Chapter - 4

Geometry

Question 1.
Fill in the blanks.
(a) Every triangle has at least _____ acute angles.
(b) A triangle in which none of the sides equal is called a _____.
(c) In an isosceles triangle _____ angles are equal.
(d) The sum of three angles of a triangle is _____.
(e) A right-angled triangle with two equal sides is called _____.

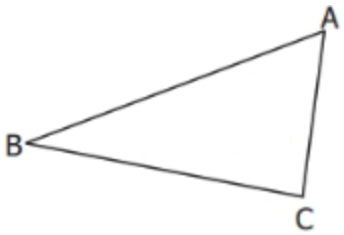
Solution:
(a) Two
(b) Scalene Triangle
(c) Two
(d) 180°
(e) Isosceles right-angled triangle

Question 2.
Match the following

(i)	No sides are equal	-	Isosceles triangle
(ii)	One right angle	-	Scalene triangle
(iii)	One obtuse angle	-	Right angled triangle
(iv)	Two sides of equal length	-	Equilateral triangle
(v)	All sides are equal	-	Obtuse angled triangle

Solution:
(i) Scalene triangle
(ii) Right-angled triangle
(iii) Obtuse angled triangle
(iv) Isosceles triangle
(v) Equilateral triangle

Question 3.
In ΔABC, name the



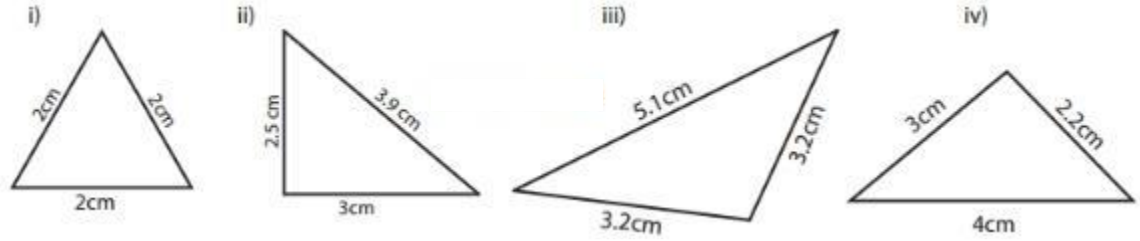
a) Three sides: ……., ……., …….
b) Three Angles: ……., ……., …….
c) Three Vertices: ……., ……., …….

Solution:

(a) $\overline{AB}, \overline{BC}, \overline{CA}$

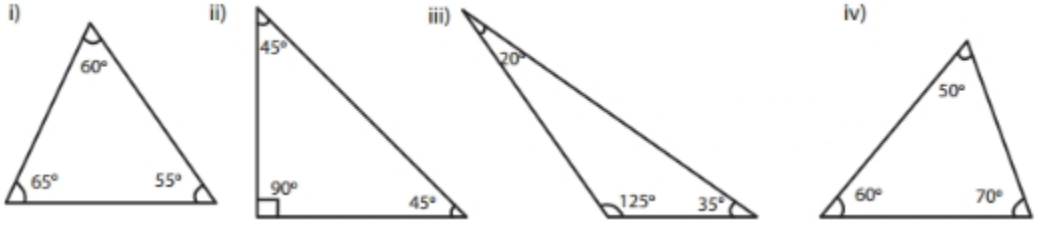
(b) ∠ABC, ∠BCA, ∠CAB or ∠A, ∠B, ∠C
(c) A, B, C

Question 4.
Classify the given triangles based on its sides as scalene, isosceles or equilateral.



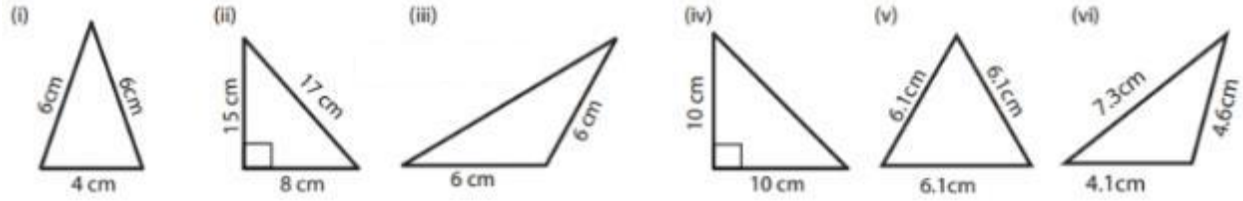
Solution:
(i) Equilateral triangle
(ii) Scalene triangle
(iii) Isosceles triangle
(iv) Scalene triangle

Question 5.
Classify the given triangles based on their angles as acute-angled, right-angled, or obtuse-angled.



