

## Loci and Construction - Worksheet

### Skill

#### Group A - Constructions

Accurately create each construction using the appropriate construction equipment:

- |   |   |
|---|---|
| <b>1)</b> Draw a $60^\circ$ angle and then bisect it using a pair of compasses and a ruler.   | <b>2)</b> Draw a $45^\circ$ angle and then bisect it using a pair of compasses and a ruler.   |
| <b>3)</b> Draw a line that is $8\text{cm}$ long and then construct the perpendicular bisector.  | <b>4)</b> Draw a line that is $10\text{cm}$ long and then construct the perpendicular bisector.   |
| <b>5)</b> Draw a line that is $8\text{cm}$ long. Mark the point $P$ $3\text{cm}$ from the end of the line and then construct the perpendicular to the line at the point $P$ . | <b>6)</b> Draw a line that is $5\text{cm}$ long. Mark the point $P$ $2\text{cm}$ from the end of the line and then construct the perpendicular to the line at the point $P$ . |
| <b>7)</b> Draw a line that is $8\text{cm}$ long. Mark a point $5\text{cm}$ from the line. Construct the perpendicular from the point to the line.                             | <b>8)</b> Draw a line that is $7\text{cm}$ long. Mark a point $4\text{cm}$ from the line. Construct the perpendicular from the point to the line.                             |
| <b>9)</b> Construct a triangle with sides $4\text{cm}$ , $3\text{cm}$ and $2\text{cm}$ .  | <b>10)</b> Construct a triangle with sides $5\text{cm}$ , $3.5\text{cm}$ and $6.5\text{cm}$ .   |
| <b>11)</b> Construct the triangle ABC where $AB = 4\text{cm}$ , $BC = 6\text{cm}$ , and angle $ABC = 55^\circ$ .  | <b>12)</b> Construct the triangle DEF where $DE = 4.5\text{cm}$ , $EF = 3\text{cm}$ , and angle $DEF = 75^\circ$ .  |

## Loci and Construction - Worksheet

### Group B - Loci

Construct each loci using the appropriate construction equipment:

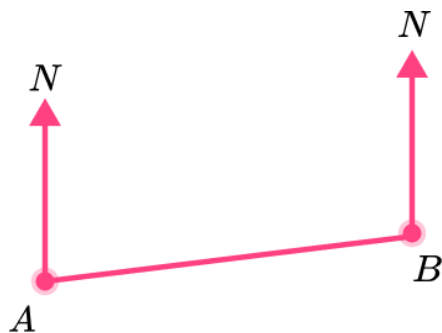
- 1) Mark a point and label it  $P$ . Draw the locus of points  $4\text{cm}$  from the point  $P$ .
- 2) Draw a line that is  $5\text{cm}$  long. Draw the locus of points that are  $2\text{cm}$  from the line.
- 3) Draw a square with sides  $4\text{cm}$ . Show the locus of points that are less than  $3\text{cm}$  from the square.
- 4) Mark two points,  $A$  and  $B$ ,  $7\text{cm}$  apart. Construct the locus of points equidistant from  $A$  and  $B$ .
- 5) Draw a rectangle  $ABCD$  where  $AB = CD = 4\text{cm}$  and  $BC = AD = 6\text{cm}$ . Shade the locus of points within the rectangle that are closer to  $A$  than to  $B$ .
- 6) Draw a rectangle  $ABCD$  where  $AB = CD = 3\text{cm}$  and  $BC = AD = 6\text{cm}$ . Shade the locus of points closer to  $AB$  than to  $BC$ .
- 7) Draw two points,  $A$  and  $B$ ,  $6\text{cm}$  apart. Construct the locus of points which are less than  $4\text{cm}$  from point  $A$  **and** less than  $3\text{cm}$  from point  $B$ .
- 8) Draw two points,  $A$  and  $B$ ,  $6\text{cm}$  apart. Construct the locus of points which are less than  $4\text{cm}$  from point  $A$  **and** more than  $3\text{cm}$  from point  $B$ .
- 9) Draw a right angled triangle  $ABC$  where  $AB = 4\text{cm}$ ,  $BC = 3\text{cm}$ , and  $AC = 5\text{cm}$ . Shade the area within the triangle that is closer to  $AB$  than to  $BC$ .
- 10) Draw a right angled triangle  $ABC$  where  $AB = 4\text{cm}$ ,  $BC = 3\text{cm}$ , and  $AC = 5\text{cm}$ . Shade the area within the triangle that is closer to  $AB$  than to  $BC$  **and** is more than  $2\text{cm}$  from the point  $B$ .
- 11) Draw a rectangle  $EFGH$  where  $EF = GH = 7\text{cm}$  and  $FG = EH = 5\text{cm}$ . Shade the locus of points that are closer to  $EF$  than to  $FG$  and less than  $3\text{cm}$  from  $EF$ .
- 12) Draw a rectangle  $EFGH$  where  $EF = GH = 7\text{cm}$  and  $FG = EH = 5\text{cm}$ . Shade the locus of points that are closer to  $FG$  than  $GH$ , closer to  $F$  than to  $G$  and more than  $4\text{cm}$  from  $E$ .

# Loci and Construction - Worksheet

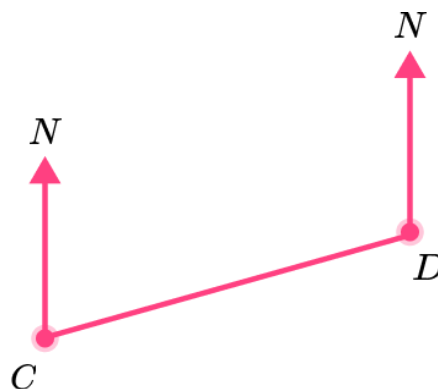
## Group C - Bearings

Find each bearing specified. Be careful which diagrams are **not** drawn to scale:

- 1) Measure the bearing of  $B$  from  $A$ .



