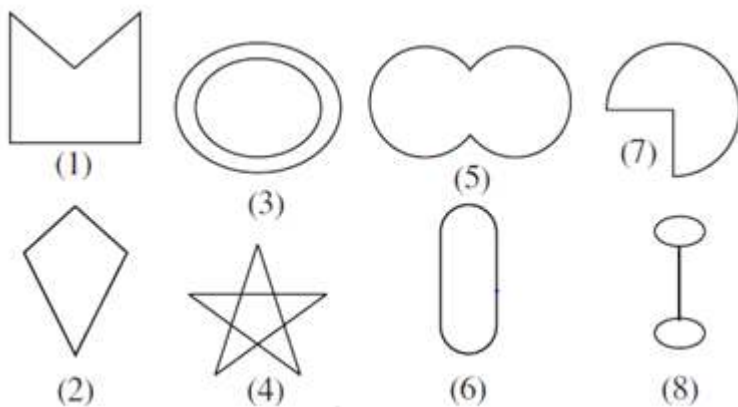


NCERT solution Quadrilaterals Exercise 1

Question 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

Answer - (a) 1, 2, 5, 6, 7

(b) 1, 2, 5, 6, 7

(c) 1, 2

(d) 2

(e) 1

Question 2- How many diagonals does each of the following have?

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

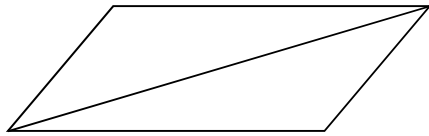
Answer - (a) There are 2 diagonals in a convex quadrilateral.

(b) There are 9 diagonals in a regular hexagon.

(c) A triangle does not have any diagonal in it.

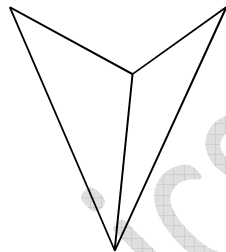
Question 3- What is the sum of the measures of the angles of a convex quadrilateral? Will this property hold if the quadrilateral is not convex? (Make a non-convex quadrilateral and try!)

Answer - The sum of the measures of the angles of a convex quadrilateral is 360° as a convex quadrilateral is made of two triangles.




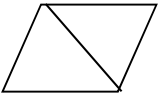
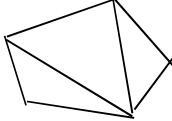
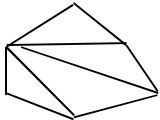
In above convex quadrilateral, it made of two triangles. Therefore, the sum of all the interior angles of this quadrilateral will be same as the sum of all the interior angles of these two triangles i.e., $180^\circ + 180^\circ = 360^\circ$

This property also holds true for a quadrilateral which is not convex. This is because any quadrilateral can be divided into two triangles.



Here again, above concave quadrilateral is made of two triangles. Therefore, sum of all the interior angles of this quadrilateral will also be $180^\circ + 180^\circ = 360^\circ$

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 | 180° | $2 \times 180^\circ$ $= (4 - 2) \times 180^\circ$ | $3 \times 180^\circ$ $= (5 - 2) \times$ | $4 \times 180^\circ$ $= (6 - 2) \times$ |

| | | | | |
|--|--|--|------|------|
| | | | 180° | 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

Answer

From the table, it can be observed that the angle sum of a convex polygon of n sides is $(n - 2) \times 180^\circ$.

So the angle sum of the convex polygons having number of sides as above will be as follows.

- (a) $(7 - 2) \times 180^\circ = 900^\circ$
- (b) $(8 - 2) \times 180^\circ = 1080^\circ$
- (c) $(10 - 2) \times 180^\circ = 1440^\circ$
- (d) $(n - 2) \times 180^\circ$

Question 5- What is a regular polygon?

State the name of a regular polygon of

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

Answer - A polygon with equal sides and equal angles is called a regular polygon.

(i) Equilateral Triangle



(ii) Square

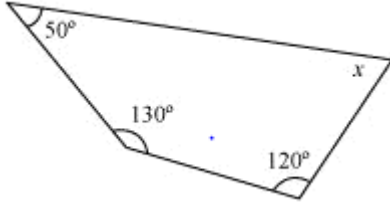


(iii) Regular Hexagon

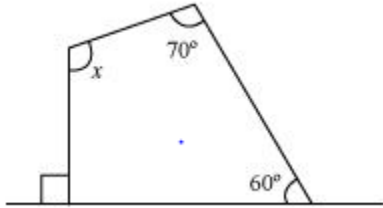


Question 6- Find the angle measure x in the following figures.