Solution:
(i) Acute angled triangle
(ii) Right-angled triangle
(iii) Obtuse angled triangle
(iv) Acute angled triangle

Question 6.
Classify the following triangles based on its sides and angles?



Solution:
(i) Isosceles Acute angled triangle
(ii) Scalene Right-angled triangle
(iii) Isosceles Obtuse angled triangle
(iv) Isosceles Right-angled triangle
(v) Equilateral Acute angled triangle
(vi) Scalene Obtuse angled triangle

Question 7.
Can a triangle be formed with the following sides? If yes, name the type of triangle.
(i) 8 cm, 6 cm, 4 cm
(ii) 10 cm, 8 cm, 5 cm
(iii) 6.2 cm, 1.3 cm, 3.5 cm
(iv) 6 cm, 6 cm, 4 cm
(v) 3.5 cm, 3.5 cm, 3.5 cm
(vi) 9 cm, 4 cm, 5 cm

Solution:
(i) Sum of two smaller sides of the triangle
$= 6 + 4 = 10 \text{ cm} > 8 \text{ cm}$
It is greater than the third side. So, a triangle can be formed a scalene triangle.

(ii) Sum of two smaller sides of the triangle
$= 8 + 5 = 13 \text{ cm} > 10 \text{ cm}$
It is greater than the third side. So, a triangle can be formed a scalene triangle.

(iii) Sum of two smaller sides of the triangle
$= 1.3 + 3.5 = 4.8$ cm < 6.2 cm
It is not greater than the third side. So, a triangle cannot be formed.

(iv) Two sides are equal.
So, a triangle can be formed. Isosceles triangle.

(v) Three sides are equal.
So, a triangle can be formed equilateral triangle.

(vi) Sum of two smaller sides of the triangle
$= 4 + 5 = 9$ cm $= 9$ cm
It is equal to the third side. No, a triangle cannot be formed.

Question 8.
Can a triangle be formed with the following angles? If yes, name the type of triangle.
(i) 60°, 60°, 60°
(ii) 60°, 40°, 42°
(iii) 90°, 55°, 35°
(iv) 60°, 90°, 90°
(v) 70°, 60°, 50°
(vi) 100°, 50°, 30°

Solution:
(i) 60°, 60°, 60°
Sum of the angles $= 60° + 60° + 60° = 180°$
A triangle can be formed as an acute-angled triangle.

(ii) 60°, 40°, 42°
Sum of the angles $= 60° + 40° + 42° = 142°$
A triangle cannot be formed.

(iii) 90°, 50°, 35°
Sum of the angles $= 90° + 55° + 35° = 180°$
A triangle can be formed Right-angled triangle.

(iv) 60°, 90°, 90°
No, a triangle can not be formed.
A triangle cannot have more than one right angle.

(v) 70°, 60°, 50°
Sum of the angles $= 70° + 60° + 50° = 180°$
A triangle can be formed as an acute-angled triangle.

(vi) 100°, 50°, 30°
Sum of the angles = 100° + 50° + 30° = 180°
A triangle can be formed as an obtuse-angled triangle.

Question 9.
Two angles of the triangles are given. Find the third angle
(i) 80°, 60°
(ii) 75°, 35°
(iii) 52°, 68°
(iv) 50°, 90°
(v) 120°, 30°
(vi) 55°, 85°

Solution:
(i) 80°, 60°
Let the third angle be x.
Sum of the angles = 180°
80° + 60° + x = 180°
140 + x = 180°
x = 180°- 140°
x = 40°
Third angle = 40°

(ii) 52°, 68°
Let the third angle be x.
Sum of the angles = 180°
52° + 68° + x = 180°
120 + x = 180°
180° – 120°
x = 60°
Third angle = 60°

(iii) 75°, 35°
Let the third angle be x.
Sum of the angles 180°
75° + 35° + x = 180°
110 + x = 180°
x = 180° – 110°
x = 70°
Third angle = 70°

(iv) 50°, 90°
Let the third angle be x. Sum of the angles = 180°
50° + 90° + x = 180°
140 + x = 180°
x = 180° – 140°
x = 40°
Third angle = 40°

(v) 120°, 30°
Let the third angle be x.
Sum of the angles = 180°
120° + 30° + x = 180°
150 + x = 180°
x = 180° – 150°
x = 30°
Third angle = 30°

(vi) 55°, 85°
Let the third angle be x.
Sum of the angles = 180°
55° + 85° + x = 180°
140 + x = 180°
x = 180° – 140°
x = 40°
Third angle = 40°

Question 10.
I am a closed figure with each of my three angles is 60°. Who am I?

