

It All Begins With The Seed!



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The mission of Alberta Canola is to support the long-term success of canola farmers in Alberta through research, extension, consumer engagement, and advocacy for canola farmers.

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Thank you to the teachers who participated in the development of this activity booklet.

Resource Design & Illustrations

Pulp Studios Inc.
James Grasdal



Welcome to the Duffy farm! Meet Chase, his sister Amelia, and Grandma and Grandpa Duffy.

Chase and Amelia often visit their grandparents at the farm and learn about canola.

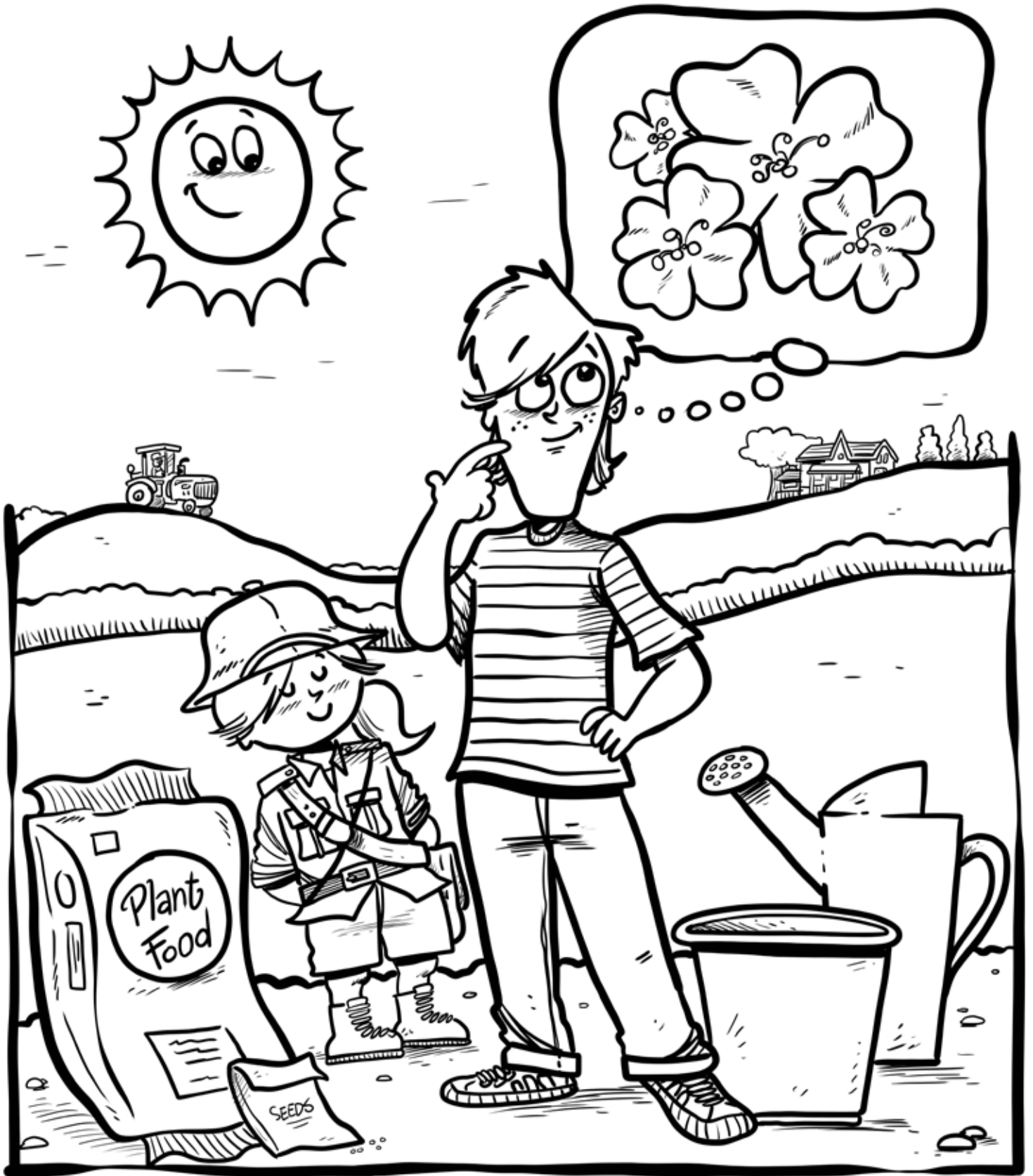
Canola is one of the main crops Grandpa Duffy grows on the family farm.



Chase and Amelia also enjoy baking and cooking with their grandma. Together, they make special traditional family recipes using heart-healthy canola oil

that comes from the canola seeds grown on the Duffy farm.

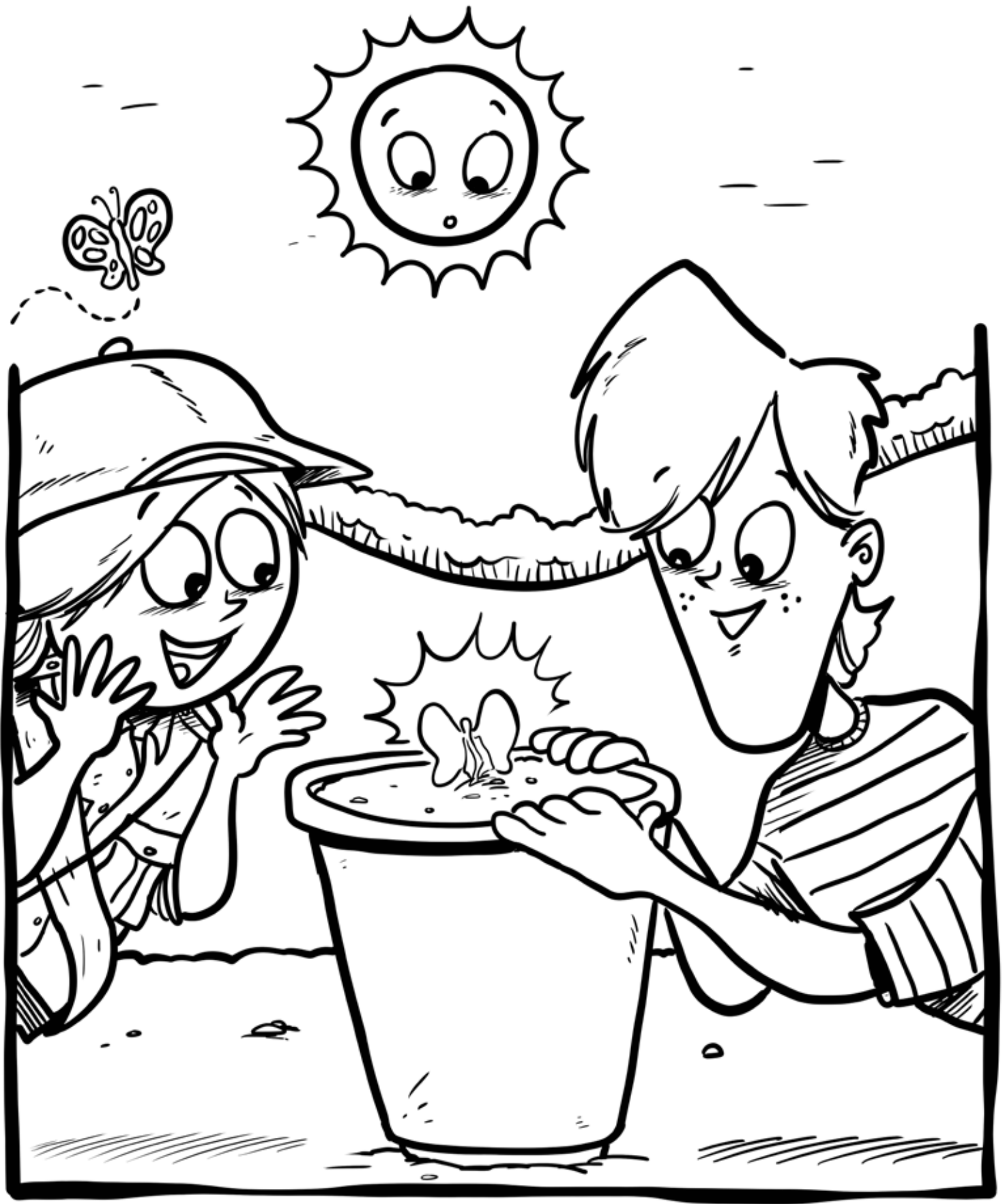
Join Chase and Amelia in their many fun-filled adventures on the Duffy farm!



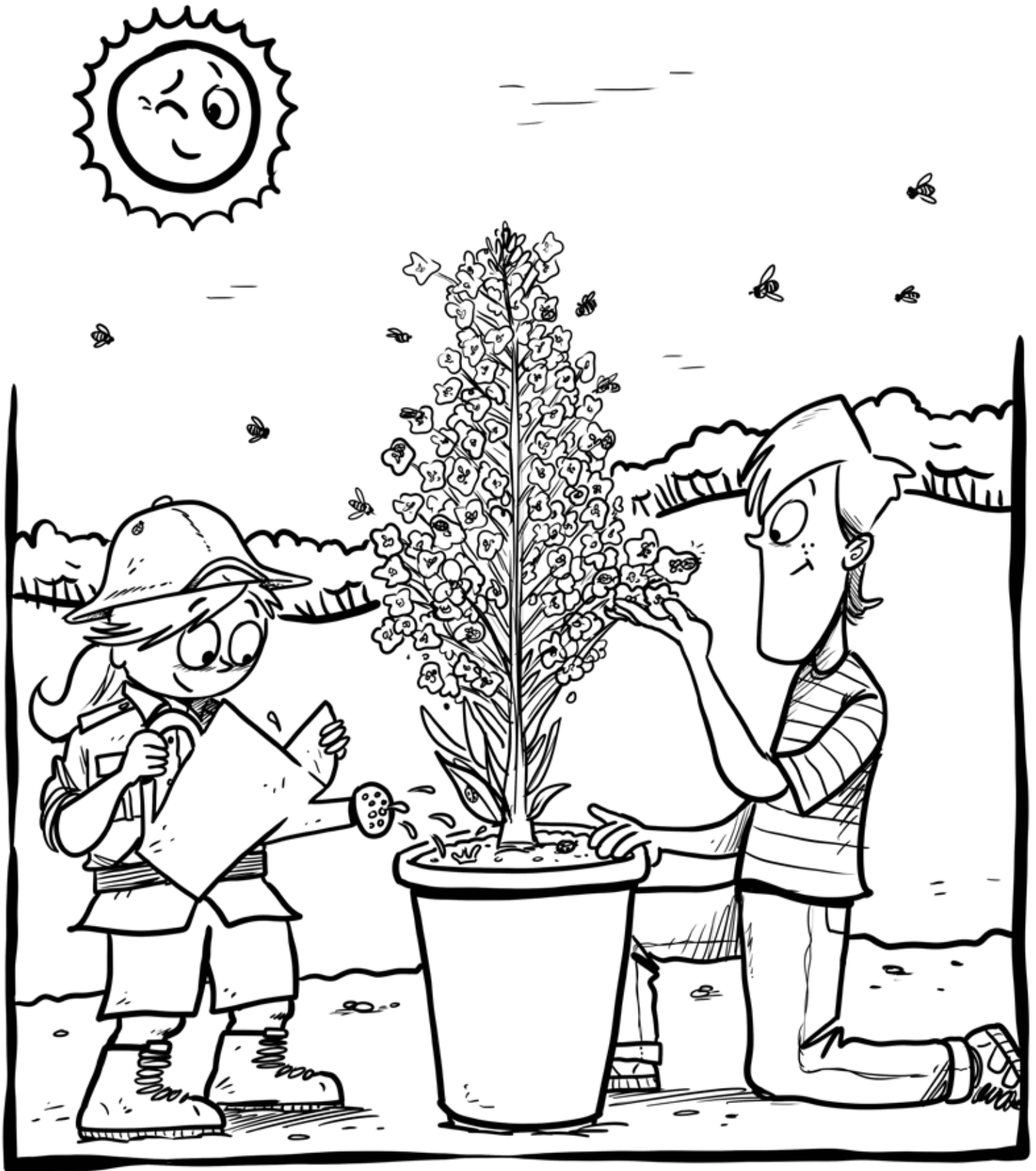
Chase and Amelia have learned so much about canola from Grandpa Duffy. In the springtime they were given some seeds by their grandpa, which they plan to grow in a pot with soil. You can also try growing your own seeds at home with the help of an adult. Seeds can be purchased from your local agriculture store.



Chase fills the pot with soil and asks Grandpa Duffy to add some plant food, which is also called fertilizer. They then plant the seeds and cover them with soil. Amelia sprinkles the mixture with water.



Chase places the pot in the sun. They water it lightly every day.
Soon little leaves appear.



Chase and Amelia watch the canola plant grow over the coming weeks. By summer they notice their canola plant becoming tall and see insects on the plant and some pollinating the tiny yellow flowers.



Once the flowers are pollinated, Chase and Amelia notice the flowers turn into green-coloured pods. Later on, they notice green seeds growing inside the pods.





By fall, Chase and Amelia notice that the green pods turn golden yellow. The canola seeds inside turn a dark black-brownish color.



IT'S YOUR TURN!

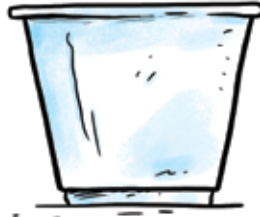
What you need...



1 small container of seeds



water



small clear disposable cup or container



soil to fill 2/3 of the container



disposable spoon

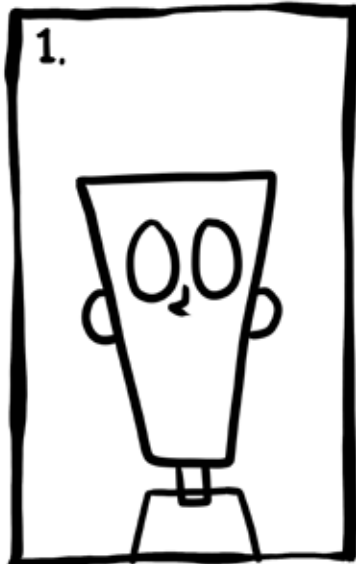
Grow some plants in the classroom... here's how:

Note: Have an adult help you with the following steps.

1. Label your clear disposable cup or container with your name.
2. Using your disposable spoon, fill the cup 2/3 with soil.
3. Place 1-2 seeds about 2.5 cm apart in the soil and about 1.5 cm deep into the soil. Once seeds are in their holes, cover with soil.
4. Drip water on top of the seed and soil until the soil is damp, but not too wet.
5. Place the cup and seed in a room temperature area where it is safe and will be able to have access to sunlight.
6. Check the cup every day. Keep the soil damp.
7. Watch what happens!



How To draw Chase Superman Duffy!



Simple Shapes!



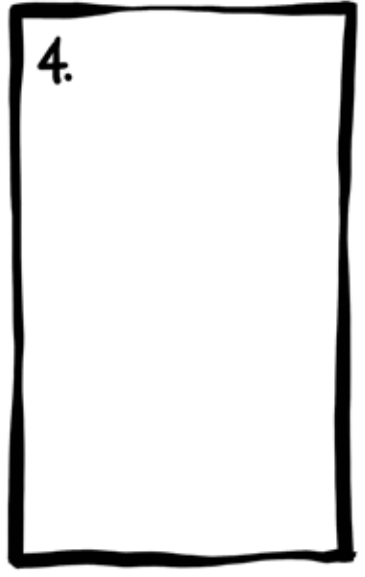
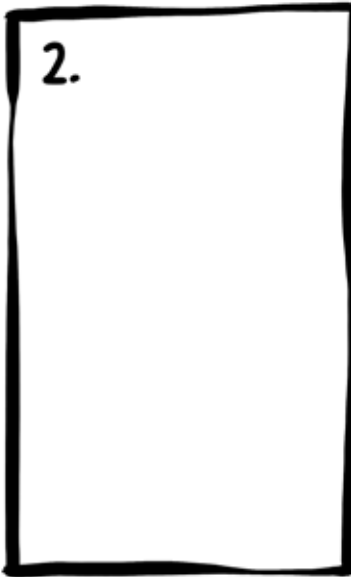
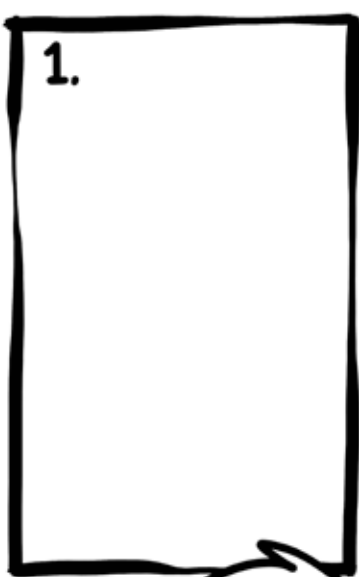
Hair!



Nose and mouth!




Details!



**Remember to
always draw in pencil first,
so you can erase guidelines
and fix mistakes!**



**Help Chase
Find All
the Oil Drops
to Learn
What Canola is
Used For!**



CANOLA SEEDS,
OIL AND MEAL
ARE USED
AROUND THE WORLD!



CANOLA OIL
CAN BE
USED TO
MAKE A LOT
OF
NON-FOOD
ITEMS
AS
WELL!

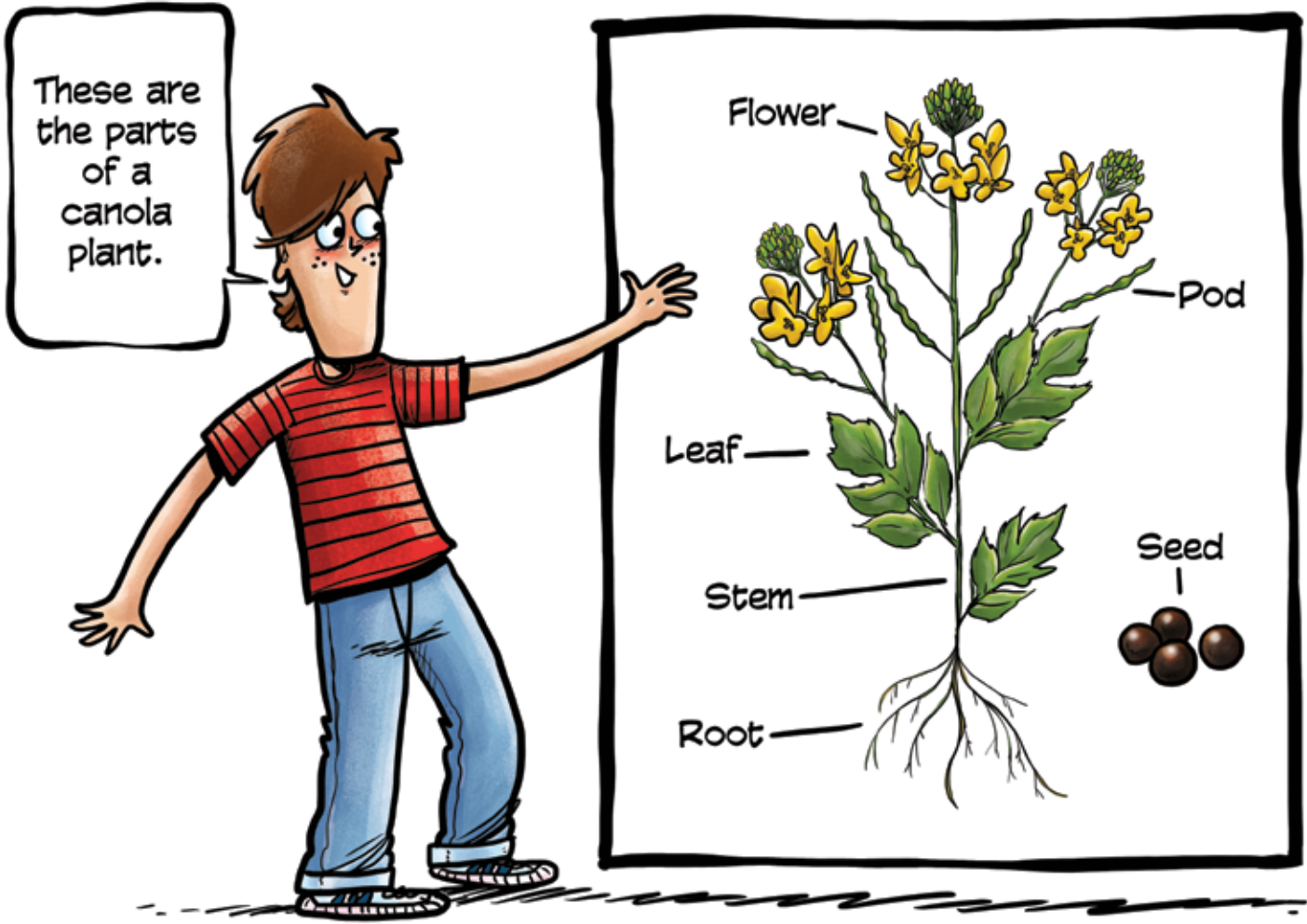


It All Begins With The Seed!

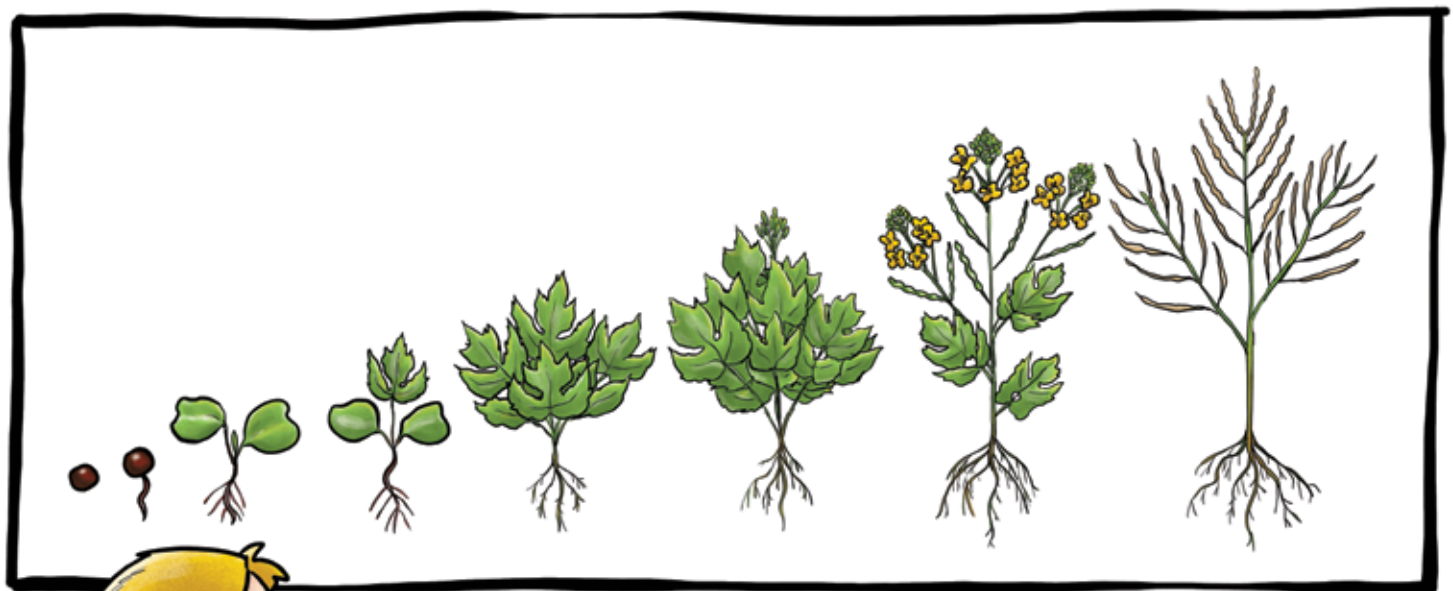


Answers
can be
found on
page 14



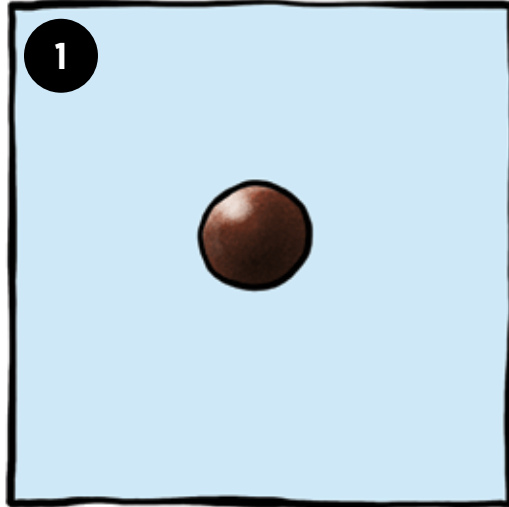


It All Begins With The Seed: Canola Plant Life Cycle.

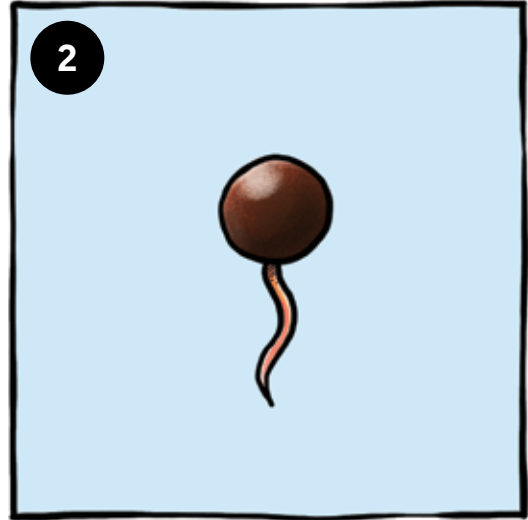


It All Begins With The Seed: Canola Plant Life Cycle.

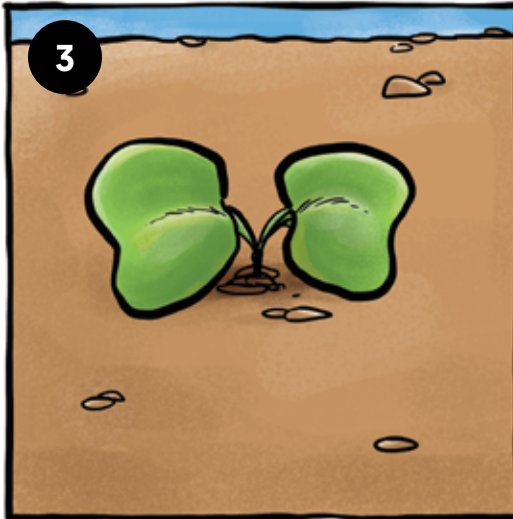
A canola plant comes from one single tiny dark-coloured canola seed that measures approximately 1 millimetre in diameter!



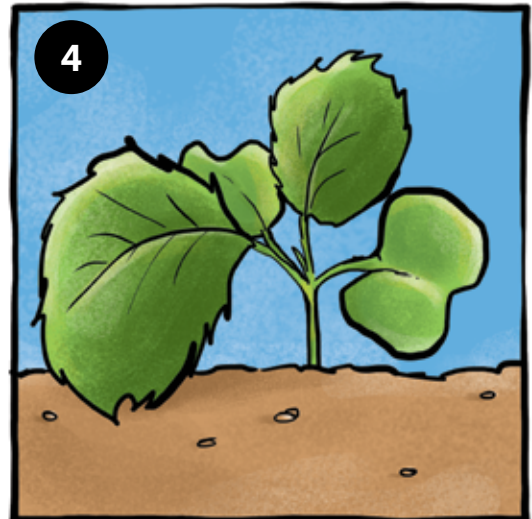
In the springtime, the canola seed is planted by special farming equipment called a seeder.



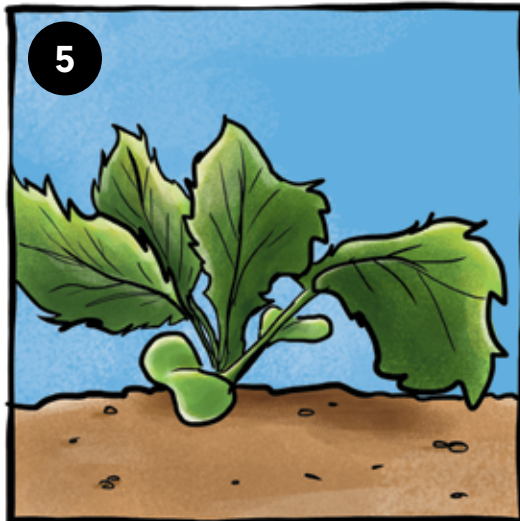
Next, the canola seed will germinate and begin to produce a root.



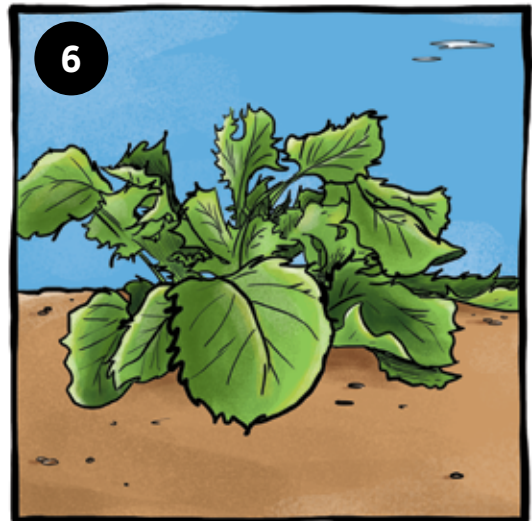
During emergence, you see a young canola plant peek through the soil. This young plant is a cotyledon.



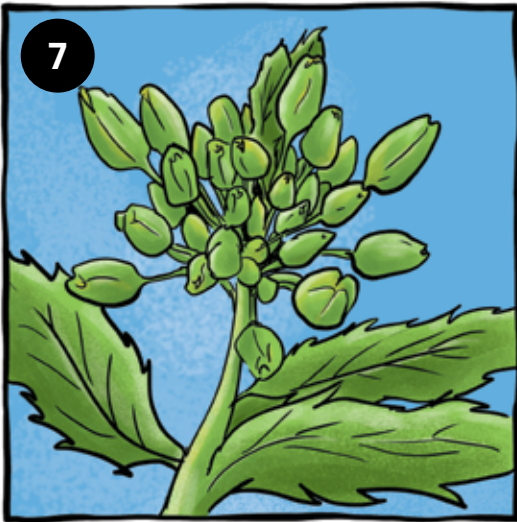
The cotyledon will develop 2 true leaves, in addition to the young cotyledon leaves.



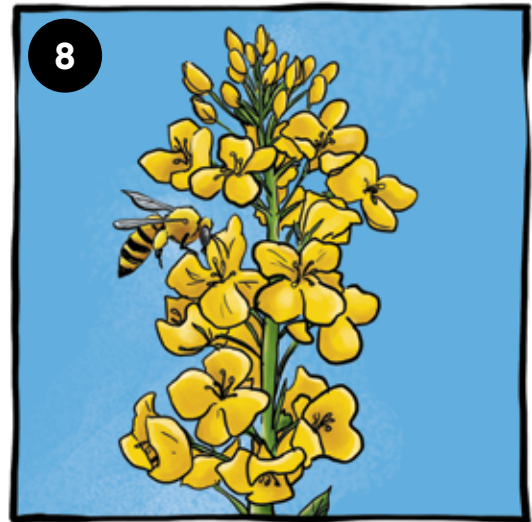
The young canola plant will grow 4 leaves.



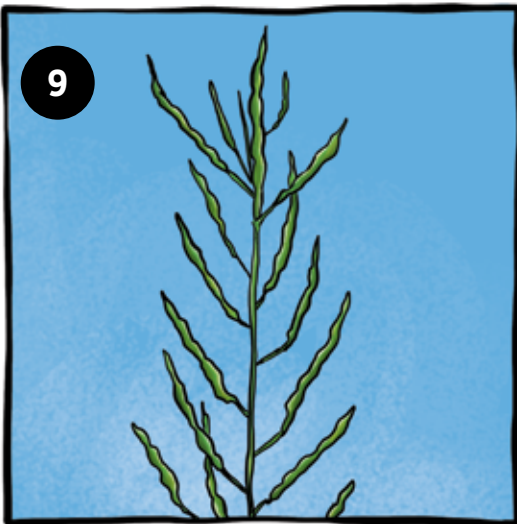
The young canola plant will enter the rosette stage.



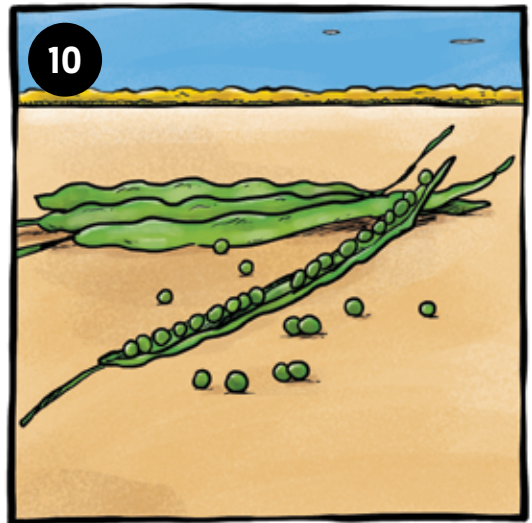
The young canola plant will enter the budding stage.



A canola plant grows to be about 1-2 metres in height and is a flowering plant. Insects, such as bees, will pollinate the flowers.



When flowers are pollinated, they will produce green pods.



Each plant will produce on average 60-100 pods that are about 5 centimetres long. Each pod will produce approximately 20-30 canola seeds.

