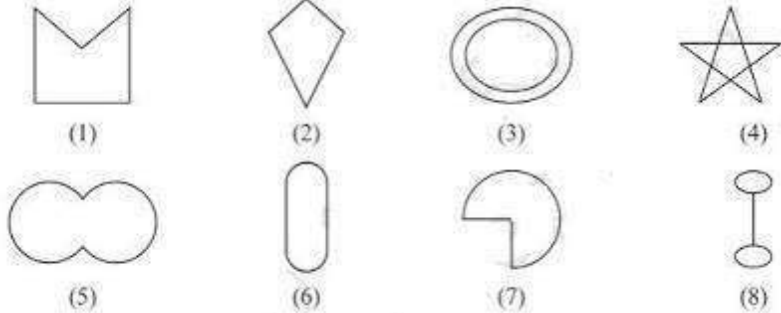


Exercise 3.1

1. Given here are some figures.



Classify each of them on the basis of the following.  
 Simple curve (b) Simple closed curve (c) Polygon  
 (d) Convex polygon (e) Concave polygon

Solution:

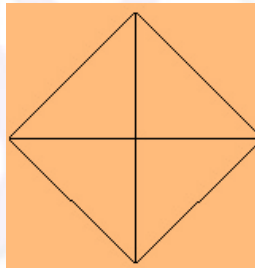
- a) Simple curve: 1, 2, 5, 6 and 7
- b) Simple closed curve: 1, 2, 5, 6 and 7
- c) Polygon: 1 and 2
- d) Convex polygon: 2
- e) Concave polygon: 1

2. How many diagonals does each of the following have?

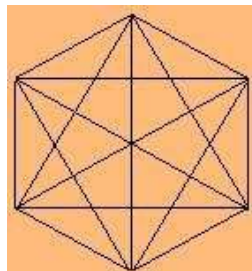
- a) A convex quadrilateral
- (b) A regular hexagon
- (c) A triangle

Solution:

- a) A convex quadrilateral: 2.

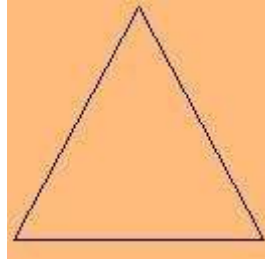


- b) A regular hexagon: 9.



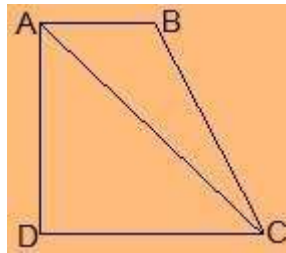
- c) A triangle: 0

## NCERT Solution For Class 8 Maths Chapter 3- Understanding Quadrilaterals



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!)

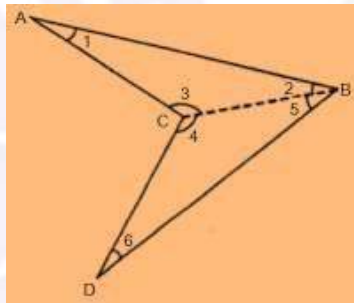
Solution:



Let ABCD be a convex quadrilateral.

From the figure, we infer that the quadrilateral ABCD is formed by two triangles,  
i.e.  $\triangle ADC$  and  $\triangle ABC$ .

Since, we know that sum of interior angles of triangle is  $180^\circ$ ,  
the sum of the measures of the angles is  $180^\circ + 180^\circ = 360^\circ$



Let us take another quadrilateral ABCD which is not convex .  
Join BC, Such that it divides ABCD into two triangles  $\triangle ABC$  and  $\triangle BCD$ .

In  $\triangle ABC$ ,

$$\angle 1 + \angle 2 + \angle 3 = 180^\circ \text{ (angle sum property of triangle)}$$

In  $\triangle BCD$ ,

$$\angle 4 + \angle 5 + \angle 6 = 180^\circ \text{ (angle sum property of triangle)}$$

$$\therefore, \angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 = 180^\circ + 180^\circ$$

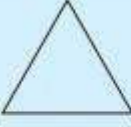
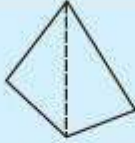


$$\Rightarrow \angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 = 360^\circ$$

$$\Rightarrow \angle A + \angle B + \angle C + \angle D = 360^\circ$$

Thus, this property hold if the quadrilateral is not convex.

