

Cryptarithm

Notes

Cryptarithm, sometimes known as “alphanumeric”, is a branch of mathematics where numbers have been replaced by letters.

There are two things to remember when we are working on problems related to cryptarithm.

- (a) The sum of 2 digits is 18 or less.
- (b) The product of 2 digits is 81 or less.

The rest is your reasoning skill.

EXAMPLES

1 Find the values of A, B and C.

$$\begin{array}{r} \text{(a)} \quad \quad \text{A B} \\ + \quad \quad \text{A B} \\ \hline \text{C A 6} \end{array}$$

$$\begin{array}{r} \text{(b)} \quad \quad \text{A B} \\ \times \quad \quad \text{7} \\ \hline \text{C 8} \end{array}$$

Solution:

- (a) $3 + 3 = 6$ or $8 + 8 = 16$
 $9 + 9 + 1 = 19$
Hence $A = 9$, $B = 8$ and $C = 1$.
- (b) We know that $7 \times 4 = 28$.
Hence $A = 1$, $B = 4$ and $C = 9$.

2 Find the values of a, b, c and d.

$$\begin{array}{r} \quad \quad \text{a b c} \\ \times \quad \quad \quad \text{6} \\ \hline \text{d 4 0 4} \end{array}$$

Solution:

We know that $4 \times 6 = 24$.

$$c = 4$$

$$(3 \times 6) + 2 = 20$$

$$b = 3$$

$$(2 \times 6) + 2 = 14$$

$$a = 2$$

$$d = 1$$

$$\begin{array}{r} \quad \quad \quad \text{2 3 4} \\ \times \quad \quad \quad \quad \text{6} \\ \hline \text{1 4 0 4} \end{array}$$

PRACTICE

1 Find the numbers represented by A, B and C.

$$\begin{array}{r} \text{(a)} \quad A \quad B \\ + \quad A \quad B \\ \hline B \quad C \end{array}$$

$$\begin{array}{r} \text{(b)} \quad \quad A \quad 7 \quad B \\ \times \quad \quad \quad \quad \quad 8 \\ \hline 4 \quad 5 \quad C \quad 2 \end{array}$$

2 Find the numbers represented by a, b and c.

$$\begin{array}{r} \text{(a)} \quad \quad a \quad b \quad 5 \\ + \quad \quad 8 \quad c \quad b \\ \hline c \quad c \quad 5 \quad 9 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad \quad a \quad 4 \\ \times \quad \quad \quad b \\ \hline 3 \quad b \quad 8 \end{array}$$

3 Find the numbers represented by the letters.

$$\begin{array}{r} \text{(a)} \quad A \quad B \quad C \\ + \quad C \quad D \quad E \\ \hline D \quad 6 \quad 8 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad \quad a \quad 6 \\ \times \quad \quad \quad 7 \\ \hline 3 \quad b \quad b \end{array}$$

Adapted:

Maths Olympiad – Unleash The Maths Olympian In You! (Junior 2)

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Solutions to:

Cryptarithm

1. (a)
$$\begin{array}{r} 24 \\ + 24 \\ \hline 48 \end{array}$$

A is 2, B is 4 and C is 8.

(b)
$$\begin{array}{r} 574 \\ \times 8 \\ \hline 4592 \end{array}$$

A is 5, B is 4 and C is 9.

2. (a)
$$\begin{array}{r} 345 \\ + 814 \\ \hline 1159 \end{array}$$

a is 3, b is 4 and c is 1.

(b)
$$\begin{array}{r} 54 \\ \times 7 \\ \hline 378 \end{array}$$

a is 5 and b is 7.

3. (a)
$$\begin{array}{r} 123 \\ + 345 \\ \hline 468 \end{array}$$

A is 1, B is 2, C is 3, D is 4 and E is 5.

(b)
$$\begin{array}{r} 46 \\ \times 7 \\ \hline 322 \end{array}$$

a is 4 and b is 2.