Solution:
Equilateral triangle

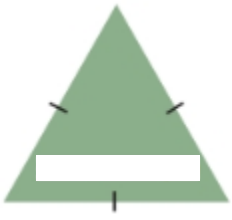
Question 11.
Using the given information, write the type of triangle in the table given below.

S.No.	∠1	∠2	∠3	Type of triangle based on angles	Type of triangle based on sides
i.	60°	40°	80°	Acute angled triangle.	Scalene Triangle
ii.	50°	50°	80°		
iii.	45°	45°	90°		
iv.	55°	45°	80°		
v.	75°	35°	70°		
vi.	60°	30°	90°		
vii.	25°	64°	91°		
viii.	120°	30°	30°		

Solution:
(ii) Acute angled triangle, Isosceles triangle
(iii) Right-angled triangle, Isosceles triangle
(iv) Acute angled triangle, Scalene triangle
(v) Acute angled triangle, Scalene triangle
(vi) Right-angled triangle. Scalene triangle
(vii) Obtuse angled triangle, Scalene triangle
(viii) Obtuse angled triangle, Isosceles triangle

Objective Type Questions

Question 12.
The given triangle is …….



(a) a right-angled triangle
b) an equilateral triangle
(c) a scalene triangle
(d) an obtuse-angled triangle

Solution:
(b) an equilateral triangle

Question 13.
If all angles of a triangle are less than a right angle, then it is called _____.
(a) an obtuse-angled triangle
(b) a right-angled triangle
(c) an isosceles right-angled triangle
(d) an acute-angled triangle

Solution:
(d) an acute-angled triangle

Question 14.
If two sides of a triangle are 5 cm and 9 cm, then the third side is
(a) 5 cm
(b) 3 cm
(c) 4 cm
(d) 14 cm

Solution:
(a) 5 cm

Question 15.
The angles of a right-angled triangle are
(a) acute, acute, obtuse
(c) acute, right, right
(c) right, obtuse, acute
(d) acute, acute, right

Solution:
(d) acute, acute, right

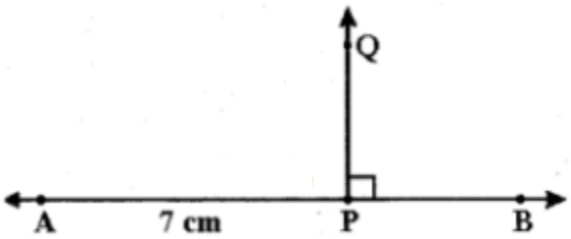
Question 16.
An equilateral triangle is
(a) an obtuse-angled triangle
(b) a right-angled triangle
(c) an acute-angled triangle
(d) a scalene triangle

Solution:
(c) an acute-angled triangle

Ex 4.2

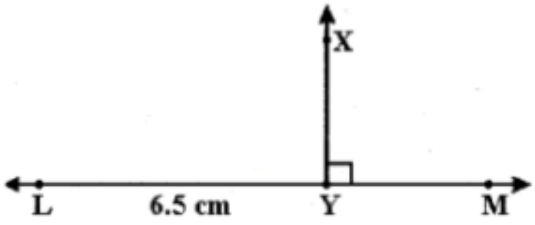
Question 1.
Draw a line segment AB = 7 cm and mark a point P on it. Draw a line perpendicular to the given line segment at P.

