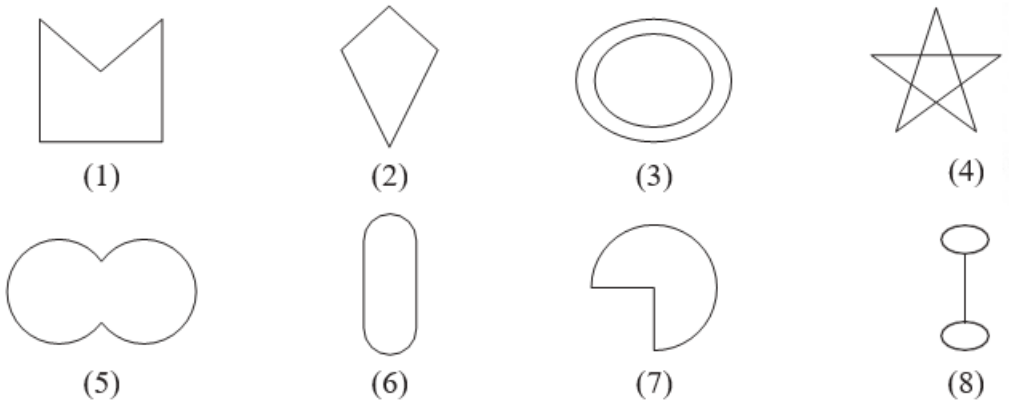
CLASS NOTES-ANSWERS

EXERCISE 3.1

1. Given here are some figures.



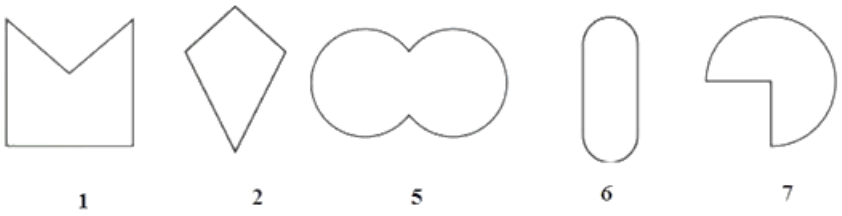
Classify each of them on the basis of the following.

(a) Simple curve (b) Simple closed curve (c) Polygon

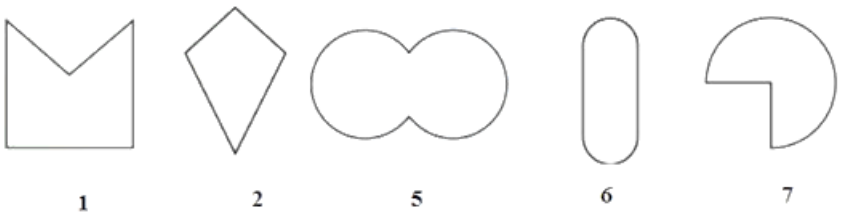
(d) Convex polygon (e) Concave polygon

Answer:

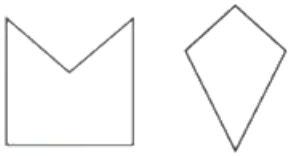
(a) Simple curve - A simple curve is a curve that does not cross itself.



(b) Simple closed curve -In simple closed curves the shapes are closed by line-segments or by a curved line



(c) A simple closed curve made up of only linesegments is called a polygon.



1 2

(d) A Convex polygon is defined as a polygon with no portions oftheir diagonals in their exteriors. It has all its interior angles less than 180°.

2

(e) A concave polygon is defined as a polygon with one or more interior angles greater than 180°. It have portions of diagonals in the exterior.

1

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

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

(c) A triangle

Answer: Number of diagonals of a polygon = $\frac{n\,(n-3)}{2}$

(a) A convex quadrilateral has two diagonals.

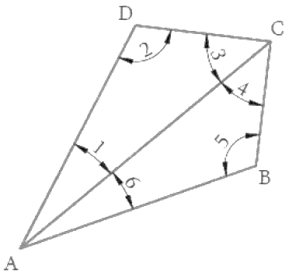
(b) Number of diagonals for a regular hexagon = $\frac{n\,(n-3)}{2} = \frac{6\,(6-3)}{2} = \frac{6\times3}{2} = 9$

(c) A triangle has no diagonal because there no two non-consecutive vertices.

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:



ABCD is a convex quadrilateral made of two triangles ΔABC and ΔADC. The sum of the angles of a triangle is 180°. So:

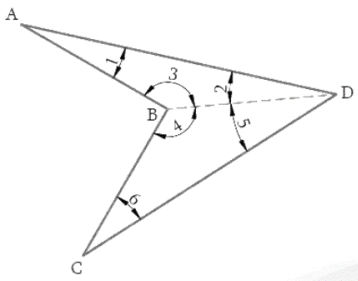
$\angle 6+\angle 5+\angle 4=180°$ [sum of the angles of ΔABC =180°]

$\angle 1+\angle 2+\angle 3=180°$ [sum of the angles of ΔADC =180°]

$\therefore \angle 6+\angle 5+\angle 4+\angle 1+\angle 2+\angle 3=180^{o}+180^{o}$

$=360^{o}$

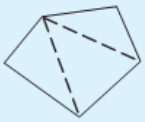
Hence, the sum of measures of the triangles of a convex quadrilateral is 360°. Yes, even if quadrilateral is not convex then, this property applies.



Let ABCD be a non-convex quadrilateral; join BD, which also divides the quadrilateral into two triangles.

ABCD is a concave quadrilateral, made of two triangles ΔABD and ΔBCD. Therefore, the sum of all the interior angles of this quadrilateral will also be, $180^o + 180^o = 360^o$

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

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

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: Angle sum of a convex polygon of n sides is $(n-2) \times 180^o$.

