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Foreword

Math Mammoth Grade 3, South African Version, comprises a complete maths curriculum for the third grade mathematics studies. This curriculum is essentially the same as the U.S. version of Math Mammoth Grade 3, only customised for South African audiences in a few aspects (listed below). The curriculum meets the Common Core Standards in the United States, but it may not perfectly align to the third grade/year standards in your country.

This version of Math Mammoth has been customised for South Africa in these aspects:

- The currency used in the money chapter (chapter 6) is the South African Rand. (The download version of the curriculum also includes this chapter for the U.S., British, Canadian, European, Australian, and New Zealand currencies.)
- The curriculum uses only metric measurement units.
- The spelling conforms British international standards.
- Large numbers are formatted with a space as the thousands separator (such as 12 394). (Decimals are formatted with a decimal comma.)
- The pages are formatted for A4 size paper.

The main areas of study in Math Mammoth Grade 3 are:

1. Students develop an understanding of multiplication and division of whole numbers through problems involving equal-sized groups, arrays and area models. They learn the relationship between multiplication and division, and solve many word problems involving multiplication and division (chapters 3, 4 and 8).
2. Students develop an understanding of fractions, beginning with unit fractions. They compare fractions by using visual models and strategies based on noticing equal numerators or denominators (chapter 11).
3. Students learn the concepts of area and perimeter. They relate area to multiplication and to addition, recognise perimeter as a linear measure (in contrast with area), and solve problems involving area and perimeter (chapter 10).
4. Students fluently add and subtract within 1000, both mentally and in columns. They also learn to add and subtract four-digit numbers, and use addition and subtraction in problem solving in many contexts, such as with money, time and geometry (chapters 1, 2 and 7).

Additional topics we study are time, money, measuring and graphs.

This book, 3-B, covers place value (chapter 7), division (chapter 8), measurement (chapter 9), geometry (chapter 10) and fractions (chapter 11). The rest of the topics are in the 3-A worktext.

I heartily recommend that you read the full user guide in the following pages.

I wish you success in teaching maths!

Maria Miller, the author

User Guide

Note: You can also find the information that follows online, at **https://www.mathmammoth.com/userguides/** .

Basic principles in using Math Mammoth Complete Curriculum

Math Mammoth is mastery-based, which means it concentrates on a few major topics at a time, in order to study them in depth. The two books (parts A and B) are like a "framework", but you still have a lot of liberty in planning your child's studies. You can even use it in a *spiral* manner, if you prefer. Simply have your student study in 2-3 chapters simultaneously. In third grade, I suggest studying chapters 1-4 in order, but you can be flexible with the other chapters and schedule them earlier or later.

Math Mammoth is not a scripted curriculum. In other words, it is not spelling out in exact detail what the teacher is to do or say. Instead, Math Mammoth gives you, the teacher, various tools for teaching:

- **The two student worktexts** (parts A and B) contain all the lesson material and exercises. They include the explanations of the concepts (the teaching part) in blue boxes. The worktexts also contain some advice for the teacher in the "Introduction" of each chapter.

  The teacher can read the teaching part of each lesson before the lesson, or read and study it together with the student in the lesson, or let the student read and study on his own. If you are a classroom teacher, you can copy the examples from the "blue teaching boxes" to the board and go through them on the board.

- There are hundreds of **videos** matched to the curriculum available at https://www.mathmammoth.com/videos/ . There isn't a video for every lesson, but there are dozens of videos for each grade level. You can simply have the author teach your child or student!

- Don't automatically assign all the exercises. Use your judgement, trying to assign just enough for your student's needs. You can use the skipped exercises later for revision. For most students, I recommend to start out by assigning about half of the available exercises. Adjust as necessary.

- Each chapter introduction contains a **list of links to various free online games** and activities. These games can be used to supplement the maths lessons, for learning maths facts, or just for some fun.

- The student books contain some **mixed revision lessons**, and the curriculum also provides you with additional **cumulative revision lessons**.

- There is a **chapter test** for each chapter of the curriculum, and a comprehensive end-of-year test.

- The **worksheet maker** allows you to make additional worksheets for most calculation-type topics in the curriculum. This is a single html file. You will need Internet access to be able to use it.

- You can use the free online exercises at https://www.mathmammoth.com/practice/
  This is an expanding section of the site, so check often to see what new topics we are adding to it!

- Some grade levels have **cut-outs** to make fraction manipulatives or geometric solids.

- And of course there are answer keys to everything.

How to get started

Have ready the first lesson from the student worktext. Go over the first teaching part (within the blue boxes) together with your child. Go through a few of the first exercises together, and then assign some problems for your child to do on their own.

Repeat this if the lesson has other blue teaching boxes. Naturally, you can also use the videos at https://www.mathmammoth.com/videos/

Many students can eventually study the lessons completely on their own — the curriculum becomes self-teaching. However, students definitely vary in how much they need someone to be there to actually teach them.

Pacing the curriculum

Each chapter introduction contains a suggested pacing guide for that chapter. You will see a summary on the right. (This summary does not include time for optional tests.)

Worktext 3-A	
Chapter 1	10 days
Chapter 2	14 days
Chapter 3	13 days
Chapter 4	19 days
Chapter 5	14 days
Chapter 6	10 days
TOTAL	**80 days**

Worktext 3-B	
Chapter 7	11 days
Chapter 8	15 days
Chapter 9	8 days
Chapter 10	22 days
Chapter 11	15 days
TOTAL	**71 days**

Most lessons are 2 or 3 pages long, intended for one day. Some 3-page lessons can take two days. Some lessons are 4-5 pages and can be covered in two days. There are also a few optional lessons (not included in the tables on the right).

It can also be helpful to calculate a general guideline as to how many pages per week the student should cover in order to go through the curriculum in one school year.

The table below lists how many pages there are for the student to finish in this particular grade level, and gives you a guideline for how many pages per day to finish, assuming a 180-day (36-week) school year. The page count in the table below *includes* the optional lessons.

Example:

Grade level	School days	Days for tests and revisions	Lesson pages	Days for the student book	Pages to study per day	Pages to study per week
3-A	93	12	209	86	2,43	12,2
3-B	87	10	175	72	2,43	12,2
Grade 3 total	180	22	384	158	2,43	12,2

The table below is for you to fill in. Allow several days for tests and additional revision before tests — I suggest at least twice the number of chapters in the curriculum. Then, to get a count of "pages to study per day", **divide the number of lesson pages by the number of days for the student book**. Lastly, multiply this number by 5 to get the approximate page count to cover in a week.

Grade level	Number of school days	Days for tests and revisions	Lesson pages	Days for the student book	Pages to study per day	Pages to study per week
3-A						
3-B						
Grade 3 total						

Now, something important. Whenever the curriculum has lots of similar practice problems (a large set of problems), feel free to **only assign 1/2 or 2/3 of those problems**. If your student gets it with less amount of exercises, then that is perfect! If not, you can always assign the rest of the problems for some other day. In fact, you could even use these unassigned problems the next week or next month for some additional revision.

In general, 1st to 2nd graders might spend 25 - 40 minutes a day on maths. Third to fourth graders might spend 30 - 60 minutes a day. Fifth to sixth graders might spend 45 - 75 minutes a day. If your student finds maths enjoyable, they can of course spend more time with it! However, it is not good to drag out the lessons on a regular basis, because that can then affect the student's attitude towards maths.

Working space, the usage of additional paper and mental maths

The curriculum generally includes working space directly on the page for students to work out the problems. However, feel free to let your students use extra paper when necessary. They can use it, not only for the "long" algorithms (where you line up numbers to add, subtract, multiply and divide), but also to draw diagrams and pictures to help organise their thoughts. Some students won't need the additional space (and may resist the thought of extra paper), while some will benefit from it. Use your discretion.

Some exercises don't have any working space, but just an empty line for the answer (e.g. 200 + _____ = 1000). Typically, I have intended that such exercises to be done using MENTAL MATHS.

However, there are some students who struggle with mental maths (often this is because of not having studied and used it in the past). As always, the teacher has the final say (not me!) as to how to approach the exercises and how to use the curriculum. We do want to prevent extreme frustration (to the point of tears). The goal is always to provide SOME challenge, but not too much, and to let students experience success enough so that they can continue enjoying learning maths.

Students struggling with mental maths will probably benefit from studying the basic principles of mental calculations from the earlier levels of Math Mammoth curriculum. To do so, look for lessons that list mental maths strategies. They are taught in the chapters about addition, subtraction, place value, multiplication and division. My article at https://www.mathmammoth.com/lessons/practical_tips_mental_math also gives you a summary of some of those principles.

Using tests

For each chapter, there is a **chapter test**, which can be administered right after studying the chapter. **The tests are optional.** Some families might prefer not to give tests at all. The main reason for the tests is for diagnostic purposes, and for record keeping. These tests are not aligned or matched to any standards.

In the digital version of the curriculum, the tests are provided both as PDF files and as html files. Normally, you would use the PDF files. The html files are included so you can edit them (in a word processor such as Word or LibreOffice), in case you want your student to take the test a second time. Remember to save the edited file under a different file name, or you will lose the original.

The end-of-year test is best administered as a diagnostic or assessment test, which will tell you how well the student remembers and has mastered the mathematics content of the entire grade level.

Using cumulative revisions and the worksheet maker

The student books contain mixed revision lessons which revise concepts from earlier chapters. The curriculum also comes with additional cumulative revision lessons, which are just like the mixed revision lessons in the student books, with a mix of problems covering various topics. These are found in their own folder in the digital version, and in the Tests & Cumulative Revisions book in the print version.

The cumulative revisions are optional; use them as needed. They are named indicating which chapters of the main curriculum the problems in the revision come from. For example, “Cumulative Revision, Chapter 4” includes problems that cover topics from chapters 1-4.

Both the mixed and cumulative revisions allow you to spot areas that the student has not grasped well or has forgotten. When you find such a topic or concept, you have several options:

1. Check if the worksheet maker lets you make worksheets for that topic.
2. Check for any online games and resources in the Introduction part of the particular chapter in which this topic or concept was taught.
3. If you have the digital version, you could simply reprint the lesson from the student worktext, and have the student restudy that.
4. Perhaps you only assigned 1/2 or 2/3 of the exercise sets in the student book at first, and can now use the remaining exercises.
5. Check if our online practice area at https://www.mathmammoth.com/practice/ has something for that topic.
6. Khan Academy has free online exercises, articles, and videos for most any maths topic imaginable.

Concerning challenging word problems and puzzles

While this is not absolutely necessary, I heartily recommend supplementing Math Mammoth with challenging word problems and puzzles. You could do that once a month, for example, or more often if the student enjoys it.

The goal of challenging story problems and puzzles is to **develop the student’s logical and abstract thinking and mental discipline**. I recommend starting these in fourth grade, at the latest. Then, students are able to read the problems on their own and have developed mathematical knowledge in many different areas. Of course I am not discouraging students from doing such in earlier grades, either.

Math Mammoth curriculum contains lots of word problems, and they are usually multi-step problems. Several of the lessons utilise a bar model for solving problems. Even so, the problems I have created are usually tied to a specific concept or concepts. I feel students can benefit from solving problems and puzzles that require them to think “outside the box” or are just different from the ones I have written.