- 2) Measure the bearing of  $C$  from  $D$ .



- 3) Measure the bearing of  $F$  from  $E$ .



- 4) Measure the bearing of  $G$  from  $H$ .



- 5) Work out the bearing of  $I$  from  $J$ .

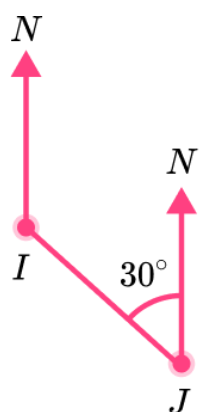


Diagram **not** to scale

- 6) Work out the bearing of  $K$  from  $L$ .

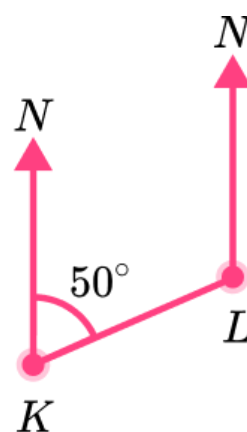


Diagram **not** to scale

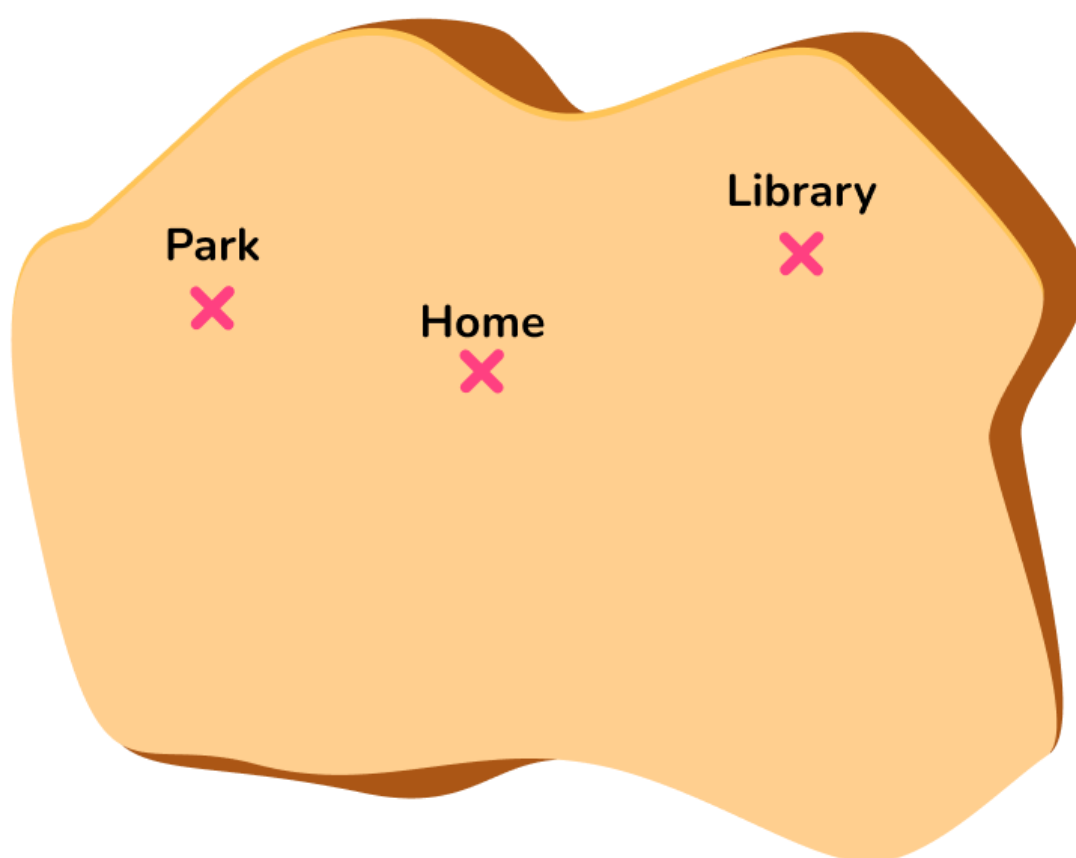
## Loci and Construction - Worksheet

- 7)** The bearing of  $Q$  from  $P$  is  $038^\circ$ .  
What is the bearing of  $P$  from  $Q$ ?
- 8)** The bearing of  $S$  from  $R$  is  $200^\circ$ .  
What is the bearing of  $R$  from  $S$ ?
- 9)** A plane starts at airport  $A$  and flies  $30\text{km}$  East and  $40\text{km}$  North to airport  $B$ . What is the bearing of airport  $B$  from airport  $A$ ?
- 10)** A plane starts at airport  $A$  and flies  $60\text{km}$  West and  $70\text{km}$  South to airport  $B$ . What is the bearing of airport  $B$  from airport  $A$ ?
- 11)** A ship travels  $2\text{km}$  South,  $5\text{km}$  East and then  $6\text{km}$  North. Find the bearing of the ship from its starting point.
- 12)** A ship travels  $15\text{km}$  East,  $10\text{km}$  South and  $24\text{km}$  West. Find the bearing from the ship to its starting point.

