

Farming & Gardening Introduction to Fractions

Transition between Third and Fourth Grade

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Farming & Gardening

Introduction to Fractions

Program of Study

This block is a combination social studies/maths of practical life block. For this reason, you will integrate the two subjects as much as possible. However, should additional practice in math be necessary, please feel free to offer review problems for independent work. Roy Wilkinson writes in [The Curriculum of the Rudolf Steiner School](#) that it can take a long long time for the child to understand both "lowly" fractions and decimals, so the teacher should not get discouraged!

As you know, I previously wrote a Fractions unit. I am expanding on it for this unit, better integrating the Farming and Gardening aspects and with some ideas for decimals.

The main thrust of this unit is that you will plan and plant your own home garden as well learn some background information about farm operations; and have hands-on practice in fractions by designing the layout of your garden beds & hands-on practice in decimals by budgeting and shopping for your new garden's supplies.

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Suggested Pacing

Week One

- The Breakfast Table – where does it come from?
- Background in Farm Operations
- Field Trip(s)

Week Two

- Choosing a Type of Home Garden
- Plants or Place?
- Finding a Location
- Soil Study

Week Three

- Harmonious Combinations
- Fractions Practice
- Sprouting Seeds
- Poetry and Prose

Week Four

- Building & Budget
- Decimals Practice
- Photo Documentation of Project (ongoing)

There is no cumulative project for this unit, as the garden itself *is* the cumulative project and has been worked on throughout.

You will, of course, continue to monitor and work with your garden throughout the calendar year. This lays a good foundation for the 5th grade study of Botany. In addition to observations in your own garden, try to find a farm nearby which you can visit on a monthly basis. Wilkinson gives suggestions of farm activities which may be observed through the calendar year (from October to September) in his book on pages 13-17.

Booklist

Teaching Practical Activities: Farming, Gardening, Housebuilding by Roy Wilkinson

A Journey through Time in Verse and Rhyme by Heather Thomas

Nonfiction/library books, such as Farming the Land: Modern Farmers and Their Machines by Jerry Bushey

A Path of Discovery Volume Four: Grade Four by Eric Fairman

Treasury of Children's Poetry edited by Alison Sage, or other poetry collections

Previous fractions unit: <http://www.waldorfcriculum.com>

Gardening Books

Sunflower Houses by Sharon Lovejoy

Roots, Shoots, Buckets and Boots by Sharon Lovejoy

Spring: Nature Activities for Children by Irmgard Kutsch & Brigitte Walden

Carrots Love Tomatoes by Louise Riotte

Roses Love Garlic by Louise Riotte

Cinder Block Gardens by Lynn A. Gillespie

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Week One

The Breakfast Table – where does it come from?

- ❖ Today I want you to serve your regular sort of breakfast and then, during breakfast conversation, casually introduce the topic of “I wonder where this comes from?” For example, if it’s a cereal you can look down the list of ingredients. (You will want to choose a breakfast food in advance that you know you’ll easily be able to answer questions about.) Maybe you’re eating hot oatmeal. Then the question would be: how are oats planted and harvested? Are any grown nearby? From this you will lead into the farming portion of your unit.
- ❖ Always leave opportunities for spontaneous exploration of a topic. For example, if your children want to spend all morning reading the lists of ingredients which comprise other foods around the house or researching how oats are grown, let them. It is better to have the children move “ahead” of the unit (which is designed to mimic their natural exploration style as much as possible but is not a perfect science) and be enthusiastic in their learning, than to cramp their style and take the heart out of learning, simply to keep them on a pre-set time frame.
- ❖ You may want to introduce a new blessing for your meals, which draws more attention to the contributions of plants. Some favorites are “Johnny Appleseed” and “Blessings on the Blossom”

(at a brisk pace)

Oh, The Lord's been good to me,
And so I thank the Lord,
For giving me
The things I need:
The sun, and the rain and the apple seed.

(slowly)

Oh, The Lord's been good to me.

And every seed that grows,
Shall grow into a tree,
And one day soon
There'll be apples there
For every one in the world to share.
The Lord is good to me.
Amen. Amen.

