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Chapter 4: Multiplication Tables

Chapter 5: Time

Chapter 6: Money

Foreword

Math Mammoth Grade 3, International 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 international 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.

The international version of Math Mammoth has been customised for international audiences in these aspects:

- The currency used in the money chapter (chapter 6) is the Australian dollar. (The download version of the curriculum also includes this chapter for the U.S., British, Canadian, European, South African, 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 point, as in the US version.)
- 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-A, covers addition and subtraction (chapters 1-2), the concept of multiplication (chapter 3), the multiplication tables (chapter 4), time (chapter 5) and money (chapter 6). The rest of the topics are in the 3-B 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) 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-2nd graders might spend 25-40 minutes a day on maths. Third-fourth graders might spend 30-60 minutes a day. Fifth-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 to enjoy 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 as PDF files. You can edit them (such as to change the numbers in them) to provide a different test using PDF apps that have editing capabilities. You can even use the annotation tools (such as text boxes) available in most PDF apps. 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 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 "out of 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 1: Addition and Subtraction
Introduction

This first chapter of *Math Mammoth Grade 3* focuses on mental maths, word problems, and patterns.

The beginning lessons give a revision of basic addition and subtraction facts, plus a revision of some mental maths strategies from second grade, so that even students who perhaps did not study mental maths in earlier grades can now catch up. The rest of the lessons have to do with third grade topics (word problems, patterns).

Students practise writing an equation with an unknown for two-step word problems. This is a challenging topic that will be practised throughout several chapters. In this chapter, the problems include only additions and subtractions. Later in third grade, the problems will also include multiplication and division. Students continue with this topic in fourth grade when they work on multi-step word problems in the same manner, and their work here is foundational to writing equations to solve problems and to model situations with mathematics in all grade levels, including in algebra.

The lessons on the concept of difference and on the connection between addition and subtraction have to do with algebraic thinking, and are also intended to help students with writing equations for the word problems.

Please see the user guide in the beginning of the worktext or at **https://www.mathmammoth.com/userguides/** for more guidance on using and pacing the curriculum.

Keep in mind the free videos that match the curriculum at **https://www.mathmammoth.com/videos/**.

Good Mathematical Practices

- Sometimes an elementary maths problem is better solved with mental maths, and sometimes with paper and pencil calculations. This chapter focuses on mental maths, enabling students to use it as an efficient tool in many future maths problems.
- One focus of this chapter is word problems and writing an equation with an unknown for them. This can be challenging to students, but it is also a wonderful opportunity for them to learn to persevere in solving problems — an essential skill in everyday life. Mention to them that mistakes are not bad because that is when you truly learn. Explain to them that your brain literally grows when you think about and analyse a mistake you made. In the same vein, make sure you as the teacher or parent do not put mistakes down in any manner, but treat them as something valuable.
- The lesson *Patterns* gives students opportunities to look for structure and patterns, which are foundational activities in mathematics.

Pacing Suggestion for Chapter 1

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.

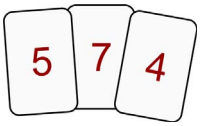
Games and Activities

The Lowest Sum

You need: Number cards with numbers from 2 to 9, preferably at least four copies of each card. A standard deck of cards from which all the aces, face cards, and jokers have been removed is one possibility.

Game play: Shuffle the cards. In each round, deal three cards to each player. Each player will then form one TWO-digit number and one SINGLE-digit number using the three cards, and will calculate the sum of those mentally. The goal is to make this sum to be as small as possible.

For example, let's say you get the cards 5, 7, and 4. You could make these sums: 57 + 4, 45 + 7, 47 + 5 and a few others. But choose the smallest sum!



Each player says their sum aloud. The person with the smallest sum wins all the cards (from all players) used in that round, and puts them into their personal pile.

Continue with the next round by dealing another three cards to each player.

Once you cannot deal three cards to each player, the game is over. The person with MOST cards in their personal pile is the winner.

Variations

1. On each round, each player is allowed to discard ONE of their cards and to draw a new one to replace it, from the deck.
2. Players try to make the largest sum possible, instead of the smallest.
3. Use four cards, and make two 2-digit numbers.
4. Use four cards, and make one 3-digit and one single-digit number.
5. Use five cards, and make one 3-digit and one 2-digit number.
6. Write down each sum of each round, and add those together, to get a final score for each player. The player with the smallest final sum wins.

Addition Facts Revision

9-trick

Nine wants to be 10, so it takes "one" from the other number!

The other number becomes one less.

7 + 9
↓ ↓
6 + 10

= 16

8-trick

Eight wants to be 10, so it takes "two" from the other number!

The other number becomes two less.

5 + 8
↓ ↓
3 + 10

= 13

1. Point to the problems and think of the answer. Practise several times! If you don't have these memorised, use the tricks above.

a.	b.	c.	d.
6 + 9	9 + 4	5 + 8	8 + 4
8 + 9	9 + 6	3 + 8	8 + 7
5 + 9	9 + 2	6 + 8	8 + 9
3 + 9	9 + 9	8 + 8	8 + 5

The doubles

Cover the answers, and practise memorising the answers.

2 + 2 = **4**	6 + 6 = **12**
3 + 3 = **6**	7 + 7 = **14**
4 + 4 = **8**	8 + 8 = **16**
5 + 5 = **10**	9 + 9 = **18**

Doubles plus 1

These facts are just one more than a doubles fact! Can you quickly tell each answer?

Point to the problems, and practise.

2 + 3	6 + 7
3 + 4	7 + 8
4 + 5	8 + 9
5 + 6	9 + 10

You can use addition facts to solve other addition problems. **Compare:**

5 + 6 = 11 35 + 6 = 41	8 + 5 = 13 78 + 5 = 83
5 + 6 is one more than 10, so 35 + 6 is one more than the *next* ten (40).	8 + 5 is three more than 10, so 78 + 5 is three more than the *next* ten (80).

2. Add.

a.	**b.**	**c.**
8 + 7 = _____	9 + 9 = _____	4 + 8 = _____
18 + 7 = _____	29 + 9 = _____	34 + 8 = _____
58 + 7 = _____	69 + 9 = _____	64 + 8 = _____

3. Add. Think of the easier problem (with single digits) in your mind.

a. 26 + 7 = _____	**b.** 74 + 9 = _____	**c.** 68 + 8 = _____
d. 58 + 5 = _____	**e.** 24 + 8 = _____	**f.** 49 + 7 = _____

4. Draw a line to connect each problem to its answer.

29 + _____ = 36		86 + _____ = 96
66 + _____ = 76	**7**	46 + _____ = 56
48 + _____ = 56	**10**	57 + _____ = 66
50 + _____ = 56	**9**	38 + _____ = 46
87 + _____ = 96	**6**	89 + _____ = 96
70 + _____ = 76	**8**	39 + _____ = 46
68 + _____ = 76		77 + _____ = 86

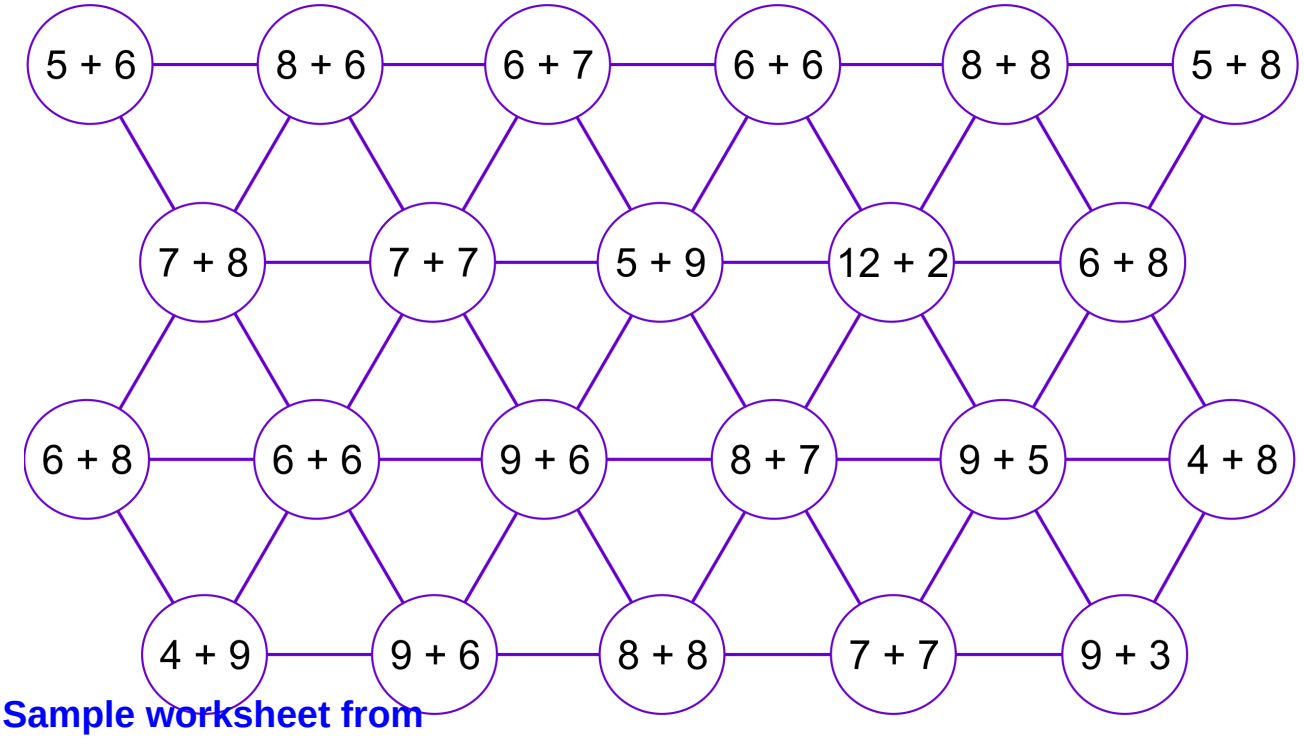
5. Add the same number each time (repeatedly).

a. Add 20.	**b.** Add 40.	**c.** Add 15.	**d.** Add 25.
20	*40*	*15*	*25*
40	*80*	*30*	*50*

6. Play the **Lowest Sum** game. (See the chapter introduction.)

7. Play the **11-Out Go Fish** game. (See the chapter introduction.) Play it also as 12-Out Go Fish and 13-Out Go Fish.

8. Island hopping puzzle! Find a path from the top to the bottom that connects islands with the same answer. *This puzzle is adapted from* ***https://www.earlyfamilymath.org*** *and published here with permission.*



Mental Addition

Break numbers into parts to make adding easier:

30 + 28
/ \
30 + 20 + 8 = _____

12 + 60
/ \
2 + 10 + 60 = _____

1. Break one of the numbers into its tens and ones. Then add using mental maths.

a. 50 + 14 = *50 + 10 + 4* = *64*	**b.** 80 + 11	**c.** 50 + 39
d. 35 + 60	**e.** 10 + 5 + 21	**f.** 29 + 40 + 30

2. Add the tens and the ones separately. Look at the example.

a. 36 + 22 = **30 + 20** + **6 + 2** =	**b.** 72 + 18 = **70 + 10** + **2 + 8** =	**c.** 54 + 37
d. 24 + 55	**e.** 36 + 36	**f.** 42 + 68

3. Play the **5-Card Draw to the Target** game. (See the chapter introduction.)

4. Find the easiest order to add! You can break numbers into parts and add part-by-part.

a. 20 + 40 + 2 + 7
= _____

b. 30 + 50 + 8 + 2
= _____

c. 40 + 60 + 4 + 3
= _____

d. 10 + 12 + 7 + 3
= _____

e. 52 + 4 + 30 + 3
= _____

f. 78 + 10 + 2 + 20
= _____

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A Letter for the Unknown 1

Example 1. Debbie spent $10 on a gift. Now she has $22 left. How much money did she have at first?

We will use **a letter to signify the unknown number**, or what the problem asks for.

Let M be Debbie's money at first. Then:

$$M - \$10 = \$22$$

Solution: M = $32. She had $32 at first.

Example 2. A wooden chair costs $59 and a metal one $28. How much *more* does the first one cost?

Let x be what the question is asking: the *difference* between the prices. A difference can be found by subtracting:

$$x = \$59 - \$28$$

Solution: x = $31. It costs $31 more.

These number sentences are **equations**, because they contain an **equals sign**, and something on both sides of it.

1. Match the correct equation(s) with each problem. Find also the value of the unknown.

a. Emily is 129 cm tall and Anna is 7 cm taller than her. How tall is Anna? (A signifies Anna's height.)

A = _____

$129 + 7 = A$ $\quad$ $129 + A = 7$

$7 + A = 129$ $\quad$ $129 - A = 7$

b. Jack is 132 cm tall now. He has grown 5 cm in three months. How tall was he three months ago? (J signifies Jack's height.)

J = _____

$132 + 5 = J$ $\quad$ $J + 5 = 132$

$132 - 5 = J$ $\quad$ $J - 5 = 132$

2. For each problem, write an **equation with x**. Find also the value of x.

a. Ann needs 56 pins for a sewing project. She only has 41. How many more does she need?

_____

x = _____

b. You are on page 62 of a book that has 96 pages. How many pages are left to read?

_____

x = _____

Example 3. A package of 100 buttons has 40 white, 25 blue, and some red buttons. How many are red?

Let's use R for our unknown, for the number of Red buttons.

We can write **an addition equation:** $25 + 40 + R = 100$.

We could also write a subtraction equation: $100 - 40 - 25 = R$. Both are correct.

Find the value of R. R = _____

3. Write an equation for each problem. Use a letter of your choosing for the unknown.

a. A bag of candy has 50 candies. Of them, 13 are strawberry, 18 lemon, and the rest are cherry. How many are cherry?

_____

_____ = _____

b. May found 14 socks in one drawer, 21 in another and five under her bed. How many socks did she find in total?

_____

_____ = _____

c. Mum bought some bushes and planted eight of them. Now she has 17 left. How many bushes did she buy?

_____

_____ = _____

d. Amy has 61 crayons. Of them, 17 are broken and the rest are not. How many are in good shape?

_____

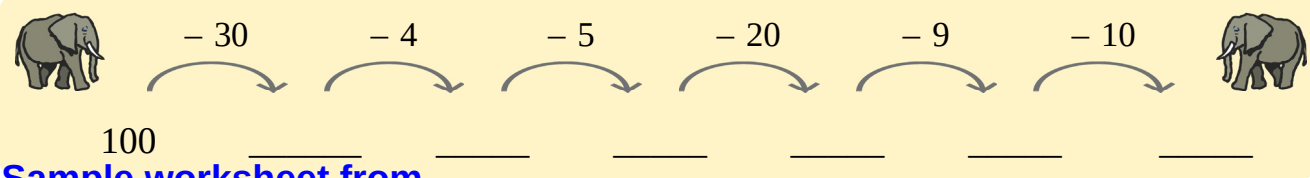
_____ = _____

e. Emma has $27 in her purse and $4 in her piggy bank. She wants to buy shoes for $45. How much more money does she need?

_____

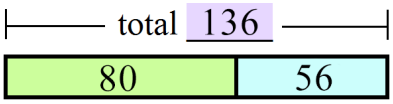
_____ = _____

4. A mental maths workout!



The Connection with Addition and Subtraction

In this bar model or diagram, two parts make a total:



You can think of this as a board 136 cm long that will be cut into two parts.

From this model, we can write two addition *and* two subtraction equations. We get **a fact family**!

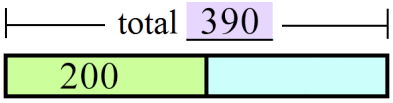
80 + 56 = 136

56 + 80 = 136

136 – 80 = 56

136 – 56 = 80

1. Write two addition and two subtraction equations to match each model. Also, fill in the parts in the model.

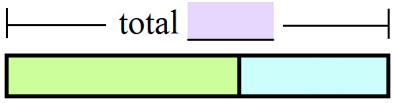


a. _____ + _____ = _____

_____ + _____ = _____

_____ – _____ = _____

_____ – _____ = _____



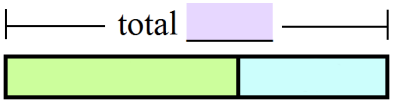
b. 199 + _____ = 400

_____ + _____ = _____

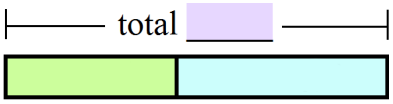
_____ – _____ = _____

_____ – _____ = _____

2. Find the missing number and write the parts into the bar model.



a. 95 – _____ = 28



b. 99 – 56 = _____

3. Draw a bar model to match the equation, and fill in the missing parts.

a. 965 – 400 = _____

b. 701 + _____ = 830

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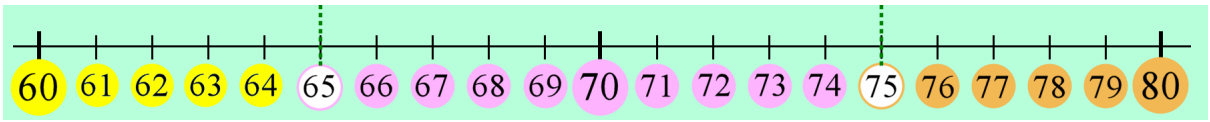
Rounding to the Nearest Ten, Part 1



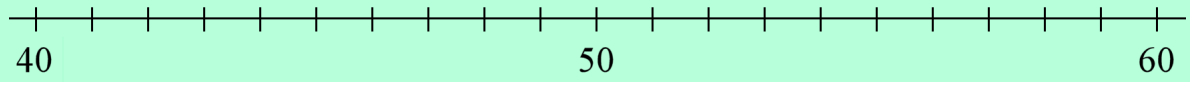
Find these multiples of ten (whole tens) on the number line: 60, 70, and 80.

Which one of those is 62 closest to? _____ And 66? _____ How about 77? _____

Rounding a number means finding another, easy number that the number is close to. *Rounding a number to the nearest ten* means finding which multiple of ten (whole ten) the number is closest to.

We use **the symbol** ≈ to indicate rounding. Read it as "is approximately" or "is about". So, 61 ≈ 60 can be read as "61 is approximately 60" or "61 is about 60".

1. Write on the empty line which multiple of ten (whole ten) each number is closest to.



a. 52 ≈ _____ **b.** 57 ≈ _____ **c.** 43 ≈ _____ **d.** 46 ≈ _____

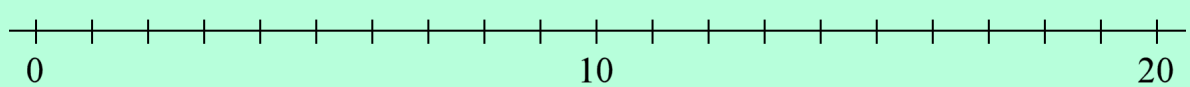
2. Round the numbers to the nearest ten.

a. 32 ≈ _____	**b.** 47 ≈ _____	**c.** 59 ≈ _____	**d.** 88 ≈ _____
e. 11 ≈ _____	**f.** 26 ≈ _____	**g.** 74 ≈ _____	**h.** 93 ≈ _____

Not only 10, 20, 30, and 40, but even *zero* is a multiple of ten.