Solution:



Step 1: Draw a line AB = 7 cm and take a point P anywhere on the line.
Step 2: Place the set square on the line in such a way that the vertex which forms right angle coincides with P and one arm of the right angle coincides with the line AB.
Step 3: Draw a line PQ through P along the other arm of the right angle of the set square.
Step 4: The line PQ is perpendicular to the line AB at P. That is, PQ ⊥ AB
∠APQ = ∠BPQ = 90°

Question 2.
Draw a line segment LM = 6.5 cm and mark a point X not lying on it. Using a set square construct a line perpendicular to LM through X.
Solution:



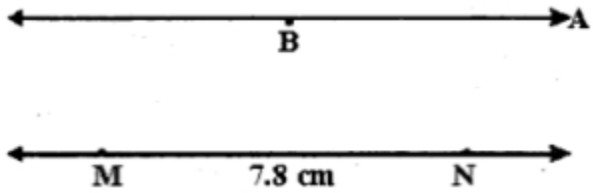
Step 1: Draw a line LM = 6.5 cm and take a point X anywhere above the line LM.
Step 2: Place one of the arms of the right angle of a set square along the line LM and the other arm of its right angle touches the point X.
Step 3: Draw a line through the point X meeting LM at Y.
Step 4: The line XY is perpendicular to the line LM at Y. That is, LM ⊥ XY.

Question 3.
Find the distance between the given lines using a set square at two different points on each of the pairs of lines and check whether they are parallel.

Solution:
They are parallel

Question 4.
Draw a line segment measuring 7.8 cm. Mark a point B above it at a distance of 5 cm. Through B draw a line parallel to the given segment.

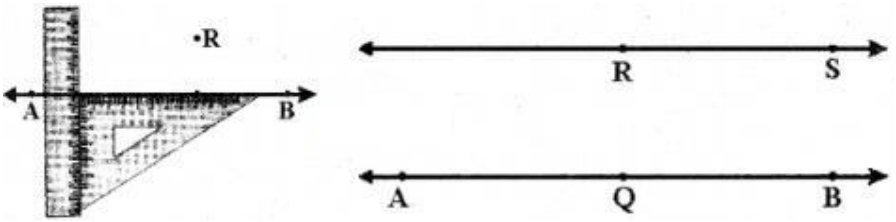
Solution:



Step 1: Draw a line. Mark two points M and N on the line such that MN = 7.8 cm. Mark a point B any where above the line.
Step 2: Place the set square below B in such a way that one of the edges that form a right angle lies along MN Place the scale along the other edge of the set square.
Step 3: Holding the scale firmly, Slide the set square along the edge of the scale until the other edge of the set square reaches the point B. Through B draw a line.
Step 4: The line MN is parallel to AB. That is, MN || AB.

Question 5.
Draw a line and mark a point R above it at a distance of 5.4 cm Through R draw a line parallel to the given line.

Solution:



Step 1 : Using a scale draw a line AB and mark a point Q on the line.
Step 2 : Place the set square in such a way that the vertex of the right angle coincides with Q and one of the edges of right angle lies along AB. Mark the point R such that QR = 5.4 cm
Step 3 : Place the scale and the set square as shown in the figure.
Step 4 : Hold the scale firmly and slide the set square along the edge of the scale until the other edge touches the point R. Draw a line RS through R.
Step 5 : The line RS is parallel to AB. That is, RS || AB.

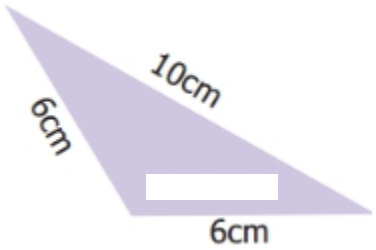
Ex 4.3

Miscellaneous Practice Problems

Question 1.
What are the angles of an isosceles right-angled triangle?

Solution:
Since it is a right-angled triangle
One of the angles is 90°
The other two angles are equal because it is an isosceles triangle.
The other two angles must be 45° and 45°
Angles are 90°, 45°, 45°.

Question 2.
Which of the following correctly describes the given triangle?



(a) It is a right isosceles triangle
(b) It is an acute isosceles triangle
(c) It is an obtuse isosceles triangle
(d) It is an obtuse scalene triangle

Solution:
(c) It is an obtuse isosceles triangle

Question 3.
Which of the following is not possible?
(a) An obtuse isosceles triangle.
(b) An acute isosceles triangle.
(c) An obtuse equilateral triangle.
(d) An acute equilateral triangle.

Solution:
(c) An obtuse equilateral triangle.

