SQUARES AND SQUARE ROOTS (1)
CUBES AND CUBE ROOTS
Class: VII, Mathematics (F)

SOLUTIONS

TEACHING TASK

I

01. $\sqrt{\frac{25}{81}-\frac{1}{9}} = \sqrt{\frac{25-9}{81}} = \sqrt{\frac{16}{81}} = \frac{4}{9}$ Ans: B

02. $\frac{52}{x} = \sqrt{\frac{169}{289}} = \frac{13}{17}$

$\Rightarrow x = 68$ Ans: D

03 $\sqrt{18 \times 14 \times a} = 84$

$\Rightarrow 18 \times 14 \times a = 84 \times 84 \Rightarrow a = 28$

Ans: C

04 $\sqrt{\frac{x}{169}} = \frac{54}{39}$

$\Rightarrow \frac{x}{169} = \frac{54 \times 54}{39 \times 39} \Rightarrow x = 324$

Ans: B

05 $\sqrt{1+\frac{x}{169}} = \frac{14}{13}$

$\Rightarrow 1+\frac{x}{169} = \frac{196}{169}$

$\Rightarrow 169 + x = 196$

$\Rightarrow x = 27$

Ans: C

06 Let the fraction be $\frac{x}{x+3}$

$\therefore \frac{x+4}{(x+3)+4} = \frac{4}{5}$

$\Rightarrow 5x + 20 = 4x + 28$

$\Rightarrow x = 8$

$\therefore$ The fraction is $\frac{8}{11}$

Ans: A

Q1

i) $(81)^2$ = ____ 1

ii) $(1234)^2$ = ____ 6

iii) $(52698)^2$ = ____ 4

iv) $(26387)^2$ = ____ 9

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2 (i) $1+3$ (ii) $5+7+9 = (1+9)+(3+7)+5 = 25$

(ii) $(1+19)+(3+17)+(5+15)+(7+11)+(9+11)$

$= 5 \times 20 = 100$

(iii) $(1+23)+(3+21)+(5+19)+(7+17)+(9+15)+(11+13)$

$= 6 \times 24 = 144$

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3 (i) $(36)^2 = 1296$ (ii) $(45)^2 = 2025$

(iii) $(27)^2 = 729$ (iv) $(60)^2 = 3600$

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4 (i) $\sqrt{4761} = 1$ or 9 (ii) $\sqrt{99856} = 4$ or 6

(iii) $\sqrt{178929} = 3$ or 7 (iv) $\sqrt{65766025} = 5$

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5 i) $100 - 1 = 99$ (ii) $99 - 3 = 96$ (iii) $96 - 5 = 91$

(iv) $91 - 7 = 84$ (v) $84 - 9 = 75$ (vi) $75 - 11 = 64$

(vii) $64 - 13 = 51$ (viii) $51 - 15 = 36$ (x) $36 - 17 = 19$

(x) $19 - 19 = 0$

Hence in 10th step we get 100.

$\therefore \sqrt{100} = 10.$

(ii) Similarly, $\sqrt{169} = 13$

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6 (i) $729 = 27^2$

$\therefore \sqrt{729} = 27$

(ii) $1936 = 2^4 \times 11^2$

$= 4^2 \times 11^2$

$= (44)^2$

$= 44$

2 | 1936
2 | 968
2 | 484
2 | 242
11 | 121
11

(iii) $\sqrt{4624} = 68$ (iv) $\sqrt{7921} = 89$ (v) $\sqrt{7744} = 88$

7 (v) $5\,|\,\overline{31.36}\,|\,5.6$

25

$106\,|\,636$

636

0

$\therefore \sqrt{31.36} = 5.6$

106×6

636

(iv) $2\,|\,\overline{7.29}\,|\,2.7$

4

$47\,|\,329$

329

0

$\therefore \sqrt{7.29} = 2.7$

47×7

329

(iii) $5\,|\,\overline{3481}\,|\,59$

25

$109\,|\,981$

981

0

$\therefore \sqrt{3481} = 59$

109×9

981

(ii) $6\,|\,\overline{4489}\,|\,67$

36

$127\,|\,889$

889

0

$\therefore \sqrt{4489} = 67$

127×7

889

(i) $4\,|\,\overline{2401}\,|\,49$

16

$89\,|\,801$

801

0

$\therefore \sqrt{2401} = 49$

89×9

801

8 $a^2 = 2916$

$\Rightarrow a = \sqrt{2916}$

$\therefore a = 54$

5 | 2916 | 54
25
104 | 416
416
0

(4)

