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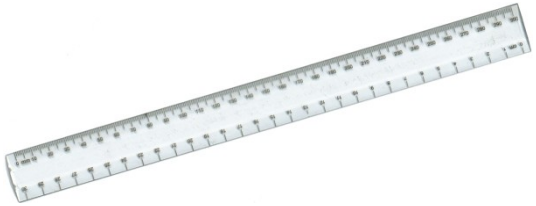
S9 Construction and loci

- S9.1 Constructing triangles
- S9.2 Geometrical constructions
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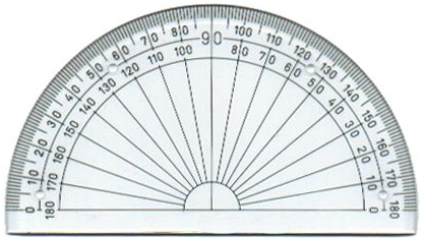
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Equipment needed for constructions

Before you begin make sure you have the following equipment:



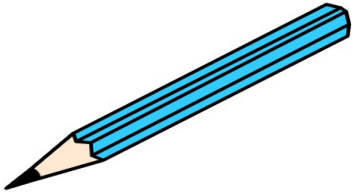
A ruler marked in cm and mm



A protractor



A pair of compasses



A *sharp* pencil

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Constructing triangles

To accurately construct a triangle you need to know:

- The length of two sides and the included angle (SAS)
- The size of two angles and a side (ASA)
- The lengths of three of the sides (SSS)

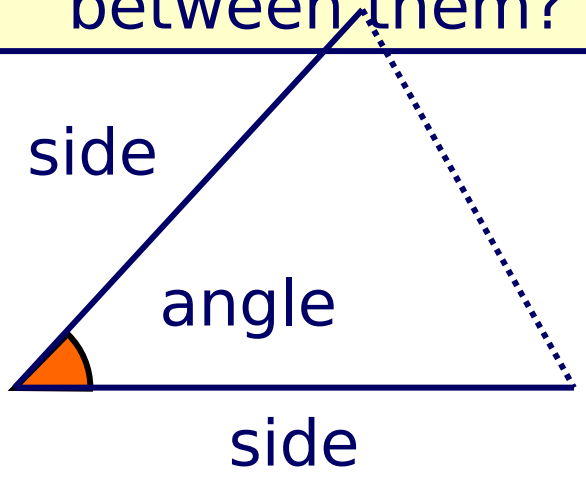
Or

- A right angle, the length of the hypotenuse and the length of one other side (RHS)

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Constructing a triangle given SAS

How could we construct a triangle given the lengths of two of its sides and the angle between them?



The angle between the two sides is often called the **included angle**.

We use the abbreviation **SAS** to stand for **S**ide, **A**ngle and **S**ide.

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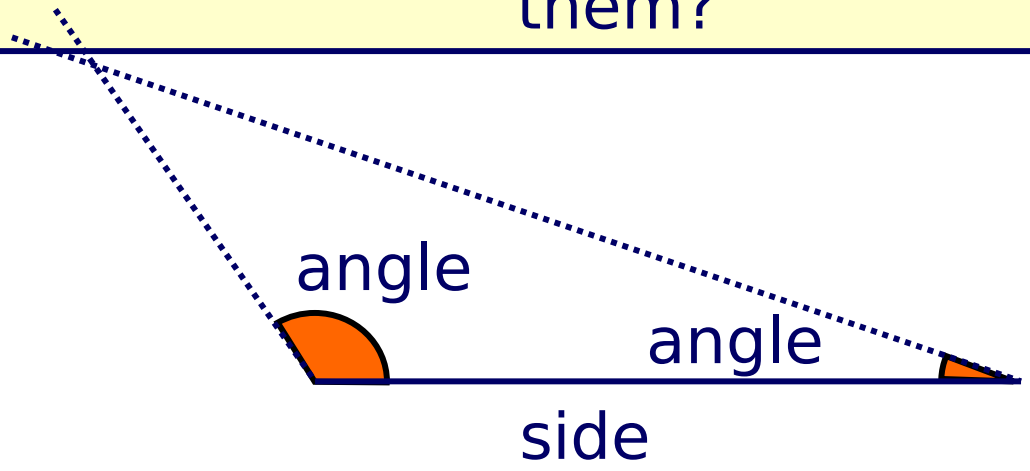
Constructing a triangle given SAS

For example, construct $\triangle ABC$ with AB = 6 cm, $\angle B = 68°$ and BC = 5 cm.

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Constructing a triangle given ASA

How could we construct a triangle given two angles and the length of the side between them?



The side between the two angles is often called the **included side**.

We use the abbreviation **ASA** to stand for **A**ngle, **S**ide and **A**ngle.