Question 4.
If one angle of an isosceles triangle is 124°, then find the other angles

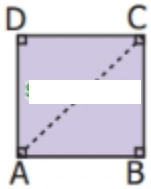
Solution:
In an isosceles triangle, any two sides are equal. Also, the two angles are equal.
Sum of three angles of a triangle = 180°
Given one angle = 124°
Sum of other two angles = 180° – 124° = 56°

Other angles are = $\frac{56}{2}$ = 28°

28° and 28°.

Question 5.
The diagram shows a square ABCD. If the line segment joins A and C, then mention the type of triangle so formed.

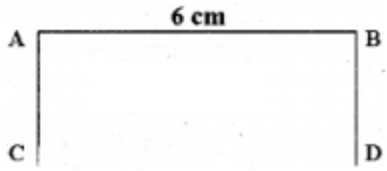
Solution:



Isosceles right-angled triangles

Question 6.
Draw a line segment AB of length 6 cm. At each end of this line segment AB, draw a line perpendicular to the line segment AB. Are these lines parallel?

Solution:



yes, they are parallel

Challenge Problems

Question 7.
Is a triangle possible with the angles 90°, 90°, and 0°, Why?

Solution:
No, a triangle cannot have more than one right angle.

Question 8.
Which of the following statements is true? Why?
(a) Every equilateral triangle is an isosceles triangle.
(b) Every isosceles triangle is an equilateral triangle

Solution:
"(a)" is true, because an isosceles triangle need not have three equal sides

Question 9.
If one angle of an isosceles triangle is 70°, then find the possibilities for the other two angles.

Solution:
(i) Given one angle = 70°
Also, it is an isosceles triangle.
Another one angle also can be 70°.
Sum of these two angles = 70° + 70° = 140°
We know that the sum of three angles in a triangle = 180°.
Third angle = 180° – 140° = 40°
One possibility is 70°, 70°, and 40°
(ii) Also if one angle is 70°
Sum of other two angles = 180° – 70° = 110°

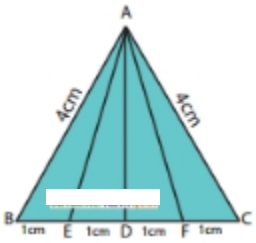
Both are equal. They are $\frac{110}{2}$ = 55°.

Another possibility is 70°, 55° and 55°.

Question 10.
Which of the following can be the sides of an isosceles triangle?
(a) 6 cm, 3 cm, 3 cm
(b) 5 cm, 2 cm, 2 cm
(c) 6 cm, 6 cm, 7 cm
(d) 4 cm, 4 cm, 8 cm

Solution:
(c) 6 cm, 6 cm, 7 cm

Question 11.
Study the given figure and identify the following triangles,



(a) equilateral triangle
(b) isosceles triangle
(c) scalene triangles
(d) acute triangle
(e) obtuse triangle
(f) right triangle

Solution:

(a) BC = 1 + 1 + 1 + 1 = 4 cm
AB = AC = 4 cm
ΔABC is an equilateral triangle.
(b) ΔABC and ΔAEF are isosceles triangles.
Since AB = AC = 4 cm Also AE = AF.
(c) In a scalene triangle, no two sides are equal.
ΔAEB, ΔAED, ΔADF, ΔAFC, ΔABD, ΔADC, ΔABF, and ΔAEC are scalene triangles.
(d) In an acute-angled triangle all the three angles are less than 90°.
ΔABC, ΔAEF, ΔABF, and ΔAEC are acute-angled triangles.
(e) In an obtuse-angled triangle any one of the angles is greater than 90°.
ΔAEB and ΔAFC are obtuse angled triangles.
(f) In a right triangle, one of the angles is 90°.
ΔADB, ΔADC, ΔADE, and ΔADF are right-angled triangles.

Question 12.
Two sides of the triangle are given in the table. Find the third side of the triangle.

Sl. No.	Side – 1	Side - 2	The length of the third side(any three measures)
i.	7 cm	4 cm	
ii.	8 cm	8 cm	
iii.	7.5 cm	3.5 cm	
iv.	10 cm	14 cm	

Solution:
(i) between 3 and 11
(ii) between 0 and 16
(iii) between 4 and 11
(iv) between 4 and 24

Question 13.
Complete the following table:

Types of Triangle / Its Angles	Acute angled triangle	Right angled triangle	Obtuse angled triangle
Any two angles	Always acute angles	i.	Always acute angles
Third angle	ii.	Right angle	iii.

Solution:
(i) Always acute angles
(ii) Acute angle
(iii) Obtuse angle