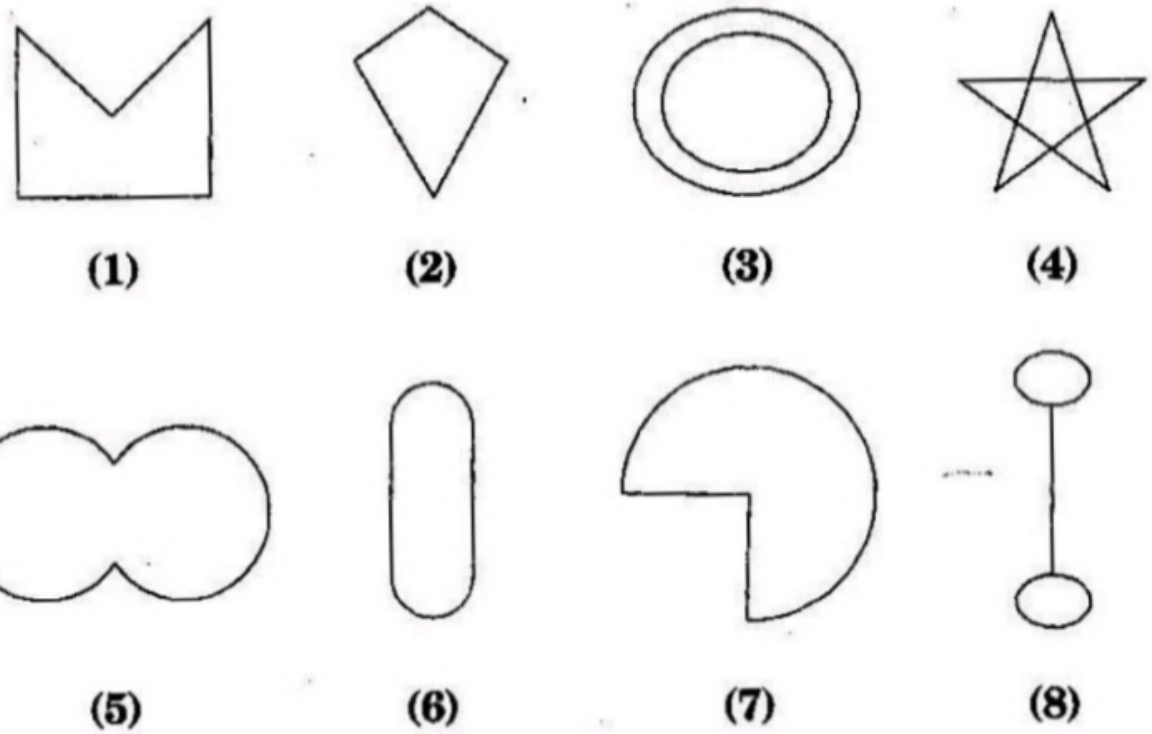
Exercise 3.1

Question 1:

Given here are some figures:

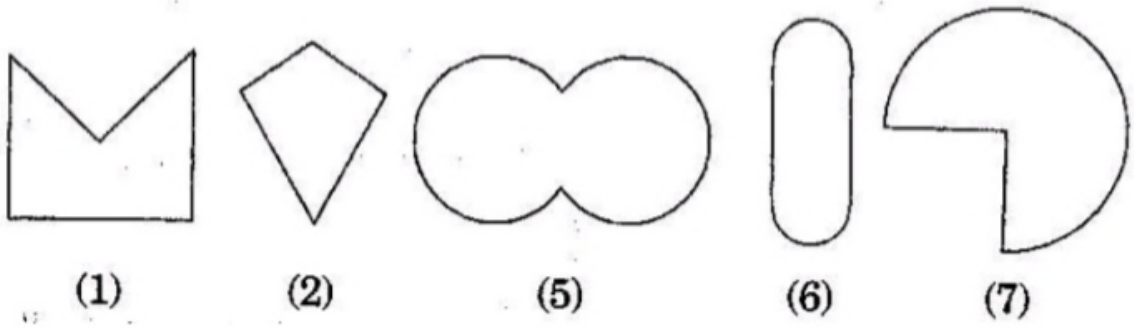


Classify each of them on the basis of the following:

