Boiling Spring Academy Virtual Fieldtrip

Video Five: Arithmetic

Photo courtesy of Donna Vissman

Boiling Spring Academy
Primm Historic Park
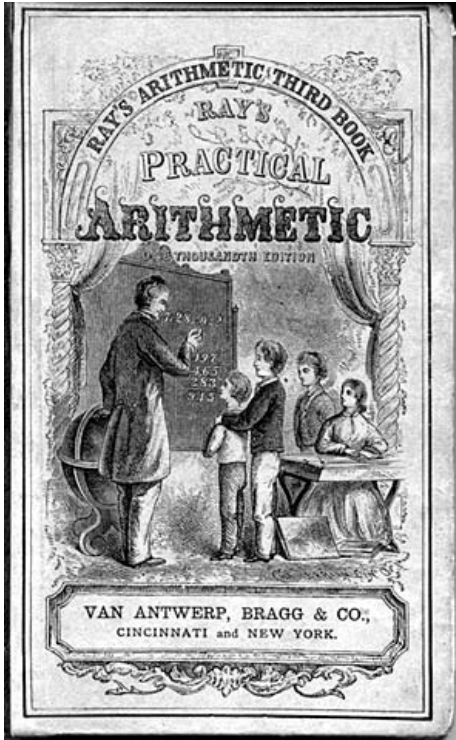Brentwood, Tennessee

Presented by

LESSON FIVE - ARITHMETIC
Students may need paper and pencil

Motions-Look, Listen & Learn
Motions for Roman numerals
Spider & Fly story problem
Jumping jacks for the mind

ARITHMETIC: Also called CIPHERING

The study of numbers, addition, subtraction, multiplication and division.

• Before 1800 arithmetic received little attention. Educators believed it had little actual educational value.

• Joseph Ray did for numbers what McGuffey did for literature. Ray didn't just teach how to solve math problems; he taught the student how to use math in their daily life. His texts were practical and dealt with buying and selling needed articles. His first book was published in 1834, just three years before McGuffey published his *First Reader*.

• Fundamentals of a good education doesn't change. 2+2 always equals 4.

• Being able to figure problems in your head was an admired and desired skill. Arithmetic became a fundamental part of education because it was necessary that the students be able to add and subtract so they could deal with simple problems in everyday life. Story problems and mental arithmetic was stressed.
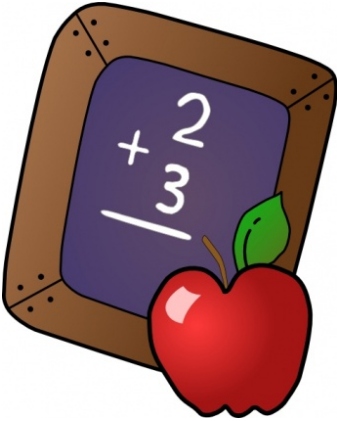
1+2=3
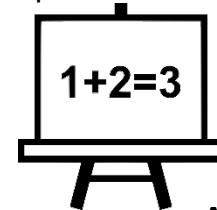
ARITHMETIC

If you have not said a kind word to someone today, or you have not done a kind deed, consider it a day lost and do better tomorrow.

OPTIONAL STUDENT POST-VIDEO ACTIVITIES

1. Example of repetition used frequently in teaching during the 1800s: Have 4 math facts on the board or this paper and ask students to write them each 20 times.

6X8=48	8X8=64
7X8=56	9X6=54

2. **Arithmetic Problems/Story Problems** were often used in Arithmetic. The problems are often based on prior knowledge and higher level thinking skills. Many involve more than one step and can be adapted to be easier or harder. Students may use repeated addition, multiplication, subtraction or division.

Students should be ready to answer:

- What process was used to obtain the answer-addition, subtraction, multiplication or division? Remember there is often more than one way to get the correct answer.
- What prior knowledge was needed to get an answer?

1. The prehistoric American Indians lived in this are from 900 to 1450. How many years did they live in this area? _____How many years have passed since they arrived to this area? _____

2. Boiling Spring Academy was built in 1832. It is now 2020 (you can change to current year). How old is the building? _____

3. There are four birds sitting on a tree limb. In all, how many wings and bills are on the limb? _____

4. Yesterday, Sally went to sell eggs at the general store. She had 3 dozen eggs. She brought 4 eggs home. How many eggs did she sell? _____ If she sold each egg for 3 cents, how much money did she bring home? _____

5. Mr. Primm bought a horse for $23.00 and a cow for $18.00. How much more did he pay for the horse? _____ What is the total spent for both animals? _____

6. A blacksmith shod 7 horses in one day, putting a shoe on each foot, how many horseshoes did he use? _____

7. When Harvey was 6 years old his younger sister Annabelle was half his age. When Harvey is 40 how old will Annabelle be? _____