## Loci and Construction - Worksheet

### Applied

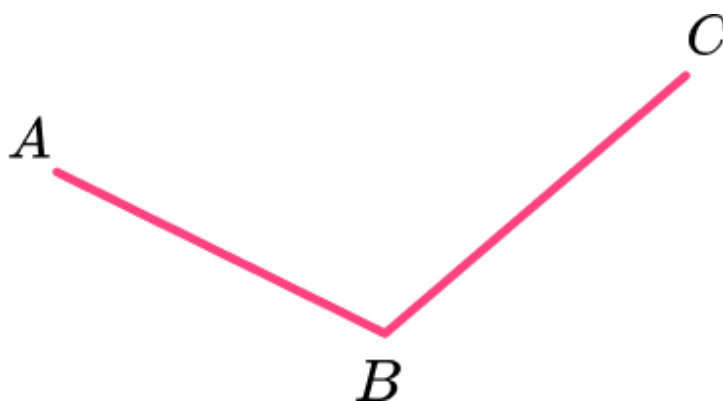
- 1)  $ABC$  is a triangle.  $AB = 8\text{cm}$ ,  $AC = 7\text{cm}$  and angle  $ABC = 50^\circ$ .  
Draw two possible triangles for  $ABC$ .
- 2) (a) A driver is between  $10\text{km}$  and  $15\text{km}$  from home. Using the scale  $1\text{cm} = 5\text{km}$ , show the locus of points where the driver could be.



- (b) The driver is closer to the park than the library. Update the diagram to show the possible position of the driver.
- 3) (a) Lucy travels  $7\text{km}$  on a bearing of  $110^\circ$  followed by  $10\text{km}$  on a bearing of  $240^\circ$ . Using an appropriate scale, create a scale drawing to show Lucy's journey.
- (b) Use your drawing to measure the bearing of Lucy's starting point from Lucy's final position.

## Loci and Construction - Exam Questions

- 1) (a) Bisect angle ABC.



- (2)
- (b) Accurately construct a triangle with side lengths  $7\text{cm}$ ,  $4\text{cm}$  and  $5.5\text{cm}$ .

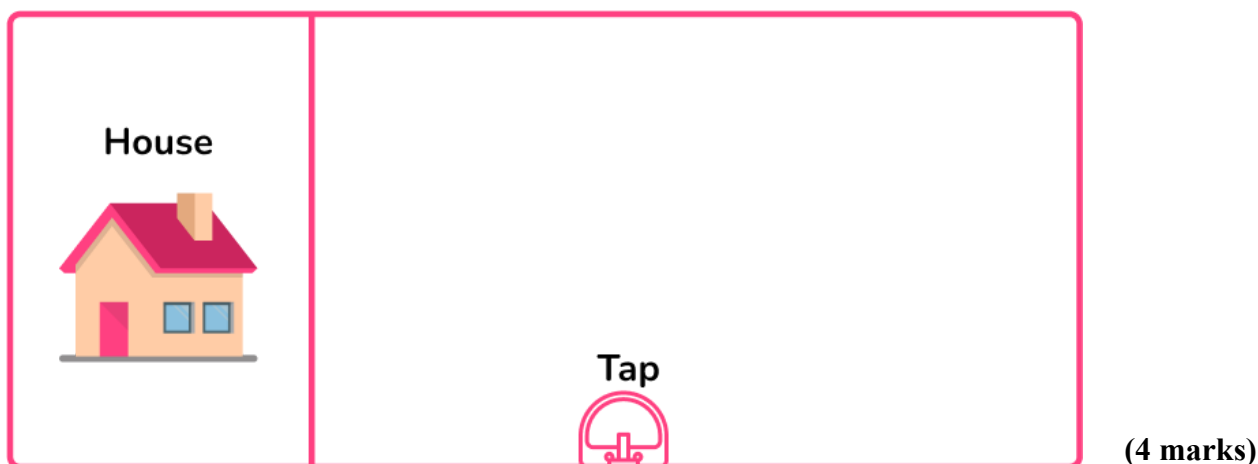
(2)  
(4 marks)

## Loci and Construction - Exam Questions

- 2) Gary is deciding where to place his BBQ.

His BBQ must be more than 2m from a building and within 3m of a tap.  
Gary wants his BBQ to be within 1.5m of any edge of his garden.

Using the scale 1cm:1m, shade the area where Gary could place his BBQ.



- 3) (a) Measure the bearing of B from A.



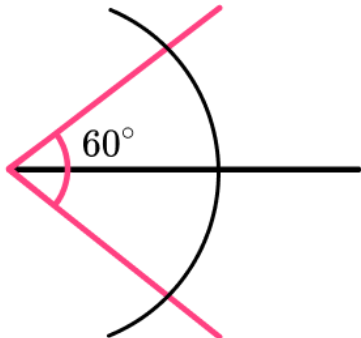
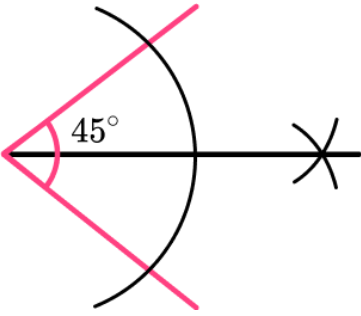
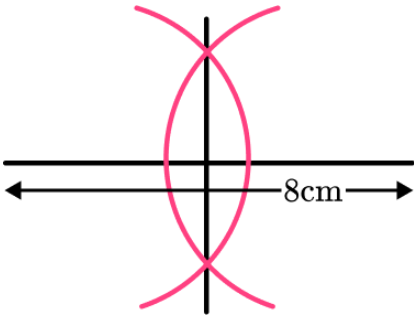
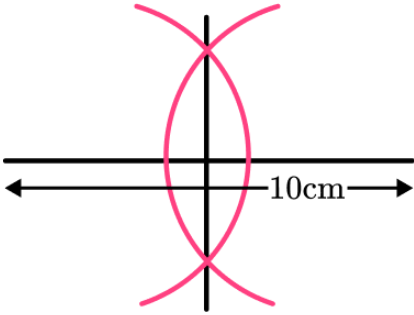
.....  
(1)

- (b) A plane is on a bearing of  $100^\circ$  from point P and a bearing of  $250^\circ$  from point Q. Mark the position of the plane.



