

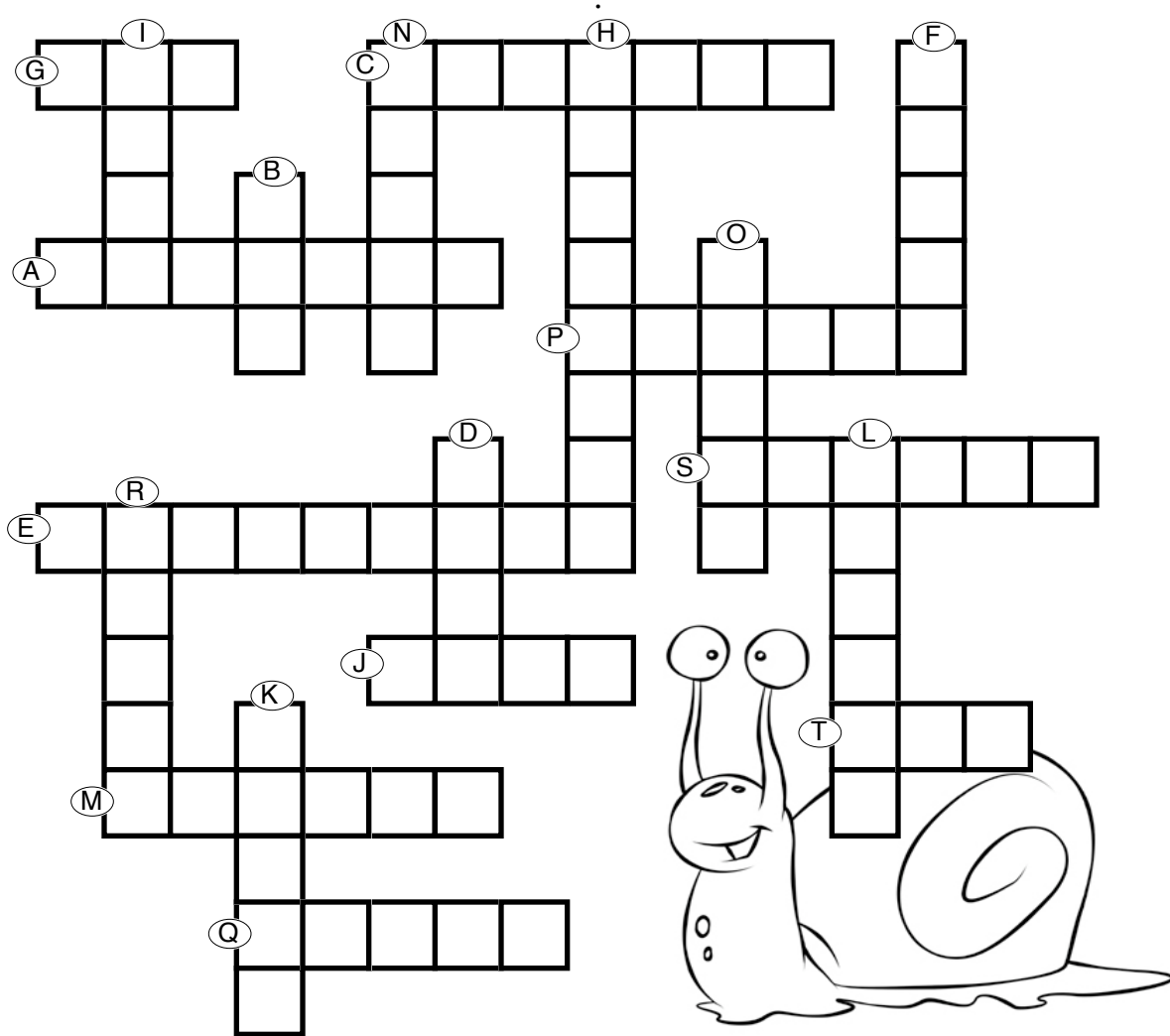
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Puzzle 14: Crossword Square Roots

