1. If a straight line divides any two sides of a triangle in the same ratio, then prove that the line must be parallel to the third side.

2. Prove that, the internal (external) bisector of an angle of a triangle divides the opposite side internally (externally) in the ratio of the corresponding sides containing the angle.

3. In ∆ PQR, given that S is a point on PQ such that ST II QR and PS/SQ= 3/5 If PR = 5.6 cm, then find PT.

4. In ∆ ABC, the internal bisector AD of < A meets the side BC at D. If BD = 2.5 cm, AB = 5 cm and AC = 4.2 cm, then find DC.

5. D is the midpoint of the side BC of ∆ ABC. If P and Q are points on AB and on AC such that DP bisects < BDA and DQ bisects < ADC, then prove that PQ II BC.

6. In ∆ ABC, < ABC=90° and BD⊥ AC. If AB=5 cm, BD=3 cm and CD=5cm, then find the value of BC.

7. In a quadrilateral ABCD, the bisectors of < B and < D intersect on AC at E. Prove that AB / BC = AD/DC

8. The internal bisector of < A of ∆ ABC meets BC at D and the external bisector of < A meets BC produced at E. Prove that BD/BE = CD/CE

9. ABCD is a quadrilateral with AB =AD. If AE and AF are internal bisectors of < BAC and < DAC respectively, then prove that EF II BD.

10. A girl of height 120 cm is walking away from the base of a lamp-post at a speed of 0.6 m/sec. If the lamp is 3.6 m above the ground level, then find the length of her shadow after 4 seconds

11. Prove that In a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

12. Prove that in any triangle the sum of the squares of any two sides is equal to twice the square of half of the third side, together with twice the square of the median which bisects the third side.

13. If ABC is an obtuse angled triangle, obtuse angled at B and if AD ⊥ CB then Prove that $AC^2=AB^2 + BC^2+2BCxBD$

14. In equilateral triangle ABC, if AD□BC, then prove that $3AB^2= 4AD^2$

15. In a right triangle ABC, right angled at C, P and Q are points of the sides CA and CB respectively, which divide these sides in the ratio 2: 1. Prove that (i) $9AQ^2= 9AC^2 + 4BC^2$ (ii) $9BP^2= 9BC^2 + 4AC^2$ (iii) $9 (AQ^2+BP^2) = 13AB^2$ [Hint Since P divides AC in the ratio 2 : 1, CP= 2/3 AC, QC= 2/3 BC]

16. P and Q are the mid points on the sides CA and CB respectively of triangle ABC right angled at C. Prove that $4(AQ^2 +BP^2) = 5AB^2$

17. In an equilateral ∆ ABC, the side BC is trisected at D. Prove that $9AD^2 = 7AB^2$

18. Prove that three times the sum of the squares of the sides of a triangle is equal to four times the sum of the squares of the medians of the triangle.

19. If ABC is an obtuse angled triangle, obtuse angled at B and if AD⊥ CB Prove that $AC2 =AB^2 + BC^2+2BCxBD$

20. If ABC is an acute angled triangle, acute angled at B and AD⊥ BC prove that $AC^2 =AB^2 + BC^2 -2BCx BD$