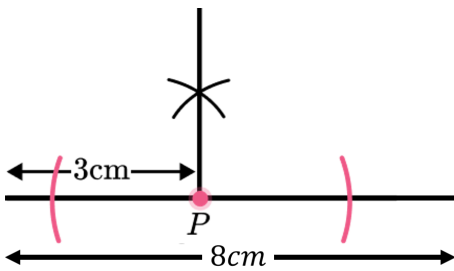
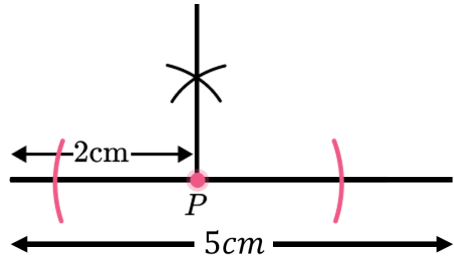
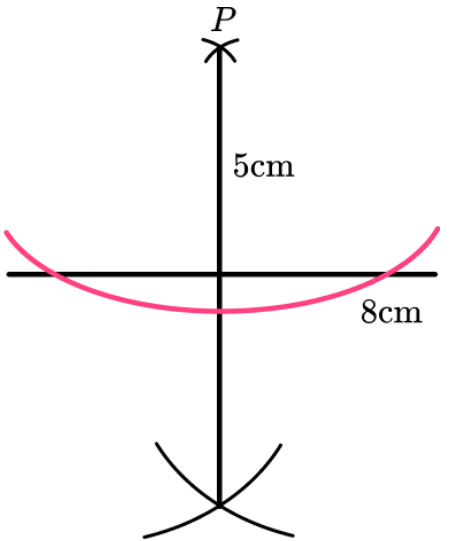
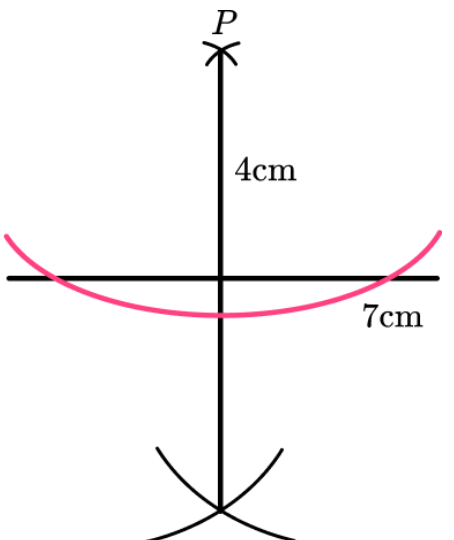
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(3)  
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## Loci and Construction - Answers

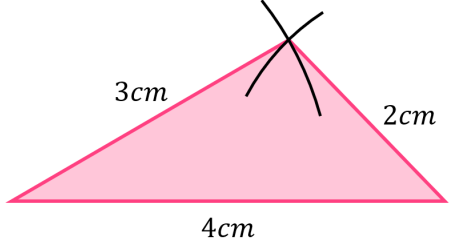
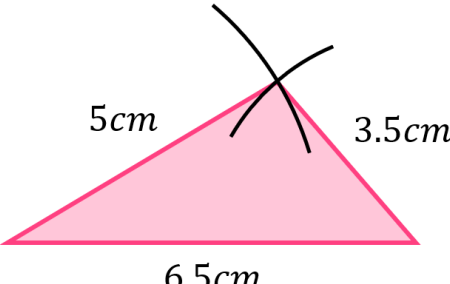
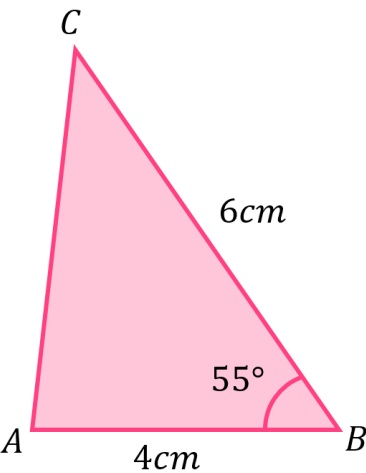
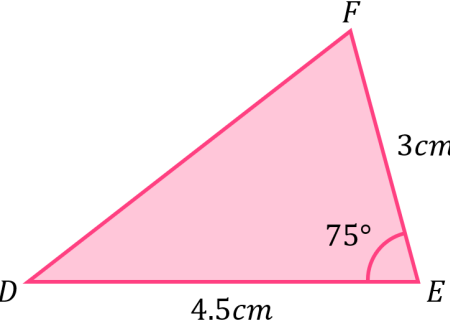
	Question	Answer
	Skill Questions	
Group A	<p>Accurately create each construction using the appropriate construction equipment:</p> <p><b>1)</b> Draw a <math>60^\circ</math> angle and then bisect it using a pair of compasses and a ruler.</p> <p><b>2)</b> Draw a <math>45^\circ</math> angle and then bisect it using a pair of compasses and a ruler.</p> <p><b>3)</b> Draw a line that is <math>8\text{cm}</math> long and then construct the perpendicular bisector.</p> <p><b>4)</b> Draw a line that is <math>10\text{cm}</math> long and then construct the perpendicular bisector.</p>	<p><b>1)</b> </p> <p><b>2)</b> </p> <p><b>3)</b> </p> <p><b>4)</b> </p>