I recommend you use the free Math Stars problem-solving newsletters as one of the main resources for puzzles and challenging problems:

Math Stars Problem Solving Newsletter (grades 1-8)
https://www.homeschoolmath.net/teaching/math-stars.php

I have also compiled a list of other resources for problem solving practice, which you can access at this link:

https://l.mathmammoth.com/challengingproblems

Another idea: you can find puzzles online by searching for “brain puzzles for kids,” “logic puzzles for kids” or “brain teasers for kids.”

Frequently asked questions and contacting us

If you have more questions, please first check the FAQ at https://www.mathmammoth.com/faq-lightblue

If the FAQ does not cover your question, you can then contact us using the contact form at the Math Mammoth.com website.

Chapter 7: Four-Digit Numbers
Introduction

This chapter focuses on four-digit numbers. The first lessons cover place value and comparing four-digit numbers. The rest of the chapter deals with addition, subtraction, and word problems.

First, students learn to write and read four-digit numbers. Then they learn about the concept of place value, write numbers in expanded form, and place them on number lines. One lesson is spent comparing numbers.

Then we turn our attention to addition and subtraction, first using mental maths. The lessons on mental maths stress the similarities between adding and subtracting four-digit numbers and adding and subtracting smaller numbers. This helps build number sense.

Several lessons are spent on adding and subtracting four-digit numbers in columns and practising regrouping. Students also solve a variety of word problems involving four-digit numbers along the way.

Overall, this chapter is probably fairly easy for most students in the fact it mostly has to do with place value, addition, and subtraction. I advise that you do not assign all the exercises by default. Use your judgement, and strive to vary the number of assigned exercises according to the student's needs.

Good Mathematical Practices

- This chapter has lots of opportunities to focus on accuracy (precision) and checking one's own work. Addition problems can be checked by adding each column in a different order. Subtraction problems can be checked by adding. Sometimes children hurry through their work and thus make mistakes. Don't assign so much work that it creates time-related stress. Less can be more! Emphasise to your student(s) that they can take time to compute carefully, and to check their own work.

Pacing Suggestion for Chapter 7

This table does not include the chapter test as it is found in a different book (or file).
Please add one day to the pacing for the test if you use it.

The Lessons in Chapter 7	page	span	suggested pacing	your pacing
Thousands	14	*4 pages*	1 day	
Four-Digit Numbers and Place Value	18	*5 pages*	2 days	
Comparing Numbers	23	*2 pages*	1 day	
Add and Subtract Four-digit Numbers 1	25	*2 pages*	1 day	
Add and Subtract Four-digit Numbers 2	27	*2 pages*	1 day	
Add Four-digit Numbers in Columns	29	*2 pages*	1 day	
Subtract Four-digit Numbers with Regrouping	31	*3 pages*	1 day	
More Practice	34	*3 pages*	1 day	
Word Problems	37	*2 pages*	1 day	
Mixed Revision Chapter 7	39	*2 pages*	1 day	
Revision Chapter 7	41	*2 pages*	1 day	
Chapter 7 Test (optional)				
TOTALS		*29 pages*	12 days	

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Games and Activities at Math Mammoth Practice Zone

Make Number Sentences
You're given numbers (in flowers), and an answer to a maths sentence. Drag two flowers to the empty slots so that the maths sentence is true. Choose addition and/or subtraction, and number ranges within four-digit numbers.
https://www.mathmammoth.com/practice/number-sentences

Vertical Addition Colour-Grid Game
Practise vertical (column) addition with this fun and colourful online game! Choose a maximum of 9000 and 2-4 addends to practise four-digit additions.
https://www.mathmammoth.com/practice/vertical-addition

Vertical Subtraction Colour-Grid Game
Practise vertical (column) subtraction with this colourful online game! Choose a maximum of 9999 for the numbers to practise four-digit subtractions.
https://www.mathmammoth.com/practice/vertical-subtraction

Helpful Resources on the Internet

We have compiled a list of Internet resources that match the topics in this chapter, including pages that offer:

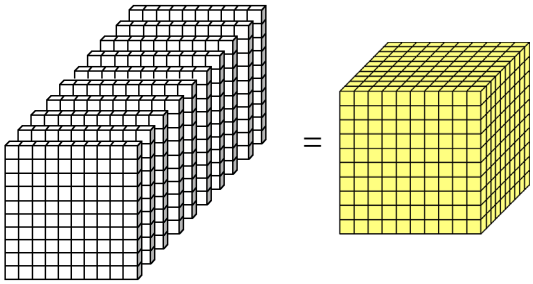
- **online practice** for concepts;
- online **games**, or occasionally, printable games;
- **animations** and interactive **illustrations** of maths concepts;
- **articles** that teach a maths concept.

We heartily recommend you take a look! Many of our customers love using these resources to supplement the bookwork. You can use these resources as you see fit for extra practice, to illustrate a concept better, and even just for some fun. Enjoy!

https://l.mathmammoth.com/2024/gr3ch7

Scan me

Thousands

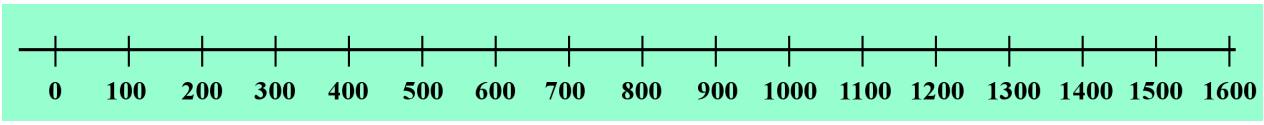


10 hundreds = 1000

When we stack 10 hundred-flats end-to-end, we get *one thousand.*

Ten hundreds = One thousand.

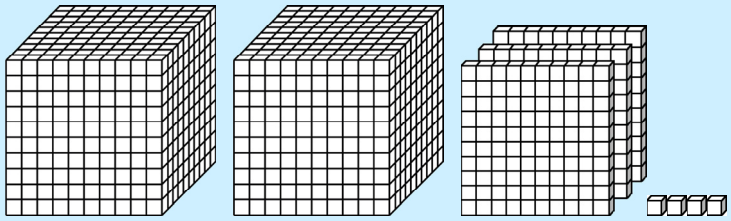
We write one thousand as 1000.



On this number line, you see only whole hundreds (multiples of hundred) marked. In between each two marks are 99 numbers. Imagine 99 little lines between 300 and 400, for example!

When counting by 100, after 900 comes "ten hundreds" or A THOUSAND (1000).

If we continue skip-counting by 100 from 1000, we get: *one thousand one hundred*, *one thousand two hundred*, *one thousand three hundred*, and so on. People often read these numbers this way: *eleven hundred*, *twelve hundred*, *thirteen hundred*, and so on.



2304

two thousand three hundred and four

Here you see two thousands, three hundreds, no tens, and four ones (units).

We write it as 2304.

Six thousand and eighteen

thou-sands	hund-reds	tens	ones
6	0	1	8

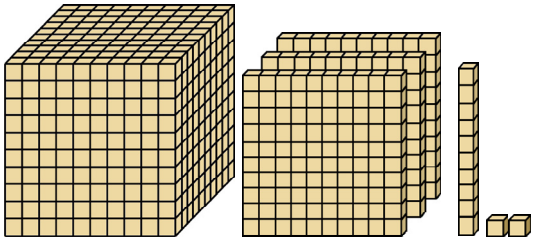
Numbers with four digits are very easy to read. The first digit is in the thousands place. Just read it as "one thousand", "two thousand", "five thousand" and so on.

Read the rest of the digits just like you are used to reading three-digit numbers.

1. (Optional) Do the activity **Making Numbers**. (See the chapter introduction.)

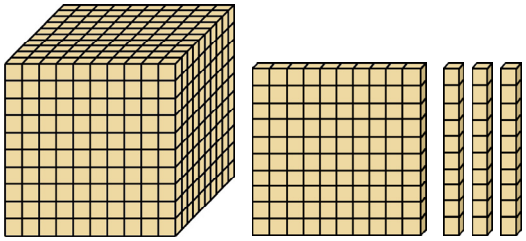
2. Write the numbers shown by the models. Note: sometimes you will need to use a zero.

a.



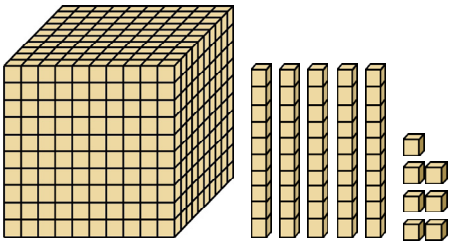
thou-sands	hund-reds	tens	ones

b.



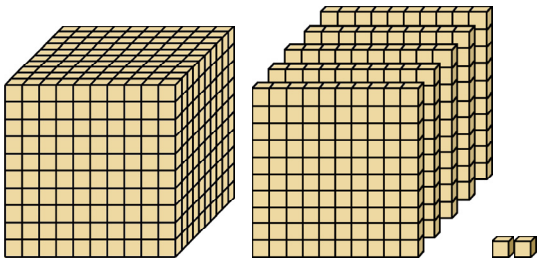
thou-sands	hund-reds	tens	ones

c.



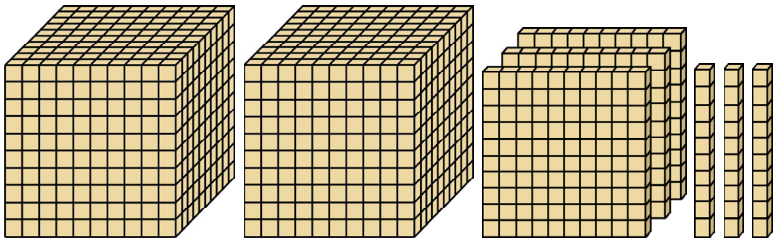
thou-sands	hund-reds	tens	ones

d.



