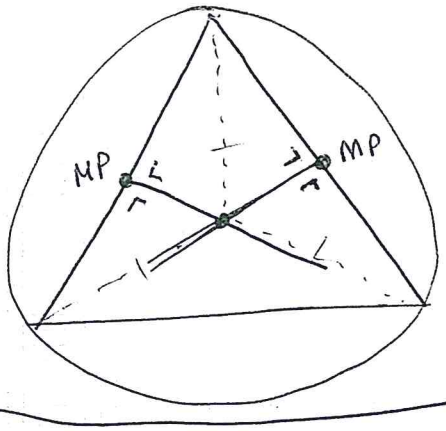
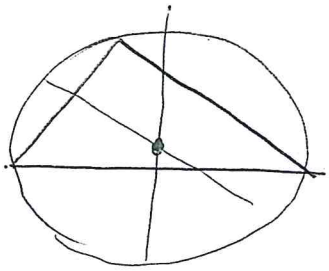
Constructions:





Circumcircle

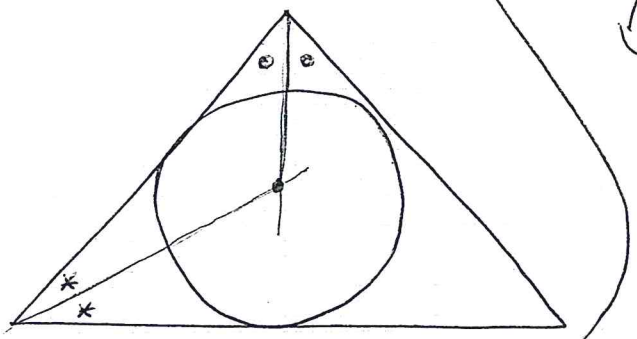
(Perpendicular bisector of sides)

centre can be outside or inside △

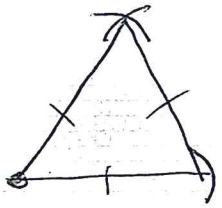
In circle

inside △

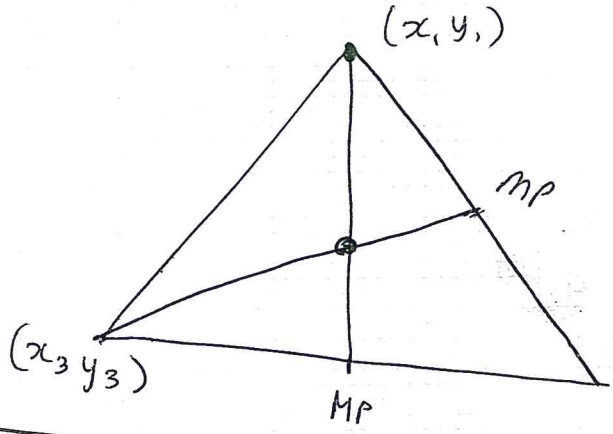
Bisect the angles



60° angle

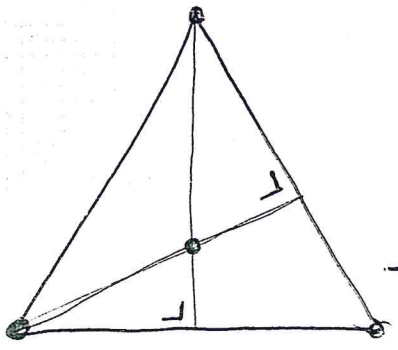


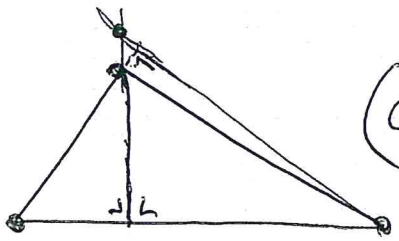
Centroid = where Medians meet = Centre of Gravity



$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2}{3}\right)$

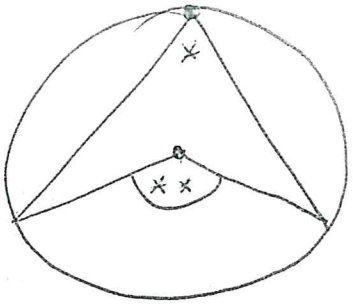
Orthocentre



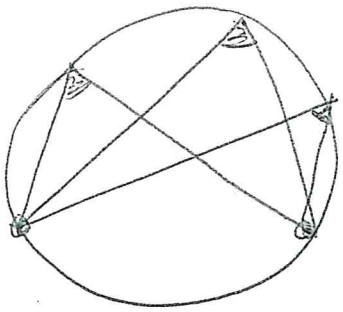


(can be outside)