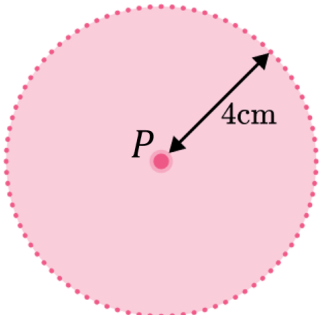
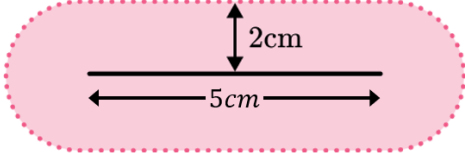
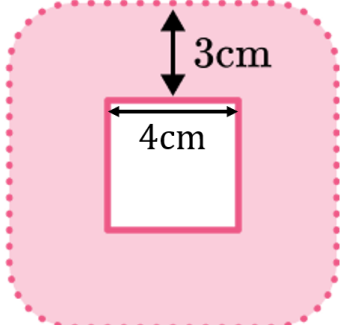
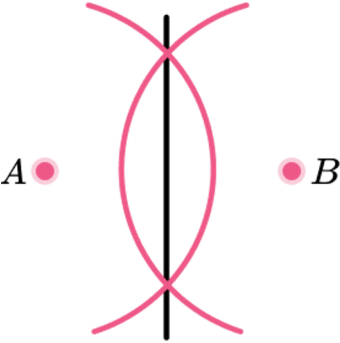
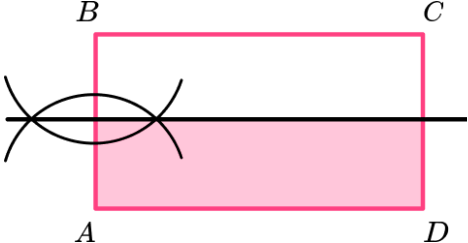
# Loci and Construction - Answers

<p>Group A contd</p>	<p>5) Draw a line that is <math>8\text{cm}</math> long. Mark the point <math>P</math> <math>3\text{cm}</math> from the end of the line and then construct the perpendicular to the line at the point <math>P</math>.</p> <p>6) Draw a line that is <math>5\text{cm}</math> long. Mark the point <math>P</math> <math>2\text{cm}</math> from the end of the line and then construct the perpendicular to the line at the point <math>P</math>.</p> <p>7) Draw a line that is <math>8\text{cm}</math> long. Mark a point <math>5\text{cm}</math> from the line. Construct the perpendicular from the point to the line.</p> <p>8) Draw a line that is <math>7\text{cm}</math> long. Mark a point <math>4\text{cm}</math> from the line. Construct the perpendicular from the point to the line.</p>	<p>5) </p> <p>6) </p> <p>7) </p> <p>8) </p>
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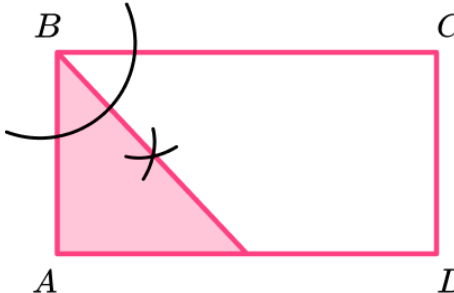
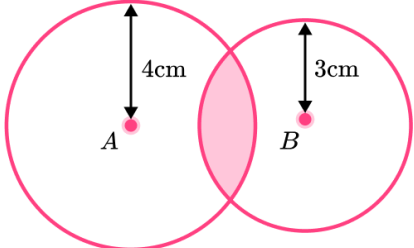
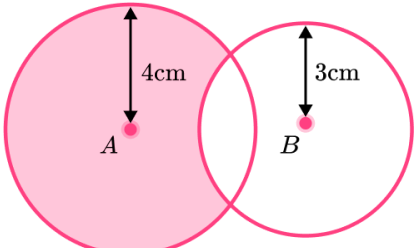
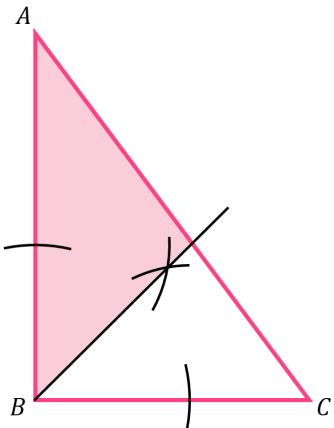
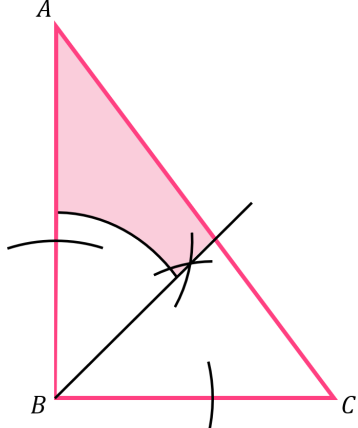
## Loci and Construction - Answers

Group A contd	<b>9)</b> Construct a triangle with sides $4\text{cm}$ , $3\text{cm}$ and $2\text{cm}$ .	<b>9)</b> 
	<b>10)</b> Construct a triangle with sides $5\text{cm}$ , $3.5\text{cm}$ and $6.5\text{cm}$ .	<b>10)</b> 
	<b>11)</b> Construct the triangle ABC where $AB = 4\text{cm}$ , $BC = 6\text{cm}$ , and angle $ABC = 55^\circ$ .	<b>11)</b> 
	<b>12)</b> Construct the triangle DEF where $DE = 4.5\text{cm}$ , $EF = 3\text{cm}$ , and angle $DEF = 75^\circ$ .	<b>12)</b> 