104 × 4
416

9 1024

10 $a^2 = 324$

$a = 18$

Ans: 18

LEARNER'S TASK

BEGINNERS

MCQ'S

1. $121 = (11)^2$ Ans: B

2. 2161 Ans: D

3. ~~[illegible]~~ 0 since $(24)^2 \neq$ ____ [8] Ans: B

4. $\square^2 = 9$ ~~[illegible]~~ Ans: B

5 $25 + 36 + 900 = 961 = (31)^2$ Ans: C

6 $p^2, (p+1)^2$ Ans: C

7 palindromes

8 non-perfect squares Ans: B

9. $(44)^2 =$ ____ [6] Ans: A

10 odd natural numbers

ACHIEVERS

01. $1024 = (32)^2$ Ans. 1024

02 $2300 + 4 = 2304$

$= (48)^2$

4 | 2304 | 48
16
88 | 704
704
0

88
× 8
704

Ans: 4

8 $a^2 = 2916$

$\Rightarrow a = \sqrt{2916}$

$\therefore a = 54$

$5|\overline{2916}|54$, 25; $104|416$, 416, 0

(4)

$10y \times y = 416$

9 1024

10 $a^2 = 324$

$a = 18$

Ans: 18

LEARNER'S TASK

BEGINNERS

MCQ'S

1. $121 = (11)^2$ Ans: B
2. 2161 Ans: D
3. ~~[illegible]~~ O since $(xy)^2 \neq$ ____ 8 Ans: B
4. $\square^2 = 9$ ~~[illegible]~~ Ans: B
5. $25 + 36 + 900 = 961 = (31)^2$ Ans: C
6. $p^2, (p+1)^2$ Ans: C
7. Palindromes
8. non – perfect squares Ans: B
9. $(44)^2 =$ ____ 6 Ans: A
10. odd natural numbers

ACHIEVERS

01. $1024 = (32)^2$ Ans. 1024

02 $2300 + 4 = 2304$

$= (48)^2$

$4|\overline{2304}|48$, 16; $88|704$, 704, 0

6

$88 \times 8 = 704$

Ans: 4

03 6096 − 12 = 6084

$\therefore \sqrt{6084} = 78$ Ans: 78

04. $3645 = 3^6 \times 5 \times \boxed{5}$

5 should be multiplied

3|3645
3|1215
3|405
3|135
3|45
3|15
5

Ans: 5

05 $6000 = 2^4 \times 3 \times 5^3$

To make it perfect square we have to divide with $3 \times 5 = 15$

2|6000
2|3000
2|1500
2|750
3|375
5|125
5|25
5

06 $\sqrt{15376} = 124$ Ans=124

07 i) 5|28622 5|535
25
103|362
309
1065|5325
5325
0

$\therefore \sqrt{286225} = 535$

103
×3
309 2
1065×5 3
5325

(ii) 2|44521|211
4
41|45
41
421|421
421

$\therefore \sqrt{44521} = 211$

(iii) Long division for $\sqrt{29929}$:

$$\begin{array}{r|l}
1 & \overline{2}\,\overline{99}\,\overline{29} \quad | \; 173 \\
  & 1 \\
27 & 199 \\
  & 189 \\
343 & 1029 \\
  & 1029 \\
  & (0)
\end{array}$$

$27 \times 7 = 189$

$343 \times 3 = 1029$

$\therefore \sqrt{29929} = 173$

(iv) Long division for $\sqrt{3136}$:

$$\begin{array}{r|l}
5 & \overline{31}\,\overline{36} \quad | \; 56 \\
  & 25 \\
106 & 636 \\
  & 636 \\
  & (0)
\end{array}$$

