A Mind for Math

Genesis Curriculum – The Book of Exodus

Here's a little snippet to give you an idea of what's in the curriculum. Its focus is on thinking about how to use math to solve problems and how numbers work together and can be manipulated.

The examples you'll find here are from throughout the teacher's book. You read the lesson together, answering questions as you go. I have my youngest answer first and then the older one tells him if he's right or not, so he stays engaged. Everyone works together until it gets past their own level. Then they can try it as a challenge or maybe move on to work on math facts. It's great review for my older son and builds his confidence as we lead up to his level.

Children will each have their own workbook with the problems along with space to work and to write their answers. During the review weeks everyone has their own page of problems to practice. These look the most like "normal" math worksheets.

Everything is formed around word problems inspired by the day's Bible reading. They do all sorts of topics beyond arithmetic including time, measurement, geometry, and such.

The emphasis is on thinking. They have to figure out problems and will learn about how numbers work and go together. I don't teach formulaic math. I try to show them tricks for how to think about numbers.

Just like the regular curriculum, this is set up with four lessons and a review day, and then five weeks of lessons and two weeks of review. There are 140 regular lesson days and then the student workbooks have 180 days of work. And just like in the regular curriculum, you are the teacher. I walk through example problems more often in the answers than in the instruction.

You should be comfortable with arithmetic to use this curriculum, but you will be going through it with your children, so you should get the refreshers you need along the way. Also, it's only first through fourth, so it doesn't get too complicated.

Day 1

Fractions

There are 11 tribes of Israel and two half tribes. Draw one circle to show Joseph's tribe. (Exodus 1:1-7)

A. Draw a line through the middle to show two halves. What's one half plus one half?

1 whole

B. Draw a circle and divide it into quarters, four parts. (You can do that by drawing a line to divide it in half and then another to divide it in half the other way.) Color in one quarter red. Color in two quarters blue. How much is 2 quarters? How much is 4 quarters? Write one quarter, ¼. Write one half, ½.

1 half, 1 whole

C. Draw a circle and divide it into thirds, three parts. Color one third red and two thirds blue. What is one third plus two thirds? Write the equation.

1 whole, $^{1}/_{3} + {}^{2}/_{3} = 1$

D. Draw two circles. Divide one into two halves. Divide one into quarters. Color in one of the halves and one of the quarters. What is one half plus one quarter? Need help? Look at B. How many quarters is one half?

Write the equation.

$^{1}/_{2} + {}^{1}/_{4} = {}^{2}/_{4} + {}^{1}/_{4} = {}^{3}/_{4}$

Day 2

Skip Counting (Multiplying), Odd and Even, Patterns

The Egyptians are afraid that the Hebrews will join themselves with the enemy. (Exodus 1:8-10)

A If 2 Hebrews joined together with 2 others, how many would there be? And if 2 more joined? And 2 more? And 2 more? Can you skip count by 2 to 20? These are all EVEN numbers. Now count by 10s. Now can you count by 100? Count by 1000s. Count by millions.

4, 6, 8, 10, 12, 14, 16, 18, 20

B If 5 Hebrews joined together with 5 others, how many would there be? And if 5 more joined? And 5 more? And 5 more? How far can you go? Write down the numbers. Are they odd or even? Can you guess whether or not the next number is going to be odd or even? How do you know?

10, 15, 20, 25, 30, 35, 40, 45

C. If 3 Hebrews joined together with 3 others, how many would there be? And if 3 more joined? And 3 more? And 3 more? How far can you go? Write down the numbers. Are they odd or even? Can you guess whether or not the next number is going to be odd or even? How do you know? What pattern does adding an odd number create?

6, 9, 12, 15, 18, 21, 24, 27, 30

D. If 6 Hebrews joined together with 6 others, how many would there be? And if 6 more joined? What if you added 6 people 7 times? How many people would that be? What if you added 6 people 12 times?