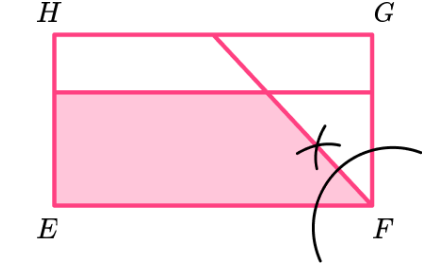
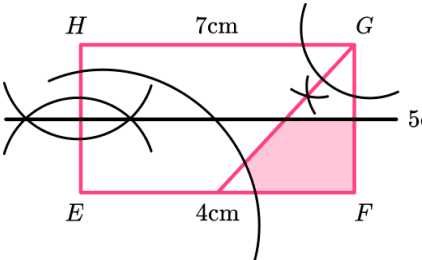

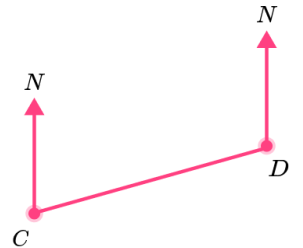


## Loci and Construction - Answers

Group B	Construct each loci using the appropriate construction equipment:	
	<b>1)</b> Mark a point and label it $P$ . Draw the locus of points $4\text{cm}$ from the point $P$ .	<b>1)</b> 
	<b>2)</b> Draw a line that is $5\text{cm}$ long. Draw the locus of points that are $2\text{cm}$ from the line.	<b>2)</b> 
	<b>3)</b> Draw a square with sides $4\text{cm}$ . Show the locus of points that are less than $3\text{cm}$ from the square.	<b>3)</b> 
	<b>4)</b> Mark two points, $A$ and $B$ , $7\text{cm}$ apart. Construct the locus of points equidistant from $A$ and $B$ .	<b>4)</b> 
	<b>5)</b> Draw a rectangle $ABCD$ where $AB = CD = 4\text{cm}$ and $BC = AD = 6\text{cm}$ . Shade the locus of points within the rectangle that are closer to $A$ than to $B$ .	<b>5)</b> 

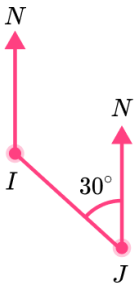
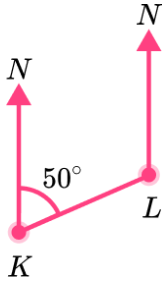
## Loci and Construction - Answers

Group B contd	<p><b>6)</b> Draw a rectangle <math>ABCD</math> where <math>AB = CD = 3\text{cm}</math> and <math>BC = AD = 6\text{cm}</math>. Shade the locus of points closer to <math>AB</math> than to <math>BC</math>.</p>	<p><b>6)</b> </p>
	<p><b>7)</b> Draw two points, <math>A</math> and <math>B</math>, <math>6\text{cm}</math> apart. Construct the locus of points which are less than <math>4\text{cm}</math> from point <math>A</math> <b>and</b> less than <math>3\text{cm}</math> from point <math>B</math>.</p>	<p><b>7)</b> </p>
	<p><b>8)</b> Draw two points, <math>A</math> and <math>B</math>, <math>6\text{cm}</math> apart. Construct the locus of points which are less than <math>4\text{cm}</math> from point <math>A</math> <b>and</b> more than <math>3\text{cm}</math> from point <math>B</math>.</p>	<p><b>8)</b> </p>
	<p><b>9)</b> Draw a right angled triangle <math>ABC</math> where <math>AB = 4\text{cm}</math>, <math>BC = 3\text{cm}</math>, and <math>AC = 5\text{cm}</math>. Shade the area within the triangle that is closer to <math>AB</math> than to <math>BC</math>.</p>	<p><b>9)</b> </p>
	<p><b>10)</b> Draw a right angled triangle <math>ABC</math> where <math>AB = 4\text{cm}</math>, <math>BC = 3\text{cm}</math>, and <math>AC = 5\text{cm}</math>. Shade the area within the triangle that is closer to <math>AB</math> than to <math>BC</math> <b>and</b> is more than <math>2\text{cm}</math> from the point <math>B</math>.</p>	<p><b>10)</b> </p>

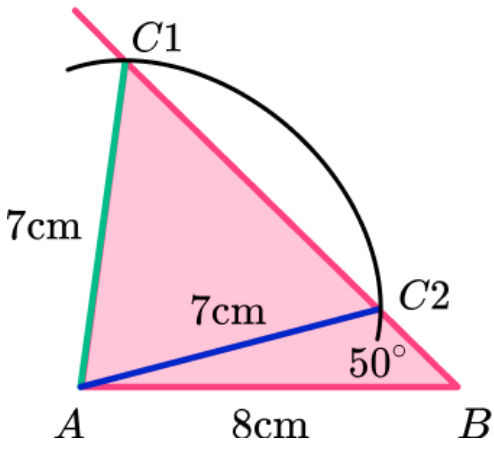
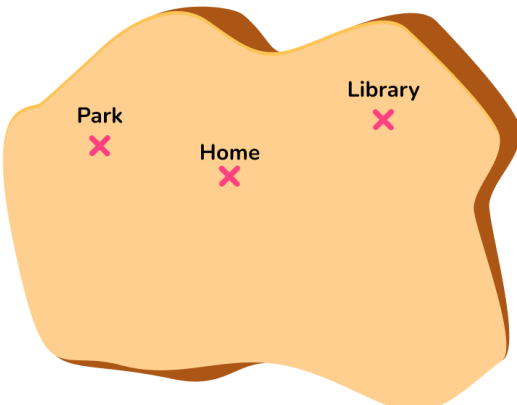
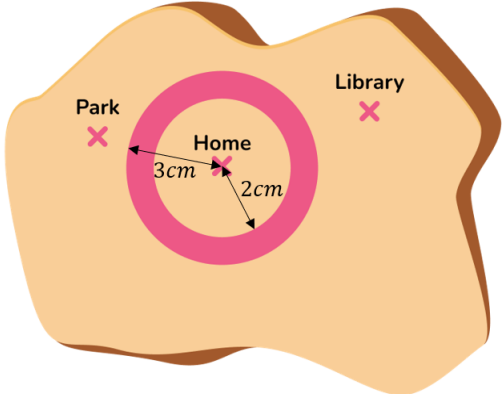
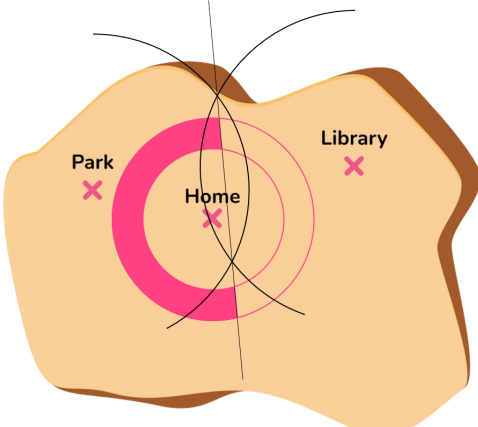
# Loci and Construction - Answers