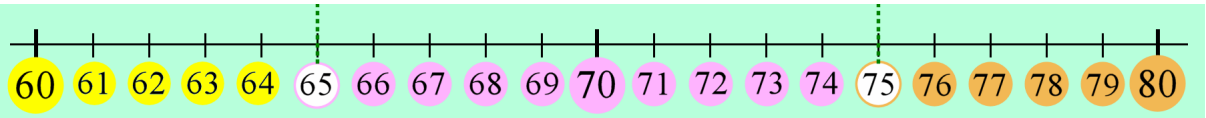
Some numbers do get rounded to zero. Think about it: two is closer to zero than it is to 10! So, rounded to the nearest ten, 2 ≈ 0.

3. Round the numbers to the nearest ten.



a. 7 ≈ _____ **b.** 3 ≈ _____ **c.** 14 ≈ _____ **d.** 19 ≈ _____ **e.** 1 ≈ _____

The middle "5"



The "middle 5" is actually as far from the previous ten as it is from the next ten, but mathematicians have decided to *round it up*. This means we round any two-digit number ending in 5 towards the "upper" or next greater multiple of ten. So, 65 ≈ 70 and 5 ≈ 10.

And, *rounding down* means that you round a number towards the "lower" or previous, lesser multiple of ten. For example, 71 is rounded down to 70.

4. Round these numbers to the nearest ten.

a. 35 ≈ _____	**b.** 65 ≈ _____	**c.** 95 ≈ _____	**d.** 82 ≈ _____
e. 5 ≈ _____	**f.** 66 ≈ _____	**g.** 75 ≈ _____	**h.** 38 ≈ _____

5. Play the **Rounding Three-in-a-Row** game. (Optional; see the chapter introduction.)

So what good does it do to round? Any time that you don't need to know the exact answer, you can use rounded numbers to do calculations. We call this *estimation*.

Example 1. A cell phone costs $78 and another costs $51. So, the one costs *about* $80 and the other costs *about* $50. The one is *about* $30 more expensive than the other.

6. Find *about* how much the two things cost together. Use rounded numbers!

a.	**b.**	**c.**
a skirt, $28, and pants, $33	a bicycle, $56, and light, $12	a puzzle, $17, and book, $9
together about $ _____	together about $ _____	together about $ _____

7. A farmer has 49 sacks of apples and his neighbour has 18 sacks of apples. *About* how many sacks do they have together?

8. About how much would a $23 DVD and two $28 DVDs cost together?

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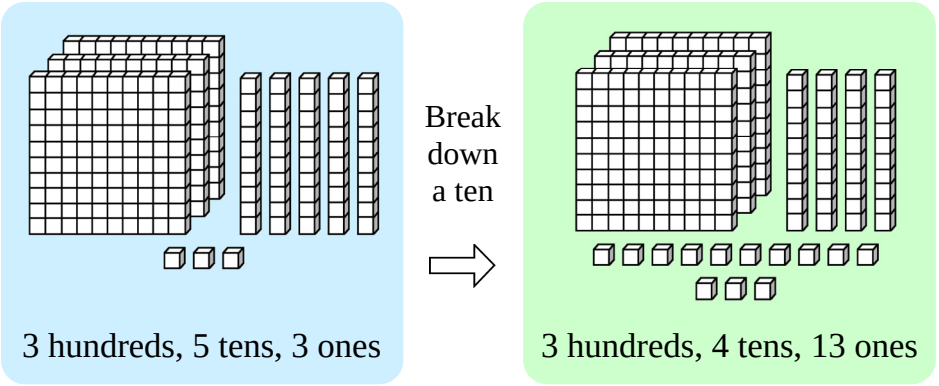
Revision: Regrouping in Subtraction



Cross out (subtract) 216 from the picture on the *right*.

What is left? ____ hundreds ____ tens ____ ones

How does regrouping one ten as 10 ones work?

- We take (borrow) one ten from the 5 tens. Now there will be only 4 tens, so to show this, we **cross out the "5"** in the tens column and **write 4 above it**.
- This new ten is grouped with the ones. There were 3 ones, but with the 10 new ones there will be 13. To show this, we **cross out the "3"** in the ones column and **write 13 above it**.
- Then we subtract separately in each column.

In columns:

		4	13
	3	~~5~~	~~3~~
−	2	1	6

Lastly, it is time to **check the answer by adding**.

Add the result (the sum) and the number you subtracted. You should get the number you subtracted from.

		1	
	1	3	7
+	2	1	6
	3	5	3

1. Break one of the tens into 10 ones, and join those with the ones. In other words, regroup. Use manipulatives if you need to.

a. 4 tens 6 ones → 3 tens _____ ones	**b.** 8 tens 2 ones → _____ tens _____ ones
c. 7 tens 4 ones → _____ tens _____ ones	**d.** 6 tens 1 one → _____ tens _____ ones

2. Subtract. You will need to regroup. *Check* the result of each subtraction by adding.

a.

$$\begin{array}{r} 92 \\ -\,56 \\ \hline \end{array}$$

Check:

$$+\,56$$

b.

$$\begin{array}{r} 55 \\ -\,38 \\ \hline \end{array}$$

Check:

$$+\,38$$

c.

$$\begin{array}{r} 354 \\ -\,217 \\ \hline \end{array}$$

Check:

$$+\,217$$

d.

$$\begin{array}{r} 762 \\ -\,156 \\ \hline \end{array}$$

Check:

$$+$$

e.

$$\begin{array}{r} 580 \\ -\,341 \\ \hline \end{array}$$

Check:

$$+$$

3. Solve. Notice that some of these can be solved with mental maths.

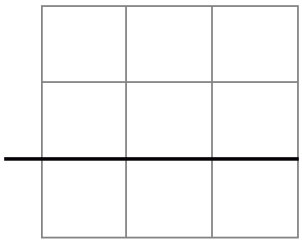
a. Mark wants to buy a laptop that costs $495. He has saved $327. Then his grandpa gave him $50 for his birthday. Now how much more does Mark still need to save in order to buy the laptop?

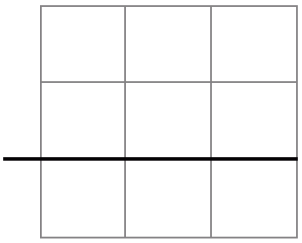
Equation(s): _____

Solution:

Mark still needs to

save $_____.





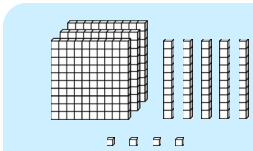
b. One hundred eighty-five people were called to a meeting. Eight couldn't come and seven others didn't show up. How many *did* come for the meeting?

Equation(s): _____

c. Mr. Jackson loaded two 50-kg sacks of potatoes, two 35-kg sacks of carrots, and a crate of tomatoes weighing 25 kg onto his pickup truck. What is the total weight of the vegetables?

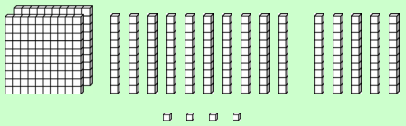
Equation(s): _____

Regrouping one hundred as 10 tens



354

break down a 100 →



200 + 15 tens + 4

Take away 100, 80, and 2. What is left? _____

$$\begin{array}{r} {\scriptstyle 2\ \ 15} \\ 3\ \cancel{5}\ 4 \\ -\ 1\ 8\ 2 \\ \hline 1\ 7\ 2 \end{array}$$

COMPARE the picture and the subtraction in columns. We break down one hundred as 10 tens. Those 10 tens are grouped with the existing tens, to get 15 tens.

4. Subtract. You will need to regroup. Find the answers in the number queue below.

a. $\begin{array}{r} 4\ 4\ 6 \\ -\ 1\ 7\ 4 \\ \hline \end{array}$	**b.** $\begin{array}{r} 7\ 3\ 9 \\ -\ 2\ 7\ 4 \\ \hline \end{array}$	**c.** $\begin{array}{r} 9\ 6\ 3 \\ -\ 3\ 8\ 2 \\ \hline \end{array}$	**d.** $\begin{array}{r} 8\ 2\ 5 \\ -\ 7\ 6\ 4 \\ \hline \end{array}$

The number queue: 9 1 6 5 8 1 8 3 8 6 7 7 6 1 8 8 1 2 7 2 6 9 5 8 8 3 6 8 6 6 7 5 4 6 5 3 6 6

5. Find the error Ethan made in this subtraction.

$$\begin{array}{r} {\scriptstyle 5\ 10} \\ 8\ \cancel{6}\ \cancel{1} \\ -\ 4\ 2\ 1 \\ \hline 4\ 3\ 9 \end{array}$$

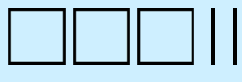
6. Subtract. Check your work by adding.

a. $\begin{array}{r} 5\ 2\ 9 \\ -\ 3\ 5\ 7 \\ \hline \end{array}$ Check: $+$ _____	**b.** $\begin{array}{r} 8\ 5\ 5 \\ -\ 3\ 9\ 4 \\ \hline \end{array}$ Check: $+$ _____
c. $\begin{array}{r} 6\ 0\ 6 \\ -\ 2\ 2\ 6 \\ \hline \end{array}$ Check: $+$ _____	**d.** $\begin{array}{r} 6\ 3\ 7 \\ -\ 5\ 4\ 1 \\ \hline \end{array}$ Check: $+$ _____

Regrouping Twice in Subtraction

Example 1. Subtract 325 – 169.

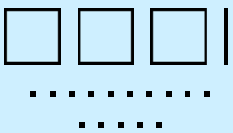
We are to subtract 169. There are not enough ones to subtract 9. So, we break one ten into 10 ones.



300 + 20 + 5

→

Now we have 1 ten and 15 ones. We could subtract the ones (15 – 9), but we cannot subtract six tens!

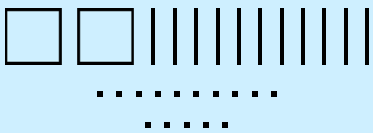


300 + 10 + 15

→

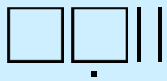
So, break a hundred into 10 tens. Now we can subtract or cross out 169.

What is left? _____



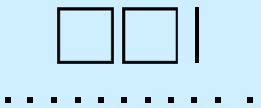
200 + 11 tens + 15

1. Fill in. Draw pictures to illustrate the process. You can use manipulatives instead. You will need to regroup twice.



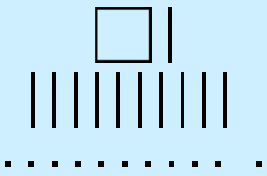
a. 200 + 20 + 1

→ break a 10



200 + _____ + ____

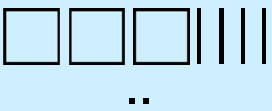
→ break a 100



100 + ____tens + ____

Now cross out 97.

What is left? _____



b. 300 + 40 + 2

→ break a 10

300 + _____ + ____

→ break a 100

200 + ____tens + ____

Now cross out 175.

What is left? _____

Sample worksheet from https://www.mathmammoth.com

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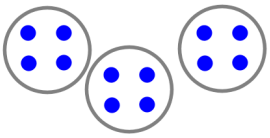
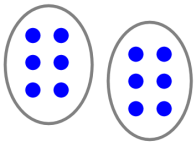
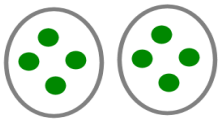
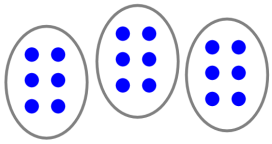
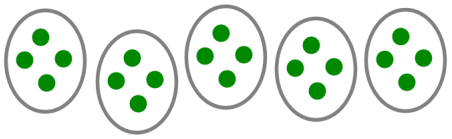
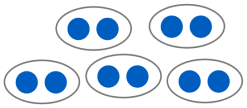
Many Times the Same Group

 3 × 4 "three times four" 3 groups of 4	 2 × 6 2 times a group of 6 We *multiply* 2 times 6.

The symbol **×** is read as "times" and indicates **multiplication**. For example, 3 × 5 is read as "three times five", and it means you have three groups of five.

1. How many groups? What size groups? Write the multiplication.

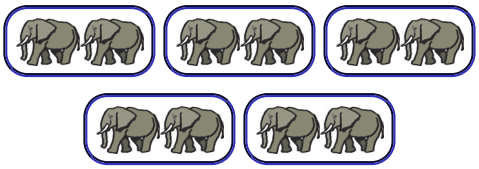
 **a.** *2* × *4* how many groups / how many in each group	 **b.** ____ × ____ how many groups / how many in each group	 **c.** ____ × ____ how many groups / how many in each group
 **d.** _____ × _____	 **e.** _____ × _____	 **f.** *1* × _____

2. Now it is your turn to draw! Remember, the first number tells you how many groups.

a. 2 × 7	**b.** 4 × 2	**c.** 4 × 3
d. 6 × 1	**e.** 1 × 8	**f.** 2 × 2

Now we have **five** groups of **two** elephants each. In total, there are **10 elephants**.

how many groups		how many in each group		how many in total
5	×	2	=	10

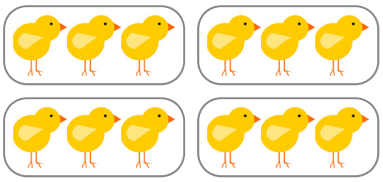


We can solve multiplications by adding repeatedly.

To solve, 5 × 2, we can add 2, five times: 5 × 2 = 2 + 2 + 2 + 2 + 2 = 10

3. Fill in the missing parts.

a.

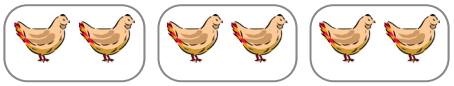


_____ + _____ + _____ + _____

____ groups of ____ chicks in each.

____ × ____ chicks = ____ chicks

b.



_____ + _____ + _____

____ groups of ____ hens in each.

____ × ____ hens = ____ hens

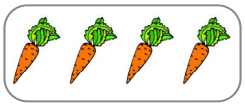
c.

_____ + _____ + _____

____ groups of ***1*** dog in each.

____ × ____ dog = ____ dogs

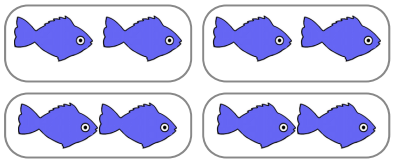
d.



1 group of ____ carrots in it.

____ × ____ carrots = ____ carrots

e.



_____ + _____ + _____ + _____

_____ × _____ = _____

f.

_____ + _____ + _____

_____ × _____ = _____

4. Now it is your turn to draw. Draw circles or sticks. Write the multiplication sentence.

a. Draw 3 groups of seven sticks. _____ × _____ = _____	**b.** Draw 2 groups of eight circles. _____ × _____ = _____
c. Draw 4 groups of one circle. _____ × _____ = _____	**d.** Draw 5 groups of two sticks. _____ × _____ = _____

5. Draw groups to solve the multiplications.

a. 5 × 4 = _____	**b.** 4 × 6 = _____

6. These questions have to do with equal-size groups. Write a multiplication for each. Drawing can help.

a. How many legs do five cows have? _____ × _____ = _____	**b.** How many wheels do six bicycles have? _____ × _____ = _____
c. How many legs do eight chickens have? _____ × _____ = _____	**d.** One bunch of grapes has 11 grapes. How many grapes are in three such bunches? _____ × _____ = _____

Multiplication as an Array

An **array** is an orderly arrangement of things in rows and columns.
When things are neatly aligned in an array, we can think of the *rows as groups*.

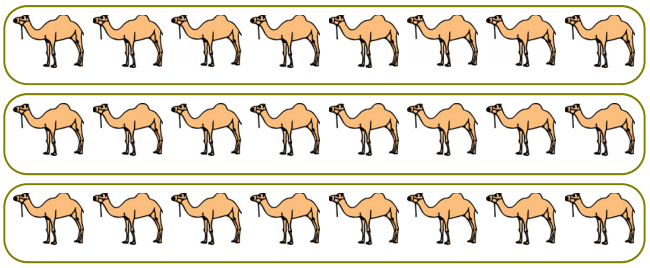
Since each group has the same amount of things, we can write a multiplication.

3 rows, 8 camels in each row.

$8 + 8 + 8$

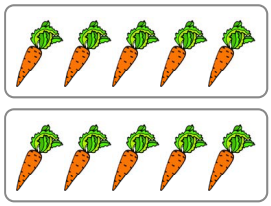
$3 \times 8 = 24$

That's a lot of camels!



1. Do the **Multiplication Arrays** activity. (Optional; see the chapter introduction.)

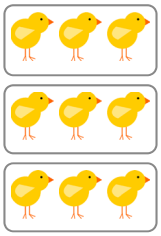
2. Fill in the missing numbers.



a. _____ rows, _____ carrots in each row.

_____ + _____

_____ × _____ = _____ carrots



b. _____ rows, _____ chicks in each row.

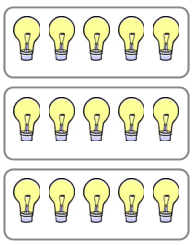
_____ + _____ + _____

_____ ×_____ = _____ chicks

c. _____ rows, _____ bear in each row.

_____ + _____ + _____

_____ × _____ = _____ bears



d. _____ rows, _____ bulbs in each row.

_____ + _____+ _____

_____ × _____ = _____ bulbs

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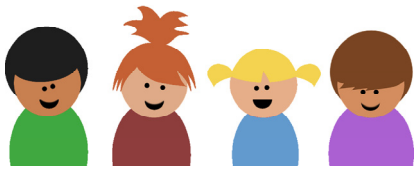
Order of Operations 2

Each child in this group has one rubber and three pencils. How many rubbers and pencils do the children have in total?



(Draw the rubbers and the pencils for each child, to help you.)

We can use multiplication, but first we need to add.
Each child has 1 + 3 = 4 objects.

Altogether, the children have 4 × 4 = 16 rubbers and pencils.

If we write a single number sentence for this, we will use **brackets** to indicate that the addition is done first:

$$\textit{total number of objects} = 4 \times (1 + 3)$$

First, we calculate 1 + 3 because it is inside the brackets. Then we calculate 4 × 4.

Brackets change the order of a calculation. Do what is inside the brackets **first**.

