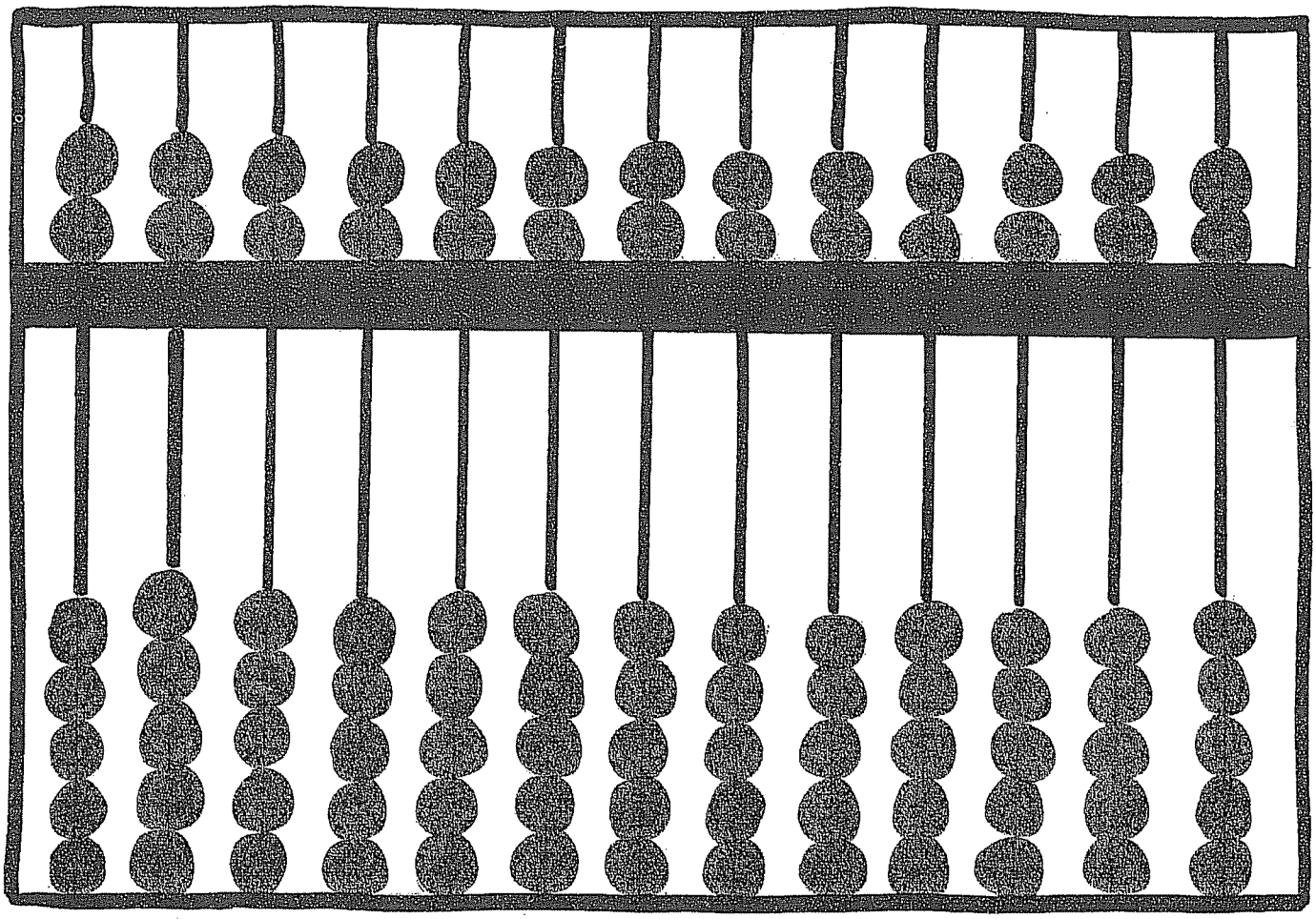
Abacus

An abacus is an instrument used to calculate math problems. It uses bead (numbers represented by beads) arithmetic. The use of the abacus is called the "art of reckoning". The abacus pictured below is one type, called the Chinese abacus.