12, 18, 6 x 7 = 42, 6 x 12 = 72

To figure out 6 x 12 you can change the problem to make it easier. You can make 12 into something easier to multiply by. 12 is just 10 + 2.
6 times 12 is the same problem as 6 times 10 plus 6 times 2. Why?
You are adding 6 more people and 6 more people and 6 more people. You do that ten times and then you add 6 more people two times more. All you are doing is the same thing, adding more people.
You can say 6 x 10 plus 6 x 2. That's 60 + 12. That's 72.

Day 3
Area

The Hebrews multiplied and spread out. (Exodus 1:11-14)

A. Draw a rectangle made of 18 blocks. Here's how to do it. Draw 6 blocks all in a line. Now draw another block on top of each of those blocks. Now do it one more time. Draw a third row of blocks right on top of the other rows. Count up the blocks. There should be 18. How high is your rectangle? How wide is your rectangle?

3 blocks high, 6 blocks wide

B. Draw 12 blocks into three different sized rectangles. Each rectangle must have a different width and height. (You can use real blocks instead of drawing.) What is the height and width of each rectangle?

1 block by 12 blocks, 2 blocks by 6 blocks, 3 blocks by 4 blocks

C. Write the equation that would tell us that a rectangle 6 blocks wide and 3 blocks high has 18 blocks. How do we find 18 blocks without having to count them all up?

Now find out how many blocks would be inside rectangles with these widths and heights: 7 and 4, 9 and 5, 11 and 2, 10 and 6.

6 x 3 = 18; 7 x 4 = 28 blocks; 9 x 5 = 45 blocks; 11 x 2 = 22 blocks, 10 x 6 = 60 blocks

D. If a rectangle was 8 meters long and 4 meters wide, what would be its area? (That means how many square meters fits inside of it. Each square meter would be like one of those blocks inside the rectangles you drew.)

Now find it for these measurements: 20 cm by 5 cm, 15 in by 3 in, 17' by 6'.

8 meters x 4 meters = 32 meters squared 8 m x 4 m = 32 m^2 That's 32 meters squared, or how many squares measuring a meter each would fit in that shape.

20 x 5 = 100 centimeters; 15 x 3 = 45 inches; 17 x 6 = 102 feet
To figure 20 by 5 you multiply 2 x 5 and add the 0 back on. 2 x 5 = 10(0)
To figure 15 x 3 you can multiply 10 x 3 and add to it 5 x 3. 30 + 15 = 45
To figure out 17 x 6 you do the same. Split 17 into 10 and 7. 10 x 6 and 7 x 6 = 60 and 42 So the answer is 60 + 42 = 102

Day 71
Rate

The Egyptians are in pursuit of the Israelites. (Exodus 14:21-31)

A. Today you're going to figure out how far the Israelites traveled when they were running from the Egyptians.

Distance (how far they went) = velocity (how fast they were going) x time

If they were going 10 miles an hour for 1 hour, then they went 10 miles because 10 x 1 (or ten one time) is 10.

If they were going 5 miles an hour for 2 hours, how far did they go? Multiply 5 times 2. (Count by fives to multiply by five.)

10 miles (remind them to label their answers)

What if the Israelites were going 5 miles an hour for 4 hours? For 6 hours? For 8 hours?

20 miles, 30 miles, 40 miles

B. What if the Israelites were traveling 10 miles an hour for 6 hours? For 9 hours? What if they were traveling 3 miles an hour for 3 hours?

60 miles, 90 miles, 9 miles

C. What if they were traveling 9 miles an hour for 6 hours? For 7 hours? For 18 hours? What if they were traveling 11 miles an hour for 16 hours?

54 miles, 63 miles, 162 miles, 176 miles

D. Division is the opposite of multiplication. To find how fast someone was going, you divide the distance they traveled by how long it took them to get there.

Let's try a problem. They went 176 miles in 11 hours. How fast were they traveling?

$\frac{176 \text{ miles}}{11 \text{ hours}}$ = **16 miles/hour**

How do you divide 11 into 176? You could take out 10 elevens. That would be 110. Find how much is left. 176 – 110 = 66 There are 6 elevens in 66. So, the answer is 16.

What if the Israelites went 144 miles an hour for 12 hours. How fast were they going? For 9 hours? For 6 hours? For 18 hours?

