

ARITHMETIC WITHOUT A PENCIL

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Arithmetic without a Pencil by Edith M. Joy

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EDITH M. JOY

**ARITHMETIC
WITHOUT A PENCIL**

ARITHMETIC WITHOUT A PENCIL

BY
EDITH M. JOY

And to know,
Rather consists in opening out a way
Whence the imprisoned splendor may escape,
Than in effecting entry for a light
Supposed to be without.



D. C. HEATH & CO., PUBLISHERS

1902

FOREWORD

THE superiority that is claimed for this book is based upon its logical, easily progressive, purposeful arrangement: logical, because each new principle or fact is introduced at the point at which the need for it appears; easily progressive, because but one difficulty at a time is presented and its mastery leaves the student with the power necessary to the accomplishment of the next; purposeful, because each exercise carries with it a particular something to be achieved, bearing directly upon the perfect whole.

Teachers of Arithmetic must bear in mind that each new phase of the science should be developed without the pencil in the student's hand; that Written Arithmetic is logically supplementary to Mental Arithmetic; and that all work must be systematic, living, and full of purpose.

Let the aim be clear reasoning, accuracy, and rapidity; with steady, daily gain in each; and let success mean, not so much the acquirement of knowledge of certain facts and principles, as the development of the power that is within.

EDITH M. JOY.

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TO THE TEACHER

AN arithmetical thought should be developed by means of (1) concrete problems involving easy numbers; after this should come (2) abstract drill until the pupils become so skillful that in further reasoning they are unhampered by the numbers; following a full comprehension of the thought, (3) problems should be given whose solution requires use of the pencil.

Abridged illustrations:

First. I spent 10 cents, which was $\frac{2}{3}$ of my money. How much money had I?

Second. 25 is $\frac{5}{8}$ of what number?

Third. My father sold a cow for \$60, which was $\frac{2}{3}$ of the cost. What did he pay for her?

Fourth. A store was sold for \$250,200. This was $\frac{2}{11}$ of what was asked for it. What was asked?

Each new principle must be dwelt upon long enough to insure its becoming fixed in mind. To do this it will be necessary for pupils to solve, without pencil, many more problems than are contained in this book. These problems he may make for himself largely. Illustrations: Make ten problems involving the principle of No. 20, Exercise 193, and introducing as much variety as possible. Make practical examples using the numbers in No. 16, Exercise 201.

The class must be studied. Its needs will furnish the inspiration from which will grow the plan for the daily lesson. May "Arithmetic without a Pencil" justify its existence by proving to be of assistance in the carrying out of such plans.

E. M. J.

ARITHMETIC WITHOUT A PENCIL

ADDITION

1

<u>6</u>	<u>8</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>9</u>	<u>7</u>	<u>6</u>	<u>4</u>	<u>6</u>	<u>5</u>	<u>7</u>
<u>7</u>	<u>4</u>	<u>9</u>	<u>7</u>	<u>6</u>	<u>8</u>	<u>8</u>	<u>3</u>	<u>7</u>	<u>6</u>	<u>6</u>	<u>7</u>
<u>8</u>	<u>2</u>	<u>7</u>	<u>8</u>	<u>7</u>	<u>5</u>	<u>4</u>	<u>4</u>	<u>9</u>	<u>6</u>	<u>7</u>	<u>4</u>
<u>5</u>	<u>9</u>	<u>2</u>	<u>8</u>	<u>9</u>	<u>4</u>	<u>3</u>	<u>9</u>	<u>9</u>	<u>8</u>	<u>5</u>	<u>4</u>

2

<u>16</u>	<u>18</u>	<u>15</u>	<u>13</u>	<u>14</u>	<u>19</u>	<u>17</u>	<u>16</u>	<u>14</u>
<u>7</u>	<u>4</u>	<u>9</u>	<u>7</u>	<u>6</u>	<u>8</u>	<u>8</u>	<u>3</u>	<u>7</u>
<u>16</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>18</u>	<u>12</u>	<u>17</u>	<u>17</u>	<u>17</u>
<u>5</u>	<u>4</u>	<u>7</u>	<u>6</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>2</u>	<u>9</u>
<u>15</u>	<u>14</u>	<u>14</u>	<u>19</u>	<u>17</u>	<u>14</u>	<u>19</u>	<u>17</u>	<u>16</u>
<u>4</u>	<u>3</u>	<u>9</u>	<u>9</u>	<u>6</u>	<u>8</u>	<u>5</u>	<u>3</u>	<u>4</u>
<u>18</u>	<u>18</u>	<u>13</u>	<u>17</u>	<u>15</u>	<u>17</u>	<u>15</u>	<u>16</u>	<u>12</u>
<u>9</u>	<u>7</u>	<u>6</u>	<u>4</u>	<u>6</u>	<u>5</u>	<u>8</u>	<u>8</u>	<u>7</u>
<u>19</u>	<u>14</u>	<u>13</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>13</u>	<u>19</u>	<u>18</u>
<u>7</u>	<u>5</u>	<u>4</u>	<u>6</u>	<u>6</u>	<u>2</u>	<u>9</u>	<u>2</u>	<u>3</u>
<u>18</u>	<u>16</u>	<u>14</u>	<u>17</u>	<u>17</u>	<u>18</u>	<u>13</u>	<u>12</u>	<u>19</u>
<u>8</u>	<u>9</u>	<u>7</u>	<u>9</u>	<u>6</u>	<u>5</u>	<u>8</u>	<u>9</u>	<u>3</u>
<u>1</u>								

3

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

4

19+9	14+9	14+3	15+4	16+5	14+4	5+17
6+16	5+18	6+12	17+7	12+7	17+9	4+17
3+16	8+17	19+8	16+4	17+3	19+5	4+18
6+17	3+15	18+3	13+3	12+9	15+4	16+3

5

3	6	6	3	2	4	6	5	4	4	4	8	3
4	3	3	8	3	9	4	9	7	8	7	2	8
<u>6</u>	<u>5</u>	<u>7</u>	<u>2</u>	<u>6</u>	<u>4</u>	<u>9</u>	<u>2</u>	<u>5</u>	<u>4</u>	<u>2</u>	<u>1</u>	<u>5</u>
7	3	3	5	3	7	9	4	4	2	3	8	9
3	4	9	7	4	7	7	6	5	7	8	8	7
<u>8</u>	<u>7</u>	<u>2</u>	<u>5</u>	<u>9</u>	<u>2</u>	<u>3</u>	<u>5</u>	<u>8</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>4</u>
5	7	5	4	9	5	3	6	3	4	6	4	7
6	7	3	7	7	2	9	8	2	2	2	2	8
<u>8</u>	<u>4</u>	<u>9</u>	<u>6</u>	<u>8</u>	<u>7</u>	<u>3</u>	<u>7</u>	<u>6</u>	<u>6</u>	<u>5</u>	<u>5</u>	<u>9</u>
5	9	4	5	2	7	4	6	8	3	3	6	4
<u>9</u>	<u>8</u>	<u>7</u>	<u>7</u>	<u>6</u>	<u>9</u>	<u>9</u>	<u>8</u>	<u>4</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>6</u>
7	3	6	5	2	7	2	5	4	4	4	9	6
<u>8</u>	<u>6</u>	<u>5</u>	<u>8</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>4</u>	<u>3</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>4</u>
7	2	3	5	8	7	4	3	9	6	3	4	6
9	8	7	9	3	8	9	9	9	6	5	4	3
<u>6</u>	<u>7</u>	<u>4</u>	<u>9</u>	<u>3</u>	<u>7</u>	<u>7</u>	<u>2</u>	<u>5</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>5</u>