## NCERT Solution For Class 8 Maths Chapter 3- Understanding Quadrilaterals

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

<b>Figure</b>				
<b>Side</b>	3	4	5	6
<b>Angle sum</b>	$180^\circ$	$2 \times 180^\circ$ $= (4 - 2) \times 180^\circ$	$3 \times 180^\circ$ $= (5 - 2) \times 180^\circ$	$4 \times 180^\circ$ $= (6 - 2) \times 180^\circ$

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

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

**Solution:**

The angle sum of a polygon having side  $n = (n-2) \times 180^\circ$

a) 7

Here,  $n = 7$

Thus, angle sum  $= (7-2) \times 180^\circ = 5 \times 180^\circ = 900^\circ$

b) 8

Here,  $n = 8$

Thus, angle sum  $= (8-2) \times 180^\circ = 6 \times 180^\circ = 1080^\circ$

c) 10

Here,  $n = 10$

Thus, angle sum  $= (10-2) \times 180^\circ = 8 \times 180^\circ = 1440^\circ$

d) n

Here,  $n = n$

Thus, angle sum  $= (n-2) \times 180^\circ$

5. What is a regular polygon?

State the name of a regular polygon of

- (i) 3 sides      (ii) 4 sides      (iii) 6 sides

**Solution:**

Regular polygon: A polygon having sides of equal length and angles of equal measures is called regular polygon. i.e., A regular polygon is both equilateral and equiangular.

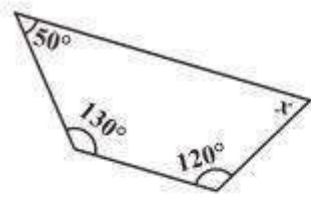
(i) A regular polygon of 3 sides is called equilateral triangle.

(ii) A regular polygon of 4 sides is called square.

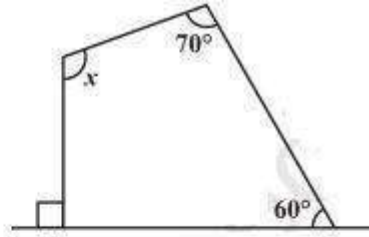
(iii) A regular polygon of 6 sides is called regular hexagon.

6. Find the angle measure  $x$  in the following figures.

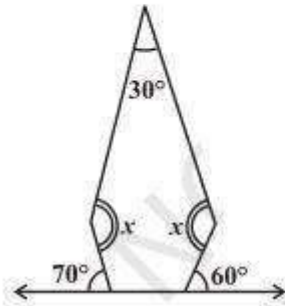
## NCERT Solution For Class 8 Maths Chapter 3- Understanding Quadrilaterals



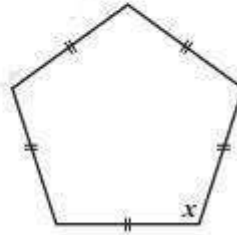
(a)



(b)



(c)



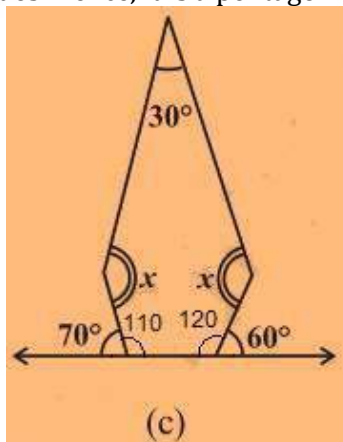
(d)

