## Assignments in Mathematics Class IX (Term 2) 11. CONSTRUCTIONS

## SUMMATIVE ASSESSMENT

## A. Important Questions

1. The construction of a triangle ABC , given that $B C=6 \mathrm{~cm}, \angle \mathrm{~B}=45^{\circ}$ is not possible when difference of AB and AC is equal to :
(a) 6.9 cm
(b) 5.2 cm
(c) 5.0 cm
(d) 4.0 cm
2. The construction of a triangle ABC , given that $B C=3 \mathrm{~cm}, \angle \mathrm{C}=60^{\circ}$ is possible when difference of AB and AC is equal to :
(a) 3.2 cm
(b) 3.1 cm
(c) 3 cm
(d) 2.8 cm
3. The construction of a triangle ABC in which $\mathrm{AB}=4 \mathrm{~cm}, \angle \mathrm{~A}=60^{\circ}$ is not possible when difference of BC and AC is equal to :
(a) 3.5 cm
(b) 4.5 cm
(c) 3 cm
(d) 2.5 cm
4. Which of the following angles cannot be constructed with the help of a ruler and a compass ?
(a) $7 \frac{1}{2}$
(b) $22 \frac{1}{2}$
(c) $30 \frac{1}{2}$
(d) $37 \frac{1}{2}$
5. To construct the perpendicular bisector of a line segment AB , we draw two equal arcs taking as centres A and B with radius :
6. In the figure, a $\triangle A B C$ is constructed when its perimeter and two base angles are given. In this construction line segment XY is drawn equal to
(a) equal to $\frac{\mathrm{AB}}{2}$
(b) more than $\frac{\mathrm{AB}}{2}$
(c) less than $\frac{\mathrm{AB}}{2}$
(d) none of these :

(a) $\mathrm{BC}+\mathrm{CA}$
(b) $\mathrm{AB}+\mathrm{AC}$
(c) $\mathrm{AB}+\mathrm{BC}+\mathrm{CA}$
(d) $\mathrm{AB}+\mathrm{BC}$

## B. Questions From CBSE Examination Papers

1. With the help of a ruler and a compass, it is not possible to construct an angle of :
[T-II (2011)]
(a) $37.5^{\circ}$
(b) $40^{\circ}$
(c) $22.5^{\circ}$
(d) $67.5^{\circ}$
2. With the help of ruler and compass, it is not pos-
sible to construct an angle of :
[T-II (2011)]
(a) $60^{\circ}$
(b) $15^{\circ}$
(c) $38^{\circ}$
(d) $135^{\circ}$
3. With the help of a ruler and a compass, it is possible to construct an angle of : [T-II (2011)]
(a) $35^{\circ}$
(b) $40^{\circ}$
(c) $37.5^{\circ}$
(d) $47.5^{\circ}$

## A. Important Questions

1. Can we construct an angle of $67 \frac{1}{2}$ 。? Justify your answer.
2. Can we construct an angle of $52 \frac{1}{2}_{2}^{\circ}$ ? Justify your answer.
3. Can we construct a $\triangle \mathrm{ABC}$ in which $\mathrm{BC}=6 \mathrm{~cm}$, $\angle \mathrm{C}=30^{\circ}$ and $\mathrm{AC}-\mathrm{AB}=4 \mathrm{~cm}$ ? Give reason for your answer.
4. A triangle ABC can be constructed in which $\angle \mathrm{B}=60^{\circ}, \angle \mathrm{C}=45^{\circ}$ and $\mathrm{AB}+\mathrm{BC}+\mathrm{AC}$ $=12 \mathrm{~cm}$. Is this statement true ? Justify your answer.
5. Construct the perpendicular bisector of the line segment $\mathrm{AB}=7.5 \mathrm{~cm}$.
6. Construct an equilateral triangle and justify your construction.
7. Draw a line segement AB and by ruler and compass, obtain a line segment of length $\frac{3}{4} \mathrm{AB}$.
8. Draw an obtuse angle. Bisect it. Measure each of the angles obtained.
9. Can we construct a triangle ABC in which $\angle \mathrm{A}=105^{\circ}, \angle \mathrm{B}=75^{\circ}$ and $\mathrm{AB}+\mathrm{BC}+\mathrm{AC}$ $=12 \mathrm{~cm}$ ?
10. Can we construct a triangle ABC in which $\angle \mathrm{B}$ $=105^{\circ}, \angle \mathrm{C}=90^{\circ}$ and $\mathrm{AB}+\mathrm{BC}+\mathrm{AC}$ $=10 \mathrm{~cm}$ ?

