Guidance for tutors

Outcome	SA1	Student can consistently:	Draw constructions and understand simple examples of loci.

How the topic is examined

- Examined through test paper questions.
- Questions are equally likely to appear on calculator and non-calculator papers.
- Students will be asked to use a ruler and compasses to “construct” a particular construction or locus of points.
- It is unlikely to use the words “locus” or “loci”, it will asks students to find the set of points that follow a given rule (e.g. are 5cm away from point A).
- Very occasionally students may be asked to draw a diagram that has angle measurements in.

Prior knowledge

- Students should be confident:
  - Using a ruler and compass.
- In addition questions involving this topic can have links to:
  - Regions and inequalities (AG6)

Suggested tuition approaches

- Students should be able to make all of the following constructions. Each construction is presented with a tutorial that explains how to make the construction.
- In mathematics, a locus is a path that follows a given rule (e.g. stay 10cm away from a particular point). Loci is the plural of locus.
- For all constructions students should use a pair of compasses, pencil and ruler.

Construction or loci	Tutorial

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Construct a triangle (including an equilateral triangle) given all three sides	http://www.cimt.org.uk/projects/mepres/book7/bk7i5/bk7_5i5.htm
Construct a 60 degree angle.	http://www.mathopenref.com/constangle60.html
Construct a perpendicular bisector of a given line	http://www.mathopenref.com/constbisectline.html
Construct an angle bisector	http://www.mathopenref.com/constbisectangle.html
Construct loci, given a fixed distance from a point	https://www.bbc.co.uk/education/guides/z24w7ty/revision/1
Construct loci, given a fixed distance from a given line	https://www.bbc.co.uk/education/guides/z24w7ty/revision/1 (halfway down page)
Construct loci, for example, given equal distances from two points	http://www.bbc.co.uk/schools/gcsebitesize/maths/geometry/locirev2.shtml

- Students may be asked to shade in regions following construction of a particular locus
  - (e.g. Shade in the region of points 5cm or less from point A. To do this you would:
    - Construct the locus of points 5cm away from A. Draw a solid line.
    - Shade in the region of points inside the circle.
    - If the line is dashed this means it cannot be equal to 5cm (i.e. it has to be strictly less than 5cm)
  - (e.g. shade in the region of points closer to A than B)
    - Construct the locus of points equidistant between A and B.
    - Draw a dashed line
    - Shade in the side of the line that is closer to A than B.
- It is unlikely students will be marked down if they do not draw a dashed line. Marks are usually awarded for the region and not the line.

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	• Multiple loci examples could be asked together and students are asked to shade in a region that satisfies more than one condition. (e.g.to construct a 30 degree angle. You would first construct a 60 degree angle and bisect)
Common errors and misconceptions	• Students often try to use a ruler and pencil only to do the constructions and loci construction. They must use a pair of compasses. • A common mistake when students are asked to find the set of points that is equidistant between two points is to simply plot the point in the middle of the two points. • Students forget to draw a dashed line if it is strictly less/greater than a particular distance. • Students mix up the constructions and loci. • Pencils need to be sharp and the pair of compasses need to be tightened so that they don't slip. Students should take care when doing the construction.

Suggested resources	• Questions
	  ○ http://www.cimt.org.uk/projects/mepres/allgcse/bkc14.pdf (pp90 - 96) (pp109 -111)
	  ○ https://www.tes.com/teaching-resource/constructions-and-loci--write-on-worksheet-6126625
	  ○ https://www.tes.com/teaching-resource/loci-worksheet-6193286
	• Past GCSE Questions
	• http://bland.in/gcse/locus.cons_new1.pdf
	• https://keshgcsemaths.files.wordpress.com/2013/11/76_loci-and-construction.pdf
	• Video tutorials
	  ○ Many of the links above are videos or have links to a video.