

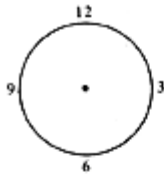
CHAPTER 24 Loci and Constructions

Exercise 24a (p. 407)

Some questions in this exercise have more than one correct solution. Any reasonable locus should be accepted. Unless stated otherwise, it will always be assumed that a straight line extends to infinity in both directions.

1. A complete circle

2. One twelfth of a circle



3. An arc from the bowler's hand to the wicket



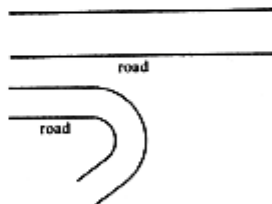
4. A straight line
(assuming the ground is flat)



5. An arc



6. a) A straight line parallel to the road at a distance equal to the radius of the wheel from it
b) An arc at a constant distance from the curve forming the bend



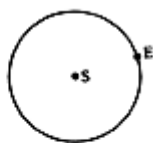
7. A semicircle



8. Approximately a circle



9. A circle (approximately)



10. A spiral



11. a) A circle of radius 80cm
b) A semicircle of radius 80cm
12. A straight line parallel to the top edge and 3cm from it.
13. Two straight lines parallel to AB and distant 3cm from it.
14. a) A circle, centre C, radius 4cm
b) A circle, centre C, radius 8cm
15. The line joining the midpoints of AD and BC
16. The perpendicular bisector of AB
17. The bisector of $\angle ABC$
18. a) The diagonal, BD, of the square
b) The diagonal, AC, of the square
Yes. The centre of the square
19. A straight line parallel to AB and CD which is twice as far from AB as it is from CD.
20. a) A circle perpendicular to the plane of the paper with AB as diameter
b) A circle perpendicular to the plane of the paper with AD as diameter
c) A circle perpendicular to the plane of the paper with AC as diameter
d) A circle within the plane of the paper with OA as radius

Exercise 24b (p. 412)

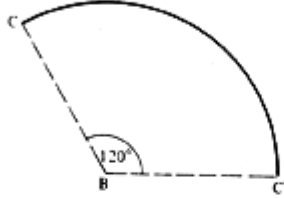
1. A circle, centre O, radius OM
2. The diameter of the circle which is perpendicular to AB
3. A straight line parallel to AB distant 4cm from it
4. A circle on AB as diameter (This assumes that C can be on either side of AB)
5. A circle, centre A, radius 5cm
6. The arc of the unique circle that passes through A, B and any position of C
7. A straight line parallel to OX, distant 2cm from it on the same side as A
8. A circle, centre O, radius OT
9. a) A quadrant of a circle, centre A, radius AD



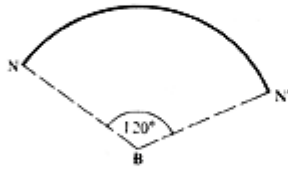
b) A quadrant of a circle, centre A, radius AC



10. a)

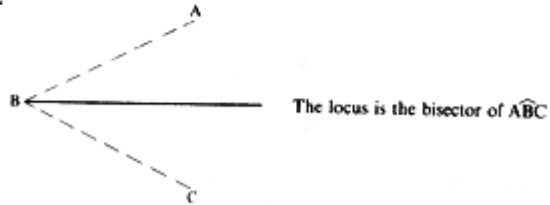


b)



BA turns through 120°

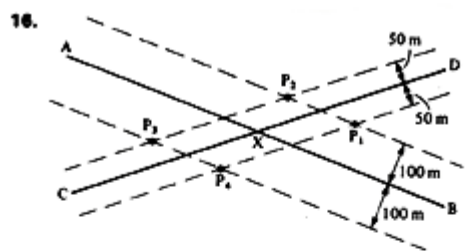
11.



