 + \angle 5 + \angle 6)$

$= 180^\circ + 180^\circ$ [By Angle sum property of triangle]

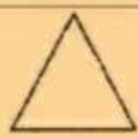
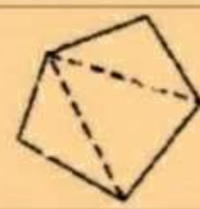
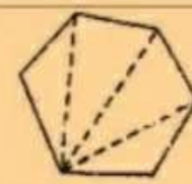
$= 360^\circ$

Hence, the sum of measures of the triangles of a convex quadrilateral is 360°.

Yes, if quadrilateral is not convex then, this property will also be applied.

Question 4

Examine the table. (Each figure is divided into triangles and the sum of the angles deduced from that.)

Figure				
Side	3	4	5	6
Angle sum	$1\times180^\circ$ $=(3-2)\times180^\circ$	$2\times180^\circ$ $=(4-2)\times180^\circ$	$3\times180^\circ$ $=(5-2)\times180^\circ$	$4\times180^\circ$ $=(6-2)\times180^\circ$

What can you say about the angle sum of a convex polygon with number of sides?

Answer 4

(a) When n = 7, then

Angle sum of a polygon = $(n-2)\times180^\circ = (7-2)\times180^\circ = 5\times180^\circ = 900^\circ$

(b) When n = 8, then

Angle sum of a polygon = $(n-2)\times180^\circ = (8-2)\times180^\circ = 6\times180^\circ = 1080^\circ$

(c) When n = 10, then

Angle sum of a polygon = $(n-2)\times180^\circ = (10-2)\times180^\circ = 8\times180^\circ = 1440^\circ$

(d) When n = n, then

Angle sum of a polygon = $(n-2)\times180^\circ$

Angle sum of a polygon = $(n - 2) \times 180°$

Question 5

What is a regular polygon? State the name of a regular polygon of:

(a) 3 sides

(b) 4 sides

(c) 6 sides

Answer 5

A regular polygon: A polygon having all sides of equal length and the interior angles of equal size is known as regular polygon.

(i) 3 sides

Polygon having three sides is called a **triangle**.

(ii) 4 sides

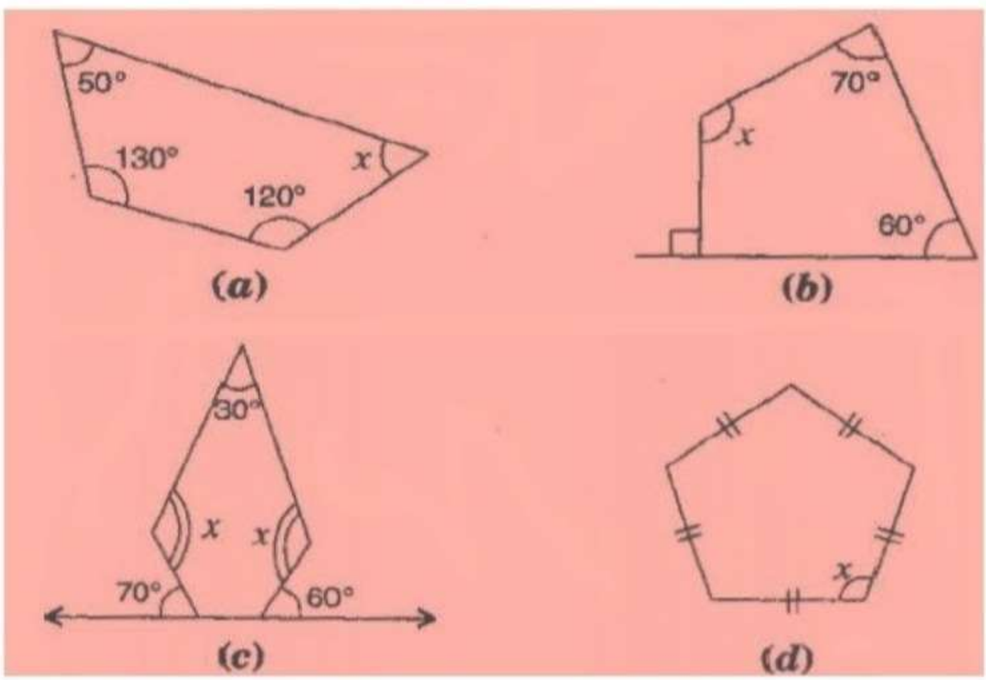
Polygon having four sides is called a **quadrilateral**.

(iii) 6 sides

Polygon having six sides is called a **hexagon**.

