

Diophantus (200-284 AD?)

$$\begin{cases} b=20 \\ c=208 \end{cases}$$

I-28: Given b, c find x, y so that $x+y=b, x^2+y^2=c$

Babylonian-style problem, and solution

Ignored negative and irrational solutions.

$$2c = b^2 + d^2 \geq b^2$$

IV-29: Find a, b, c, d so that $(a^2+b^2+c^2+d^2) + (a+b+c+d) = K$

Solution: $x^2 + x + 1/4 = (x + 1/2)^2$ so need $x_1^2 + x_2^2 + x_3^2 + x_4^2 = K+1$

Given $K=12, 13 = 4+9 = (\frac{8}{5})^2 + (\frac{6}{5})^2 + (\frac{12}{5})^2 + (\frac{9}{5})^2$

B-7 Given b, c find x, y so that $x+y=b, x^3+y^3=c$

Fix $b=20, c=2240$ start with $\frac{b}{2}=10$

$$(10-\delta)^3 + (10+\delta)^3 = 2000 + 60\delta^2 = 2240$$

$$60\delta^2 = 240$$

$$\delta^2 = 4$$

$$\delta = 2$$

$$\begin{cases} x = 10 - \delta = 8 \\ y = 10 + \delta = 12 \end{cases}$$

$$\begin{cases} \frac{b}{2} + \frac{b}{2} = b \\ \frac{b}{2}^3 + \frac{b}{2}^3 = 2000 \approx c \end{cases}$$

A-25 Find x, y, z so that $(x^2)^2 + (y^3)^2 = z^2$

Take $\begin{cases} x = ay \\ z = ky^2 \end{cases}$, solve $\begin{cases} a^4 y^4 + y^6 = k^2 y^4 \\ a^4 + y^2 = k^2 \end{cases}$

Already solved for all a $\left[\begin{array}{l} \text{If } a=2, \text{ get } y=3 \\ k=5 \quad x=6 \end{array} \right]$

Ὀτός τοι Διόφαντος ἔχει τάφος ἄ μέγα θαῦμα
καὶ τάφος ἐκ τέχνης μέτρα βίοιο λέγει.
ἕκτην κουρίζειν βίοτου θεὸς ὥπασε μοίρην
δωδεκάτην δ' ἐπιθείς, μήλα πόρεν χροαίην
τῇ δ' ἄρ' ἐφ' ἑβδομάτῃ τὸ γαμήλιον ἤψατο φέγγος, ἔ
ἐκ δὲ γάμων πέμπτην παῖδ' ἐπένευσεν ἔτει.
αἰαί, τηλύγετον δειλὸν τέκος, ἦμισυ πατρὸς
† τοῦδε καὶ ἡ κρυερὸς μέτρον ἑλὼν βίοτου.
πένθος δ' αὐτὸν πιαύρεσσι παρηγορέων ἐνιαυτοῖς
τῆδε πόσον σοφίῃ τέρα' ἐπέρησε βίου.

This tomb holds Diophantus. Ah, how great a marvel! the tomb tells scientifically the measure of his life. God granted him to be a boy for the sixth part of his life, and adding a twelfth part to this, he clothed his cheeks with down; He lit him the light of wedlock after a seventh part, and five years after his marriage He granted him a son. Alas! late-born wretched child; after attaining the measure of half his father's life, chill Fate took him. After consoling his grief by this science of numbers for four years he ended his life.

DIOPHANTI ALEXANDRINI ARITHMETICORVM LIBRI SEX, ET DE NVMERIS MVLTANGVLIS. LIBER VNVS.

CVM COMMENTARIIS C. G. BACHETTI P. G. & obseruationibus D. P. de FERMAT Senasoris Tulosani. Accessit Doctrinae Analyticae inuentum nouum, collectum ex varijs eiusdem D. de FERMAT Epistolis.



TOLOSAE, Excudebat BERNARDVS ROSC, à Regione Collegij Societatis Iesv. M. DC. LXX. 4

- DIOPHANTUS

II. 8

8. To divide a given square number into two squares.

Given square number 16. x^2 one of the required squares. Therefore 16 - x^2 must be equal to a square.

Take a square of the form (mx - 4)^2, m being any integer and 4 the number which is the square root of 16, e.g. take (2x - 4)^2, and equate it to 16 - x^2.

Therefore 4x^2 - 16x + 16 = 16 - x^2, or 5x^2 = 16x, and x = 16/5.

The required squares are therefore 256/25, 144/25.

x^2 + y^2 = 16

Solution: (16/5)^2 + (12/5)^2 = 16

interuallum numerorum... minor autem 1 N. utque idem maior N. + 2. Oponeat utque 4 N. + 4. triplos esse ad 2. & ad hoc superaddere 16. Ter ipsius 2. additis unitatibus 16. aquatur 4 N. + 4. & fit: N. 3. Erat ergo minor 3. maior 5. & satisfaciunt quaestioni.

et sic e' deo... et sic e' deo... et sic e' deo...

IN QVAESTIONEM VII.

CONDITIONIS apponit talis ratio est qua & apponit precedenti quaestioni, ad cuius solutio requirit quatuor et quatuordecim numeri... Cuiusmodi idem hic erunt locum habebant, et manifestum est.

QVAESTIO VIII.

PROPOSITVM quatuordecim dividere in duos quadratos. Insperatum sit ut 16. dividatur in duos quadratos. Ponatur primus: Q. Oponeatur igitur 16. - 1. Q. aequalis esse quadrato. Fingo quatuordecim 3. numeris quatuordecim liberis, cum defectu tota uariatione quod consistit hinc ipsius 16. esse 22 N. - 4. ipse igitur quadratus erit 4 Q. + 16. - 16 N. haec equationem uariationibus 16. - 1. Q. Compositis additur utriusque defectus, & si similibus inferatur similia, fiet 5 Q. aequalis 16 N. & fit: 1 N. 5. Erat igitur alter quadratorum 5. alter uero 11. & utriusque summa est 16. seu 16. & utriusque quadratus est.

TON... et sic e' deo... et sic e' deo...

OBSERVATIO DOMINI PETRI DE FERMAT.

Cum autem in duos cubos, aut quadratoquadratum in duos quadratoquadratos, & generaliter nullum in infinitum ultra quadratum potestatem in duas inflexum nominat fas est dividere cuius rei demonstrationem mirabilem sane detexi. Haec marginis exiguitas non caperet.

QVAESTIO IX.

RVASVS oponeat quatuordecim 16. dividere in duos quadratos. Ponatur uocibus primi lateris 1 N. alterius uero quatuordecim numerorum cum defectu tota uariatione, quod consistit hinc dividendi. Erat itaque 2 N. - 4. erant quadrati, hic eundem: Q. ille uero 4 Q. + 16. - 16 N. Ceterum uolo utriusque ferretur equari unitatibus 16. igitur 5 Q. + 16. - 16 N. aquatur unitatibus 16. & fit 1 N. 5. etc.

ESTO... et sic e' deo... et sic e' deo...

Name:



Hypatia of Alexandria - Feminist, Philosophy

Birth Year: c. 355

Death Year: 415

Representative Image:



Famous for their
Commentaries on
Diophantus'
Arithmetica



"To divide a cube into two other cubes, a fourth power or in general any power whatever into two powers of the same denomination above the second is impossible, and I have assuredly found an admirable proof of this, but the margin is too narrow to contain it."

Pierre de Fermat

(08/16/1601 – 01/12/1665)

French mathematician, notes in the margin of his copy of Diophantus' Arithmetica (1637)