Evaluate the expression and complete the puzzle in words



<p>(A) $10\sqrt{49}$</p>	<p>(B) $\frac{\sqrt{900}}{\sqrt{9}}$</p>	<p>(C) $\frac{5\sqrt{36}}{2}$</p>	<p>(D) $\sqrt{64} - \sqrt{64}$</p>	<p>(E) $\sqrt{169} + \sqrt{16}$</p>
<p>(F) $\sqrt{2400 + 1200}$</p>	<p>(G) $\sqrt{1} \sqrt{1} \sqrt{1} \sqrt{1}$</p>	<p>(H) $\sqrt{100 + 69}$</p>	<p>(I) $\sqrt{9} \sqrt{9}$</p>	<p>(J) $\sqrt{4} \sqrt{4}$</p>
<p>(K) $\sqrt{25} \sqrt{100}$</p>	<p>(L) $\sqrt{64} \sqrt{100}$</p>	<p>(M) $\sqrt{400} + \sqrt{100}$</p>	<p>(N) $\frac{10\sqrt{144}}{3}$</p>	<p>(O) $\sqrt{9} + \sqrt{16}$</p>
<p>(P) $5\sqrt{16}$</p>	<p>(Q) $\sqrt{81} - \sqrt{36}$</p>	<p>(R) $\frac{\sqrt{1600}}{\sqrt{25}}$</p>	<p>(S) $\sqrt{121} - \sqrt{0}$</p>	<p>(T) $\frac{\sqrt{144}}{\sqrt{36}}$</p>

Puzzle 14: Crossword Square Roots

Mini-Lesson: Square Roots and Exponents

Ask students:

Q: Which expressions can be expressed as powers?

A: Expression G: $\sqrt{1}\sqrt{1}\sqrt{1}\sqrt{1} = (\sqrt{1})^4$

Expression J: $\sqrt{4}\sqrt{4} = (\sqrt{4})^2$

Answer Key

The crossword puzzle grid contains the following words:

- Across:**
 - 1: one (G)
 - 3: fifteen (C)
 - 4: thirteen (H)
 - 6: ten (B)
 - 7: seventy (A)
 - 8: one (O)
 - 10: seventeen (E)
 - 11: eight (R)
 - 12: zero (D)
 - 13: four (J)
 - 14: thirty (M)
 - 15: fifty (K)
 - 16: eighty (L)
 - 17: three (Q)
 - 18: two (T)
- Down:**
 - 2: nine (I)
 - 5: sixty (F)
 - 9: eleven (S)
 - 10: twenty (P)
 - 11: seven (O)
 - 12: eleven (S)
 - 13: two (T)
 - 14: four (J)
 - 15: thirty (M)
 - 16: fifty (K)
 - 17: eighty (L)
 - 18: three (Q)
 - 19: two (T)

(A) seventy	(B) ten	(C) fifteen	(D) zero	(E) seventeen
(F) sixty	(G) one	(H) thirteen	(I) nine	(J) four
(K) fifty	(L) eighty	(M) thirty	(N) forty	(O) seven
(P) twenty	(Q) three	(R) eight	(S) eleven	(T) two