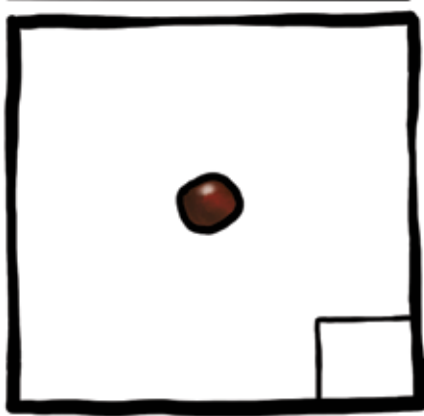
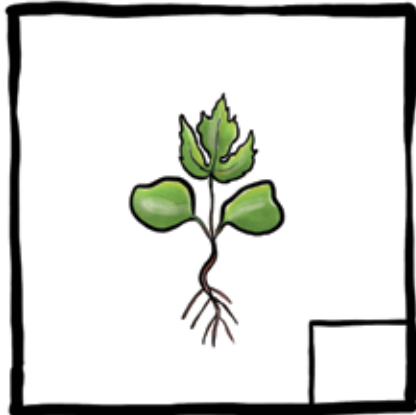
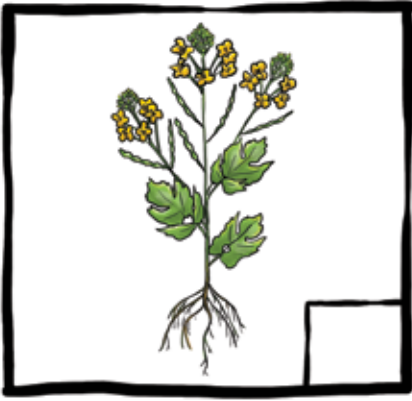


Seed colour determines maturity and indicates when the canola crop is ready for harvest. A combine is used to get the dry canola seeds out of the golden yellow pods.

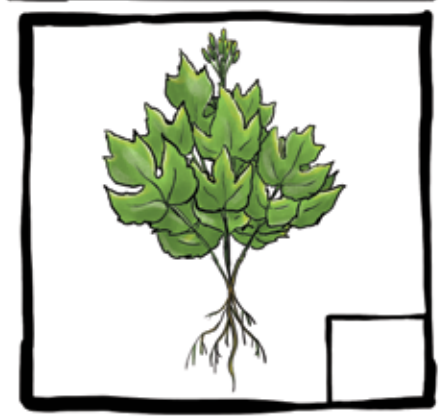
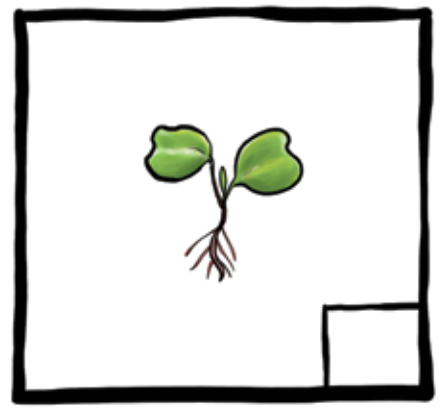
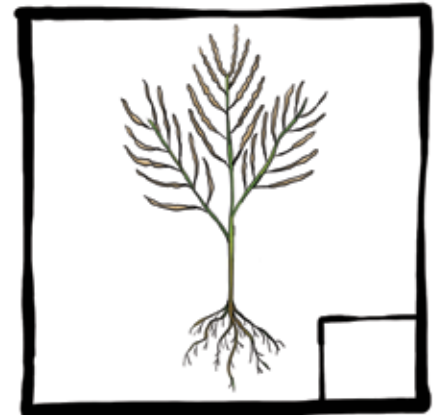
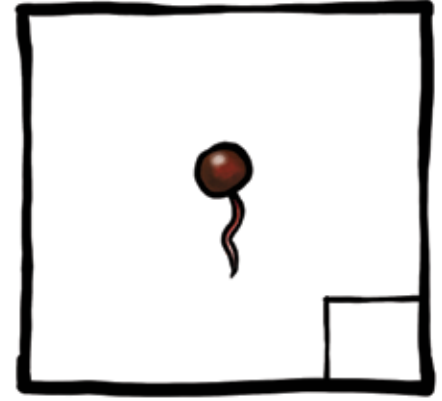
Solution to the hidden oil drops from page 10-11

- o Plane - canola oil is used in biofuel and plane de-icer. Planes export canola seeds, oil, and meal all around the world.
- o Bird feeder - canola meal can be used in bird feed.
- o Truck - canola oil is used to make biodiesel and trucks transport canola seed, meal and oil.
- o Suntan lotion - canola oil is used to make suntan lotion.
- o Canola oil - canola is used in cooking, baking and various other products.
- o Lipstick - canola oil is used to make cosmetics.
- o Bunny - canola meal is part of pet food.
- o Bee - canola flowers give bees their source of food to make honey, and the bees help to pollinate canola flowers to produce canola seeds.
- o Cow - canola meal is used to make animal feed.
- o Cookies - canola oil is used for baking.
- o Insect repellent and lip gloss - canola oil is used in making cosmetics and things like bug spray.
- o Mushrooms - canola oil is used in cooking.
- o Newspaper - use canola oil to make ink.
- o Candle - use canola oil to produce wax in candles.
- o Canola field - canola seed is used to grow canola.

OUT OF ORDER!



Oh no!
We have forgotten
all of the stages
of canola growth!
Can you help us
put this mess
back in order?



In the space provided
on each image, record
the number (in the
little box) and write down
the name (on the line
below the image) of the
canola growth stage
that picture is
showing.

Hey Kids! Check Out These Other Great Fun Activities!

Kindergarten: ●

- Let's Play: *What Do You See: How Many Canola Flowers, Ladybugs, and Bees?* pg. 17
- Let's Play: *4 Seasons!* pg. 18
- Cooking with Chase and Grandma Duffy: *Nuts N Bolts*..... pg. 19
- Chase's Crazy Canola Crafts: *Yellow Blooms and Mixed Medium Painting* pg. 20-22

Grade 1:

- Let's Play: *Doubles Aren't Trouble!*..... pg. 23
- Let's Play: *Find the Field - Colour by Number*..... pg. 24
- Cooking with Chase and Grandma Duffy: *Bannock* pg. 25
- Chase's Crazy Canola Crafts and Science Experiments:
Fizzy Chaos, Berry Playdough and Juicy Gel Squish! pg. 26-28

Grade 2:

- Let's Play: *Connect Four - Addition!* pg. 29
- CANowledge Time: *The Good, the Bug, and the Canola!*..... pg. 30
- What Helps and Harms a Canola Plant? pg. 31
- How Much Water to Grow a Bee-you-tiful Golden Flower? pg.32-33
- Let's Play: *Elimination!* pg. 34-35
- Cooking with Chase and Grandma Duffy: *Monster Cookies*..... pg. 36
- Chase's Crazy Canola Crafts and Science Experiments:
Light It Up, Upside Down PLOP, Show What You Know! pg. 37-39
- Canola Breakout! pg. 40

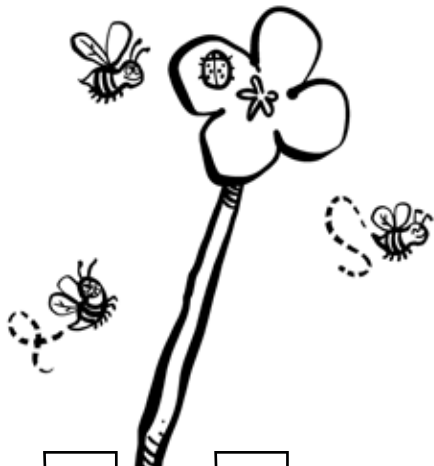
Grade 3:

- Let's Play: *One-Metre Canola Dash Madness; Stand Up, Sit Down; Let There Be Cake, and Area and Perimeter of a Canola Field.* pg. 41-48
- Cooking with Chase and Grandma Duffy: *Did Someone Say Pizza?* pg. 49
- The Journey of the Canola Seed: *From Grain Bin to Bottle!* pg. 50-52
- Uh-Oh! Help Grandpa Duffy Get his Canola Seed Through the Crushing Plant Maze! pg. 53
- Chase's Crazy Canola Crafts and Science Experiments:
Stained Glass and the Ultimate Brain-Build-A-Thon Challenge: Drive In, Eggs Away, London Bridge Isn't Falling Down! pg. 54-59
- Canola Craze..... pg. 60-61


Let's Play - What Do You See: How Many Canola Flowers, Ladybugs, and Bees?

How many canola flowers, ladybugs and bees do you see?

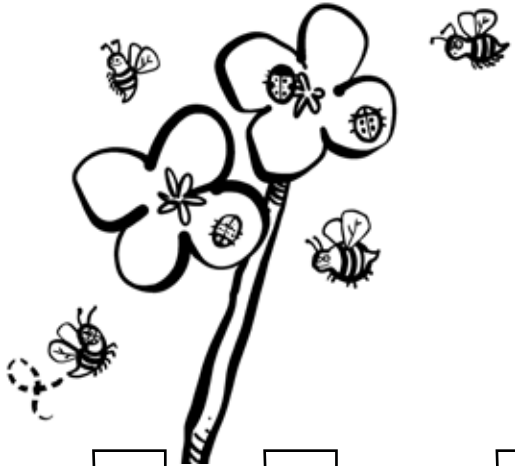
Colour all canola flowers **yellow**, the ladybugs **red**, and the bees **yellow**. Record your number in the **answer box** below the canola plant for each plant shown.



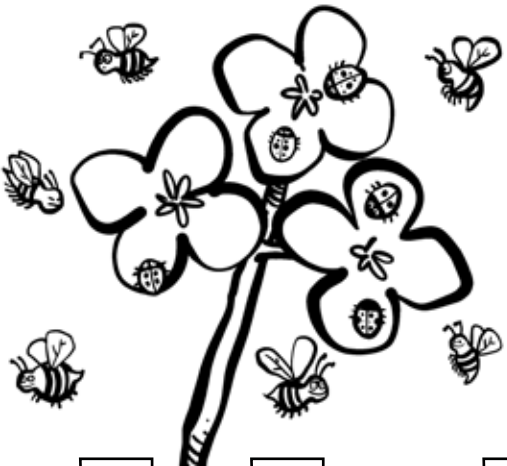
Canola Flowers Bees Ladybugs




Canola Flowers Bees Ladybugs



Canola Flowers Bees Ladybugs



Canola Flowers Bees Ladybugs



Canola Flowers Bees Ladybugs

Let's Play - 4 Seasons!

Many things in life are connected to the seasons, including canola growth. We seed canola in the spring, canola grows throughout the summer, and canola seeds are harvested in the fall. Plants cannot grow during the winter when the ground is covered with snow. At this time, the farmer is working hard to plan ahead for their next growing season.

We will play 4 Seasons to help you think about what is happening with canola during the different seasons.

Materials:

Class of students, and one big area where students can run.

Objective of the game:

To eventually tag all students and have all students in the middle with the "It" person.

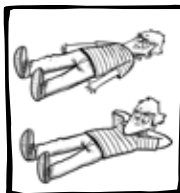
How to Play:

4 seasons is played like 4 corners!

1. One person stands in the middle, closes their eyes and counts to 10.
2. During the 10 seconds, players who are not "it", can run to any of the 4 corners that the adult has assigned ahead of time to one of the 4 seasons: winter, spring, summer or fall.
3. After 10 seconds, the person in the middle calls out a season (e.g. "fall"), and opens their eyes.
4. All people in the called-for corner will join the "it" person in the middle. The people in the other corners all must act out what canola may be doing during that season during their assigned corner's season.
5. The person in the middle then counts out another 10 seconds and all the people that are in the centre with them can try to tag a friend. The person in the middle then repeats the activity until all players are in the centre.

Canola Actions for the Game [Note to participants: feel free to be as creative as you would like!]:

- **Winter:** Canola seeds would be resting in the grain bin. Have children on their stomachs or back lying down on the floor to exemplify canola seeds resting in the grain bin.



- **Spring:** Canola would be seeded and starting to emerge. Have kids kneeling or doing a squat position while holding their hands above their head to represent emergence.



- **Summer:** Canola is growing big and tall. Have kids standing up super tall, raising their arms above their heads, spreading their fingers wide to show canola flowering. This demonstrates the height of the canola plant and the canola plant flowering.



- **Fall:** Canola seed pods would be harvested. Have kids roll their hands and forearms over each other in front of their bodies to represent combines harvesting the canola seeds from the canola pods.



Cooking with Chase and Grandma Duffy

Nuts N Bolts ¹

Being healthy means caring for your body so that you have energy to learn, play, and grow. Eating healthy snacks can help you get enough energy, keep your tummy from growling, and meet your daily nutrition needs.

Grandma Duffy knows that sometimes after all the playing and learning Chase and Amelia do around the farm, Chase and Amelia might have a healthy snack attack! With the help of an adult, try making some Nuts N Bolts to crunch on.

Yield: 44 cups

Ingredients:

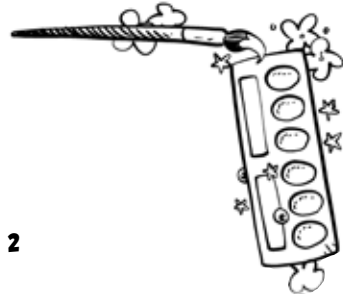
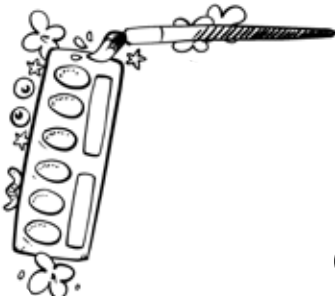
- 6 cups Rice Squares [1.5 L]
- 6 cups Multigrain O's [1.5 L]
- 5 cups Wheat Squares [1.25 L]
- 6 cups Crispy Hexagons [1.5 L]
- 5 cups Corn Squares [1.25 L]
- 1 - 200 g package pretzel sticks [about 3 ½ cups] [875 mL]
- 1 - 1.13 kg jar salted mixed nuts or peanuts
- 1 cup canola oil [250 mL]
- ¼ cup Worcestershire sauce [60 mL]
- 1 Tbsp seasoning salt [15 mL]
- 1 Tbsp celery seed [15 mL]
- 2 tsp garlic powder [10 mL]
- 1 tsp onion powder [5 mL]
- ½ - 1 tsp cayenne pepper [2-5 mL]
- Large roasting pan, or depending on the size of your roasting pan, 2 roasting pans.

Instructions:

1. Preheat oven to 200°F [100°C]
2. In a large roasting pan or aluminum pan, combine cereals, pretzels and nuts.
3. In a small bowl, whisk together remaining ingredients. Drizzle mixture over cereal mixture, stirring constantly; toss to coat. Stir cereal and oil mixture 3 or 4 times as you drizzle.
4. Bake for about 1 hour, stirring every 15 minutes, until dry and crispy.
5. Let the mixture cool. Serve or store the mixture in an air-tight container.
6. Clean up.
7. **Note:** You may need to divide the mix into two batches to bake depending on the size of your roasting pan. Additionally, this recipe can be halved. Cayenne pepper is also optional.

See reference section for additional great helpful tips! ^{1a}





Chase's Crazy Canola Crafts

Yellow Blooms

(and Mixed Medium Painting) ²

We have learned a lot about canola so far! Let's share some of our CANowledge with others by making this fun craft with the help of an adult!

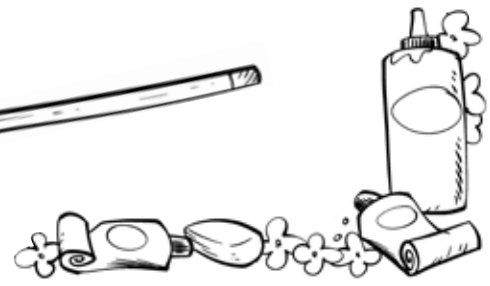
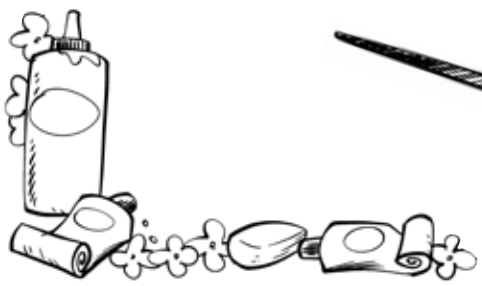


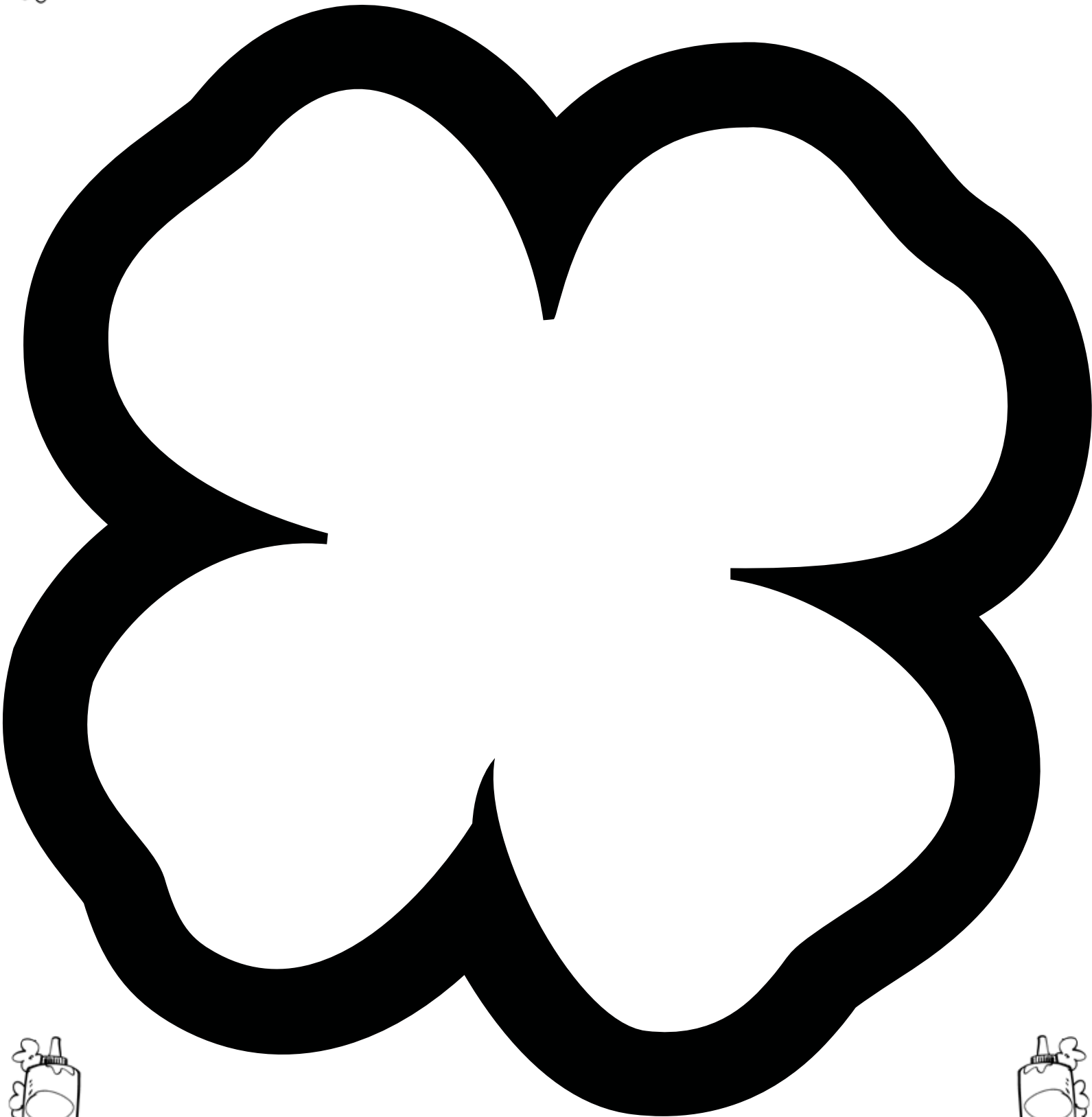
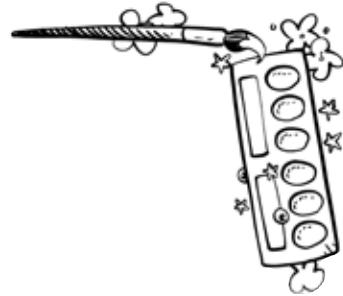
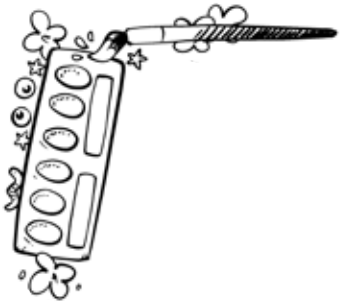
Materials needed:

- Scissors
- Pencil
- Eraser
- Old mixing containers for paint and water [2-5 depending on how many colours you make]
- Enough paintbrushes for all of the colours you choose to use
- Material to protect painting surface [e.g., old newspapers or garbage bags]
- Cut out of canola flower on page 21
- Permanent dark-coloured marker
- Additional canola flower decorations you might like to use
- 6 various unwrapped wax crayons of any colour and brand you want to use
- **[Note: Bright colours will work best]**
- ½ cup [125 mL] of canola oil
- Muffin pan
- Cupcake paper liners
- Toothpicks or stir sticks for mixing
- Optional: 4 tsp of glitter of your choice [20 mL]

Directions:

1. Prepare area and yourself to paint. Cover any surface that you do not want to get paint on with protective material. Wear appropriate clothing.
2. Print out 1 to 4 fun facts you learned about canola onto each petal of the flower found on page 21 with your pencil. Trace over in permanent marker.
3. With an adult helper, follow the directions on page 22, Mixed Medium Painting, to mix paint and paint your canola flower!
4. Using scissors, cut out the canola flower on page 21-22.
5. Clean up!





Mixed Medium Painting ²

Use the materials on page 20.

Instructions:

1. Preheat oven to 200°F [100°C].
2. Line a muffin pan with double baking cups. Line 6 of the muffin cups in the pan.
3. Break unwrapped wax crayons into smaller pieces and place one crayon in each baking cup.
4. Place muffin pan into the oven for 8-10 minutes or until crayons are melted in baking cups. Ask an adult for help to remove the pan from the oven as melted wax can cause serious skin burns.
5. Working quickly with 1 colour at a time, add 1 tsp [5 mL] of canola oil to one baking cup. Stir the mixture with a toothpick until the canola oil completely disappears into the hot melted crayon. Add another 1 tsp [5 mL] of canola oil to the baking cup. Stir until the canola oil is completely absorbed.
6. Repeat step 5 until each crayon colour has 2 tsp [10 mL] of canola oil added. Let the baking cup cool.
7. *If using glitter, add ¼ tsp [1 mL] to each of the melted wax-canola oil mixtures.*
8. Paint the cut-out canola flower and let dry.
9. Clean up.
10. Once the canola flower is dry, display your canola flower on the fridge for everyone to see!

Let's Play - Doubles Aren't Trouble

From one canola seed we can get many more! Let's practice our adding!

In Doubles Aren't Trouble, roll one die and double your answer to see how many possible canola plants will grow from one seed!

Objective of the Game:

To have the student get the first straight or diagonal row filled in on their gameboard.

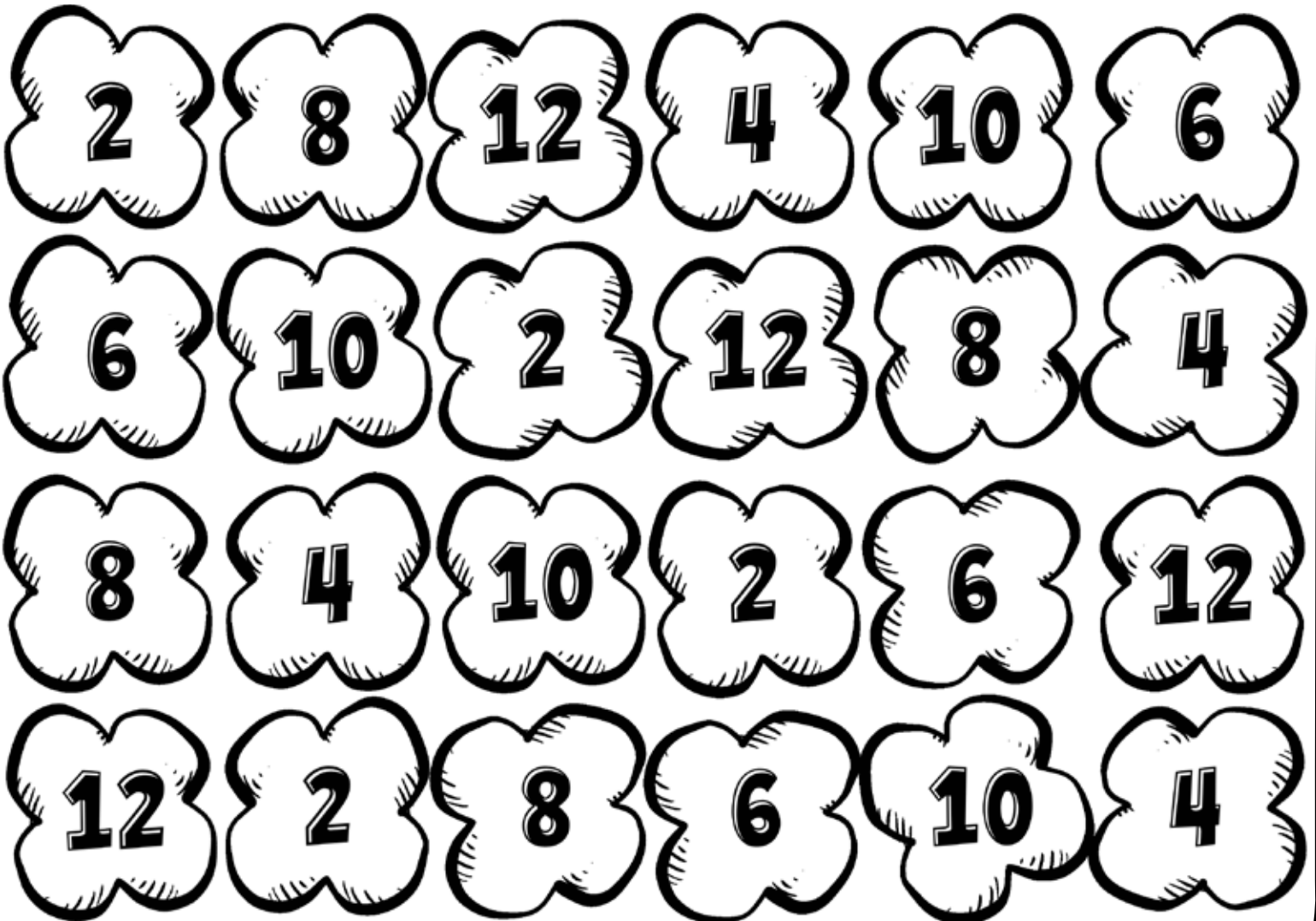
Number of players: 2

Materials Needed to Play:

- 1, 6-sided die
- 1 game board per player
- A yellow marker

How to Play:

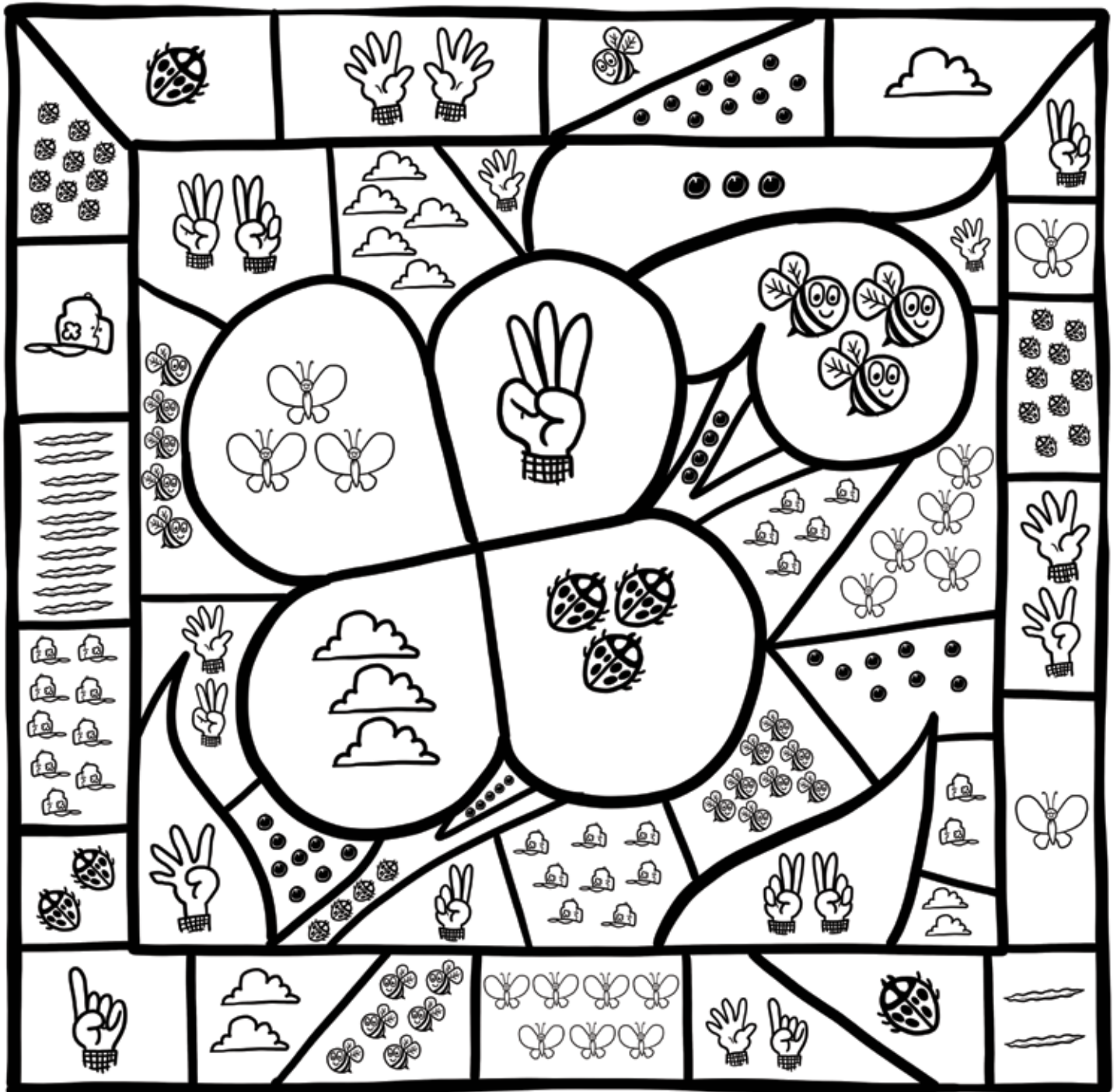
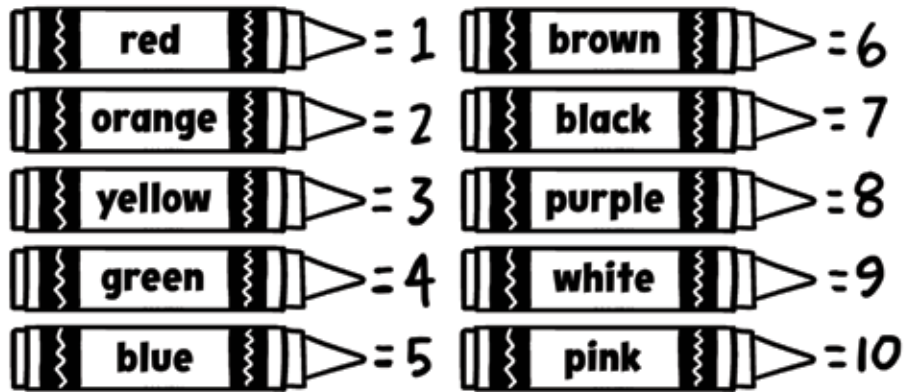
1. Roll one die and double your answer.
2. Colour in the canola flower on your answer sheet that matches the number you determined by doubling your roll.
3. Challenge a friend to see who gets the first straight row or diagonal row.
4. Ultimate challenge! Challenge a friend to see who can fill in all of the flowers first



Let's Play

Find the Field:

Colour by Number



Cooking with Chase and Grandma Duffy

Bannock! ³

Eating a variety of foods is not only delicious but is the key to a healthy and balanced diet. Have plenty of vegetables and fruits on one half of your plate, bowl or lunch box. Put grains and protein foods on the other half. Choose protein foods from plants more often (Alberta Health Services).

Here is a fun-filled First Nations, Inuit, and Métis inspired recipe that can be cooked by anyone.

Chase and Grandma Duffy love to make bannock to eat with a bowl of stew on a chilly day. Chase also loves to eat this with margarine and his Grandma Duffy's famous homemade raspberry jam. Remember to have an adult help you with this recipe!

Yield: 8 servings

Ingredients:

- 2 $\frac{1}{3}$ cups whole wheat flour [575 mL]
- 1 tsp baking powder [5 mL]
- $\frac{1}{2}$ tsp salt [2 mL]
- $\frac{1}{4}$ cup soft [non-hydrogenated] margarine [60 mL]
- $\frac{1}{4}$ cup 1% milk [60 ml]
- $\frac{3}{4}$ cup water [175 mL]



Instructions:

1. Preheat oven to 375°F [190°C].
2. Lightly spray the baking sheet or baking dish with non-stick cooking spray. Set aside.
3. In a large bowl, mix 2 cups [500 mL] of flour, baking powder and salt with a spoon.
4. With the tips of your fingers, work margarine into flour mixture until margarine is divided into small [pea size] pieces.
5. Make a well in the centre of the flour mixture; pour milk and water into the well.
6. Starting at the centre of flour mixture, gradually mix flour into liquid until a soft dough forms. Add remaining flour if needed to get mixture to form a soft non-sticky dough.
7. **[Note:** If you have remaining flour from making the dough, use this to flour your surface.] Turn dough onto lightly floured surface, knead dough a few times, cover and let it rest for at least 20 minutes.
8. Place dough on prepared baking sheet or dish. Flatten dough and shape it into a rectangle.
9. Bake at 375°F [190°C] for approximately 30-40 minutes or until golden.
10. Cut bannock into pieces, about 2 inches X 2 inches [5 cm X 5 cm].
11. Clean up.
12. Serve with soup or stew. Bannock also tastes great with peanut butter and jam!