1. Write a single number sentence for each situation, using brackets, and solve.
You can draw pictures to help you.

a. There are three picnic baskets. Each basket has six big plates and three small plates.

Total number of plates = _____

b. Susan made 10 snack bags for her friends. Each bag had two bananas and three pears.

Total number of pieces of fruit = _____

c. Mrs. Henderson planted flowers in four rows. Each row has 5 petunias and 8 daffodils.

Total number of flowers = _____

2. The store gives you a $2 discount on T-shirts that normally cost $12 each.
(The discount means that $2 is taken away from the normal price.)

a. Fill in the blanks. The cost for four shirts is _____ × (12 – ____) = _____ .

. **b.** Write a single number sentence for this situation.
You buy three bags of flour that normally cost $10 but are now discounted by $2.

Order of Operations

1) First, we calculate what is inside the **BRACKETS** ( ).

2) Then, we **MULTIPLY** before adding or subtracting.

3) Lastly, we **ADD** and **SUBTRACT** from left to right.

3. Subtract and add. You can circle the operation to be done first in a "bubble"

a. 20 + 6 – 3 =	**c.** 20 – 6 + 3 =	**e.** 80 – 30 – (30 + 20) =
b. 20 + (6 – 3) =	**d.** 20 – (6 + 3) =	**f.** 80 – (30 – 30) + 20 =

4. Calculate. You can circle the operation to be done first.

a. 3 + 5 × 2 =	**b.** 5 × (3 + 1) =	**c.** 4 × (4 – 2) =
d. 3 × 6 – 11 =	**e.** 25 – 5 × 2 =	**f.** (3 – 2) × 6 =

5. Solve. Write an equation for each problem, and use a letter for the unknown.
Do not write just the answer.

a. Ten people are going to eat dinner. One of them is little Hannah. There are two plates for everybody, except Hannah only has one plate. How many plates are on the table?

_____

Solution: _____ There are _____ plates on the table.

b. Ava's picture has four bird nests. In each nest, she drew two baby birds and three eggs. If we count the eggs as unborn babies, how many babies are there in total?

_____

Solution: _____ There are_____ babies in total.

6. Solve. Write an equation for each problem, and use a letter for the unknown.
Do not write just the answer.

a. In a small restaurant, there are five tables for two people and four tables for four people. How many people can be seated in total?

_____

Solution: _____ _____ people can be seated in total.

b. There are five people in the Smith family. Each person keeps a hand towel and a bath towel in the bathroom. How many towels are there hanging in their bathroom?

_____

Solution: _____ There are _____ towels.

7. Use these for more practice. Solve.

a. $0 \times 7 + 2 =$	**b.** $(10 - 5) \times 4 =$	**c.** $5 \times (1 + 9) =$
d. $100 - 5 \times 7 =$	**e.** $8 + 4 \times 3 =$	**f.** $(3 + 2) \times 5 =$

8. Play the **Three in a Row** game. (Optional; see the chapter introduction.)

9. Challenge (optional). Each exercise has *three* operations.

a. $(4 + 2 - 1) \times 2 =$	**b.** $3 \times 5 + 2 \times 4 =$	**c.** $2 \times (4 + 3) + 8 =$
d. $50 - (7 - 2) \times 4 =$	**e.** $3 \times 4 - 2 \times 3 =$	**f.** $6 + 7 \times (4 - 2) =$

Puzzle Corner Which operations will make the equations true?

16 ☐ 1 ☐ 1 = 15 10 ☐ 5 ☐ 2 = 20 3 ☐ 4 ☐ 5 ☐ 6 = 29

35 ☐ 5 ☐ 4 = 15 5 ☐ 7 ☐ 6 = 41 9 ☐ 3 ☐ 5 ☐ 2 = 17

You can make a game out of this. Make problems beforehand and use any board game with dice, the rule being that you can roll the dice only after you first answer the question right.

Mixed Revision Chapter 3

1. Choose the equation that matches the problem. Then solve.

(A Letter for the Unknown/Ch1)

Lucas weighs 64 kg, and Davy is 9 kg lighter than him. How much does Davy weigh?

$64 + 9 = D$ $\quad$ $64 + D = 9$

$9 + D = 64$ $\quad$ $64 - D = 9$

Davy weighs _____ kg.

2. Add using mental maths. (Various addition lessons/Ch1)

a. $93 + 6 =$ _____ $893 + 6 =$ _____	**b.** $47 + 29 =$ _____ $607 + 9 =$ _____	**c.** $15 + 18 =$ _____ $624 + 8 =$ _____

3. Subtract in parts. (Mental Subtraction with Three-Digit Numbers/Ch1)

a. $161 - 6 =$ _____ (161 – 1 – 5)	**b.** $332 - 5 =$ _____	**c.** $773 - 8 =$ _____

4. Add. Check your work by adding in a different order. (How to Check Addition Problems/Ch2)

a. 159 234 275 91 + 42	**b.** 226 94 288 125 + 205	**c.** 127 395 254 69 + 103	**d.** 41 248 189 55 + 124

5. Calculate. (Order of Operations/Ch2)

a. $19 - (6 + 2) + 5 =$ _____ $19 - 6 + 2 + 5 =$ _____	**b.** $(800 - 60) - (50 - 40) =$ _____ $800 - 60 - 50 - 40 =$ _____

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Multiplication Table of 5

1. Skip-count by fives. Practise this pattern until you can say it from memory. Also practise it backwards (up-down). You may practise one-half of it at first, and the other half later.

0, 5, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, 60

2. Fill in the missing numbers. Then cover what you wrote, and choose problems in random order and practise. You may first practise only the first half of the table (from 1 × 5 till 6 × 5, and the rest at a later time, such as the next day.

a.

1 × 5 = ____	7 × 5 = ____
2 × 5 = ____	8 × 5 = ____
3 × 5 = ____	9 × 5 = ____
4 × 5 = ____	10 × 5 = ____
5 × 5 = ____	11 × 5 = ____
6 × 5 = ____	12 × 5 = ____

b.

____ × 5 = 5	____ × 5 = 35
____ × 5 = 10	____ × 5 = 40
____ × 5 = 15	____ × 5 = 45
____ × 5 = 20	____ × 5 = 50
____ × 5 = 25	____ × 5 = 55
____ × 5 = 30	____ × 5 = 60

c. What same multiplication fact is both...

...in the table of five and the table of two?

...in the table of five and the table of four?

...in the table of five and the table of ten?

3. Don't write the answers down. Use these problems for random drill practice.

6 × 5	7 × 5	5 × 3	5 × 7	5 × 10
9 × 5	12 × 5	5 × 11	5 × 4	3 × 5
4 × 5	8 × 5	5 × 9	5 × 6	5 × 5

4. Don't write the answers down. Use these problems for random drill practice.

☐ × 5 = 35	☐ × 5 = 20	☐ × 5 = 55	☐ × 5 = 40	☐ × 5 = 55
☐ × 5 = 5	☐ × 5 = 45	☐ × 5 = 25	☐ × 5 = 50	☐ × 5 = 30
☐ × 5 = 60	☐ × 5 = 10	☐ × 5 = 35	☐ × 5 = 60	☐ × 5 = 15

5. **a.** Skip-count by 5 and by 10.

0, 5, 10, 15, _____, _____, _____, _____, _____, _____, _____, 55 , 60

0, 10, 20, 30, _____, _____, 60 , 70 , _____, _____, _____, _____, _____

b. Compare the lists. What do you notice?

c. Write these numbers from the table of 10 as something times 5 and as something times 10.

20	30	40	50	60
____ × 10	____ × 10	____ × 10	____ × 10	____ × 10
____ × 5	____ × 5	____ × 5	____ × 5	____ × 5

What do you notice about the numbers you filled in?

d. Now, extend the pattern you noticed above, to these also:

80	90	120	150	180
____ × 10	____ × 10	____ × 10	____ × 10	____ × 10
____ × 5	____ × 5	____ × 5	____ × 5	____ × 5

e. You have noticed a pattern between the tables of 10 and 5. How could you use that to solve for example 14 × 5 or 28 × 5?

6. Compare and solve.

a. 26 × 10 = _____ 26 × 5 = _____	**b.** 36 × 10 = _____ 36 × 5 = _____	**c.** 84 × 10 = _____ 84 × 5 = _____

7. Fill in the parts of the multiplication chart that we have studied.

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0													
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

Puzzle Corner What numbers can go into the puzzles?

	×		=	20
×		×		
	×		=	20

= 10 = 40

	×		=	12
×		×		
	×		=	12

= 6 = 24

More Practice and Revision

1. Revise the tables of two, four, and five. Then check yourself with these problems.

a. 9 × 2 = _____ 7 × 4 = _____	**b.** 5 × 2 = _____ 3 × 4 = _____	**c.** 7 × 2 = _____ 8 × 5 = _____	**d.** 6 × 5 = _____ 12 × 4 = _____
e. 6 × 4 = _____ 11 × 2 = _____	**f.** 12 × 2 = _____ 5 × 6 = _____	**g.** 6 × 2 = _____ 4 × 11 = _____	**h.** 5 × 5 = _____ 1 × 4 = _____
i. 4 × 4 = _____ 5 × 11 = _____	**j.** 12 × 5 = _____ 9 × 4 = _____	**k.** 2 × 1 = _____ 5 × 9 = _____	**l.** 8 × 4 = _____ 7 × 5 = _____

2. Solve. Write an equation for each problem. You can draw pictures to help.

a. Mum bought two cartons of eggs. Each carton had a dozen eggs. Now she has used four eggs. How many eggs are left?

There are _____ eggs left.

b. Eleven shops in a shopping mall have three workers each, and two shops have nine workers each. How many workers are there all totalled?

There are _____ workers in total.

c. Anna arranged all her stuffed animals in groups of four. She had 20 animals. How many groups did she get?

_____ × _____ = _____

She got _____ groups.

d. Marie packed dolphin figurines in five boxes, four figurines in each box. Then she also packed three figurines in one box. How many dolphin figurines did she pack?

She packed _____ figurines.

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Revision Chapter 4

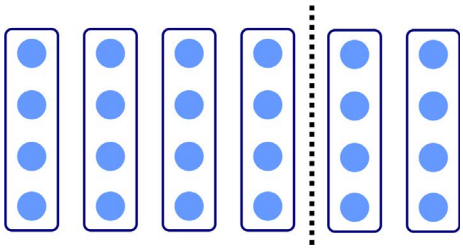
1. Fill in the multiplication chart — for the last time.

×	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

2. Multiply.

a. $4 \times 2 \times 2 =$ _____ **b.** $9 \times 2 \times 5 =$ _____ **c.** $3 \times 4 \times 7 =$ _____

3. What mathematical principle does the image illustrate?



4. What single multiplication is equal to $3 \times 7 + 2 \times 7$?

5. Fill in the missing numbers.

a. ____ × 4 = 28

36 = 4 × ____

____ × 12 = 84

b. 108 = 12 × ____

32 = ____ × 8

8 × ____ = 72

c. 36 = ____ × 3

____ × 3 = 21

____ × 12 = 60

6. Compare, writing < , > , or = in the box between the multiplications.

a. 9 × 8 ☐ 10 × 8 **b.** 9 × 5 ☐ 11 × 4 **c.** 9 × 8 ☐ 9 × 6

d. 9 × 8 ☐ 9 × 4 **e.** 4 × 4 ☐ 2 × 8 **f.** 10 × 11 ☐ 10 × 7

7. If you need to find 17 × 8, how can you use the fact that 17 × 4 = 68 to help you?

8. Solve. Write down the calculation(s) you do.

a. A teacher puts 20 students in groups so that each group has 4 students. How many groups will there be?

_____

_____

There will be _____ groups.

b. Josefina bought four books of stickers that cost $3 each and a notebook for $7. What was the total cost?

_____

_____

The total cost was _____.

c. Andy bought some packages of seeds for $24. Each package cost $2. How many packages did he buy?

_____

_____

He bought _____ packages.

d. A zoo has five  s, three  s, and twenty  s. How many feet do those animals have in total?

_____

_____

They have _____ feet in total.

9. Figure out the missing numbers in these multiplication charts.

×		**7**	
	10		30
9			54
		77	

×	**12**			
11		33		55
	48	12		
			63	35

10. Fill in the skip-counting patterns.

a.

			72			48		32

b.

		180		300		420		

c.

		36			63		81	

(All mystery numbers are less than 100.)

a. You can find me both in the table of eleven and in the table of four.

I am _____.

b. I am more than 15. I am in the table of two, the table of three, and the table of four!

I am _____.

c. I am between 15 and 35. The number one more than me is in the table of five. The number one less than me is in the table of four.

I am _____.

d. I am both in the table of four and in the table of three, and if you add one to me, I am in the table of five.

I am _____.

e. I am in the table of 11. The number that is one more than me, is in the table of five, but not in the table of ten.

I am _____.

f. I am less than 22 but more than 9, and I am in the table of four. If you exchange my digits, I am in the table of three!

I am _____.

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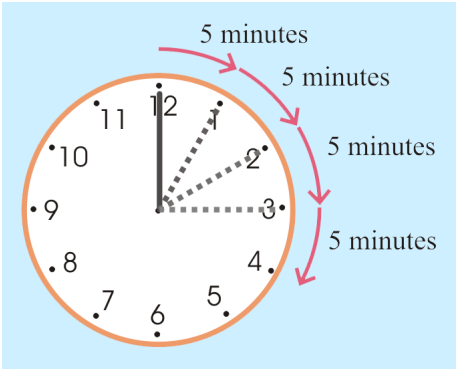
Revision: Reading the Clock

When the MINUTE hand travels from one number to the next on the clock face, 5 minutes of time passes.

Each interval is five minutes. That is why you skip-count by fives, when figuring out the minutes.



1. Write the time the clock shows. Then continue writing the times at each five-minute interval. You can use your practice clock to help.

a.

8 : 15

8 : 20

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

b.

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

c.

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

____ : ____

d.

____ : ____

____ : ____

____ : ____

____ : ____

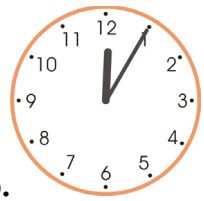
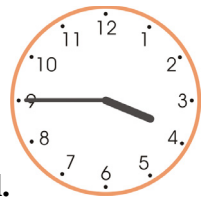
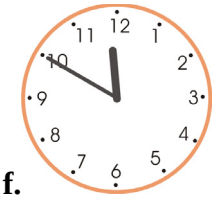
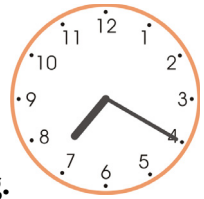
____ : ____

____ : ____

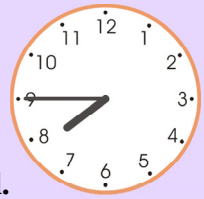
____ : ____

____ : ____

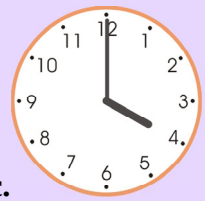
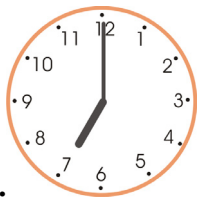
2. Write the time the clock shows.

a.  _____ : _____	**b.**  _____ : _____	**c.**  _____ : _____	**d.**  _____ : _____
e.  _____ : _____	**f.**  _____ : _____	**g.**  _____ : _____	**h.**  _____ : _____

3. Write the time the clock shows. Then write the time 10 minutes later than what the clock shows.

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

4. Write the time 5 minutes *earlier* than what the clock shows.

	a. 	**b.** 	**c.** 	**d.** 
5 min. earlier →	_____ : _____	_____ : _____	_____ : _____	_____ : _____

Half and Quarter Hours

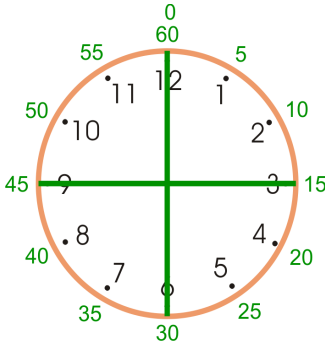
Imagine the clock face divided into four parts, or *quarters*. The word "quarter" means a fourth part.

Recall that one hour is 60 minutes. So then, each quarter of an hour is **15 minutes.**

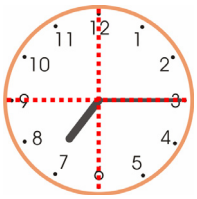
Since 15 minutes is a quarter of an hour, the time 6:15 can also be said as "**quarter past 6**."

Similarly, the time 5:45 can also be said as "**quarter to 6**". It means a quarter of an hour, or 15 minutes, before 6 o'clock.

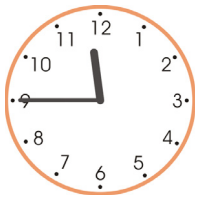
Remember also "half past." For example, 6:30 is "half past 6". It means a half-hour past or after 6 o'clock.



1 hour = 60 minutes
1/2 hour = 30 minutes
1/4 hour = 15 minutes



a quarter past 7



a quarter to 12

half past 10

1. Write the time in the standard way. Then match a clock with each given time.

a. a quarter past 8 _____ : _____

b. a quarter to 9 _____ : _____

c. a quarter past 9 _____ : _____

d. a quarter to 8 _____ : _____

2. Fill in the missing words or numbers.

a. 8:15	**b.** 4:45	**c.** _____ : _____
a quarter past _____	a quarter _____ ____	a quarter to 12

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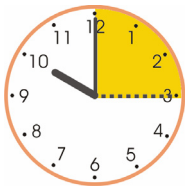
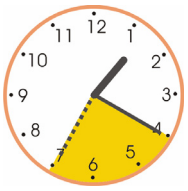
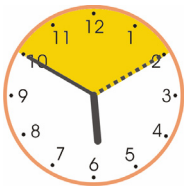
Elapsed Time 1

1. Do the activity **How Long?** from the chapter introduction. Use times that are to the nearest five minutes (like what you see in the lesson). The student can count by fives.

2. How many minutes does the minute hand "cover," or "pass through," on the clock? Count by fives. You can use your practice clock to help.

 **a.** From 10:00 until 10:15 _____ minutes	 **b.** From 1:20 until 1:35 _____ minutes	 **c.** From 5:50 until 6:10 _____ minutes	 **d.** From 2:05 until 2:40 _____ minutes

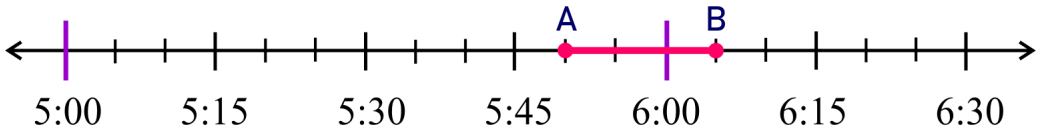
3. How many minutes pass? Count by fives. You can use your practice clock to help.