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Constructing a triangle given ASA

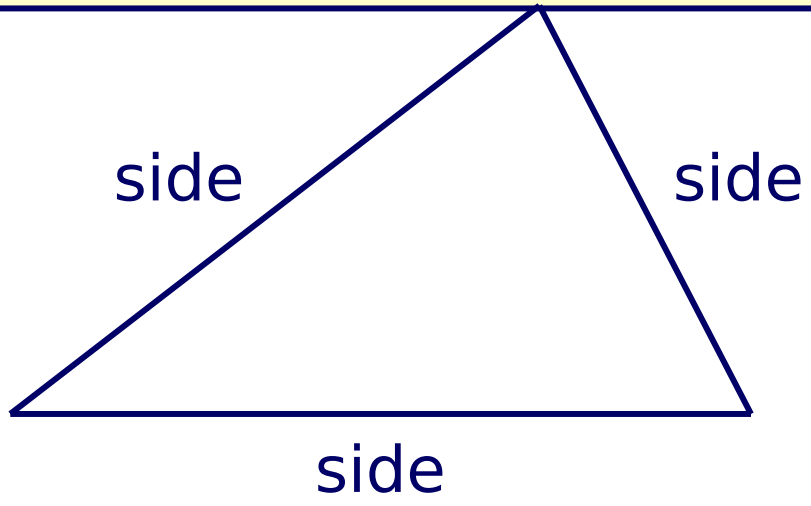
For example, construct $\triangle ABC$ with AB = 10 cm, $\angle A = 35°$ and $\angle B = 115°$.



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Constructing a triangle given SSS

How could we construct a triangle given the lengths of three sides?



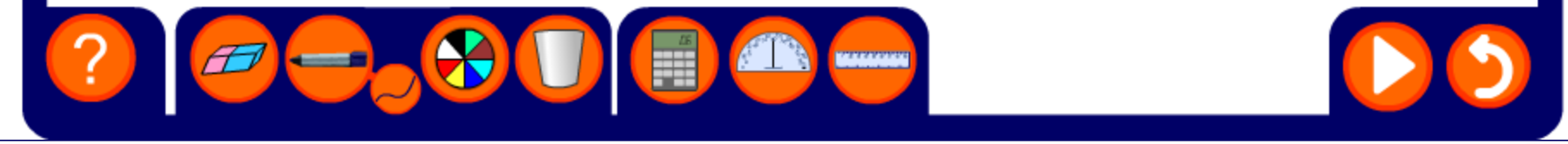
Hint: We would need to use a compass.

We use the abbreviation **SSS** to stand for **S**ide, **S**ide, **S**ide.

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Constructing a triangle given SSS

For example, construct $\triangle ABC$ with AB = 4 cm, BC = 3 cm and AC = 5 cm.

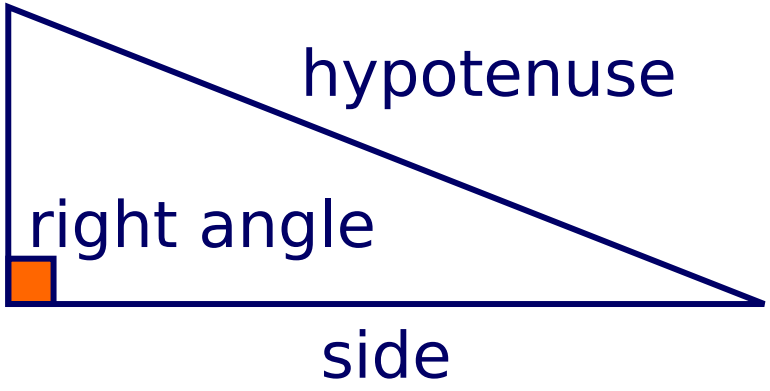


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Constructing a triangle given RHS

Remember, the longest side in a right-angled triangle is called the **hypotenuse**.

How could we construct a right-angled triangle given the right angle, the length of the hypotenuse and the length of one other side?



We use the abbreviation **RHS** to stand for **R**ight angle, **H**ypotenuse and **S**ide.

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Constructing a triangle given RHS

For example, construct $\triangle ABC$ with AB = 5 cm, $\angle B = 90°$ and AC = 7 cm.

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S9 Construction and loci

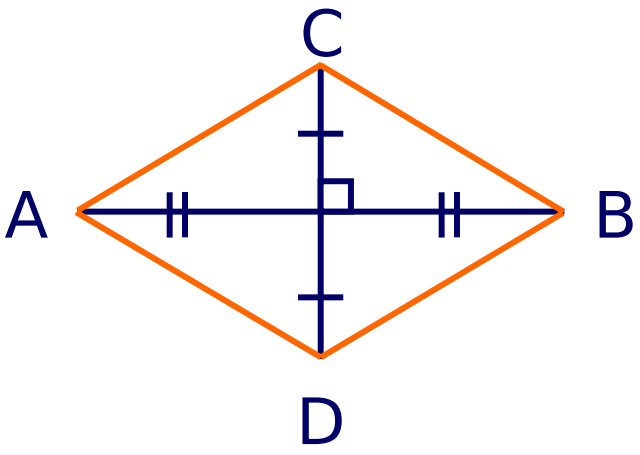
- S9.1 Constructing triangles
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- S9.3 Imagining paths and regions
- S9.4 Loci
- S9.5 Combining loci

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Bisecting lines

Two lines **bisect** each other if each line divides the other into two equal parts.

For example, line CD bisects line AB at right angles.



We indicate equal lengths using dashes on the lines.