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Chase's Crazy Canola Crafts and Science Experiments!

Fizzy Chaos! ⁴

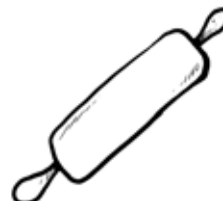
Amelia Duffy is curious and would like you to help her find out what might happen when vinegar and baking soda are mixed together. This activity will leave you with a fizzy good time. Make sure to work with an adult to help where necessary.

Materials:

- Medium to large-sized mixing bowl
- 1 cup all-purpose flour (250 mL)
- 1 cup baking soda (250 mL)
- ¼ cup canola oil (60 mL)
- Food colouring - oil based, or 1 tsp of non-water based, powdered food colouring
- Vinegar
- Spray bottle
- Spoon
- Whisk [optional]
- Moulds or cookie cutters [optional]

Instructions:

1. Make a **prediction** [a best guess] about what might happen when baking soda and vinegar are mixed together. Ask your teacher or adult for examples of when they might mix vinegar and baking soda together in the kitchen.
2. Mix the flour and baking soda in a bowl - it is safe to use your hands!
3. Measure a 1/2 cup of vegetable oil in a liquid measuring cup. Add a couple drops of food colouring or 1 teaspoon of powdered, food colouring to the oil. Mix with a spoon or whisk.
Note: the colour will appear a lot darker in the oil than the final colour when mixing with the dry ingredients.
4. Carefully, add the coloured oil to the bowl. Use a large spoon to mix the ingredients.
Note: the food colouring may leave temporary stains on your hands, so use a mixing tool to avoid unwanted colour on your hands.
5. Play with the dough to form shapes or a scene involving canola flowers! If you like, use cookie cutters or moulds to help get you started.
6. Fill a spray bottle with vinegar. Spray the dough gently and watch how the vinegar reacts to form fizz!
7. Was your prediction correct? Yes or no? Can you think of any other questions from this experiment, or ideas you want to test, that might help Amelia in the future?
8. Clean up.



Chase's Crazy Canola Crafts and Science Experiments!

Berry Playdough! ⁵

Did you know, you can create something magical with berries you may find on a nature walk?

Materials for Berry Dye and Berry Playdough:

- 2 cups all-purpose flour (500 mL)
 - 1 cup salt (250 mL)
 - 2 Tbsp cream of tartar (30 mL)
 - 2 Tbsp canola oil (30 mL)
 - 1½ cup berry dye (375 mL)
- Note:** see below for instructions on berry dye.
- Approximately 2500 g of frozen berries or about 3-4 cups of fresh berries for berry dye
 - ½ cup water (125 mL)
 - Fairy stones (stones from outdoors)
 - Googly eyes
 - Pipe cleaners
 - Sparkles
 - Large pot



Instructions for Berry Dye:

1. Gather your berries. Collect enough to fill half a large pot.
2. Add enough water to just cover the berries.
3. Simmer the berries over low heat for approximately 1 - 1 ½ hours. Stir and check the berries approximately every 15-20 minutes. Leave the lid off of the pot so the berries cook down.
4. Strain the juice from the berries roughly 4 times. You can strain once with a cheese cloth as well to remove the pulp and let cool. The juice will yield approximately 4 cups.

Instructions for Berry Playdough:

1. In a large saucepan combine flour, salt, cream of tartar, and vegetable oil.
2. Add 1½ cups of the berry dye and ½ a cup of water for a strong colour. For a weaker colour use 1 cup of dye and 1 cup of water.
3. Stir over medium heat until the mixture begins to form a ball, approximately 3-5 minutes.
4. Remove the mixture from the heat and knead until the dough is smooth.
5. To prevent any staining, use a plastic tablecloth or placemat when playing and shaping the dough.
6. Decorate with whatever materials you have available such as pipe cleaners, googly eyes. Have fun!
7. Clean up.

Chase's Crazy Canola Crafts and Science Experiments!

Juicy Gel Squish! ⁶

When Chase eats certain candies, he notices some look a lot different than how they actually feel. Have you ever experienced this before? Try making these tasty agar juicy gel bubbles!

Materials:

- 1½ cups canola oil (375mL)
- Tall glass container
- 1 cup colourful fruit juice or sports drink (250 mL)
- 1 tsp agar powder (5 mL)
- 2 cup (500 mL) liquid measuring cup or glass beaker
- 1 pipette or eye dropper
- Optional: larger pipette or turkey baster will allow for bigger drops
- 1 colander or fine mesh strainer

Instructions:

1. Make a **prediction** (best guess) on whether you think these candies will be squishy or not by looking at the materials. What might make the candies squishy?
2. Gather your materials.
3. With adult help, pour the oil into the jar or beaker and place the beaker in the freezer until the oil is really cold (at least 30 minutes).
4. Pour the fruit juice into a small pot and stir in the agar powder.
5. With an adult, place the pot over medium heat. Cook, stirring constantly, until the powder dissolves and the mixture just begins to boil.
6. Remove the pot from the heat. Pour the fruit juice and agar mixture into a bowl. Let the mixture cool to room temperature for at least 20 minutes.
7. Remove the glass of oil from the freezer. (If the glass of oil is cloudy, let it sit at room temperature until the cloudiness clears.) Fill the medicine dropper with the juice mixture. Hold the medicine dropper with the fruit mixture about an inch above the surface of the oil in the glass. Squirt a small amount of the juice mixture from the medicine dropper into the oil. As soon as the juice hits the oil in the glass, the mixture should form a little ball-shaped mass that will sink to the bottom of the glass. Continue until you have created about 20 beads (do not crowd the beads at the bottom, or they will smash).
8. Set a colander inside the bowl. Slowly pour the mixture of beads and oil into the colander to capture the beads. The separated oil can be reused for additional beads (though you may have to chill it again after a few batches).
9. Using a clean spoon, spoon the beads onto the top of ice cream in a dish, or straight into your mouth and enjoy!
10. Give a conclusion, which means explain if your prediction was right, explain what happened and what might have caused the candies to be squishy or not.
11. Clean up.

Teachers and adults: check out additional references for a special note on this experiment! ^{6a}



Let's Play - Connect Four: Addition

From one canola seed we can get many more!

Let's practise our adding! In Connect Four: Addition, we will see how many possible canola plants will grow from one seed!

Objective of the game: For the student to have the first straight or diagonal row filled in on their gameboards.

Materials:

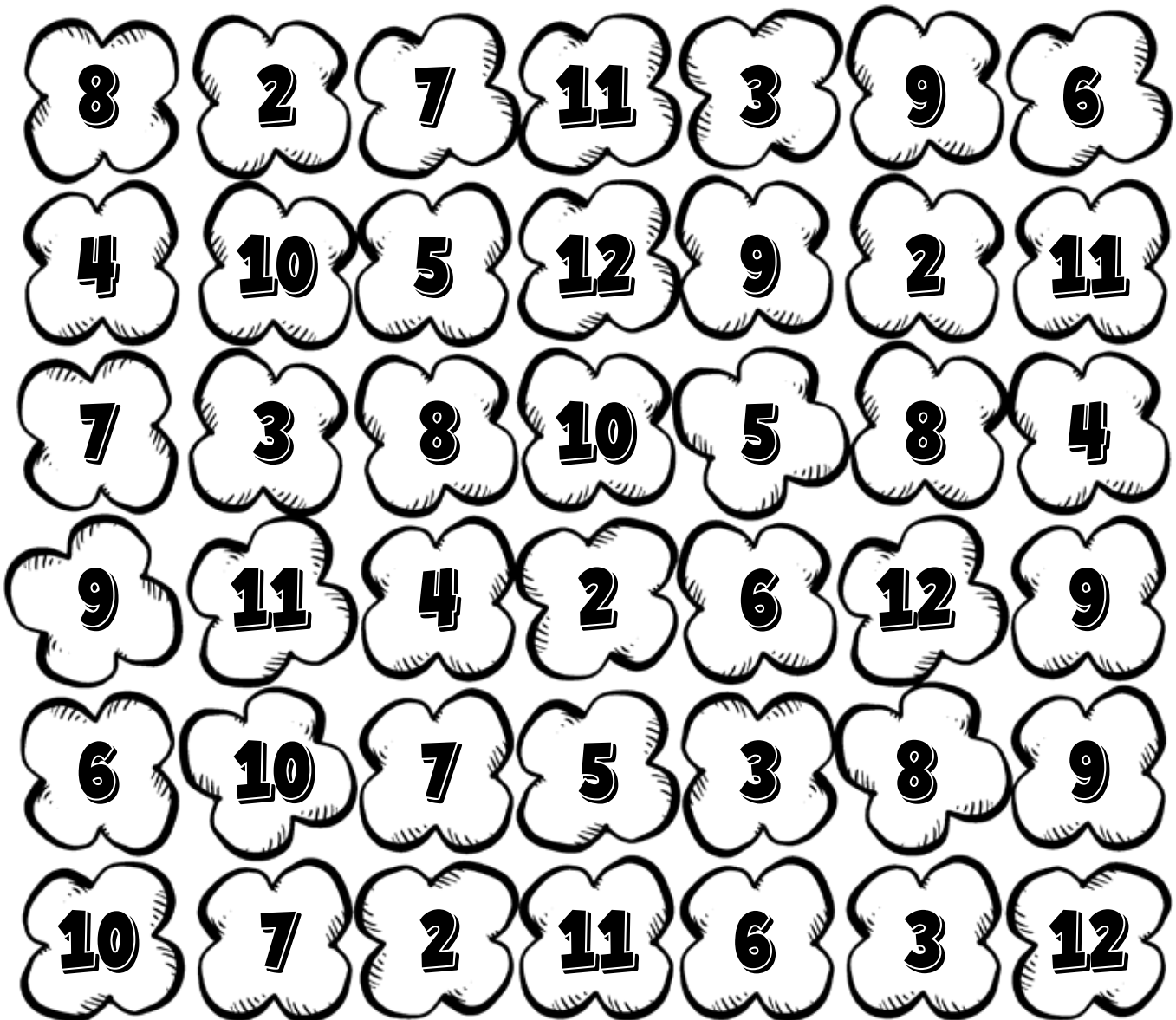
- 2, 6-sided dice
- A game board for each student
- A yellow marker

Number of players: 2

Getting ready to play:

How to Play:

1. Roll both dice and add the two numbers for your answer.
2. Colour in your canola flower on your answer sheet that matches the answer on your die.
1. Each student will need their own game board and marker or something to cover up their gameboard.
2. The players will need 2, 6-sided dice.
3. Challenge a friend to see who gets the first straight row or diagonal row.
4. Challenge a friend to see who can fill in all of the flowers first.



CANowledge Time

The Good, The Bug, and The Canola!

Like humans, canola plants need water, nutrients (which can be found in soil from broken down and decomposed plant life in the soil, or come from fertilizer) and sunlight, to grow and become healthy and strong. Canola plants also depend on insects for growth. Insects that help the canola plant grow big and produce many canola seeds are called **beneficial insects**.

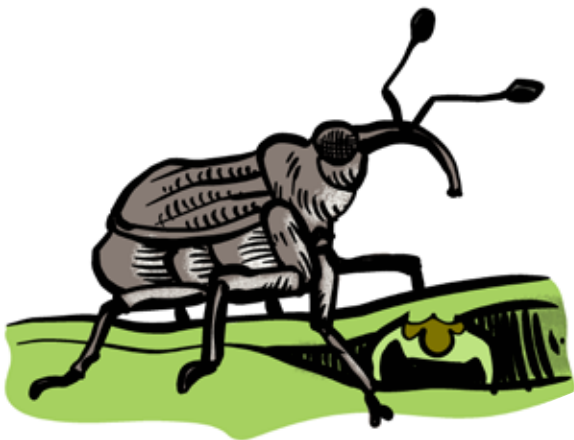


For example, honey bees pollinate the canola flowers, which help the canola plant produce pods.

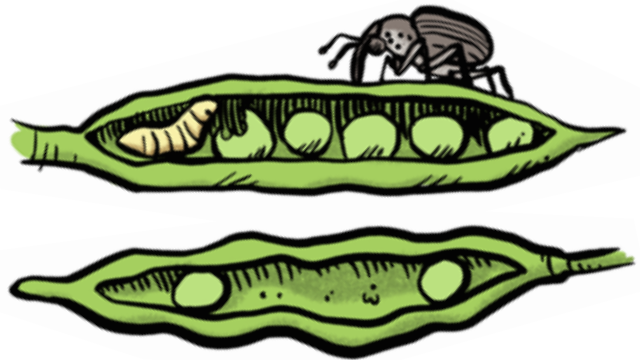
Inside canola pods is where we find the canola seeds.



Some insects are harmful to canola plants.



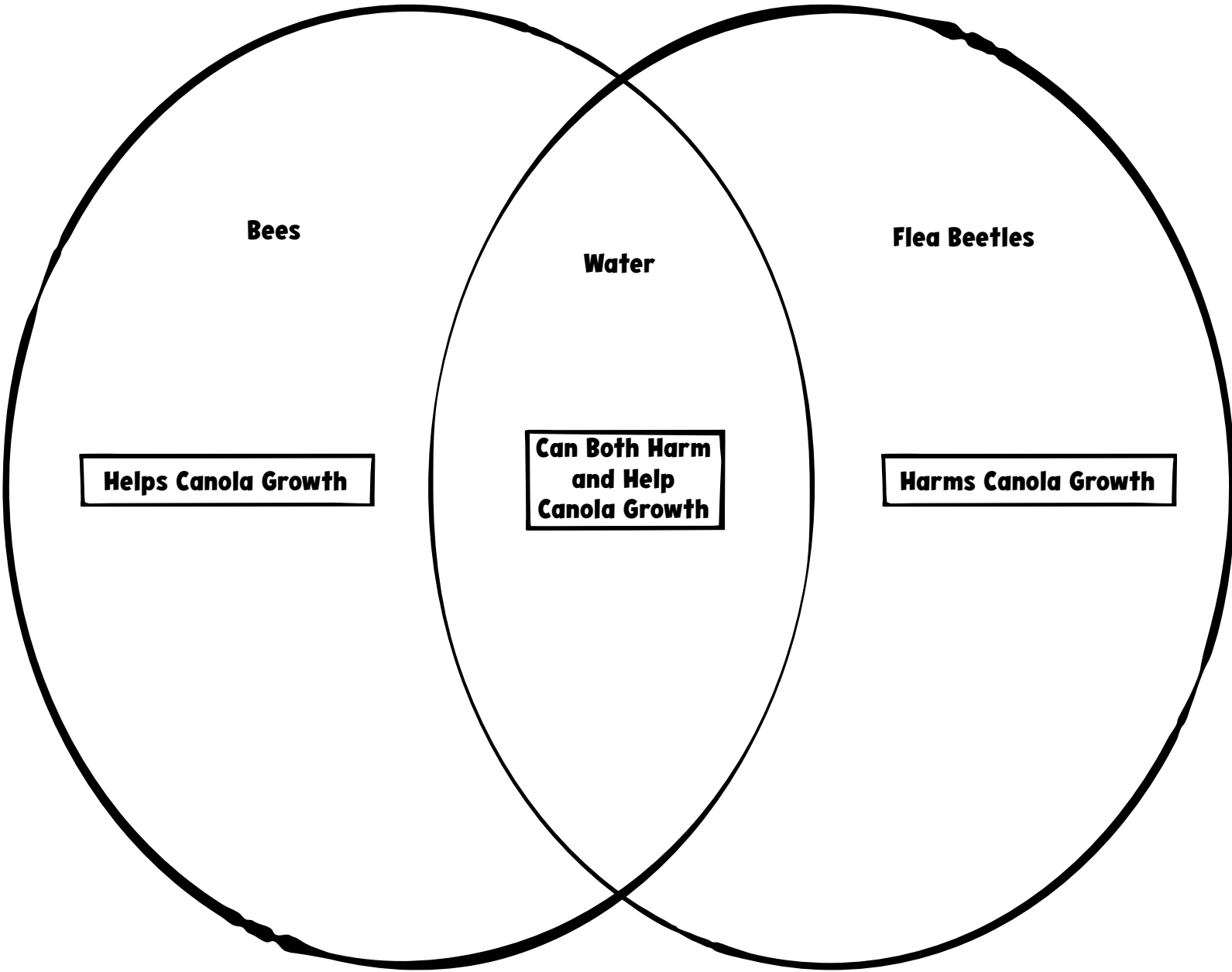
For example, cabbage seedpod weevils will bite through the pod wall, and lay their eggs inside the canola pods. When larvae hatch from the eggs, the larvae will eat the seeds inside the pods to grow and develop. During budding and early flowering stages, the adults will feed on the pollen, nectar and buds.



Flea beetles eat new canola seedling leaves, which affects the growth of the plant.



What Helps and Harms a Canola Plant?



Amelia and Chase are learning from Grandpa Duffy that there is a lot to learn when it comes to growing crops. A canola plant has **factors** (different types of things) that help and harm it when it is growing.

The information from CANnowledge Time: The Good, The Bug, and the Canola and the rest of the activity book, will help you in this activity.

Can you help Chase and Amelia make a venn diagram to compare and contrast all of the **similarities** and **differences** between what might help or harm a canola plant?

As a reminder, a venn diagram can help us organize information we learn about and can be used for many different topics. The titles have been added.

1 example for each section has been provided.



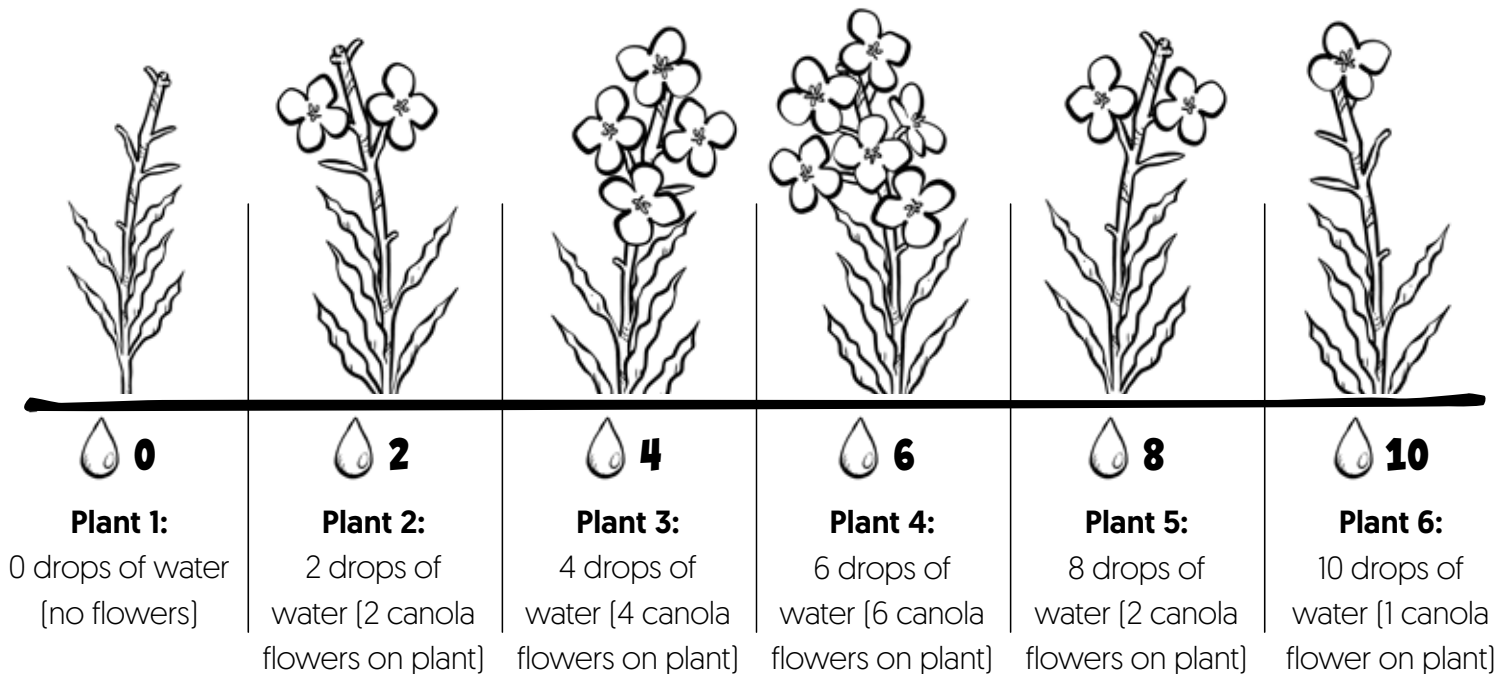
How Much Water to Grow A Bee-you-tiful Golden Flower?

Grandpa Duffy explained to Chase and Amelia that canola plants need nutrients (food that can be found in soil from broken down and decomposed plant life in the soil, or come from fertilizer), water, sunlight, and the right temperature to grow. Chase and Amelia wanted to see if they could grow canola plants like their Grandpa Duffy, but in Grandma Duffy's greenhouse!



Being the scientist Amelia is, she is curious to find out if different amounts of water would help their canola plants produce more flowers? Amelia convinced Chase to let her grow 6 canola plants from seed to flower over 7 weeks.

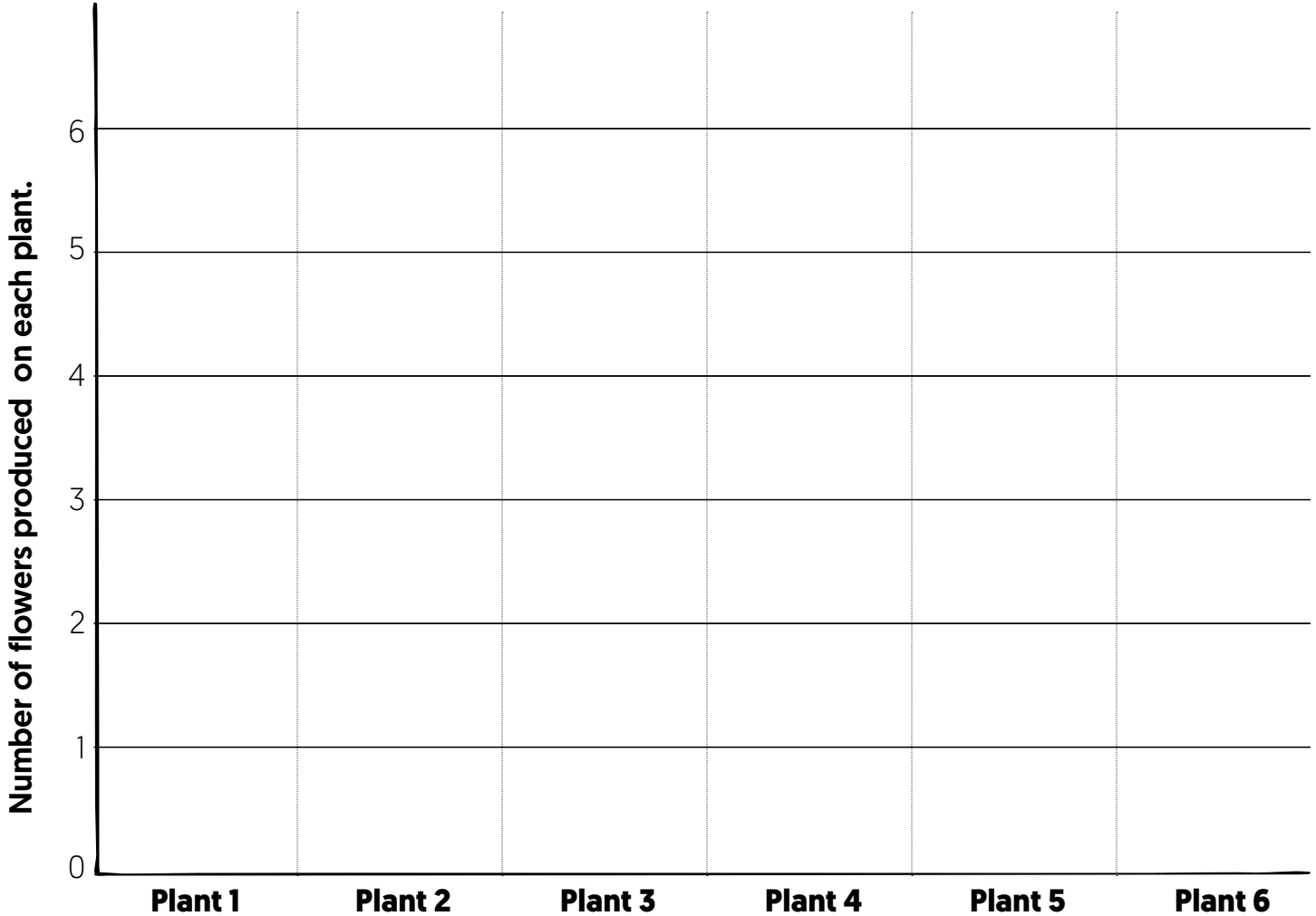
All plants were given the same type and amount of soil, sunlight, and nutrients. The soil for each plant also had the same amount of moisture before Amelia and Chase planted and watered the canola seeds. Each plant was given a different number of drops of water with an eye dropper once a week. Each canola plant produced a different number of flowers after 7 weeks:



Can you help Chase and Amelia put their results into a picture graph on the next page?

How Water Affects the Growth and Development of Canola Flowers

You will draw the number of flowers that grew on each plant in the graph below.



Conclusion:

1. By looking at the graph and the results, which plant produced the greatest number of flowers? How many drops of water was it given?

2. By looking at the graph and the results, which plant produced the least number of flowers? How many drops of water was it given?

3. What future improvements (ideas) would you suggest to Chase and Amelia to improve their experiment or results in the future?

Let's Play - Elimination

In Elimination, you will pretend you are a canola farmer trying to get rid of the bad insects harming your canola plant.

Materials:

- 2, 6-sided dice
- A Game Board
- A Marker or something to cover up numbers as you play
- A Partner to play with

Objective of the game: Be the first to cover up 5 numbers to form a row on your game board.

Number of players: 2

Getting ready to play:

1. Each student will need a partner, their own game board, a marker or something to cover up their game board.
2. The students will need 2, 6-sided dice.

How to play:

1. Roll 2 dice together to determine how many total flea beetles and cabbage seedpod weevils you have on your canola plant.
2. From the total number rolled, count backwards by 2. [For example, if you rolled a 10 you would count backwards to 8].
3. From the new total number, subtract 2 from this new number. [The 2 represents the two ways you tried to destroy the flea beetles and cabbage seedpod weevils for that round]. The leftover number represents how many flea beetles and cabbage seedpod weevils you have left on your canola plant. Cross off the number on the game board. If you do not have any matching numbers, you will have to wait until it is your turn again to try again.
4. The first person to get 5 in a row WINS and jumps up to say "Hooray my canola plant is saved!" as they were able to save their canola plant the quickest!



Let's Play - Elimination



10	3	5	0	4
1	9	6	8	7
9	3	FREE SPACE	1	2
6	8	4	9	7
10	6	5	6	2

Cooking with Chase and Grandma Duffy

Monster Cookies! ⁷

Fats are a very important part of our diet. Fats provide your body with energy, help your body use certain vitamins, make hormones, and protect your organs. Did you know that fats that are solid at room temperature such as hard margarine, lard, coconut oil, shortening and butter contain saturated fats that can raise your risk of developing heart disease? Choose foods made with healthy fats, like canola oil, most often.

After Chase has been helping Grandpa Duffy during harvest, one of Grandpa Duffy and Chase's favourite treats to share is Grandma Duffy's monster cookies! After all the work you have been doing, take a break and with the help of an adult, make some TASTY MONSTER COOKIES!!!

Yield: 3 dozen cookies

Ingredients:

- ½ cup (125 mL) canola oil
- ½ cup (125 mL) non-hydrogenated canola margarine
- 1 cup (250 mL) brown sugar
- 1 cup (250 mL) granulated white sugar
- 3 eggs
- 1 Tbsp (15 mL) vanilla extract
- 2½ cups (625 mL) all-purpose flour
- ½ tsp (2 mL) salt
- 2 tsp (10 mL) baking soda
- 1½ cups (375 mL) rolled oats
- 1 cup (250 mL) candy-coated chocolate pieces
- 1 cup (250 mL) chocolate chips
- ½ cup (125 mL) chopped pecans (optional)



Instructions:

1. Preheat oven to 350°F (180°C).
2. Beat canola oil, margarine, brown sugar, granulated sugar, eggs and vanilla until light and fluffy.
3. In a separate bowl combine flour, salt and baking soda, then add to the egg mixture.
4. Fold in the rolled oats, candy-coated chocolate pieces, chocolate chips and pecans.
5. Using a tablespoon, drop the dough onto a greased baking sheet, or a baking sheet lined with parchment paper.
6. Bake approximately 10 minutes until golden brown.
7. Clean up.
8. Cool and enjoy!



Chase's Crazy Canola Crafts and Science Experiments

Light It UP!!! ⁸

What do you think happens when we mix together canola oil, water, and effervescent antacid tablets? With the help of an adult, find out what happens by trying out this glowing bubblicious experiment.

Wow! Effervescent antacid tablets are some big words! An effervescent antacid tablet is a type of medicine that an adult might take if they have a stomach ache.

Materials:

- 1 sandwich-sized sealable sandwich bag
- ½ cup water (125 mL)
- Food colouring of your choice
- 1½ cups canola oil (375 mL)
- Effervescent antacid tablet (or any similar antacid tablet that contains 1000 mg citric acid and 1916 mg sodium bicarbonate)
- Highlighter (optional: to make the bubbles glow)
- Paper towel (optional)
- Black light (optional)

Instructions:

1. Make a prediction about what might happen when you mix canola oil, water, and effervescent antacid tablets (provide a best guess based on some research from talking to adults).
2. Gather your materials.
3. Pour the ½ cup of water into a sealable sandwich-sized bag (avoid filling the bag beyond half its size).
4. Add two to three drops of food colouring of your choice and mix together.
5. Pour 1½ cups of oil into the bag (avoid filling the bag beyond half its size) and firmly seal the bag. Observe what happens to the oil and the water. Which substance floats to the top?
6. Break one antacid tablet into pieces (only use one tablet at a time). Drop the pieces into the bag. What do you think is happening? Why?
7. To create a glowing bubble lamp, follow steps 1-6. To make fluorescent water with a highlighter, use the highlighter (yellow or green works best) to colour a paper towel sheet until the paper towel is completely covered.
8. Soak the coloured sheet in a ½ cup of water for 15 seconds, until all the colour has been absorbed by the water and the towel is almost inkless, or a lighter shade of the highlighter colour.
9. Remove and wring out the paper towel to get as much of the ink into the water as you can.
10. Now repeat steps 2-4 with the highlighter water in place of the food colouring water. For a glowing effect, add effervescent antacid tablet pieces to the bubble lamp in a dark room. Point a black light at the bag and watch the glowing bubble lamp in action!
11. Was your prediction correct? Yes or no and why? Do you have any questions you can think of that you might like to test in the future?
12. Clean up.

Note to adult helper: With help for explanation see 8a in Additional Teacher/Parent Resource Page. This activity is best done with 1 person holding the sandwich bag while the other person pours.

Chase's Crazy Canola Crafts and Science Experiments

Upside Down PLOP! ⁹



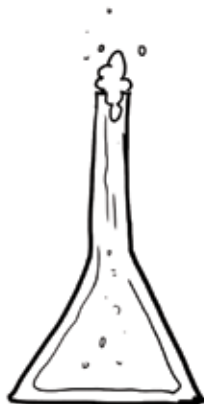
Have you ever tried mixing canola oil, salt, and water together? What happens? Try this science activity with the help of an adult to find out!

Materials:

- Tap water
- Salt from a salt shaker
- Canola oil
- Narrow jar [size of jar is optional]
- Food colouring [your choice]
- Funnel [optional]

Instructions:

1. Make a **prediction** [best guess] as to what happens when you mix canola oil, salt, and water together?
2. Fill a narrow jar $\frac{2}{3}$ full of water. Have an adult show you where $\frac{2}{3}$ is on the bottle. Use a funnel to assist if your jar opening is narrow.
3. Fill your narrow jar $\frac{1}{3}$ full of canola oil. Use a funnel to assist if your jar opening is narrow.
4. Add ONLY 1 drop of food colouring of your choice to the water.
5. Look at what the drop of food colouring is doing and where it is in the mixture. Why?
6. Using a salt shaker, add 3-6 shakes of salt to your creation. Use a funnel to assist if your jar opening is narrow. What happens to the drop of food colouring? Why do you think this is happening?
7. Was your prediction right? Can you think of any other predictions and tests you can do with this experiment in the future?
8. Clean up.



Note to adult: Refer to Additional Teacher/Parent Resource Page 9a for additional information.