Start	End	Start	End	Start	End
					
a. _____ minutes		**b.** _____ minutes		**c.** _____ minutes	

4. Now you are given how much time passes. Tell the starting time or the ending time.

a. Start 	20 minutes pass	**End** _____ : _____
b. Start 	15 minutes pass	**End** _____ : _____
c. Start _____ : _____	10 minutes pass	**End** 
d. Start _____ : _____	20 minutes pass	**End** 

Besides a clock, we can also use a number line to help us figure out time intervals.

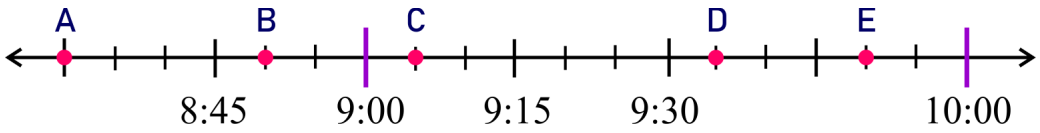


The number line between 5:00 and 6:00 is divided into four large parts, marked with 5:15, 5:30, and 5:45. Then it is also divided into smaller parts.
Can you tell how many minutes it is from each little tick mark to the next?

Where would 5:20 be? What about 5:40? 6:25? (Find these with the help of your teacher.)

What time does point A signify? Point B?
How long is the time interval from A to B? (Find the answers at the end of this page.)

5. What times do the marked points signify?



A ____ : _____ B ____ : _____ C ____ : _____ D ____ : _____ E ____ : _____

6. How long a time passes? You can use the number line above to help.

a. from 8:30 to 8:45

_____ minutes

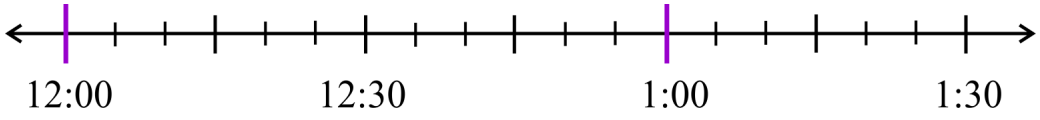
b. from 8:55 to 9:05

_____ minutes

c. from 8:45 to 9:10

_____ minutes

7. Use the number line to figure out how long a time passes.



a. from 12:40 to 1:00

_____ minutes

b. 12:50 to 1:05

_____ minutes

c. 12:45 to 1:15

_____ minutes

Answers to the teaching box: It is five minutes from each little tick mark to the next.
Point A is 5:50. Point B is 6:05. From A to B is 15 minutes.

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Counting Coins

Let's revise coins!	 5 cents	 10 cents	 20 cents	 50 cents	 1 dollar	 2 dollars
Count up, starting with the coin(s) with the largest value.	 200c 300c 380c 390c 400c = $4.00					

1. (Optional) Do the **Counting Money** activity from the chapter introduction.

2. Count the coins.

a. _____c

b. _____c

c. _____c

d. _____c

3. Fill in the patterns.

a. four 20-cent coins = _____c

five 20-cent coins = _____c = $_____

six 20-cent coins = _____c

seven 20-cent coins = _____c

eight 20-cent coins = _____c

b. six 50-cent coins = $_____

seven 50-cent coins = $_____

eight 50-cent coins = $_____

nine 50-cent coins = $_____

ten 50-cent coins = $_____

4. Write how many 20-cent or 50-cent coins you need to make these amounts.

a. _____ 20-cent coins = 140 cents _____ 20-cent coins = 200 cents _____ 20-cent coins = 260 cents	**b.** _____ 50-cent coins = $2 _____ 50-cent coins = $6 _____ 50-cent coins = $11

5. **a.** Dorothy says 130c = four 20-cent coins and ten 5-cent coins, and Daniel says 130c = five 20-cent coins and three 10-cent coins. Who is correct?

b. Find another way to make 130c with various coins.

6. Use two different kinds of coins to make the asked amount. Find two ways to do so.

a. 90c	**b. 105c**
_____ 20-cent coins + _____ 5-cent coins _____ 20-cent coins + _____ 5-cent coins	_____ 20-cent coins + _____ 5-cent coins _____ 20-cent coins + _____ 5-cent coins

7. Draw **coins** to make the money amounts. Make them in two different ways.

a. 65c

65c

b. 125c

125c

c. 90c

90c

d. 260c

260c

Dollars

Here you see the Australian notes with dollar amounts.





Write the "$" symbol in front of dollar amounts.

First write the dollars, then a decimal point, and then the cents.

$5.25

$21.30

1. How much money? Write the amount.

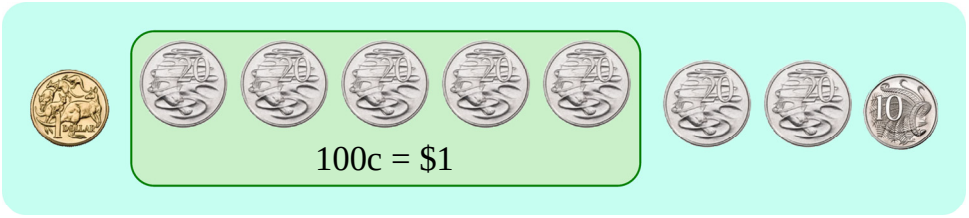
a. $_____

b. $_____

c. $_____

d. $_____

100 cents make <u>a dollar</u>.



= $2.50 in total

2. How much money? Write the amount.

a. $_____

b. $_____

c. $_____

Remember to put 0 into the dollars place if your total cent-amount is less than 100.

40 cents = $0.40 80 cents = $0.80 5 cents = $0.05

3. Write as dollar amounts.

a. $_____

b. $_____

three 5-cent coins
and a 10-cent coin

c. $_____

eight 10-cent coins

d. $_____

a 1-dollar coin
and a 5-cent coin

e. $_____

three 20-cent coins
and two 10-cent coins

f. $_____

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Contents

Chapter 10: Geometry

Chapter 11: Fractions

Foreword

Math Mammoth Grade 3, International 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 international 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.

The international version of Math Mammoth has been customised for international audiences in these aspects:

- The currency used in the money chapter (chapter 6) is the Australian dollar. (The download version of the curriculum also includes this chapter for the U.S., British, Canadian, European, South African, 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 point, as in the US version.)
- 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

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Add and Subtract Four-Digit Numbers 2

Example: This is how you can add 5670 + 20 using mental maths. The second number, 20, is two tens. This means we simply add two tens to the 7 tens that 5670 has. We get 70 + 20 = 90. The sum is 5670 + 20 = 5690.

You can also see this idea if we write the 20 under the 5670, lining up the digits by their places (ones under the ones, tens under the tens, etc.) The 7 tens and the 2 tens get added.

$$\begin{array}{r} 5\,6\,7\,0 \\ +\quad\;\; 2\,0 \\ \hline 5\,6\,9\,0 \end{array}$$

1. Count by tens.

a. 4000, 4010, _____, _____, _____, _____

b. _____, _____, 1740, 1750, _____, _____

c. _____, _____, 3370, 3380, _____, _____

2. Add and subtract using mental maths. Compare the problems.

a. 100 + 20 = _____ 5100 + 20 = _____	**b.** 220 + 40 = _____ 4220 + 40 = _____
c. 140 – 90 = _____ 4140 – 90 = _____	**d.** 230 – 30 = _____ 4230 – 30 = _____

3. Solve with mental maths. Think of the helping problem without the thousands.

a. 5540 + 50 = _____ (540 + 50)	**b.** 7210 + 90 = _____
c. 7760 – 30 = _____	**d.** 1490 – 50 = _____
e. 2080 + 90 = _____	**f.** 4980 + 20 = _____

4. Solve with mental maths.

a. 6040 + 70 = _____	**b.** 4530 + 60 = _____	**c.** 8250 – 20 = _____
d. 4110 – 50 = _____	**e.** 9660 + 40 = _____	**f.** 3530 – 30 = _____

5. These are skip-counting patterns. Find the skip-counting step and fill in the missing numbers.

a.	6140			6260				6420
b.	2870				3070			
c.			5850			6450		
d.		1500				1620		

6. How much was added or subtracted?

a. 5280 + _____ = 5300	**b.** 7760 + _____ = 7810
c. 3160 – _____ = 3110	**d.** 6140 – _____ = 6080

Fill in the puzzle.

Puzzle Corner

4550	–		+		= 4560
–		+		–	
	+		+		= 50
+		–		+	
	+		+		= 100
= 4580		= 30		= 60	

Add Four-Digit Numbers in Columns

Adding four-digit numbers in columns happens the same way as adding smaller numbers. Regrouping (carrying) is done the same way as you have learned before. But here, you might have to regroup three times: in the tens, in the hundreds, and in the thousands.

Without help, finish the two examples below. Then ask the teacher to check your answers.

$\begin{array}{r} {\scriptstyle 1\ 1\ 1\ \ } \\ 5879 \\ +\ 2544 \\ \hline 8423 \end{array}$	$\begin{array}{r} 4337 \\ +\ 3918 \\ \hline \end{array}$	$\begin{array}{r} 4768 \\ +\ 2655 \\ \hline \end{array}$

1. Add.

a. $\begin{array}{r} 5091 \\ +\ 510 \\ \hline \end{array}$

b. $\begin{array}{r} 2393 \\ +\ 4716 \\ \hline \end{array}$

c. $\begin{array}{r} 5862 \\ +\ 1878 \\ \hline \end{array}$

2. Add. Remember: it helps to add those numbers first which make ten (if any)! Lastly, check your work, for example by adding the numbers in any column in a different order.

a. $\begin{array}{r} 6098 \\ 1034 \\ +\ 254 \\ \hline \end{array}$

b. $\begin{array}{r} 2255 \\ 345 \\ +\ 2170 \\ \hline \end{array}$

c. $\begin{array}{r} 362 \\ 2389 \\ +\ 4067 \\ \hline \end{array}$

d. $\begin{array}{r} 456 \\ 7328 \\ 1134 \\ +\ 554 \\ \hline \end{array}$

e. $\begin{array}{r} 1659 \\ 199 \\ 267 \\ +\ 6037 \\ \hline \end{array}$

f. $\begin{array}{r} 373 \\ 288 \\ 5217 \\ +\ 3399 \\ \hline \end{array}$

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Word Problems

Example: Find the change when Dan buys a mower for $1589 and pays with $2000.

We need to find the difference between these numbers.
One way to do this is to add up from 1589 to 1600.

From 1589 to 1600 is just 11. And from 1600 to 2000 is 400.
In total, the difference is 411. Dan's change is $411.

The other way is subtraction (on the right).

$$\begin{array}{r} {\scriptstyle 9\ 9} \\ 1\,\cancel{10}\,\cancel{10}\,10 \\ \cancel{2}\ 0\ 0\ 0 \\ -\,1\ 5\ 8\ 9 \\ \hline 4\ 1\ 1 \end{array}$$

1. Solve. Write a number sentence or several for each problem to show your calculations.

a. Latoya bought a fridge for $1158 and a freezer for $745. She paid with $2000. What was her change?

_____

_____

_____

b. A store owner bought four washer/dryer machines for $1109 each. Then he got $500 off of his total bill (a discount). Find what he had to pay.

_____

_____

c. You are on page 704 of a book that has 1380 pages. How many more pages do you still have to read?

_____

2. Solve. Write down your calculations, to show your work.

a. Can you buy three air conditioners at $979 each, with $3000?
If yes, how much will be left over?

If not, how much more money would you need?

_____

_____

_____

b. Using the digits 1, 2, 3, and 4, build the largest and the smallest number possible.

What is the difference between the two?

c. A new motorcycle costs $8740 and a used one $1295.
What is the price difference?

Puzzle Corner

What numbers are missing from the additions and subtractions?

$$\begin{array}{r} 5\square\square 7 \\ -\square 5 5\square \\ \hline 3684 \end{array} \qquad \begin{array}{r} \square\square 01 \\ -27\square\square \\ \hline 3542 \end{array} \qquad \begin{array}{r} 6\square\square 9 \\ +\square 00\square \\ \hline 9774 \end{array} \qquad \begin{array}{r} \square\square 88 \\ +27\square\square \\ \hline 4900 \end{array}$$

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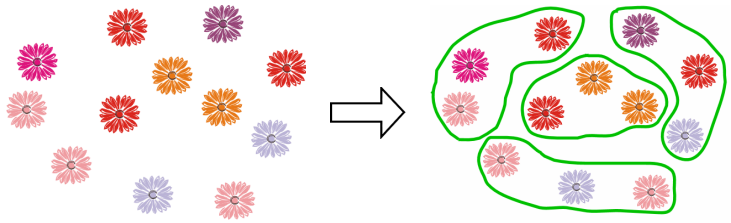
Division as Making Groups

There are 12 daisies. Make groups of 3.

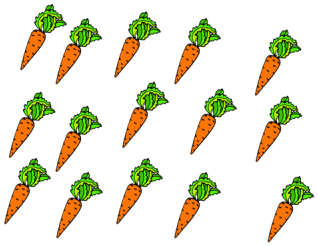


How many groups? *Four groups.*

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

1. Divide into groups.

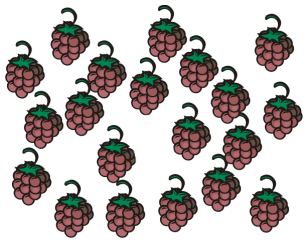
a. There are 15 carrots.
Make groups of 5.



How many groups? _____

How many 5's are there in 15? _____

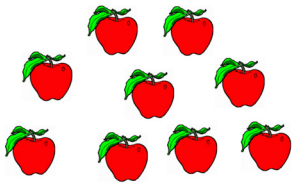
b. There are _____ berries.
Make groups of 4.



How many groups? _____

How many 4's are there in _____? _____

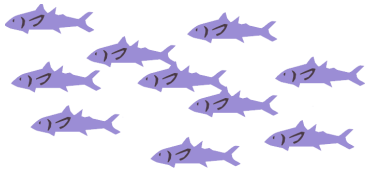
c. There are _____ apples.
Make groups of 3.



How many groups? _____

How many 3's are there in _____? _____

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



How many groups? _____

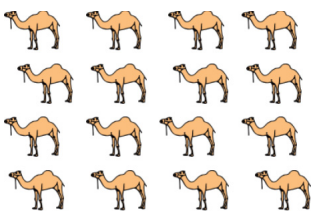
How many 2's are there in _____? _____

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.

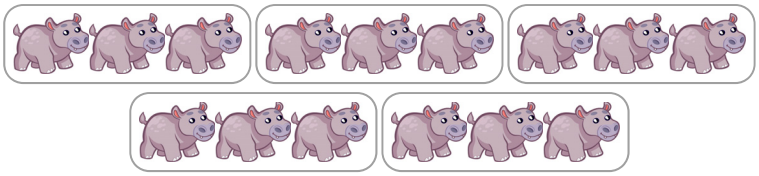


How many groups? _____

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.

$18 \div 6 = ?$

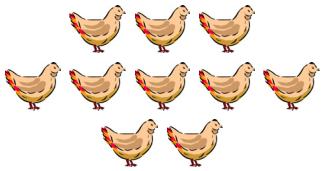
Think: "How many 6's in 18?"

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**.

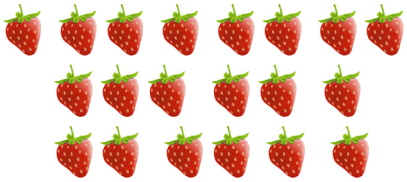
2. Make a division sentence.

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



_____ ÷ _____ = _____

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

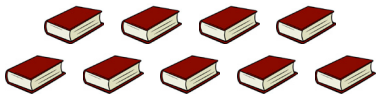


_____ ÷ _____ = _____

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

_____ ÷ _____ = _____

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

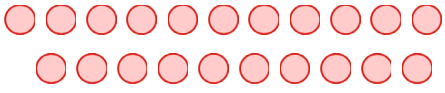


_____ ÷ _____ = _____

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

_____ ÷ _____ = _____

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

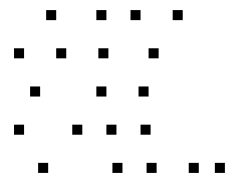
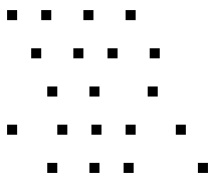
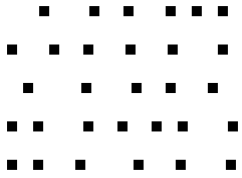
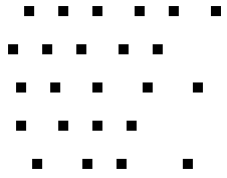
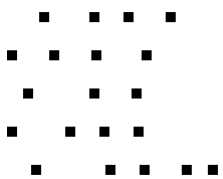
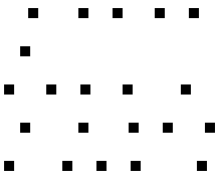
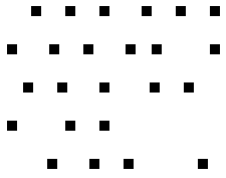
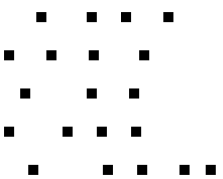


_____ ÷ _____ = _____

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.

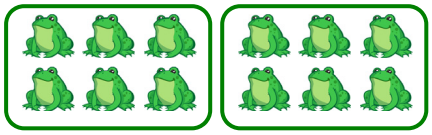
$12 \div 4 = 3$

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 _____.

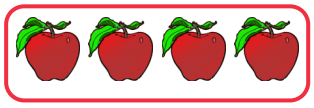
_____ × 2 = _____

_____ 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.

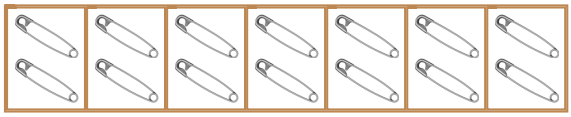
_____ × 1 = _____

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

_____ ÷ 1 = _____

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

_____ × _____ = _____

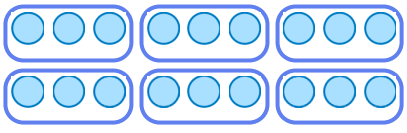


_____ divided into ***groups of 2*** is ___ groups.

_____ ÷ _____ = _____

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

_____ × _____ = _____



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

_____ ÷ _____ = _____

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Pictographs

This is a **pictograph.** It shows how many flowers each child picked, using little pictures.