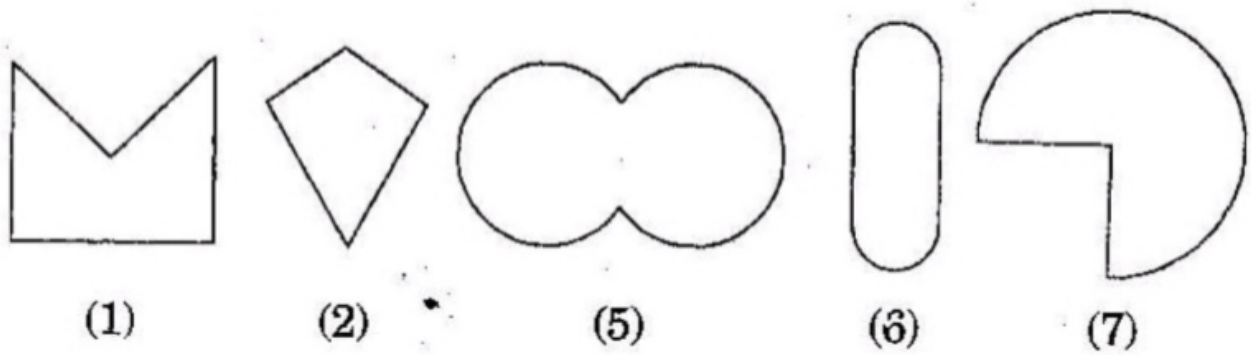
(a) Simple curve
(b) Simple closed curve
(c) Polygon
(d) Convex polygon
(e) Concave polygon

Answer 1:

(a) Simple curve

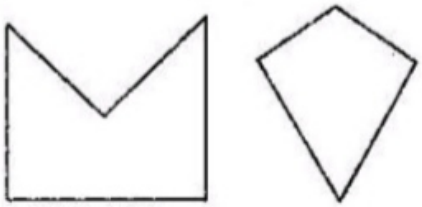


(b) Simple closed curve



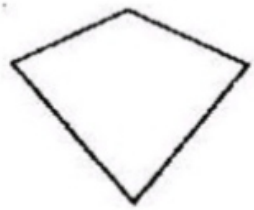
(1) (2) (5) (6) (7)

(c) Polygons



(1) (2)

(d) Convex polygons



(1)

(e) Concave polygon

(1)

Question 2:

How many diagonals does each of the following have?

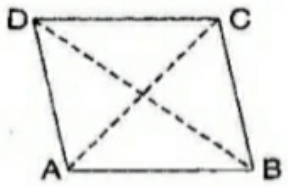
(a) A convex quadrilateral (b) A regular hexagon

(c) A triangle

Answer 2:

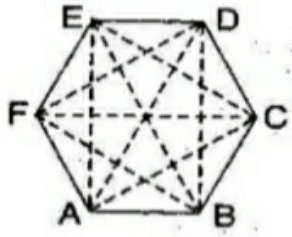
(a) A convex quadrilateral has two diagonals.