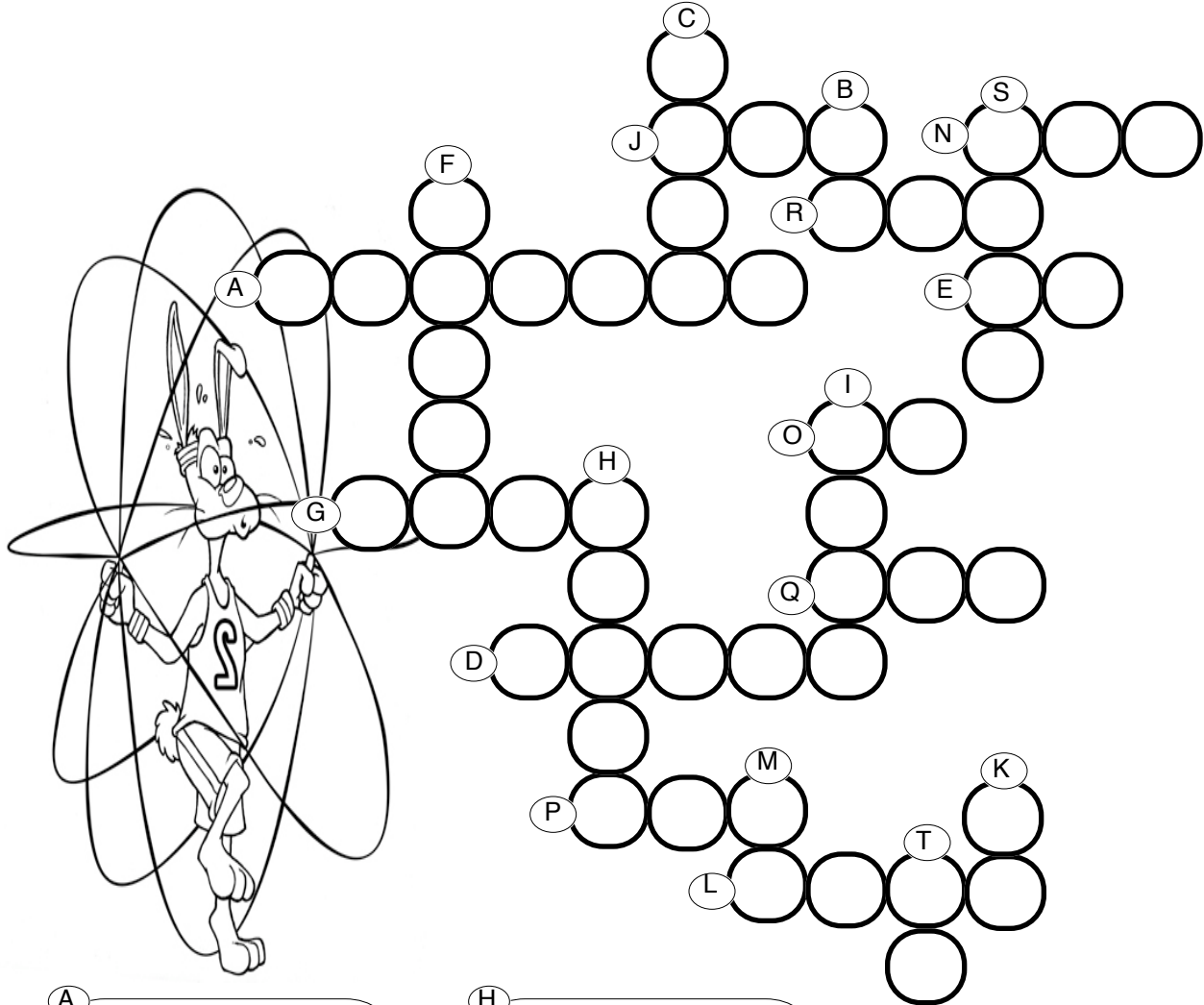
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Puzzle 15: Exponents and Powers

Evaluate the expressions. Remember, one digit per shape.



A 10^6

B $60 - 2^2$

C $10^3 + 5 \cdot 10^2$

D $10^4 + 2^2$

E $5^2 + 4^2 - 1$

F $3 \cdot 10^4$

G $6 \cdot 10^3 + 10^1 + 7 \cdot 10^0$

H $7 \cdot 10^4 + 3^2$

I 2^{10}

J $5 \cdot 10^2 + 5$

K 4^3

L $5 \cdot 10^3 + 3^3 + 7$

M $10^2 - 5$

N $2^3 \cdot 5^2$

O $2^5 - 5^2 + 3$

P $10^3 - 10^2 + 3^2$

Q $2 \cdot 5^3$

R $2^3 \cdot 3^1 \cdot 5^2$

S $2 \cdot 10^3 + 2^3 \cdot 5$

T 2^5

Puzzle 15: Exponents and Powers

Mini-Lesson: Rewriting Expressions

- 1) Select three expressions and rewrite them replacing the exponents with multiplication.

Example: $10^2 - 5 = 10 \cdot 10 - 5$

- 2) Select one of the above expressions and rewrite the multiplication as an addition. Remember, 2 times 5 is 2 groups of 5; therefore 5 plus 5.