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Welcome to the spring edition of *Abacus.* This issue sports a new title page thanks to the creativity of **Shoshanah Waxman** who attends The Linden School in Toronto.

The September l996 *Abacus* had two contests: new title page and Pentominoes Sum 20 puzzle. Only one entry was received for the first; however, ten entries were submitted for the puzzle. Thank you to the teachers who encouraged their students to participate. See page 3 for the contest solutions and entrants' names.

Does the problem-solving strand cause stress in your classroom? Do you wonder what tasks you should provide to promote problem-solving? This issue will hopefully inspire you and your students to have some fun and challenge at the same time.

Fun with l997 introduces some fascinating ideas for K-6 to ponder. Have your students add their own ideas and send them to the editor for future publication.

In August l996 I had the privilege of attending a four-day conference at University of Waterloo. This Problems Conference sharpened my skills in solving and creating problems for the classroom. Seminars in the morning, small group workshops in the afternoon, and social mealtimes and breaks throughout the day made participation a thrill. This conference will be occurring again in August 1997. **Fraser Simpson,** a mathematics teacher at the University of Toronto Schools and the Cryptic Crosswords writer for the Saturday Globe and Mail, inspired several of us at the conference to try these puzzles. This very busy fellow fulfilled my request for a ***Cryptic Search*** specially designed for elementary school students. He recommends this puzzle for transition 7-9 and up. The skills emphasis is on reason or critical thinking and mathematics vocabulary. Thank you, Fraser Simpson, for the solving tips and the beautiful puzzle.

Students, teachers and parents who enjoy solving problems for fun and recreation will be interested in the Canadian Mathematics Competition. With special permission from CMC and input from Professor **Ron Scoins,** chairman, you'll find a selection of problems from the ***Gauss Grade 7 l996*** Contest reprinted for your enjoyment. This contest, Gauss, is available for grade 7 and grade 8. For more information about these contests or the problems conference write to ***Centre for Education in Mathematics and Computing,*** Faculty of Mathematics, University of Waterloo, Waterloo, Ontario, N2L 3G1. Are there other contests available for K-8? If so please write and tell me about the contest for a future feature in *Abacus.*