106

$\therefore \sqrt{3136} = 56$

8 i)

$$\begin{array}{r|l}
2 & 15876 \\
2 & 7938 \\
3 & 3969 \\
3 & 1323 \\
3 & 441 \\
3 & 147 \\
7 & 49 \\
 & 7
\end{array}$$

$\therefore 15876 = 2^2 \times 3^4 \times 7^2$

$\therefore \sqrt{15876} = 2 \times 3^2 \times 7$

$= 126$

$18 \times 7 = 126$

Ans: 126

(ii)

$$\begin{array}{r|l}
2 & 32400 \\
2 & 16200 \\
2 & 8100 \\
2 & 4050 \\
3 & 2025 \\
3 & 675 \\
3 & 225 \\
 & 75
\end{array}
\qquad
\begin{array}{r|l}
3 & 75 \\
5 & 25 \\
 & 5
\end{array}$$

$\therefore 32400 = 2^4 \times 3^4 \times 5^2$

$\therefore \sqrt{32400} = 2^2 \times 3^2 \times 5$

$= 180$

(iii)

2 | 19044
2 | 9522
3 | 4761
3 | 1587
23 | 529
23

529

$\sqrt{19044} = \sqrt{2^2 \times 3^2 \times 23^2}$

$= 2 \times 3 \times 23$

$= 138$

(iv)

2 | 5184
2 | 2592
2 | 1296
2 | 648
2 | 324
2 | 162
9 | 81
9

$\therefore \sqrt{5184} = \sqrt{2^6 \times 9^2}$

$\therefore = 2^3 \times 9$

$= 72$

9 (i) $\sqrt{\frac{256}{441}} = \frac{16}{21}$ (ii) $\sqrt{\frac{625}{1296}} = \frac{25}{36}$

10 Area of rectangle $= 72 \times 338$

$= 24336$

$\therefore \sqrt{24336} = 156$

EXPLORERS

01. A) $(161)^2 =$ ——— II C) $(109)^2 =$ ——— I

Ans: A, C

02 Conceptual

Ans: A, B, C, D

03. Conceptual

Ans: A, B

04 Conceptual

Ans: A, B, C, D

05 $\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)^2 = (\sqrt{3})^2+\left(\frac{1}{\sqrt{3}}\right)^2 - 2.\sqrt{3}.\frac{1}{\sqrt{3}}$ (2)

$= 3+\frac{1}{3}-2$

$= 1+\frac{1}{3} = \frac{4}{3}$

Ans: A

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06 $\frac{\sqrt{27}}{\sqrt{3}} = \sqrt{\frac{27}{3}} = \sqrt{9} = 3$ (or) ~~Ans: A~~

$\frac{\sqrt{27}}{\sqrt{27}} = 1$ (or)

$\frac{\sqrt{27}}{3\sqrt{3}} = \frac{1}{3}\sqrt{\frac{27}{3}} = \frac{9}{3} = 3$ Ans: A, B, C

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07 $\therefore 5808 = 2^4 \times 3 \times 11^2$

Smallest number = 3

2 | 5808
2 | 2904
2 | 1452
2 | 726
3 | 363
11 | 121
11

Ans: D

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8 a) $1^2+2^2+3^2 = 1+4+9 = 14$

b) $2^2+3^2+6^2 = 4+9+36 = 49 = 7^2$

c) $3^2+4^2+12^2 = 9+16+144 = 169 = 13^2$

d) $4^2+5^2+20^2 = 16+25+400 = 441 = (21)^2$

Ans: ~~(D)~~ -, 3, 2, 5

RESEARCHERS

05 $\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)^2 = (\sqrt{3})^2+\left(\frac{1}{\sqrt{3}}\right)^2 - 2.\sqrt{3}.\frac{1}{\sqrt{3}}$ (2)

$= 3+\frac{1}{3}-2$

$= 1+\frac{1}{3} = \frac{4}{3}$

Ans: A

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06 $\frac{\sqrt{27}}{\sqrt{3}} = \sqrt{\frac{27}{3}} = \sqrt{9} = 3$ (or)