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)

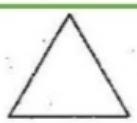
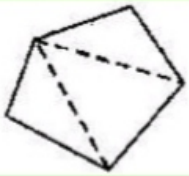
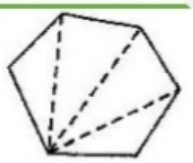
Answer 3:

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 a
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 = $(n-2)\times180^\circ$

Question 5:

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

(a) 3 sides
(b) 4 sides
(c) 6 sides

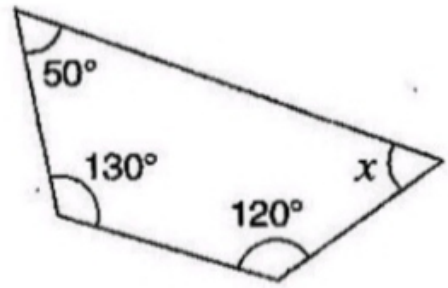
Answer 5:

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

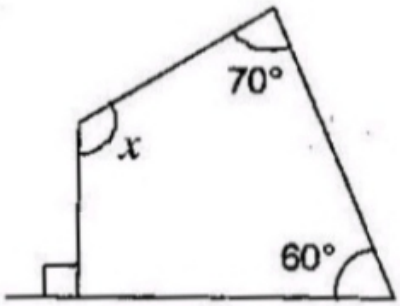
(i) 3 sides
Polygon having three sides is called a ***triangle.***
(ii) 4 sides
Polygon having four sides is called a ***quadrilateral.***
(iii) 6 sides
Polygon having six sides is called a ***hexagon.***

Question 6:

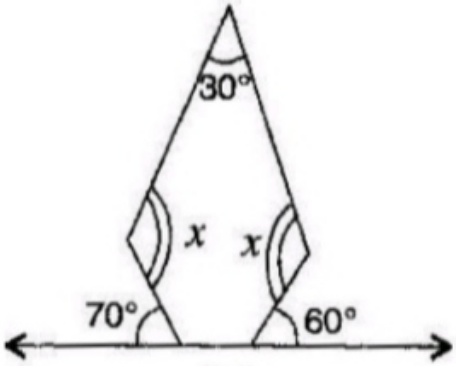
Find the angle measures x in the following figures:



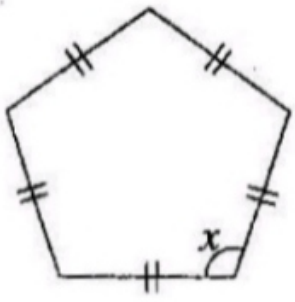
(a)



(b)



(c)

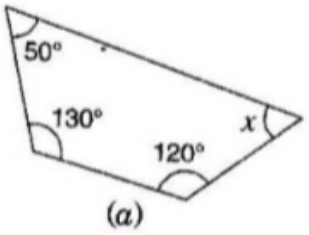


(d)

Answer 6:

(a) Using angle sum property of a quadrilateral,

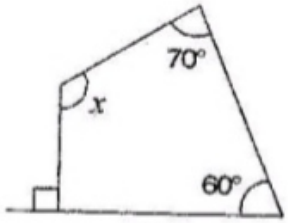
$$\begin{aligned} & 50^\circ+130^\circ+120^\circ+x=360^\circ \\ \Rightarrow\ & 300^\circ+x=360^\circ \\ \Rightarrow\ & x=360^\circ-300^\circ \\ \Rightarrow\ & x=60^\circ \end{aligned}$$



(a)

(b) Using angle sum property of a quadrilateral,

$$\begin{aligned} & 90^\circ+60^\circ+70^\circ+x=360^\circ \\ \Rightarrow\ & 220^\circ+x=360^\circ \\ \Rightarrow\ & x=360^\circ-220^\circ \\ \Rightarrow\ & x=140^\circ \end{aligned}$$



(b)

(c) First base interior angle $= 180^\circ-70^\circ=110^\circ$

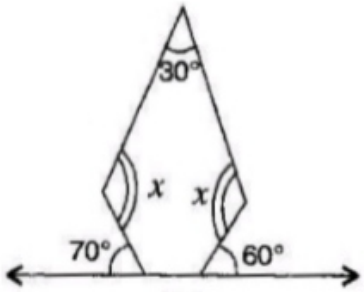
Second base interior angle $= 180^\circ-60^\circ=120^\circ$