Blessings on the blossom,
Blessings on the root,
Blessings on the leaf and stem,
Blessings on the fruit.

Materials list: breakfast foods

Background in Farm Operations

- ❖ For this main lesson, we will be using pages 1 through 12 of Roy Wilkinson's book. Review these now to guide you in laying out some activities for a background in farm operations. As he says, there can be an almost endless number of themes which can be developed out of this topic.
- ❖ Wilkinson gives some introductory poems (good additions to your fresh clean main lesson book) of "The Ploughman's Charm" and "Vainomoinen's Sowing". There is also a "Farming and Building" chapter in A Journey through Time in Verse and Rhyme which includes poems entitled "Farming", "A Growing Rhyme", "The Shrewmouse", "The Seed Shop", and "The Scarecrow".
- ❖ Use the suggestions under the introduction passage on "Farming and Gardening" (page 5 in Wilkinson's book) as your first lesson/discussion.
- ❖ Next, discuss tools (skip the part about Soil – we'll come back to it later on). The "Tools" section of his plans is found on pages 8 & 9. Do some research on farm machinery in the library (one good picture book is called Farming the Land: Modern Farmers and their Machines by Jerry Bushey).
- ❖ Try digging outside with the most ancient of tools... a digging stick. You can also use a large shell, such as an oyster shell. Wilkinson also suggests having the child make a clay model of a plough.
- ❖ Add a page to your main lesson book with a description of ancient tools (such as the digging stick) and modern ones (such as the plough). What are the advantages of modern tools? The drawbacks?
- ❖ Take your child shopping for a spade, fork, rake, hoe, wheelbarrow, watering can and pair of gardening gloves in her size.

Materials list: blank main lesson book, pencil, block or stick beeswax crayons

Teaching Practical Activities: Farming, Gardening, Housebuilding by Roy Wilkinson

A Journey through Time in Verse and Rhyme by Heather Thomas

Nonfiction/library books, such as Farming the Land: Modern Farmers and Their Machines by Jerry Bushey

Items to use as ancient tools – sticks, shells

Clay for modeling

Field Trip(s)

- ❖ Taking field trips for this block is just as natural as breathing. Try to do as many as you can. Some suggestions of places which will add dimension to your unit study are modern working farms (join a CSA if you can), an Amish farm, historical exhibits or museum displays which show the agriculture methods of the time, farm supply stores which sell farm equipment, and farmer's markets where she can interview people about how the crops are raised and harvested.
- ❖ Have your child add pages to his/her main lesson book after every field trip with illustrations and observations.
- ❖ After several field trips have been completed, ask your child what she thinks the *most important* part of the farm is. Then tell her the story of "Sunnyside Farm" & "A Diversion" as laid out by Roy Wilkinson on pages 9-12. Add a page to your main lesson book with an illustration and explanation of what Farmer Giles says. In your storytelling, add the map of Sunnyside Farm to your blackboard in colored chalk. Leave it there for your child to think about over the weekend.

Materials list: classroom blackboard, colored chalk

Camera to take pictures on field trips (optional)

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Week Two

Choosing a Type of Home Garden

- ❖ At the beginning of this week, first call your child's attention to the chalkboard illustration of Farmer Giles's farm. What kinds of things does he grow? How does he organize them? What are the natural resources available on the farm (hedges to keep wind down and provide habitat for pest-eating birds, rivers and streams)?

Think to yourself what type of home garden you'd like to build. Do you want an herb garden, a fruit and vegetable garden, a flower garden, or a combination? Do you want any "extras" such as play spaces (like a sunflower house), benches for sitting (these can be built out of cob), a chicken coop or even beekeeping? This is the stage to let your imagination roam free. [Sunflower Houses](#) by Sharon Lovejoy has a wonderful idea for a floral clock garden, made of plants which bloom successively throughout the day. Other books I recommend for kid-friendly garden ideas are

[Roots, Shoots, Buckets and Boots](#) by Sharon Lovejoy

[Spring: Nature Activities for Children](#) by Irmgard Kutsch & Brigitte Walden
And the remaining books in the series: [Summer](#), [Autumn](#), and [Winter](#)

Plants or Place?