<p>Group B contd</p>	<p><b>11)</b> Draw a rectangle <math>EFGH</math> where <math>EF = GH = 7\text{cm}</math> and <math>FG = EH = 5\text{cm}</math>. Shade the locus of points that are closer to <math>EF</math> than to <math>FG</math> and less than <math>3\text{cm}</math> from <math>EF</math>.</p> <p><b>12)</b> Draw a rectangle <math>EFGH</math> where <math>EF = GH = 7\text{cm}</math> and <math>FG = EH = 5\text{cm}</math>. Shade the locus of points that are closer to <math>FG</math> than <math>GH</math>, closer to <math>F</math> than to <math>G</math> and more than <math>4\text{cm}</math> from <math>E</math>.</p>	<p><b>11)</b> </p> <p><b>12)</b> </p>
<p>Group C</p>	<p>Find each bearing specified. Be careful which diagrams are <b>not</b> drawn to scale:</p> <p><b>1)</b> Measure the bearing of <math>B</math> from <math>A</math>.</p>  <p><b>2)</b> Measure the bearing of <math>C</math> from <math>D</math>.</p>  <p><b>3)</b> Measure the bearing of <math>F</math> from <math>E</math>.</p>  <p><b>4)</b> Measure the bearing of <math>G</math> from <math>H</math>.</p> 	<p><b>1)</b> <math>082^\circ</math></p> <p><b>2)</b> <math>253^\circ</math></p> <p><b>3)</b> <math>107^\circ</math></p> <p><b>4)</b> <math>280^\circ</math></p>

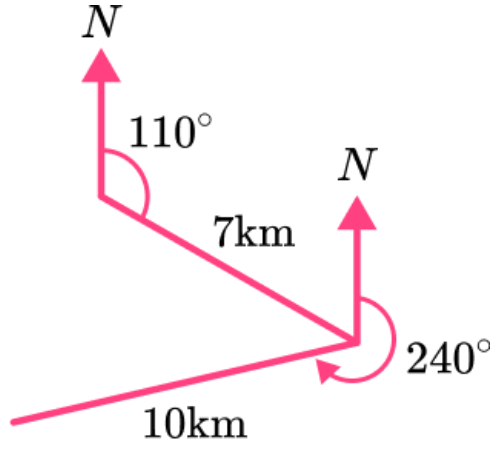
# Loci and Construction - Answers

Group C contd	<p><b>5)</b> Work out the bearing of <math>I</math> from <math>J</math>.</p>  <p>Diagram <b>not</b> to scale</p>	<b>5)</b> $330^\circ$
	<p><b>6)</b> Work out the bearing of <math>K</math> from <math>L</math>.</p>  <p>Diagram <b>not</b> to scale</p>	<b>6)</b> $230^\circ$
	<p><b>7)</b> The bearing of <math>Q</math> from <math>P</math> is <math>038^\circ</math>. What is the bearing of <math>P</math> from <math>Q</math>?</p>	<b>7)</b> $218^\circ$
	<p><b>8)</b> The bearing of <math>S</math> from <math>R</math> is <math>200^\circ</math>. What is the bearing of <math>R</math> from <math>S</math>?</p>	<b>8)</b> $020^\circ$
	<p><b>9)</b> A plane starts at airport <math>A</math> and flies <math>30\text{km}</math> East and <math>40\text{km}</math> North to airport <math>B</math>. What is the bearing of airport <math>B</math> from airport <math>A</math>?</p>	<b>9)</b> $037^\circ$
	<p><b>10)</b> A plane starts at airport <math>A</math> and flies <math>60\text{km}</math> West and <math>70\text{km}</math> South to airport <math>B</math>. What is the bearing of airport <math>B</math> from airport <math>A</math>?</p>	<b>10)</b> $221^\circ$
	<p><b>11)</b> A ship travels <math>2\text{km}</math> South, <math>5\text{km}</math> East and then <math>6\text{km}</math> North. Find the bearing of the ship from its starting point.</p>	<b>11)</b> $051^\circ$
	<p><b>12)</b> A ship travels <math>15\text{km}</math> East, <math>10\text{km}</math> South and <math>24\text{km}</math> West. Find the bearing from the ship to its starting point.</p>	<b>12)</b> $042^\circ$