12 m/hr, 16 m/hr, 24 m/hr, 8 m/hr

That last one didn't require dividing. You already have the answer for 9 hours. If the same distance took them twice as long to cover, then they were going half the speed.

Day 72

Division and Remainders

The Israelites divide the spoil of the Egyptians. (Exodus 15:1-10)

A. So far when we've divided things up, there has been an even amount in every group, but what if it didn't end up evenly? Get ten blocks and divide them into three groups. Keep putting one in each group until you've put them all down. What happens?

There are three in each group and then one is left over. Whatever is left over after we divide is called the remainder. Ten divided by three has a remainder of one.

Find the remainder of twelve divided by five, 14 ÷ 5, and 11 ÷ 4.

2, 4, 3

B. Continue to find the remainder. Say you collected twenty gold bracelets from the Egyptians and need to divide them up between six different families. How many bracelets would each family get and how many would be left over? Then try the other problems. Draw a picture (or use blocks or something) if you need help figuring it out.

20 ÷ 6 = **__3__ Remainder __2__**

15 ÷ 6 = **__2__ Remainder __3__**

18 ÷ 6 = **__3__ Remainder __0__**

C. Division and multiplication are opposites. If you know multiplication, you can use it to help you figure out the answer to division problems.

Let's say you need to find out 55 ÷ 6. You can use what you know of multiplication to figure it out. Try some different multiplication problems. What's 6 x 10? 60. That's just a little too much. What's 6 x 9? 54 You know that 6 can't go into 55 any more than 9 times. How many would be left over? (55 – 54 = 1) Just one. 55 ÷ 6 = 9 R 1 (Fifty-five divided by six equals nine remainder one.)

You try. Use what you know of multiplication to figure out the division problems.

50 ÷ 7 = **__7__ Remainder __1__**

40 ÷ 6 = **__6__ Remainder __4__**

30 ÷ 4 = **__7__ Remainder __2__**

D. Practice dividing and finding the remainder. We'll practice with remainders more on Day 73. What is left is the remainder. Find the remainders and then write them as fractions. Put the remainder over the number you are dividing by. Simplify if you can.

123 ÷ 6 = **_20___ R __3__ 3/6 = ½**

240 ÷ 7 = **_34___ R __2__ 2/7**

298 ÷ 3 = **_99___ R __1__ 1/3**

Bonus: Write the first answer as a decimal, twenty and three sixths. **20.5**

Day 73 (Dice – one die is enough)

Remainders Game

The player will choose a number from the list and roll the die. The number on the die has to be divided into the chosen number. The remainder is how many points the player gets. Play as long as you like and the winner has the most points.

You can let younger kids use a calculator here. It won't give the remainder. Here's an example.

> Thirty-five is the number chosen and you roll a four. 35 ÷ 4 = 8.75 That means that it goes in eight times with some left over. Then you multiply. 8 x 4 = 32. Then you subtract. 35 – 32 = 3. The remainder is three. BTW, these are the steps to long division that they are practicing!
>
> You don't have to use a calculator. An older kid can be the calculator for a younger kid. Have an older kid figure out how many times it goes in and then multiply that. Maybe a younger kid can do the subtraction. Work together on all the problems so everyone is engaged and not just waiting for their own turn.

Here's the list of numbers to choose from. This list is in their workbooks. They can cross off each number as it is used. If you have a larger group, you can just add more numbers to the list.

> 10, 17, 23, 35, 41, 56, 60, 73, 81, 93, 111

Day 74

Addition (extra place value, "carrying"-B)

There were twelve springs of water and seventy date palms. (Exodus 15:22-27)

A. Write twelve and seventy in the tens and ones columns below.

Tens	Ones
1	**2**
7	**0**

Write twelve and seventy each as expanded numbers. **10 + 2, 70 + 0**
Now we're going to add them together. The easy way to do it is to add the tens first. What's seventy plus ten? **80** Now add the ones. What's two plus zero? **2** Now we just put them together eighty and two is? **82** 80 + 2 = 82

Now you try on your own. Write fifteen and twenty-three as tens and ones, in expanded form, and then add them together.