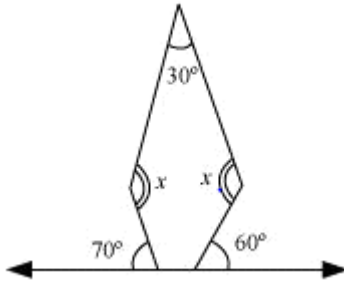
a)



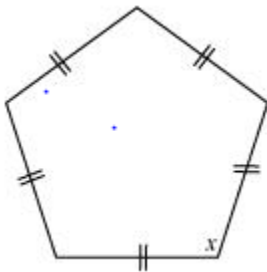
b)



c)



d)



Answer

(a)

Sum of the measures of all interior angles of a quadrilateral is 360° .

Therefore, in the given quadrilateral,

$$50^\circ + 130^\circ + 120^\circ + x = 360^\circ$$

$$300^\circ + x = 360^\circ$$

$$x = 60^\circ$$

(b)

Let the other unknown angle be p , then 90 and p forms a linear pair

$$90^\circ + p = 180^\circ \text{ (Linear pair)}$$

$$p = 180^\circ - 90^\circ = 90^\circ$$

Sum of the measures of all interior angles of a quadrilateral is 360° .

Therefore, in the given quadrilateral,

$$60^\circ + 70^\circ + x + 90^\circ = 360^\circ$$

$$220^\circ + x = 360^\circ$$

$$x = 140^\circ$$

(c)

Let the other unknown angle be p and q in the pentagon, then

$$70 + p = 180^\circ \text{ (Linear pair)}$$

$$p = 110^\circ$$

$$60^\circ + q = 180^\circ \text{ (Linear pair)}$$

$$q = 120^\circ$$

Sum of the measures of all interior angles of a pentagon is $=540^\circ$.

Therefore, in the given pentagon,

$$120^\circ + 110^\circ + 30^\circ + x + x = 540^\circ$$

$$260^\circ + 2x = 540^\circ$$

$$2x = 280^\circ$$

$$x = 140^\circ$$

(d)

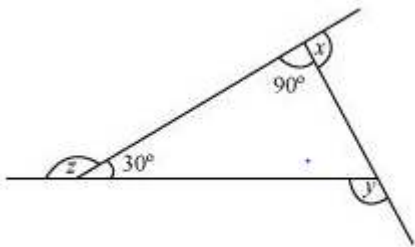
Sum of the measures of all interior angles of a pentagon is 540° .

$$5x = 540^\circ$$

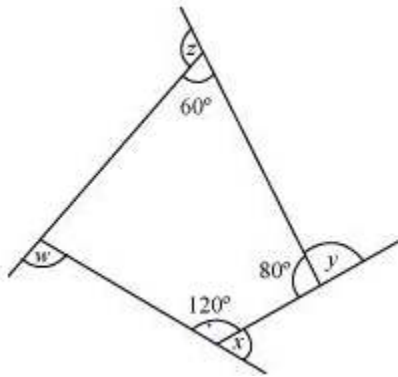
$$x = 108^\circ$$

Question 7

(a) find $x + y + z$



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


Answer

$$(a) \ x + 90^\circ = 180^\circ \text{ (Linear pair)}$$

$$x = 90^\circ$$

$$z + 30^\circ = 180^\circ \text{ (Linear pair)}$$

$$z = 150^\circ$$

$$y = 90^\circ + 30^\circ \text{ (Exterior angle theorem)}$$

$$y = 120^\circ$$

$$x + y + z = 90^\circ + 120^\circ + 150^\circ = 360^\circ$$

(b)

Sum of the measures of all interior angles of a quadrilateral is 360° .

Therefore, in the given quadrilateral,

$$a + 60^\circ + 80^\circ + 120^\circ = 360^\circ$$

$$a + 260^\circ = 360^\circ$$

$$a = 100^\circ$$

$$x + 120^\circ = 180^\circ \text{ (Linear pair)}$$

$$x = 60^\circ$$

$$y + 80^\circ = 180^\circ \text{ (Linear pair)}$$

$$y = 100^\circ$$

$$z + 60^\circ = 180^\circ \text{ (Linear pair)}$$

$$z = 120^\circ$$

$$w + 100^\circ = 180^\circ \text{ (Linear pair)}$$

$$w = 80^\circ$$

$$\text{Sum of the measures of all interior angles} = x + y + z + w$$

$$= 60^\circ + 100^\circ + 120^\circ + 80^\circ$$

$$= 360^\circ$$