## Loci and Construction - Answers

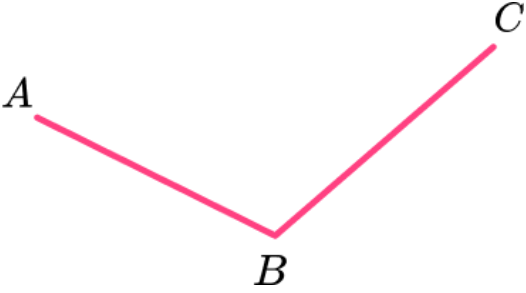
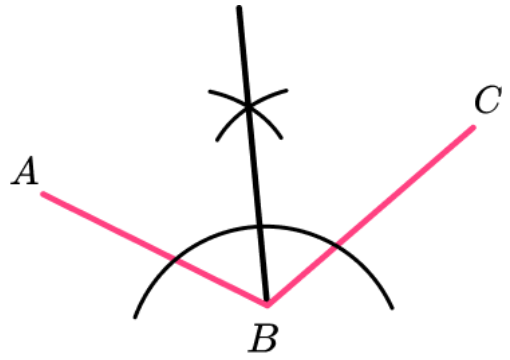
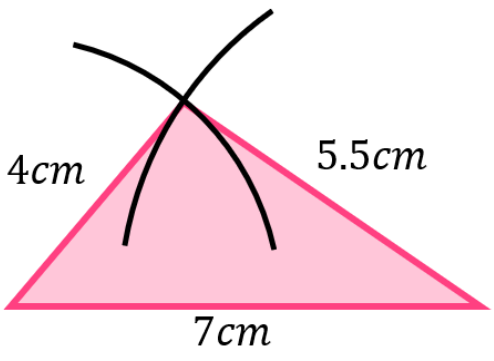
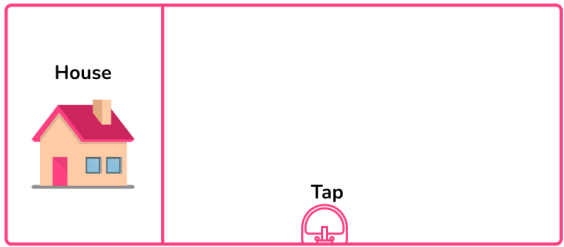
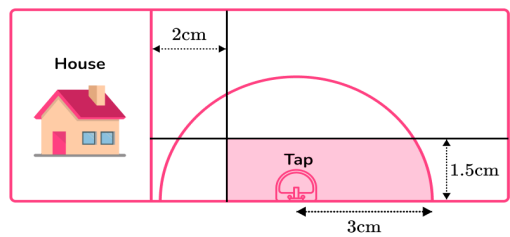
	Question	Answer
	Applied Questions	
1)	<p><math>ABC</math> is a triangle. <math>AB = 8\text{cm}</math>, <math>AC = 7\text{cm}</math> and angle <math>ABC = 50^\circ</math>. Draw two possible triangles for <math>ABC</math>.</p>	
2)	<p>a) A driver is between <math>10\text{km}</math> and <math>15\text{km}</math> from home. Using the scale <math>1\text{cm} = 5\text{km}</math>, show the locus of points where the driver could be.</p>  <p>b) The driver is closer to the park than the library. Update the diagram to show the possible position of the driver.</p>	<p>a)</p>  <p>b)</p> 

**Loci and Construction - Answers**





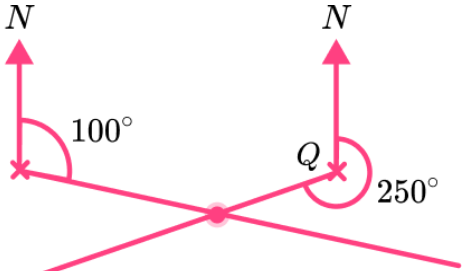
<b>3)</b>	<p><b>a)</b> Lucy travels <math>7\text{km}</math> on a bearing of <math>110^\circ</math> followed by <math>10\text{km}</math> on a bearing of <math>240^\circ</math>. Using an appropriate scale, create a scale drawing to show Lucy's journey.</p> <p><b>b)</b> Use your drawing to measure the bearing of Lucy's starting point from Lucy's final position.</p>	<p><b>a)</b></p>  <p><b>b)</b> <math>016^\circ</math></p>
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## Loci and Construction - Mark Scheme

	Question	Answer
	Exam Questions	
1) (a)	Bisect angle ABC. 	(a)  For construction arcs For correct bisector <div style="float: right; text-align: right;">             (1) (1)           </div>
(b)	Accurately construct a triangle with side lengths 7cm, 4cm and 5.5cm.	(b)  For base and construction arcs For correct triangle <div style="float: right; text-align: right;">             (1) (1)           </div>
2)	Gary is deciding where to place his BBQ. His BBQ must be more than 2m from a building and within 3m of a tap. Gary wants his BBQ to be within 1.5m of any edge of his garden. Using the scale 1cm:1m, shade the area where Gary could place his BBQ. <div style="display: flex; align-items: center; margin-top: 10px;">  </div>	 For line 2cm from house For arc radius 3cm from tap For line 1.5cm from base For correct shaded region <div style="float: right; text-align: right;">             (1) (1) (1) (1)           </div>

## Loci and Construction - Mark Scheme

<b>3) (a)</b>	Measure the bearing of B from A. <div style="text-align: right; margin-top: 100px;">  B         </div> <div style="text-align: left; margin-top: 100px;">  A         </div>	<b>(a)</b> 074°	<b>(1)</b>
<b>(b)</b>	A plane is on a bearing of 100° from point P and a bearing of 250° from point Q. Mark the position of the plane. <div style="display: flex; justify-content: space-around; margin-top: 100px;"> <div style="text-align: left;">  P         </div> <div style="text-align: right;">  Q         </div> </div>	<b>(b)</b>  <div style="margin-top: 10px;">           For line with bearing 100°            For line with bearing 250°            For correct position of the plane marked         </div>	<b>(1)</b> <b>(1)</b> <b>(1)</b>

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