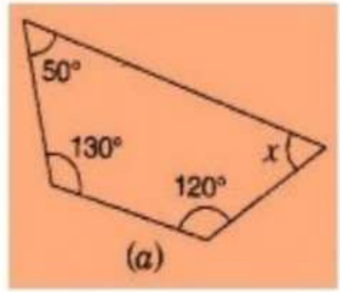
Question 6

Find the angle measures x in the following figures:



Answer 6

(a) Using angle sum property of a quadrilateral,



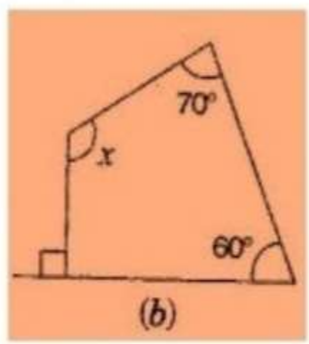
$50° + 130° + 120° + x = 360°$

$\Rightarrow 300° + x = 360°$

$\Rightarrow x = 360° - 300°$

$\Rightarrow x = 60°$

(b) Using angle sum property of a quadrilateral,



$90° + 60° + 70° + x = 360°$

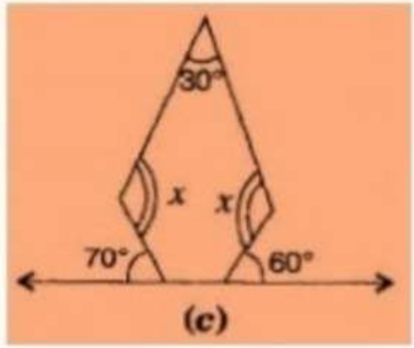
$\Rightarrow 220° + x = 360°$

$\Rightarrow x = 360° - 220°$

$\Rightarrow x = 140°$

$\Rightarrow x = 140°$

(c)



First base interior angle = 180° – 70° = 110°

Second base interior angle = 180° – 60° = 120°

There are 5 sides, n = 5

∴ Angle sum of a polygon = $(n - 2) \times 180° = (5 - 2) \times 180° = 3 \times 180° = 540°$

∴ $30° + x + 110° + 120° + x = 540°$

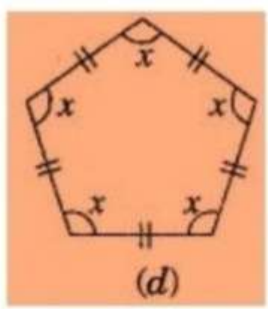
$\Rightarrow 260° + 2x = 540°$

$\Rightarrow 2x = 540° - 260°$

$\Rightarrow 2x = 280°$

$\Rightarrow x = 140°$

(d) Angle sum of a polygon = $(n - 2) \times 180° = (5 - 2) \times 180° = 3 \times 180° = 540°$



∴ $x + x + x + x + x = 540°$

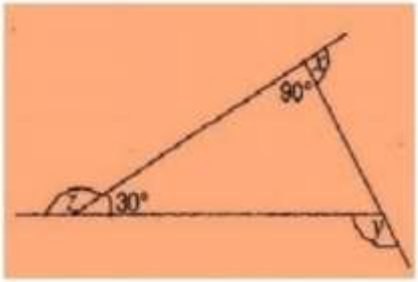
$\Rightarrow 5x = 540°$

$\Rightarrow x = 108°$

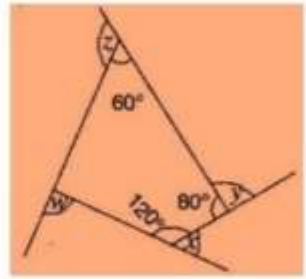
Hence each interior angle is 108°.

Question 7

(a) Find x + y + z

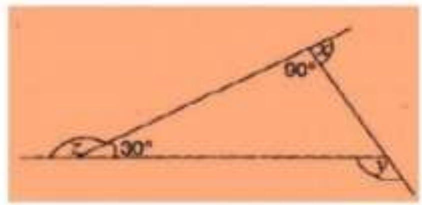


(b) Find x + y + z + w



Answer 7

(a) Since sum of linear pair angles is 180°.



$\therefore$ 90° + x = 180°

$\Rightarrow$ x = 180° − 90° = 90°

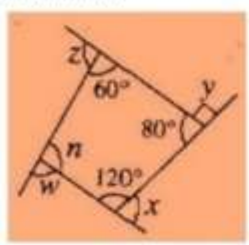
And z + 30° = 180°

$\Rightarrow$ z = 180° − 30° = 150°

Also y = 90° + 30° = 120° [Exterior angle property]

$\therefore$ x + y + z = 90° + 120° + 150° = 360°

(b) Using angle sum property of a quadrilateral,



60° + 80° + 120° + n = 360°

$\Rightarrow$ 260° + n = 360°

$\Rightarrow$ n = 360° − 260°

$\Rightarrow$ n = 100°

Since sum of linear pair angles is 180°.

$\therefore$ w + 100° = 180° .... (i)

x + 120° = 180° .... (ii)

y + 80° = 180° .... (iii)

z + 60° = 180° .... (iv)

Adding eq. (i), (ii), (iii) and (iv),

$\Rightarrow$ x + y + z + w + 100° + 120° + 80° + 60° = 180° + 180° + 180° + 180°

$\Rightarrow$ x + y + z + w + 360° = 720°

$\Rightarrow$ x + y + z + w = 720° − 360°

$\Rightarrow$ x + y + z + w = 360°