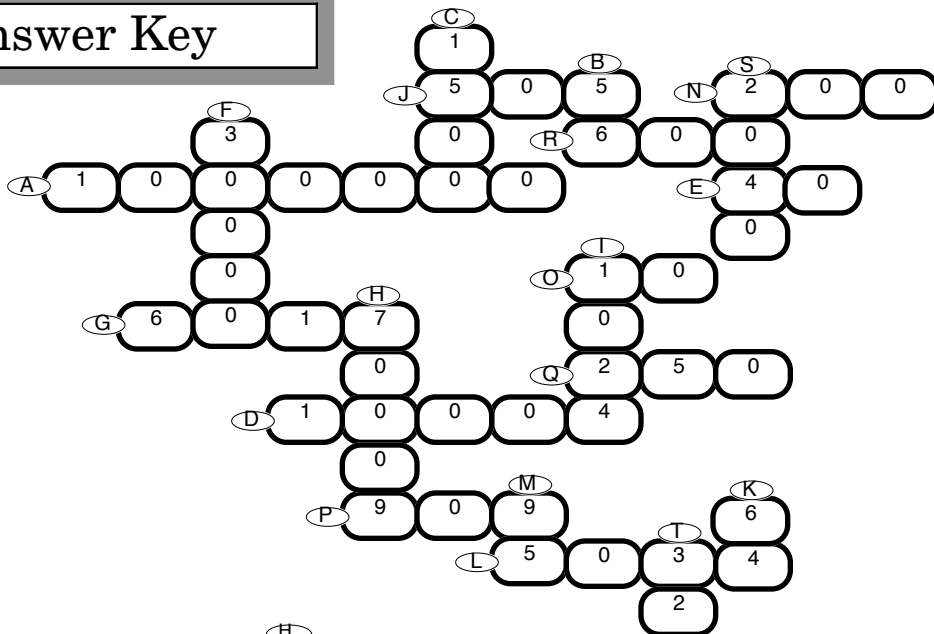
Example: $10^2 - 5 = 10 \cdot 10 - 5$

$10 \cdot 10 - 5 = 10 + 10 + 10 + 10 + 10 + 10 + 10 + 10 + 10 + 10 - 5$

This mini-lesson helps student understand the Order of Operations Rules and develops number sense.

Exponents can always be expressed as multiplication, but not vice-versa.
Multiplication can always be expressed as addition, but not vice-versa.

Answer Key



- A $10^6 = 1000000$
- B $60 - 2^2 = 60 - 4 = 56$
- C $10^3 + 5 \cdot 10^2 = 1500$
- D $10^4 + 2^2 = 10004$
- E $5^2 + 4^2 - 1 = 40$
- F $3 \cdot 10^4 = 30000$
- G $6 \cdot 10^3 + 10^1 + 7 \cdot 10^0 = 6017$

- H $7 \cdot 10^4 + 3^2 = 70009$
- I $2^{10} = 1024$
- J $5 \cdot 10^2 + 5 = 505$
- K $4^3 = 64$
- L $5 \cdot 10^3 + 3^3 + 7 = 5034$
- M $10^2 - 5 = 95$
- N $2^3 \cdot 5^2 = 8 \cdot 25 = 200$

- O $2^5 - 5^2 + 3 = 10$
- P $10^3 - 10^2 + 3^2 = 909$
- Q $2 \cdot 5^3 = 2 \cdot 125 = 250$
- R $2^3 \cdot 3^1 \cdot 5^2 = 600$
- S $2 \cdot 10^3 + 2^3 \cdot 5 = 2040$
- T $2^5 = 32$

