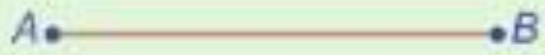
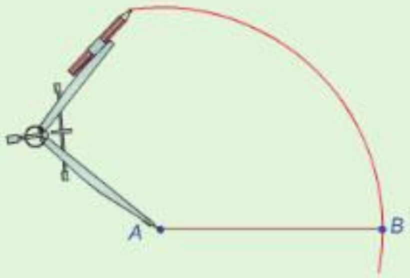
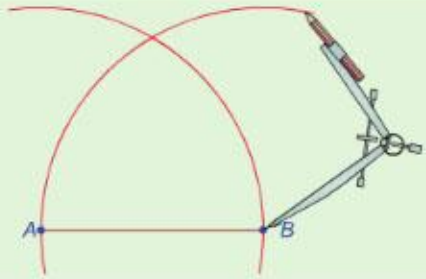
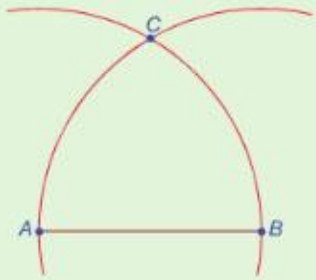
Construct an angle of 60 degrees with a protractor

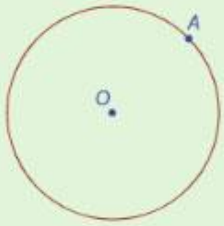
Construct an angle of 60° without using a protractor or a set square.

Solution

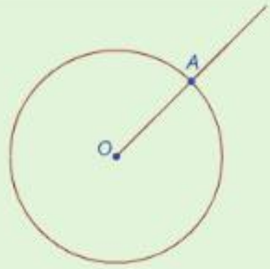
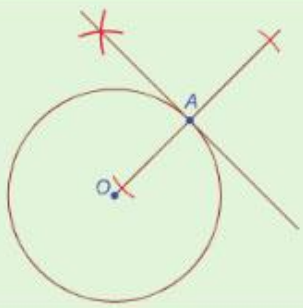
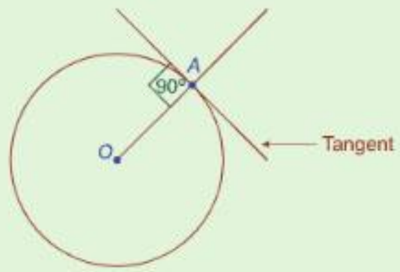
Draw a line segment [*AB*].	
Place the compass point at *A*, and draw an arc of radius length |*AB*|.	
Place the compass point at *B*, and draw an arc of radius length |*AB*|.	
Mark the point of intersection of the arcs and label as point *C*.	

Tangent to a circle at a given Point

Construct a **tangent** to the given circle at the point *A*.



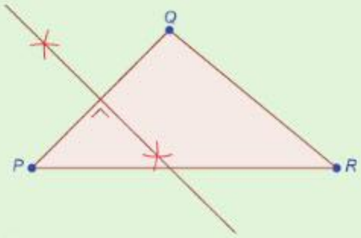
A **tangent** is a line that touches the circle at a single point.

Draw a ray from the centre *O* of the circle through the given point *A*.	
Construct a line perpendicular to the ray [*OA* through the point *A*.	
This is the tangent to the circle.	

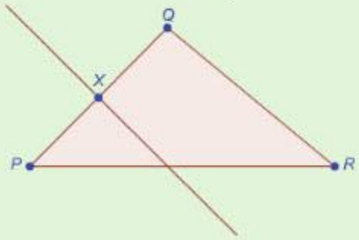
The Centroid of a Triangle

Construct the centroid of the triangle *PQR*.

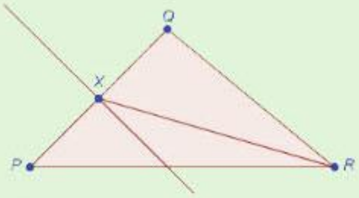
Construct the perpendicular bisector of the side [*PQ*].



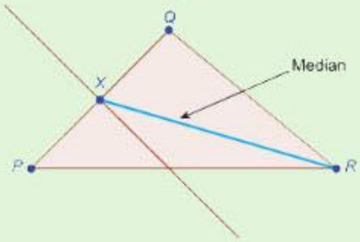
Label the midpoint of [*PQ*] as the point *X*.