8. If 10 cents make 1 dime, 10 dimes make 1 dollar, and 10 dollars makes 1 eagle, how many dimes are in 1 eagle? _____ In 8 dollars? _____

9. William had 12 marbles and lost one fourth of them. How many marbles did he lose? _____

10. Billy Bob had 20 chickens. Of these, seven are black, six are brown, three are white and four are red. How many of Billy Bob's chickens are black and red? _____

The following problems are taken from Ray's Arithmetic, Second Book *Intellectual Arithmetic* by Joseph Ray M.D. (1857)

1. Three boys commence playing marbles: Thomas had 20, David 10, and Moses 4; when they quit, David had 6 and Moses 8: how many had Thomas? _____
2. A farmer had 24 sheep: 9 of them were killed by wolves, 5 of them were stolen, and 6 he sold: how many had he left? _____
3. A man paid 38 dollars for a horse, and 20 for a colt: he afterward sold the colt for 10 dollars and the horse for 65: how much did he make by the transaction? _____
4. A drover bought sheep as follows: of one man 10; of another, 12; of another, 5: of another, 3: he sold at one time 15; and at another 5: how many were left? _____
5. What number must be added to 25, to make a sum 14 less than 45? _____
6. If 2 men can do a job of work in 3 days, how many days will it take 1 man to do it? _____
7. A person has a job of work which 6 men can do in 9 days; but it is necessary to do it in one day: how many men must be employed? _____
8. If 2 barrels of cider last 6 persons 4 weeks, how many weeks will it last 1 person? _____
9. If 12 horses can be sustained in a pasture 10 months, how many horses will it feed 1 month? _____
10. A boy bought 3 apples at 4 cents each: how much did they cost? _____
    He paid for them with oranges, at 6 cents each: How many oranges did it take? _____

3. Jumping Jacks for the brain. Oral problems said slowly and then repeated once.
If possible, do this as a mental math challenge--Do not use pencil and paper.

1. How much is 2 and 5, multiplied by 2, subtract 3? _____
2. How many are 4 multiplied by 2, subtract 1, add 5, multiplied by 2? _____
3. How many are 3 and 5, subtract 4, multiplied by 3, and divided by 2? _____
4. How many are 4 and 9, less 8, multiplied by 6? _____
5. How many are 10 and 7, less 8, multiplied by 6, divided by 9? _____

4. Roman Numerals
Answer what number the Roman Numerals stands for:

V=_____   IX=_____

VI= _____   XXV=_____

IV=_____   XXXIX=_____

X=_____   L=_____

XI=_____   XLIII=_____

5. BUZZ- Group game. A counting game that can be adjusted to the student's math level. The teacher calls out a BUZZ number such as 7. Students sit or stand in a circle and begin counting off around the circle by ones. Any time a student has a number with a 7 in it they have to say BUZZ. For example, 1, 2, 3, 4, 5, 6, Buzz, 8, 9, 10, 11, 12, 13, 14, 15, 16, Buzz, 18... If they said the number instead-they would be out. Continue until only 1 person remains. The last person left is the winner.

Other variations

- **Change the direction that you count after saying buzz.** Once you reach 7 and someone says buzz, continue the count, but in a counterclockwise direction. Then, when you reach 17 and someone says buzz, change the direction again and count in a clockwise direction. Continue alternating each time someone says buzz.
- **Multiplication facts**: Use the number seven and multiples of seven such as 7, 14, 21, 28, and so on. Any number can be used. Tell the students that the aim of the game is to count to 50 – All multiples of the chosen number must be replaced by the word 'Buzz.' For example, if the buzz number was multiples of 5, play would go 1,2,3,4, buzz,6,7,8,9, buzz,11,12…etc..
- For a harder variation, choose **two sets of multiples** to exclude**.** Example 5 is Bizz & 7 is Buzz: 1, 2, 3, 4, Bizz, 6, Buzz, 8, 9, Bizz, 11, 12, 13, Buzz, Bizz, 16, Buzz, 18, 19, Bizz, Buzz, 22, ... Can also add if the number is a multiple of 5 and 7, or has 5 and 7 in it, like 35 or 57 or 70 or 75, say 'BizzBuzz'!

6. Mad Math Relay-Group game. Each child has a slate/chalk or whiteboard. Form a circle so they can easily pass their slates from one person to another. Teacher calls out a number to write at the top of their slate. Teacher calls out another number along with the function to be performed, example "add 27", "multiply by 3" etc. Uses numbers and functions suitable to the grade level. Give participants a set time to perform the function. Once completed, pass slates to the right. Call out another function, pass slates again. Do this 5 times. Compare the slates. Does everyone have the same answer? Have participants check the work on the slate they are holding. Erase and begin a new relay.