Below the pictograph is the **legend** or the **key**. It explains that one little picture of a flower means 8 flowers, not one.

For example, for Sofia we see two pictures of flowers. This means she picked 16 flowers.

Flowers Picked	
Ava	
Sofia	
Oliver	
Liam	

 = 8 flowers

1. Look at the pictograph above and answer the questions.

   a. How many more flowers did Ava pick than Liam?

   b. How many did Sofia and Ava pick together?

   c. Who picked more, Oliver & Liam together, or Ava and Sofia together?

2. The children picked fruit from Grandpa Jerry's fruit trees. They picked 35 oranges, 10 mangos, 40 bananas, and 25 apples. Make a pictograph to show this. Draw **one** fruit **picture** to mean **10 fruits**. Draw a picture of a half fruit to mean 5 fruits.

Key

 = 10 oranges

 = 10 mangos

 = 10 bananas

 = 10 apples

Fruits We Picked	
oranges	
mangos	
bananas	
apples	

3. Fill in the pictograph on the right to show how many kilograms of vegetables different families used in a month.

   Use a carrot for the picture. Choose how many kilograms it represents.

   The Jacksons used 15 kg.
   The Joneses used 10 kg.
   The Millers used 20 kg.
   The Eastmans used 30 kg.
   The Davises used 25 kg.

Vegetable use in one month	
Jacksons	
Joneses	
Millers	
Eastmans	
Davises	

 = _____ kg of vegetables

4. Answer the questions using the information in the previous exercise.

   a. How many more kilograms of vegetables did the Davises use than the Joneses? _____ kg

   b. How many more kilograms of vegetables did the Jacksons and the Joneses use together than the Millers? _____ kg

   c. How many kilograms of vegetables did the three families that used the most vegetables use in total? _____ kg

5. The Hall family members received many packages in the mail last month. Of all the packages, 12 were for Mum, 10 for Dad, 4 for Isabella, and 2 for Cayden.

   Draw a pictograph from this data. Don't forget to fill in the key.

   Optionally, you can also use half of your chosen picture to represent half of the amount in your key.

Hall Family Packages	
Mum	
Dad	
Isabella	
Cayden	

Key: = _____ packages

6. Draw a pictograph to show the information in the table.

   - Decide a picture to use in the pictograph, and how many litres of milk your picture represents. Remember that you can use half of your picture to represent half of that amount.
   - Put a legend near the pictograph.
   - Also include a title.

Quantity of Milk Anderson Family Purchased (in litres)	
January	12
February	14
March	13
April	15
May	10
June	11

7. Refer to the previous exercise. How much more milk did the Anderson family consume in the first three months of the year than in the next three months?

8. Jack is a fisherman. Last week he caught these amounts of fish:
   Monday: 600 kg; Wednesday: 1200 kg; Friday: 1000 kg; Sunday: 600 kg

   a. Make a pictograph to show how many fish he caught last week.

   b. How much bigger catch did Jack get on Friday than on Monday?

   c. How many kilograms of fish did he catch in total during the week?

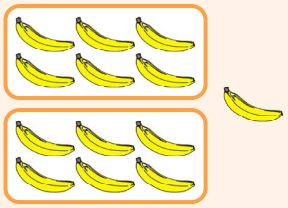
When Division Is Not Exact

(This lesson is optional.)

Example 1. If we divide 13 bananas evenly between Luke and Emma, how many does each one get?

Each one gets 6 bananas and one banana is left over.

The leftover banana is called **the remainder**, and is indicated after the letter R. So, 6 R1 means six bananas for each person, with one left over.

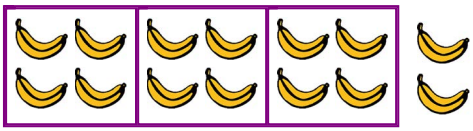


6 R1

1. Fill in the blanks. You can draw sticks or circles to represent the items.

a. Divide 14 bananas among 3 people.

Each person gets _____ bananas and _____ bananas are left over.



4 R2

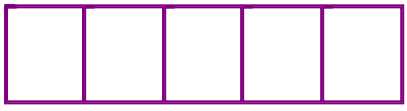
b. Divide 14 carrots among 3 people.

Each person gets ____ carrots and ____ carrots are left over.

_____ R____

c. Divide 8 pears among 5 people.

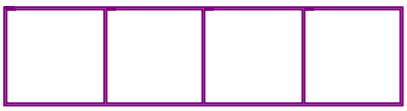
Each person gets ____ pear(s) and ____ pears are left over.



_____ R____

d. Divide 14 apples among 4 people.

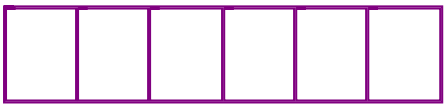
Each person gets ____ apples and ____ apples are left over.



_____ R____

e. Divide 15 hens into 6 boxes.

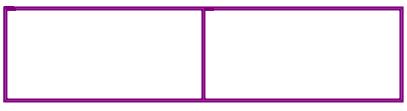
Each box has ____ hens, and ____ hens are left over.



_____ R_____

f. Divide 9 fish between 2 people.

Each person gets_____ fish and _____ fish are left over.



_____ R_____

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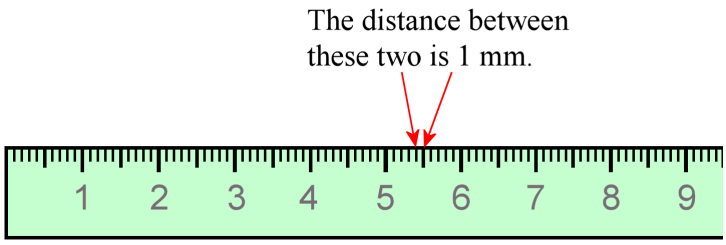
Centimetres and Millimetres

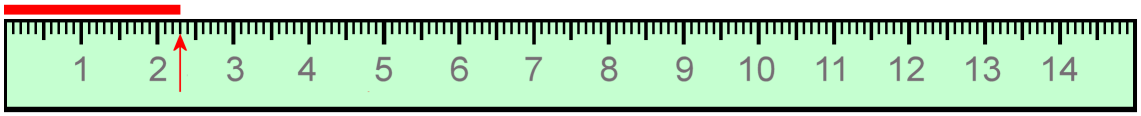
This ruler measures in centimetres. The numbers signify whole centimetres. All the shorter lines between those are for *millimetres*.



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

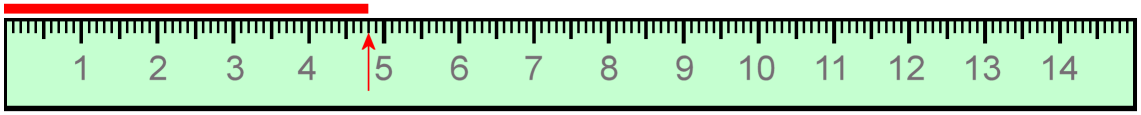
Look at the ruler: **there are 10 millimetres in each centimetre.**

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?

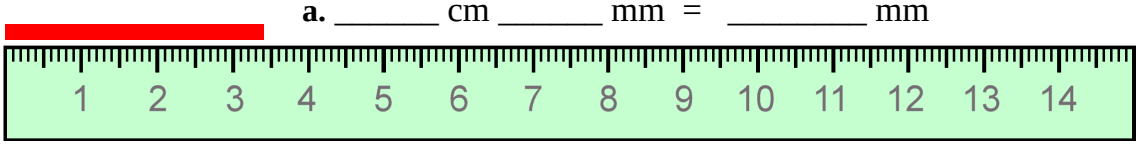
Each centimetre is 10 mm, so 2 cm is 20 mm. So, 2 cm 3 mm makes 23 mm in total.



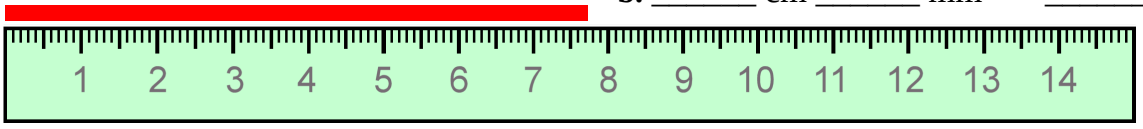
This line is 4 cm 8 mm long. At the same time, it is 48 mm long.

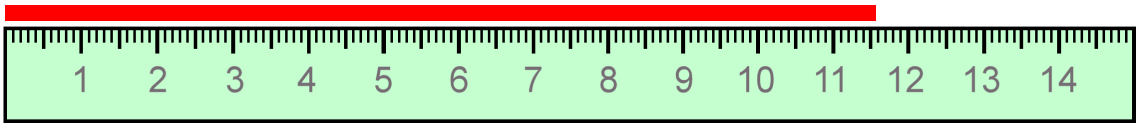
1. Measure the lines using the ruler, first in whole centimetres and millimetres. Then write their lengths using millimetres only.

a. _____ cm _____ mm = _____ mm

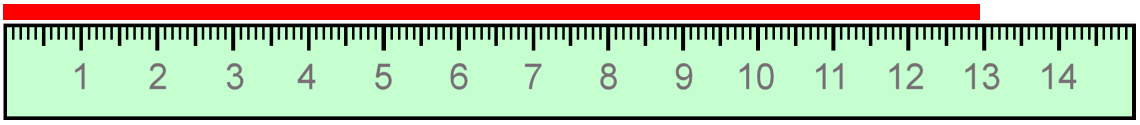


b. _____ cm _____ mm = _____ mm

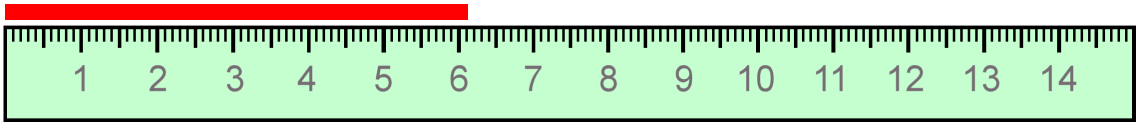




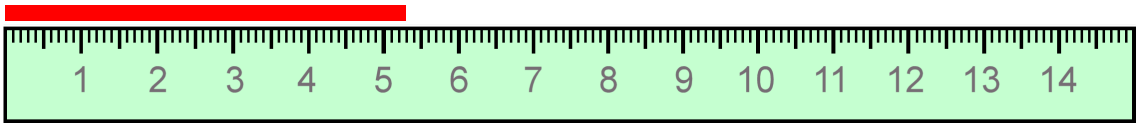
c. _____ cm _____ mm = _____ mm



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.

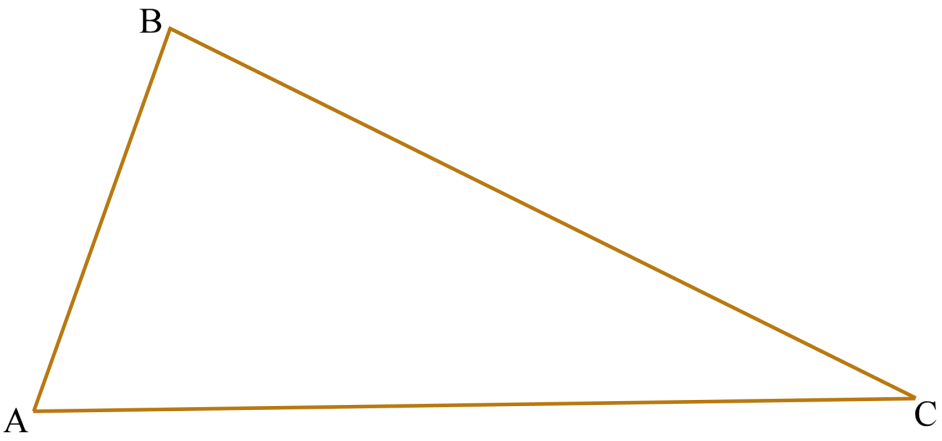
a.	b.	c.
2 cm = _____ mm	1 cm 1 mm = *11* mm	4 cm 5 mm = _____ mm
5 cm = _____ mm	1 cm 8 mm = _____ mm	7 cm 8 mm = _____ mm
8 cm = _____ mm	2 cm 3 mm = _____ mm	10 cm 4 mm = _____ mm

5. Measure the sides of this triangle in millimetres.

Side AB: _____ mm

Side BC: _____ mm

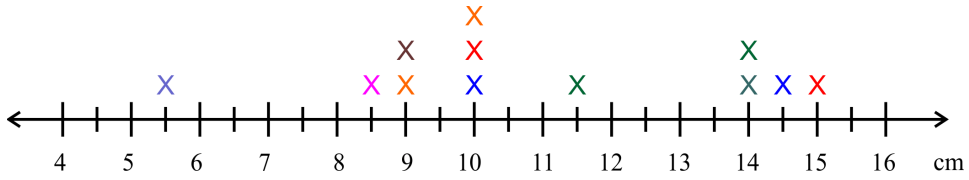
Side CA: _____ mm



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?

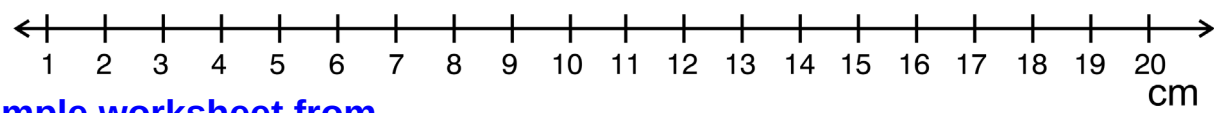
2. Measure many pencils of different lengths to the nearest centimetre.
   Write the lengths below.

_____ 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.)

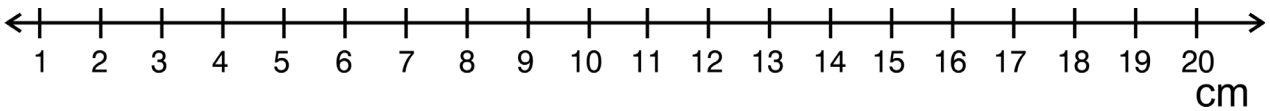
_____ cm _____ cm _____ cm _____ cm _____ cm.

_____ 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.

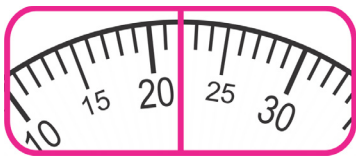
Grams and Kilograms

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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Word Problems and More

1. One shampoo bottle contains 1000 ml of shampoo.
   Another one contains 478 ml.
   How much more does the bigger one contain?

2. Mum held her baby and stepped on the scale. It showed 61 kg. Then she stepped on the scale by herself and it showed 56 kg. What was the baby's mass?

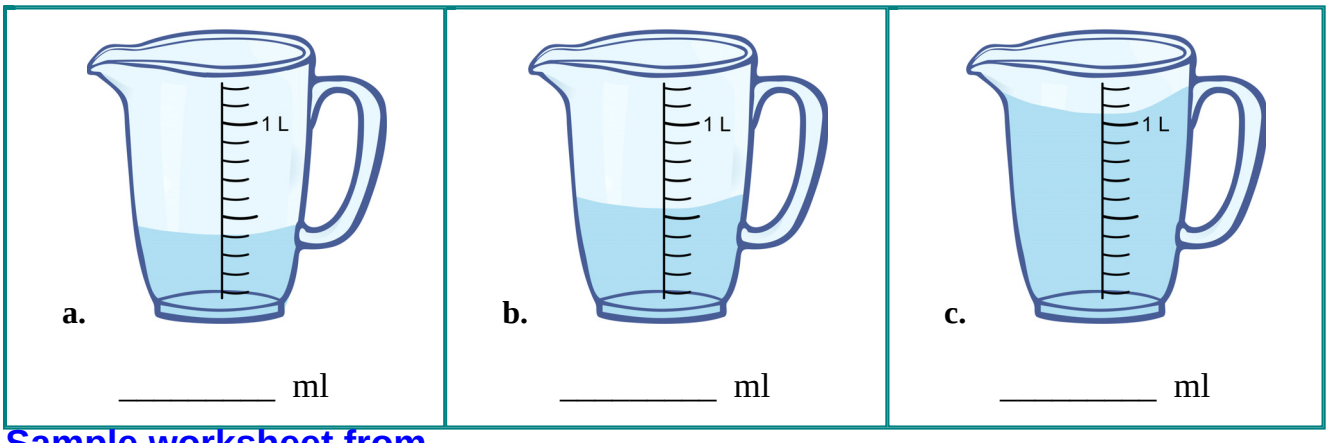
3. A package of crackers weighs 90 grams. How many of those do you need in order to have 1 kilogram of crackers? (1 kilogram is 1000 grams.)

4. Olivia weighed a can of tomato sauce. The scale showed 730 g. The label on the can reads: "Net weight 660 g." (The net weight refers to the weight of the contents, not including the can itself.)

   a. What is the mass of the can itself?

   b. If Olivia uses half of the tomato sauce from the can, and then puts the can on the scale, what will it show?

5. How much liquid is in each pitcher?



6. **a.** How much liquid is in three bottles that contain 450 ml of water each?

   b. Is this more or less than 1 litre? (1 litre = 1000 ml) How much more/less?

7. A bottle contains one litre (1000 ml) of juice.
   How many 250-ml glasses could you fill from it?

8. The mass of an apple is 150 grams.

   a. How many such apples do you need to have *at least* 500 g of apples?

   b. What about 1 kg of apples? (1 kg = 1000 g)

9. One day, Carol walked to school and back two different times.
   Her home and school are 600 m apart. What distance, in metres, did she walk?

10. Emma is 1 metre 23 centimetres tall. Since one metre is 100 centimetres,
    how tall is she in centimetres?

11. Alex has toy cars that are each 5 centimetres long.

    a. How many of his cars will make a line that is 1 metre (100 centimetres) long?

    b. How many will make a line that is 3 metres long?

12. Karen sent a "Thank You" card to each person who had attended her fiftieth
    birthday party. Each card weighed 50 grams, and their total weight was
    600 grams. How many people attended her party?

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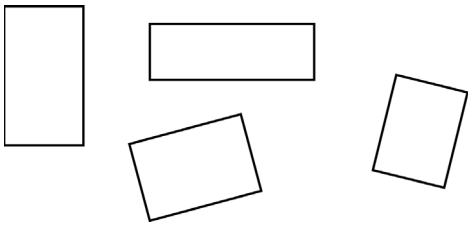
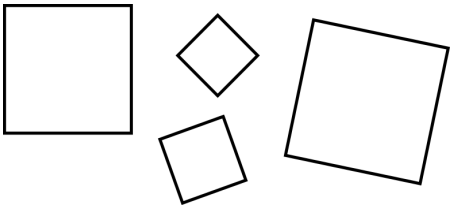
Some Special Quadrilaterals



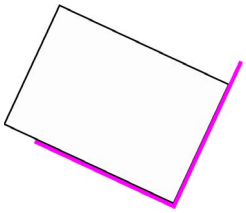
Rectangles are quadrilaterals (they have four sides) with four **right angles**. A right angle is a "straight" corner — like a corner of a book.