Using a straight edge, draw a line from *X* to *R*, the opposite vertex of the triangle.

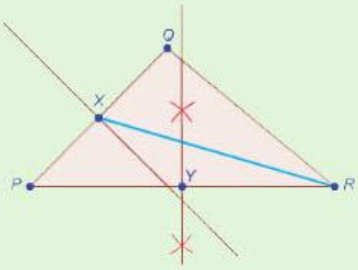


This line is a **median** of the triangle *PQR*.



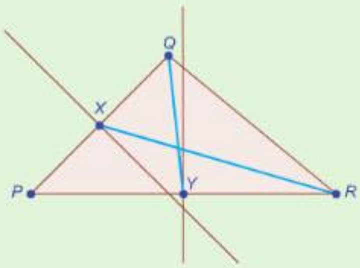
A **median** of a triangle is a segment that goes from one of the triangle's vertices to the midpoint of the opposite side.

Construct the perpendicular bisector of [*PR*] and label the midpoint *Y*.

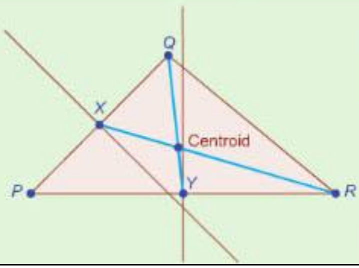


Using a straight edge, join *Y* to the opposite vertex, *Q*.

This is a second median.



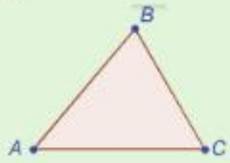
Where the medians intersect is the centroid of the triangle *PQR*.



The **centroid** is the triangle's balance point or centre of gravity, i.e. the point where the three medians of the triangle meet.

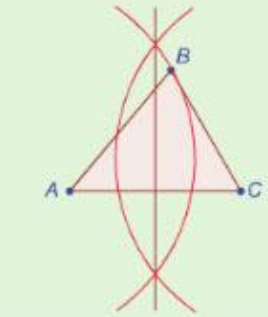
Circumcentre and Circumcircle

Construct the circumcentre and circumcircle of the triangle ABC.

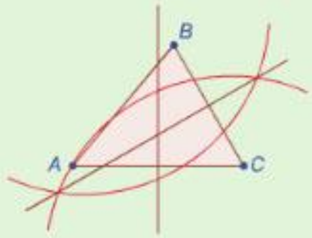


Solution

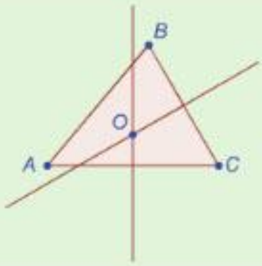
Construct the perpendicular bisector of $[AC]$.



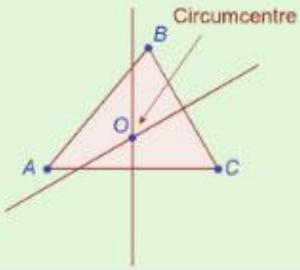
Construct the perpendicular bisector of any other side of the triangle – in this case the side $[BC]$.



Mark the point of intersection of the perpendicular bisectors and label as point O.

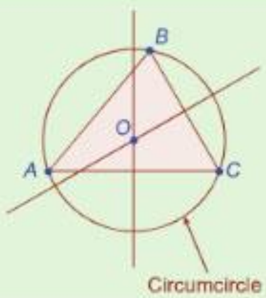


Point O is the **circumcentre** of the triangle ABC.



The **circumcentre** is the point where a triangle's three perpendicular bisectors meet.

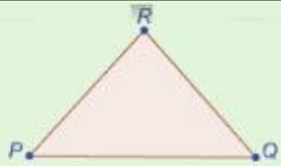
Place the compass point on O and draw a circle of radius length $|OA|$. This circle is the **circumcircle** of the triangle ABC.