Tens	Ones
1	**5**
2	**3**

10 + 5, 20 + 3 **10 + 20 = 30, 5 + 3 = 8, 30 + 8 = 38**

Encourage them to write 30 and 8 down before 38, though this can be done in your head. They do not have to write 10 + 20. They can just write the 30. When there are bigger numbers involved, it's nice to write down the middle step numbers to keep track.

Show your child how they can get thirty-eight by adding the columns above. They can add down 1 + 2 and get 3 for the tens columns, representing 30, and they can add down 5 + 3 and get 8 for the ones. This is a helpful way to know how to add, but the other way is easier with bigger numbers.

B. What if it were 12 springs and 79 date palms? Only one number would change from your first problem. What is it? **The 9.** Write the numbers as tens and ones again, but this time use 79. Then write them in expanded form.

Tens	Ones	
1	**2**	**10 + 2 and 70 + 9**
7	**9**	

Now, add them together. Add the tens. 10 + 70 = 80. Add the ones. 2 + 9 = 11. Add them together.

  80
+ 11
  91

This is where adding vertically is easy and helpful, but you can break it apart again. 80 + 10 = 90 and 0 + 1 = 1. 90 and 1 equals 91. That's something you can do in your head, but always be willing to write it down to help you keep track of the numbers.

Try some on your own. Sixteen plus thirty-seven and forty-four plus eighteen.

16 + 37 = 10 + 6 + 30 + 7 = 40 + 13 = 53

44 + 18 = 40 + 4 + 10 + 8 = 50 + 12 = 62

C. You are going to add bigger numbers today. You can do it. It all works the same way. Break it apart. Put it back together. Write down each total. Write the total thousands, the total hundreds, the total tens, the total ones, so that you have them to add altogether for your final total.

Twelve springs plus seventy date palms plus 678 figs plus 2391 pomegranate seeds—Add them all together.

2000 + 900 + 240 + 11 = 3151

1234 + 2345 + 3456 = **6000 + 900 + 120 + 15 = 7035**

4567 + 5678 + 6789 = **15,000 + 1800 + 210 + 24 = 17,034**

D. Even bigger numbers…Here are your numbers to add. Do the same thing. Break them apart and write each separate total before you add them all back together. Start with the ten thousands.

12,000 + 70,000 + 6,780 + 2,391 =
80,000 + 10,000 + 1,000 + 170 + 1 = 91,171

12,345 + 23,456 + 34,567 = **60,000 + 9,000 + 1,200 + 150 + 18 = 70,368**

45,678 + 56,789 + 67,890 = **150,000 + 18,000 + 2,100 + 240 + 17 = 170,357**

Day 112 (ruler)

Adding Decimals

Moses was instructed to make an altar that was a cubit wide and two cubits high. (Exodus 30:1-10)

A. Let's say that a cubit is a centimeter. Draw the width of the altar. Then draw its height. Compare the two lengths. How much smaller is the width than the height? How much bigger is the height than the width?

The width is half the length of the height. The height is double the width. It is two times longer than the width.

B. Draw a line that is two and a half inches long. Let's say that's the width of the altar for your scale drawing. Now draw a line to show its height. How long should it be?

5 in. You can think of this as 2 plus 2 and ½ plus ½. Or, you can write it down and ignore the decimal point. 25 + 25 = 50. Then you have to remember to put the decimal point back in its place! 5.0 The .0 means nothing, so we just write 5.

Now find how long you should draw the height if the width were represented by a line that was four and a half inches long, 10.5 in., and 13.5 in.

9 in., 21 in., 27 in.

C. Draw a line that is 10 centimeters long. Let's say that line represents the height of the altar. What would be the width?

5 cm.

If the height of the altar was represented by a line that was 23 centimeters long, how long would you draw the width? How about a line that was 60.8 centimeters long or 72.6 centimeters long?

11.5 cm., 30.4 cm., 36.3 cm.

D. Draw a line that is 4.9 centimeters long. Let's say that line represents the height of the altar. What would be the width?