Chase's Crazy Canola Crafts and Science Experiments

Show What You Know! ¹⁰

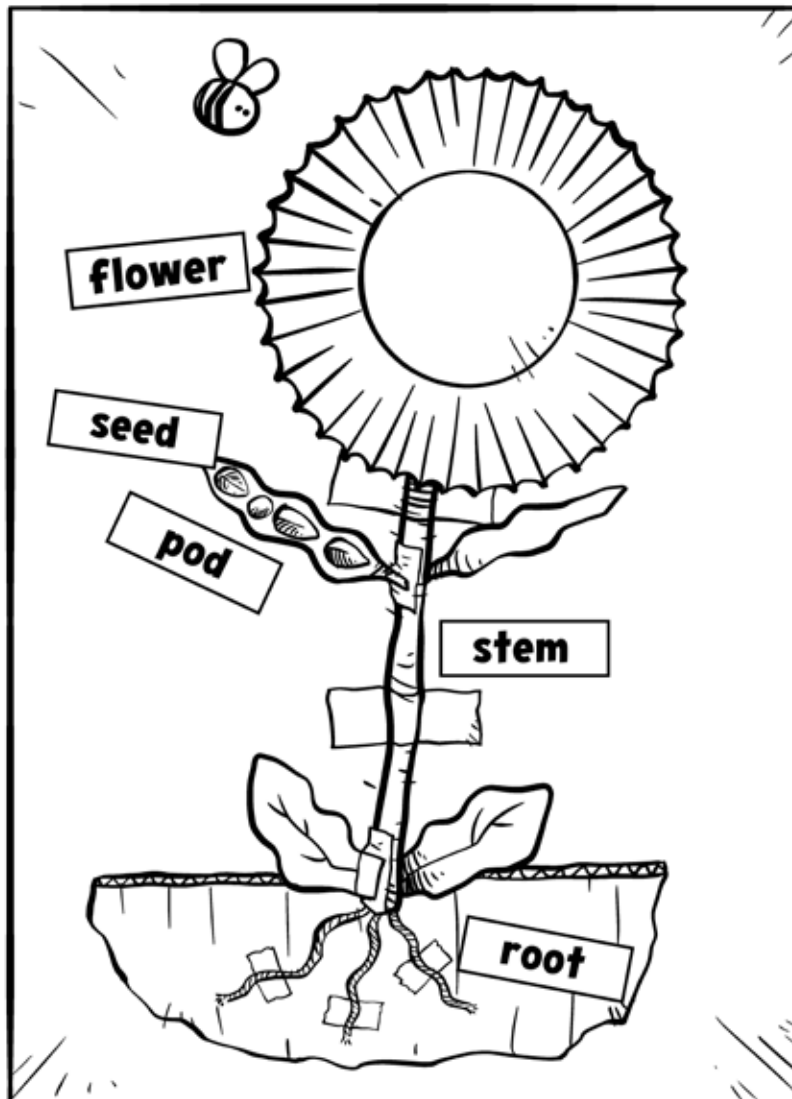
We have learned lots about canola! Using recycled materials, let's make a beautiful yellow canola flower on a separate piece of blank paper. Label all the parts of the canola plant at different stages and show one beneficial insect with it. The key words to include are: **flower, stem, root, seed, pod.**

Hint: [If you can't remember what a canola plant looks like, check out page 9!]

Materials:

- A blank piece of paper
- Crayons or pencil crayons
- Scissors
- Various recycled items you can use to make your canola plant and beneficial insect [e.g., muffin liner, straw that can be coloured for a stem, yarn, or whatever else that can be used to create the plant].
- Glue
- Markers
- Tape

Here is an example.





CANOLA Breakout!



A C O
 U V X Q F C H M A
 U V R Z D N N H O M Q K D
 F P B E N E F I C I A L J C O T R
 K T T X X B X W C L L Z E W F N P S U
 P P R L L I A U N O Q E I E G V L M X D V
 V O C L N O N S N Z L J S Q S I N H E Y J
 Y M X Z A H K Y S C M R F Z E S H L E T Y X S
 M F G O E T I V S E Y Z J N F V W F H Z V A L
 K D E Q E M M Q I E D C O J X P Z G O I V G S O E
 T K R T T G N I A E A Q T E M C Z Z K K J A V U Y
 L A E N A Y S D K U B X J M Z M X J N P B L N M A
 C U F M G N A Y B Y N V D Z A W V P G O L I L S Q M L
 C H J E W I N G V Z T D C O O J R T D D Z Z A Z Z W G
 P L I R N M X Z G C P O F A B Y O S K E F H A K N Y F
 H C G P R I D R A L R Y H N Z I R L L A U A A A R
 S R E P E Y F A P S F Q Y D O B U R Y R T J X L P
 D P N R G G N I S N W X C V D L S H T M H N J O P
 E C Z E N I B M O C H H O L Q A D O E A I L A
 L E R L Z E O I L M C O I W I S D C R B L V E
 O S U C W Z I X H G E M Y S V U A A I Z J
 M U S S Q A U C H J J Q S D K M V N W D R
 Z F W F M E W E D Q M R O T C A R T T
 P F R E Y N P P K T D J D T N E A
 X P O J D X J X L L E X L
 P H J P N A D C H
 Z I U

COMBINE
 MEAL
 TRACTOR
 COTYLEDON
 BENEFICIAL

FEED
 OIL
 POLLINATE
 GERMINATE
 FARMER

FLOWER
 SEED
 INSECT
 EMERGENCE
 CANOLA

Let's Play! - One Metre Canola Dash Madness! ¹¹

Canola plants grow roughly between 1-2 metres (m) tall. The average pod length for canola is 5 centimetres (cm) and the diameter of a seed is 1 millimetre (mm).

[**Diameter** is the longest distance across a circle from edge to edge.]

Materials:

- Ruler
- Metre stick
- Pencil
- Paper

Objective of the game:

To earn the highest number of points by estimating and measuring the actual length of objects in the classroom with your teammate.

Getting ready to play:

[**Note to teachers or parents:** This game can be competitive. Be sure to group students into fair teams ahead of time regarding skill set.]

1. Your teacher will assign you a partner and together you will compete against other groups.
2. Your team will need a metre stick, ruler, pencils and the chart on page 43.



Let's Play! - One Metre Canola Dash Madness!

How to play:

1. The teacher or guardian will tell the groups when they can begin and end.
2. With your partner, look around the room and find the following objects that both of you can estimate the length of for the following categories:
 - 3 objects that measure 1 m
 - 3 objects that measure 10 cm
 - 3 objects that measure 5 cm
 - 3 objects that measure 1 mm

***How to estimate:** look at the object and give your best guess of how long the object would be without using a ruler or metre stick*

3. Write down the name of your object in the table [see example].
4. Record the estimated length of your object in the estimated length section of the table [see example].
5. Next, measure the length of the object with either a ruler or metre stick to see how close your partner and you were with your estimate. Record the actual length of the object in the table [see example].
6. Your group will then record the total number of items you were successfully able to finish measuring with your ruler or metre stick for bonus points in the table.
7. If your group is within 1 mm of all required measurements for that object, give your group an extra 5 points for that specific object [see example under "is the item within 1 mm of estimate?"].
8. Your group can earn 2 additional bonus points by correctly identifying how many millimetres are in a centimetre, and how many centimetres are in a metre [record your answer in table below].
9. Total your group's overall score [in "total points" section of table] and share your results with other competing groups to determine a winner.



One Metre Canola Dash Madness!

Gameboard

	Item you found that you think is close to the length you are estimating	Estimated length 	Actual length	Is the item within 1mm of the estimated length? (yes = 5 points no = 0 points)
Example: Object 1: 1m	Example: Desk height	Example: 1m	Example: 1m and 22cm	Example: no = 0 points
Object 1: 1m				
Object 2: 1m				
Object 3: 1m				
Object 1: 10cm				
Object 2: 10cm				
Object 3: 10cm				
Object 1: 5cm				
Object 2: 5cm				
Object 3: 5cm				
Object 1: 1mm				
Object 2: 1mm				
Object 3: 1mm				
Total of how many items estimated and measured (1 bonus point for each item)	Answer:			
How many centimetres (cm) are in 1 metre (m)? (2 bonus points)	Answer:			
How many millimetres (mm) are in 1 centimetre (cm)? (2 bonus points)	Answer:			
TOTAL POINTS:				

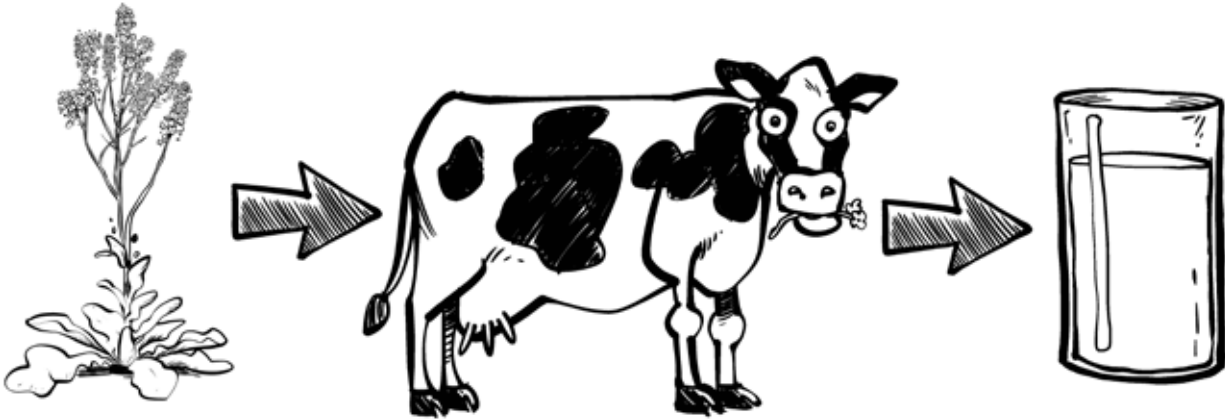


Let's Play! - Stand Up, Sit Down ¹³

Note to parent and teacher: see additional resources before playing ^{13a}

Dairy cows produce an average of 30 litres of milk per day! When fed a diet that includes canola meal, they produce an extra litre of milk per day. That all adds up!

Let's see your superpower multiplication and addition skills shine!



**CANOLA MEAL CAN HELP A DAIRY COW
PRODUCE AN EXTRA LITRE OF MILK PER DAY!**

Materials:

A homemade deck of cards numbered 1-100. Based on total number of students, split the numbers up and give each student an assigned set of numbers to cut out and write out so that in the end there are 100 individual cards each labelled with one number from 1-100. The cards need to be the same size and the numbers need to be big enough to see from a distance. All students provide their cards to the teacher.

Objective of the game:

Not to be the last person remaining in your seat!

Number of players: 1 - a large class of students.

How to play the game:

1. The teacher or adult shuffles the class set of cards.
2. The class of students sit in front of a teacher.
3. The teacher gives an equation without an answer [e.g., 2×2].
4. The teacher then draws a number off the top of the deck of shuffled cards.
5. If the number is the same as the answer to the equation, students who are sitting must stand. If the answer is not the same, they remain seated. If students stand to a wrong answer, they have lost that round.
6. The game resets at the end of every round.

Optional: if some students have physical limitations, have the student engage in a different action that works with their abilities.

Let's Play! - Let There Be Cake ¹⁴

Canola oil is used to cook all sorts of tasty treats like cakes and cookies! To make these tasty treats we have to measure ingredients like canola oil during baking. Measuring requires precision and precision involves fractions. Show off your super-mad-fraction-baking-skills in this game!

Materials:

- Find and tear out the Equivalent Fraction Cards included in book (see last page after additional resource page for these cards. There are two decks worth of cards available. You will use both sets of cards. See the reference section or website for more cards).
- Grab enough spoons so you have 1 fewer than the total number of players.



Objective of the game:

To be the last player remaining in the game, and collect four fraction cards that are equivalent but do not have to be same to obtain a spoon [e.g., $\frac{1}{2} = \frac{4}{8}$ but is not the exact same fraction]. Players get closer to being eliminated each time they are left without a spoon, which earns them the next letter in the word C-A-K-E. Once a player has earned all 4 letters in the word C-A-K-E, they are eliminated for that round and can cheer on their teammates.

Number of players: 3-6 players

Getting ready to play:

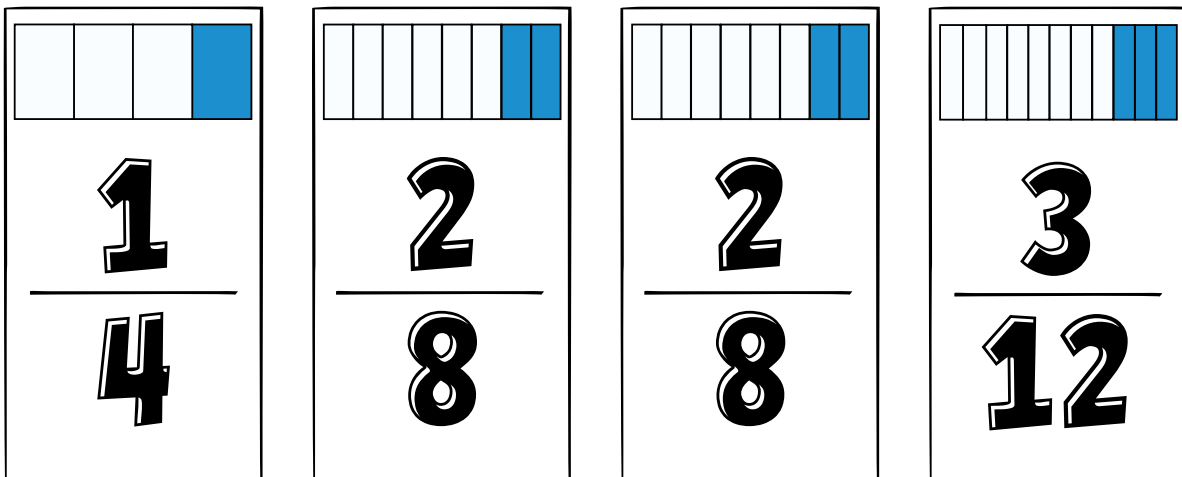
1. Arrange the spoons in a small circle in the centre of the table.
2. Choose a dealer for the round.
3. The dealer shuffles the Equivalent Fraction Game Cards (**use both sets of cards** found at the **back of the book** and **mix together**). The players may look at their own cards, but may not show their cards to anyone else.
4. The dealer deals four cards face down to each player.
5. The remaining cards should be placed in a pile facedown beside the dealer.

Let's Play! - Let There Be Cake

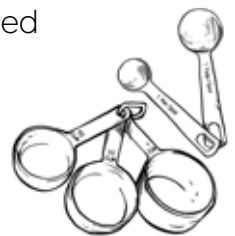
How to play the game:

1. The dealer takes a card off the top of the pile so that he or she now has five cards in his or her hand. The dealer removes one of the five cards from his or her hand and passes it facedown to the player on his or her left. The dealer then continues to pick up cards from the pile and discards one card at a time to the player on his or her left.
2. The player to the left of the dealer picks up the discarded card from the dealer. Like the dealer, he or she removes one of the five cards from his or her hand and passes it facedown to the person on his or her left. He or she continues to do this as cards continue getting discarded to him or her.
3. This quick picking up and passing of cards continues around the circle. The player to the right of the dealer will end the turn and place their discarded card into a discard pile. These cards are now out of play for the round.
4. Once someone gets four equivalent fractions [e.g., $\frac{1}{4}$, $\frac{2}{8}$, $\frac{2}{8}$ [from second set of cards] and $\frac{3}{12}$] in their hand, the student grabs a spoon from the centre of the table.

Optional: if some students have physical limitations, have the student engage in a different action that works with their abilities, or have a partner assist them.



5. There are wild cards in the deck. Wild cards can be used to make four equivalent fractions, with a limit of only having three wild cards in a winning hand.
6. Once the player with four equivalent fractions takes a spoon from the table, everyone else tries to immediately grab a spoon [even if they do not yet have four equivalent fractions].
7. The player left without a spoon earns a letter in the word C-A-K-E.
8. The round is now over and the game begins again. If any players were eliminated during the last round, a spoon must be removed so that there is always one fewer spoon on the table than players.



Let's Play! - Area and Perimeter of a Canola Field ¹²

Every year before seeding, a farmer has to think about the area of canola and other crops they want to grow. They start planning very early for this to make sure they have enough seed during seeding time.

Grandpa Duffy would like your help to determine the area and perimeter of his field.

Materials:

- 2 coloured markers or 2 coloured pencil crayons [1 for each player]
- 2 players [evenly skilled]
- 2 dice [numbered 1-6]
- 1 piece of grid paper for each game with each square measuring 1 cm²

Objective of the game:

Build up the largest amount of total surface area first on the grid paper.

Number of players: 2

Getting ready to play:

1. Each player chooses a coloured pencil crayon they will use in the game.
2. Find Chase's Duffy's MULTIPLICATION FACTS on p. 66 of this book.
3. Rip out the double-sided grid paper on p. 64-65.
4. Find 2, 6-sided dice with numbers 1-6 on the dice. Assign die 1 as length and die 2 as width.



Area and Perimeter of a Canola Field Gameboard



Instructions:

1. Players take turns rolling both dice together on each turn. Players then use the rolled numbers to determine and draw the perimeter of a rectangle or square. For example, if die 1 was a 2 and die 2 was a 3, the formula would be as follows:
 - **area = length x width** or **area = (die 1) x (die 2)** or **area = 2 cm x 3 cm**

Area = 2 [cm] x 3 [cm] = 6 [cm²]
2. Once the area is calculated, use die 1 to draw the length of the square and die 2 to draw the width of the square or rectangle on the grid paper with your chosen colour. Players can start drawing squares or rectangles on any area on the paper.
3. Next, record the calculated area in the middle of the shape.
4. **Note:** squares cannot overlap each other, but can touch each other.
5. The game ends when players run out of room to draw squares by either player.
6. Each player calculates their total area from all of their squares or rectangles drawn on the page.
7. The winner is the player who has the largest total area from all of their squares or rectangles drawn on the page.

turn number	die 1: length (cm)	die 2: width (cm)	total area of 2 dice (cm ²)
example	2cm	3cm	6cm ²

Cooking with Chase and Grandma Duffy

Did Someone Say Pizza? ¹⁵

Your body needs dietary fats for energy, to help your body grow and develop (and to help absorb vitamins A, D, E, and K). Choose foods with healthy fats such as nuts, seeds, fatty fish, avocados, vegetable oils (like canola oil) and soft non-hydrogenated margarine.

After completing a run through one of Grandpa Duffy's canola fields to practice for track season, Chase loves to help his Grandma Duffy prepare homemade pizza! Cooking with his Grandma Duffy creates a special family tradition that they both share.

With the help of an adult, try making this delicious pizza to enjoy! The possibilities are endless for toppings! **Remember: if you don't have whole wheat flour that's okay, this pizza can be made with all-purpose flour too!**

Yield: 8 servings

Ingredients:

- 1 cup whole wheat flour [250 mL]
- 1½ – 2 cups all-purpose flour [375-500 mL]
- 2 Tbsp wheat germ [30 mL]
- 1 pkg [7 g] quick rising instant yeast [1 pkg]
- 1 cup warm water [250 mL]
- 1 Tbsp canola oil [15 mL]
- ¼ tsp salt [1 mL]

Instructions:

1. In a large bowl, mix whole wheat flour, wheat germ, 1 cup [250 mL] all-purpose flour, salt and yeast.
2. Stir in warm water [slightly warmer than room temperature] and canola oil.
3. Gradually stir in enough of remaining all-purpose flour to make a soft dough. Knead on lightly-floured surface until smooth and elastic.
4. Shape dough into a ball. Cover and let the dough rest for 10 minutes before rolling out to be about 2.5-5 cm thick.
5. Place on greased baking sheet and top with your favourite ingredients! Be creative!
6. Bake at approximately 400°F [200°C] for approximately 40-60 minutes or until the crust appears golden brown on the bottom. If you use excessive toppings, the pizza may take longer to bake [1- 1.5 hours]. Additionally, check out Canola Eat Well for a great tomato sauce recipe: <https://canolaeatwell.com/recipe/pizza-dough-quick-pizza-sauce/> Have an adult help you check the crust to determine doneness.
7. Clean up.



The Journey of the Canola Seed: From Grain Bin to Bottle!

After canola seeds are harvested from the field, the farmer stores them in grain bins on their farm. The farmer then transports the seeds to either a grain elevator or a processing plant.

The seeds at the elevator are stored in giant grain bins until a train can transport them to export markets.

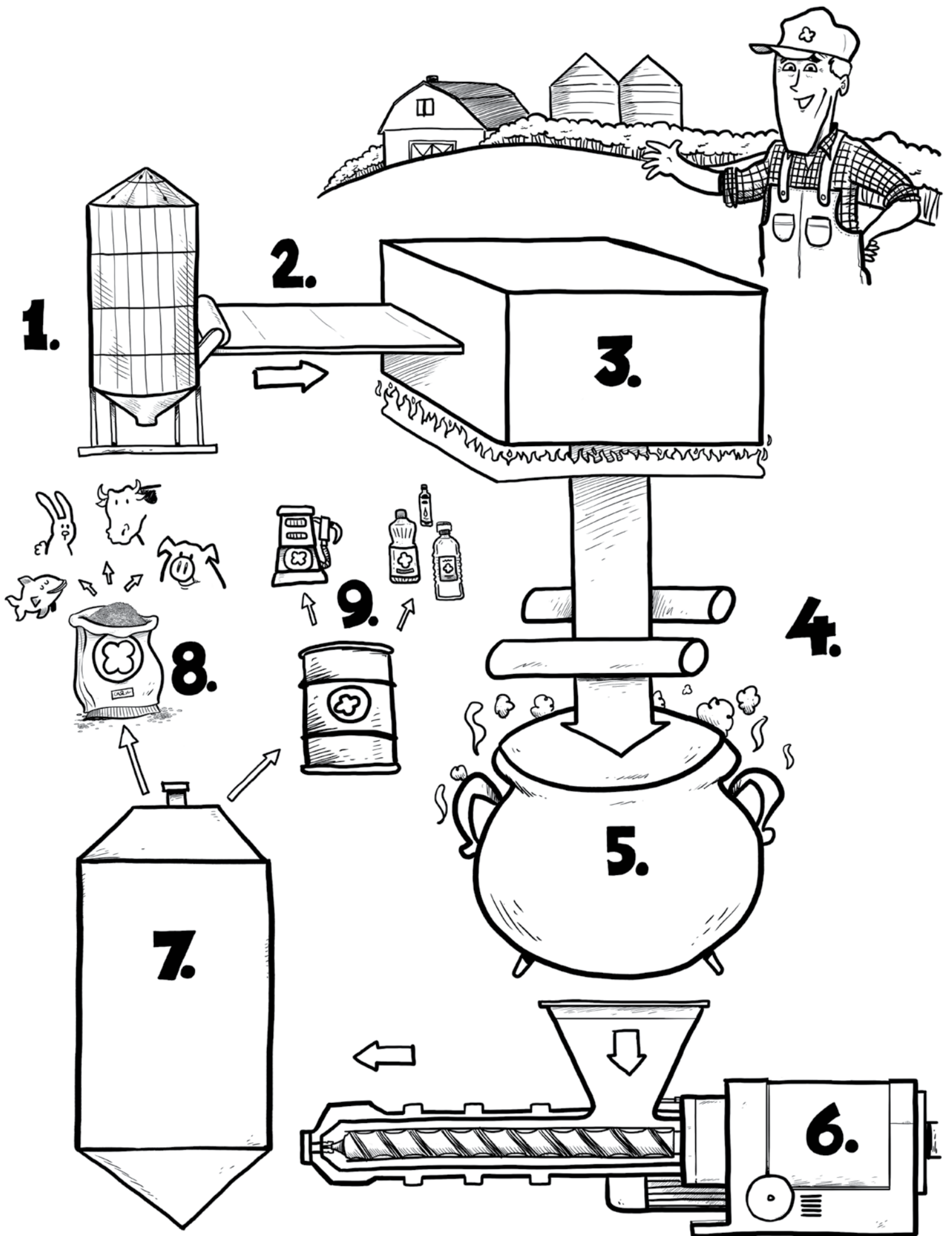
1. At the processing plant, the seeds are stored in giant bins until they are ready to be crushed to obtain canola oil and meal.
2. The canola seeds are then thoroughly cleaned.
3. Next the canola seeds are pre-heated to a specific temperature so the seed coats do not shatter.
4. Once the pre-heated canola seeds are heated to an optimal temperature, the canola seeds are flaked. This means the canola seeds are pressed flat, by a set of steel rollers, which are like a set of giant rolling pins. Flaking helps to crack open the seeds' coat cell wall.
5. Flaked canola seeds are cooked at a high temperature in a giant pot called a cooker.



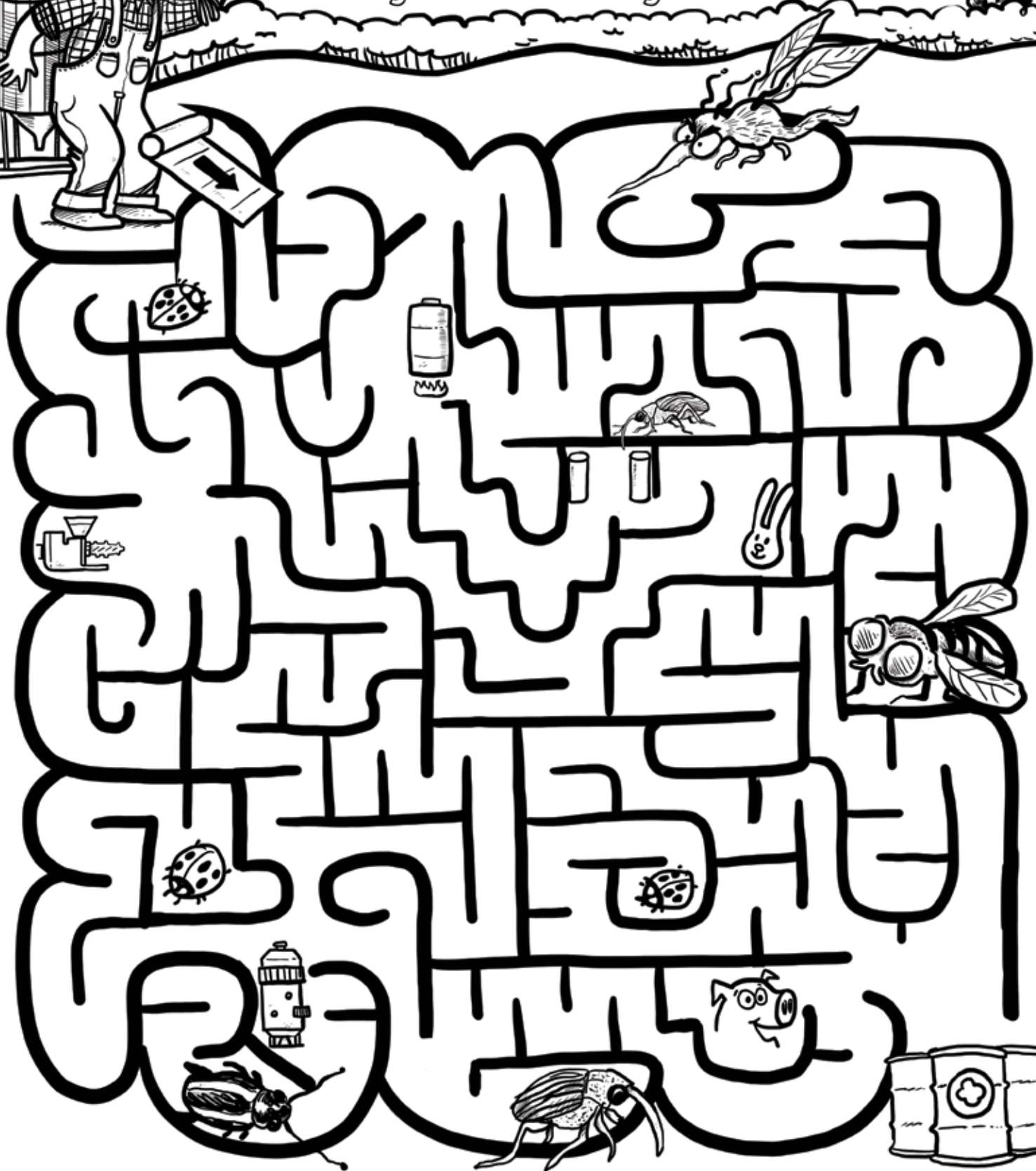
6. The canola seeds are then passed through a machine called a screw press or expeller. The expeller's job is to squeeze most of the oil out from the seeds. Two products are left - the canola oil and the solid seed material called "cake fragments".
7. Once the cake fragments leave the screw press, the cake fragments are then washed in a machine called an extractor to separate out any leftover canola oil from the canola cake fragment. This step might be repeated several times to get all the canola oil from the canola cake fragments.
8. As soon as the cake fragments leave the extractor, the canola cake fragments are now called "canola meal". This is used to produce a variety of different things, including pellets, which are used to make animal feed.
9. The oil processed from the expeller or screw press is crude oil and must be further refined to make edible and non-edible products. Crude oil goes through more steps to be made into the canola oil used in the kitchen for cooking, baking, frying or even made into non-hydrogenated margarine!

It can also be used in cosmetics, printing inks, sunscreen, biodegradable gels (to help fight forest fires) or turned into biofuels (fuel for trucks, buses and tractors).





Uh-Oh! Help Grandpa Duffy
Get His Canola Seeds
Through the Crushing Plant!



Chase's Crazy Canola Crafts and Science Experiments

Stained Glass ¹⁶

A canola plant journeys through many steps before it becomes canola oil! Make a picture of your favourite processing stage, or of your favourite item that is produced from canola and be sure to hang it in the window.

Materials:

- 1 piece of white paper (any shape or size)
- Pencil crayons
- Paper towels
- Paintbrush
- Canola oil
- Newspaper or garbage bag to protect your surface from paint

Instructions:

1. Use a white piece of paper to draw a colourful picture with pencil crayons.
2. Lay picture flat on a paper towel.
3. Using a paintbrush, cover the paper with enough canola oil to soak through completely, making the paper almost translucent (translucent means clear or see through).
4. Once the oil soaks in, wipe excess oil away with paper towel.
5. Clean up.
6. Allow paper to dry for at least 48 hours before hanging in a window.



Chase's Crazy Canola Science Experiment

Ultimate Brain-Build-A-Thon Challenge!

Simple materials and designs are sometimes the best building supplies and techniques for various projects. Canola flowers have a very strong root system to help anchor the plant to the ground. The canola flower's shape and colour helps with the plant's pollination process. The pod is designed to protect the developing seeds from damage.

In this next set of activities, challenge yourself to see what you can design and build! You will have to make one to two batches of sugar cookies and an icing of your choice. You will then use the cookies and icing somehow in all of your designs.



Sugar Cookies ¹⁷

Ingredients:

- $\frac{2}{3}$ cup sugar (150 mL)
- $\frac{1}{2}$ cup canola oil (125 mL)
- 2 tsp vanilla (10 mL)
- 2 eggs (2)
- $2\frac{1}{2}$ cups flour (625 mL)
- 2 tsp baking powder (10 mL)
- $\frac{1}{2}$ tsp salt (2 mL)
- 1-3 Tbsp (45 mL) of milk (optional)



Directions:

1. Preheat oven to 350°F (180°C)
2. In a large bowl or stand mixer, beat together sugar and canola oil until light and fluffy; beat in vanilla and eggs, one at a time.
3. Whisk together flour, baking powder and salt; stir into canola mixture and mix until well combined.

Note: If dough seems dry add 1 Tbsp (15 mL) of milk at a time to the dough to get the dough to come together.

4. Divide dough in half; shape into discs. Wrap in plastic wrap; refrigerate for 30 minutes.
5. Roll out dough on floured board and cut cookies using favourite cookie-cutters. Transfer cookies to parchment paper-lined cookie sheets. Bake for about 10 minutes or until lightly browned.
6. Clean up.
7. Cool and ice with icing of your choice to build your structure.

Other Materials for Build-A-Thon Challenge:

- Bag of mini marshmallows
- 20 toothpicks
- 1 toy car
- 1 sheet of legal paper (8.5 x 11 inches)
- 1 paper clip
- 1 hardboiled egg
- Assorted washed and sanitized coins
- Scissors
- 2-3 metres of tape (masking tape or scotch tape would be fine)
- 30 cm ruler
- Icing of your choice that hardens

Challenge 1: Drive In

Directions:

1. Research and design a structure that has a roof that a toy car must fit under. All items in the materials list must be used in the design and construction of the structure.
2. Include 1-3 sketches in the Prediction/Research area of this page. The roof must cover the length of the car. The roof must also leave at least 5 cm between the top of the car and the roof.

Materials:

- Scissors
- 8-10 sugar cookies
- 20 miniature marshmallows
- 20 toothpicks
- 1 sheet of paper [8.5 x 11 inches]
- 1 paper clip
- 1 metre of tape of your choice
- 1 average small toy car
- 30 cm ruler
- Icing of your choice that hardens

Prediction/Research:

Using all the materials, what structure can you build that your toy car can fit under?

Observations:

How well did your structure work?

What problems arose with the build?

How high and long is your structure?

Conclusion and Future Modifications:

What can you do to improve your design?

Can you draw an example?

Test your modification. Did it work?

Challenge 2: Eggs Away!

Materials:

- Scissors
- 8-10 sugar cookies
- 30 miniature marshmallows
- 20 toothpicks
- 1 sheet of paper [8.5 x 11 inches]
- 1 paper clip
- 1 metre of tape of your choice
- 1 hardboiled egg
- Icing of your choice that hardens



Directions:

1. Design an egg-safe contraption that keeps your whole egg safe when dropped from different heights. Use the materials listed. Include 1-3 sketches in the Prediction/Research area of this page.
2. Next, drop your egg in its contraption from 30 cm. Then, continue to and go up by increments of 10 cm each time until the egg cracks.
3. If you have the help of an adult, determine the maximum height reached before the egg cracks. Continue to drop the egg until it is no longer safe to do so.

Prediction/Research:

Observations:

Did your egg survive the following egg height drops?	Place a [checkmark for YES or X for No]
30 cm	
40 cm	
50 cm	
60 cm	
70 cm	
80 cm	
90 cm	
100 cm	
Max height reached before egg cracked or until it was no longer safe with the help of an adult to drop egg structure from [cm]:	

Conclusion and Future Modifications:

How high could you drop the egg safely with the help of an adult before the egg cracked?

What worked well and not so well in your structure?

What can you do to improve your design?
Can you draw an example?

Test your new design. Did the improvement work?

Challenge 3: London Bridge Isn't Falling Down...