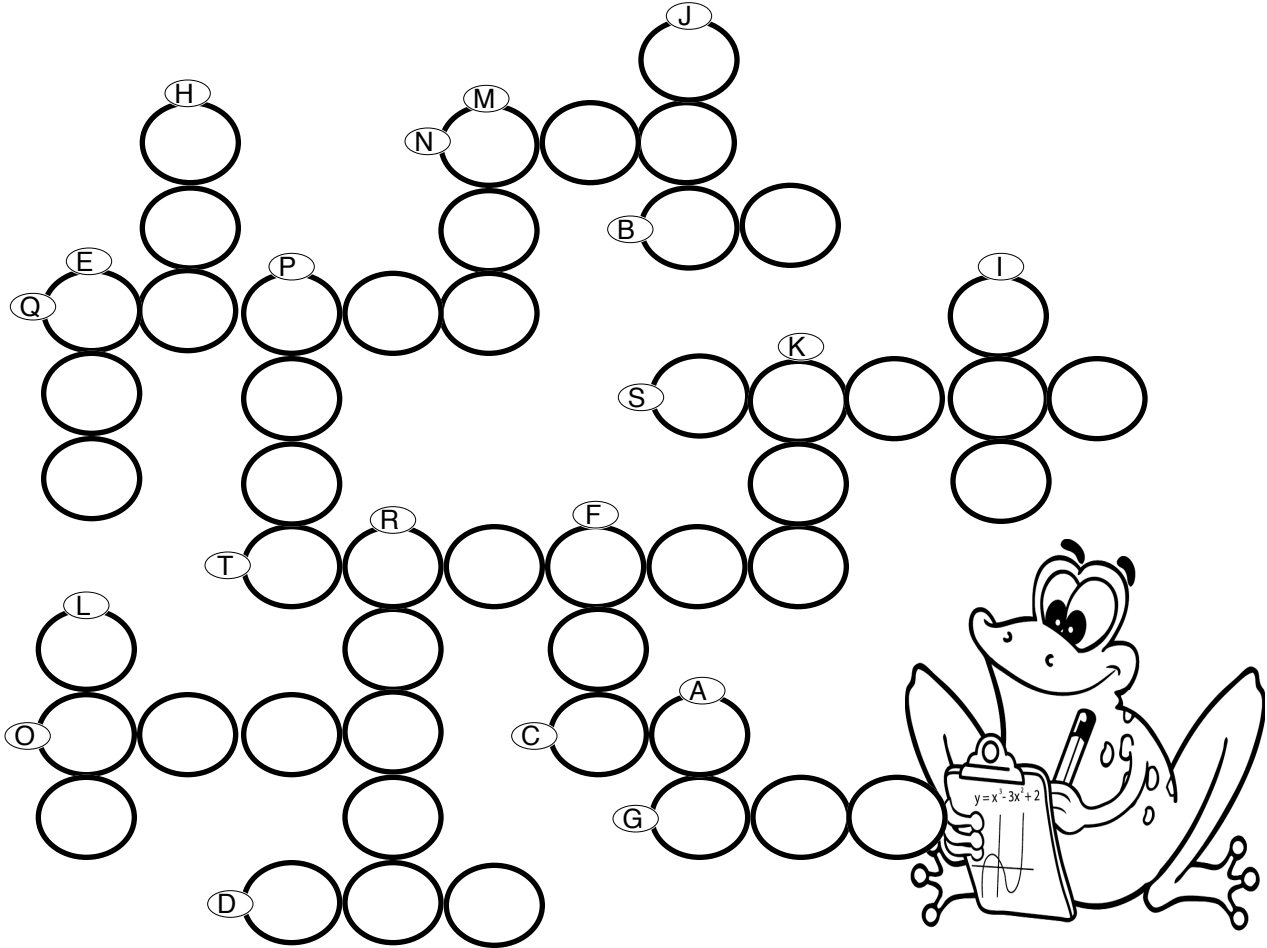
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Puzzle 16: Order of Operations

Evaluate the expressions. Remember, one digit per shape.



(A)	$5 + 2 \cdot 5$		(K)	$5 \cdot 7 \cdot 20 + 15$	
(B)	$2 + 80 \div 2$		(L)	$90 \div 3 + 2 \cdot 2 \cdot 5 \cdot 35 + 2 \cdot 2$	
(C)	$2 \cdot 25 + 4 \cdot 10 + 1$		(M)	$1400 \div 2 + 144 \div 2$	
(D)	$2 \cdot 2 \cdot 5 \cdot 5 + 3 \cdot 7$		(N)	$2000 - 1500 + 300 - 15$	
(E)	$71 + 2 \cdot 100$		(O)	$3 \cdot 10 \cdot 10 \cdot 10 + 10 \cdot 10$	
(F)	$600 \div 2 + 240 \div 4 - 1$		(P)	$5 \cdot 1000 - 600 + 6 \cdot 7$	
(G)	$2 \cdot 250 + 6 \cdot 4$		(Q)	$26000 + 20 \cdot 20 + 52$	
(H)	$1000 \div 4 \cdot 2 + 2 \cdot 23$		(R)	$4 \cdot 100 \cdot 100 + 6 \cdot 1000 + 4 \cdot 10 + 2$	
(I)	$600 - 3 \cdot 5$		(S)	$5 \cdot 10000 - 3 \cdot 1000 + 580$	
(J)	$700 - 50 + 4$		(T)	$24638 \cdot 10 - 5$	

Puzzle 16: Order of Operations

Mini-Lesson: Rewriting Expressions using Exponents

1) Ask students:

Q: Which expressions can be rewritten using exponents?