2.45

4.9 is ones and tenths, 4 ones and 9 tenths.
2.45 is ones, tenths, and hundreds, 2 ones and 4 tenths and 5 hundredths. Those are the place value names for the numbers in decimal places.

How long would you draw the width if the height was represented with line of the following lengths: 12.5 inches, 44.3 inches, 0.1 inches (Hint: Remember that you can add zeros at the end of a decimal without changing its value. 0.1 is the same as 0.10000000 or 0.10.)

6.25 in., 22.15 in., 0.05 in.
Half of 10 is 5. Half of 0.10 is 0.05.
You can add to check your answers. 0.05 + 0.05 = 0.10

Day 113

Comparing Fractions

Everyone must pay the same. The rich shouldn't pay more, and the poor shouldn't pay less. (Exodus 30:11-21)

We're going to compare things today.

A. Which is bigger two tenths or seven tenths? **seven tenths** Seven is bigger than two, so seven tenths is bigger than two tenths. Draw the greater than symbol facing the right way, with the big end pointing toward the big number and the small end pointing to the smaller number, between two tenths and seven tenths.

$0.2 < 0.7$ $\qquad$ $^{2}/_{10} < {}^{7}/_{10}$

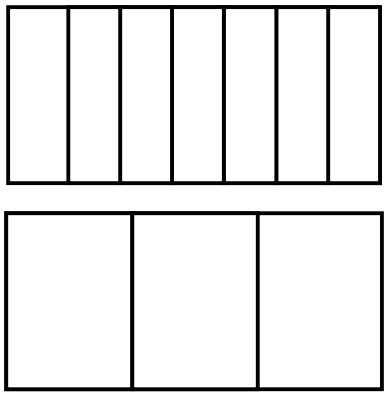
Do the same for these numbers.

$0.4 < 0.9$ $\qquad$ $^{4}/_{10} < {}^{9}/_{10}$

$2.3 > 2.1$ $\qquad$ $2\,{}^{3}/_{10} > 2\,{}^{1}/_{10}$

B. Use the pictures below to figure out which is bigger, two thirds or four sevenths? Color in two of the rectangles in the one divided into three parts. That shows two thirds. Color in four of the rectangles in the one divided into seven parts. Which is bigger?

$^{4}/_{7} < {}^{2}/_{3}$



C. Let's use math to figure out that same problem.

In order to compare fractions, we need their denominators to be the same. They have to have the same number of pieces so that we can tell which one has more. To make fractions have the same denominators, we can multiply them by one. Any number over itself is one. $^2/_2 = 1$ $^4/_4 = 1$ Those say two out of two parts and four out of four parts equals one whole.

When you multiply by one, what is the answer? The same number. It doesn't change. Whether I give you half or a million, if I give it to you one time, you will only have that amount. Watch what happens when we multiply a fraction by one.

$\frac{1}{2}$ times $\frac{4}{4}$ equals $\frac{1 \times 4}{2 \times 4}$ equals $\frac{4}{8}$

Does four eighths equal one half? **Yes.** Four is half of eight. It is still one half, but we have a new denominator now. Let's say you had to compare three eighths and one half. Which is bigger? **one half** Why? **One half is bigger because four eighths is bigger than three eighths and four eighths and one half are the same amount. They are what we call equivalent fractions, equal fractions.**

Now back to our problem four sevenths and two thirds. One way to get equal denominators is to multiply them by each other. So we can multiply four sevenths by three thirds. The denominator will be seven times three. Write out that equation and answer.

$\frac{4}{7}$ times $\frac{3}{3}$ equals $\frac{4 \times 3}{7 \times 3}$ equals $\frac{12}{21}$

Now what do we need to multiply two thirds by in order to get twenty-one for the denominator? **seven sevenths** Write out the equation and answer.

$\frac{2}{3}$ times $\frac{7}{7}$ equals $\frac{2 \times 7}{3 \times 7}$ equals $\frac{14}{21}$

Now compare the original fractions and write the answer with the greater than and less than symbol in the correct place.