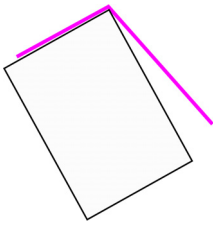
Squares are quadrilaterals with four equal sides (each side has the same length) and four right angles.

You can use the corner of a book to check if an angle is right (if the corner is "straight"). Or, fold a piece of paper twice in half, to get a right-angle checking tool.

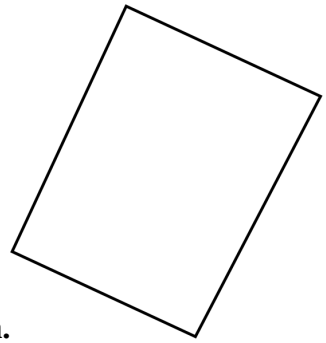
This *is* a right angle!



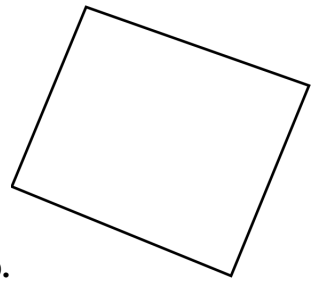
This is *not* a right angle!



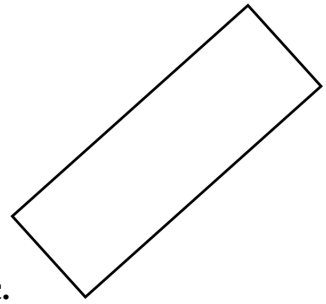
1. Are these shapes rectangles or not? Check if the angles are right angles.



a.

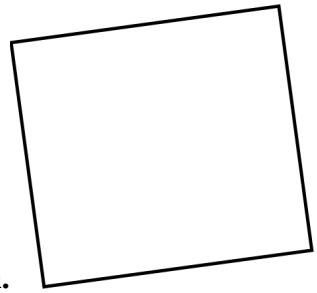


b.

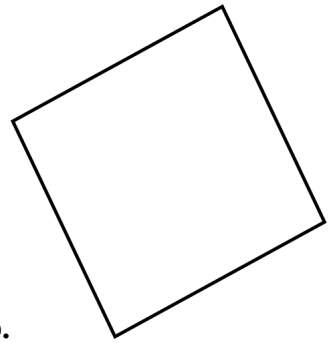


c.

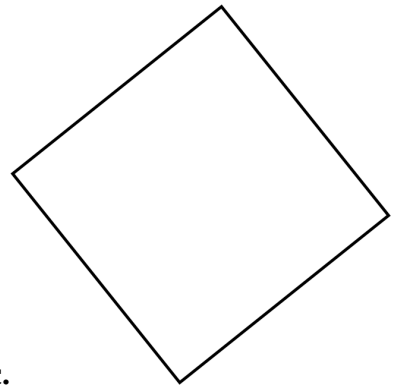
2. Are these shapes squares? Check if the angles are right angles *and* if the sides have the same length (use a ruler).



a.



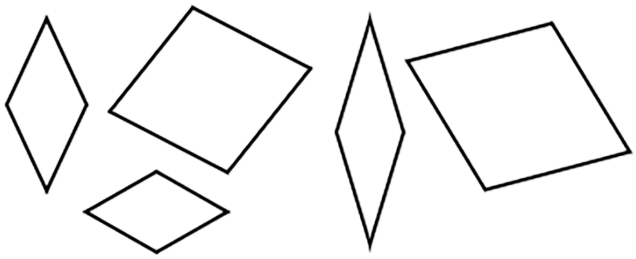
b.



c.

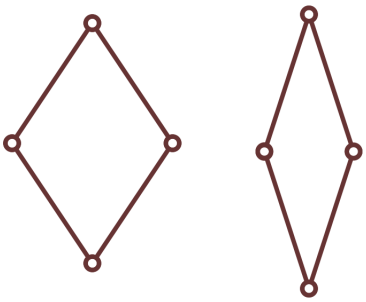
A **rhombus** is a quadrilateral with four equal sides. A rhombus is also called a diamond-shape or a diamond in common language.

The plural of rhombus is **rhombi**.



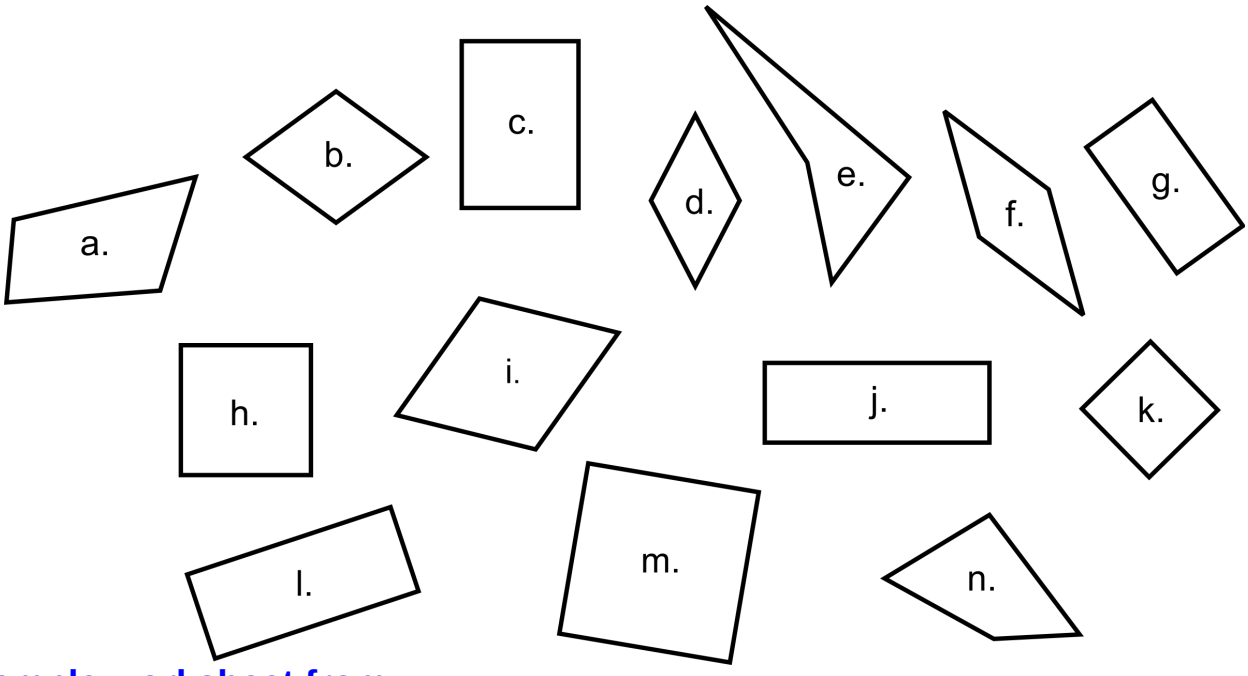
3. You can make a rhombus by taking four popsicle sticks, pencils, matches, or other sticks of the same length.

   Arrange the four sticks into a diamond shape. Now, change it slightly to get another rhombus. Make a skinny one, a less skinny one, and so on. You can even make a square!



4. Can the angles of a rhombus be right angles?
   If they are, what do we get? Sketch an example.

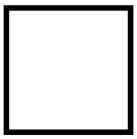
5. Colour all the rectangles green, squares blue, rhombi red, and other quadrilaterals yellow. Or, choose your own colours.



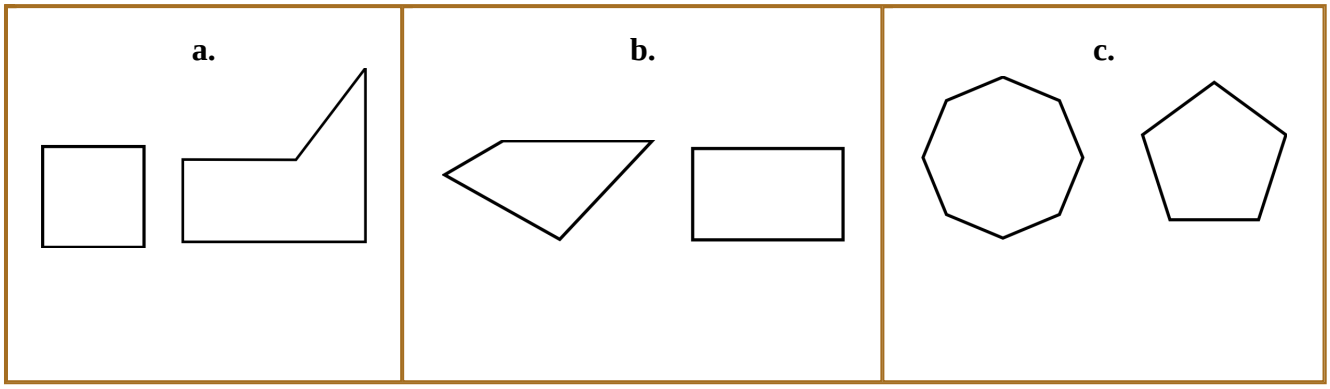
More Practice with Shapes

1. Macy said, “This is a square, not a rectangle.”
   Brian said, “But it has four sides and four right angles, so it *is* a rectangle.”

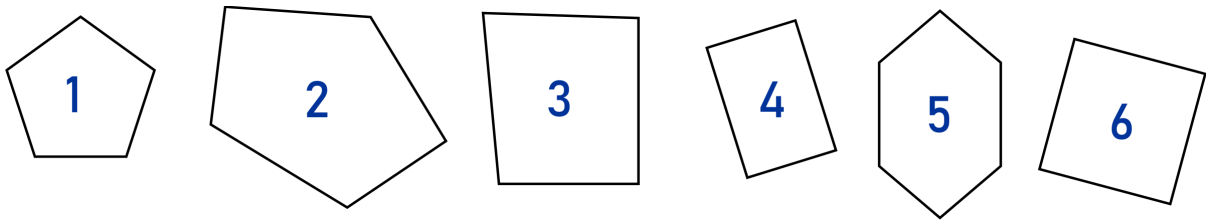
   Who is right? Explain.



2. What same attribute(s) do the two shapes have? In other words, what is the same about both?



3. Match each description to one shape. One shape will be left over.



   a. It has no right angles. Its sides are equal.

   b. It has exactly one right angle.

   c. All its sides are equal, and it has four right angles.

   d. It has four right angles.

   e. It has five sides, no right angles, and not all its sides are equal.

4. Sketch here:

   a. A triangle that doesn’t have any equal sides

   b. A quadrilateral that doesn’t have any equal sides.

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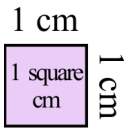
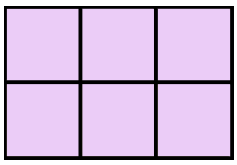
Units for Measuring Area



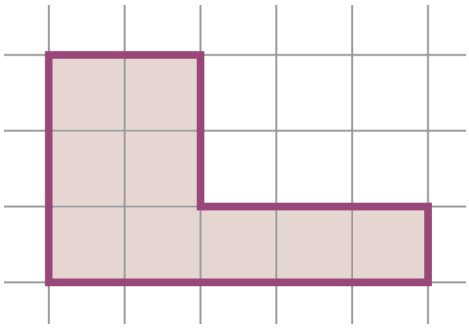
Each side of this square measures 1 centimetre. It is a special square. It is called **a square centimetre**. We can use it to measure areas of other shapes.



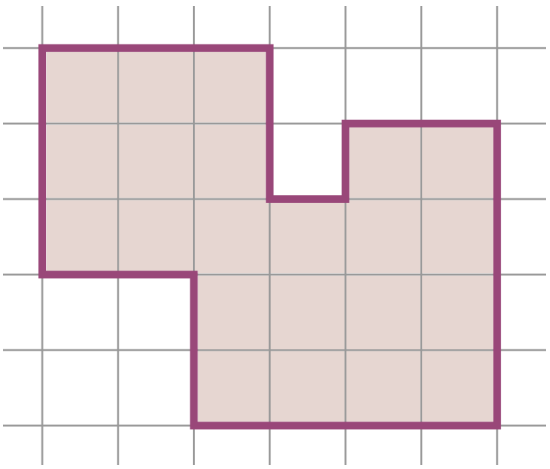
We need six square centimetres to cover this rectangle. So, its area is just that: 6 square centimetres.

We abbreviate this as **6 cm^2**. The elevated two in "cm^2" indicates the "squaring." (It refers to the unit "centimetre" being multiplied by itself.)

1. Find the area of each shape in square centimetres. Don't forget the unit (cm^2)!



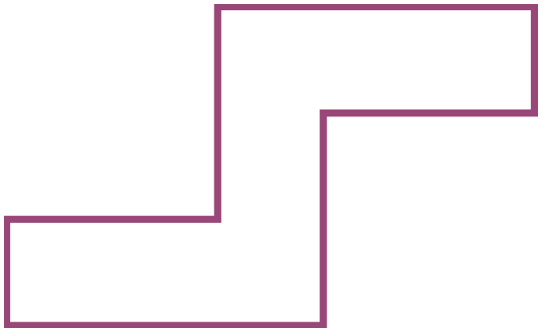
a. Area = _____

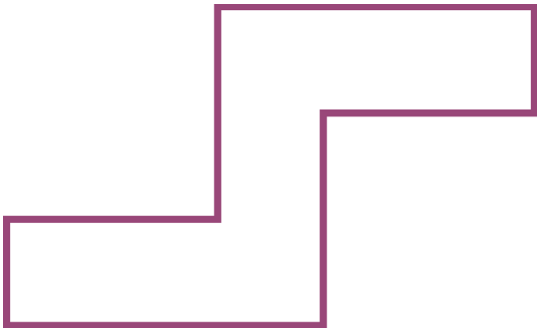


b. Area = _____

2. This is a square-centimetre grid. Draw in it a shape with an area of **a.** 11 cm^2 **b.** 13 cm^2. Your shapes don't have to be rectangles! Be creative.

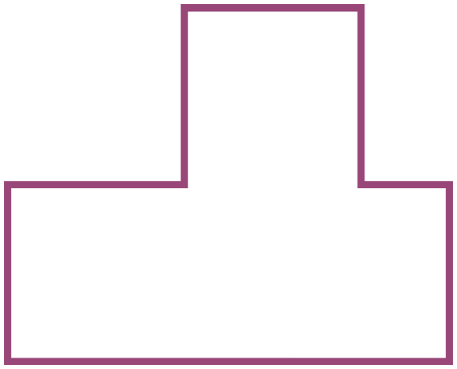
3. Find the area of these shapes using your own square unit. In other words, for each shape, draw a square unit of any size you choose, and then figure out how many of those will cover the shape. Each shape is there twice so you can experiment.

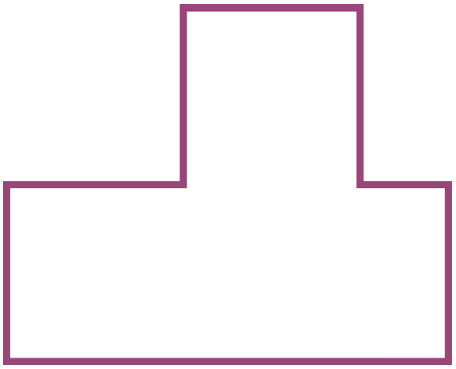




a. my square unit:
(sketch it here)

area = _____ square units





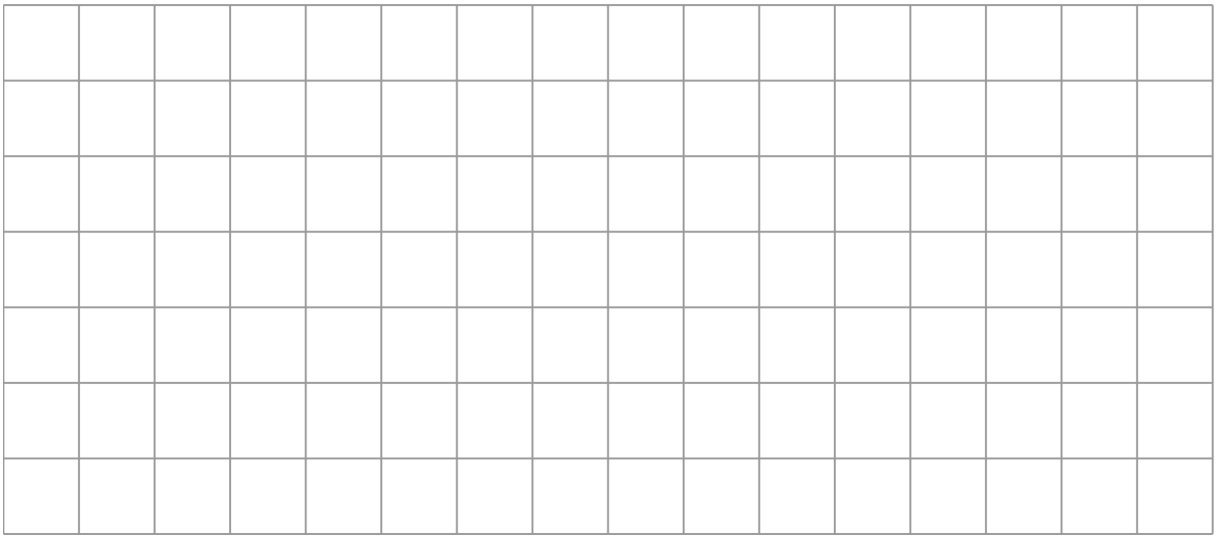
b. my square unit:
(sketch it here)

area = _____ square units

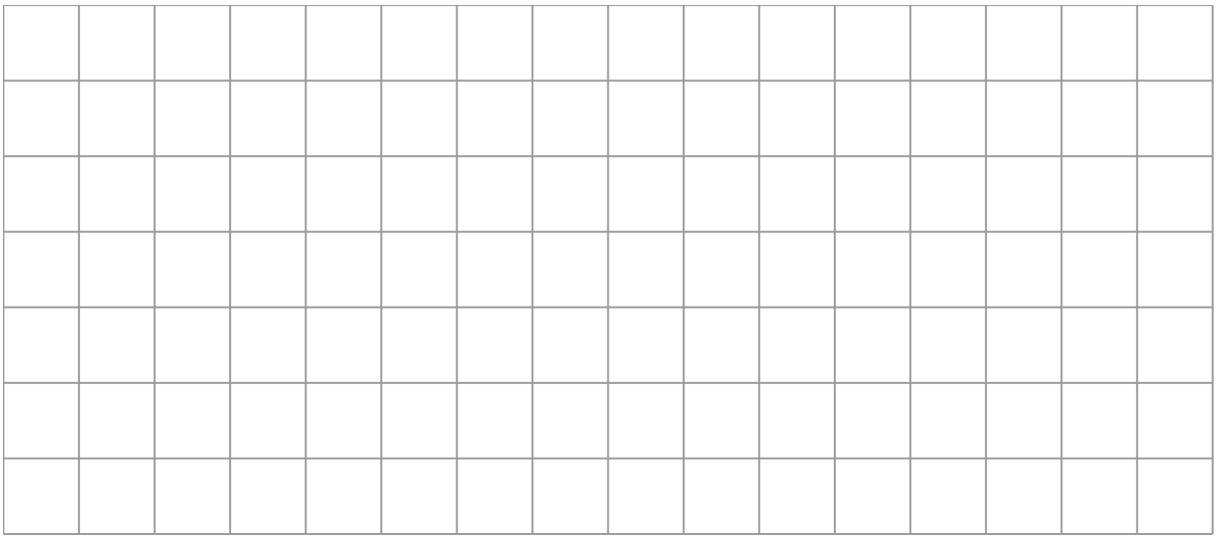
c. my square unit:
(sketch it here)

area = _____ square units

4. The grid below has square centimetres. Draw in it two *different* shapes with an area of 17 cm^2. (They don't have to be rectangles.)