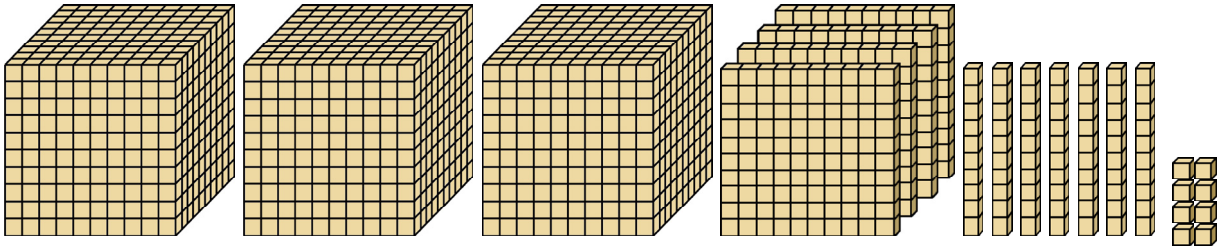
thou-sands	hund-reds	tens	ones

e.



thou-sands	hund-reds	tens	ones

f.



thou-sands	hund-reds	tens	ones

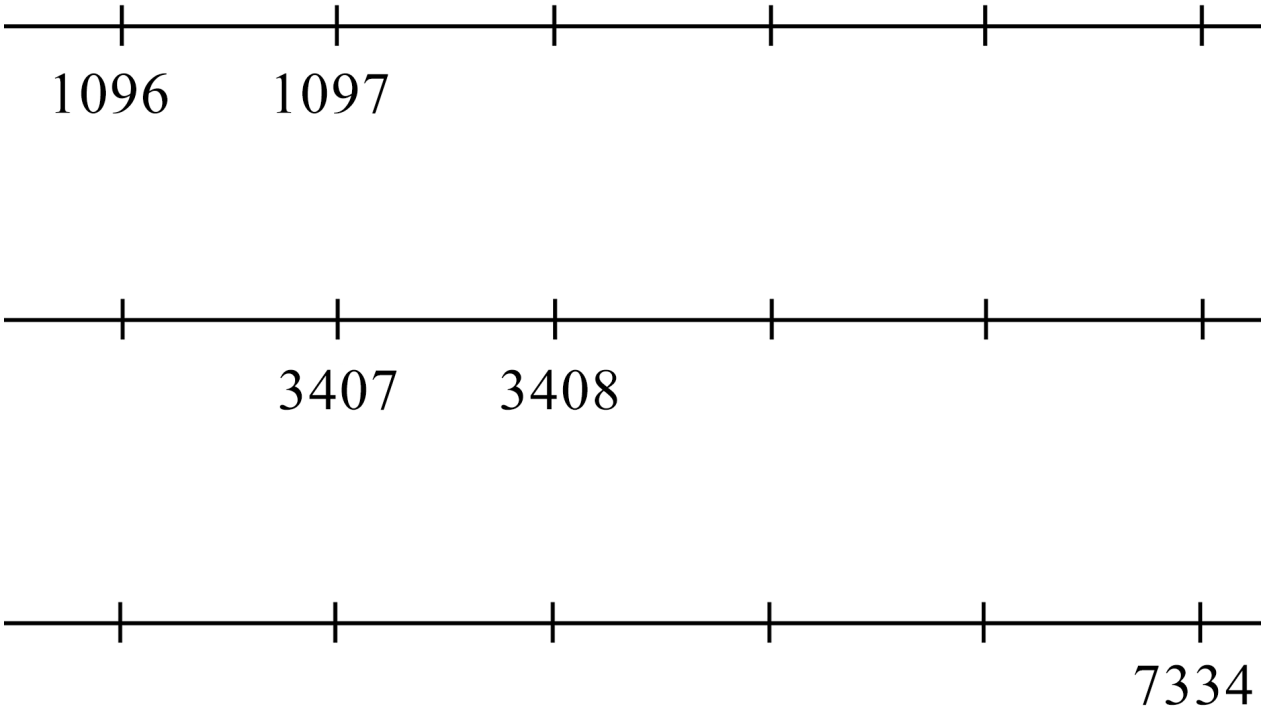
3. Fill in.

a. One thousand two hundred and fifty-six thou-sands: 1 · hund-reds: 2 · tens: 5 · ones: 6	**b.** Three thousand five hundred and ninety-four thou-sands · hund-reds · tens · ones	**c.** Four thousand six hundred and seventeen thou-sands · hund-reds · tens · ones
d. Nine thousand eight hundred and twenty-two thou-sands · hund-reds · tens · ones	**e.** Six thousand two hundred and eleven thou-sands · hund-reds · tens · ones	**f.** Five thousand seven hundred and ninety-nine thou-sands · hund-reds · tens · ones

4. Fill in. Now you will need to use a zero or zeros, so be careful!

a. One thousand and one thou-sands: 1 · hund-reds: 0 · tens: 0 · ones: 1	**b.** Two thousand and five thou-sands · hund-reds · tens · ones	**c.** Four thousand and sixty-one thou-sands · hund-reds · tens · ones
d. Three thousand and twelve thou-sands · hund-reds · tens · ones	**e.** Six thousand two hundred thou-sands · hund-reds · tens · ones	**f.** Five thousand and ninety thou-sands · hund-reds · tens · ones
g. One thousand one hundred and three thou-sands · hund-reds · tens · ones	**h.** Seven thousand five hundred and six thou-sands · hund-reds · tens · ones	**i.** Five thousand eight hundred thou-sands · hund-reds · tens · ones
j. Two thousand and eleven thou-sands · hund-reds · tens · ones	**k.** Two thousand three hundred and twenty thou-sands · hund-reds · tens · ones	**l.** Nine thousand and thirty-two thou-sands · hund-reds · tens · ones

5. Fill in the numbers for these number lines.



6. Fill in the number chart, counting by tens.

4 0 1 0	4 0 2 0			
4 0 6 0				

7. Fill in another number chart, counting by tens.

		8 6 8 0	8 6 9 0	

Four-Digit Numbers and Place Value

Let's look at the number 2467 in detail.

The 2, 4, 6, and 7 are called the ***digits*** of the number.

Each digit has its own **place** (location) in the number:

- 2 is in the thousands place,
- 4 is in the hundreds place,
- 6 is in the tens place, and
- 7 is in the ones (units) place.

thou-sands	hund-reds	tens	ones
2	4	6	7

2000 + 400 + 60 + 7

Each digit also has a different **value** in the number.

- The value of digit 2 in this number is 2000.
- The value of the digit 4 is 400.
- The value of the digit 6 is 60.
- The value of the digit 7 is just 7.

So, each digit of a number has both a specific place and a specific value. That is why the way we write numbers is called a **place value system**.

The number 2467 is actually the sum (addition) of the values of the digits: it equals 2000 + 400 + 60 + 7.

Examples. Here, each number is written as a sum, according to the places and values of its digits. It is like writing each number out in full, using its parts: the thousands, the hundreds, the tens and the ones. **Note!** When there are *no* hundreds, tens, or ones, we **write a zero**.

thou-sands	hund-reds	tens	ones
1	0	9	0

1000 + 0 + 90 + 0

thou-sands	hund-reds	tens	ones
5	6	0	2

5000 + 600 + 0 + 2

1. Fill in the blanks.

thou-sands	hund-reds	tens	ones
5	2	5	9

a. 5000 + _____ + 50 + ____

thou-sands	hund-reds	tens	ones
7	0	8	2

b. 7000 + 0 + _____ + ____

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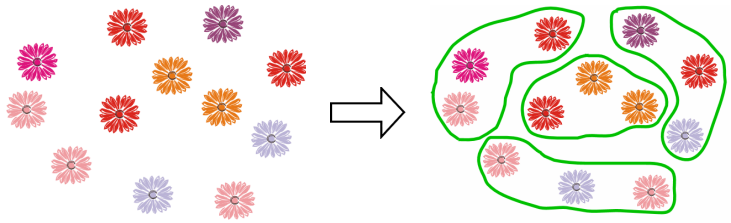
Division as Making Groups

There are 12 daisies. Make groups of 3.

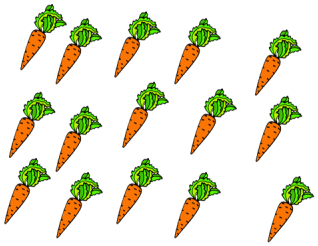


How many groups? *Four groups.*

How many 3's are there in 12? *Four.*

1. Divide into groups.

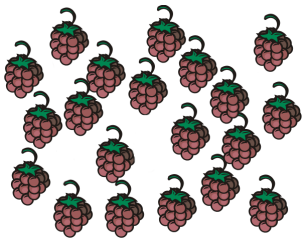
a. There are 15 carrots.
Make groups of 5.



How many groups? _____

How many 5's are there in 15? _____

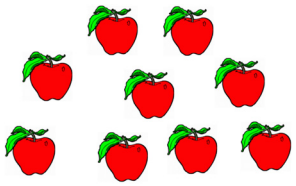
b. There are _____ berries.
Make groups of 4.



How many groups? _____

How many 4's are there in _____? _____

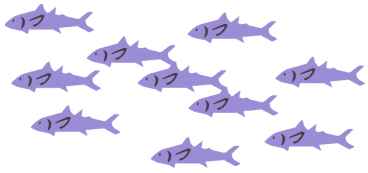
c. There are _____ apples.
Make groups of 3.



How many groups? _____

How many 3's are there in _____? _____

d. There are _____ fish.
Make groups of 2.



How many groups? _____

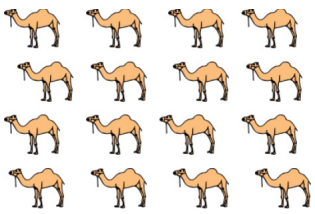
How many 2's are there in _____? _____

e. There are _____ daisies.
Make groups of 6.

How many groups? _____

How many 6's are there in _____? _____

f. There are _____ camels.
Make groups of 4.

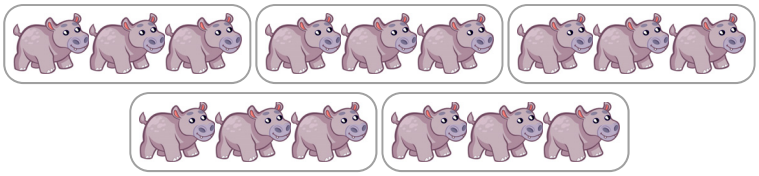


How many groups? _____

How many 4's are there in _____? _____

We **DIVIDE 15** hippos into groups of **three**. We get **five** groups.

How many 3's in 15? Five.



We can write a **division**: $15 \div 3 = 5$ (Read: "Fifteen divided by three is five.")

The number 3 is the **divisor**. It does the dividing, so to speak. Here, it indicates the size of the groups: each group has three hippos. The answer shows how many groups we get.

$18 \div 6 = ?$

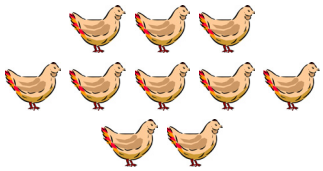
Think: "How many 6's in 18?"

If we DIVIDE 18 into groups of six, how many groups are there?

Since 6 + 6 + 6 = 18, or 3 × 6 = 18, there are THREE groups of six in 18. So, 18 ÷ 6 = **3**.

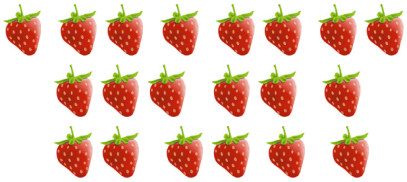
2. Make a division sentence.

a. Divide 10 hens into groups of two. How many groups?



_____ ÷ _____ = _____

b. Divide _____ berries into groups of four. How many groups?

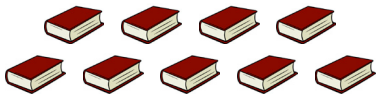


_____ ÷ _____ = _____

c. Divide _____ apples into groups of six. How many groups?

_____ ÷ _____ = _____

d. Divide _____ books into groups of three. How many groups?

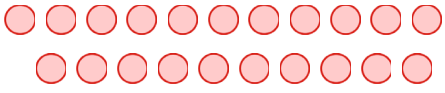


_____ ÷ _____ = _____

e. Divide _____ rubbers into groups of five. How many groups?

_____ ÷ _____ = _____

f. Divide _____ circles into groups of three. How many groups?

