Constructions

1. Given below are the steps of construction of a pair of tangents to a circle of radius 6 cm from a point on the concentric circle of radius 8 cm. Find which of the following steps is INCORRECT?

Steps of Construction

Step I: Take a point O on the plane paper and draw a circle of radius $OA = 6\ cm$. Also, draw a concentric circle of radius $OB = 8\ cm$

Step II: Find the mid-point A of OB and draw a circle of radius BA = AO. Suppose this circle intersects the circle of radius 6 cm at P and O.

Step III: Join BP and 8Q to get the desired: tangents.

(a) Step I
(b) Step II
(c) Step I and Step II
(d) Step II and Step III

2. Given below are the steps of construction of a pair of tangents to a circle of radius 6 cm which are inclined to each other at an angle of 60°. Find which of the following step is wrong?

Steps of Construction

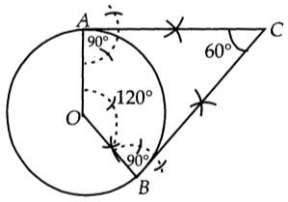
I. With centre O and radius = 6 cm, draw a circle.

II. Taking a point b A on the circle and draw $\angle AOB - 120^o$.

III. Draw a perpendicular on OA at A. Draw another perpendicular on OB at B.

IV. Let the two perpendiculars meet at C.

Thus CA and C8 are the two required tangents to the given circle which are inclined to each other at 120^o.



(a) Only Step I (b) Only Step II
(c) Only Step III (d) Only Step IV

3. Given below are the steps of construction of two tangents to the circle (without using the centre of the circle) of radius 4 cm from point P. Which of the following steps is INCORRECT?

Steps of Construction

Step I: Draw a circle of radius 4 cm and take a point P outside the circle and draw a secant PAB, intersecting the circle at A and B.

Step II: Produce AP to C such that $AP = CP$. Draw a semicircle with CB as diameter.

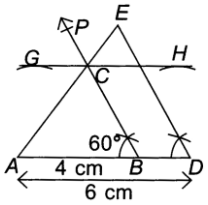
Step III: Draw PD 1 CB, intersecting the semicircle at D. With P as centre and PC as radius draw arcs to intersect the given circle at T and T.

Step IV: Join PT and PT. Then, PT and PT are the required tangents.

(a) Only Step I
(b) Both Step I and Step II
(c) Only Step III
(d) Both Step II and Step IV

4. Arrange the following steps of construction for constructing a ΔABC in which $AB = 4\ cm,\ \angle B = 60^o$ and altitude $CL = 3\ cm$ and then construct ΔADE similar to ΔABC such that each side of ΔADE is $\frac{3}{2}$ times that of the corresponding side of ΔABC

Steps of Construction



Step I: Join CA. Thus, ΔABC is obtained.

Step II: Draw $DE \parallel BC$, cutting AC produced at E.

Step III: Extend AB to D such that $AD = \frac{3}{2}AB = \left(\frac{3}{2} \times 4\right) cm = 6cm.$

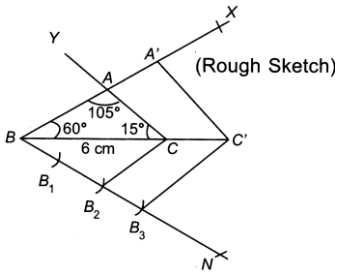
Step IV: Draw a line segment AB = 4 cm.

Step V: Draw a line $GH \parallel AB$ at a distance of 3 cm, intersecting BP at C.

Step VI: Construct $\angle ABP = 60^o$

(a)	IV, II	VI,	V,	I,	III,
(b)	IV, II	V,	VI,	I.	Ill,
(c)	IV, VI	V,	I,	III,	II,
(d)	V, II	IV,	VI,	III,	I,

5. Given below are the steps of construction a triangle ABC with side $BC = 6\ cm$, $\angle B = 60^o$, $\angle A = 150^o$ and a triangle whose sides are (3/2) times the corresponding ; sides of A ABC. Which of the following steps of construction is INCORRECT?



Steps of Construction

Step I: Draw BC = 6 cm.

Step II: At B construct $\angle CBX = 60^o$ and at C construct

Suppose BX and CY intersect at A. ΔABC so obtained is the given triangle.

Step III: Construct an obtuse angle $\angle CBZ$ at B on opposite side of vertex A of ΔABC.

Step IV: Mark-off three (greater 3 of 2 in 3/2) points $B_1, B_2, B_3,$ on BZ such that $BB_1 = B_1B_2 = B_2B_3$..

Step V: Join B_2 (the second point) to C and draw a line through B_3 parallel to B_2 C, intersecting the extended line segment BC at C'.

Step VI: Draw a line through C' parallel to CA intersecting the extended line segment BA at A'.