Frances Schatz

Answer Keys

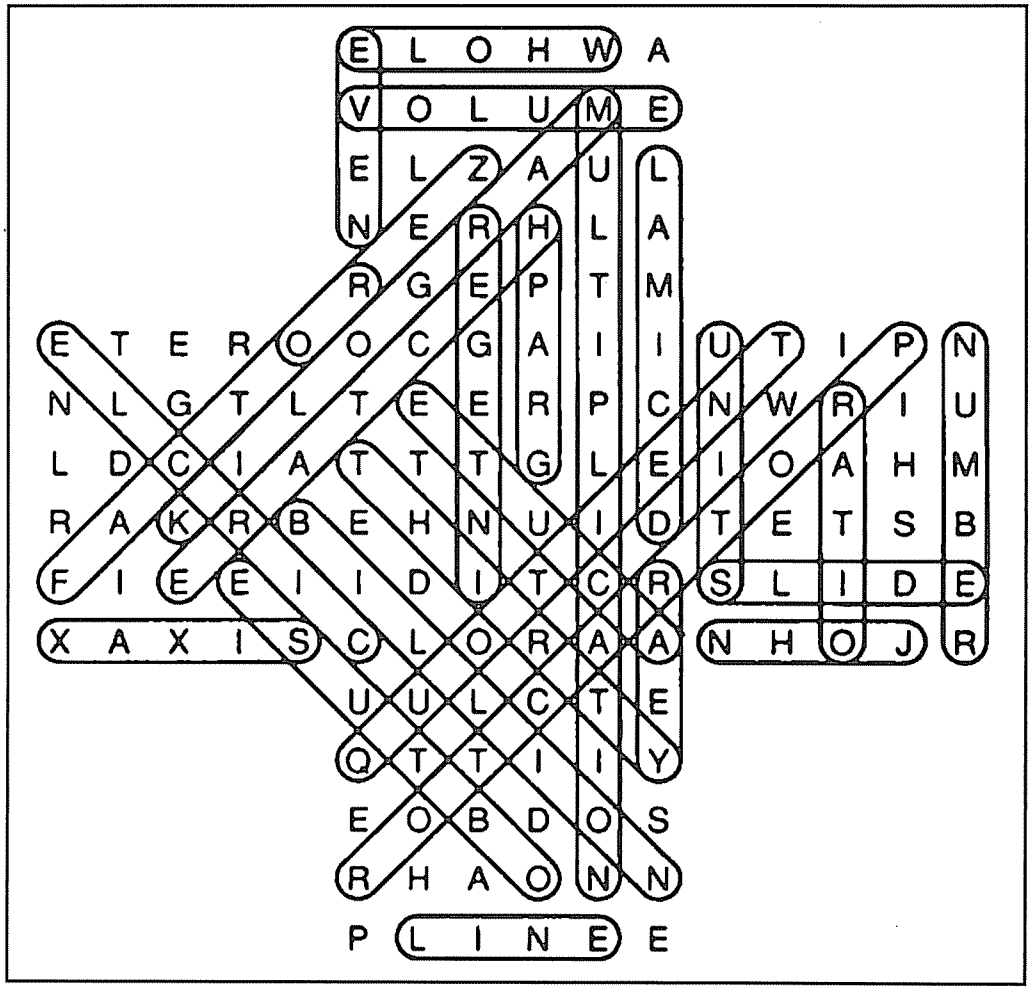
Fun with l997

1. Other numbers include 17, 71, 79, 997, 9719. Can you add to this list?
2. 567, 1997, 1997, A = 28886, B = 26, 1111, C = 29, D = 34 is one possible answer.
3. 1997
4. 9971-1799 = 8172
   8721-1278 = 7443
   7443-3447 = 3996
   9963-3699 = 6264
   6642-2466 = 4176
   7641-1467 = 6174 same digits 1, 4, 6, 7 as last one.
5. 1997
6. a) 38, 194 b) 57, 291

Cryptic Search

Acute, **B**illion, **C**ircle, **D**ecimal, **E**ven, **F**actor, **G**raph, **H**ectare, **I**nteger, **J**ohn, **K**ilogram, **L**ine, **M**ultiplication, **N**umber, **O**btuse, **P**rotractor, **Q**uotient, **R**atio, **S**lide, **T**hirty, **U**nits, **V**olume, **W**hole, **X**-axis, **Y**ear, **Z**ero.

The leftover letters spell:
Altering wild three-sided shape (8)
TRIANGLE



Gauss Answers

1. D 2. B 3. B
4. A 5. B 6. D
7. D 8. B 9. B
l0. A

Pentominoes Sum 20

Solution 1 (given in September, l996 ABACUS)

6	9	5	3	2	1
1	2	4	5	4	4
7	3	1	7	3	1
2	9	1	2	6	7
5	3	8	1	5	3

Solution 2

6	9	5	3	2	1
1	2	4	5	4	4
7	3	1	7	3	1
2	9	1	2	6	7
5	3	8	1	5	3

Submitted by:
Shoshanah Waxman, The Linden School, Toronto
Marshall Belknap, Shannon Cosby, Sarah d'Entremont, Curtis Duncan, Adam Groleau, Gareth Inglis, Deborah Kong, Lesley Steeve, Heather Storey, Innisdale Secondary School, Barrie.

FUN WITH 1997

1. 19, 97 and 1997 are all prime numbers. A **prime** number is a whole number greater than one and this number has only one and itself as divisors. Can you form any other prime numbers using one, two, three or four of the digits 1, 9, 9, 7 in any order?

