24 i. To construct a square equal to a given circle.

Let O be the centre and PR any diameter.

Bisect OP at H and trisect OR at T. Draw TQ perp to OP.

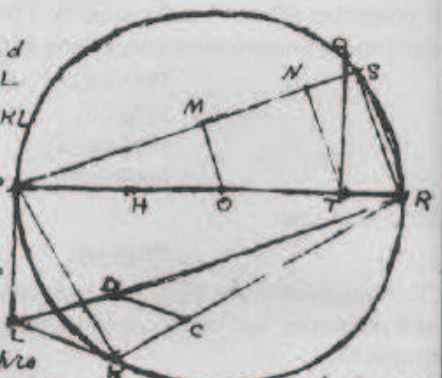
Draw RS = TQ. Join PS.

Draw OM & TN ∥ to RS.

Draw PK = PM; & PL = MN and perp to OP. Join KL, RK & KL.

Cut off RC = RH. Draw CD ∥ to KL.

Then $RD^2 = \odot PQR$.



N.B. RD is $\frac{1}{100}$th of an inch greater than the true length if the given ⊙ is 14 Sq. miles in area.

Cor. 1. One of the two mean proportionals between a side of an equilateral triangle inscribed in the ⊙ and the length PS is only 30000th part of it less than the true length.

Cor. 2. The app. length got by assuming $\pi = 4\sqrt{97\frac{1}{2}}$ $\frac{1}{11}$ is $\frac{1}{100}$th of an inch less than the true length if the ⊙ is a million square miles in area

ii. $\{6n^2 + (3n^2-n)\}^3 + \{6n^2 - (3n^2-n)\}^3 = \{6n^2(3n^2+1)\}^2$

iii. $\{m^7 - 3m^4(1+p) + m(3.1+p^2-1)\}^3$

$+ \{3m^6 - 3m^3(1+2p) + (1+3p+3p^2)\}^3$

$+ \{m^6 - (1+3p+3p^2)\}^3 = \{m^7 - 3m^4p + m(3p^2-1)\}^3$

ex. $(11\frac{1}{2})^3 + (\frac{1}{2})^3 = 29^2$; $(3 - \frac{1}{105})^3 + (\frac{1}{105})^3 = (5\frac{6}{35})^2$

$(3\frac{1}{7})^3 - (\frac{1}{7})^3 = (5\frac{4}{7})^2$; $(3\frac{1}{102})^3 - (\frac{1}{102})^3 = (5\frac{2}{102})^2$.

$3^3 + 4^3 + 5^3 = 6^3$; $1^3 + 12^3 = 9^3 + 10^3$; $1^3 + 75^3 = (38\frac{1}{2})^3 + (37\frac{1}{2})^3$

$3^3 + 507^3 + 34^6 = 1188^3$; $18^3 + 19^3 + 21^3 = 28^3$

$7^3 + 14^3 + 17^3 = 20^3$; $19^3 + 66^3 + 69^3 = 82^3$; $15^3 + 82^3 + 87^3$

$= 108^3$; $3^3 + 36^3 + 37^3 = 46^3$; $1^3 + 135^3 + 138^3$ 173^3.