<u>KEY TO QUESTIONS</u>

2. **Arithmetic & Story Problems**
    1. The prehistoric American Indians lived in this are from 900 to 1450. How many years did they live in this area? (550years) How many years have passed since they arrived to this area? (2020 – 900 = 1120 years)
    2. Boiling Spring Academy was built in 1832. It is now 2020 (you can change to current year). How old is the building? (188 years)
    3. There are four birds sitting on a tree limb. In all, how many wings and bills are on the limb? (8 wings and 4 bills=12) (Prior knowledge-how many wings and bills on each bird;
    4. Yesterday Sally went to sell eggs at the general store. She had 3 dozen eggs. She brought 4 eggs home. How many eggs did she sell? (3X12=36 –4=32 eggs sold). If she sold each egg for 3 cents, how much money did she bring home? (32 eggs @ 3 cents each = 96 cents) (Prior Knowledge-How many eggs in a dozen.
    5. Mr. Primm bought a horse for $23.00 and a cow for $18.00. How much more did he pay for the horse ($23.00-$18.00=$5.00). What is the total spent for both animals? ($41.00)
    6. A blacksmith shod 7 horses in one day, putting a shoe on each foot, how many horseshoes did he use? 28
    7. When Harvey was 6 years old his younger sister Annabelle was half his age. When Harvey is 40 how old will Annabelle be? (37 years)
    8. If 10 cents makes 1 dime, 10 dimes make 1 dollar, and 10 dollars makes 1 eagle, how many dimes are in 1 eagle? __100____   In 8 dollars? __80____
    9. William had 12 marbles and lost one fourth of them. How many marbles did he lose? (3 marbles)
    10. Billy Bob had 20 chickens. Of these, seven are black, six are brown, three are white and four are red. How many of Billy Bob's chickens are black and red? (11 chickens)

Ray's Arithmetic, Second Book *Intellectual Arithmetic*
    1. Three boys commence playing marbles: Thomas had 20, David 10, and Moses 4; when they quit, David had 6 and Moses 8: how many had Thomas? _20____20+10+4=34; 6+8=14; 34-14=20
    2. A farmer had 24 sheep: 9 of them were killed by wolves, 5 of them were stolen, and 6 he sold: how many had he left? __4___ 9+5+6=20 24-20=4
    3. A man paid 38 dollars for a horse, and 20 for a colt: he afterward sold the colt for 10 dollars and the horse for 65: how much did he make by the transaction? _17____ 38+20=58; 65+10=75; 75-58=17
    4. A drover bought sheep as follows: of one man 10; of another, 12; of another, 5: of another, 3: he sold at one time 15; and at another 5: how many were left? __10___ 10+12+5+3=30; 30-15 -5=10
    5. What number must be added to 25, to make a sum 14 less than 45? __6___ 45-14=31; 31-25=6; 25+6=31
    6. If 2 men can do a job of work in 3 days, how many days will it take 1 man to do it? __6___ Analysis-It will require 1 man twice as long as 2 men. If it takes 2 men 3 days, it will take 1 man twice 3 days, which are 6 days; therefore if 2 men do a job of work in 3 days, 1 man will do it in 6 days.
    7. A person has a job of work which 6 men can do in 9 days; but it is necessary to do it in one day: how many men must be employed? __54 men___ 9X6=54
    8. If 2 barrels of cider last 6 persons 4 weeks, how many weeks will it last 1 person? ___24 weeks__ 6 X 4= 24
    9. If 12 horses can be sustained in a pasture 10 months, how many horses will it feed 1 month? _120 horses__ 12 X 10=120
    10. A boy bought 3 apples at 4 cents each: how much did they cost? __12 cents___
        a. He paid for them with oranges, at 6 cents each: How many oranges did it take? __2__ oranges___ Analysis: 3 apples cost 3 times the price of 1 apple, that is, 3 X 4 cents or 12 cents.

Second it took as many oranges as 6 cents are contained times in 12 cents; 6 cents are contained in 12 cents 2 times. Ans 2 oranges

3. Jumping Jacks for the brain. Oral problems said slowly and then repeated once.
If possible, do this as mental math-challenge--Do not use pencil and paper.

6. How much is 2 and 5, multiplied by 2, subtract 3 = __11__ (2 + 5 =7 7 X 2 =14 14-3= 11)
7. How many are 4 multiplied by 2, subtract 1, add 5, multiplied by 2 = __24__ (8-1=7 + 5=12 X 2 = 24)
8. How many are 3 and 5 , subtract 4, multiplied by 3, divided by 2= __6__ (8 – 4 =4 X 3=12 ÷ 2 =6)
9. How many are 4 and 9, less 8, multiplied by 6? __30__ (4+9) -8 X 6=30
10. How many are 10 and 7, less 8, multiplied by 6, divided by 9? __6__ (10+7) -8 X 6 ÷ 9=6

4. Roman Numerals
Answer what number the Roman Numerals stands for:

V=__5__   IX=__9__

VI= __6__   XXV=__25__

IV=__4__   XXXIX=__39__

X=__10__   L=__50__

XI=__11__   XLIII=__43__