- ❖ After making a wishlist of what *kind* of garden you'd like to have, ask what comes first... choosing the plants or choosing the place? You can go either way with this, honestly, but it's good to debate it and see what your child thinks are the important considerations.
- ❖ If you choose the plants first, you then have to choose a location which the plants will thrive in. Take into consideration sun/shade requirements, soil type, and protection. You probably won't get into soil testing (acid or alkaline) but you will want to consider if your plants prefer sandy, rocky or loamy soil. Some plants thrive in poor conditions; others require a lot of amending. In choosing the list of desired plants first, you may also want to consider whether you want to do all native plants or whether you have no problems with introducing foreign plants into your garden.
- ❖ In choosing the ideal location for your garden first, you will walk along your property and consider facts such as ease of access, including proximity to the house and a water supply. Being near a hose is much preferable to carrying a

watering can every day! Then you would narrow down your list of plants based on what will thrive in your chosen location.

Finding a Location

- ❖ Once you are set on your location, make a rough sketch of it (like Farmer Giles' farm). This is not the time for measurements, but an idea of what should go where. Do several drafts of your garden and allow yourself time to mull things around in your head. Meanwhile, take this time in the remainder of the week to get to know your patch of land more intimately, and really observe how much light it gets at different times of day, what animals might already be occupying the space, and – in particular – spend some time looking at the soil.

Soil Study

- ❖ Refer to Wilkinson's book for some suggestions on your soil study (pages 6-8). Roots, Shoots, Buckets and Boots has some suggestions about compost (if you don't already compost, start a bin now) and worms on pages 145-149. It might be fun to build a worm box!
- ❖ Try to do some more farm visits at the latter part of this week and specifically consider how farmers amend their soil as well as rotate their crops. See if you can interview a few farmers about this process. What plants leave healthy soil behind and which strip the soil of all its nutrients? Find out which animals give off manure that can be used in gardens and which do not (you cannot use the feces from any animal that eats meat). If there's a zoo near you, inquire about zoo-doo, which many zoos provide for free or at a low cost. They have a tremendous amount of manure that piles up, no pun intended!
- ❖ Check out the activities suggested in Roots, Shoots, Buckets and Boots for getting to know your soil (pages 138-141).

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Week Three

Harmonious Combinations

- ❖ Time to learn about harmonious plant combinations. Even though you have your location picked out and your wishlist of plants, not all plants do well next to one another and this affects your final garden layout. I HIGHLY recommend the two books by Louise Riotte that I've put in the booklist. If you are planning a flower garden, choose Roses Love Garlic. For a vegetable garden, you'll want to read Carrots Love Tomatoes. It's not necessary to get into all the science of companion planting, but these books serve as a wonderful source of inspiration for storytelling. You might want to introduce this week with a story about one of the plants you have chosen – for example, watermelon (Carrots Love Tomatoes, page 27). Watermelons do well interplanted with potatoes. They also need a lot of sunshine so should not be planted with or near tall-growing vegetables. So you have here the foundation of a story and make it as imaginative and creative as you wish. The point by the end of the story should be that watermelons and potatoes are friends but watermelons do not get along with corn. Tell several of these stories and add them to the main lesson book. Then let your child read the books by Louise Riotte to do his/her own research in (taking it from the Heart to the Head) and make a set of lists as to what plants should go together and which should be kept apart. This should be done even if you're doing a planned garden, such as the ones Sharon Lovejoy has suggested, so that you get a feeling for plants as living things that have personalities, likes and dislikes.

Fractions Practice

- ❖ With your location, plant list, and final organization plan for your garden in place, it is time to make the final diagram. This should be done on graph paper. One book that I really recommend for garden planning – and contains a TON of math that you can easily create your problems around – is Cinder Block Gardens. The only downside of using this book Waldorf-wise is that it doesn't use the existing soil in your garden... she gives a recipe for a planting bed mixture of peat moss, sand, and compost. So you can either 1) use this mixture because you have found that your soil is rocky, difficult to dig in or would require a lot of amending or 2) create the beds using her diagrams and get the math advantages but simply use your own soil as the top layer of the bed. However, as she points out, it is likely to have at least some weed seeds in it, which you can talk about with your child, and decide how you'd like to proceed. It would be a shame to talk so much about your soil and then not use it, but maybe you can come up with a compromise. Math-wise this book is wonderful for fractions!!