## B. Questions From CBSE Examination Papers

1. Construct an angle of $60^{\circ}$ using a ruler and compass and bisect it.
[T-II (2011)]

## SHORT ANSWER TYPE QUESTIONS

## A. Important Questions

1. Construct $\triangle \mathrm{ABC}$ in which $\mathrm{BC}=6.4 \mathrm{~cm}$, $\angle B=45^{\circ}$ and $\mathrm{AB}-\mathrm{AC}=3.5 \mathrm{~cm}$.
2. Draw a line segment $A B$ of 5 cm in length. Draw a line perpendicular to $A B$ through $A$ and $B$ respectively. Are these lines parallel ?
3. Construct the angles of the following measurements :
(i) $67.5^{\circ}$
(ii) $52.5^{\circ}$
4. Construct $\triangle \mathrm{ABC}$ in which $\mathrm{BC}=4.5 \mathrm{~cm}$, $\angle B=45^{\circ}$ and $A B+A C=5.6 \mathrm{~cm}$.
5. Draw an angle of $80^{\circ}$ with the help of a protractor. Then construct angles of (i) $40^{\circ}$ (ii) $160^{\circ}$ (iii) $120^{\circ}$
6. Construct a square of side 3.6 cm .
7. Construct a rectangle whose adjacent sides are 6.3 cm and 4.2 cm .
8. Construct a rhombus whose side is of length 3.4 cm and one of its angles is $45^{\circ}$.
9. Construct a triangle whose sides are 4.2 cm , 3.9 cm and 6.1 cm . Bisect its greatest angle and measure each part.
10. Construct a right angled triangle in which the base is 3 cm and the difference of hypotenuse and perpendicular is 1 cm .