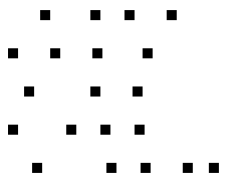
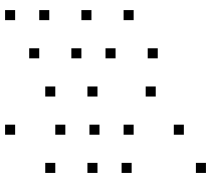
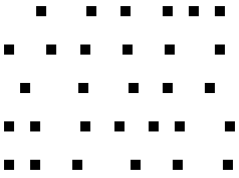
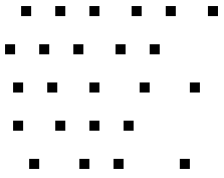
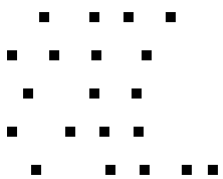
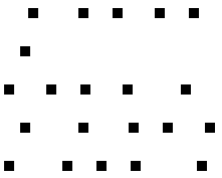
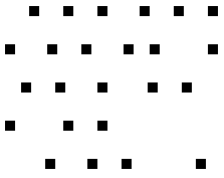
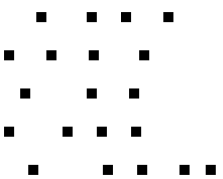


_____ ÷ _____ = _____

3. Draw sticks. Divide them into groups to fit the division sentence.

a. 18 ÷ 3 = _____	**b.** 24 ÷ 2 = _____
c. 21 ÷ 3 = _____	**d.** 25 ÷ 5 = _____
e. 15 ÷ 5 = _____	**f.** 24 ÷ 8 = _____

4. Make groups by circling dots and write a division sentence.

a. Make groups of 4  _____ ÷ 4 = ____	**b.** Make groups of 2  _____ ÷ 2 = ____	**c.** Make groups of 6  _____ ÷ 6 = ____	**d.** Make groups of 3  _____ ÷ 3 = ____
e. Make groups of 5  _____ ÷ 5 = ____	**f.** Make groups of 7  _____ ÷ 7 = ____	**g.** Make groups of 6  _____ ÷ 6 = ____	**h.** Make groups of 10  _____ ÷ 10 = ____

Division and Multiplication

We can write both a **multiplication fact** and a **division fact** from the same picture:

Three ***groups of 4*** makes 12.

$3 \times 4 = 12$

12 divided into ***groups of 4*** is three groups.

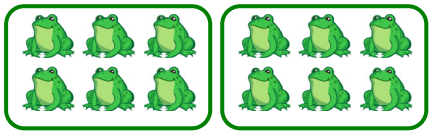
$12 \div 4 = 3$

Both multiplication and division have to do with **same-sized groups**, but they are the opposite operations of each other. You could say division is "backwards" multiplication.

1. Fill in the blanks.

a. Two ***groups of 6*** is 12.

$2 \times 6 = 12$



12 divided into ***groups of 6*** is two groups.

$12 \div 6 = 2$

b. Five ***groups of 2*** is _____.

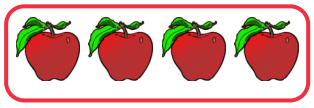
_____ × 2 = _____

_____ divided into ***groups of 2*** is ___ groups.

_____ ÷ 2 = _____

c. One ***group of 4*** is 4.

_____ × 4 = _____



4 divided into a ***group of 4*** is one group.

_____ ÷ 4 = _____

d. Five ***groups of 1*** is 5.

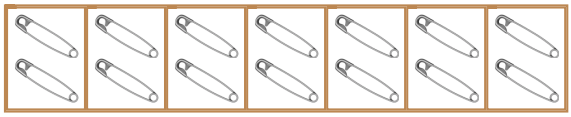
_____ × 1 = _____

5 divided into ***groups of 1*** is _____ groups.

_____ ÷ 1 = _____

e. _____ ***groups of*** _____ is _____.

_____ × _____ = _____

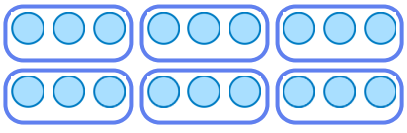


_____ divided into ***groups of 2*** is ___ groups.

_____ ÷ _____ = _____

f. _____ ***groups of 3*** is _____.

_____ × _____ = _____



_____ divided into ***groups of 3*** is ___ groups.

_____ ÷ _____ = _____

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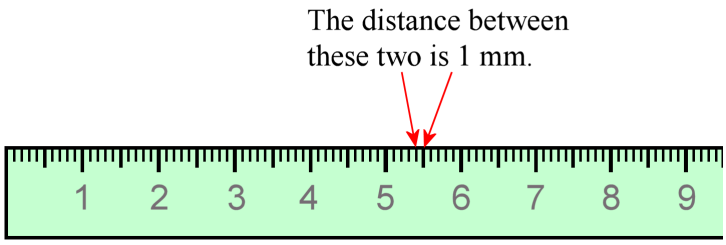
Centimetres and Millimetres

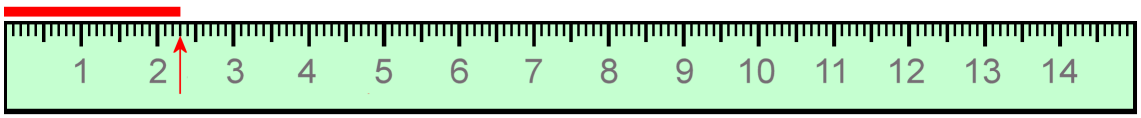
This ruler measures in centimetres. The numbers signify whole centimetres. All the shorter lines between those are for *millimetres*.



The distance from one short line to the next is *1 millimetre*. We write 1 mm. Millimetres are very tiny!

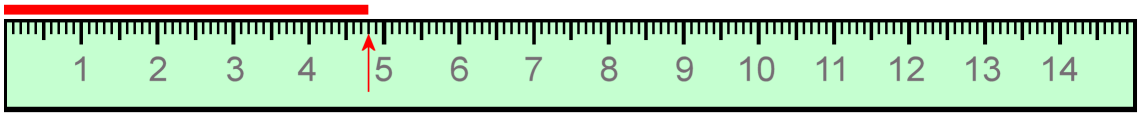
Look at the ruler: **there are 10 millimetres in each centimetre.**

Measuring lines: First see how many whole centimetres long the line is. Then count how many little millimetre-lines beyond that it reaches.



This line is 2 cm 3 mm long. At the same time, it is 23 mm long. Why?

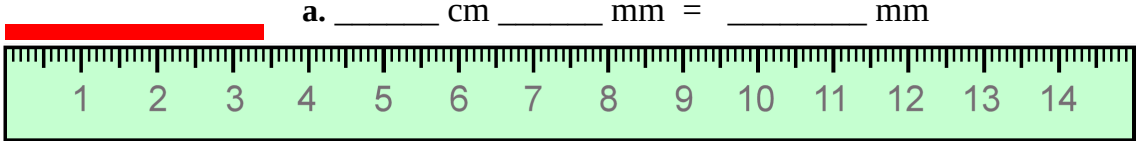
Each centimetre is 10 mm, so 2 cm is 20 mm. So, 2 cm 3 mm makes 23 mm in total.



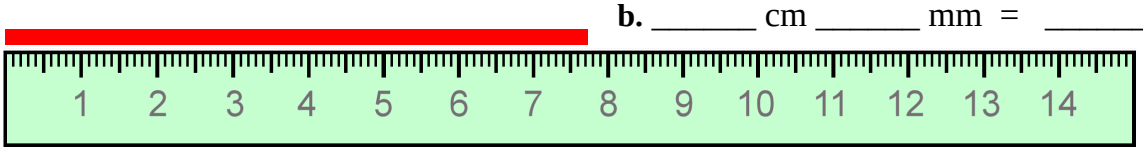
This line is 4 cm 8 mm long. At the same time, it is 48 mm long.

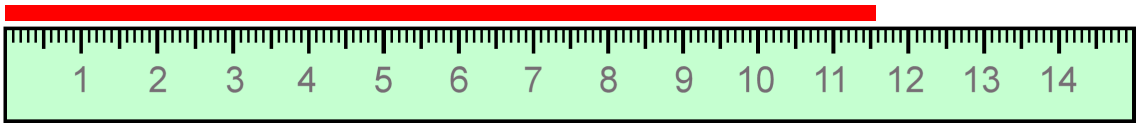
1. Measure the lines using the ruler, first in whole centimetres and millimetres. Then write their lengths using millimetres only.

a. _____ cm _____ mm = _____ mm

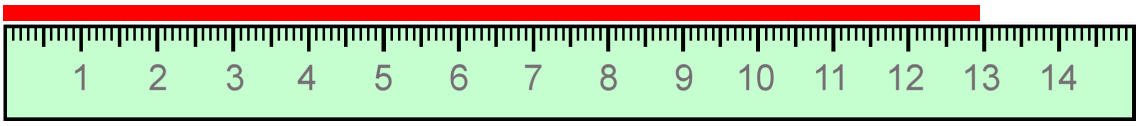


b. _____ cm _____ mm = _____ mm

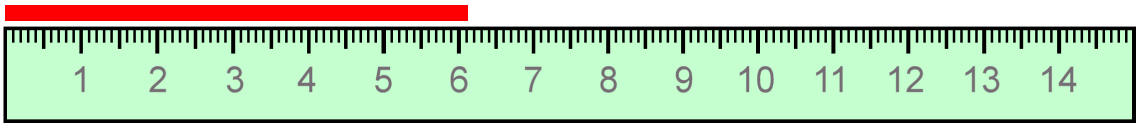




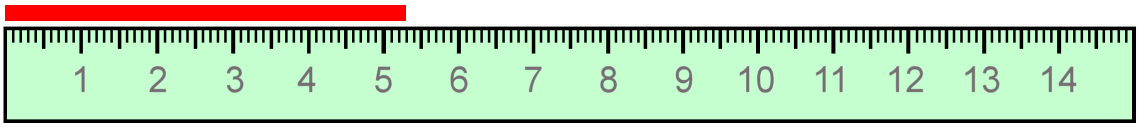
c. _____ cm _____ mm = _____ mm



d. _____ cm _____ mm = _____ mm



e. _____ cm _____ mm = _____ mm



f. _____ cm _____ mm = _____ mm

2. Draw lines using a ruler.

a. 7 cm 8 mm

b. 10 cm 5 mm

c. 14 mm

d. 55 mm

e. 126 mm

3. Measure items, using a centimetre-millimetre ruler. If the item is not exactly as long as the markers on the ruler, choose the nearest mark.