- ❖ However you decide to plan your gardens, this is the time when fractions come into play. You can use some of the suggestions from my previous fractions unit (which may be downloaded from the site) and/or Eric Fairman's POD 4, which I recommend getting anyway since it will be of great help to you in fourth grade. In POD 4, "The World of Fractions" is on pages 22-36. Use his lesson notes to guide you – he gives quite a lot of suggestions. You have room later in the year to work with Fractions again, depending on how you plan the fourth grade year.
- ❖ Basic concepts in fractions that need to be introduced are
 1. The difference between a whole number and a fractional number
 2. The terms numerator and denominator (included in my previous unit – see story at the end)
 3. Equivalent fractions
 4. Fractions and multiplication
 5. (Some teachers use this block as a time to teach factoring, as it helps children do later fractions work, ie. $24=1 \times 24$, 2×12 , 3×8 , 4×6 , 6×4 , 8×3 , 12×2 , 24×1)
 6. Simplifying fractions
 7. Addition and subtraction of fractions with a common denominator
 8. Polygons and their fractional parts
- ❖ The above is covered both in my previous unit & Fairman's book pp.22-30. If I were you, I'd leave the remainder (pp.31-36) for another unit later this year.
- ❖ All of these concepts will be covered in the planning and building of your garden and can be reinforced by independent assignments. There are a ton of fractions worksheets available on the internet. Also, remember that giving your child a firm grasp on what a fraction *is* is more important than anything and teaching the fine points of manipulation can happen later on.
- ❖ Measure your garden and make a drawing of it, to scale, on your graph paper. Determine what supplies you will need to build it. Next week you will make a budget and purchase materials and finally get to build your garden!
- ❖ Make sure you take some photographs of your garden location in its "Before" state, so that you can put together a final presentation of all the stages the garden went through before its completion.

Sprouting Seeds

- ❖ While you're dreaming of planting, now is the time to practice some seed starting. Many seeds are available now in the grocery stores so you can easily stop and pick some up. Seed starting guidelines are covered in Roots, Shoots, Buckets and Boots on pages 141-144. Making seed tapes is a fun project.
- ❖ Have your child make sketches of the seedlings as they sprout. You can even purchase growing containers with clear plexiglass sides (or try growing things in an old aquarium) so that you can see the roots growing down as well as the new plant growing up. These daily sketches can be done in colored pencil and then more formal versions in watercolors or watercolor pencil in the main lesson book.

Poetry and Prose

- ❖ There are many poems about plants growing which would be good for the main lesson book at this time. One of my favorite collections of poetry is called Treasury of Children's Poetry and is edited by Alison Sage. It also has amazing illustrations. Some poems which come to mind as being most appropriate are

"The Months"	page 58-60	Sara Coleridge
"A Spike of Green"	page 61	Barbara Baker
"The Magic Seeds"	page 67	James Reeves
"The Sun"	page 126	Grace Nichols
"The Spinning Earth"	page 130	Aileen Fisher
"Holes of Green"	page 131	Aileen Fisher
from "The Song of Solomon"	page 132	King James Bible
"Green"	page 212	Lilian Moore
"A Change in the Year"	page 219	William Wordsworth
"The Poem"	page 229	Amy Lowell

Of course, other poems about the seasons, day and night, the weather, or animals which live in the garden would be very suitable as well.

