

## UNIT 12 *Constructions and Loci*

## Teaching Notes

### *Historical Background and Introduction*

The great period of Greek mathematics covered (roughly) the 600 years from 500 BC to 100 AD; their major preoccupation was with geometry. In fact, all the geometry that is now covered in the normal school curriculum was developed by the Greeks during that time. The master work of geometry, Euclid's 'Elements' was written about 300 BC.

To the Greeks, problem solving was usually done by using constructions. For instance, when investigating, "Given two squares, find the size of a single square which is equal in area to the two together", they would have expected the answer to be drawn as a construction and would not, as we would today, be looking for an arithmetical answer. So, all the constructions we practise today have been in existence for well over 2000 years, and no doubt many others have been lost along the way.

Some of the problems the Greeks posed, and solved, related to loci. In fact, though they knew of the conic sections (circle, ellipse, parabola, hyperbola) as being made by a plane intersecting a cone, they also knew those same curves could be generated as loci. A good starting point for work with loci is to ask the class, orally, for a description of the locus generated by a moving point which is a fixed distance from, respectively, *one, two three* and *four* fixed points. Much waving around of hands may be seen, but some useful discussion should take place. It is also worth doing some work on the drawing of loci using some of the 'mechanical' methods, as well as geometrical constructions.

Loci have important applications for engineers in relation to mechanisms, where parts have to move in a particular way to perform their intended operation. Just try designing a contrivance that ties knots in string - and not in itself!

### *Routes*

	<b>Standard</b>	<b>Academic</b>	<b>Express</b>
12.1 Recap: Angles and Scale Drawing	✓	✓	(✓)
12.2 Constructions	(✓)	✓	✓
12.3 Loci	×	✓	✓

### *Language*

	<b>Standard</b>	<b>Academic</b>	<b>Express</b>
Perpendicular bisector	(✓)	✓	✓
Locus (loci)	×	✓	✓

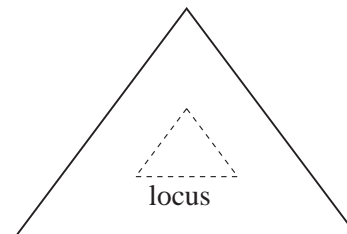
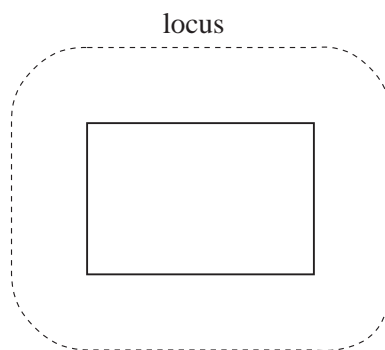
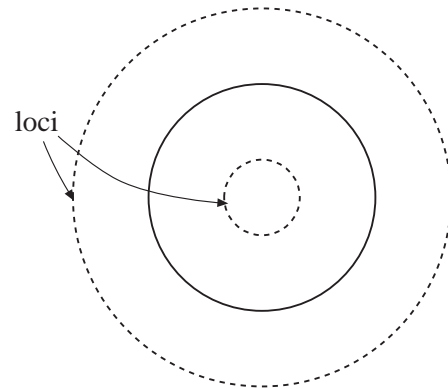
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## Misconceptions

The main misconceptions here:

- pupils must make sure that, when finding loci, *all* points are found, e.g. points distance 1 cm from circle, diameter 3 cm:
- appreciating that problems occur at boundaries, e.g.



## Challenging Questions

The following questions are more challenging than others in the same section:

	<i>Section</i>	<i>Question No.</i>	<i>Page</i>
<i>Practice Book Y9B</i>	12.1	9	86
" "	12.1	10	87
" "	12.2	8, 9	91
" "	12.3	11	98