Item	Length

4. Change between centimetres and millimetres. Remember that 1 cm = 10 mm.

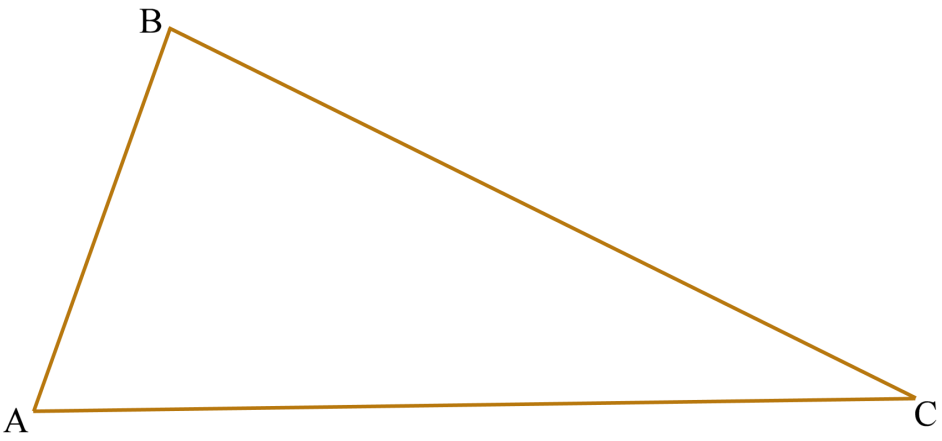
a.	b.	c.
2 cm = _____ mm	1 cm 1 mm = *11* mm	4 cm 5 mm = _____ mm
5 cm = _____ mm	1 cm 8 mm = _____ mm	7 cm 8 mm = _____ mm
8 cm = _____ mm	2 cm 3 mm = _____ mm	10 cm 4 mm = _____ mm

5. Measure the sides of this triangle in millimetres.

Side AB: _____ mm

Side BC: _____ mm

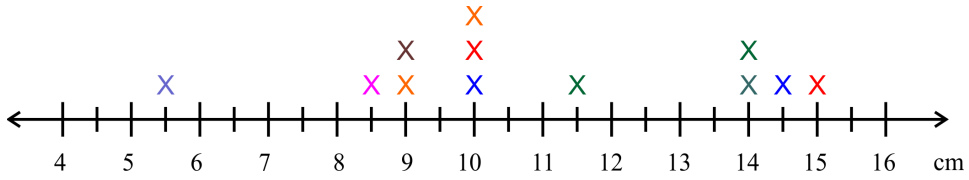
Side CA: _____ mm



6. If you went all the way around the triangle in #5, what distance would you travel?

Line Plots

Amanda measured the length of some of her coloured pencils.
She recorded her results in a **line plot** below. For each pencil, she put an "x" mark above the number line to show how many centimetres long it was.



For example, Amanda's longest pencil (red x-mark) is 15 centimetres long.

1. Look carefully at the line plot above, and answer:

   a. How many pencils does Amanda have that are 10 centimetres long?

   b. How long is the pencil that is *between* 8 and 9 centimetres long?

   c. How long is Amanda's shortest pencil?

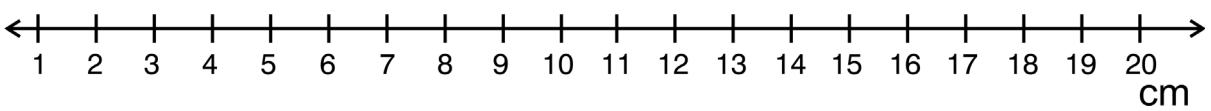
2. Measure many pencils of different lengths to the nearest centimetre.
   Write the lengths below.

_____ cm _____ cm _____ cm _____ cm _____ cm

_____ cm _____ cm _____ cm _____ cm _____ cm

_____ cm _____ cm _____ cm _____ cm _____ cm

Now, make a line plot about your pencils. Write an "X" mark for each pencil.



3. Refer to your collection of pencils and the line plot you just made.

a. If you take your two longest pencils and put them end-to-end, how long is your line of pencils?

It is _____ cm. (You can measure to check your answer!)

b. If you take your two shortest pencils and put them end-to-end, how long is your line of pencils?

It is _____ cm. (You can measure to check your answer!)

4. Measure a collection of similar items to the *nearest* centimetre. For example, you can measure the length of spoons or of stuffed animals, or the width of books. Another idea is to ask different people to draw a line 6 centimetres long without using a ruler (in other words, guess and draw it), and then measure their lines and check who guessed the closest.

(You don't have to find as many items as there are empty lines below.)

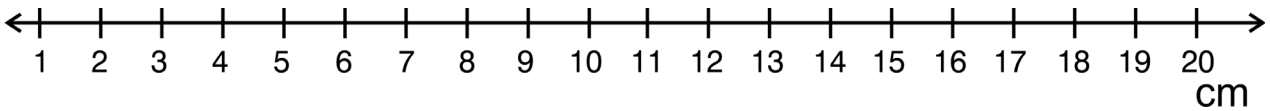
_____ cm _____ cm _____ cm _____ cm _____ cm.

_____ cm _____ cm _____ cm _____ cm _____ cm.

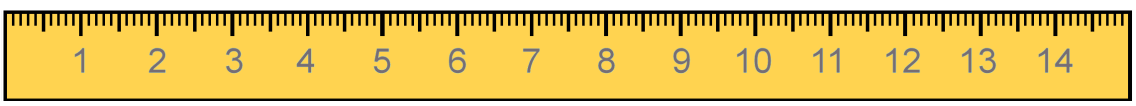
_____ cm _____ cm _____ cm _____ cm _____ cm.

_____ cm _____ cm _____ cm _____ cm _____ cm.

Now, make a line plot. Write an "X" mark for each item. Decide the scaling for the number line based on the kind of numbers you have in the list above.



You can cut out the ruler below and glue it on cardboard, or tape it on top of your ruler.



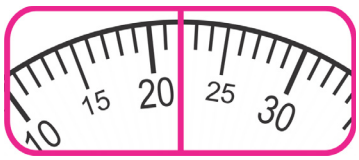
Grams and Kilograms

We can measure objects using different types of scales, to find out how heavy they are.

In this lesson we will use scales that show kilograms (kg) and grams (g). Those are units for mass. The **mass** of an object means how much material (or substance or "stuff") is in it. And the more material is in it, the heavier it is!

- A **gram** (abbreviated "g") is a very small unit of mass. One large paperclip has a mass of about 1 gram.
- A **kilogram** (kg) is a larger unit of mass. For example, a baby might have a mass of 4 kg. A litre bottle of water has a mass of 1 kg.
- A thousand grams make one kilogram: 1000 g = 1 kg.

In this lesson, you will need:



- A bathroom scale that measures in kilograms. An analogue scale is great; digital is fine.
- A kitchen scale that measures in grams. An analogue scale is great; digital is fine, too.
- Paperclips, thumbtacks, pencils, and other small objects.
- A book, water bottle, or other object with a mass of (approximately) 1 kg.
- An object with a mass of 100 g (a small apple, tomato, or a potato will do).
- Objects to weigh.

1. Let's weigh stuff!

a. How many paperclips do you need to make the scale show 10 grams? Use both small and large paperclips if you have them.

Note: one paperclip may not make a scale to show anything, because it may be less than one gram. (Small paperclips are about 1/4 to 1/3 of a gram.)

b. Place 20 paperclips on the scale. Then do the same with 20 thumbtacks. Which is heavier, *one* paperclip or *one* thumbtack?

c. Estimate (make a guess) the mass of a ruler and a pencil. Then check with the scale.

(Note to the teacher: Technically speaking, scales measure weight, not mass. Weight of an object is a force; it is how much gravity pulls on an object. Scales measure the pull of gravity on an object. But, scales we will be using here do not show a measurement of force (which would be in Newtons) but use kilograms or grams which are units of mass. In other words, the scales use gravity to indirectly measure an object's mass. In this lesson, it is alright to use the word "weight" since that is common in everyday usage, and since that is what scales in reality do measure. However, it is also good to get students used to the word and idea of "mass".)

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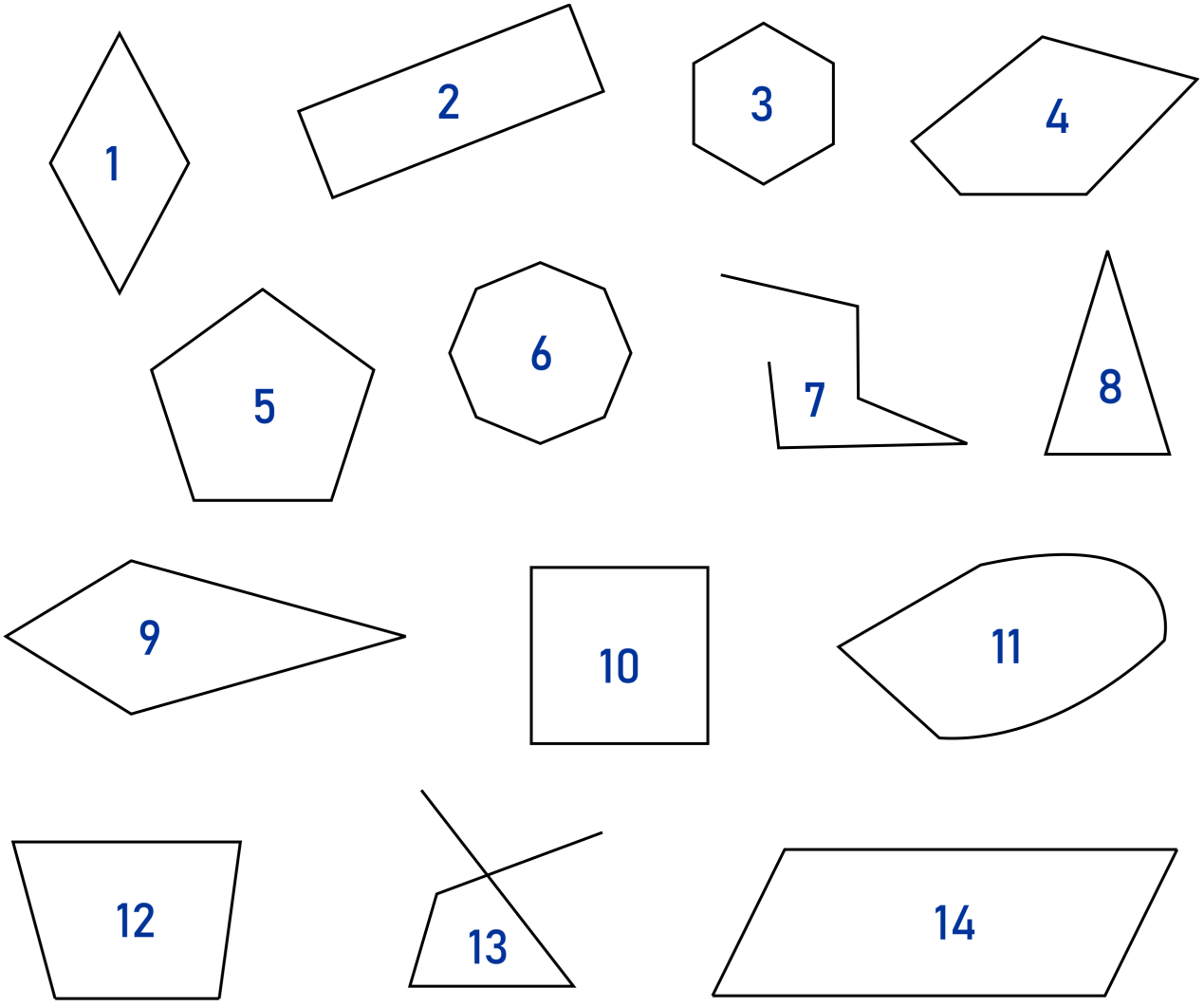
Polygons

1. **a.** Find a way to sort these shapes (there are many possible ways). You can cut them out! Explain why you sorted them the way you did.

b. Now sort them in a different way.