- ❖ If you like, your child can try his/her hand at writing a poem about seeds sprouting. Some yoga poses, or other stretching exercises where you go from being curled up in a ball on the floor to stretching your body out tall to the sun, can help set the mood for this. Some poetry is written in the shape of the thing it is about (see "Seal" on page 111 and "Do Not Disturb the Dinosaur" on page 114) and this would be a lot of fun for a seed or plant poem.
- ❖ Prose is a good option here, too. Your child could keep a little "Diary of a Seed" if she likes, and write each day about what the seed may be 'thinking' below its sketch. This type of piece can become a short story or even a play if she really enjoys it. Let her do whatever project seems to suit her best. The idea is to spend some time on the imaginative part of the unit, and not to just get bogged down in the math. This topic lends itself to work in all three parts of the day... maybe math first thing in the morning, sketching and writing in the journal before lunch, and measuring, building and planting in the afternoon.

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Week Four

Building & Budget

- ❖ Time to sit down as a family with the list of building materials needed for the new garden project and determine an appropriate budget. This doesn't need to be a large amount – and, certainly, many gardens are built of reclaimed materials – but there does need to be at least an amount of money and some shopping so that you can get in your decimals practice, IF you have decided to include decimals in your fractions block. If you are using Cinder Block Gardens for your garden planning, she gives the most specific information on what to expect as far as expenses.
- ❖ Have Courtney take the shopping list to the home supply store and make notes as to the unit cost for each individual thing so that you can do more math at home.

Decimals Practice

- ❖ To me, the only logical decimals practice is with money and this is, as well, an excellent way to introduce it. We use decimals in other ways in practical life (such as temperature) but none are so easy to understand as money & building on from fractions concepts. Steiner writes in The Renewal of Education"

...we must try to find the transition from the ordinary fractions to decimal fractions, so that they do not appear to our pupils as irrational and remote from ordinary life....They should also feel that the transition from the whole number to the first decimal place is nothing but a continuation of the same principle which underlies our number notation based on columns of tens, hundreds, and so on....

- ❖ In Chapter Five of School as a Journey, Torin Finser gives an imaginative account of an introduction to decimals, with stories taking place on Decimal Island. Personally, I feel these would be better for later, more intensive work with decimals in fifth grade, as we are currently just doing a brief introduction of decimals and focusing in terms of how they relate to fractions.
- ❖ A brief overview of how money relates to fractions could go like this. First, a dollar is a WHOLE. Make a piece of chart paper that shows columns with a blank space underneath. The columns should be arranged thus:

\$1.00	50¢	25¢	10¢	5¢	1¢

- ❖ Use fraction circles (download FREE fraction circles here: <http://switzerite.blogspot.com/2010/03/fraction-circles.html>) printed on red cardstock and cut out. Lay the whole under the \$1.00 column and put a dollar bill under the whole fraction circle. Lay the $\frac{1}{2}$ under the 50¢ column and put a fifty cent piece under the $\frac{1}{2}$ fraction circle. Show that two $\frac{1}{2}$ pieces make a whole and two fifty cent pieces make 100 cents, which is a dollar. Skip your next fraction circle which is the thirds. Explain that in our country, we don't have a coin for every one of the fractions. Imagine how hard it would be to find the coin we want in our pocket if we had every possible fraction! Lay the $\frac{1}{4}$ under the 25¢ column and put a quarter under the $\frac{1}{4}$ fraction circle. Explain that because a 25 cent piece is a quarter of a dollar, it is sometimes also referred to as a quarter. Show that four $\frac{1}{4}$ pieces make a whole and four quarters make a whole dollar. Lay the tenth fraction piece under the 10¢ column and put a dime under the fraction piece. Count by tens to 100, laying down a tenth fraction piece each time. 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. Ten tenths equals a whole. Ten dimes equals 100 cents which equals a whole dollar. Explain that the penny is $\frac{1}{100}^{\text{th}}$ of a dollar.
- ❖ There are some nice traditional classroom materials for reinforcing counting coins. In my classroom we have some flashcards which show an amount of money on the front and the child lays plastic coins which they think would equal that amount down on the table. Then you flip over the card and find a picture of the coins to check your work. You can make your own cards like this if you buy a set of coin stamps and a stamp pad. Or, just offer your child the coin stamps and a stamp pad and ask him/her to stamp the coins that it would take to make a set amount. Actually, practicing by counting the change in your purse each day is simple and it's the best way to learn the amounts.