There are 5 sides, $n = 5$

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

$=(5-2)\times180^\circ=3\times180^\circ = 540^\circ$

$$\begin{aligned} \therefore\ & 30^\circ+x+110^\circ+120^\circ+x=540^\circ \\ \Rightarrow\ & 260^\circ+2x=540^\circ \\ \Rightarrow\ & 2x=540^\circ-260^\circ \\ \Rightarrow\ & 2x=280^\circ \\ \Rightarrow\ & x=140^\circ \end{aligned}$$

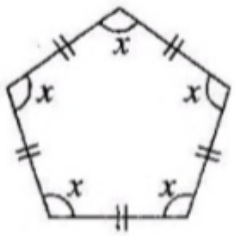


(c)

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

$=(5-2)\times180^\circ=3\times180^\circ = 540^\circ$

$$\begin{aligned} \therefore\ & x+x+x+x+x=540^\circ \\ \Rightarrow\ & 5x=540^\circ \\ \Rightarrow\ & x=108^\circ \end{aligned}$$

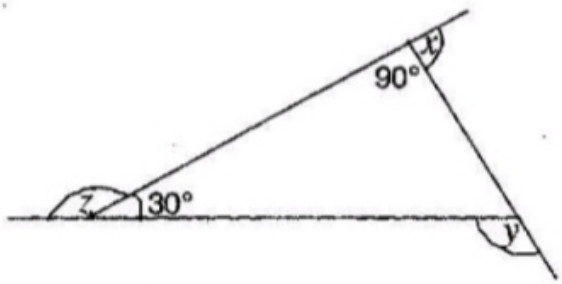


(d)

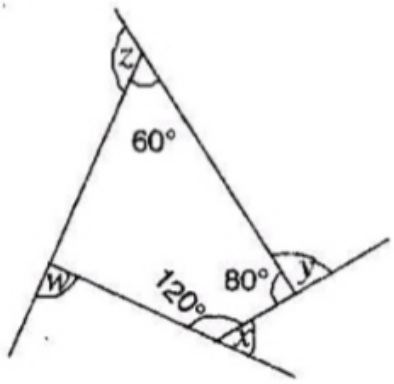
Hence each interior angle is 108°.

Question 7:

(a) Find $x+y+z$



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



Answer 7:

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

$\therefore \quad 90°+x=180°$

$\Rightarrow \quad x=180°-90°=90°$

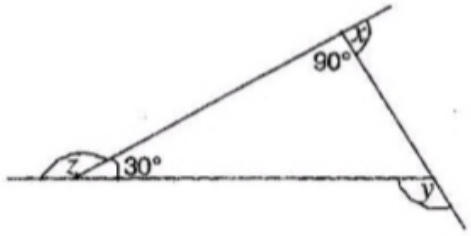
And $\quad z+30°=180°$

$\Rightarrow \quad z=180°-30°=150°$

Also $\quad y=90°+30°=120°$

[Exterior angle property]

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



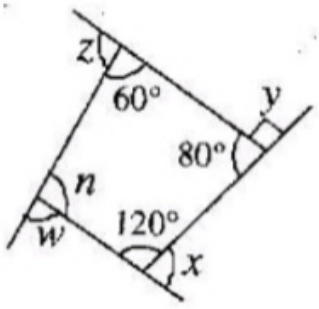
(b) Using angle sum property of a quadrilateral,

$60°+80°+120°+n=360°$

$\Rightarrow \quad 260°+n=360°$

$\Rightarrow \quad n=360°-260°$

$\Rightarrow \quad n=100°$



Since sum of linear pair angles is $180°$.

$\therefore \quad w+100=180° \quad$ .....(i)

$x+120°=180° \quad$ .....(ii)

$y+80°=180° \quad$ .....(iii)

$z+60°=180° \quad$ .....(iv)

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

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

$\Rightarrow \quad x+y+z+w+360°=720°$

$\Rightarrow \quad x+y+z+w=720°-360°$

$\Rightarrow \quad x+y+z+w=360°$