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https://www.mathmammoth.com/download/polygons-gr3.pdf

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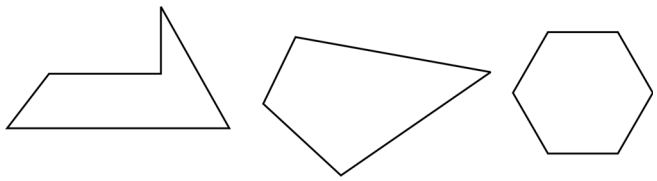
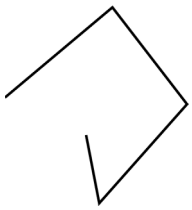
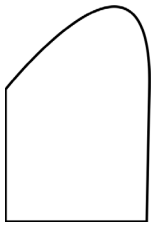
A **polygon** is a closed shape with straight sides.



This is not a polygon because it is not a closed shape.

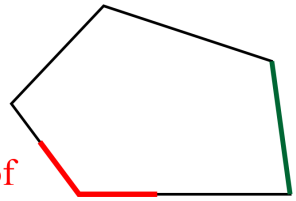


This is not a polygon because one of its sides is not straight.



Can you think of another shape that is not a polygon?

An angle of a polygon is the part where two sides join (a "corner").



2. One way to sort the shapes in question 1 is whether they are polygons or not. Which shapes in question 1 are not polygons?

3. Another way to sort the shapes in #1 is whether the shape has equal sides or not (sides of equal length). If a polygon has equal sides and equal angles, it is a **regular polygon**. Which shapes in #1 are regular polygons?

4. Yet a different way to sort the shapes in #1 is by the number of their angles. Which polygons in #1 have four angles?

5. We could also sort them by the number of their sides. Which polygons in #1 have five sides?

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Mixed Revision Chapter 10

1. Solve. (Elapsed Time 3/Ch5)

a. The clock shows the time now. Angela has to get her chores done by 5:30. How much time does she have left?

b. Bentley started doing his English homework at 7:20 and finished at 7:48. How long did it take him?

c. The clock shows the time now, and the class ends at 3:00. How many minutes is it till the class ends?

2. Find the area and perimeter of this rectangle. Use a centimetre-ruler to measure. (Area of Rectangles 2/Ch10)

Area:

Perimeter:

3. What can you find out using what the problem tells you? Calculate to find it.

A child arranged toy cars in rows of six cars.
He made seven rows like that. Then he also
made one more row with three cars.

4. Fill in. (Mental Maths with Three-Digit Numbers/Ch1)

+ 20 + 100 + 200 + 40 + 60 − 400

260 _____ _____ _____ _____ _____ 280

5. Draw lines using a ruler. (Centimetres and Millimetres /Ch9)

a. 7 cm 8 mm

b. 34 mm

c. 10 cm 5 mm

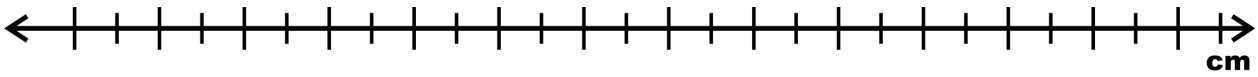
6. Measure a collection of similar items. For example, you can measure the length of shoes or the height of glasses and mugs. (Line Plots/Ch9)
(You don't have to find as many items as there are empty lines below.)

_____ cm _____ cm _____ cm _____ cm _____ cm

_____ cm _____ cm _____ cm _____ cm _____ cm

_____ cm _____ cm _____ cm _____ cm _____ cm

Then make a line plot. Write an "X" mark for each item. Decide the scaling for the number line based on the kind of numbers you have in the list above.

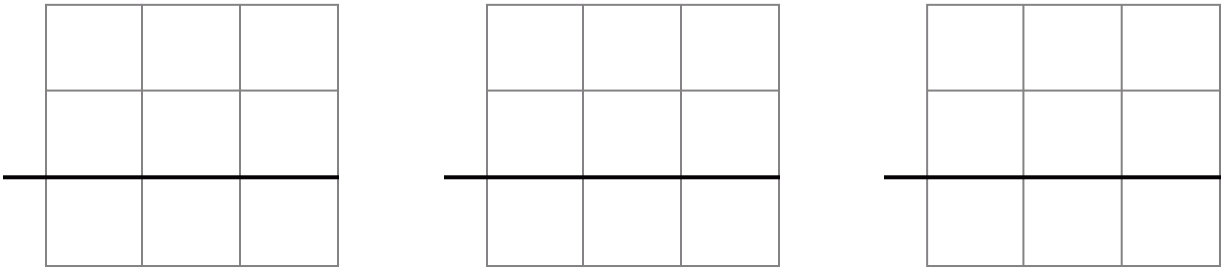


7. One refrigerator costs R545 and another costs R68 less than that. (Various Lessons/Ch2)

a. Find the cost of the cheaper refrigerator.

b. Mr. Sandman bought two of the cheaper refrigerators. What was the total cost?

c. He paid with R1000. What was his change?



8. Circle the reasonable weight or mass. (Grams and Kilograms/Ch9)

a. 

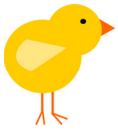
440 kg 70 kg

b. 

120 g 2 kg

c. 

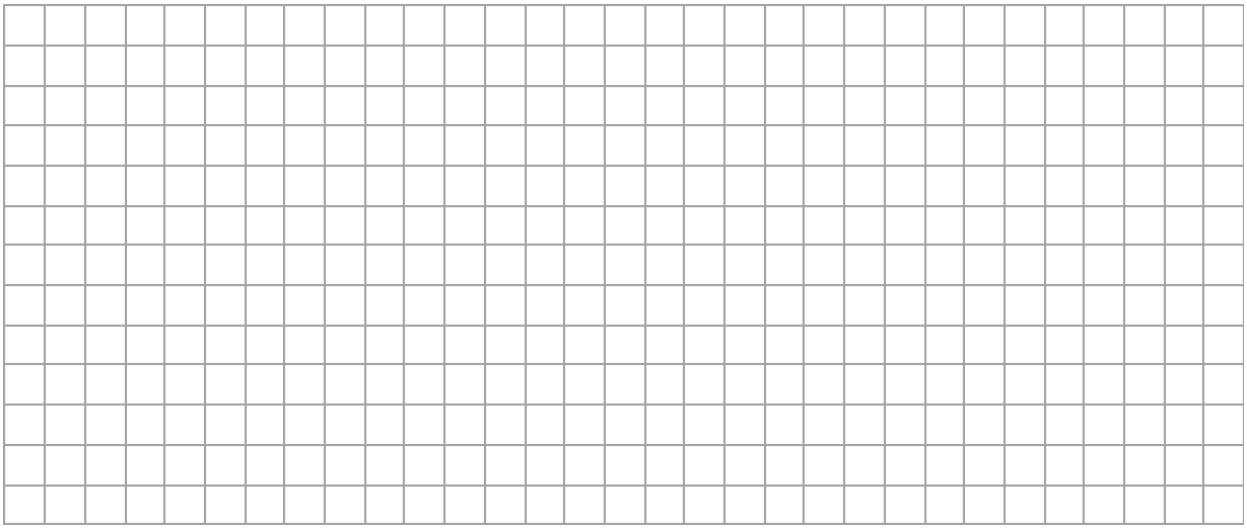
2 kg 22 kg

d. 

2 kg 90 g

9. Make a bar graph using the data in the table on the right. Don't forget to add a title. (Bar Graphs/Ch8)

Beach Toy	Price
Volleyball set	R30
Beach ball	R5
Sand toys set	R15
Snorkelling set	R35
Swimming rings	R20



10. Refer to the price of the beach toys above. (Bar Graphs/Ch8)

a. How much more does the snorkelling set cost than the swim rings set?

b. How much do the sand toys, beach ball, and the swimming rings cost together?

c. What is the total cost if you buy the two cheapest items?

11. Write the time the clock shows, and the time 15 minutes later. (Clock to the Minute/Ch5)

	a.	**b.**	**c.**
			
The time now →	_____ : _____	_____ : _____	_____ : _____
15 min. later →	_____ : _____	_____ : _____	_____ : _____

12. One of the three numbers fits on the empty line so that the comparisons are true. Which? Circle the number. (Comparing Numbers/Ch7)

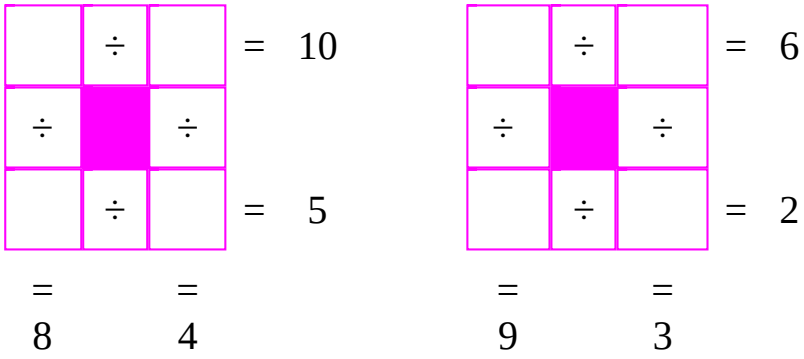
a. 5637 5673 5607 5609 < _____ < 5650	**b.** 6142 6121 6211 6114 < _____ < 6140
c. 6996 9966 9696 9595 < _____ < 9700	**d.** 4001 4010 4011 4001 < _____ < 4011

13. Solve.

a.	**b.**	**c.**	**d.**
2 × 0 = _____	12 × 1 = _____	0 × 1 = _____	15 × 10 = _____
0 ÷ 9 = _____	8 ÷ 1 = _____	0 × 0 = _____	42 × 10 = _____

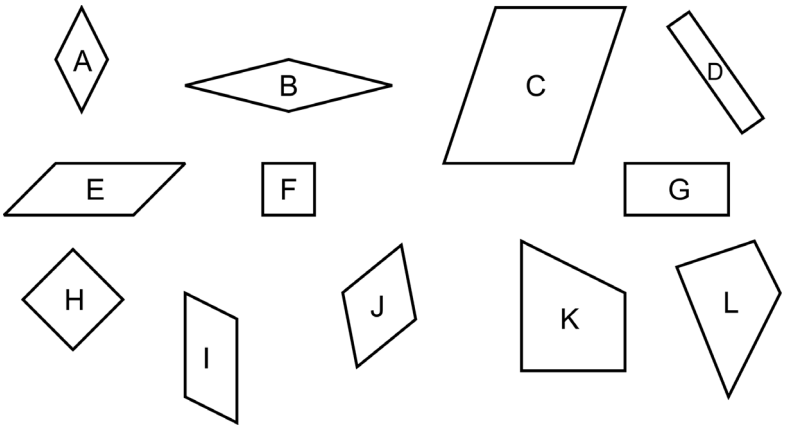
Puzzle Corner

What numbers can go into the puzzles?