Directions:

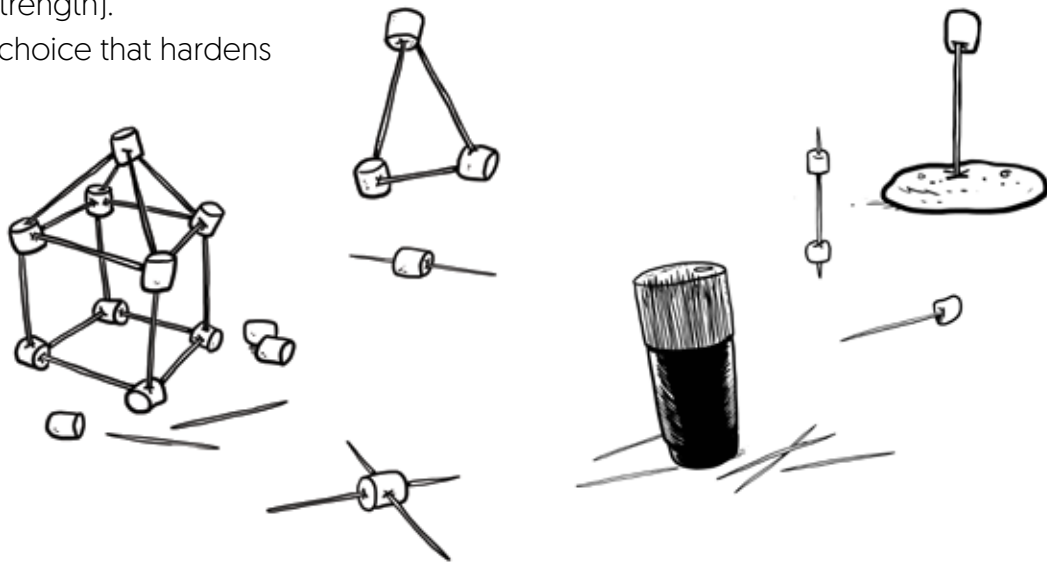
1. Research and design a bridge, using the materials below, to determine how many smaller objects, such as clean and disinfected coins, it can hold.
2. Research to see what improvements can be made to your bridge so that you can add more objects or more mass to your current bridge design.

To help you with your design, in Google enter the following phrases in the search bar to help you with your research:

1. What makes bridges so strong video
2. Nova super bridge build a bridge

Materials:

- 30 miniature marshmallows
- 6-8 sugar cookies
- 20 toothpicks
- Clean and disinfected objects [e.g., coins, washers, rocks] [You may use other items that are clean and in similar mass to each other. These items will be used to determine the bridge's strength].
- Icing of your choice that hardens



Prediction/Research:

Observations:

How many items or what maximum mass did your bridge hold before it collapsed?

Conclusion and Future Modifications:

How well did your structure work? What problems arose with the build?

How tall, wide, and long is your structure?

Challenge a family member or friend to see if they can design and build a bridge and then test your bridges to determine whose bridge design can hold more mass [or amount of objects].

How many of the same items with the same mass can your structure hold compared to a classmate, adult, or friend?

What would you do to improve your design?

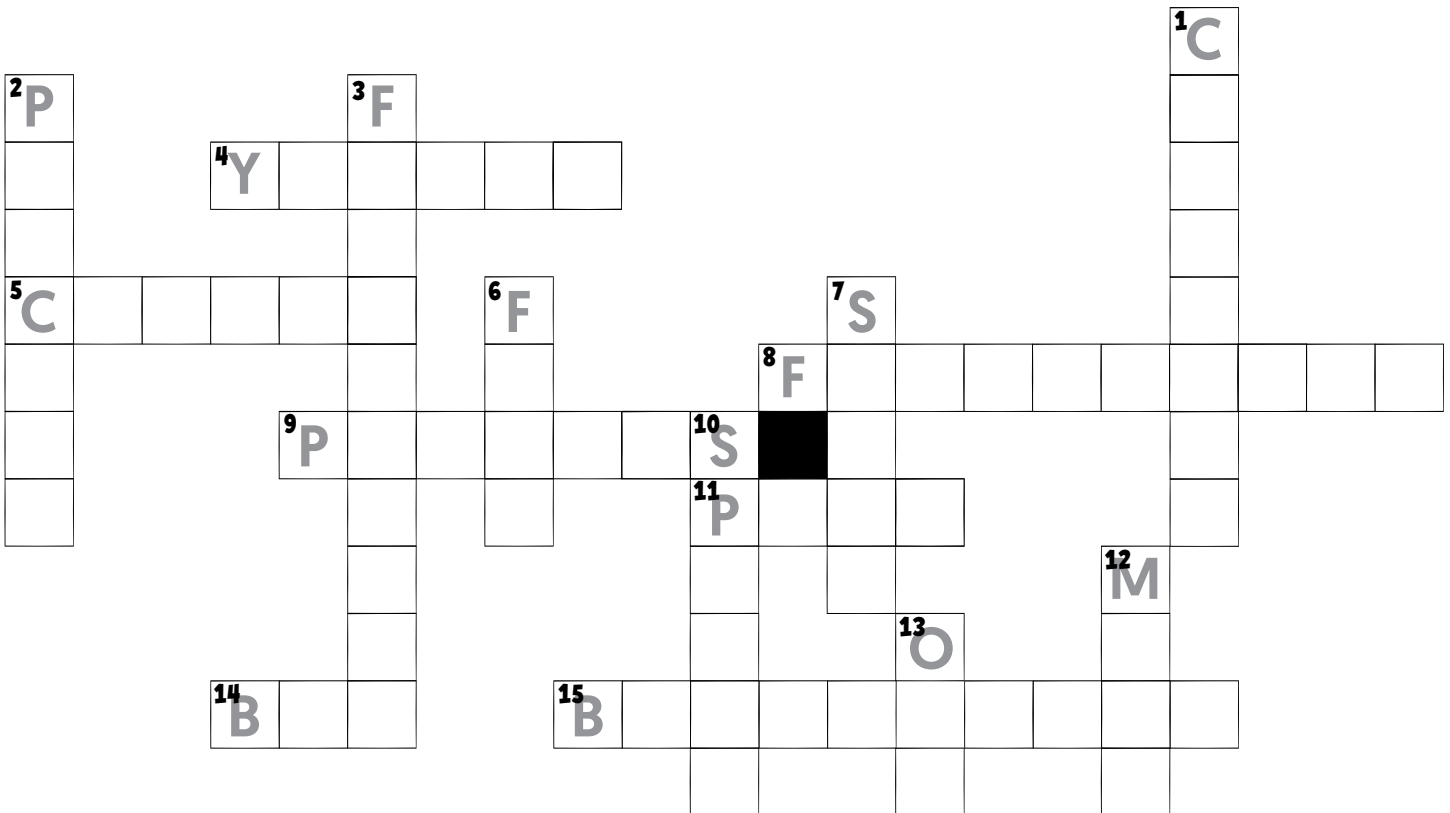
Can you provide a sketch?

Build and test your improvement.

Did the improvement work?



Canola Craze!

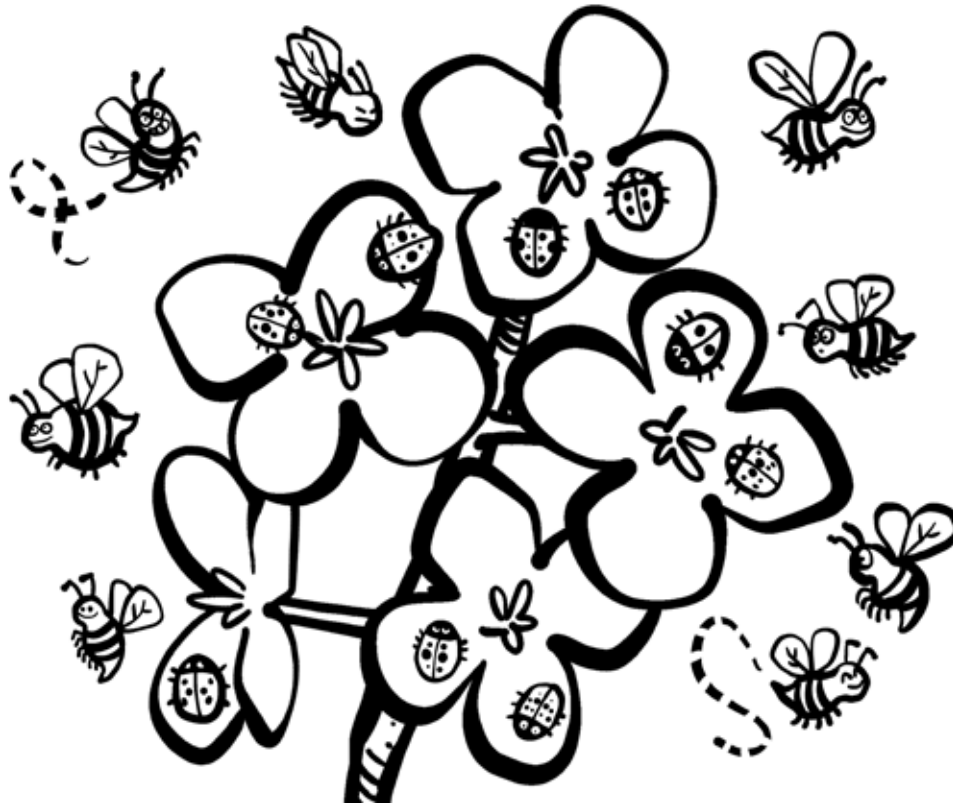


ACROSS

4. The colour of canola flowers.
5. A great Canadian invention.
8. Used as food source to grow canola.
9. Feed made from leftover canola meal.
11. Where you can find canola seeds.
14. Insect that pollinates canola flowers.
15. Insects that help the canola plant grow.

DOWN

1. Process used to get canola oil from the canola seed.
2. A great snack that uses canola oil.
3. Insects that eat the leaves of young canola plants.
6. Time of the year when canola is harvested.
7. Where the canola oil comes from.
10. Time of the year when canola is typically seeded.
12. The leftover material from the canola seed.
13. Used for cooking, cosmetics, biodiesel, ink, margarine, airplane de-icer.



Canola Craze!

Answer Key

canola A great Canadian invention.

meal The leftover material from the canola seed.

oil Used for cooking, cosmetics, biodiesel, ink, margarine, airplane de-icer.

beneficial Insects that help the canola plant grow.

flea beetle Insects that eat the leaves of young canola plants.

pellets Feed made from leftover canola meal.

fertilizer Used as food source to grow canola.

crushing Process used to get canola oil from the canola seed.

fall Time of the year when canola is harvested.

spring Time of the year when canola is typically seeded.

pods Where you can find canola seeds.

seeds Where the canola oil comes from.

popcorn A great snack that uses canola oil.

yellow The colour of canola flowers.

bee Insect that pollinates canola flower.

Additional Teacher/Parent Resource Page

1. Cooking with Chase and Grandma Duffy: Nuts n Bolts.

Content reprinted and adapted with permission from Canola! Eat Well:
www.canoaleatwell.com

- a. To involve children more in this recipe, split the cereal mix equally into 2-4 large sealable plastic bags. Have the child hold open their bag and drizzle the oil and spice mixture evenly over cereal mixture. Work together to seal the bag and have the child shake the bag up to coat the cereal mix evenly. Combine all the cereal in a large roasting pan or into two roasting pans evenly. Follow with steps 4-6 and if needed have an extra large mixing bowl to help split up and stir the mixture evenly. Please also note, this recipe yields 44 cups. Feel free to scale back to your desired yield.



2. Mixed Medium Painting.

Content reprinted and adapted with permission from Canola! Eat Well: www.canoaleatwell.com

3. Cooking with Chase and Grandma Duffy: Bannock.

Recipe reprinted and adapted with permission from Alberta Health Services:
www.learncanola.com/stempage

4. Fizzy Chaos!

Adapted from: www.powerfulmothering.com - *Resource:* www.learncanola.com/stempage

5. Berry Playdough!

Adapted from: www.kiwico.com - *Resource:* www.learncanola.com/stempage

6. Juicy Gel Squish!

Adapted from: www.kiwico.com - *Resource:* www.learncanola.com/stempage

- a. *Note to adult/teacher:* Agar is an edible gelling agent. This experiment is a cool example of how gelling agents work: The agar dissolves in the hot juice and, as it cools, traps the juice in a web of molecules. This gives the juice less space to move around, and it “sets” into a semi-solid substance. When you drip the juice mixture into cold oil, it gels on contact. Because oil and juice [which is water-based] don’t mix, the juice drops cling to one another, forming smooth spheres.

7. Cooking with Chase and Grandma Duffy: Monster Cookies

Recipe reprinted with permission from: <https://www.canolainfo.org/recipes/monster-cookies>

Additional Teacher/Parent Resource Page

8. Light It Up!

Adapted from: www.kiwico.com - *Resource:* www.learncanola.com/stempage

- a. *Note for adults on how experiment works:* As the antacid dissolves, the sodium bicarbonate and citric acid react together, creating carbon dioxide gas bubbles. You made a bubble lamp! As the bubbles rise, they give a temporary lift to the water. As the bubbles burst at the surface, the water falls back down.

9. Upside Down PLOP!

Adapted from: www.kiwico.com - *Resource:* www.learncanola.com/stempage

- a. *Note to adult/teacher:* answer to the question: Oil is less dense than water, so it floats on top of water. When salt is added to the top of the mixture, it sinks through the oil taking some of the oil with it to the bottom of the jar. As the salt dissolves in the water, the oil rises back up to the top of the jar creating movement over and over again. You can repeat adding salt multiple times.

The following games can be adjusted based on the difficulty according to student age and skill level.

10. Show What You Know

Idea developed with inspiration from Canola! Eat Well: www.canoaeatwell.com

11. One-Metre Canola Dash Madness

Game adapted from: www.prodigygame.com - *Resource:* www.learncanola.com/stempage

12. Area and Perimeter of a Canola Field

Game adapted from: www.pinterest.ca - *Resource:* www.learncanola.com/stempage

13. Stand Up, Sit Down

Game adapted from: www.prodigygame.com - *Resource:* www.learncanola.com/stempage

- a. *Note to teacher or adult:* adjust the difficulty according to student age and skill level

Additional note to adult/teacher:

You can modify requirements for standing as needed.

For example, you can tell students to stand if the answer is:

- Greater than 10
- An even number
- A multiple of three
- You can also alternate from addition to subtraction, and from multiplication to division.

14. Let There Be Cake

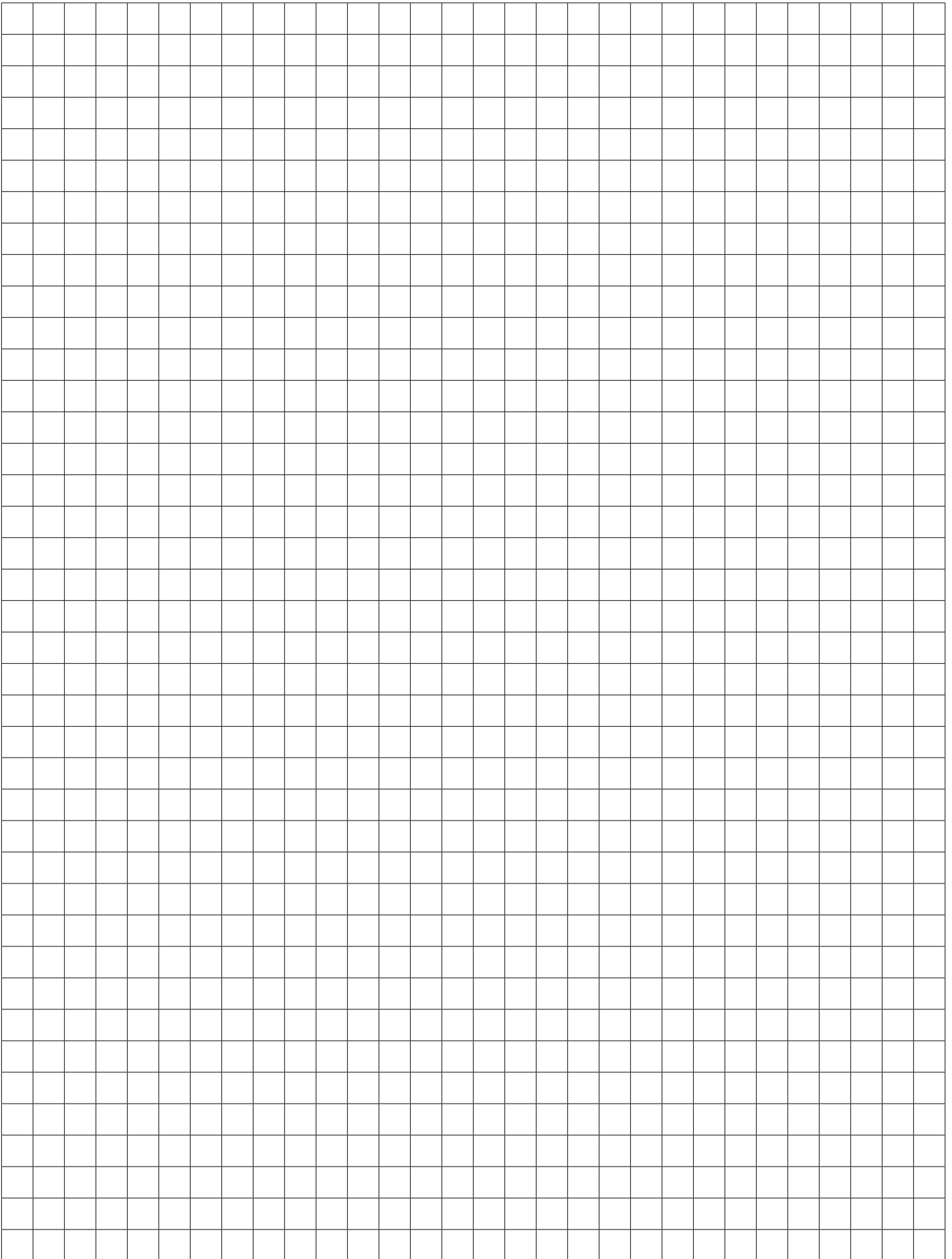
Game adapted from: www.weareteachers.com - *Resource:* www.learncanola.com/stempage

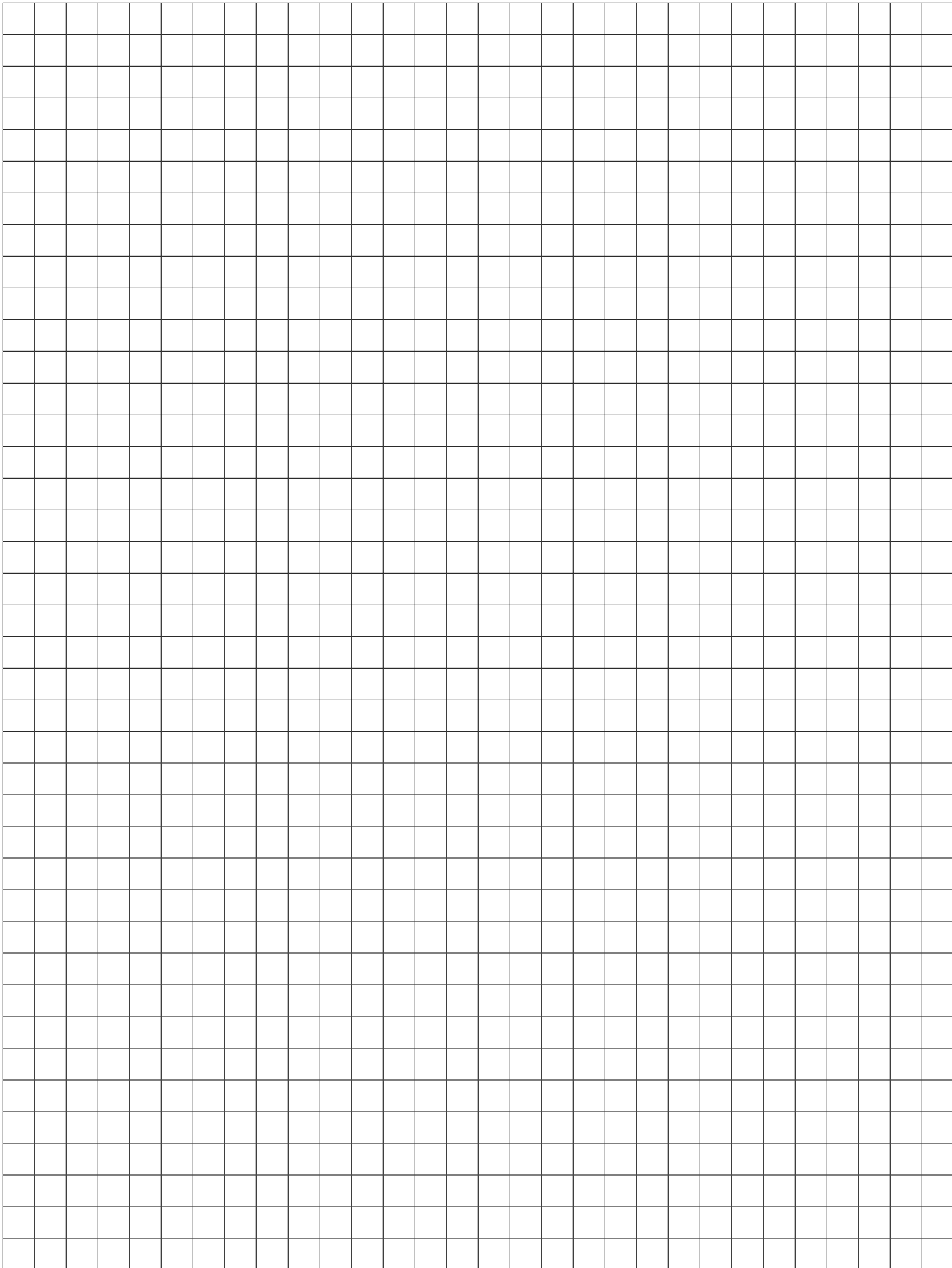
15. Pizza. *Recipe reprinted with permission from:* <https://canolaeatwell.com>

16. Stained Glass. *Project recipe reprinted with permission from:* <https://canolaeatwell.com>

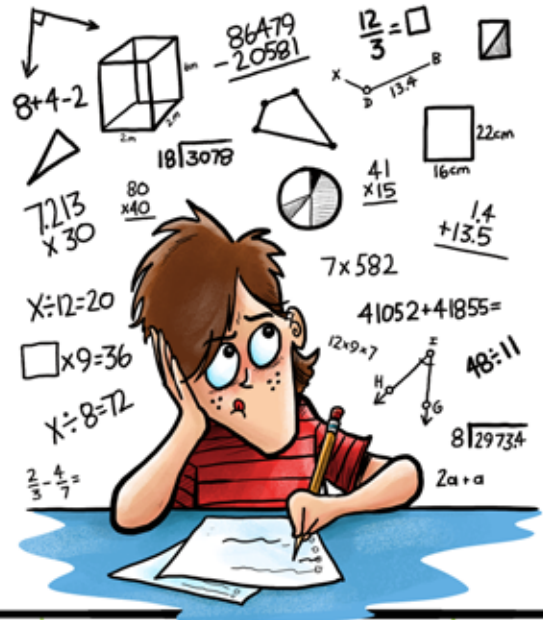
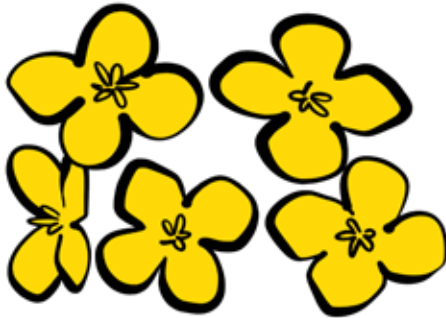
17. Sugar Cookies. *Recipe reprinted with permission from:* <https://canolaeatwell.com>

Area and Perimeter of a Canola Field





Chase Duffy's Multiplication Facts...



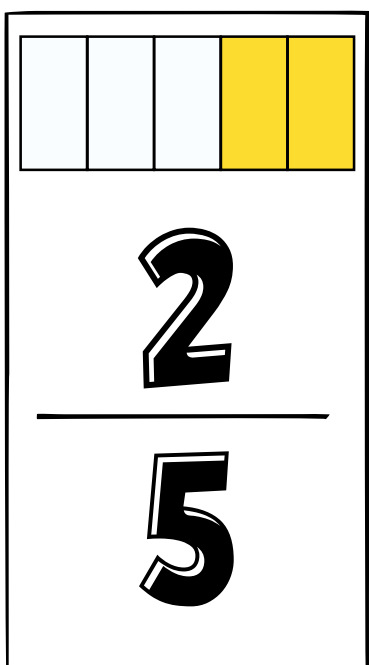
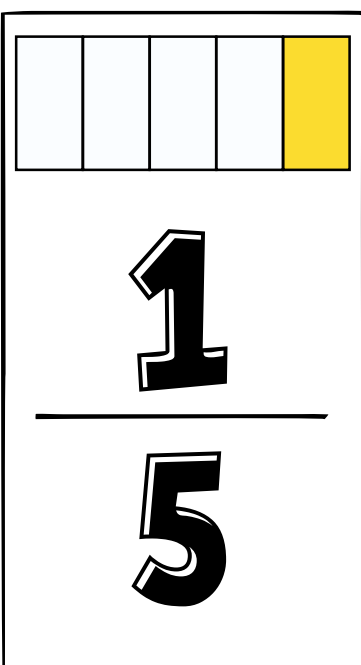
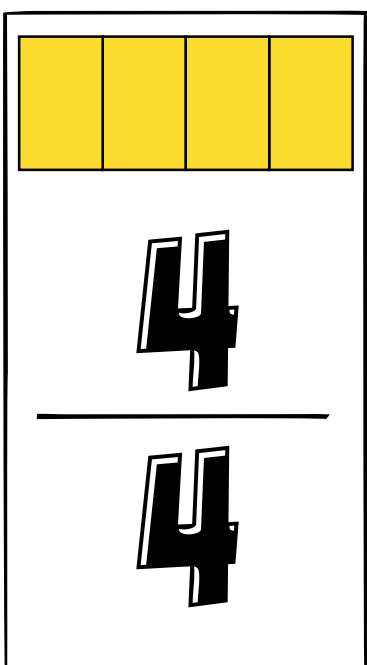
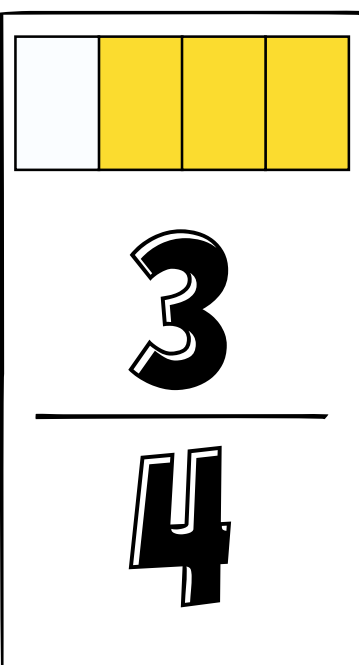
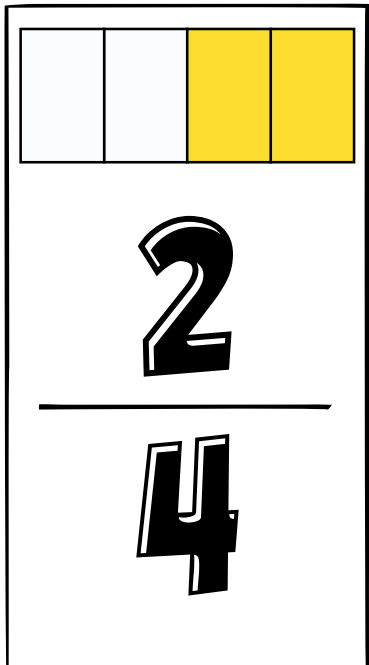
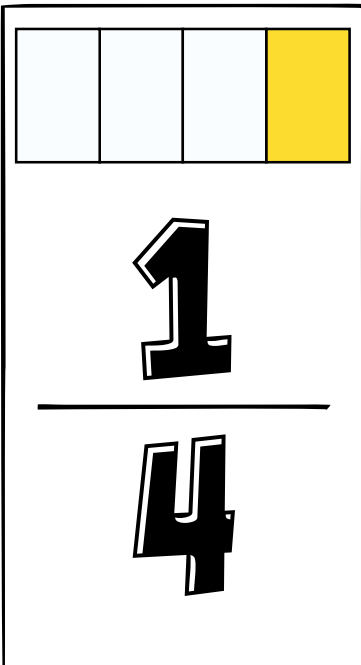
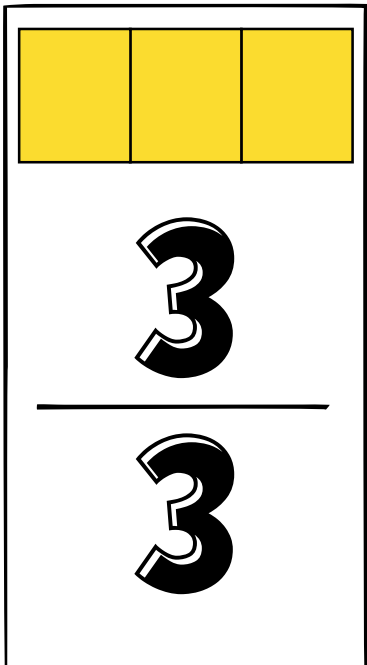
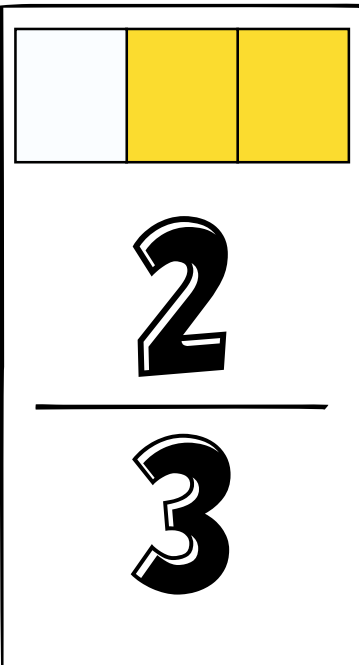
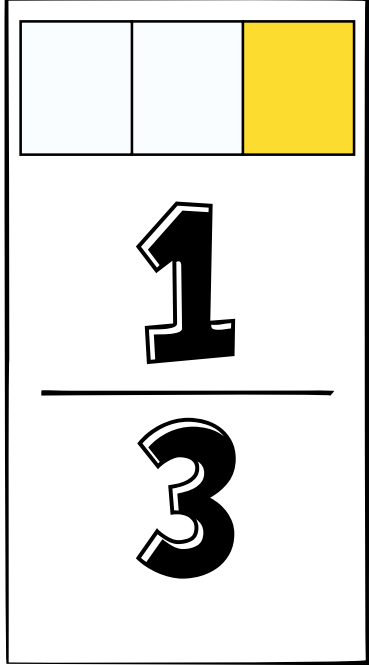
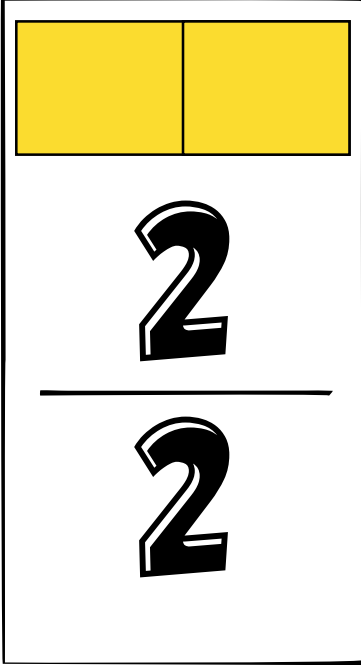
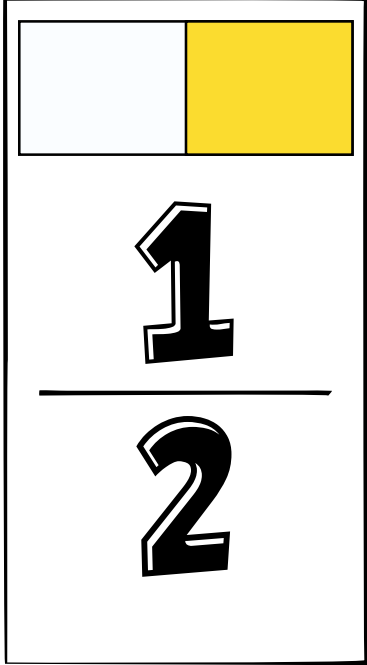
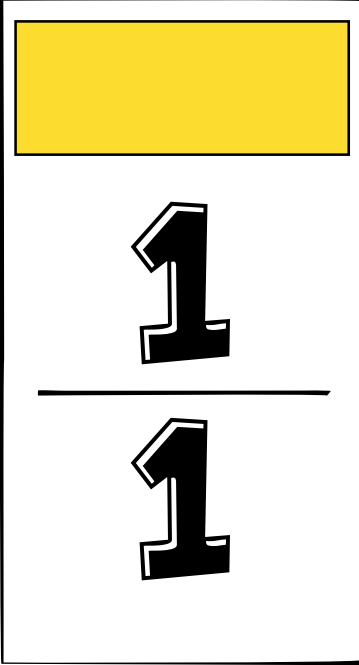
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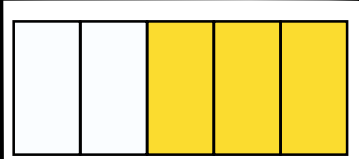
Doodle Pages