2. Magic? $1 \times 9 \times 9 \times 7 = ?$

$$2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^3 + 2^2 + 2^0 = ?$$

$$19 \times 3 + 20 \times 97 = ?$$

$1997 + 9971 + 9719 + 7199 = A$ $\qquad$ $1 + 9 + 9 + 7 = B$

A divided by B is _____

$19^2 + 97^2 = 9770$. Can you find C and D so that

$$C^2 + D^2 = 1997?$$

3. MCMXCVII is Roman numerals for ?

4. Arrange the digits 1, 9, 9, 7 to form the largest number E.
Use the same digits to form the smallest number F.

E subtract F = G.

Take the digits of G to form the largest number M and smallest number N.

M – N = P.

Repeat the process until a special number emerges.
What are the digits of the special number?

5. Divide the number 1998997 by 7, then 11 and then 13.
What is the new number?

6. Fill in the boxes to make the following arithmetic true.
More than one answer may be possible.

a) $\frac{19}{\square} + \frac{97}{\square} = 1$ $\qquad$ b) $\frac{19}{\square} \times \frac{\square}{97} = 1$

Take the number 1997 or its digits. List all the facts you can about the number or its digits. Send your notes to ABACUS editor.

How to Solve Cryptic Clues by Fraser Simpson

A cryptic clue is a special type of clue used in word games such as crosswords. To solve our "Cryptic Search" puzzle this issue, you need to know how these clues work. Every clue contains a definition of the answer word. So if the answer is HORNET, the clue will contain the definition such as "Stinging insect". However, there is something else included, too: another way to find the answer. This extra hint involves one of these two types of wordplay:

Anagram

An anagram is a rearrangement. Here's the clue with an anagram add-on:

Throne bothered stinging insect (6)

The (6) tells you that the answer is 6 letters long. The definition in the clue is "stinging insect". The extra part in the clue, "throne bothered", gives you another way to solve. A bothered (rearranged) version of THRONE gives the answer: HORNET.

In an anagram clue, there is always:

- ***a definition ("stinging insect")***
- ***an anagram signal ("bothered", which tells you to scramble the letters)***
- ***the letters to rearrange ("throne")***

The anagram signal is any word that suggests a letter arrangement needs to be ruined or repaired, such as "changed", "wild", "wrecked", "different", "adjusted", "fixed", "reprinted", "strange", and so on.

Hidden Word

A hidden word clue has the answer spelled out inside it, with no rearranging.

Stinging insect found in pouch or netting (6)

The definition is "stinging insect", but this time the answer is found inside the words "pouch or netting". Look closely, and you'll see the hidden word in its correct order: pouc**H OR NET**ting. Sometimes the answer is hidden in the initial letters of a string of words.

Stinging insect hovering over radio near egg timer, initially (6).

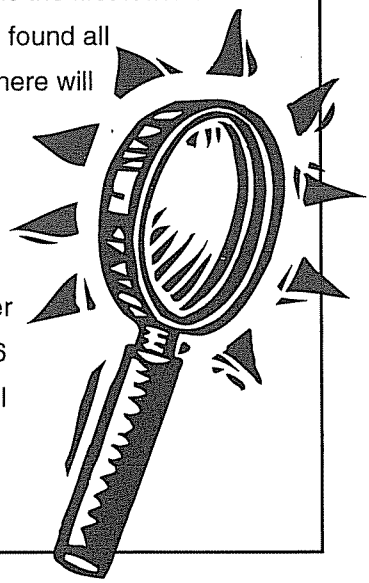
The word "initially" tips us off: we need to use initial letters of the six words right before it: **H**overing **O**ver **R**adio **N**ear **E**gg **T**imer. Those letters spell the answer, HORNET.

Solving Tip

As you look at each cryptic clue in our word search puzzle, try to decide whether the clue involves an anagram or a hidden word. Or, look for math-related words in the diagram and match them with our clues. Good luck, and have fun solving.