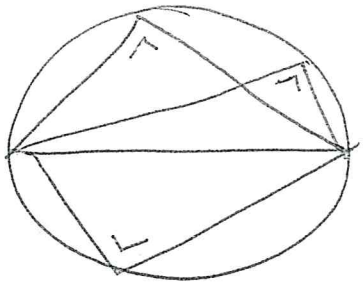
⊥ line from vertex to opposite side



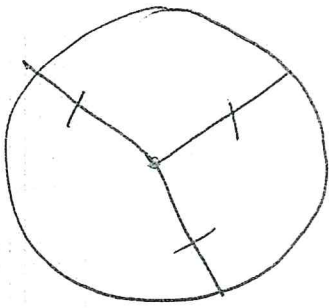
Angle at centre standing on arc = twice angle at edge standing on same arc.



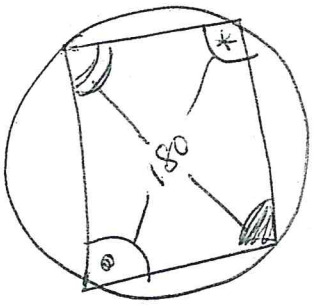
Angles @ edge standing on same arc are equal



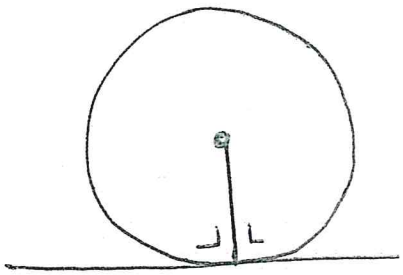
Any angle standing across a diameter is equal



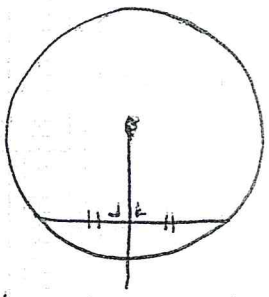
Always mark in radii



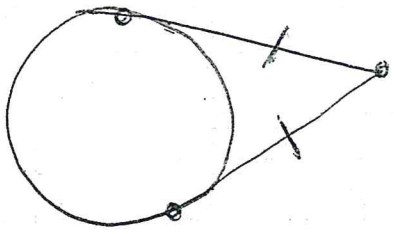
Opp angles of Cyclic Quadrilateral add up to 180°



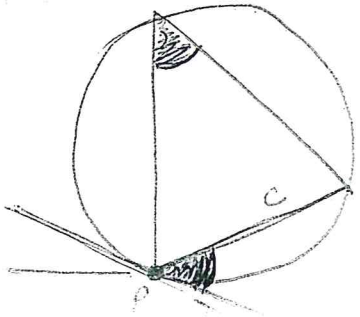
A tangent is ⊥ to the radius that goes to the point of contact



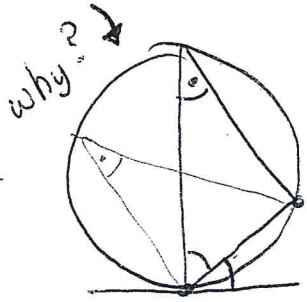
⊥ line from centre to chord bisects chord

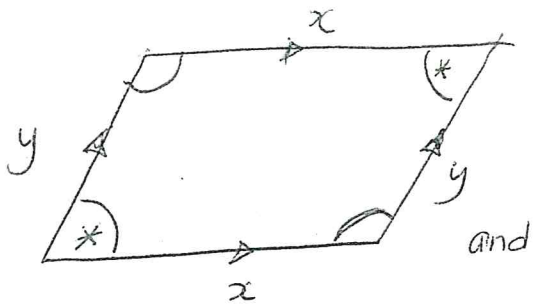


lengths of 2 tangents from a point to a circle are equal



angle between a tangent T and a chord C through the point of contact P = angle subtended by the chord in the alternate segment