## B. Questions From CBSE Examination Papers

1. Construct a triangle XYZ in which $\angle \mathrm{Y}=30^{\circ}$, $\angle \mathrm{Z}=90^{\circ}$ and $\mathrm{XY}+\mathrm{YZ}+\mathrm{ZX}=11 \mathrm{~cm}$. [T-II (2011)]
2. Construct a triangle ABC in which $\mathrm{BC}=7 \mathrm{~cm}$, $\angle \mathrm{B}=75^{\circ}$ and $\mathrm{AB}+\mathrm{AC}=13 \mathrm{~cm}$. [T-II (2011)]
3. Construct a $\triangle \mathrm{ABC}$ in which $\mathrm{BC}=5 \mathrm{~cm}$, $\angle B=75^{\circ}$ and $A B+A C=9 \mathrm{~cm}$.
[T-II (2011)]
4. Construct a triangle ABC in which $\mathrm{BC}=5.5 \mathrm{~cm}$
and $\angle B=60^{\circ}$ given that $A B+A C=8 \mathrm{~cm}$.
[T-II (2011)]
5. Construct a triangle ABC in which $\mathrm{BC}=4 \mathrm{~cm}$, $\angle \mathrm{B}=30^{\circ}$ and $\mathrm{AB}+\mathrm{AC}=6 \mathrm{~cm}$. [T-II (2011)]
6. Construct a $\triangle \mathrm{PQR}$ with its perimeter $=10.4 \mathrm{~cm}$ and base angles of $75^{\circ}$ and $30^{\circ}$.
[T-II (2011)]
7. Construct a $\triangle \mathrm{ABC}$ whose perimeter is 12 cm , $\angle B=60^{\circ}$ and $\angle C=45^{\circ}$. Justify the construction.
[T-II (2011)]
8. Construct an equilateral triangle, given its one side $=5 \mathrm{~cm}$.
[T-II (2011)]
9. Construct $\triangle \mathrm{XYZ}$ in which $\angle \mathrm{Y}=90^{\circ}$, $\angle \mathrm{Z}=30^{\circ}$ and perimeter is 13 cm . [T-II (2011)]
10. Construct a right triangle whose base is 6 cm and the difference of its hypotenuse and the other side is 8 cm .
[T-II (2011)]
11. Construct $\triangle \mathrm{ABC}$ such that $\angle \mathrm{B}=60^{\circ}, \angle \mathrm{C}=45^{\circ}$ and $\mathrm{AB}+\mathrm{BC}+\mathrm{CA}=10 \mathrm{~cm}$.
[T-II (2011)]
12. Construct a triangle $P Q R$ in which $P Q=5 \mathrm{~cm}$, $\angle \mathrm{P}=60^{\circ}$ and $\mathrm{PR}+\mathrm{RQ}=9 \mathrm{~cm}$.
[T-II (2011)]
13. Construct a right triangle whose base is 12 cm and sum of its hypotenouse and other side is 18 cm .
[T-II (2011)]
14. Construct a triangle PQR with base $\mathrm{PQ}=8.4 \mathrm{~cm}$, $\angle \mathrm{P}=45^{\circ}$ and $\mathrm{PR}-\mathrm{QR}=2.8 \mathrm{~cm}$. [T-II (2011)]
15. Construct a triangle ABC in which $\angle \mathrm{B}=60^{\circ}$, $\angle \mathrm{C}=45^{\circ}$ and the perimeter of the triangle is 11 cm .
[T-II (2011)]
16. Construct a right angled triangle $P Q R$ right angled at Q where base QR is 4 cm and the sum of other side and hypotenuse is 8 cm .
[T-II (2011)]
17. With the help of ruler and compass, draw an angle of $75^{\circ}$ and bisect it. Write its steps of construction also.
[T-II (2011)]
18. Construct a triangle PQR in which $\angle \mathrm{Q}=60^{\circ}$, $\angle \mathrm{R}=30^{\circ}$ and its perimeter is 12.5 cm . [T-II (2011)]
19. Construct a triangle ABC in which $\mathrm{BC}=5 \mathrm{~cm}$ $\angle \mathrm{B}=45^{\circ}$ and $\mathrm{AB}-\mathrm{AC}=2.8 \mathrm{~cm}$. [T-II (2011)]
20. Construct a $\triangle \mathrm{ABC}$ in which $\mathrm{BC}=5.7 \mathrm{~cm}$, $\angle \mathrm{B}=30^{\circ}$ and $\mathrm{AB}-\mathrm{AC}=3 \mathrm{~cm}$. [T-II (2011)]
21. Construct a $\triangle \mathrm{ABC}$ in which $\mathrm{AB}=5.8 \mathrm{~cm}$ $B C+C A=8.4 \mathrm{~cm}$ and $\angle B=60^{\circ} . \quad[T-I I(2011)]$

## LONG ANSWER TYPE QUESTIONS

## A. Important Questions

1. Construct an equilateral triangle if its altitude is 4 cm . Give justification of your construction.
2. Construct a triangle ABC in which $\angle \mathrm{A}=45^{\circ}$, $\angle \mathrm{B}=120^{\circ}$ and $\mathrm{AB}+\mathrm{BC}+\mathrm{AC}=10.4 \mathrm{~cm}$.
3. Construct a right triangle in which one side is 3.5 cm and sum of other side and hypotenuse is 5.5 cm .
4. Construct a triangle ABC , given that perimeter is $12.5 \mathrm{~cm}, \angle \mathrm{~B}=60^{\circ}$ and $\angle \mathrm{C}=75^{\circ}$.
5. Construct a rhombus whose diagonals are 4 cm and 6 cm in lengths.
6. Construct a triangle $A B C$ such that $\mathrm{AB}=\mathrm{BC}=6 \mathrm{~cm}$ and median $\mathrm{AD}=4 \mathrm{~cm}$.