Cryptic Search by Fraser Simpson

Twenty-six math-related terms are hidden in the large addition sign. Every answer is in a straight line up, down, forward, backward or diagonally, and each one starts with a different letter of the alphabet. The words are clued below. The letter before each cryptic clue is the first letter of its answer. When you've found all 26 answers in the grid, there will be 27 leftover letters. These letters (reading from left to right, top to bottom) spell a final cryptic clue for an 8-letter word. Can you find all 26 words and solve the final clue?



Cryptic Search



A Under 90 adults could use the elevator initially (5)

B Number hidden by gerbil, lioness (7)

C Cleric wrecked round shape (6)

D Strangely, claimed a point (7)

E Divisible by two in seventy (4)

F Some stiff actors break down (6)

G Seeing Raphaela is holding a connect-the dots picture (5)

H Teacher changed unit of area (7)

I Greetin' wild number (7)

J Mr. Napier the mathematician initially just opened his novel (4)

K I mark log, changing unit of weight (8)

L Berliner holds straight object (4)

M Times impact until oil changes (14)

N One or two, for example, burn me badly (6)

O Changed us to be over 90? (6)

P Tractor pro fixed angle-measurer (10)

Q Answer to division not quite fixed (8)

R Relationship found in operation (5)

S Deli's weird transformation (5)

T Strangely, try & hit a multiple of ten (6)

U Tunis adjusted metres or litres (5)

V Love, um, changing space used (6)

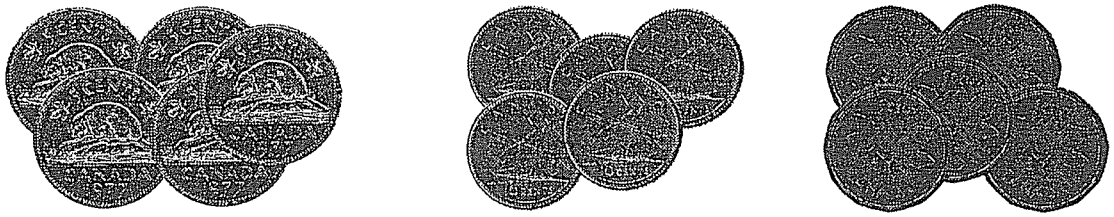
W At the start, who left a type of number? (5)

X Graph item reprinted as XXI (1-4)

Y A long time in Germany earlier (4)

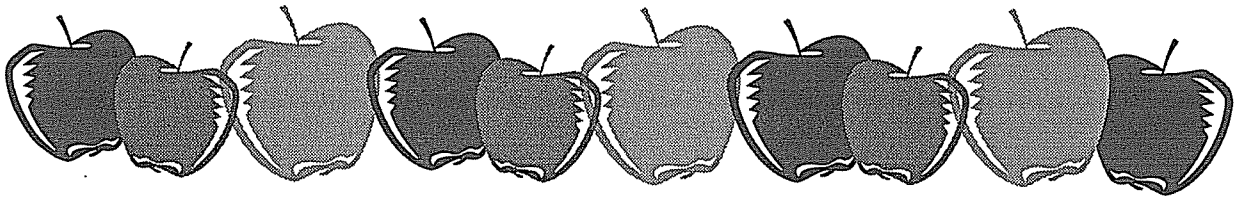
Z Nothing inside panzerotto (4)

Gauss Contest May 1996 Favourites



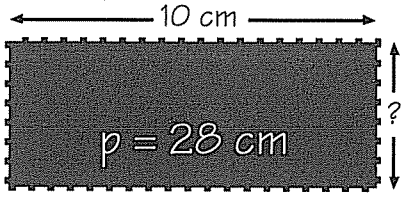
1. Chris has only 5 nickels, 5 dimes, and 5 pennies in his pocket.
The total amount of money that he has in his pocket is