Triangle A'B'C so obtained is the required triangle such that $\frac{A'B}{AB} = \frac{BC'}{BC} = \frac{A'C'}{AC} = \frac{3}{2}$

(a) Step III (b) Step IV

(c) Step V (d) Step II

6. Which of the following steps of construction is INCORRECT while dividing a line segment of length $3.2\ cm$ in the ratio of $3:5$ internally.

Steps of Construction

Step I: Draw $AB = 3.2\ cm$

Step II: Construct an acute $\angle BAX$.

Step III: On AX make $3+5+1$ i.e. 9 equal parts and mark them as $A_1, A_2, A_3, A_4, ...A_9$

Step IV: Join B to A_8 From A_3 draw A_3C parallel to A_8B . Point C divides AB internally in the ratio $3:5$.

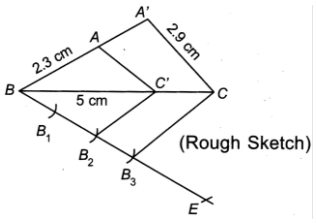
Thus, $AC:CB = 3:5.$

(a) Step II (b) Step III

(c) Step IV (d) None of these

7. Arrange the following steps of construction while constructing a triangle of scale $AB = 2.3\ cm,\ BC = 5\ cm$ and $AC = 2.9\ cm$ such that each of its sides is $\frac{2}{3}rd$ of the corresponding side of the ΔABC .

Steps of Construction



Step I: On BE, cut off 3 equal parts making B_1, B_2 and B_3.

Step II: Now, draw C'A' parallel to CA. Then, $\Delta A'BC'$ is the required A whose sides are of the corresponding sides of the ΔABC .

Step III: From point B draw an arc of $2.3\ cm$ and from point C draw an arc of $2.9\ cm$ cutting each other at point A.

Step IV: Take $BC = 5\ cm$.

Step V: Join B_3C and from B_2 draw B_2C' parallel to B_3C, such that BC is 2/3 of BC.

Step VI: On B make an acute $\angle CBE$ downwards.

Step VII: Join AB and AC. Then ABC is the required triangle.

(a)	IV, V,	III, II	VII,	I,	VI,
(b)	IV, VII,	V, II	I,	VI,	III,
(c)	IV, V,	III, II	VII,	VI,	I,
(d)	IV, I,	VII, II	III,	VI,	V,

8. Arrange the steps of construction while constructing pair of tangents to a circle of radius 5 cm from a point 12 cm away from its centre.

Steps of Construction

Step I: Join OA and bisect it. Let P is the mid-point of OA.

Step II: Join AB and AC. AB and AC are the required tangents. Length of tangents $=11\ cm$.

Step III: With O as centre, draw a circle; . of radius 5 cm.

Step IV: Taking P as centre and PO as radius, draw a circle intersecting the given circle at the points B and C.

Step V: Take a point A at a distance of 12 cm from O.

(a)	III,	V,	I,	IV,	II
(b)	III,	V,	IV,	I,	II
(c)	II,	V,	IV,	III,	I
(d)	II,	IV,	II,	I,	III

9. Which of the following steps is INCORRECT to construct a circle of radius 2 cm with centre 0 and then drawing two tangents to the circle from P where P is a point : outside the circle such that $OP = 4.5\ cm$.

Steps of construction

Step I: Draw a circle with O as centre and radius 2 cm.

Step II: Mark a point P outside the circle such that $OP = 2.25\ cm$.

Step III: Join $OP = 4.5\ cm$ and bisect it at M.

Step IV: Draw a circle with M as centre and radius equal to MP to intersect the given circle at the points T and T'.

Step V: Joint PT and PT'. Then. PT and PT are the required tangents.

(a) Step V (b) Step IV

(c) Step II (d) None of these

10. Which of the following steps of construction is INCORRECT while drawing a tangent to a circle of radius 5 cm and making an angle of 30° with a line passing through the centre.

Steps of Construction

Step I: Draw a circle with centre O and radius $2.5\ cm$.

Step II: Draw a radius OA of this circle and produce it to B.

Step III: Construct an angle $\angle AOP$ equal to the complement of 30^o i.e. equal to 150^o.

Step IV: Draw perpendicular to OP at P which intersects OA produced at Q.

Clearly, PO is the desired tangent such that $\angle OQP = 30^o$

(a) Both I and III (b) Only III

(c) Both III and IV (d) Only I

11. Arrange the following steps of construction while constructing a pair of tangents to circle, which are inclined to each other at an angle of 60^o to a circle of radius 3 cm.

Steps of Construction

Step I: Draw any diameter AOB of this circle.

Step II: Draw AM 1 AB and $CN \perp OC$.

Let AM and CN intersect each other at P.

Then PA and PC are the desired tangents to the given circle, inclined at an angle of 60^o.

Step III: Draw a circle with O as centre and radius 3 cm.

Step IV: Construct $\angle BOC = 60^o$ such that radius OC meets the circle at C.

(a) III, I, IV, II (b) III, II. IV. I

(c) II, I, IV, III (d) IV, II, III. I

12. Arrange the following steps of construction while constructing a pair of tangents to a circle of radius 3 cm from a point 10 cm away from the centre of the circle.