## B. Questions From CBSE Examination Papers

1. Construct a triangle with perimeter 10 cm and base angles $60^{\circ}$ and $45^{\circ}$.
[T-II (2011)]
2. Construct a triangle ABC in which $\mathrm{BC}=7.5 \mathrm{~cm}$, $\angle \mathrm{B}=45^{\circ}$ and $\mathrm{AC}-\mathrm{AB}=2.5 \mathrm{~cm} . \quad$ [T-II (2011)]
3. Construct a $\triangle \mathrm{ABC}$ in which $\angle \mathrm{B}=30^{\circ}$ and $\angle \mathrm{C}=90^{\circ}$ and the perimeter of the triangle is 11 cm .
[T-II (2011)]

## FORMATIVE ASSESSMENT

## Activity-1

Objective : To construct (by paper folding) a triangle whose perimeter and two base angles are given.
Materials Required : Tracing paper, geometry box, etc.
Procedure : Let the perimeter of the triangle be 10 cm and two base angles be $70^{\circ}$ and $40^{\circ}$.

1. On a tracing paper, draw a line segment $X Y=10 \mathrm{~cm}$. At $X$, draw an angle of $70^{\circ}$ and at Y, draw an angle of $40^{\circ}$ (using protractor) to get the triangle XYZ.

2. Using paper folding method, find the bisectors of $\angle \mathrm{X}$ and $\angle \mathrm{Y}$. Let these bisectors meet at A.
3. Again, using paper folding method, draw the perpendicular bisectors of AX and AY. Let the perpendicular bisectors of AX and AY meet XY at B and C respectively.


Figure-3


## Activity-2

Objective : To find the centre of a circle using a $30^{\circ}-60^{\circ}-90^{\circ}$ set square.
Materials Required : A bangle, a thick sheet of paper, geometry box, etc.
Procedure :

1. Draw a circle using a bangle.


Figure-1

3. Place the $30^{\circ}-60^{\circ}-90^{\circ}$ set square over the circle so that its vertex $G$ falls at $A$.

Note that $\angle \mathrm{EGF}=30^{\circ}$.
4. Draw lines along GF and GE which intersect the circle at B and C respectively.
5. Join B to C.

6. Now place the $30^{\circ}-60^{\circ}-90^{\circ}$ set square so that the side EF falls along CB.

Note that $\angle \mathrm{FEG}=60^{\circ}$


Figure-4
7. Draw a line along EG.
8. Now place the $30^{\circ}-60^{\circ}-90^{\circ}$ set square such that its side EG falls along BC .
Note that $\angle \mathrm{GEF}=60^{\circ}$


Figure-5

Figure-6
9. Draw a line along EF, which intersects the line drawn in step 7 at O .

## Observations :

1. $\angle \mathrm{BAC}=30^{\circ}$.
2. $\angle \mathrm{OBC}=\angle \mathrm{OCB}=\angle \mathrm{BOC}=60^{\circ}$, So, $\triangle \mathrm{OBC}$ is an equilateral triangle.

3. $\angle \mathrm{BOC}=2 \angle \mathrm{BAC}$ [From 1. and 2.]
$\Rightarrow \mathrm{O}$ is the centre of the circle. [The angle subtended by an arc at the centre of a circle is twice the angle subtended by the arc at any point on the remaining part of the circle.]

## Conclusions :

1. We can find the centre of a circle using only a $30^{\circ}-60^{\circ}-90^{\circ}$ set square.
2. The angle subtended by an arc at the centre of a circle is twice the angle subtended by the arc at any point on the remaining part of the circle.

## Do Yourself :

1. Using ruler and compass only, find the centre of a circle.
2. A part of a circle (an arc) is given. Using ruler and compasses, find the centre of the circle whose part is the given arc.