A: Expression D: $2 \cdot 2 \cdot 5 \cdot 5 + 3 \cdot 7 = 2^2 \cdot 5^2 + 3 \cdot 7$,

Expression L: $90 \div 3 + 2 \cdot 2 \cdot 5 \cdot 35 + 2 \cdot 2 = 90 \div 3 + 2^2 \cdot 5 \cdot 35 + 2^2$

Expression O: $3 \cdot 10 \cdot 10 \cdot 10 + 10 \cdot 10 = 3 \cdot 10^3 + 10^2$

2) Ask students:

Q: How can you rewrite 100 using exponents?

A: 10^2

Q: How can you rewrite 1000 and 10000 using exponents?

A: 10^3 and 10^4

3) In the puzzle, find all the expressions that include 100, 1000 and 10000 and rewrite them using exponents.

Expression E: $71 + 2 \cdot 100 = 71 + 2 \cdot 10^2$

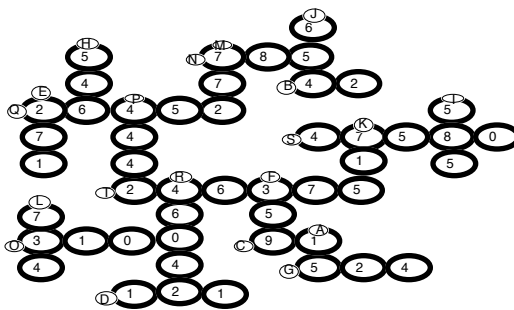
Expression H: $1000 \div 4 \cdot 2 + 2 \cdot 23 = 10^3 \div 4 \cdot 2 + 2 \cdot 23$

Expression P: $5 \cdot 1000 - 600 + 6 \cdot 7 = 5 \cdot 10^3 - 600 + 6 \cdot 7$

Expression R: $4 \cdot 100 \cdot 100 + 600 \cdot 1000 + 4 \cdot 10 + 2 = 4 \cdot 10^2 \cdot 10^2 + 600 \cdot 10^3 + 4 \cdot 10 + 2$

Expression S: $5 \cdot 10000 - 3 \cdot 1000 + 580 = 5 \cdot 10^4 - 3 \cdot 10^3 + 580$

Answer Key



(A) $5 + 2 \cdot 5$	15	(K) $5 \cdot 7 \cdot 20 + 15$	715
(B) $2 + 80 \div 2$	42	(L) $90 \div 3 + 2 \cdot 2 \cdot 5 \cdot 35 + 2 \cdot 2$	734
(C) $2 \cdot 25 + 4 \cdot 10 + 1$	91	(M) $1400 \div 2 + 144 \div 2$	772
(D) $2 \cdot 2 \cdot 5 \cdot 5 + 3 \cdot 7$	121	(N) $2000 - 1500 + 300 - 15$	785
(E) $71 + 2 \cdot 100$	271	(O) $3 \cdot 10 \cdot 10 \cdot 10 + 10 \cdot 10$	3100
(F) $600 \div 2 + 240 \div 4 - 1$	359	(P) $5 \cdot 1000 - 600 + 6 \cdot 7$	4442
(G) $2 \cdot 250 + 6 \cdot 4$	524	(Q) $26000 + 20 \cdot 20 + 52$	26452
(H) $1000 \div 4 \cdot 2 + 2 \cdot 23$	546	(R) $4 \cdot 100 \cdot 100 + 6 \cdot 1000 + 4 \cdot 10 + 2$	46042
(I) $600 - 3 \cdot 5$	585	(S) $5 \cdot 10000 - 3 \cdot 1000 + 580$	47580
(J) $700 - 50 + 4$	654	(T) $24638 \cdot 10 - 5$	246375