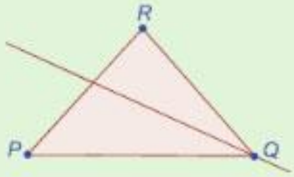
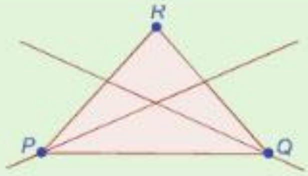
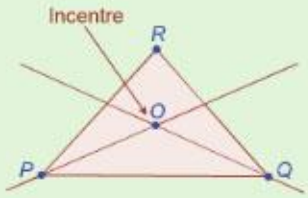
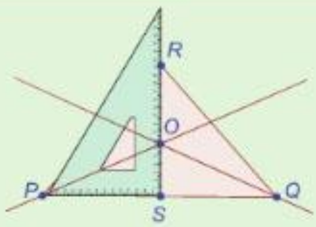
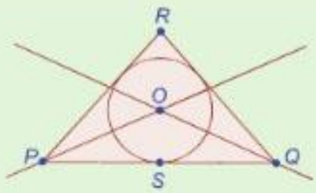
The **circumcircle** of a triangle is a circle that passes through all three vertices of the triangle.

Incentre and Incircle of a Triangle

Construct the incentre and incircle of the triangle *PQR*.



Solution

Construct the bisector of the angle *PQR*.	
Construct the bisector of any other angle in the triangle, e.g. ∠*RPQ*.	
Mark the point of intersection of the angle bisectors, and label as point *O*. Point *O* is the **incentre** of the triangle *PQR*.	
Using your set square, draw a perpendicular from *O* to a side of the triangle. Label the point where it meets this side as *S*.	
Place the compass point on *O* and the pencil on *S*, and draw a circle. This circle should touch all three sides of the triangle. This is the **incircle** of the triangle *PQR*.	

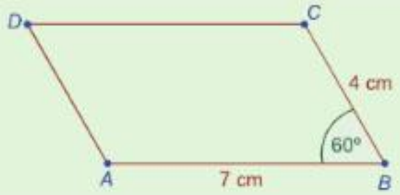
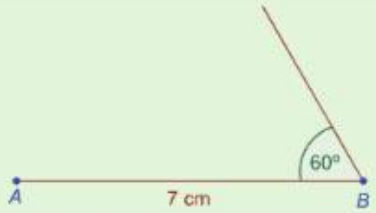
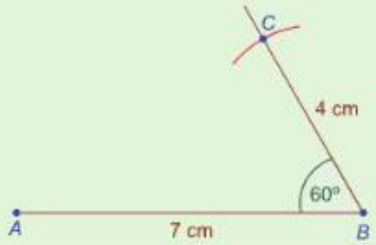
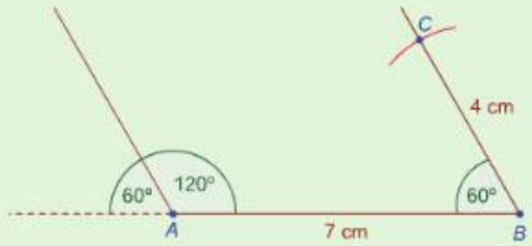
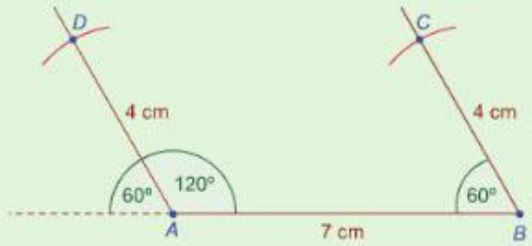
The **incentre** is the point where a triangle's three angle bisectors meet.

The **incircle** of a triangle is the largest circle that will fit inside the triangle. Each of the triangle's three sides is a tangent to the circle.

Parallelogram of given side lengths and given Angle

Construct a parallelogram $ABCD$ where $|AB| = 7$ cm, $|BC| = 4$ cm and $|\angle ABC| = 60°$.

Solution

Draw a rough sketch of the parallelogram.	
Construct the line segment [AB] where $\|AB\| = 7$ cm.	
At point B, construct an angle of 60°, using the line segment [AB] as one arm of the angle. Use your protractor for this angle.	
Mark the point C on this angle such that $\|BC\| = 4$ cm. Use your compass (or ruler) for this measurement.	
At point A, construct a ray parallel to BC. Use your protractor to measure the correct angle.	
Mark the point D on this ray such that $\|AD\| = 4$ cm. Use your compass (or ruler) for this measurement.	
Using a ruler, join C to D. Label all given measurements.