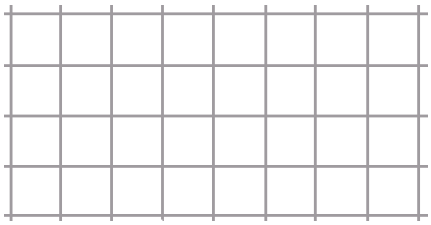
Revision Chapter 10

1. **a.** Find the rhombi among these figures.

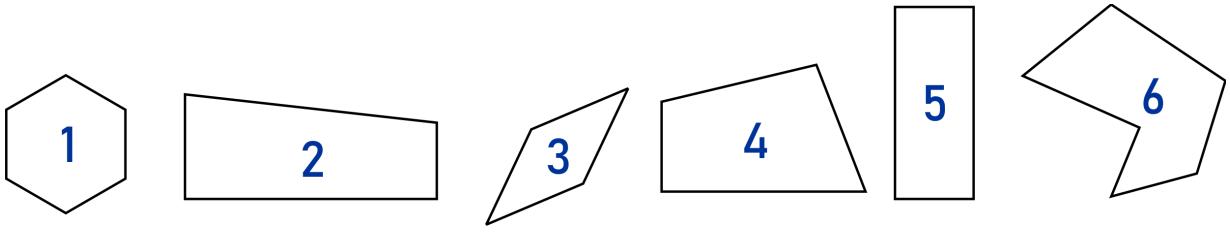


b. Find quadrilaterals that are not rectangles nor rhombi.

2. Draw a quadrilateral that doesn't have any equal sides.



3. Match each description to one shape.



a. It has two pairs of equal sides.

b. It has four equal sides.

c. It has two right angles and is a quadrilateral.

d. All its sides are equal.

e. It has one right angle.

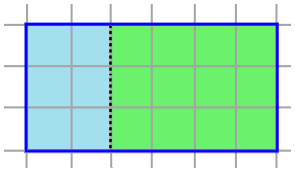
f. It is a hexagon.

4. Find the area of a rectangle that is 6 metres wide and 8 metres long.

5. Draw here two different rectangles with an area of 20 square units. Then find the perimeter of each rectangle.

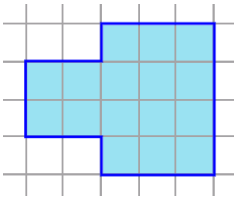
6. Write a multiplication *and* addition for the areas of these figures.

a.



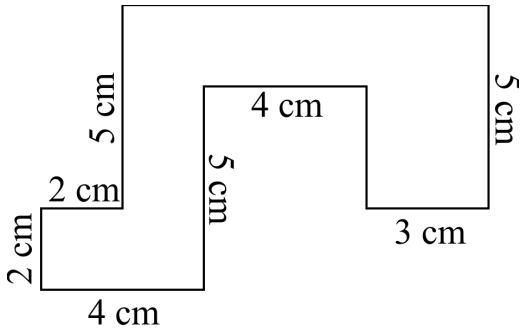
A =

b.



A =

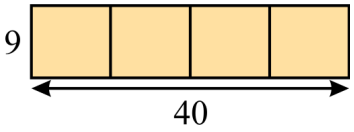
7. Find the area of this rectilinear shape.



8. Multiply using the shortcut.

a. 7 × 70 = _____	**b.** 6 × 80 = _____	**c.** 40 × 7 = _____

9. Find the total area of this rectangle, and the area of each part.



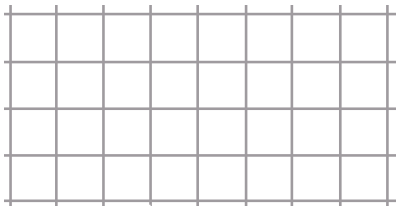
Area of each part:

Total area:

10. Draw and fill in.

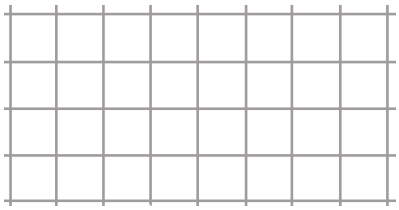
a. Fill in the missing parts, and then draw a two-part rectangle to illustrate this number sentence.

$3 \times (5 + 1) \quad = \quad \_\_\_ \times \_\_\_ + \_\_\_ \times \_\_\_$



b. Fill in the missing parts, and then draw a two-part rectangle to illustrate this number sentence.

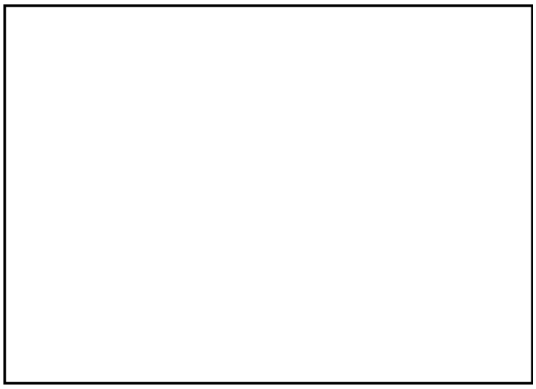
$\_\_\_ \times (\_\_\_ + \_\_\_) \quad = \quad 4 \times 2 \quad + \quad 4 \times 3$



11. Find the perimeter and area of this rectangle. Use a centimetre ruler.

Area:

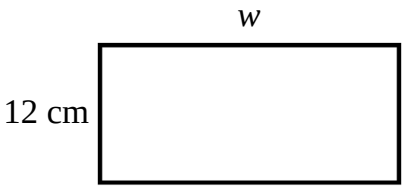
Perimeter:



12. The one side of this rectangle is 12 cm. Its perimeter is 82 cm. How long is the other side? Write an equation with an unknown.

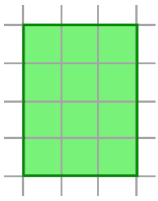
_____

Solution: _____



13. Find the area and perimeter of these figures.

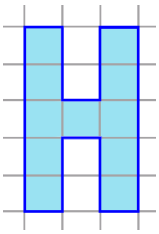
a.



Area:

Perimeter:

b.



Area:

Perimeter:

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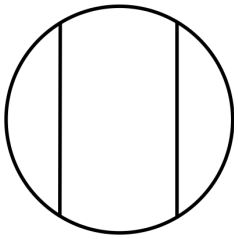
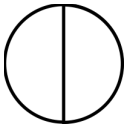
Understanding Fractions 1

Example: Three friends share a pizza. Here you see how the pizza is divided into three parts. Would you say that each person will get a fair share?

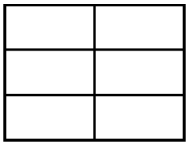
Why or why not?





Here, one whole is divided into two equal parts. Each part is one-half of the whole.

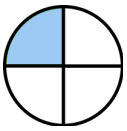
Here, one whole is divided into three equal parts. Each part is one-third of the whole.



Here, one whole is divided into six equal parts. Each part is one-sixth of the whole.

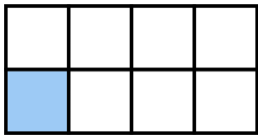
One whole is divided into four equal parts. One part is coloured.

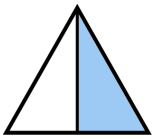
That one part is 1 fourth of the whole, and is written as $\frac{1}{4}$.



One whole is divided into eight equal parts. One part is coloured.

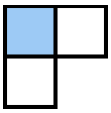
That one part is 1 eighth of the whole, and is written as $\frac{1}{8}$.





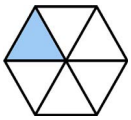
1 half

$\frac{1}{2}$



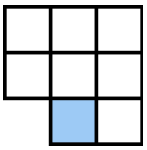
1 third

$\frac{1}{3}$



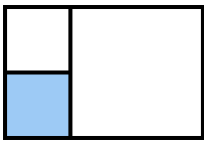
1 sixth

$\frac{1}{6}$



1 eighth

$\frac{1}{8}$

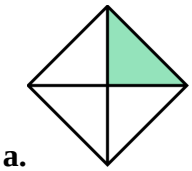


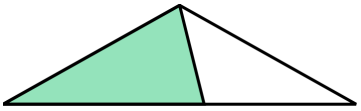
Here, the whole is not divided into equal parts, so we cannot easily tell what fraction this is.

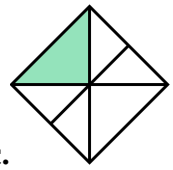
The fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$ and so on are called **unit fractions**.

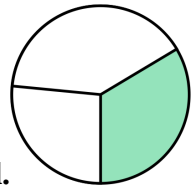
A unit fraction signifies ONE part of a whole, when the whole is divided into *equal* parts.

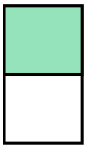
1. In each picture, one part is shaded. **If** the one whole is divided into *equal* parts, write the fraction that is formed, and otherwise not.

a. 

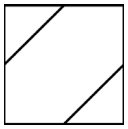
b. 

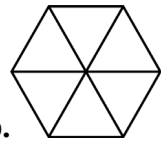
c. 

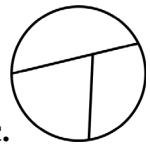
d. 

e. 

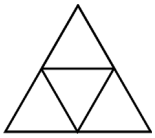
2. Is the one whole divided into equal parts or not? If yes, shade one of the pieces and write the resulting fraction.

a. 

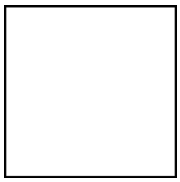
b. 

c. 

d. 

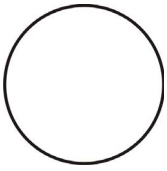
e. 

3. Divide each shape into equal parts. Shade one of the parts. Write the unit fraction.



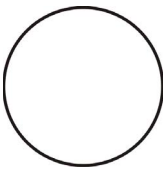
a. four equal parts

b. three equal parts

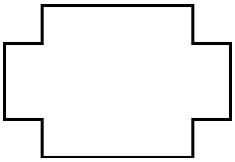


c. eight equal parts

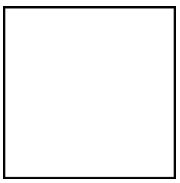
d. six equal parts



e. four equal parts



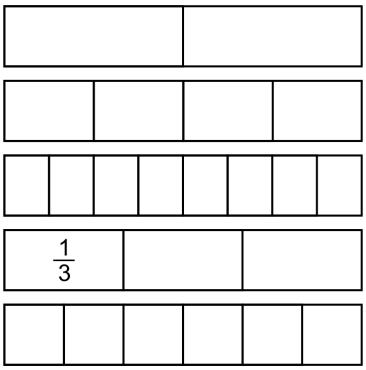
f. two equal parts



g. eight equal parts

h. three equal parts

4. **Activity: fraction strips**



You will need: Five identical strips of paper, approximately 15 cm long and 2.5 cm tall.

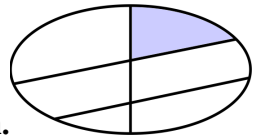
Fold three of the strips of paper so that you will get halves, fourths, and eighths. Fold the other two so that you will get thirds and sixths. See the illustration.