Doodle Pages

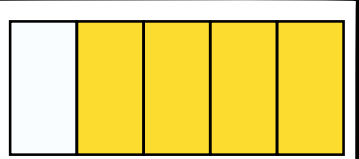






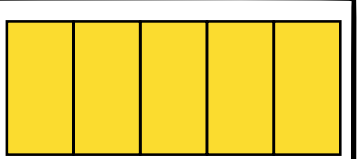
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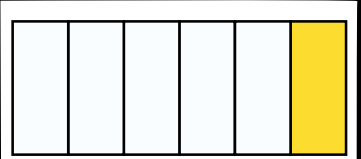
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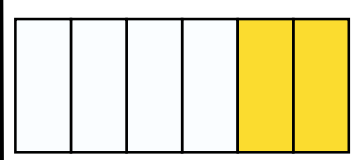
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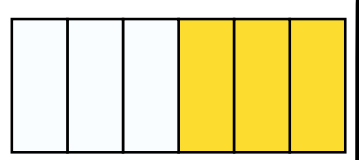
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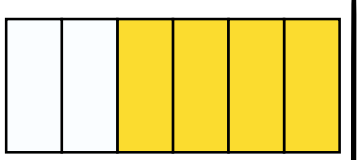
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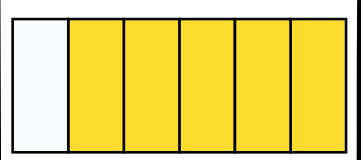
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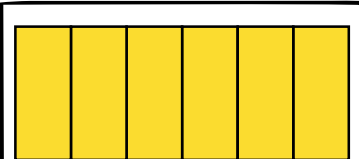
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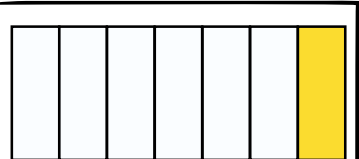
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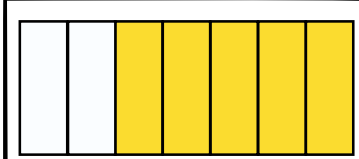
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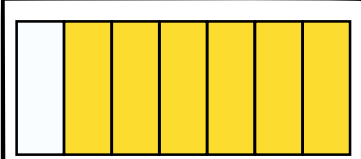
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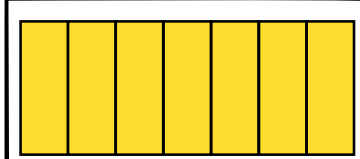
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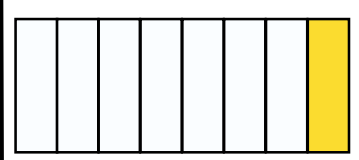
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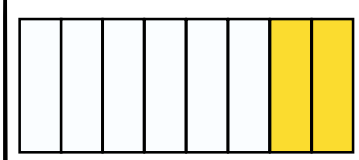
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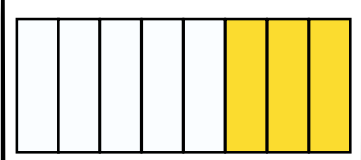
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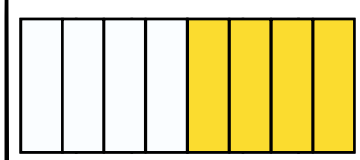
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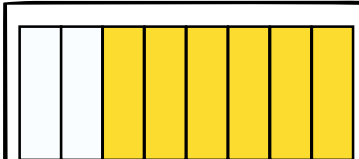
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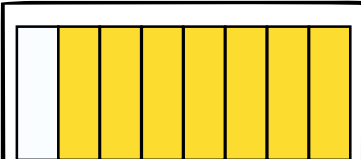
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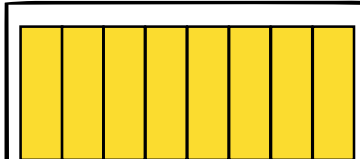
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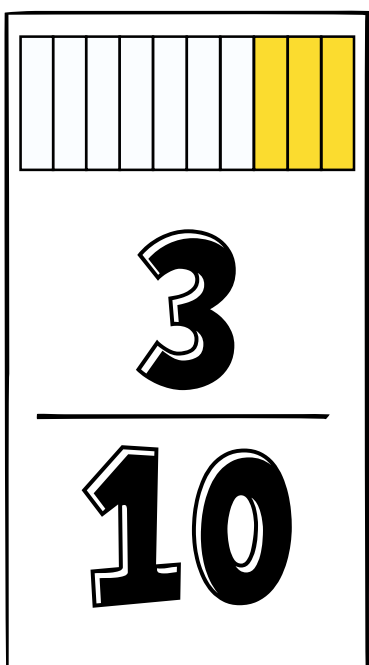
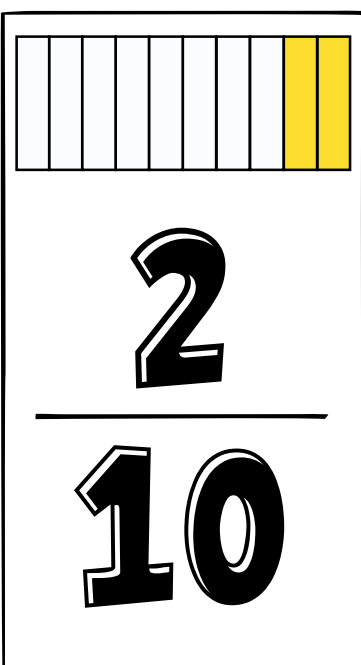
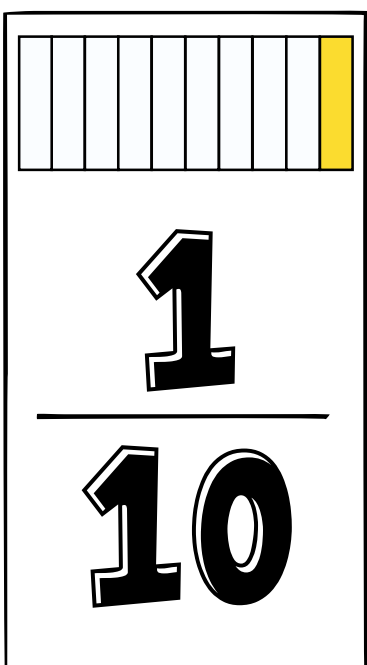
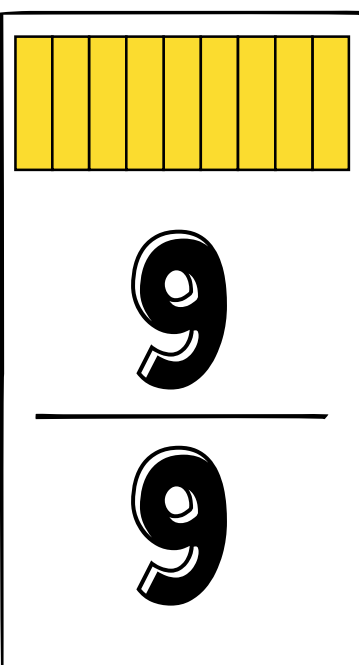
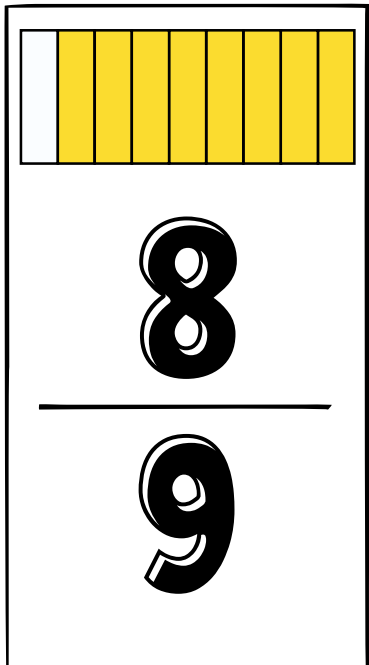
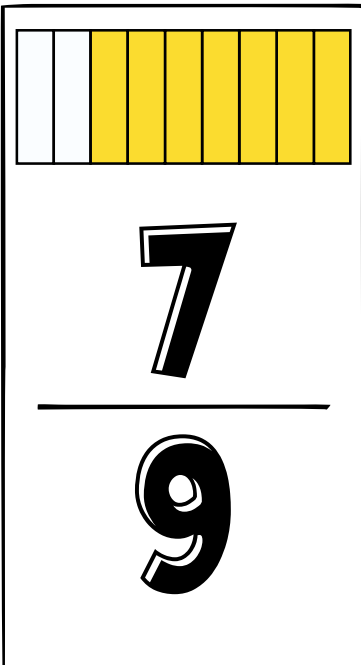
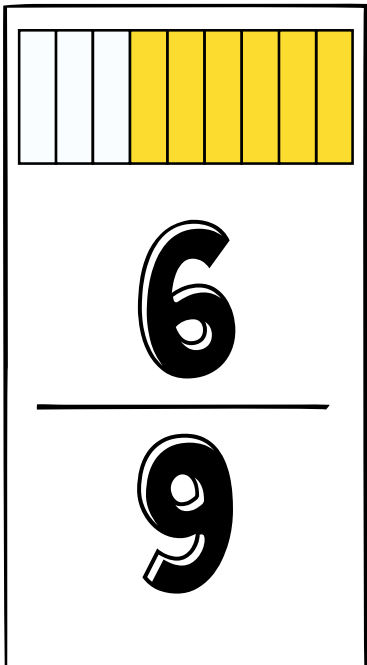
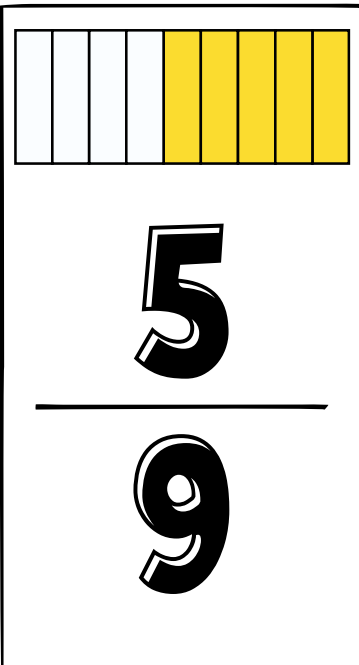
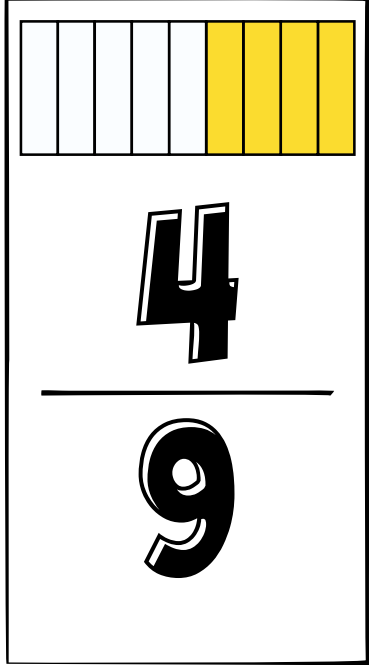
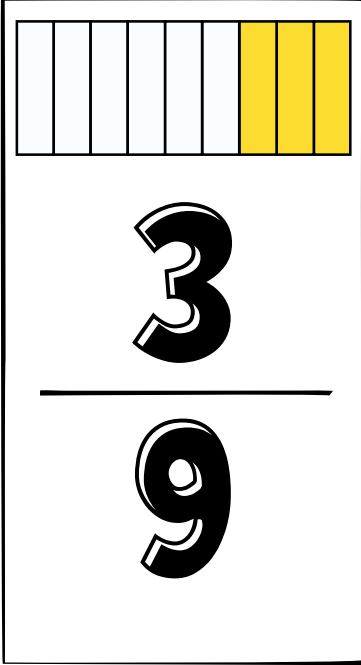
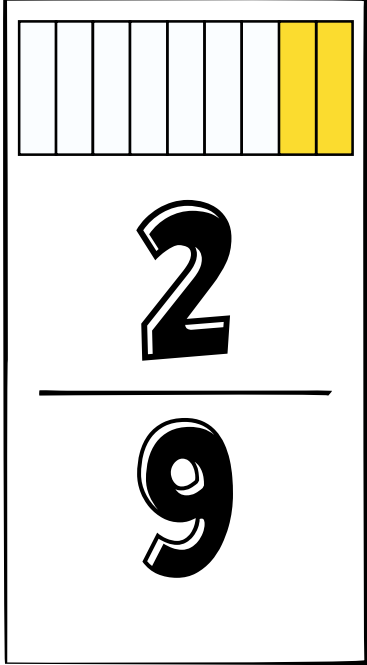
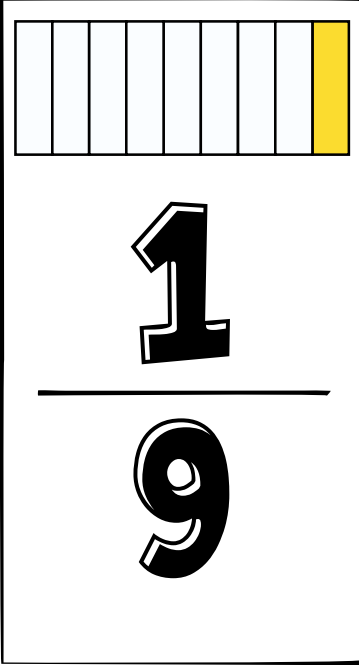
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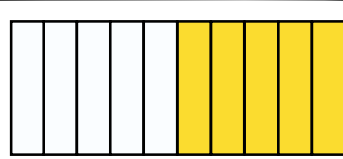
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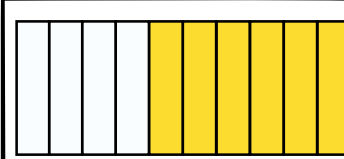
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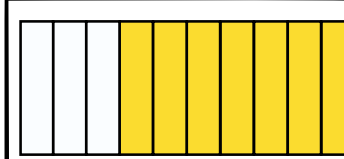
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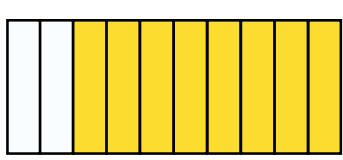
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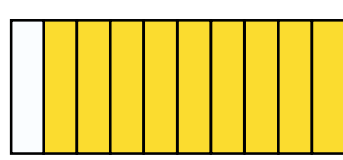
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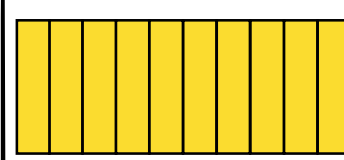
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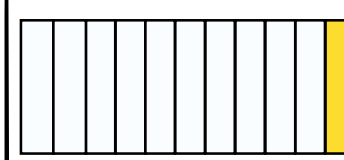
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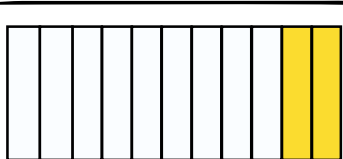
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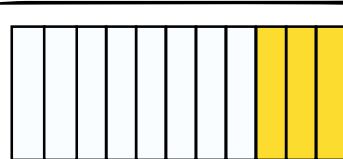
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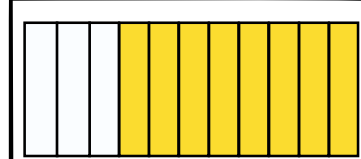
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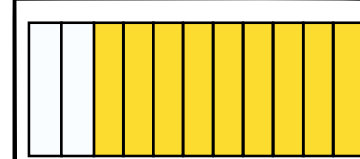
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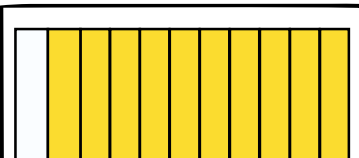
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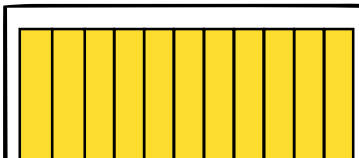
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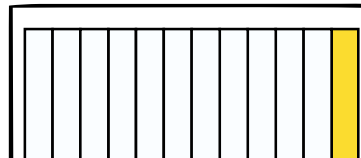
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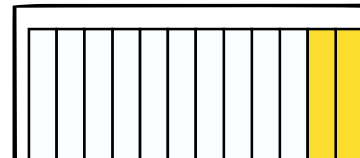
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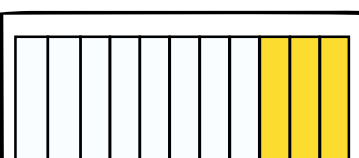
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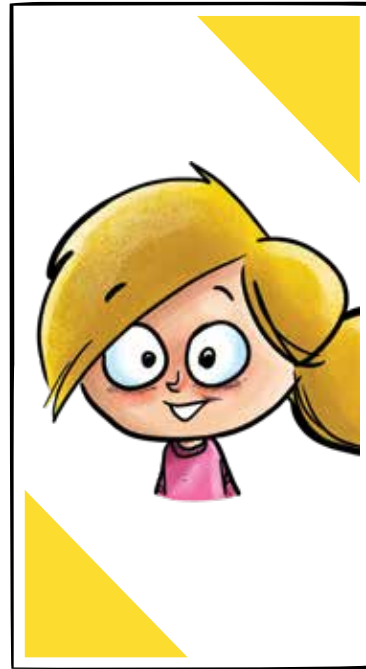
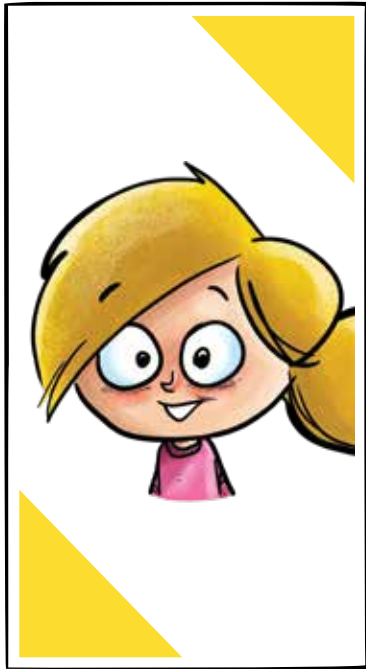
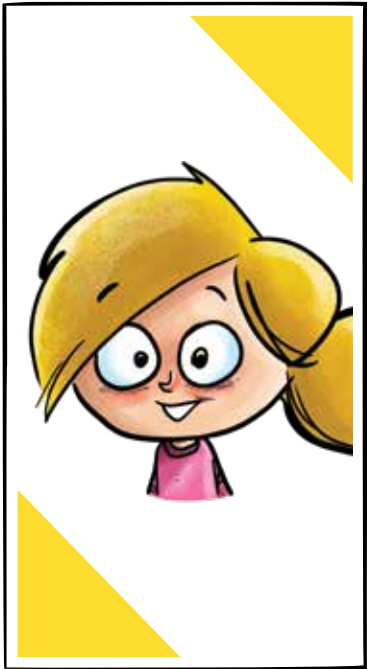
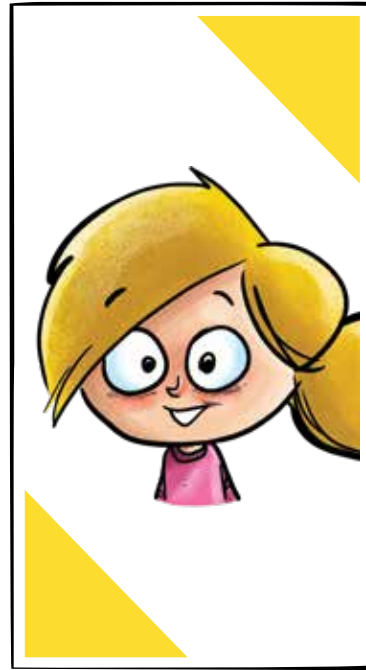
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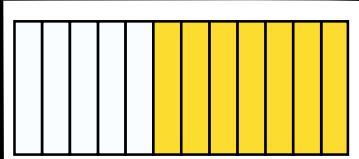
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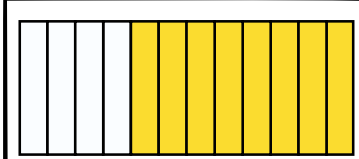
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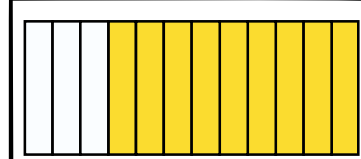
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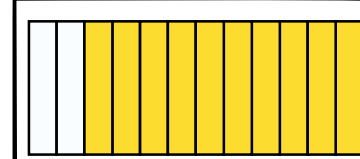
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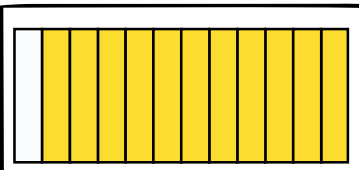
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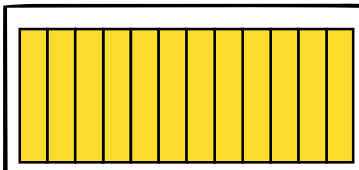
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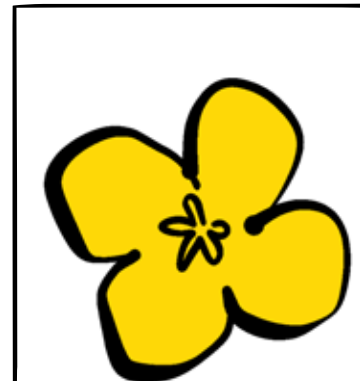


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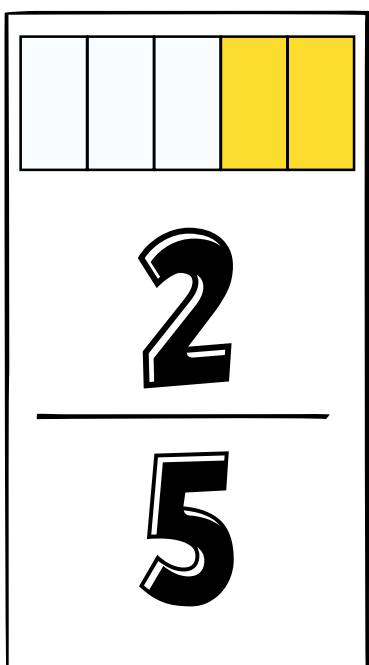
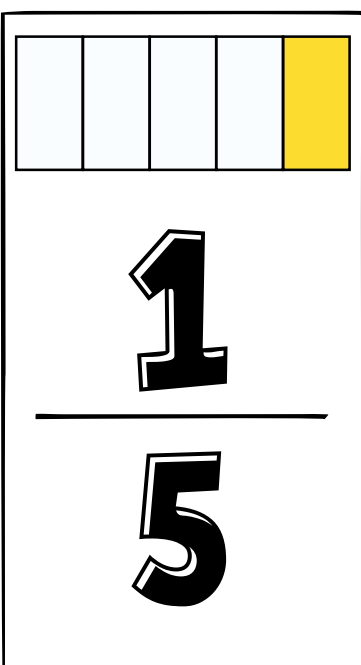
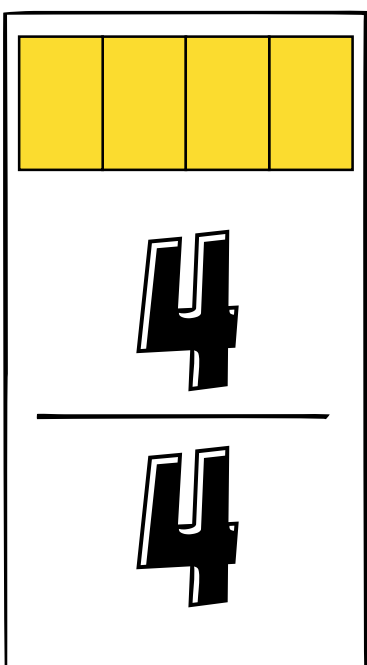
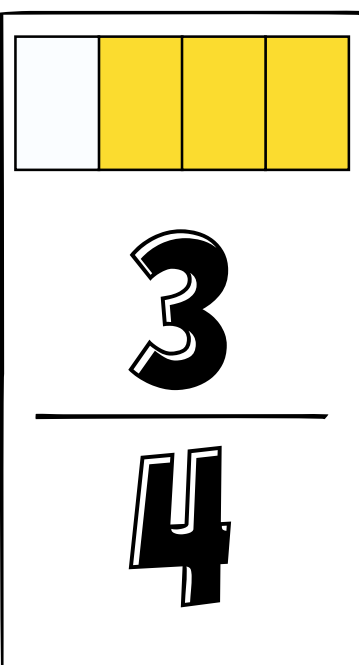
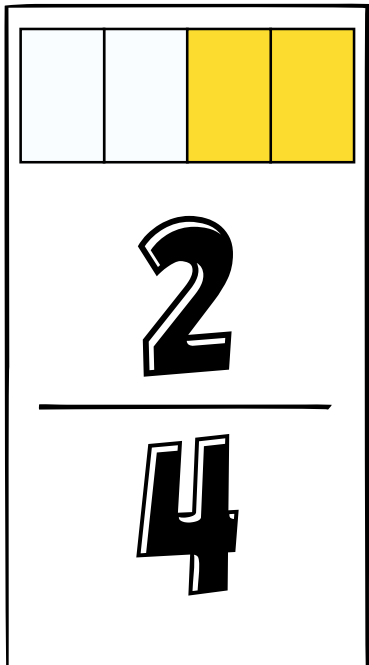
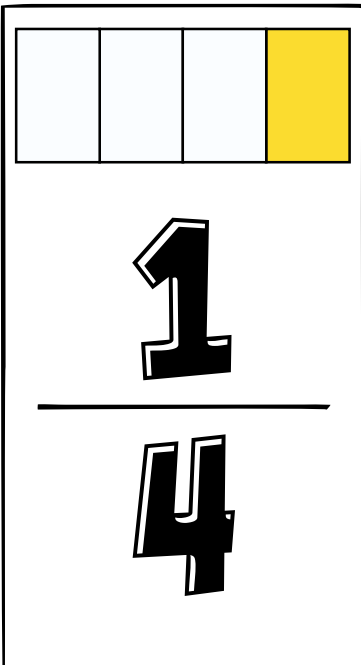
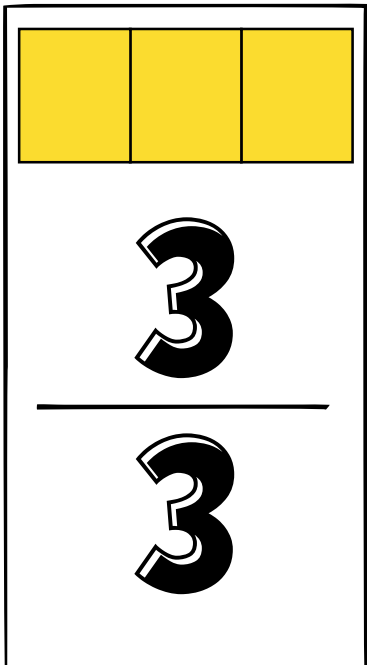
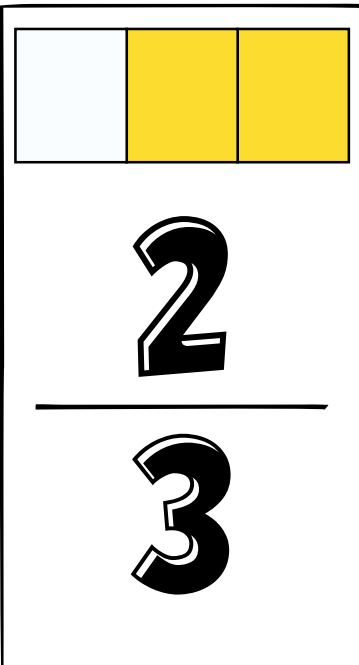
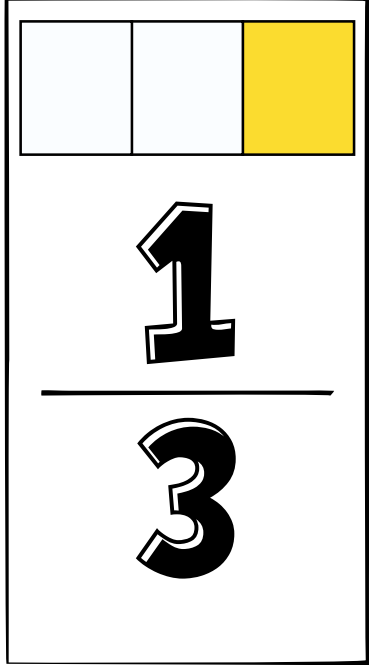
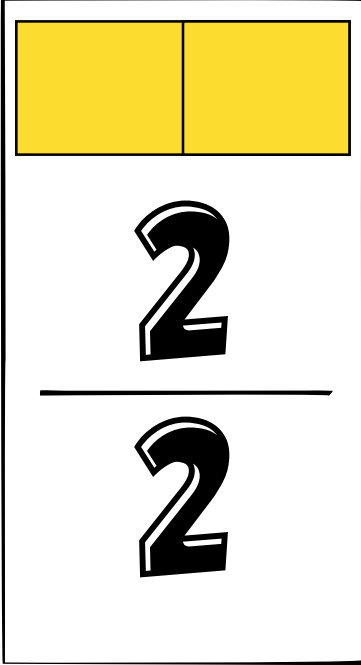
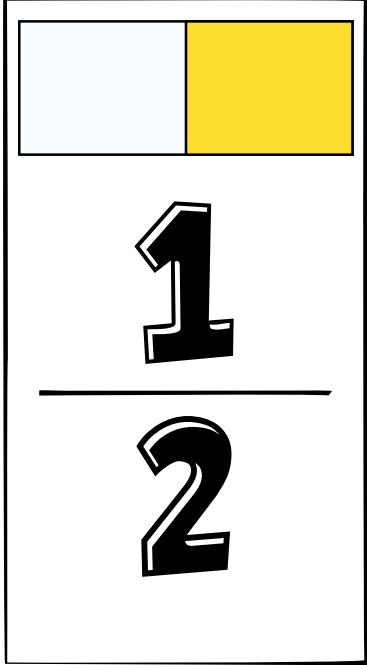
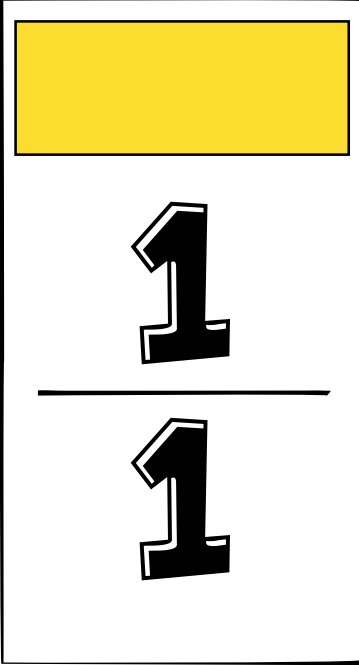
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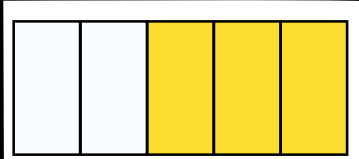