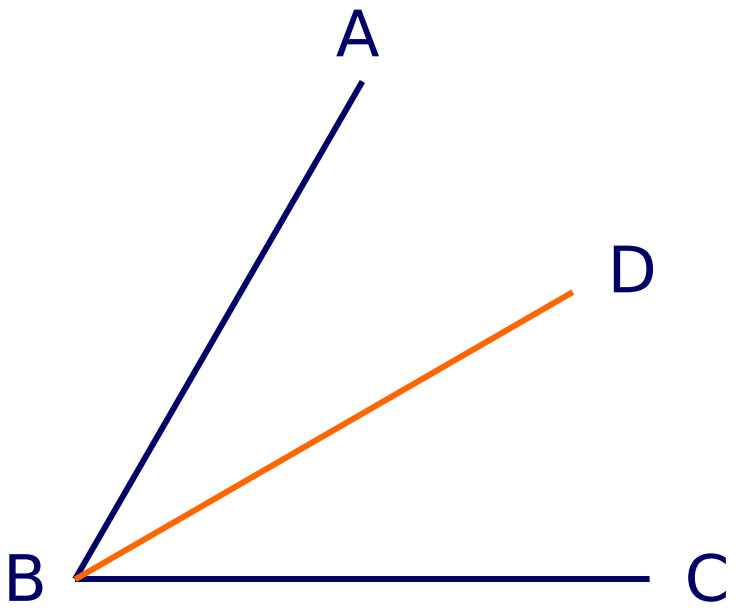
When two lines bisect each other at right angles we can join the end points together to form a rhombus.

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Bisecting angles

A line **bisects** an angle if it divides it into two equal angles.

For example, in this diagram line BD bisects $\angle$ ABC.



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The perpendicular bisector of a line

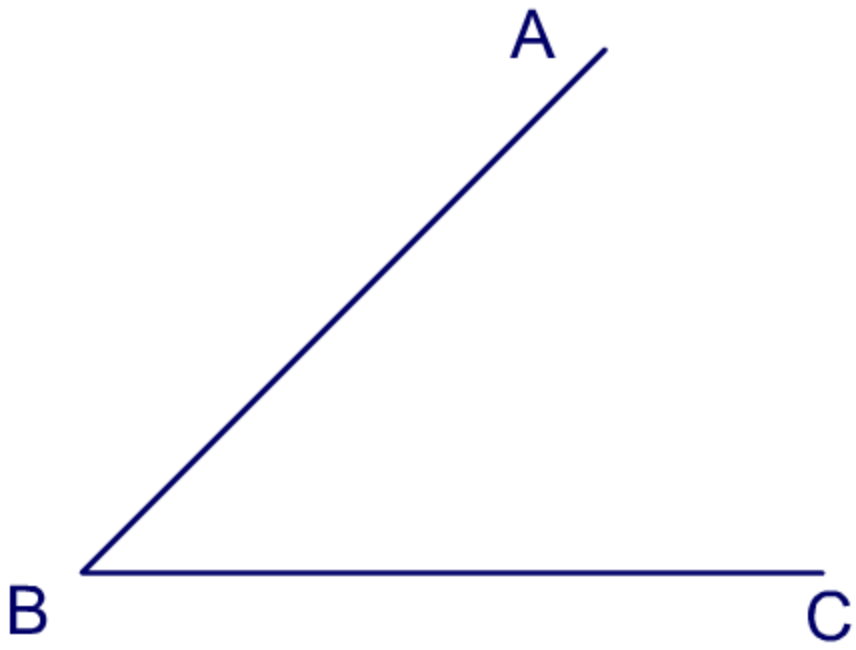
We can construct the perpendicular bisector of line segment AB using a ruler and a compass as follows.



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The bisector of an angle

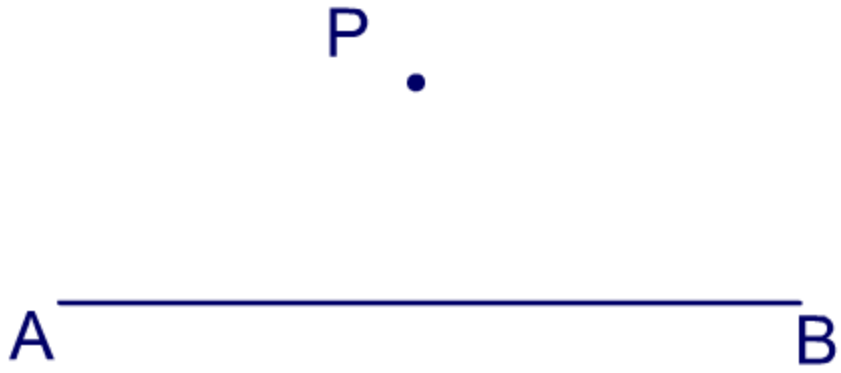
We can construct the bisector of an angle ABC using a ruler and a compass as follows.



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The perpendicular from a point to a line

We can construct the perpendicular from point P to line segment AB using a ruler and a compass as follows.



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The perpendicular from a point on a line

We can construct the perpendicular from the point P on line segment AB using a ruler and a compass as follows.



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