Label the individual unit fractions. In the illustration, one of the thirds is marked. Use pretty colours.

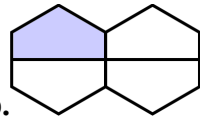
5. Yanga drew a shape, divided it into equal parts, and coloured $\frac{1}{6}$ of it.

Which ones of these shapes below could be the one she drew?

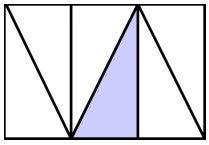
a.



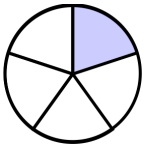
b.



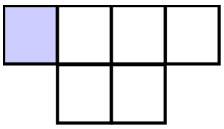
c.



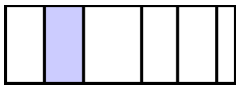
d.



e.

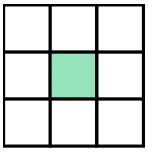


f.



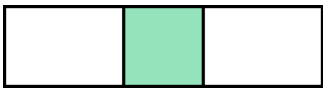
6. Students wrote what fraction of the shape is shaded. Which students made an error? Explain why they are in error.

Student 1:



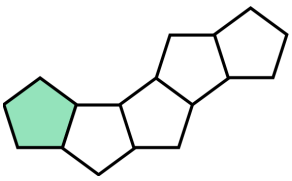
$\frac{1}{8}$

Student 2:



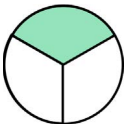
$\frac{1}{3}$

Student 3:



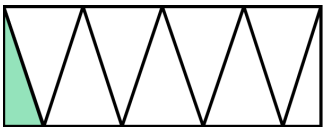
$\frac{1}{5}$

Student 4:



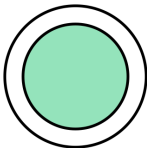
$\frac{1}{2}$

Student 5:



$\frac{1}{9}$

Student 6:

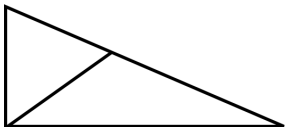


$\frac{1}{2}$

Use questions 7 and 8 for extra practice.

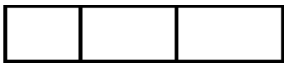
7. IF the shape is divided into equal parts, shade one of the parts. Then write the fraction.

a.

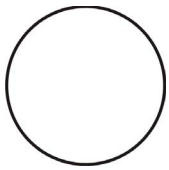


b.

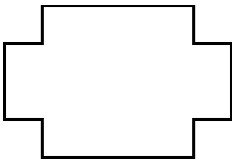
c.



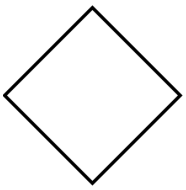
8. Divide each shape into equal parts. Shade one of the parts. Write the unit fraction.



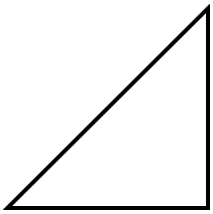
a. six equal parts



b. four equal parts

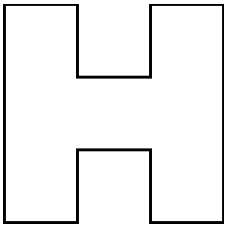


c. eight equal parts

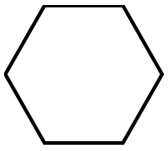


d. two equal parts

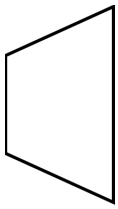
e. eight equal parts



f. four equal parts



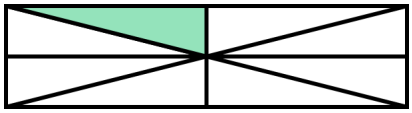
g. six equal parts



h. two equal parts

Puzzle Corner

Is it true that 1/8 of the shape is shaded? Explain.



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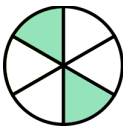
Equivalent Fractions 3

(This lesson is optional.)

1. The pie model on the right shows a certain fraction. Which of the following fractions are equivalent to it? $\frac{2}{3}$ $\frac{3}{6}$ $\frac{6}{2}$ $\frac{2}{4}$ $\frac{1}{3}$



2. Some of these equations are not true. Correct the ones that are false, by changing one number in them.

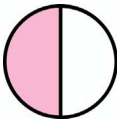
a. $\frac{3}{3} = 3$	**b.** $\frac{3}{1} = 1$	**c.** $\frac{4}{2} = \frac{6}{3}$	**d.** $\frac{4}{10} = \frac{2}{5}$	**e.** $3 = \frac{12}{3}$

3. Draw illustrations to show different fractions that are equivalent to 1/3.

4. Liam says, "These fractions are equivalent." $\frac{2}{4} = \frac{1}{8}$

He says that is so because $2 \times 4 = 8$. Explain to Liam why his thinking is wrong.

5. **a.** Half of the cherry pie is left. Show in the picture how three persons can share it equally.



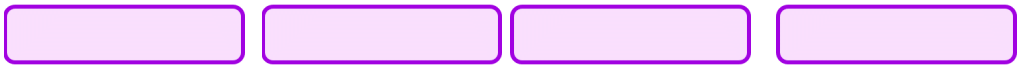
b. Your "cutting" shows certain two fractions to be equivalent. Which ones?

6. Show the equivalent fractions on the number lines.

a. $\frac{2}{4} = \frac{5}{10}$

b. $\frac{2}{3} = \frac{4}{6}$

7. These pictures show four fruit bars. They illustrate that $4 = \frac{4}{1}$.



a. Now "cut" each fruit bar into halves. Now the illustration shows that 4 is equal to another fraction. Which?

b. Now "cut" each fruit bar in a different way, and write 4 as a fraction according to your illustration.

8. Match the equivalent fractions. Not all fractions will be matched.

$\frac{2}{4}$	$\frac{5}{10}$	$\frac{2}{6}$	$\frac{4}{2}$
$\frac{3}{4}$	$\frac{1}{3}$	$\frac{4}{8}$	$\frac{1}{5}$
$\frac{3}{1}$	$\frac{6}{8}$	$\frac{2}{1}$	$\frac{8}{4}$
$\frac{10}{2}$	$\frac{5}{1}$	$\frac{7}{10}$	$\frac{16}{8}$

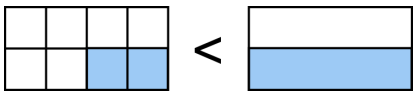
Puzzle Corner

Which whole numbers are these?

a. 60 fourths **b.** 104 eighths **c.** 120 halves **d.** 75 thirds

Comparing Fractions 1

Example 1. In the illustration, each rectangle is one whole. We can see that 2/8 is less than 1/2.

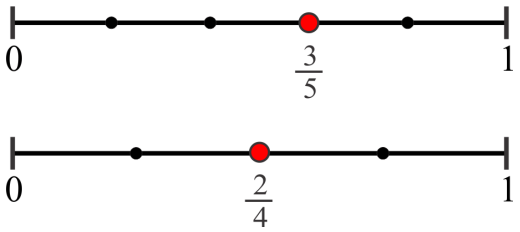


$\frac{2}{8} < \frac{1}{2}$

Example 2. With number lines, the point that is furthest from 0 marks the bigger number. And, fractions are numbers, too.

(Imagine a rectangle drawn from 0 to the given fraction. Which rectangle will be longer?)

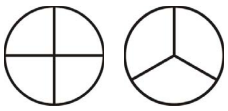
We can see that 3/5 is greater than 2/4.



$\frac{3}{5} > \frac{2}{4}$

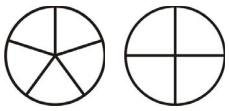
1. Compare and write > or < between the fractions. You can colour pieces to help.

a.



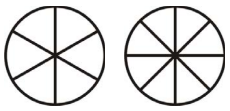
$\frac{1}{4}$ $\frac{1}{3}$

b.



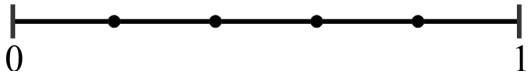
$\frac{4}{5}$ $\frac{3}{4}$

c.

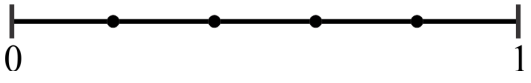


$\frac{5}{6}$ $\frac{6}{8}$

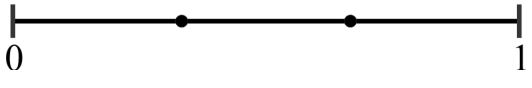
2. Compare and write > or < between the fractions.



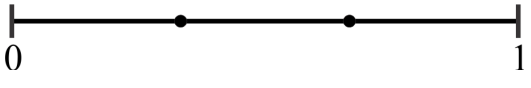
a. $\frac{1}{5} \square \frac{1}{8}$



b. $\frac{2}{5} \square \frac{1}{4}$



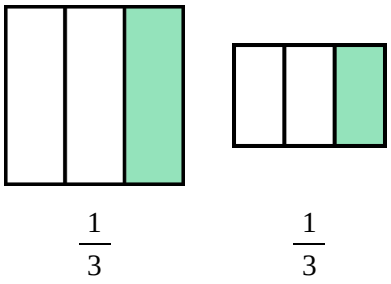
c. $\frac{1}{3} \square \frac{3}{8}$



d. $\frac{2}{3} \square \frac{2}{5}$

Example 3. If these were some kind of food, which coloured part would give you more to eat?

Obviously, the one on the left. Yet they are both 1/3 of the entire shape! Does this mean that 1/3 is greater than 1/3 sometimes?! What is going on?



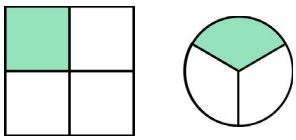
$\frac{1}{3}$ $\frac{1}{3}$

The problem is caused by the fact that the wholes are not the same size. This means we cannot make valid comparisons using fractions. We *can* say that the piece on the left is bigger (in area) than the piece on the right, but we should not do a comparison using fractions.

For a comparison with fractions to be valid, **the fractions have to refer to a whole that is the same size.**

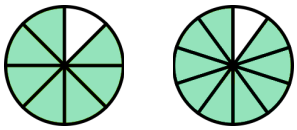
3. Compare the fractions, writing > or < between them, but only if the comparison is valid. If the comparison would not be valid, cross out the entire problem.

a.



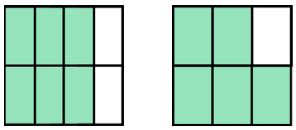
$\frac{1}{4}$ $\frac{1}{3}$

b.



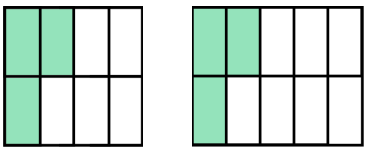
$\frac{\quad}{\quad}$ $\frac{\quad}{\quad}$

c.



$\frac{\quad}{\quad}$ $\frac{\quad}{\quad}$

d.



$\frac{\quad}{\quad}$ $\frac{\quad}{\quad}$

4. Finn says that these fractions are equal, because both 6/6 and 4/4 are equal to 1.

Hazel says that is not true, because one of them has "more to eat", because it's bigger.

What do you think?