(a) When n = 7

Then Angle sum of a polygon = $(7-2) \times 180^o = 5 \times 180^o = 900^o$

(b) When n = 8

Then Angle sum of a polygon = $(8-2) \times 180^o = 6 \times 180^o = 1080^o$

(c) When n = 10

Then Angle sum of a polygon = = $(10-2) \times 180^o = 8 \times 180^o = 1440^o$

(d) When n = n

Then Angle sum of a polygon = = $(n-2) \times 180^o$

5. What is a regular polygon? State the name of a regular polygon of

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

Answer:

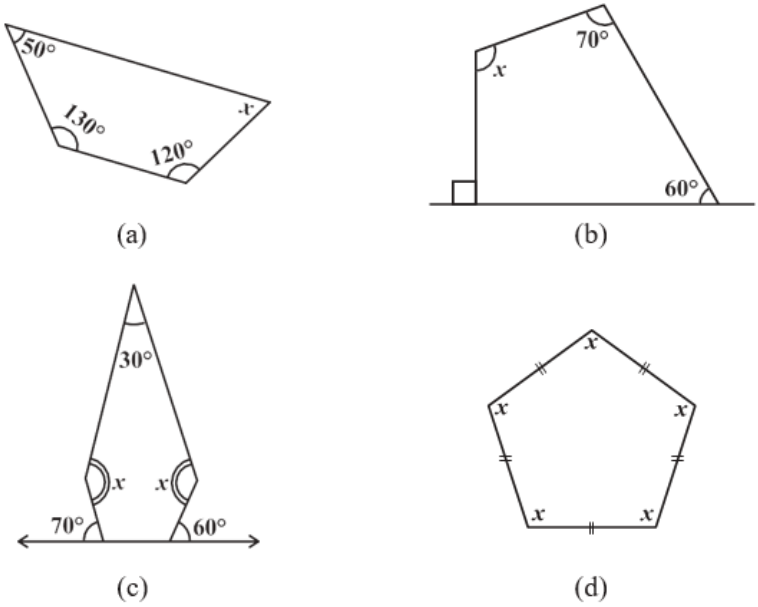
Regular polygon - A polygon having all sides of equal length and the interior angles of equal measure is known as regular polygon i.e., a regular polygon is both 'equiangular' and 'equilateral'.

(i) regular polygon of 3 sides = Equilateral triangle

(ii) regular polygon of 4 sides = Square

(iii) regular polygon of 6 sides = Regular hexagon

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



Answer:

(a) $50^o + 130^o + 120^o + x = 360^o$

$300^o + x = 360^o$

$x = 360^o - 300^o$

$x = 60^o$

(b) $90^\circ + 60^\circ + 70^\circ + x = 360^\circ$

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

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

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

$x = 140^\circ$

(c) Angle sum of a polygon = $(n-2)\times 180^o$

$= (5-2)\times 180^o$

$= 3\times 180^o = 540^o$

Sum of the interior angle of pentagon is 540°.

Angles at the bottom are linear pair.

First base interior angle = $180^o - 70^o = 110^o$

Second base interior angle = $180^o - 60^o = 120^o$

$30^o + x + 110^o + 120^o + x = 540^o$

$2x + 260^o = 540^o$

$2x = 540^o - 260^o$

$2x = 280^o$

$x = 140^o$

(d) Sum of the interior angle of pentagon is 540°.

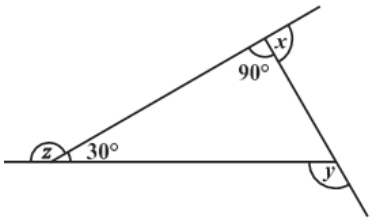
Angle sum of a polygon $= x + x + x + x + x = 540^o$

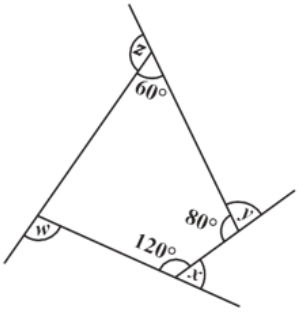
$5x = 540^o$

$x = 108^o$

Here pentagon is a regular polygon. Hence each interior angle is 108°.

7.





(a) Find x + y + z

(b) Find x + y + z + w

Answer:

(a) Sum of linear pair of angles is $= 180^o$

- $x + 90^o = 180^o$ (Linear pair)

  $x = 180^o - 90^o$

  $x = 90^o$
- $z + 30^o = 180^o$ (linear pair)

  $z = 180^o - 30^o$

  $z = 150^o$
- $y = 90^o + 30^o$ (Exterior angle property)

  $y = 120^o$

$x + y + z = 90^o + 120^o + 150^o = 360^o$

(b) The sum of the measures of all the interior angles of a quadrilateral is 360^o.

Let n is the fourth interior angle of the quadrilateral.

$60^o + 80^o + 120^o + n = 360^o$

$260^o + n = 360^o$

$n = 360^{o} - 260^{o}$

$n = 100^{o}$

Sum of linear pair of angles is180°.

$w + 100^{\circ} = 180^{\circ}$

$x + 120^{\circ} = 180^{\circ}$

$y + 80^{\circ} = 180^{\circ}$

$z + 60^{\circ} = 180^{\circ}$

On adding we get,

$w + 100^{\circ} + x + 120^{\circ} + y + 80^{\circ} + z + 60^{\circ} = 180^{\circ} + 180^{\circ} + 180^{\circ} + 180^{\circ}$

$w + x + y + z + 360^{\circ} = 720^{\circ}$

$w + x + y + z = 720^{\circ} - 360^{\circ}$

$w + x + y + z = 360^{\circ}$

The sum of the measures of the external angles of any polygon is 360°.