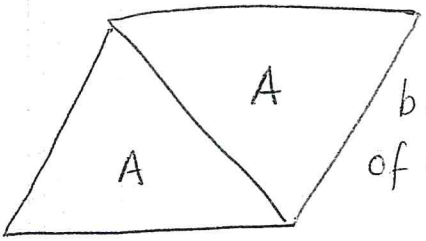




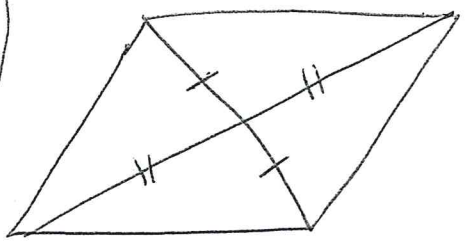
Opposite angles are equal

Opposite sides are equal

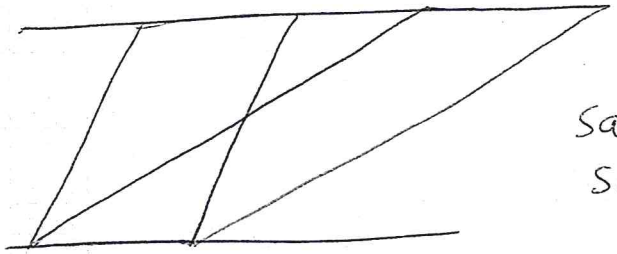
and $\angle * + \triangle = 180°$



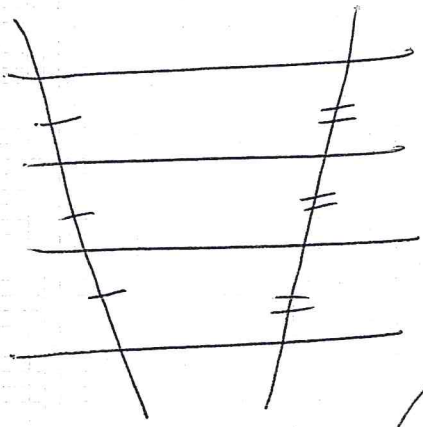
A diagonal bisects the area of a parallelogram



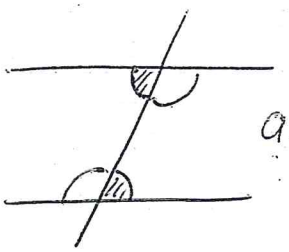
The diagonals of a parallelogram bisect each other



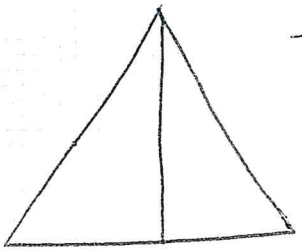
Same side
Same ⊥ height
=> Same area



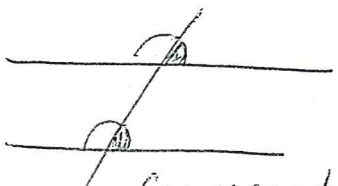
If n parallel lines cut off equal segments of some transversal
Then they will cut off equal segments of any other transversal



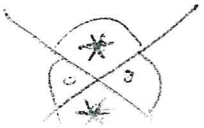
alternate angles



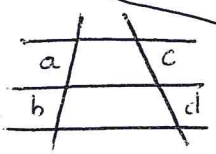
There are 3 Δ's in this diagram!



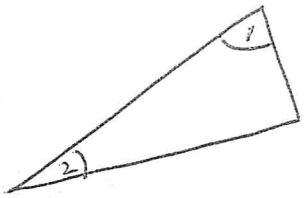
Corresponding angles



Vertically opposite

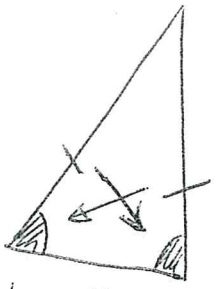


$\frac{a}{b} = \frac{c}{d}$

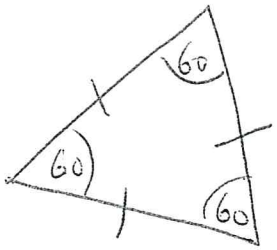


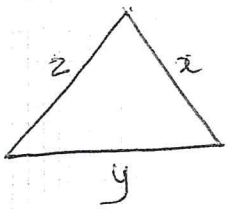
$\angle 1 > \angle 2$

angle opposite bigger side > angle opposite smaller side. o V.V.