$^{12}/_{21} < {}^{14}/_{21}$ so $^4/_7 < {}^2/_3$

Now compare 2/5 and 3/7. Step 1: Make their denominators equal by multiplying them by 1 (5/5 or 7/7). Compare their numerators. Write the fractions with a greater than or less than symbol written the right way.

$\frac{14}{35} < \frac{15}{35}$ so $\frac{2}{5} < \frac{3}{7}$

D. Do the same for these fractions. 3/8 and 5/9 ; 4/7 and 3/5

$\frac{3}{8} < \frac{5}{9}$ $\frac{4}{7} < \frac{3}{5}$

Day 116

Subtraction (Borrowing intro for B)

They are to make the table and its utensils, the lampstand and its utensils, as well as all the woven garments. (Exodus 31:6-18)

A. If there were 27 things prepared, and 23 of them were utensils, how many were garments? What do you need to do in order to answer that question? If you aren't sure, then make the numbers smaller. If there were 7 things prepared and 3 of them were utensils, how many were garments? Once you figured out what to do, use the bigger numbers. (Hint: Twenty minus twenty equals zero. You really are only subtracting seven minus three.)

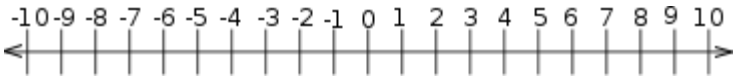
Now use these numbers to answer the same question: 38 – 14, 46 – 32, 55 – 11, 15 – 8

4 garments, 24 garments, 14 garments, 44 garments, 7 garments

B. If there were 22 things prepared and 15 were utensils, how many garments were there? How can you solve this problem? You still need to subtract.

Let's say that I owe you five dollars. If I only had two dollars and gave them to you, how many would I still owe you? **Three dollars** How did you figure that out? **5 – 2 = 3** Even though we're trying to really figure out two minus five, you just used what you knew and found the difference between five and two.

Look at this number line. Count down two from five and count down five from two. The answer is three each time, but what's the difference?



When you take five away from two, the answer is negative. You don't have enough; you can't really take five away. You have to go into debt! Going into debt is almost never a good idea in real life, but in math, those negative numbers are going to help us out.

2 - 5 = - 3 That negative three is just a minus sign and a three. We say negative three to read that number, but we're going to use it just like a minus sign and you already know how to subtract. (This problem is continued on the next page.)

Here's our problem 22
- 15
10 Just like in addition, we can do the tens first. 20 - 10 = 10
- 3 Then we subtract the ones. 2 – 5 = - 3
7 To solve you need to count down or use your facts.

The answer is 7 garments.

Try it with these numbers. Write the problems vertically, up and down, and make sure to line up the ones and tens, so you are always subtracting the right thing!
53 – 46, 42 – 27, 31 – 13

Check your answers by adding.

7 + 46 = 53, **15** + 27 = 42, **18** + 13 = 31

C. If there were 1231 things prepared and 715 were utensils, how many were garments? Subtract the thousands, then the hundreds, then the tens, then the ones. Make sure to write neatly and keep your numbers lined up so that you are subtracting off the right numbers! Also make sure to use a negative sign if the number is negative. When combining your final answer, numbers without a negative sign are added. Numbers with a negative sign are subtracted.

516 garments

Now try it with these numbers: 371 – 128, 135 – 98, 1527 - 1382

243, 37, 145

D. If the number of garments made was three tenths of the number of utensils made, how many garments were made if there were 500 utensils made? (Hint: Figure out one tenth first. To find one tenth, you divide by ten. Do you remember how to do that? You move the decimal point over one. 10.0 ÷ 10 = 1.0, 20 ÷ 10 = 2 The decimal point is moved over one place, even if you never see the decimal point. What's one tenth of 500? **50** Then you need three of those to make three tenths.)

150 garments

Now figure out these amounts: $^{7}/_{10}$ of 620, eight tenths of 1285, $^{3}/_{10}$ of 742

62 x 7 = **434,** 128.5 x 8 = **1028,** 74.2 x 3 = **222.6**