~~Ans: A~~

$\frac{\sqrt{27}}{\sqrt{27}} = 1$ (or)

$\frac{\sqrt{27}}{3\sqrt{3}} = \frac{1}{3}\sqrt{\frac{27}{3}} = \frac{9}{3} = 3$

Ans: A, B, C

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07 $5808 = 2^4 \times 3 \times 11^2$

Smallest number = 3

2 | 5808
2 | 2904
2 | 1452
2 | 726
3 | 363
11 | 121
11

Ans: D

---

8 a) $1^2+2^2+3^2 = 1+4+9 = 14$

b) $2^2+3^2+6^2 = 4+9+36 = 49 = 7^2$

c) $3^2+4^2+12^2 = 9+16+144 = 169 = 13^2$

d) $4^2+5^2+20^2 = 16+25+400 = 441 = (21)^2$

Ans: ~~D~~ -, 3, 2, 5

RESEARCHERS

01. $\frac{1}{2+\frac{1}{3+\frac{1}{4+\frac{1}{5}}}} = \frac{1}{2+\frac{1}{3+\frac{1}{\left(\frac{21}{5}\right)}}} = \frac{1}{2+\frac{1}{3+\frac{5}{21}}}$

$= \frac{1}{2+\frac{68}{21}} = \frac{1}{\left(\frac{110}{21}\right)}$

$= \frac{21}{110}$

Ans: D

02 $\frac{Q}{P} = \frac{11 \times 13 \times 17 \times 19}{2 \times 3 \times 5 \times 7} = \frac{46189}{210} = 219.9476$ (9)

$= 219$

Ans: B

03

04 $1.5a = 0.04b$

$\frac{a}{b} = \frac{0.04}{1.5} = \frac{4}{150} = \frac{2}{75}$

$\therefore \frac{b-a}{b+a} = \frac{1-\frac{a}{b}}{1+\frac{a}{b}} = \frac{1-\frac{2}{75}}{1+\frac{2}{75}} = \frac{73}{77}$

Ans: B

05 $0.\overline{001}$

Let $x = 0.\overline{001}$

$x = 0.001001001001\ldots$

$1000x = 0.001.001001001\ldots$

$-999x = -1 \Rightarrow x = \frac{1}{999}$

Ans: C

06 $\frac{0.1}{0.01} + \frac{0.01}{0.1} + \frac{0.001}{0.01} + \frac{0.01}{0.001}$

$= \frac{10}{1} + \frac{1}{10} + \frac{1}{10} + \frac{10}{1}$

$= 20 + \frac{2}{10} = 20 + \frac{1}{5} = \frac{101}{5} \times \frac{20}{20} = \frac{2020}{100}$

$= 20.2$

07 $\sqrt{53824} = 232$

Ans: B

08 $6 \times 24 = 6 + 24 + \sqrt{6 \times 24}$

$= 6 + 24 + 12$

$= 42$

Ans: B

09 $\sqrt{0.16} = 0.4$ Ans: C

10 $\sqrt{0.00004761} = 0.0069$ Ans: B

11 $\sqrt{3^n} = 729 \Rightarrow \sqrt{3^n} = 3^6$

$\Rightarrow \frac{n}{2} = 6 \Rightarrow n = 12$ Ans: D

12 $\sqrt{(7+3\sqrt{5})(7-3\sqrt{5})} = \sqrt{49-45} = \sqrt{4} = 2$ Ans: B

13 $\sqrt{8} + 2\sqrt{32} - 3\sqrt{128} + 4\sqrt{50}$

$= 2\sqrt{2} + 2 \cdot 4\sqrt{2} - 3 \cdot 8\sqrt{2} + 4 \cdot 5\sqrt{2}$

$= 2\sqrt{2} + 8\sqrt{2} - 24\sqrt{2} + 20\sqrt{2}$

$= 6\sqrt{2}$

$= 6 \times 1.414$

$= 8.484$ or $\frac{84.84}{100}$ or $\frac{8484}{1000}$ Ans: B, C, D

14 $\left(\sqrt{3} - \frac{1}{\sqrt{3}}\right)^2 = 3 + \frac{1}{3} - 2 \cdot \sqrt{3} \cdot \frac{1}{\sqrt{3}}$