5. The grid below has square centimetres. Draw in it a 3-cm by 6-cm rectangle. Then, draw another rectangle with *different* same lengths, but with the same area.



Puzzle Corner

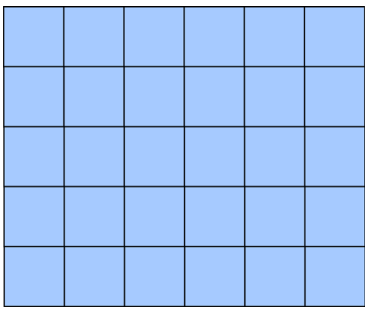
a. Margaret drew a rectangle with 5 cm and 8 cm sides. Then she drew a line from one corner of the rectangle to the opposite corner, dividing it into two triangles. What is the area of one of those triangles?

b. Draw a triangle with an area of 12 cm^2.

Area of Rectangles 1

How many square units is the area of this rectangle?

Can you think of a quicker way to find that, besides counting the square units one by one?

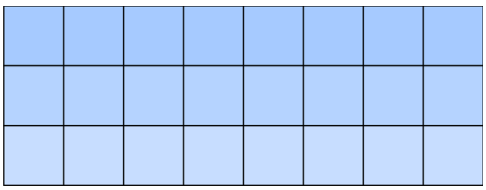


Notice how this rectangle has <u>three</u> rows of square units. Each row has <u>eight</u> squares. It is an array.

What quick way can we use to find the area?

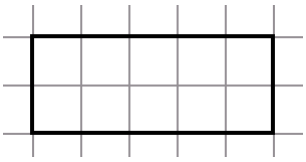
_____

_____



1. Write a number sentence to find the area. Then write down the area. ("A" means area.)

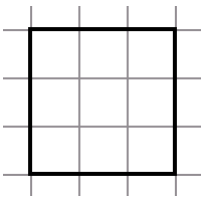
a.



_____ = _____

A = _____ square units

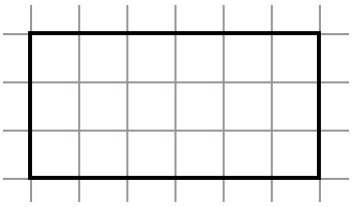
b.



_____ = _____

A = _____ square units

c.



_____ = _____

A = _____ square units

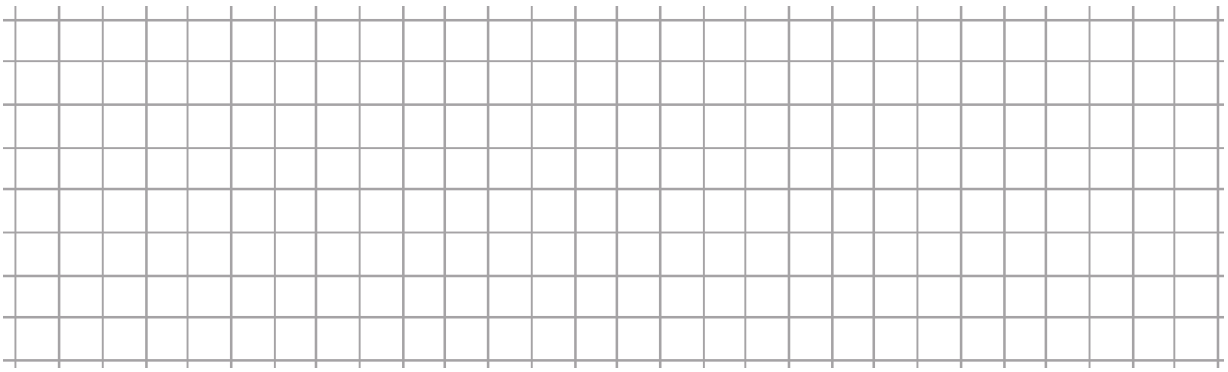
2. Draw two different rectangles with an area of 16 square units.

3. Annie drew a rectangle on a grid paper. She said her rectangle had 2 rows of square units. What other information would you ask Annie to know exactly what the area of her rectangle is?

4. Draw a rectangle that...

   a. has three rows of square units, and an area of 24 square units

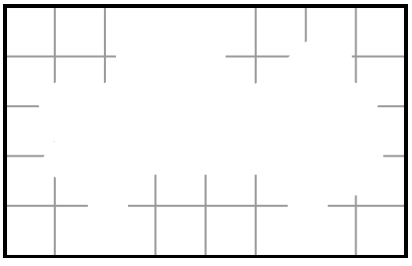
   b. has two columns of square units, and an area of 8 square units



5. Elizabeth made a rectangle using square tiles. It had 4 rows of squares, with 7 squares in each. Then she added one more column to her rectangle. What is its area now?

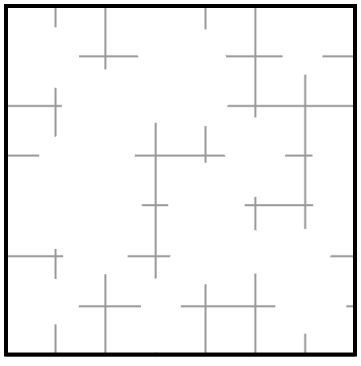
6. Find the areas of these figures when only a portion of the gridlines are visible.

a.



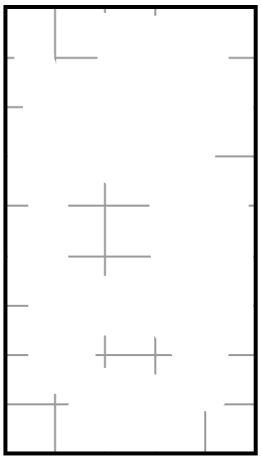
_____ square units

b.



_____ square units

c.



_____ square units

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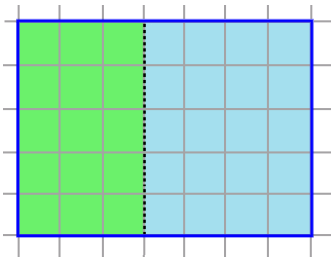
Area of Decomposed Rectangles

1. This rectangle is divided into two parts.



a. What is the area of the smaller part? Write a multiplication.

b. What is the area of the larger part? Write a multiplication.

c. What is the area of the entire rectangle? Write a multiplication.

d. You've written three multiplications. What is same about each one?

e. If we write the length of this rectangle as $3 + 4$, then what would $5 \times (3 + 4)$ signify?

2. **a.** Draw here a rectangle that is divided into two smaller rectangles in this manner:

The entire rectangle is 4 units high by 12 units long.
The first part will be 4 units high by 3 units long.
The second part is 4 units high by 9 units long.

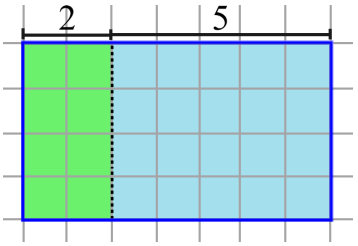
b. Write a multiplication for the area of the smaller part.

c. Write a multiplication for the area of the larger part.

d. Write a single multiplication for the area of the entire rectangle.

e. What would $4 \times (3 + 9)$ signify in this context?

The **height** of this rectangle is **4** units. Since the rectangle is divided into two parts, we can write its **length** as the sum **2 + 5**.



All in all, the area of the entire rectangle is **4 × (2 + 5)** = 4 × 7 = 28 square units.

But we can also think of it this way. The area of the first part is 4 × 2, or 8, and the area of the larger part is 4 × 5, or 20.

Adding those together, the area of the entire rectangle can be written as **4 × 2 + 4 × 5**.

Both of those calculations give us the area of the entire rectangle — so they are equal:

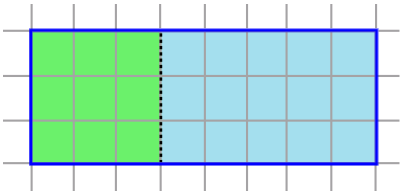
$4 \times (2 + 5)$	=	4×2	+	4×5
area of the whole rectangle		area of the first part		area of the second part

3. Fill in the missing parts to match the expressions (number sentences) for the area.

a.

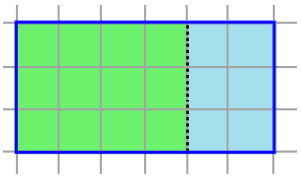
___ × (___ + ___) = ___ × ___ + ___ × ___

area of the whole rectangle | area of the first part | area of the second part



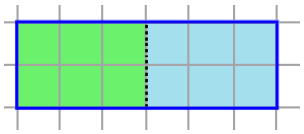
b.

___ × (___ + ___) = ___ × ___ + ___ × ___



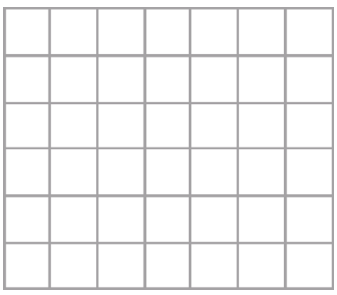
c.

___ × (___ + ___) = ___ × ___ + ___ × ___

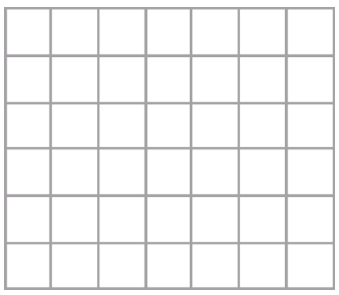


4. Draw a rectangle that matches the given expression (number sentence). Also find its area.

a. $3 \times (2 + 4) =$



b. $5 \times (1 + 4) =$

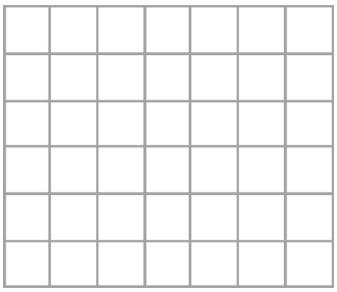


5. Draw a rectangle that matches the given expression, and fill in the missing parts.

a.

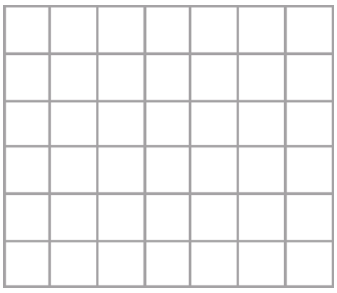
$4 \times (3 + 1)$ = ___ × ___ + ___ × ___

area of the whole rectangle | area of the first part | area of the second part



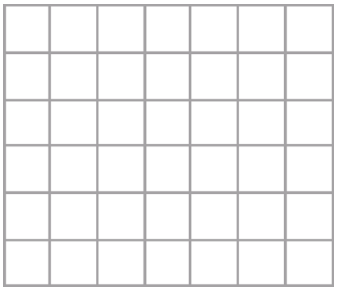
b.

___ × (___ + ___) = 3×2 + 3×1



c.

___ × (___ + ___) = 2×5 + 2×2

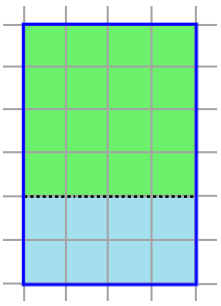


6. Write expressions for the area of each rectangle, thinking of it as one rectangle or two. (This time, the parts are divided by a horizontal line, not a vertical.)

a.

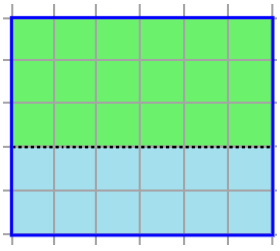
___ × (___ + ___) = ___ × ___ + ___ × ___

area of the whole rectangle | area of the first part | area of the second part



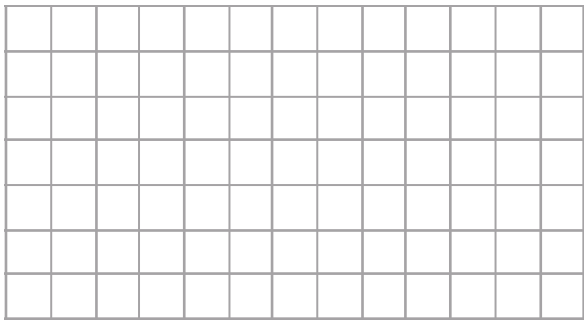
b.

___ × (___ + ___) = ___ × ___ + ___ × ___

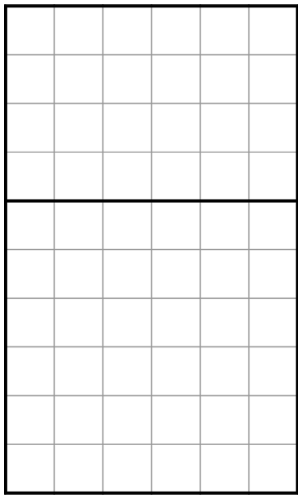


7. Draw a rectangle to show that $6 \times (2 + 9)$ equals $6 \times 2 + 6 \times 9$.

   Explain how your rectangle shows that.



8. Which expressions match the area model shown by the rectangle?



(i) $6 \times (4 + 6)$

(ii) $6 \times 4 + 6 + 4$

(iii) $6 \times 4 \times 6 \times 6$

(iv) $6 \times 4 + 6 \times 6$

(v) $6 \times 4 \times 6 + 4$

(vi) $6 \times (4 + 4)$

(vii) $4 \times (6 + 6)$

9. Draw a two-part rectangle that matches the given expression.

a. $5 \times (7 + 6)$

b. $7 \times 1 + 7 \times 6$

Find the value of the unknown in each case.

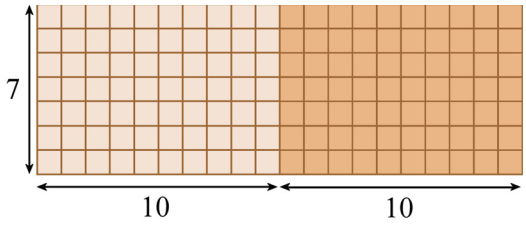
Puzzle Corner

a. $5 \times (2 + b) = 10 + 40$

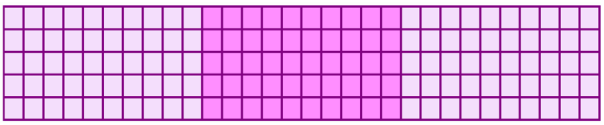
b. $104 = 8 \times (s + 7)$

Multiplying by Multiples of Ten

1. The picture shows a particular idea for solving 7 × 20. What is that idea?



2. Solve 5 × 30 by dividing the rectangle into parts.



5 × 30 = _____

We can solve multiplication problems, such as 5 × 60, by repeated addition.

$$5 \times 60 = 60 + 60 + 60 + 60 + 60$$

We could also solve it by breaking the multiplication into several parts, like you did in exercises 1 and 2. But here's another idea for solving 5 × 60.

- First, 60 is equal to 6 × 10, isn't it? So, to solve 5 × **60**, we can multiply 5 × **6 × 10**.
- Then, **5 × 6** × 10 is the same as **30** × 10.
- Lastly, 30 × 10 is just 30 with a zero tagged on the end of it... or 300.

3. Break each multiplication into another where you multiply three numbers, one of them being 10. Multiply and fill in.

a. 7 × 90 = 7 × 9 × 10 = _____ × 10 = _____	**b.** 4 × 80 = ____ × ____ × 10 = _____ × 10 = _____	**c.** 6 × 40 = ____ × ____ × 10 = _____ × 10 = _____
d. 9 × 90 = ____ × ____ × 10 = _____ × 10 = _____	**e.** 30 × 12 = 10 × ____ × ____ = 10 × _____ = _____	**f.** 80 × 3 = 10 × ____ × ____ = 10 × _____ = _____

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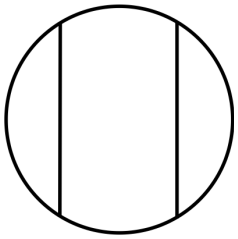
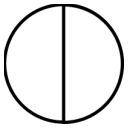
Understanding Fractions 1

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?

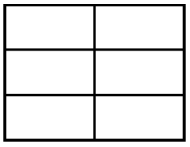
Why or why not?





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

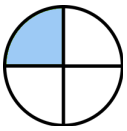
Here, one whole is divided into three equal parts. Each part is one-third of the whole.



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

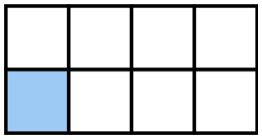
One whole is divided into four equal parts. One part is coloured.

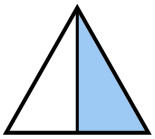
That one part is 1 fourth of the whole, and is written as $\frac{1}{4}$.



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

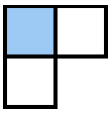
That one part is 1 eighth of the whole, and is written as $\frac{1}{8}$.





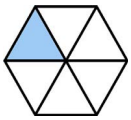
1 half

$\frac{1}{2}$



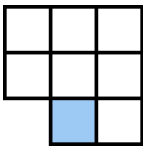
1 third

$\frac{1}{3}$



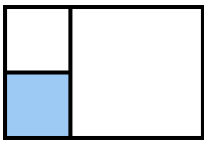
1 sixth

$\frac{1}{6}$



1 eighth

$\frac{1}{8}$

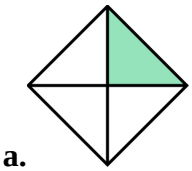


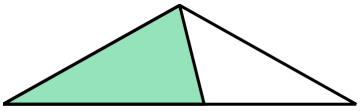
Here, the whole is not divided into equal parts, so we cannot easily tell what fraction this is.