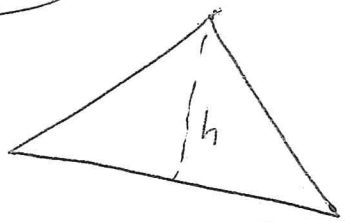
angles opp equal sides in ISOSceles triangles are equal



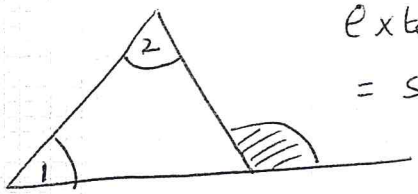


$x < y + z$
$y < x + z$
$z < x + y$

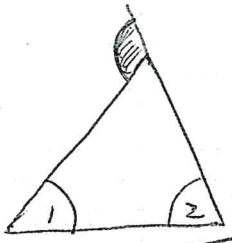
(Shortest distance between 2 points is the line joining them)

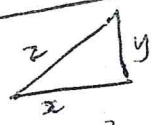


Area = $\frac{1}{2}$ (length of one side) × (⊥ distance from that side to opposite vertex)



Exterior angle = sum of 2 opposite interior angles

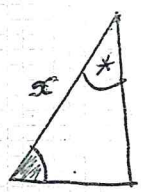




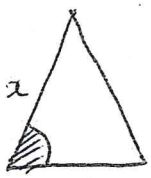
(short side)^2 + (Other SS)^2 = (Hypotenus)^2

$x^2 + y^2 = z^2$

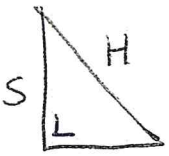
Congruency (identical)



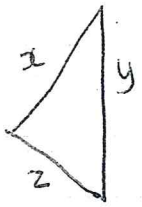
ASA



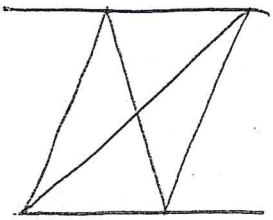
SAS



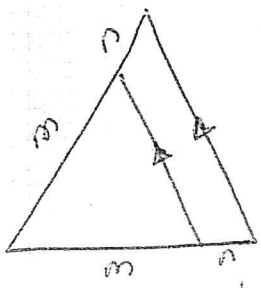
RHS



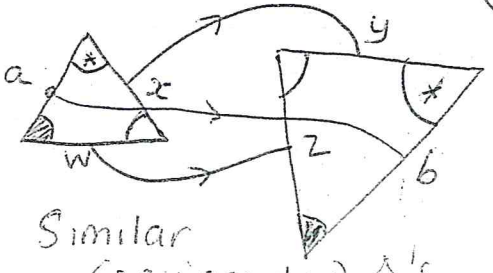
S.S.S.



Same base
Same ⊥ heigh
∴ Same area



A line // to one side of a △ divides the other sides in same ratio



Similar (equiangular) △'s have sides that are

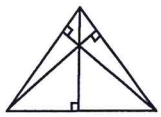


Figure 31.

7 Constructions to Study

The instruments that may be used are:

straight-edge: This may be used (together with a pencil) to draw a straight line passing through two marked points.

compass: This instrument allows you to draw a circle with a given centre, passing through a given point. It also allows you to take a given segment $[AB]$, and draw a circle centred at a given point C having radius $|AB|$.

ruler: This is a straight-edge marked with numbers. It allows you measure the length of segments, and to mark a point B on a given ray with vertex A, such that the length $|AB|$ is a given positive number. It can also be employed by sliding it along a set square, or by other methods of sliding, while keeping one or two points on one or two curves.

protractor: This allows you to measure angles, and mark points C such that the angle $\angle BAC$ made with a given ray $[AB$ has a given number of degrees. It can also be employed by sliding it along a line until some line on the protractor lies over a given point.

set-squares: You may use these to draw right angles, and angles of 30°, 60°, and 45°. It can also be used by sliding it along a ruler until some coincidence occurs.

The prescribed constructions are:

1. Bisector of a given angle, using only compass and straight edge.
2. Perpendicular bisector of a segment, using only compass and straight edge.
3. Line perpendicular to a given line l, passing through a given point not on l.

4. Line perpendicular to a given line l, passing through a given point on l.
5. Line parallel to given line, through given point.
6. Division of a segment into 2, 3 equal segments, without measuring it.
7. Division of a segment into any number of equal segments, without measuring it.
8. Line segment of given length on a given ray.
9. Angle of given number of degrees with a given ray as one arm.
10. Triangle, given lengths of three sides.
11. Triangle, given SAS data.
12. Triangle, given ASA data.
13. Right-angled triangle, given the length of the hypotenuse and one other side.
14. Right-angled triangle, given one side and one of the acute angles (several cases).
15. Rectangle, given side lengths.
16. Circumcentre and circumcircle of a given triangle, using only straight-edge and compass.
17. Incentre and incircle of a given triangle, using only straight-edge and compass.
18. Angle of 60°, without using a protractor or set square.
19. Tangent to a given circle at a given point on it.
20. Parallelogram, given the length of the sides and the measure of the angles.
21. Centroid of a triangle.
22. Orthocentre of a triangle.