**WILD
CARD**



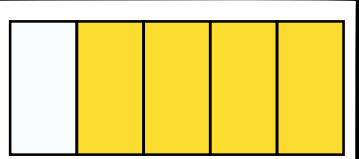
**WILD
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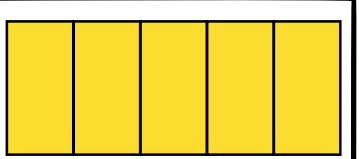
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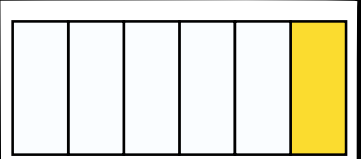
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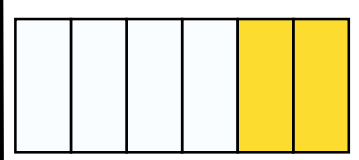
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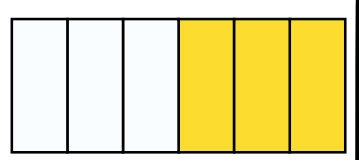
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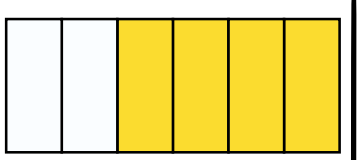
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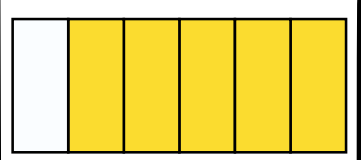
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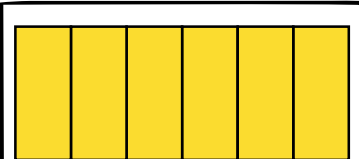
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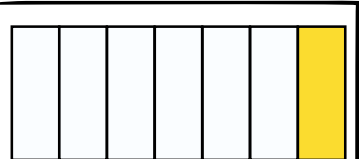
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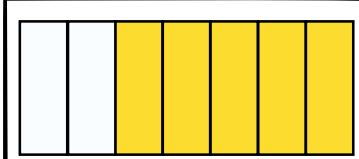
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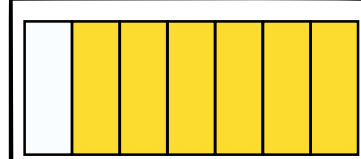
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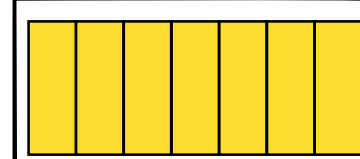
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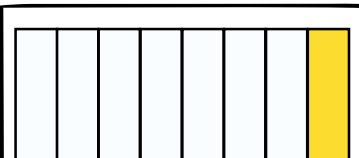
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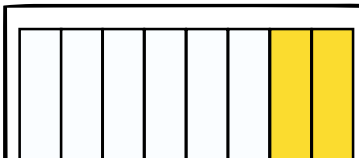
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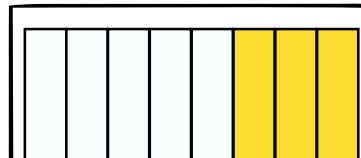
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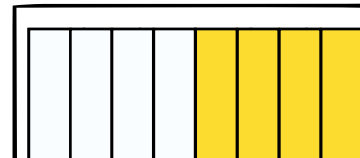
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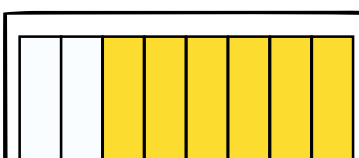
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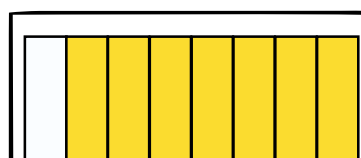
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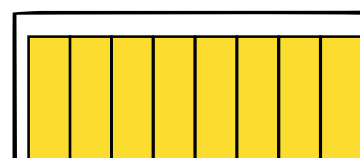
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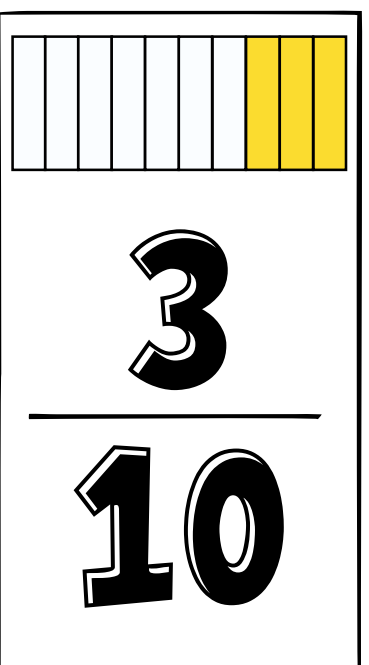
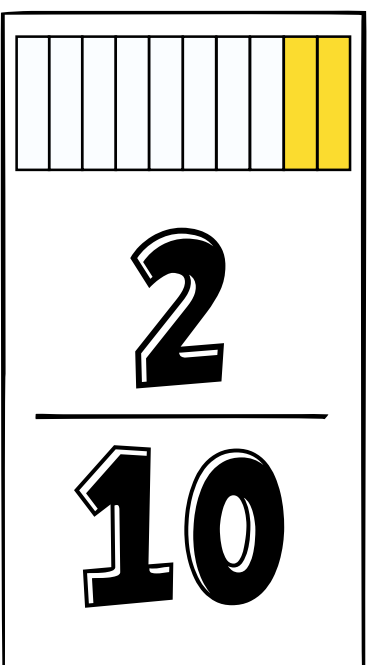
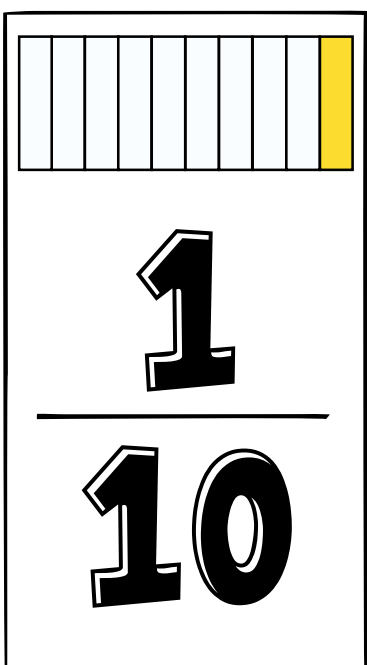
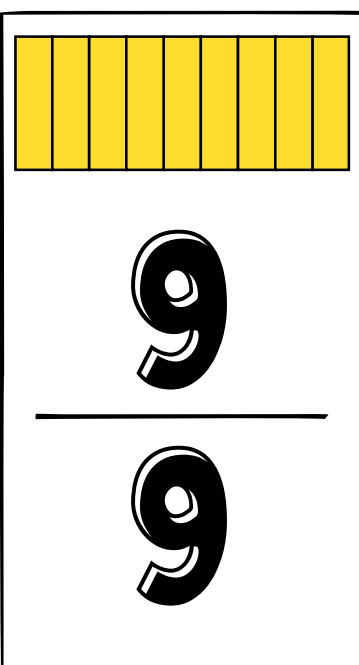
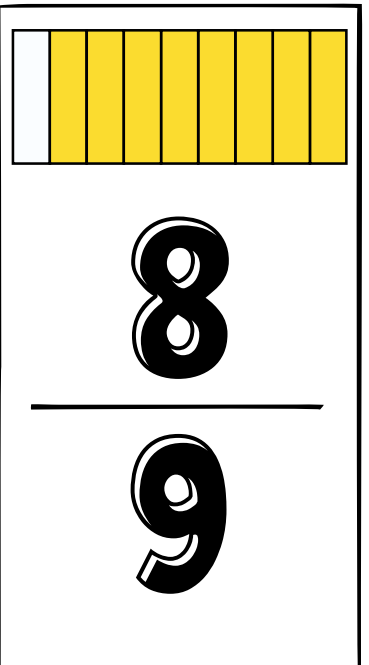
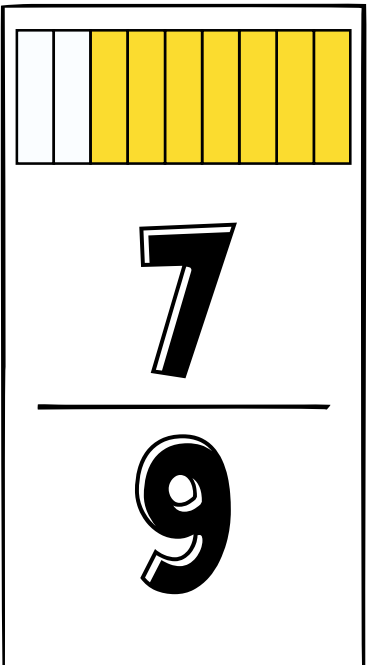
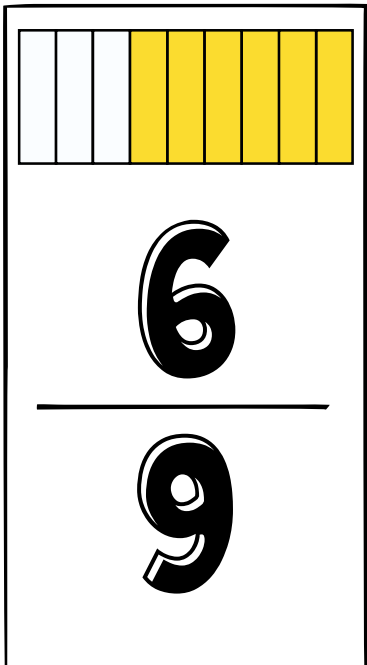
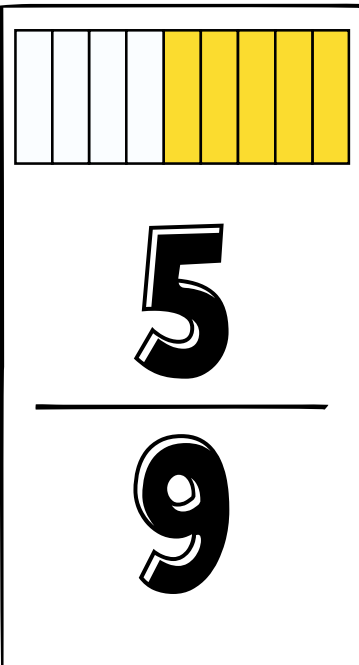
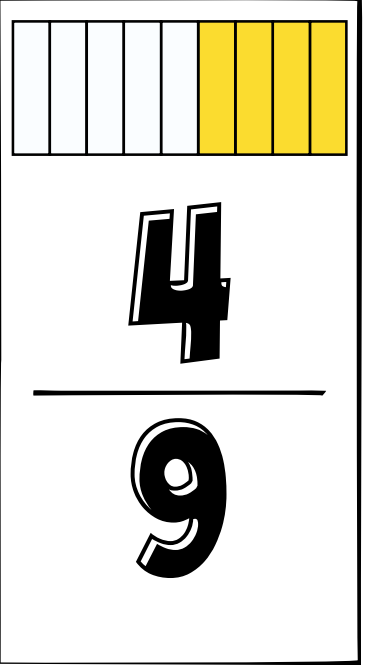
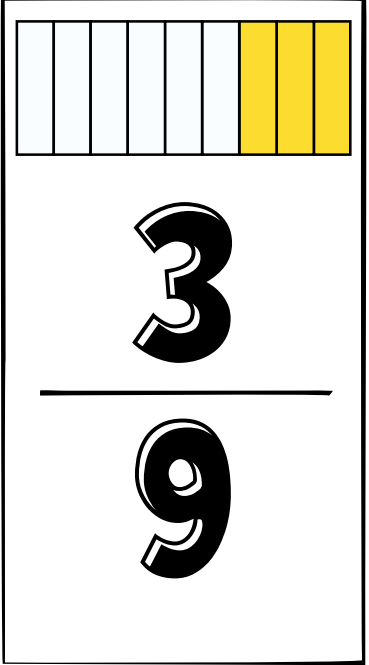
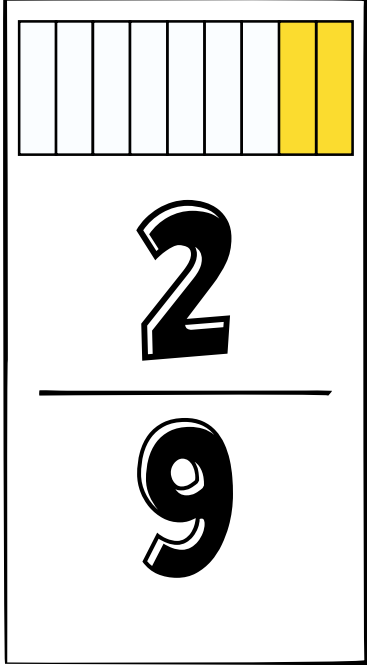
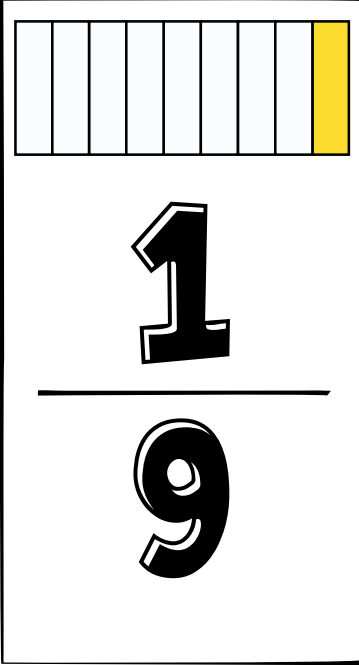
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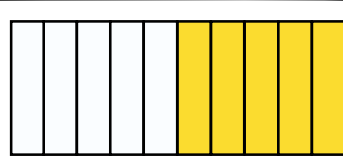
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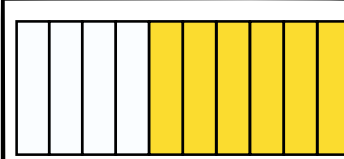
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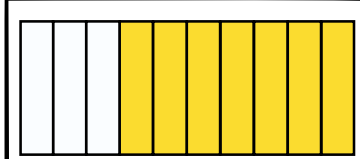
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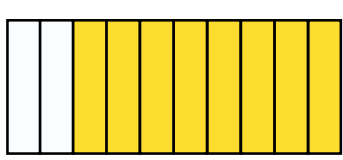
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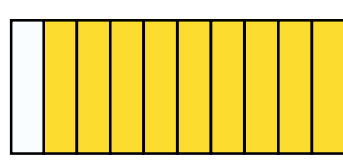
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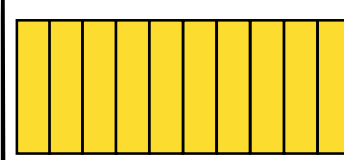
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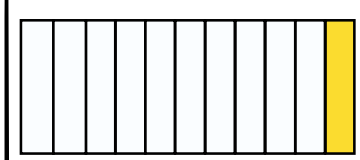
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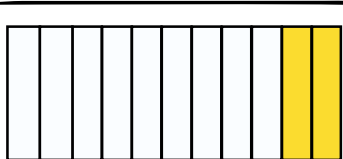
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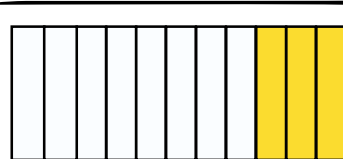
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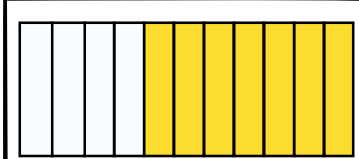
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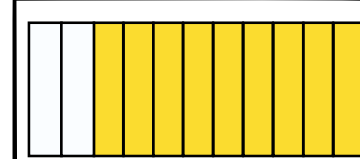
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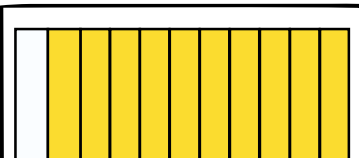
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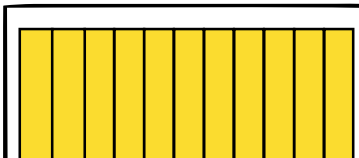
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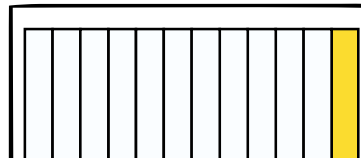
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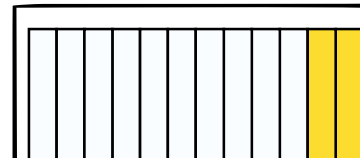
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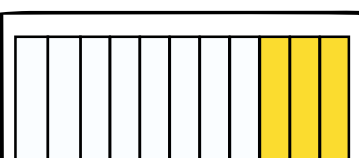
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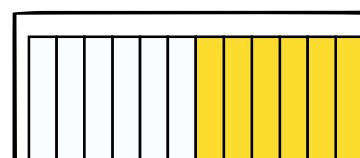
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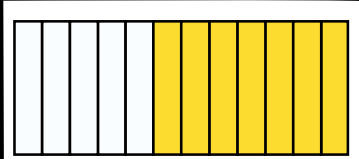
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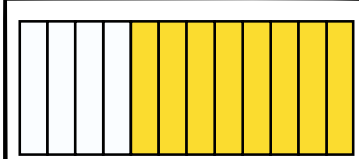
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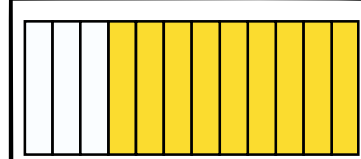
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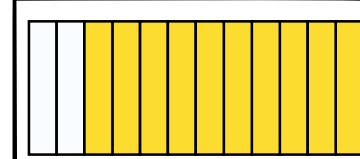
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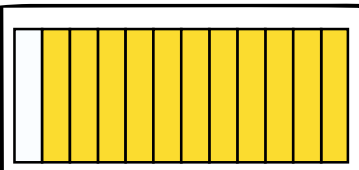
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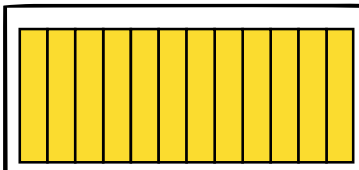
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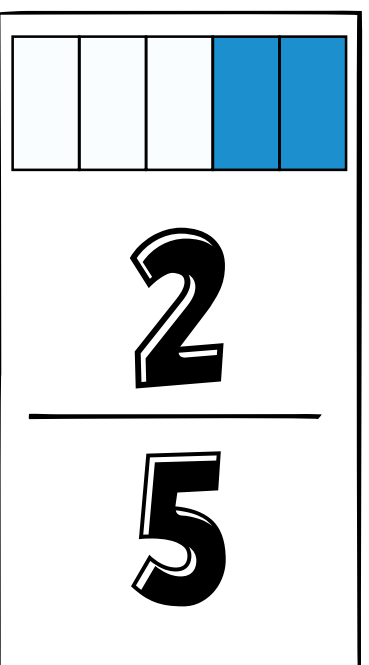
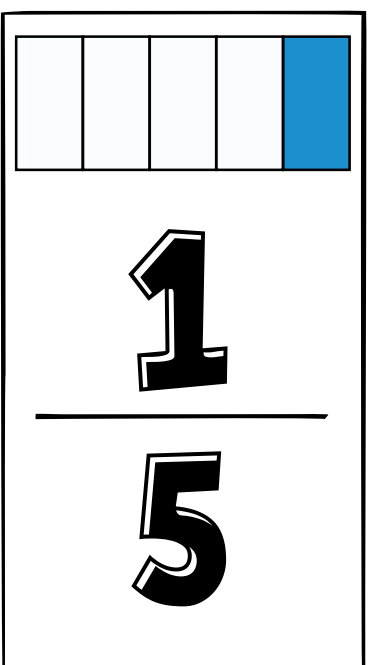
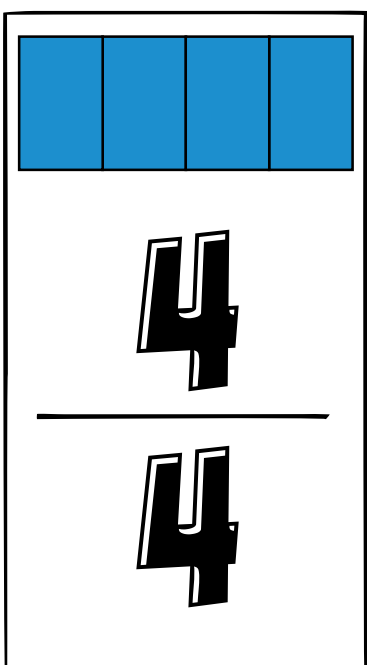
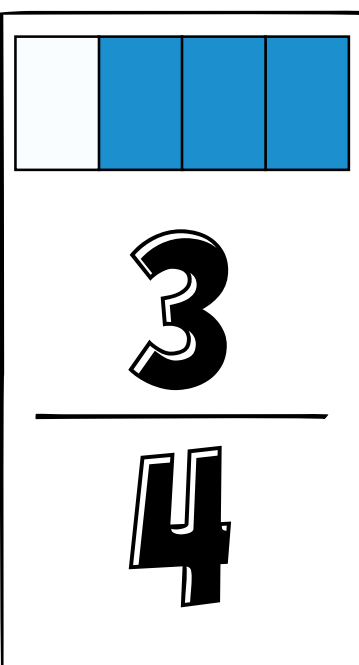
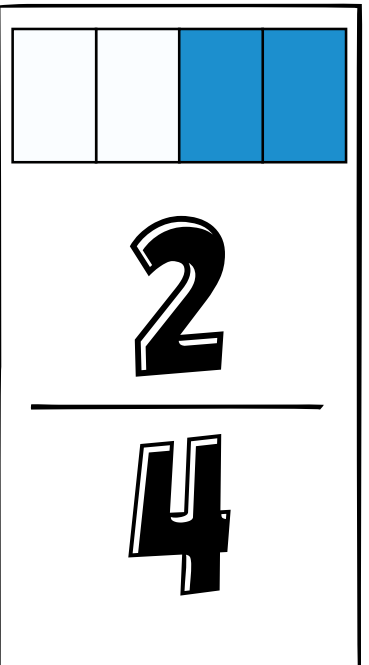
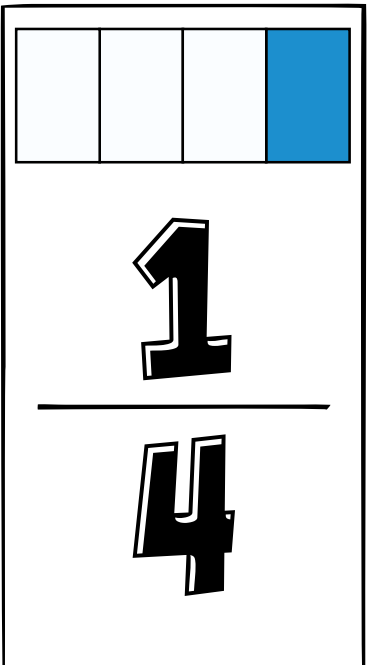
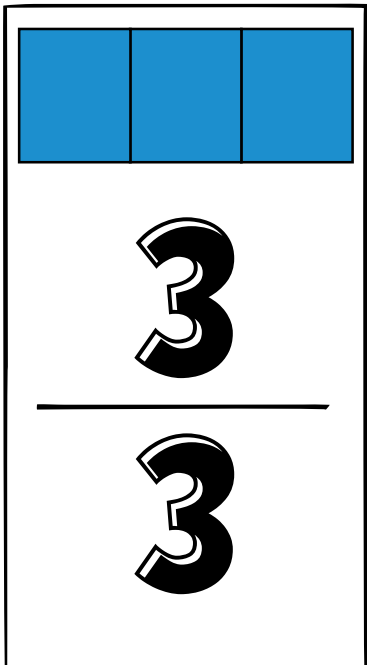
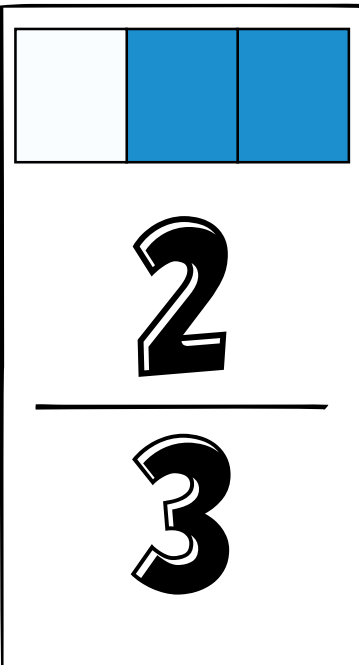
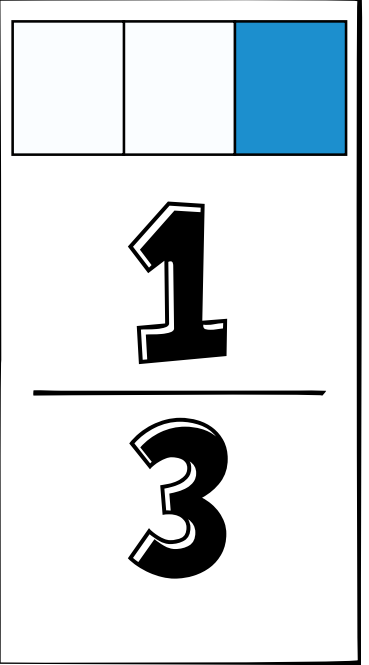
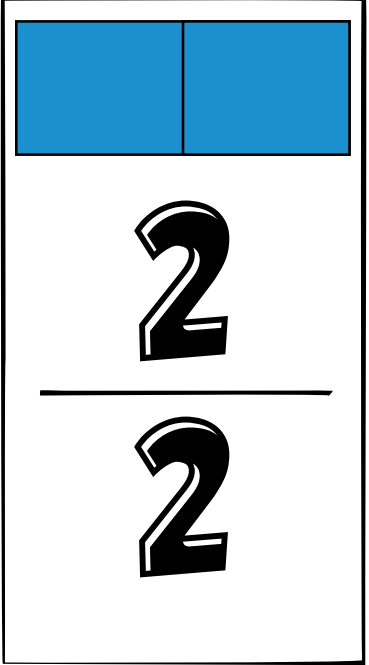
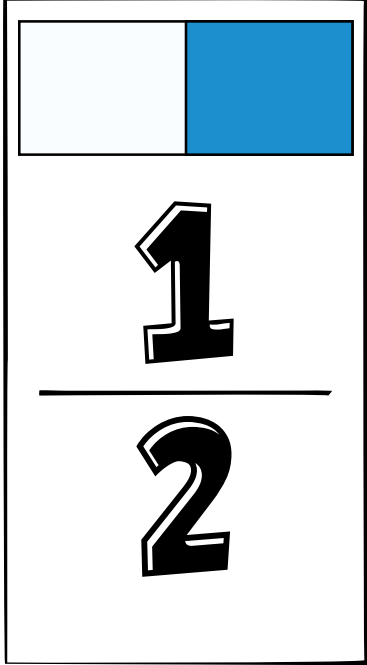
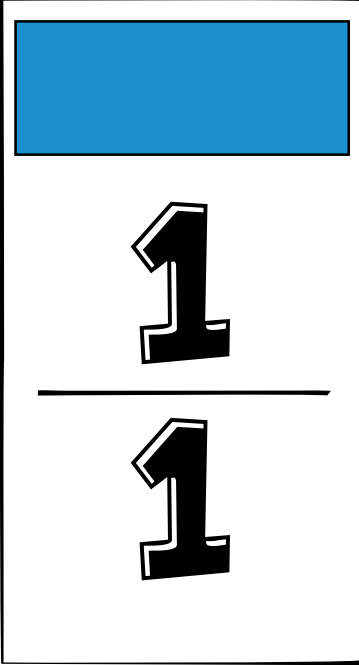
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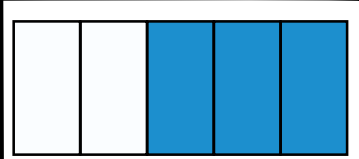


**WILD
CARD**



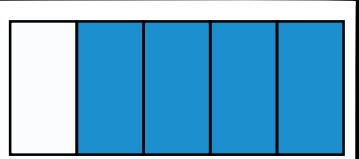
**WILD
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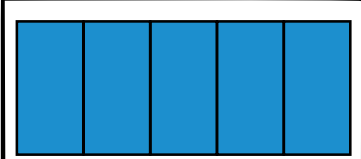
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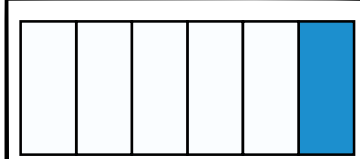
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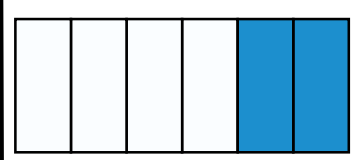
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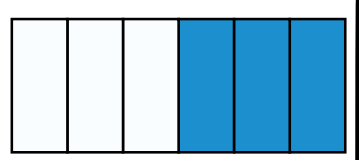
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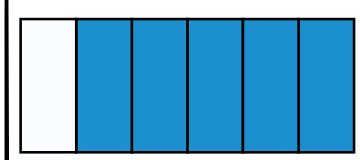
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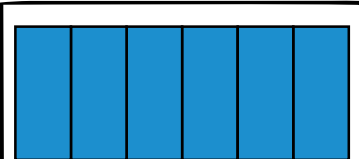
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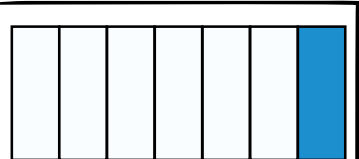
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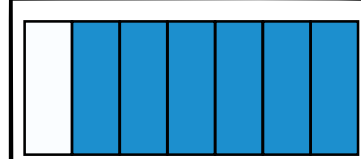
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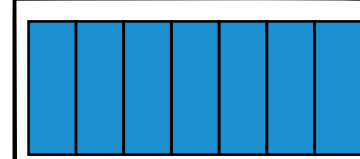
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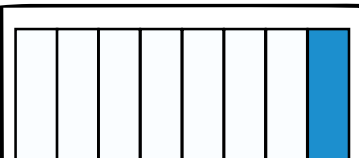
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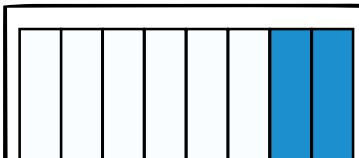
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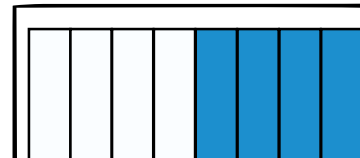
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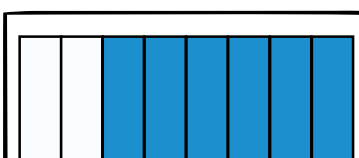
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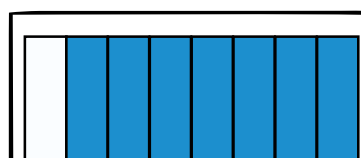
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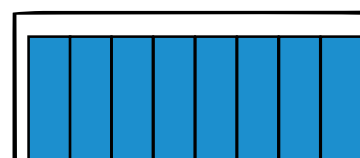
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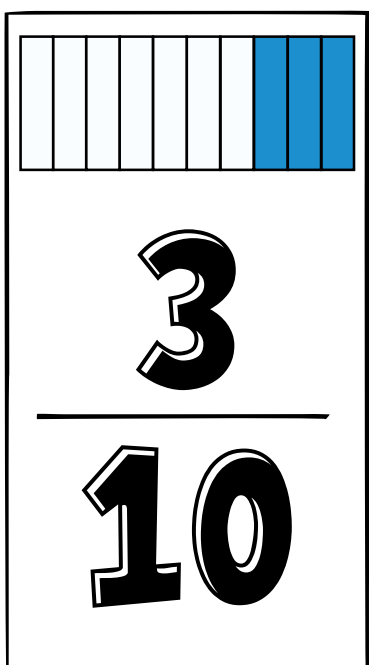
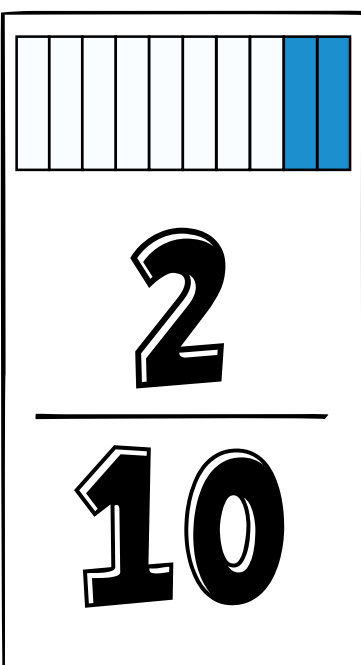
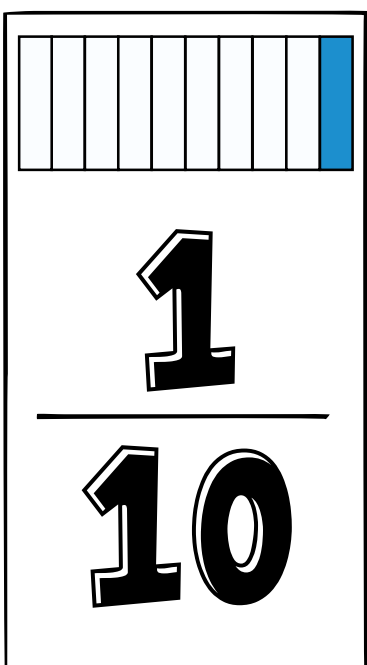
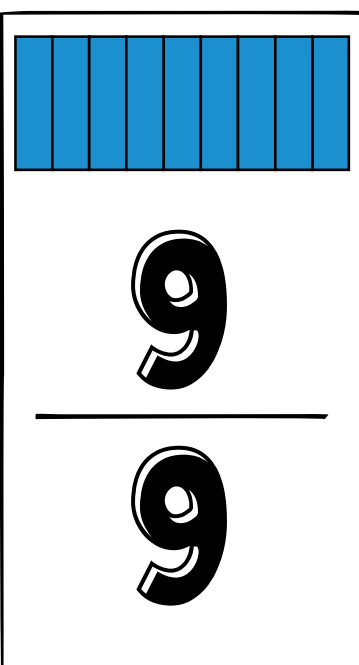
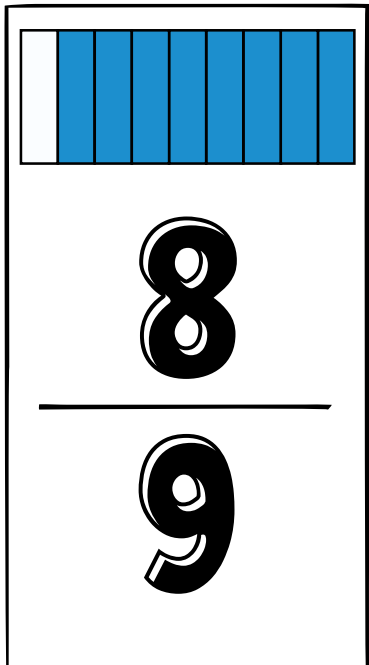
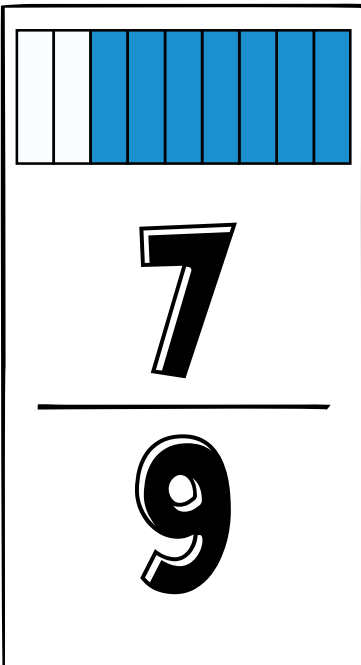
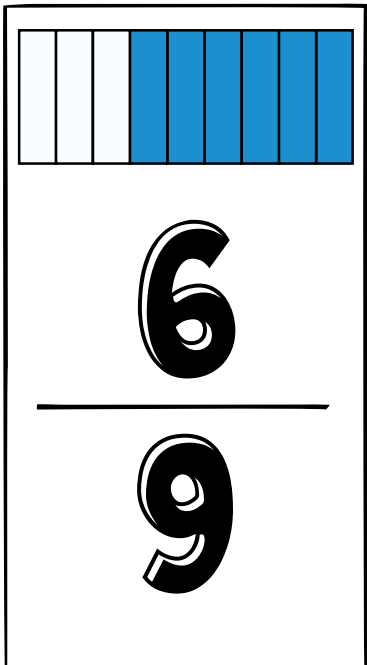
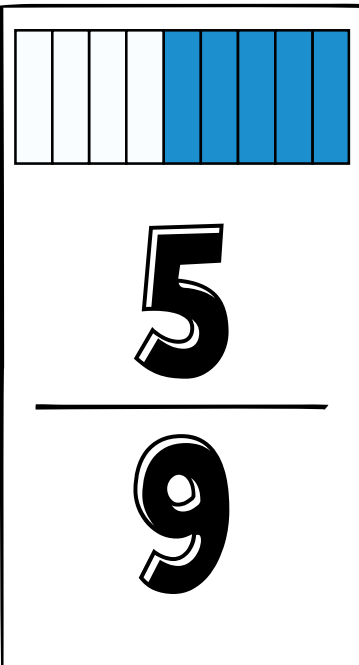
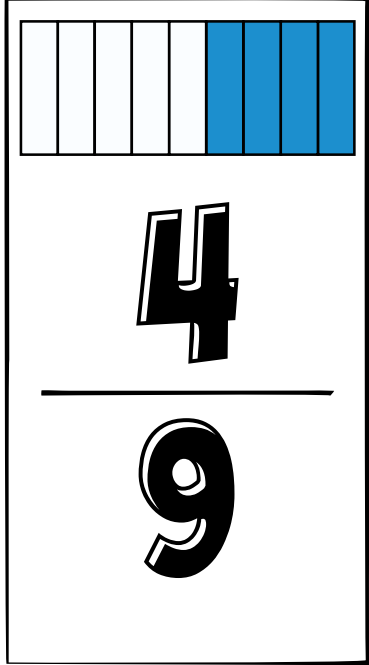
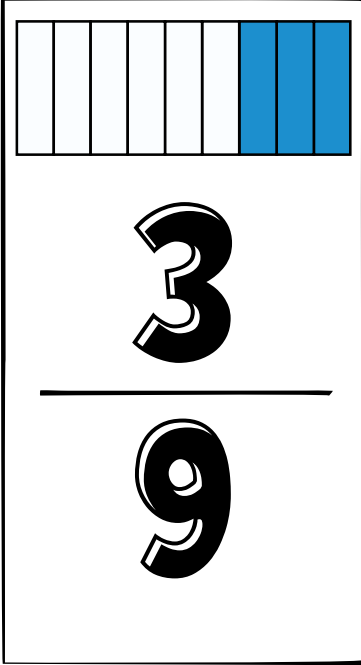
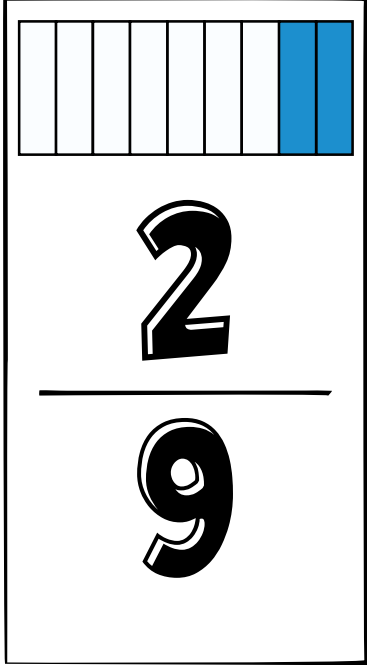
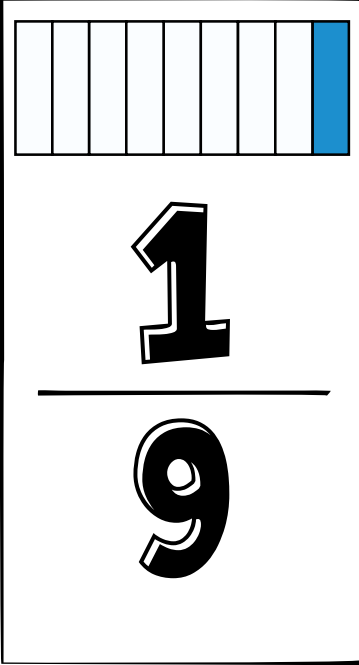
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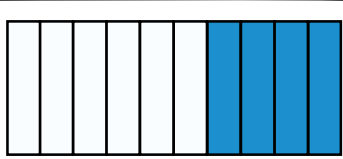