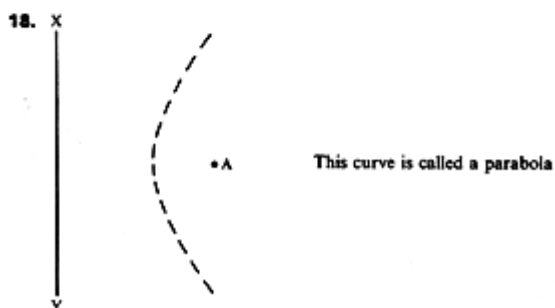
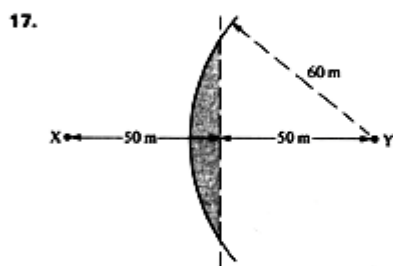
12.



- 13. a) A circle of radius 4cm, concentric with the circle of radius 5cm
- b) A circle of radius 6cm, concentric with the circle of radius 5cm
- 14. The perpendicular bisector of AB
- 15. It is the midpoint of AC



P_1, P_2, P_3, P_4 show the four possible positions for P

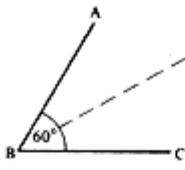


Exercise 24c (p. 416)

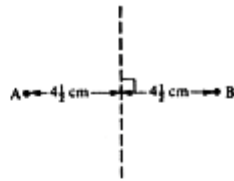
Pupils should be reminded of the importance of neat and accurate constructions. In an ideal diagram the figure asked for, e.g. a quadrilateral, should stand out more strongly than any construction lines that have been used. Sketches should be encouraged for they enable the accurate construction to be well placed on the page and the correct method of construction chosen.

Note that “suitable instruments” can also include a computer with appropriate CAD software.

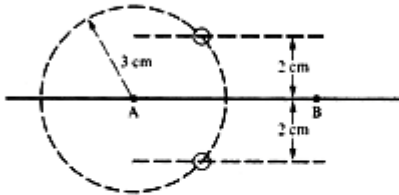
1.



2.

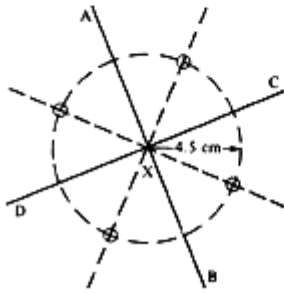


3.



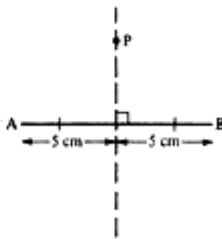
c) The loci intersect in 2 points. 6.1 cm

4.



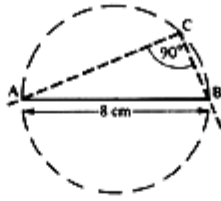
c) Four, 4.5 cm

5.

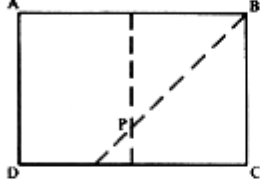


6. The point is equidistant from A, B and C.

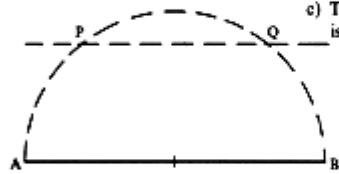
7.



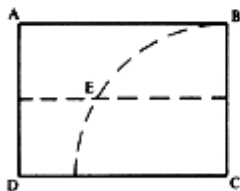
8. A B d) $PC = 6.3$ cm



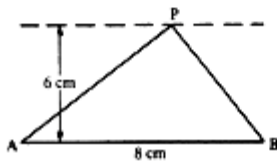
9. c) The difference between AP and PB is 4.9 cm



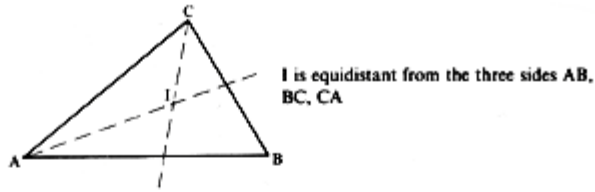
10. A B AE = 5.0 cm



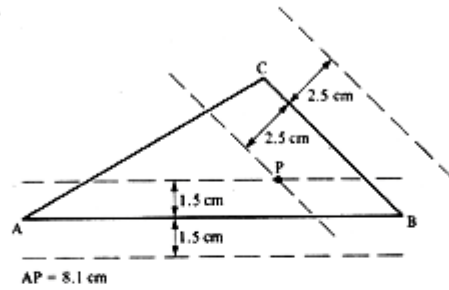
11. P could also be on the opposite side of AB



12.