$= \frac{10}{3} - 2 = \frac{4}{3}$ or $\frac{\sqrt{48}}{2\sqrt{3}} = \frac{4\sqrt{3}}{3\sqrt{3}} = \frac{4}{3}$ Ans: A, D

CUBE AND CUBE ROOTS

TEACHING TASK

01. $\sqrt[3]{-17576} = \sqrt[3]{(-26)^3} = -26$ Ans: B

02 $(27)^3 = \_\_\_(7)^3 = \_\_\_$ 7 Ans: B

03 $\sqrt[3]{\frac{8}{125000}} = \sqrt[3]{\left(\frac{2}{50}\right)^3} = \frac{2}{50} = \frac{4}{100} = 0.04$ Ans: B

04 $1^3+2^3+3^3+4^3 = 1+8+27+64$ (11)

$= 100$

Ans: B

05 $\sqrt[3]{4\frac{12}{125}} = \sqrt[3]{\frac{512}{125}} = \sqrt[3]{\left(\frac{8}{5}\right)^3} = \frac{8}{5}$

Ans: C

II 1) i) $7^3-6^3 = 1+7\times6\times3 = 127$

(ii) $12^3-11^3 = 1+12\times11\times3 = 397$

(iii) $20^3-19^3 = 1+20\times19\times3 = 1141$

(iv) $51^3-50^3 = 1+51\times50\times3 = 7551$

2 $392\times7 = 2744$

$\therefore \sqrt[3]{2744} = \sqrt[3]{(14)^3} = 14$

Ans: 7

3 (i) $216 = 6^3$ (ii) $512 = (8)^3$

(iii) $8000 = (20)^3$

4 $9^3 = 729$

Ans: 9

5 (i)

2 | 512
2 | 256
2 | 128
2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2

$\therefore 512 = 2^9$

$= \left(2^3\right)^3 = 8^3$

$\therefore \sqrt[3]{512} = 8$

Similarly we can do other problems. akto

6) (iv) 675

$3 \overline{)675}$
$3 \overline{)225}$
$3 \overline{)75}$
$5 \overline{)25}$
5

$\therefore 675 = 3^3 \times 5^2$

Clearly we have to multiply with 5 to make the given number perfect cube

Similarly we can do other problems

Ans: 5

07. $\sqrt[3]{-10648} = \sqrt[3]{(-22)^3} = -22$

Ans: −22

08 $\sqrt[3]{392} \times \sqrt[3]{448}$

$= \sqrt[3]{392 \times 448} = \sqrt[3]{175616} = \sqrt[3]{(58)^3}$

$= 58$

Ans: 58

09. $V = a^3$

$\therefore a^3 = 46656$

$\therefore a = \sqrt[3]{46656}$

$= 36$

Ans: 36

LEARNERS TASK

Beginners

01. Between 1 to 500

$1^3, 2^3, 3^3, 4^3, 5^3, 6^3, 7^3$ there are 7

Ans: C

02 $2^x = \sqrt[3]{32} = \sqrt[3]{2^5} = 2^{5/3}$

$\therefore x = \frac{5}{3}$

Ans: B

03 $27000 = (30)^3$

Ans: C

04 $(27)^3 =$ ____ 3

Ans: C

05 $(013)^3 =$ _____ [7] Ans: D (13)

06 $13^3 + 25^3$

$=$ _____ [7] + _____ [5]

$=$ _____ [2] Ans: B

ACHIEVERS

01. $2 \mid 288$, $2 \mid 144$, $2 \mid 72$, $2 \mid 36$, $2 \mid 18$, $3 \mid 9$, 3

$\therefore 288 = 2^5 \times 3^2$

To make 288 perfect cube we have to multiply it with $2 \times 3 = 6$.