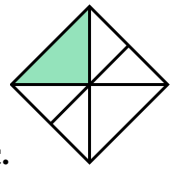
The fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$ and so on are called **unit fractions**.

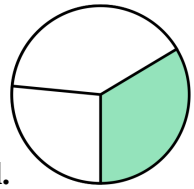
A unit fraction signifies ONE part of a whole, when the whole is divided into *equal* parts.

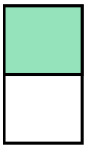
1. In each picture, one part is shaded. **If** the one whole is divided into *equal* parts, write the fraction that is formed, and otherwise not.

a. 

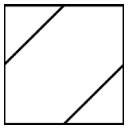
b. 

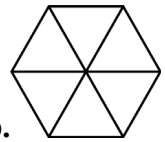
c. 

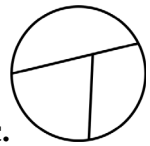
d. 

e. 

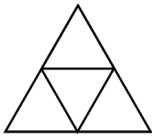
2. Is the one whole divided into equal parts or not? If yes, shade one of the pieces and write the resulting fraction.

a. 

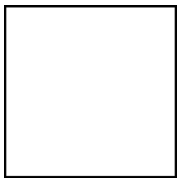
b. 

c. 

d. 

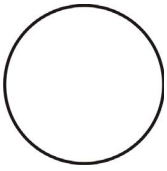
e. 

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



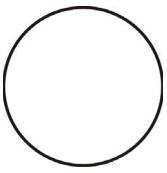
a. four equal parts

b. three equal parts

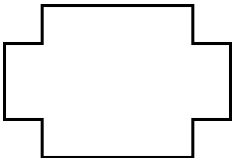


c. eight equal parts

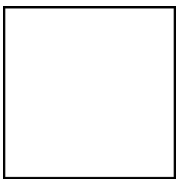
d. six equal parts



e. four equal parts



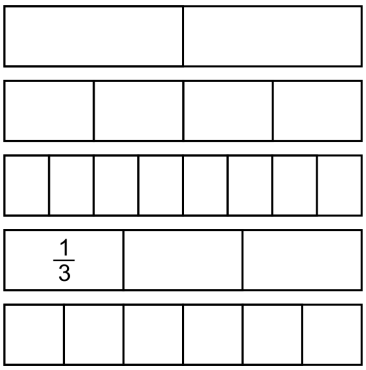
f. two equal parts



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.

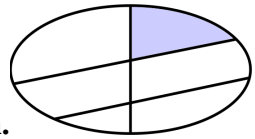
Fold three of the strips of paper so that you will get halves, fourths, and eighths. Fold the other two so that you will get thirds and sixths. See the illustration.

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

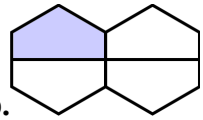
5. Mandy drew a shape, divided it into equal parts, and coloured $\frac{1}{6}$ of it.

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

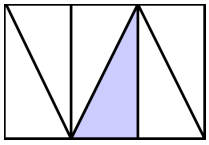
a.



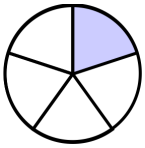
b.



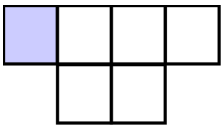
c.



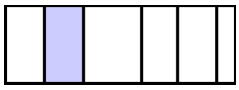
d.



e.

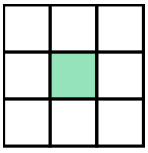


f.



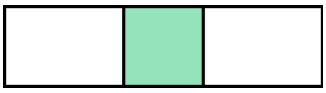
6. Students wrote what fraction of the shape is shaded. Which students made an error? Explain why they are in error.

Student 1:



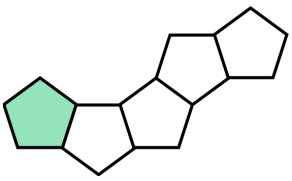
$\frac{1}{8}$

Student 2:



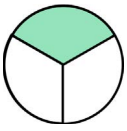
$\frac{1}{3}$

Student 3:



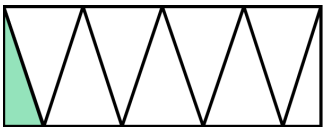
$\frac{1}{5}$

Student 4:



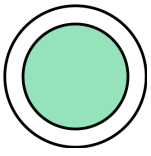
$\frac{1}{2}$

Student 5:



$\frac{1}{9}$

Student 6:

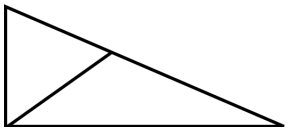


$\frac{1}{2}$

Use questions 7 and 8 for extra practice.

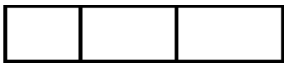
7. IF the shape is divided into equal parts, shade one of the parts. Then write the fraction.

a.

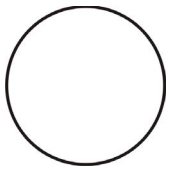


b.

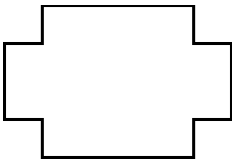
c.



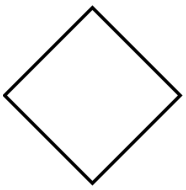
8. Divide each shape into equal parts. Shade one of the parts. Write the unit fraction.



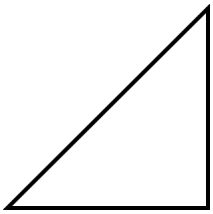
a. six equal parts



b. four equal parts

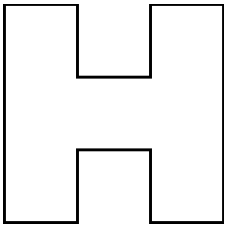


c. eight equal parts

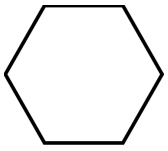


d. two equal parts

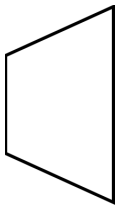
e. eight equal parts



f. four equal parts



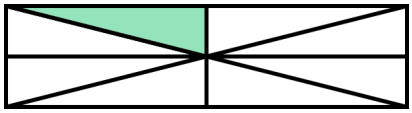
g. six equal parts



h. two equal parts

Puzzle Corner

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



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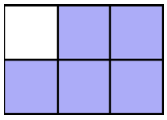
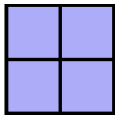
Understanding Fractions 2



$\frac{5}{6}$

Here, the rectangle is one whole. It is divided into six equal parts, and five of those are coloured. Those five parts are **5 sixths.**



$\frac{4}{4}$

Now the whole has four equal parts. All four parts are coloured. We have 4 fourths or one whole.

$\frac{3}{8}$

"three eighths"

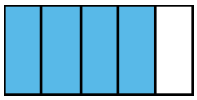
The top number tells **how many** (coloured) **PARTS** we have. It is the **numerator** — it enumerates or gives the count of the parts.

The bottom number tells **how many equal parts the whole is divided into**. It is the **denominator** — it denominates or names the type of parts we have.

After halves, we use ordinal numbers to name the fractional parts (thirds, fourths, fifths, sixths, sevenths, eighths, tenths, and so on).

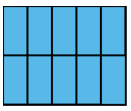
$\frac{2}{3}$

2 thirds



$\frac{4}{5}$

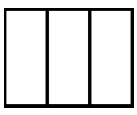
4 fifths



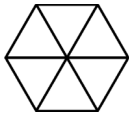
$\frac{10}{10}$

10 tenths

1. Colour parts to illustrate each fraction.

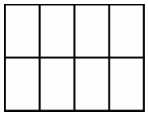


a. 2 thirds

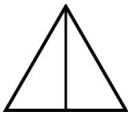


b. 4 sixths

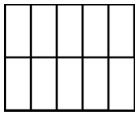
c. 3 fifths



d. $\frac{3}{8}$



e. $\frac{2}{2}$

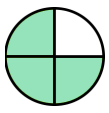


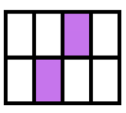
f. $\frac{9}{10}$

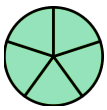
2. Write each fraction, and read it aloud.

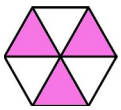
a. 

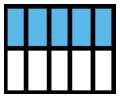
b. 

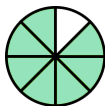
c. 

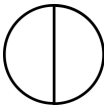
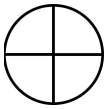
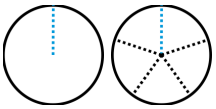
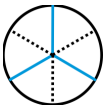
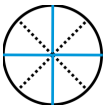
d. 

e. 

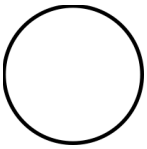
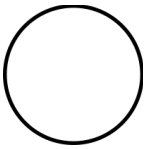
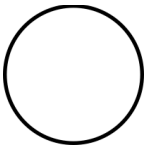
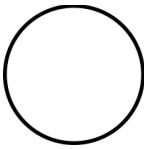
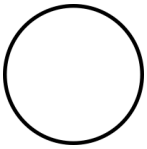
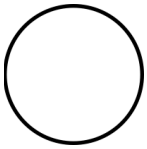
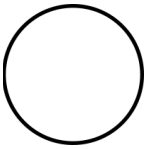
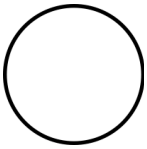
f. 

g. 

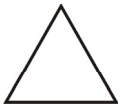
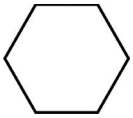
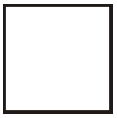
h. 

How to draw pie models		
Halves:  split the circle with a straight line.	**Thirds:**  Draw lines at 12 o'clock, 4 o'clock, and 8 o'clock.	**Fourths:**  First draw halves, then split those like a cross pattern.
Fifths:  Draw as if a man doing jumping jacks.	**Sixths:**  First draw thirds, then split those.	**Eighths:**  First draw fourths, then split those.

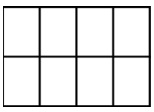
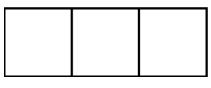
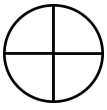
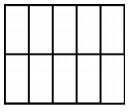
3. Draw the pie models and colour the parts to illustrate the fractions.

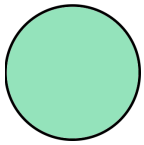
a. $\frac{2}{3}$ 	**b.** $\frac{2}{5}$ 	**c.** $\frac{3}{6}$ 	**d.** $\frac{6}{8}$ 
e. $\frac{4}{5}$ 	**f.** $\frac{3}{8}$ 	**g.** $\frac{3}{3}$ 	**h.** $\frac{7}{8}$ 

4. Divide the shapes into equal parts, and colour some of the parts, to show the fractions.

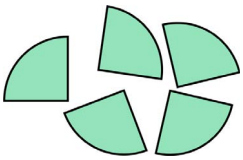
a. $\frac{1}{2}$ 	**b.** $\frac{3}{6}$ 	**c.** $\frac{1}{3}$ 	**d.** $\frac{3}{4}$ 

5. Colour in <u>the whole shape</u> = 1 whole. Then write 1 whole as a fraction.

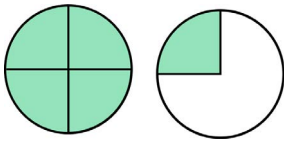
 **a.** $1 = \frac{8}{8}$	 **b.** $1 = \frac{\quad}{\quad}$	 **c.** $1 = \frac{\quad}{\quad}$	 **d.** $1 = \frac{\quad}{\quad}$	 **e.** $1 = \frac{\quad}{\quad}$



one whole



5 fourths

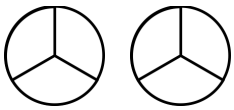


5 fourths = $\frac{5}{4}$

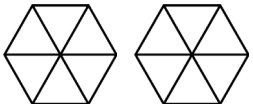
Here, the circle is one whole. The little pieces are **fourths (**compared to the whole). We have **5 fourths**. If we place these fourths inside the one-whole circles, we get one full circle and another one with one fourth filled in.

How many fourths would you need to have **two wholes**? _____ fourths

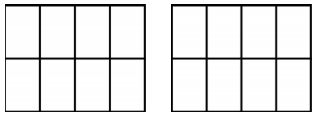
6. Colour in the parts to show each fraction. In each case, one circle, one hexagon, or one rectangle depicts one whole.



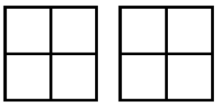
a. $\frac{5}{3}$



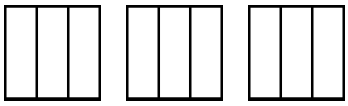
b. $\frac{10}{6}$



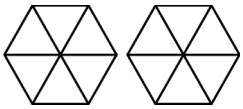
c. $\frac{11}{8}$



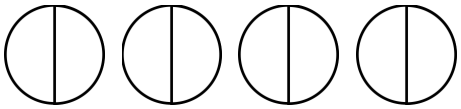
d. $\frac{8}{4}$



e. $\frac{7}{3}$

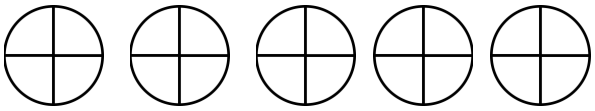


f. $\frac{8}{6}$



g. $\frac{7}{2}$

h. $\frac{19}{4}$



7. <u>Counting activity.</u> We can count in fractions just like counting with whole numbers. For example, counting in sixths, we count:

1 sixth, 2 sixths, 3 sixths, 4 sixths, 5 sixths, <u>6 sixths</u> which also equals <u>one whole</u>.
7 sixths, 8 sixths, 9 sixths, 10 sixths, 11 sixths, <u>12 sixths</u> = <u>two wholes</u>. And so on.

Count in fractions with your teacher or in a circle of students. Each person says the next count. Every time you come to a whole number, name it. If someone gets stuck, others can help.

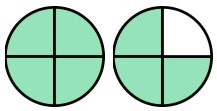
a. Count in halves, up to four wholes.

b. Count in thirds, up to four wholes.

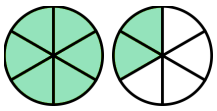
c. Count in fourths, up to four wholes.

d. Count in fifths, up to four wholes.

8. Write the fraction and say it aloud.

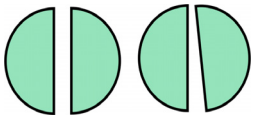


a. ___

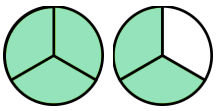


b. ___

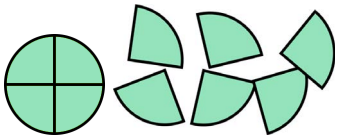
c. ___



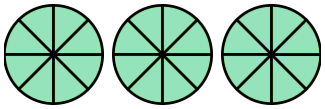
d. ___



e. ___



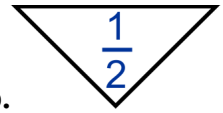
f. ___



g. ___

9. The picture shows a fractional part. Draw a one whole that corresponds to it.
Are there several ways to draw it?

a. $\frac{1}{4}$



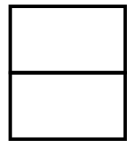
b.

c.

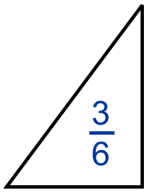
Puzzle Corner

The picture shows fractional parts. Draw a one whole that corresponds to it.

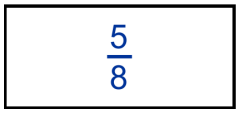
a. $\frac{2}{5}$



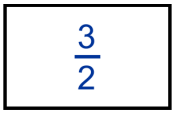
b.



c.

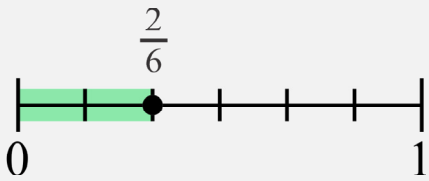


d.



Fractions on a Number Line 1

This is a number line from 0 to 1. It is partitioned or divided into *six* parts. Each sixth, or one part, is this much: ⟼. The green rectangle shows the two parts out of six parts in total.
The point marks **the fraction $\frac{2}{6}$** on the number line.

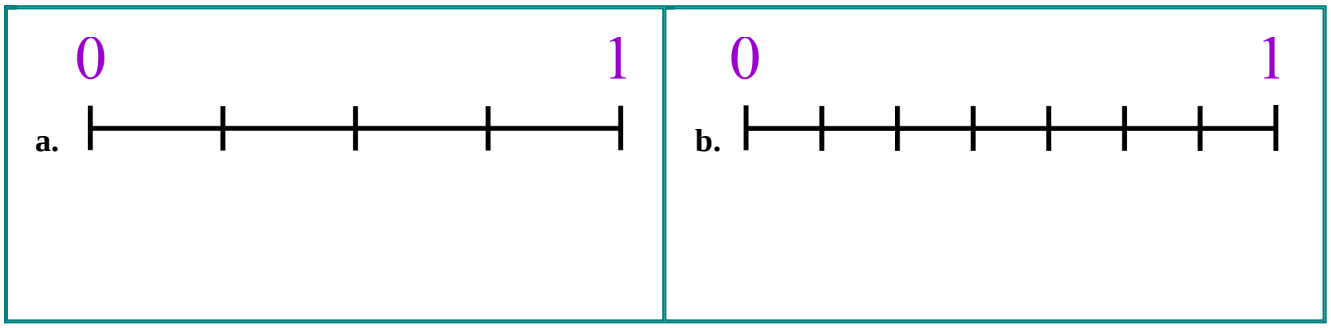


Note: the point for 2/6 is at the right end of the rectangle. Normally, we simply draw a *point* (not a rectangle) on the number line to indicate a number (and fractions *are* numbers). The rectangle is drawn here just to help you understand the concept.

Here you see all the fractions from $\frac{0}{6}$ to $\frac{6}{6}$ on the number line. Note that $\frac{0}{6}$ is the same as 0, and $\frac{6}{6}$ is the same as 1.

The fraction $\frac{5}{6}$ is marked with a dot. Imagine or draw a rectangle extending from zero to 5/6. The length of that rectangle would be five times ⟼.

1. Write the fractions under every tick mark, including under 0 and 1.



2. Write the fraction marked by the dot on the number line.