13.



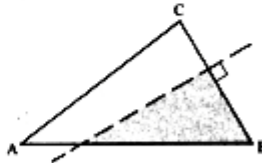
- 14. $PB = 4.5 \text{ cm}$
- 15. $CD = 10.3 \text{ cm}$

- 16. $DX = 4.2 \text{ cm}$
- 17. $AD = 7.9 \text{ cm}$

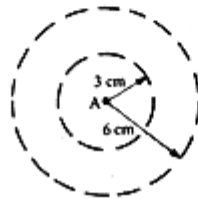
EXERCISE 24d 1.
(p. 420)



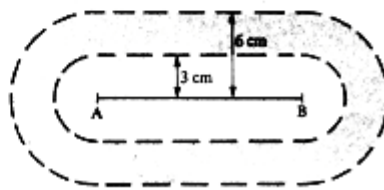
3.

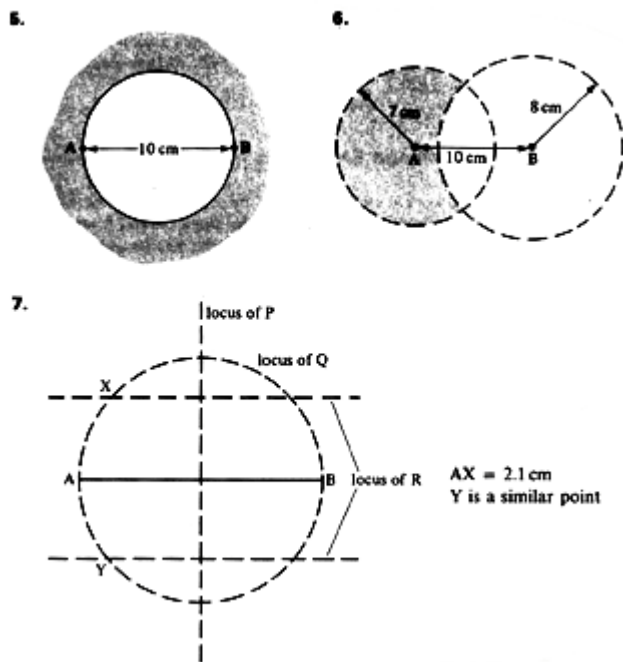


2.



4.



**Exercise 24e (p. 421)**

An exercise worth tackling whether it is in your examination syllabus or not.

1. A sphere, centre A, of radius 6cm
2. The plane that bisects AB at right angles
3. a) A sphere, centre A, of radius 5cm
b) The plane that bisects AB at right angles
c) A circle of radius 3cm which lies in the plane that bisects AB at right angles
4. A sphere of radius 15cm
5. Two circles, one of radius 5cm and one of radius 15cm. There are two possible circles in this case but only one in question 4.
6. a) A circle, centre D, radius DA
b) A circle, centre B, radius BA
c) A circle, centre at N, the foot of the perpendicular from A to DB, radius AN
7. a) Two planes, one on each side of ABCD, each 8cm from it
b) The plane that bisects AD at right angles
c) Two lines, on opposite sides of ABCD, parallel to AB and 8.9cm $(\sqrt{80cm})$ from both AB and DC
8. The circle of intersection of the plane which bisects AB at right angles and the sphere, centre C, radius 10cm (this assumes that the loci intersect)
9. The line, perpendicular to ABC, that passes through the circumcentre of $\triangle ABC$