Steps of Construction

Step I: Bisect the line segment OP and let the point of bisection be M.

Step II: Taking M as centre and OM as radius, draw a circle. Let it intersect the given circle at the point Q and R.

Step III: Draw a circle of radius 3 cm.

Step IV: Join PQ and PR.

Step V: Take an external point P which is 10 cm away from its centre. Join OP.

(a)	III,	V,	I,	II,	IV
(b)	III,	I,	V,	IV,	II
(c)	III,	V,	I,	IV,	II
(D)	III,	V,	II,	I,	IV

13. Let ABC be a right triangle in which $AB = 3\ cm$, $BC = 4\ cm$ and $\angle B = 90^o$. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Given below are the steps of constructions of a pair of tangents from A to this circle. Which of the following steps is INCORRECT?

Steps of Construction

Step I: Draw ΔABC and perpendicular BD from B on AC.

Step II: Draw a circle with BC as a diameter. This circle will pass through D.

Step III: Let O be the mid-point of BC. Join AO.

Step IV: Draw a circle with AO as diameter. This circle cuts the circle drawn in step II at S and P. Join /AO, AP and AB are desired tangents drawn from A to the circle passing through B, C and D.

(a) Only Step I (b) Only Step II
(c) Only Step III (d) Only Step IV

14. Arrange the following steps of construction while dividing a line segment of length 8 cm internally in the ratio $3:4$.

Steps of Construction

Step I: Draw a ray BY parallel to AX by making $\angle ABY$ equal to $\angle BAX$.

Step II: Join A_3B_4. Suppose it intersects AB at a point P. Then, P is the point dividing AB internally in the ratio $3:4$.

Step III: Draw the line segment AB of length 8 cm.

Step IV: Mark of three point A_1, A_2, A_4 on AX and 4 points B_1, B_2, B_3, B_4 on BY such that $AA_1 = A_1A_2 = A_2A_3 = BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.

Step V: Draw any ray AX making an acute angle $\angle BAX$ with AB.

(a) III, V, I, II. IV (b) III, IV, I, V, II
(c) III, I, V, IV, II (d) III, V, I, IV, II

15. Which of the following steps is INCORRECT to construct a tangent to the circle of radius 5 cm at the point P on it without using the centre of the circle.

Steps of Construction

Step I: Draw a circle of radius 5 cm.

Step II: Mark a point P on it.

Step III: Draw any chord PQ.

Step IV: Take a point R in the minor arc QP.

Step V: Join PR and RQ.

Step VI: Make $\angle QPT = \angle PRQ$.

Step VII: Produce TP to T. Then, PT is the required tangent at P.

(a) Step II (b) Step IV
(c) Step VI (d) None of these

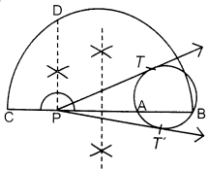
ANSWER KEY									
1.	B	**2.**	D	**3.**	C	**4.**	A	**5.**	A
6.	B	**7.**	C	**8.**	A	**9.**	C	**10.**	A
11.	A	**12.**	A	**13.**	D	**14.**	D	**15.**	B

HINTS AND SOLUTION

1. (b)

2. (d)

3. (c): Steps of Construction



Step I: Draw a circle of radius 4 cm and take a point P outside it. Through P draw a secant PAB to intersect the circle at A and B.

Step II: Produce AP to a point C such that $AP = CP$. Draw a semicircle with CB as diameter.

Step III: Draw $PD \perp CB$ intersecting the semicircle at D. With P as centre and PD as radius draw arcs to intersect the circle at 7" and T'.
Step IV: Join PT and PT. Then, PT and PT are the required tangents.

4. (a): Correct sequence of steps is
IV, VI, V, I, III, II

5. (a): Step III is incorrect since we construct an acute angle $\angle CBZ$ at B on opposite side of vertex A of ΔABC.

6. (b): Step III is incorrect as on X make $3+5=8$ equal parts and mark them as $A_1, A_2, A_3\ A_4, \_\_\_\_\_ A_8$.

7. (c): Correct sequence of steps is
IV, III, VII, VI, I, V, II,

8. (a): Correct sequence of steps is
III, V, I, IV, II.

9. (c): Step II is incorrect. Mark the point P outside the circle such that OP = 4.5 cm is correct.

10. (a): Step I and III are incorrect. Draw a circle with centre O and radius 6 cm and construct $\angle AOP$ equal to complement of 30^o i.e. equal to 60^o are correct steps.

11. (a): Correct sequence of steps is III, I, IV, II.

12. (a): Correct sequence of steps is III, V, I, II, IV.

13. (d): Only AB and AP are tangents to the given circle. AO is secant to the circle.
So, step IV is incorrect.

14. (d): Correct sequence of steps is III, V, I, IV, II.

15. (b): Step IV is incorrect as the point R will be taken in the major arc QP.