$288 \times 6 = 1728$

$\therefore \sqrt[3]{1728} = 12$

02 $3 \mid 1029$, $7 \mid 343$, $7 \mid 49$, 7

$1029 = 3 \times 7^3$

To make it perfect cube we have to divide the number with 3

$\therefore \frac{1029}{3} = 343$

$\therefore \sqrt[3]{343} = 7$

03 (iii) $5 \mid 91125$, $5 \mid 18225$, $5 \mid 3645$, $3 \mid 729$, $3 \mid 243$, $3 \mid 81$, 27

$3 \mid 27$, $3 \mid 9$, 3

$91125 = 5^3 \times 3^6$

$= 5^3 \times (3^2)^3$

$= (5 \times 3^2)^3$

$= (45)^3$

$\therefore \sqrt[3]{91125} = 45$

Similarly we can do other problems. (14)

09 $\sqrt[3]{1372} \times \sqrt[3]{1458}$

$= \sqrt[3]{1372 \times 1458}$

$= \sqrt[3]{(126)^3} = 126$

$\sqrt[3]{\frac{125}{216}}$

$= \sqrt[3]{\left(\frac{5}{6}\right)^3}$

$= \frac{5}{6}$

05

2 | 4096
2 | 2048
2 | 1024
2 | 512
2 | 256
2 | 128
2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2

$4096 = 2^{12}$

$= (2^4)^3 = 16^3$

$\therefore \sqrt[3]{4096} = 16$

Similarly we can find the cube root of 1728

$\therefore \sqrt[3]{1728} = 12$

Explorers

01 (A) ~~$\sqrt[3]{500}$~~ $\sqrt[3]{1331} = \sqrt[3]{(11)^3} = 11$

(D) $\sqrt[3]{216} = \sqrt[3]{6^3} = 6$

(B) $\sqrt[3]{512} = \sqrt[3]{8^3} = 8$

2) 700 is not a perfect cube

03 $1^3 + 2^3 + 3^3 = 1 + 8 + 27 = 36$

Now $(1+2+3)^2 = 6^2 = 36$

Ans: C

04 $(\_\_\_0)^3 = 0$ (15)

$(\_\_\_4)^3 = \_\_\_4$

$(\_\_\_5)^3 = \_\_\_5$

$(\_\_\_6)^3 = \_\_\_6$

Ans. A, B, C, D

05

$3 \overline{)1323}$
$3 \overline{)441}$
$3 \overline{)147}$
$7 \overline{)49}$
7

$1323 = 3^3 \times 7^2$

We have to multiply with 7
or $\sqrt[3]{343}$ or $\sqrt{49}$

Ans: A, C, D

06 a)

$3 \overline{)675}$
$3 \overline{)225}$
$3 \overline{)75}$
$5 \overline{)25}$
5

$\therefore 675 = 3^3 \times 5^2$

multiply with 5

b)

$2 \overline{)8640}$
$2 \overline{)4320}$
$2 \overline{)2160}$
$2 \overline{)1080}$
$2 \overline{)540}$
$2 \overline{)270}$
$3 \overline{)135}$
$3 \overline{)45}$
$3 \overline{)15}$
5

$\therefore 8640 = 2^6 \times 3^3 \times 5$

$= (2^2)^3 \times 3^3 \times 5$

8640 should be divided by 5

c)

c) $3\overline{)7803}$
$3\overline{)2601}$
$3\overline{)867}$
$17\overline{)289}$
17

$7803 = 3^3 \times 17^2$ (16)

7803 should be multiplied with 17

d) $2\overline{)3600}$
$2\overline{)1800}$
$2\overline{)900}$
$2\overline{)450}$
$3\overline{)225}$
$3\overline{)75}$
$5\overline{)25}$
5

$3600 = 2^4 \times 3^2 \times 5^2$

To make 3600 perfect cube it should be divided with $2 \times 3^2 \times 5^2$
$= 450 = 45 \times 10$

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7 (i) $10^3 - 9^3 = 1 + 10 \times 9 \times 3 = 271$

(ii) $15^3 - 14^3 = 1 + 15 \times 14 \times 3 = 631$

(iii) $26^3 - 25^3 = 1 + 26 \times 25 \times 3 = 1951$

(iv) $271 + 631 + 1951 = 2853$

⇒ THE END ⇐