(A) $1.80 (B) $0.15 (C) $0.75 (D) $0.80 (E) $1.50



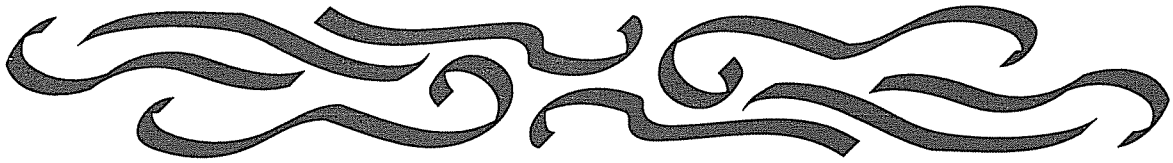
2. Apples at Metcalf's Market cost 45 cents each. Alex has sixteen dollars.
The maximum number of apples that Alex can purchase is

(A) 32 (B) 35 (C) 36 (D) 29 (E) 30



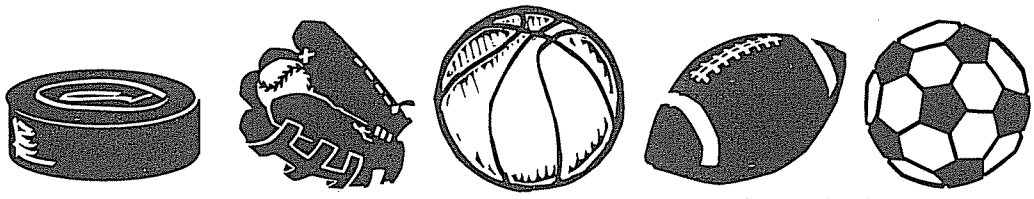
3. A rectangle has a perimeter of 28 cm and a length of 10 cm. The width of the rectangle is

(A) 9 cm (B) 4 cm (C) 8 cm (D) 18 cm (E) 7 cm



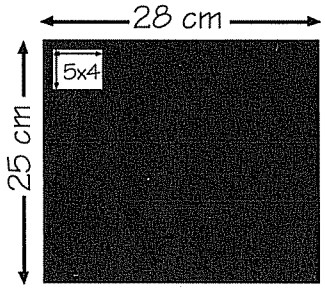
4. A piece of ribbon, 4 metres long, is cut into eight pieces. Seven of these pieces are each 52 cm long. What is the length of the remaining piece?

(A) 36 cm (B) 91 cm (C) 348 cm (D) 363 cm (E) 208 cm



5. Leslie buys five types of sports collector cards one at a time and always in the same order. He buys a hockey card first, then a baseball card, then a basketball card, then a football card, then a soccer card, and then starts again with a hockey card. The 37th card he buys is which card?

(A)hockey (B)baseball (C)basketball (D)football (E)soccer



6. The greatest number of rectangular tickets measuring 4 cm by 5 cm which can be cut from a rectangular piece of cardboard measuring 25 cm by 28 cm is

(A) 30 (B) 31 (C) 33 (D) 35 (E) 36



555-5???

7. Shamira wishes to phone Elena. She knows the first four digits and their order correctly. She also knows that the last three digits of Elena's 7-digit phone number are 2, 4 and 6, but is unsure of the order. She lists all the possible phone numbers for Elena. The number of wrong phone numbers in her list is

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

? + ? + ? + ? + 32 = ? x 6 = ?

8. A teacher gave her class five numbers to add together, the fifth one being 32. She told them to multiply the resulting sum by six. While adding the five numbers, one student added 22 instead of 32. After he multiplied by six, the difference between his answer and the correct answer was

(A) 10 (B) 60 (C) 22 (D) 32 (E) 50



9. Peter, Paul and Mary climb a flight of 54 steps. Mary climbs the steps one at a time, using steps 1, 2, 3, ..., 53, 54. Paul climbs the steps two at a time, using steps 2, 4, 6, ..., 52, 54. Peter climbs the steps three at a time, using steps 3, 6, 9, ..., 51, 54. The number of steps that exactly two people use is

(A) 36 (B) 27 (C) 18 (D) 45 (E) 9



10. A positive integer is divisible by 24 and is comprised only of 0's and 1's. If this number is as small as possible, the number of digits in it is

(A) 6 (B) 9 (C) 10 (D) 12 (E) 4

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