**Solution:**

a) The figure is having 4 sides. Hence, it is a quadrilateral. Sum of angles of the quadrilateral =  $360^\circ$   
 $\Rightarrow 50^\circ + 130^\circ + 120^\circ + x = 360^\circ$   
 $\Rightarrow 300^\circ + x = 360^\circ$   
 $\Rightarrow x = 360^\circ - 300^\circ = 60^\circ$

b) The figure is having 4 sides. Hence, it is a quadrilateral. Also, one side is perpendicular forming right angle.  
 Sum of angles of the quadrilateral =  $360^\circ$   
 $\Rightarrow 90^\circ + 70^\circ + 60^\circ + x = 360^\circ$   
 $\Rightarrow 220^\circ + x = 360^\circ$   
 $\Rightarrow x = 360^\circ - 220^\circ = 140^\circ$

c) The figure is having 5 sides. Hence, it is a pentagon.

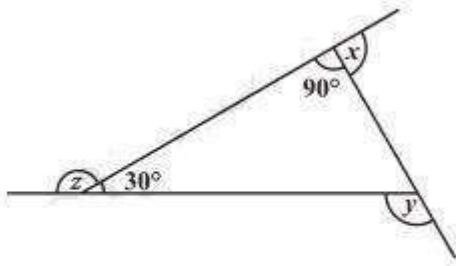


## NCERT Solution For Class 8 Maths Chapter 3- Understanding Quadrilaterals

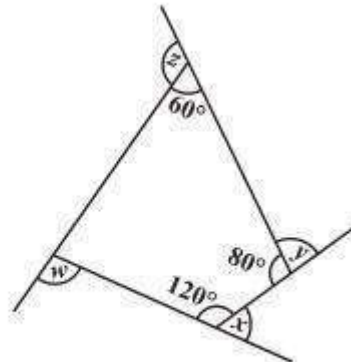
Sum of angles of the pentagon =  $540^\circ$   
 Two angles at the bottom are linear pair.  
 $\therefore, 180^\circ - 70^\circ = 110^\circ$   
 $180^\circ - 60^\circ = 120^\circ$   
 $\Rightarrow 30^\circ + 110^\circ + 120^\circ + x + x = 540^\circ$   
 $\Rightarrow 260^\circ + 2x = 540^\circ$   
 $\Rightarrow 2x = 540^\circ - 260^\circ = 280^\circ$   
 $\Rightarrow 2x = 280^\circ$   
 $= 140^\circ$

d) The figure is having 5 equal sides. Hence, it is a regular pentagon. Thus, its all angles are equal.  
 $5x = 540^\circ$   
 $\Rightarrow x = 540^\circ/5$   
 $\Rightarrow x = 108^\circ$

7.



(a) Find  $x + y + z$



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

**Solution:**

a) Sum of all angles of triangle =  $180^\circ$   
 One side of triangle =  $180^\circ - (90^\circ + 30^\circ) = 60^\circ$   
 $x + 90^\circ = 180^\circ \Rightarrow x = 180^\circ - 90^\circ = 90^\circ$   
 $y + 60^\circ = 180^\circ \Rightarrow y = 180^\circ - 60^\circ = 120^\circ$   
 $z + 30^\circ = 180^\circ \Rightarrow z = 180^\circ - 30^\circ = 150^\circ$   
 $x + y + z = 90^\circ + 120^\circ + 150^\circ = 360^\circ$

b) Sum of all angles of quadrilateral =  $360^\circ$   
 One side of quadrilateral =  $360^\circ - (60^\circ + 80^\circ + 120^\circ) = 360^\circ - 260^\circ = 100^\circ$   
 $x + 120^\circ = 180^\circ \Rightarrow x = 180^\circ - 120^\circ = 60^\circ$   
 $y + 80^\circ = 180^\circ \Rightarrow y = 180^\circ - 80^\circ = 100^\circ$   
 $z + 60^\circ = 180^\circ \Rightarrow z = 180^\circ - 60^\circ = 120^\circ$   
 $w + 100^\circ = 180^\circ \Rightarrow w = 180^\circ - 100^\circ = 80^\circ$   
 $x + y + z + w = 60^\circ + 100^\circ + 120^\circ + 80^\circ = 360^\circ$