- ❖ Regarding the decimal point, you can simply tell your child that it is used to separate the whole amounts from the fraction amounts in money. Once you have one whole, you write a one on the left hand side of the decimal point. The fraction goes on the right hand side of the decimal point. This idea was standardized by John Napier (read his story in [Mathematicians are People, Too volume 1](#)).
- ❖ When you add and subtract decimals, use graph paper to help your child properly line up her columns. If you need to do some real-life examples showing that unless you subtract the dollars from the dollars, the dimes from the dimes, and the pennies from the pennies, you WILL get the wrong answer, you can. Play money is easily found in teaching supply stores. Real money is always better.
- ❖ If you don't give your child an allowance (from the 3rd grade measurement unit), you might want to consider that now. Or just focus your financial work on the garden planning.
- ❖ I don't think that in this situation you need to practice converting fractions to decimals. Fractions are happy being concrete as gardens divided up into parts, and you carry your decimals around in your pocket. They can meet and become interchangeable later on.
- ❖ Your list of decimal skills will therefore be short. Decimal skills:
 1. Terminology "ones", "tenths", "hundredths", "decimal point"
 2. Adding and subtracting decimals
- ❖ As with the fractions, you can assign independent extra work with decimals as needed. This can be done with the grocery store circular and a grocery list. Extra work with fractions can also be accomplished by cooking dinner each night.

Photo Documentation of the Project (ongoing)

- ❖ As soon as you break ground for your garden, begin to take photos of the process. Of course your garden will continue to grow and evolve throughout the calendar year, so the photo documentation should be ongoing. Find a place to display your photos... or begin a garden scrapbook where people can add photos, favorite recipes, memories, paintings and sketches, poems, leaf prints, etc. as time goes on. This could become a cherished family heirloom and your child will be proud to have been a part of it. A large corkboard display space in the living room, schoolroom, kitchen or dining room would also serve well.

Farming & Gardening

Journaling Page

Week One:

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Journaling Page

Week Two:

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Journaling Page

Week Three:

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Journaling Page

Week Four:

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Assessment

Eric Fairman writes in [A Steiner-Waldorf Mathematic Resource](#) that

“It is of importance in the teaching of mathematics that the teacher does not lose sight of the importance of addressing the needs of the emerging soul qualities of the child so that they are strengthened and developed.

Activities and rhythmical work to strengthen the will (my note: be sure to continue with times tables); imaginative presentation through the use of original stories, use of colourful illustrations so as to nourish the feeling life of the child and investigative activity and written work to enliven the thinking processes.”

Therefore, your assessment for this unit will be in all three areas: Head, Heart, and Hands. For Head, consider your child’s knowledge in the areas of Social Studies and Math, including of farming practices such as crop rotation, the history of tools, soil types and methods of augmentation, what is meant by companion planting and some examples, seed starting, garden planning and required specific skills in fractions and decimals, as well as more general mathematic skills of measurement, times tables, and factoring whole numbers. For Heart, consider the painting and sketching, poetry and prose activities, and storytelling, as well as your child’s main lesson book as a whole. For Hands, assess your child’s hands-on projects such as building a compost pile or worm bin, making seed tapes, building the garden bed itself, and all related activities.

Your documentation will consist of your child’s main lesson book, any independent worksheets or written problems, your journaling, and the photo diary and/or scrapbook of the garden in progress. Remember to continue with the garden all year long to lay a strong foundation for 5th grade Botany study.

The three aspects of assessment I want you to consider when evaluating your child are

1. Content/declarative knowledge: how well does the student know the **content**?
2. Quality of the **product**: how well did the student present the work in writing, speaking, etc.
3. Quality of the **application**: how well did the student execute the knowledge application process?

If you are required to give her a grade from your state system, or you'd like to be able to compare her achievement in each block at a glance, you can assign a four point scale to each of these aspects:

- 4 points – exceptional; absolutely above and beyond
- 3 points – quite satisfactory
- 2 points – somewhat less than satisfactory
- 1 point – completely dismal

Such a rubric would correspond to the following traditional grades:

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49