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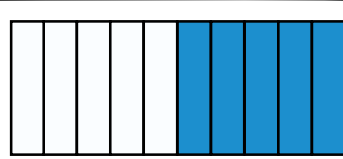
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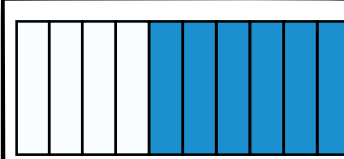
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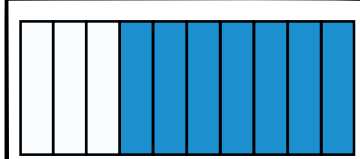
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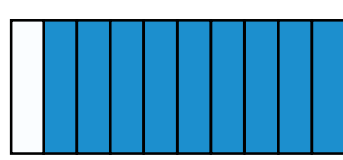
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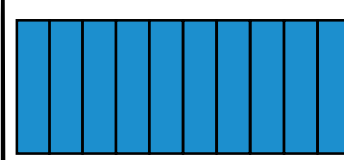
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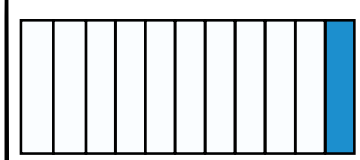
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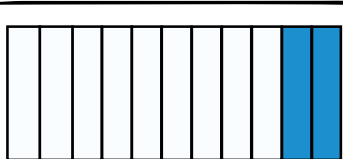
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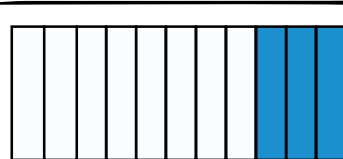
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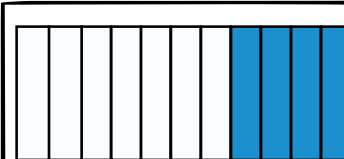
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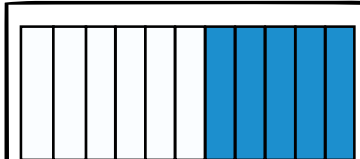
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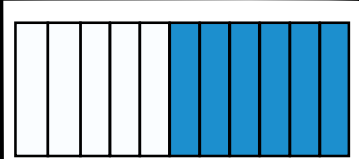
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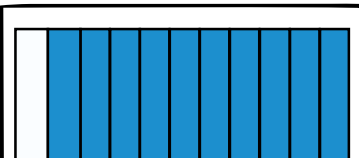
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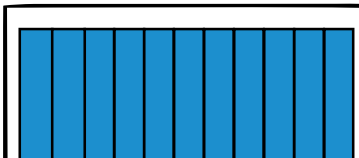
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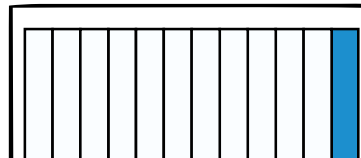
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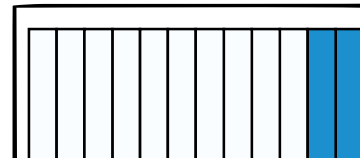
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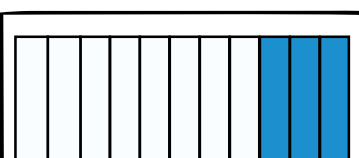
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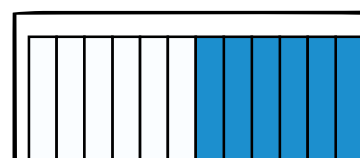
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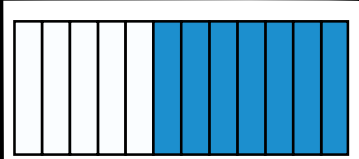
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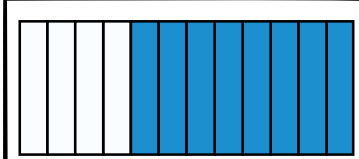
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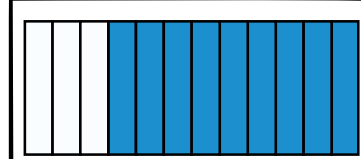
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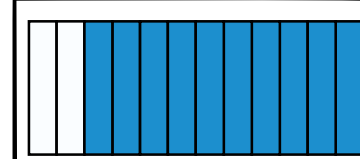
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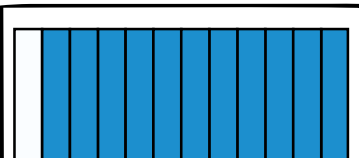
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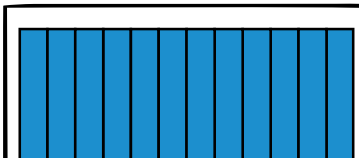
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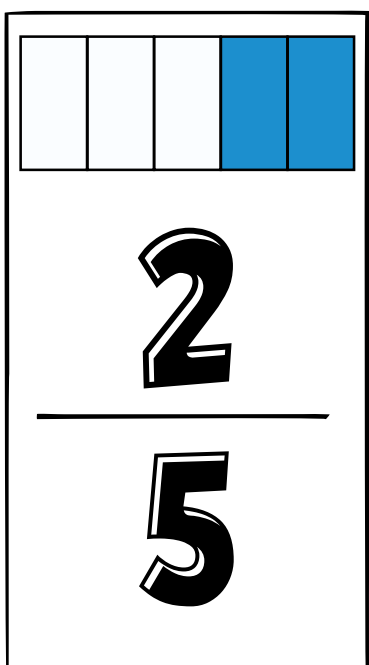
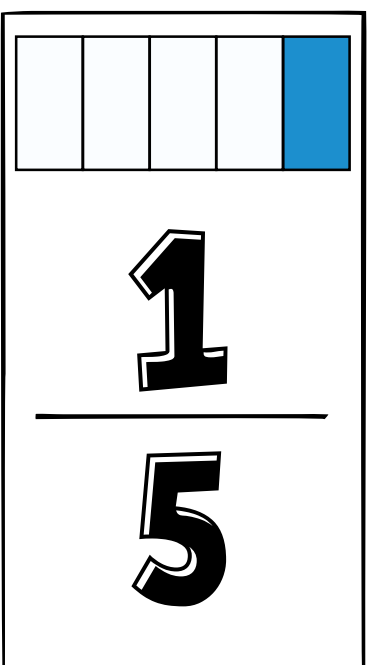
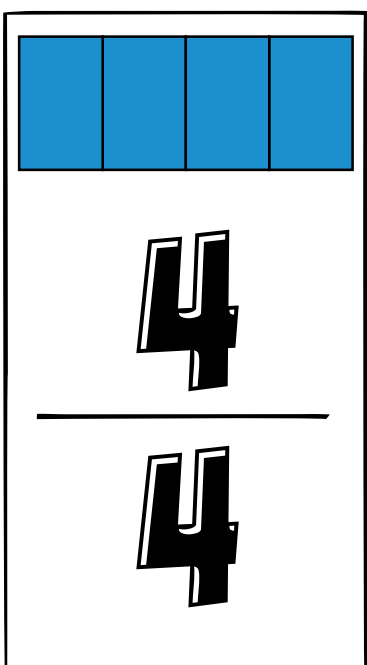
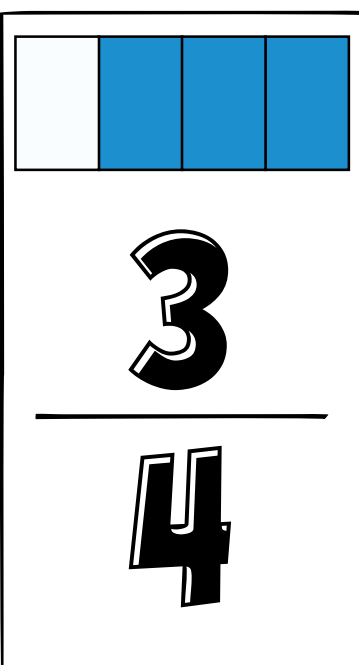
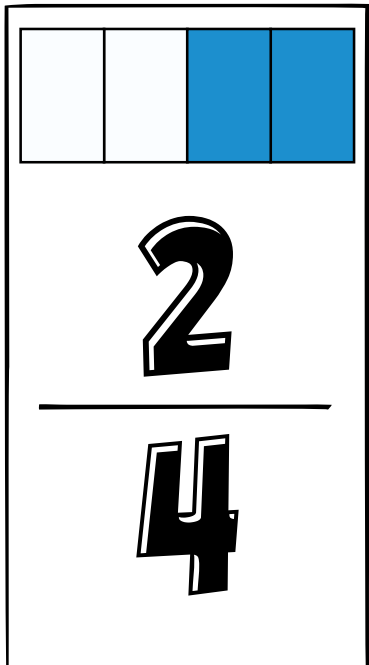
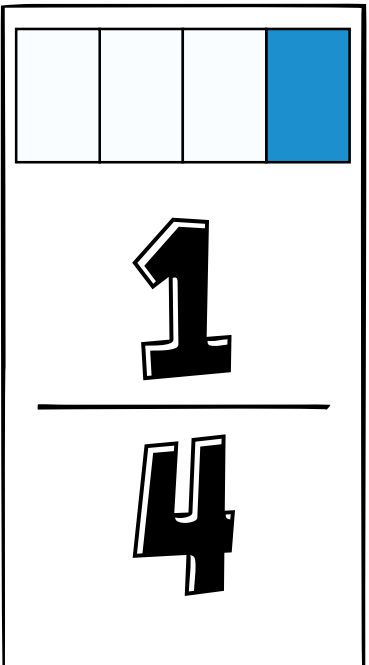
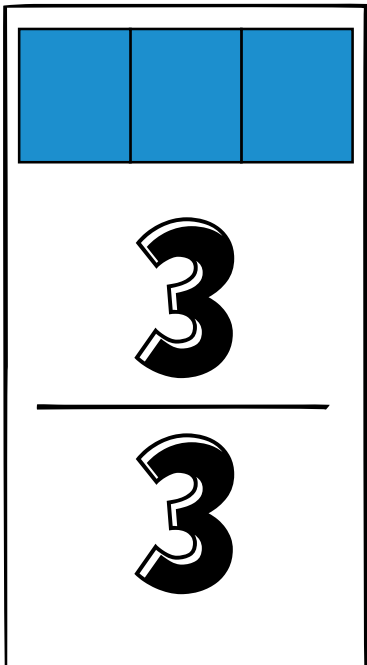
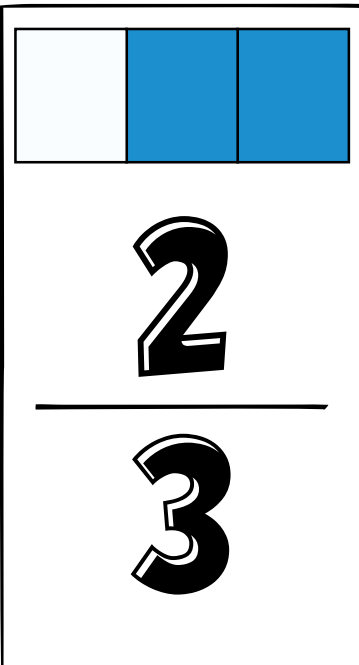
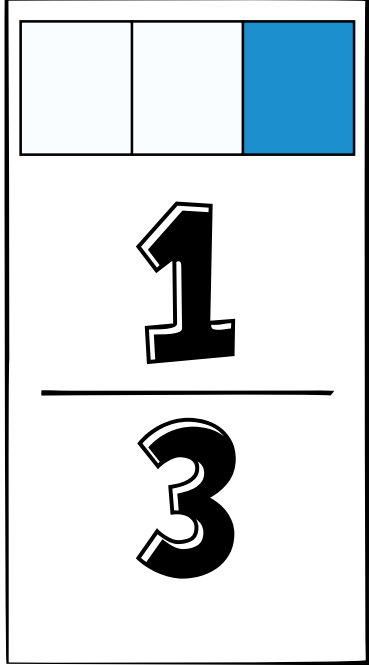
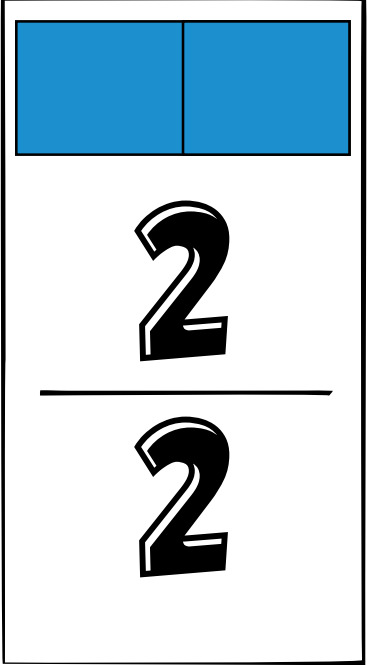
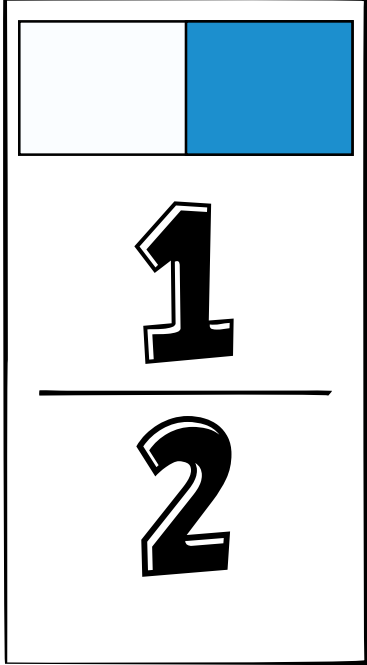
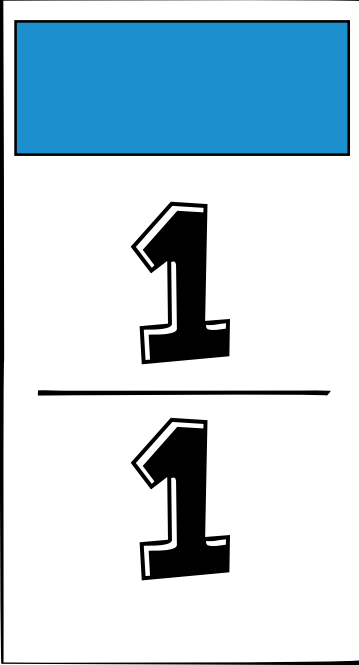
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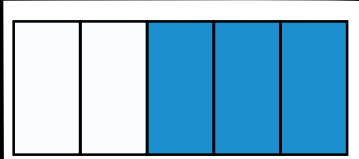


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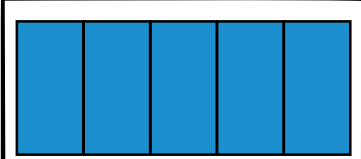
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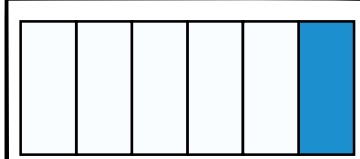
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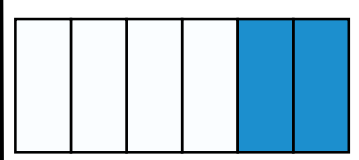
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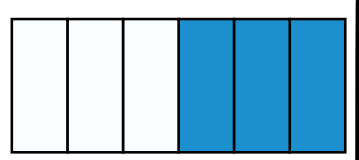
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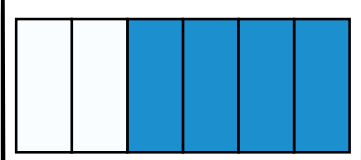
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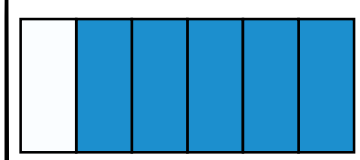
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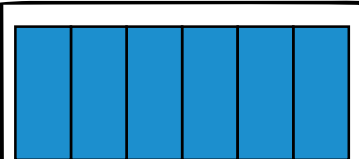
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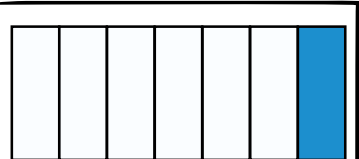
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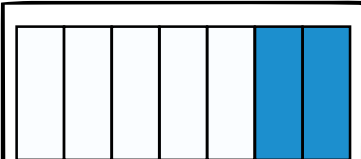
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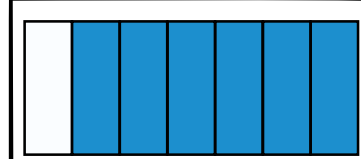
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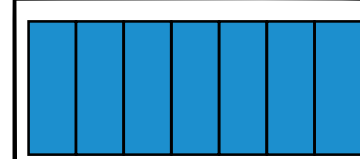
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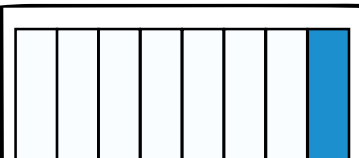
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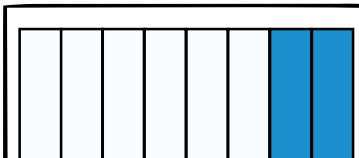
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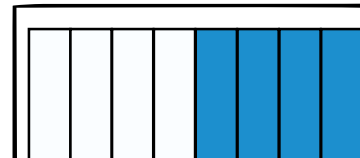
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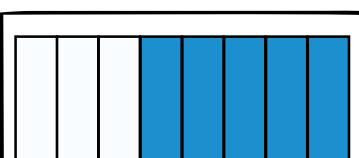
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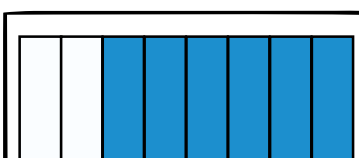
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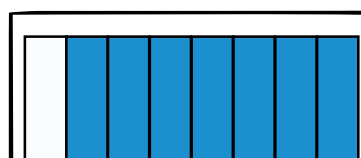
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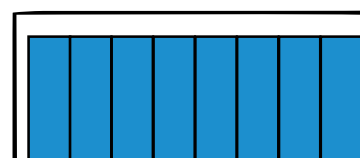
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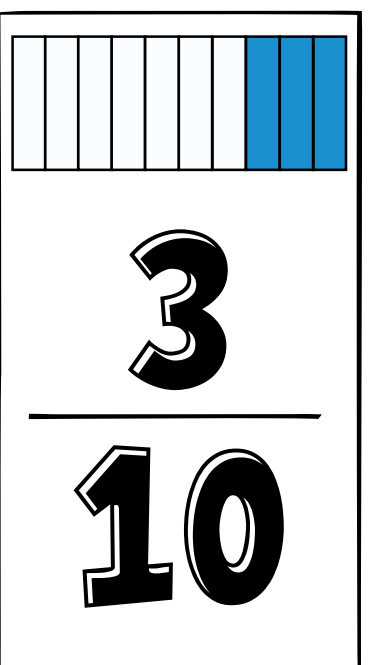
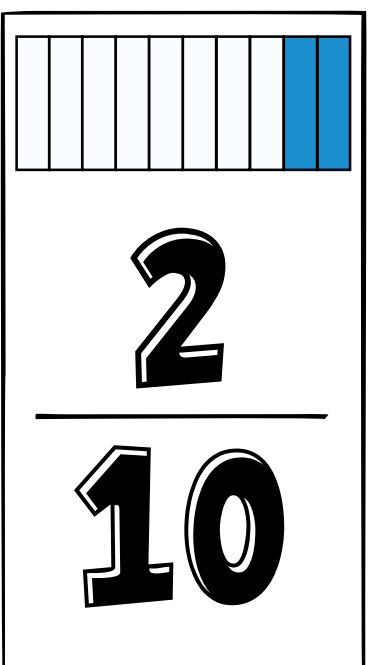
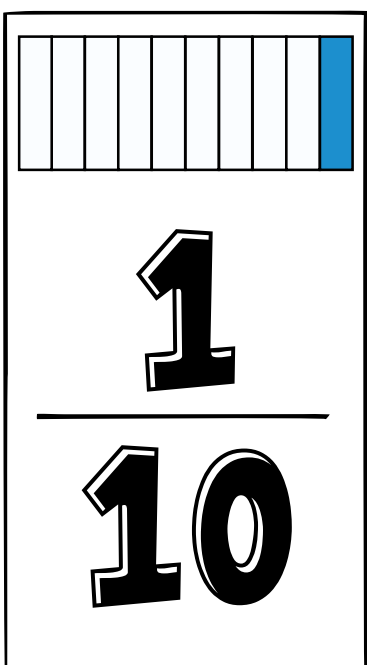
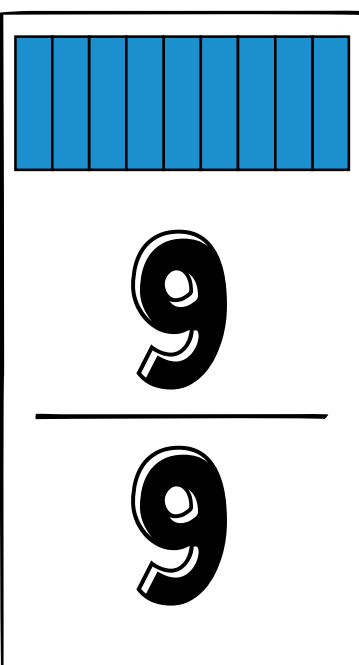
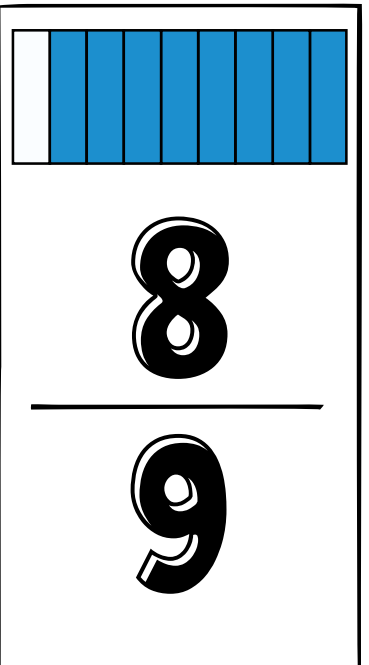
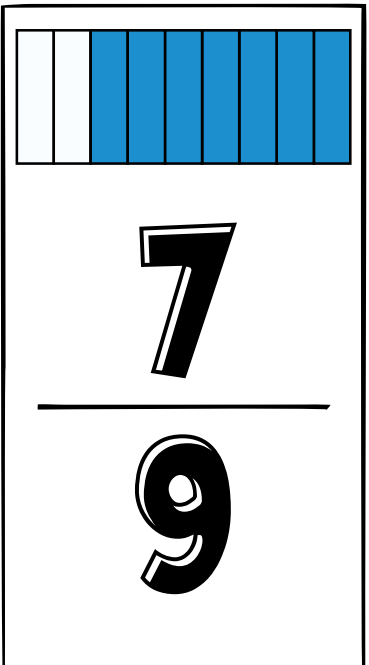
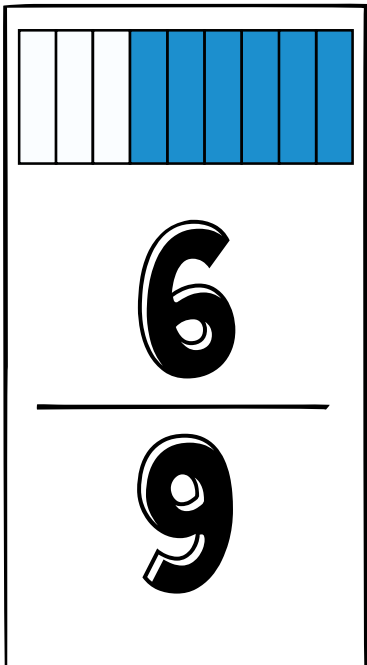
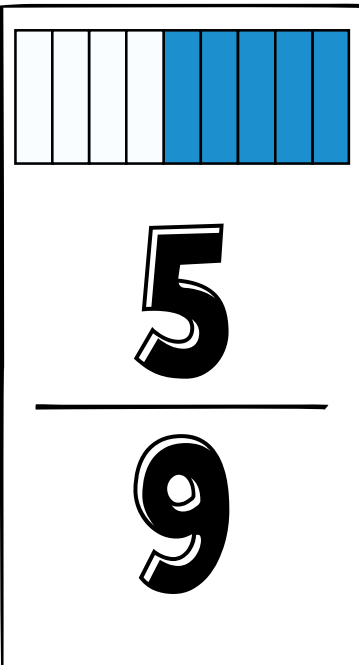
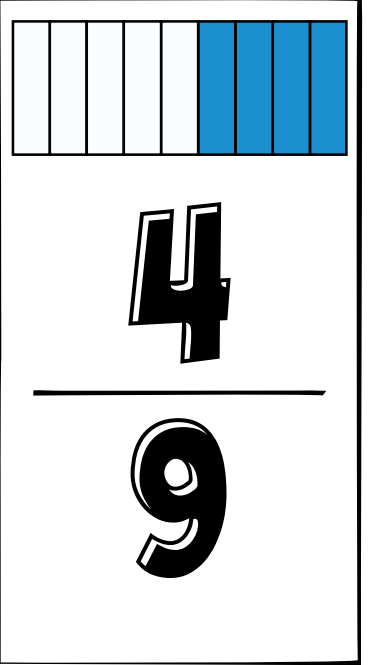
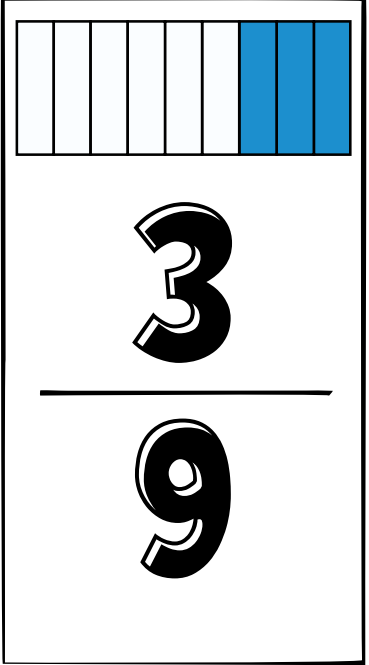
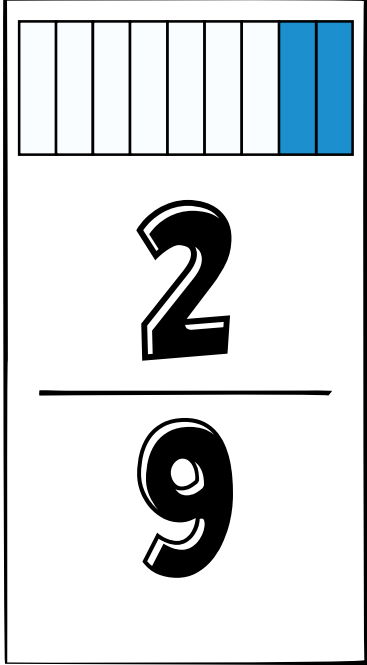
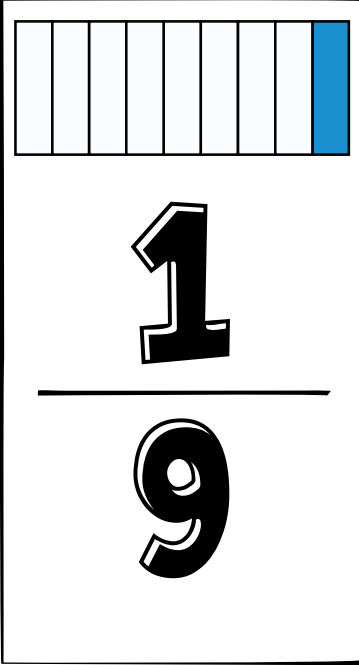
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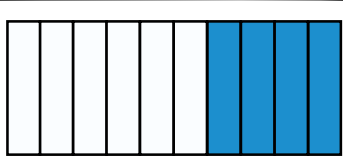


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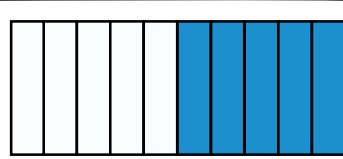
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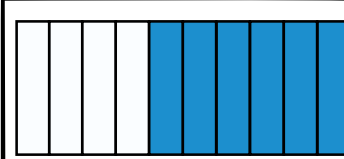
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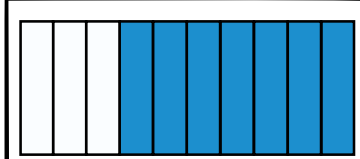
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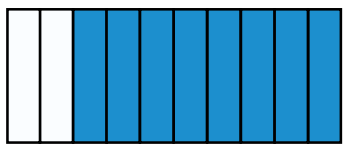
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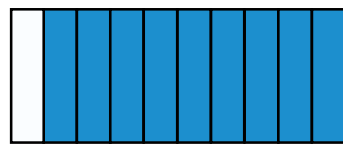
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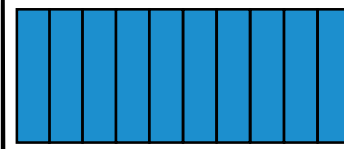
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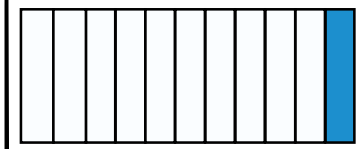
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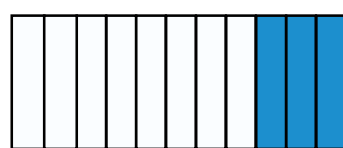
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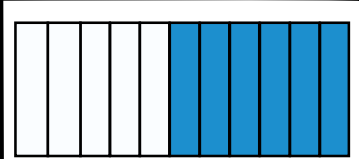
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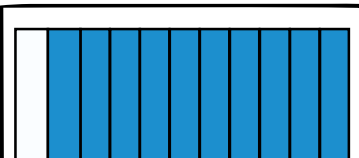
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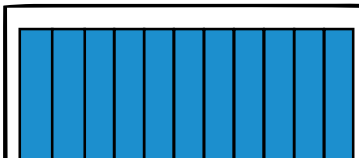
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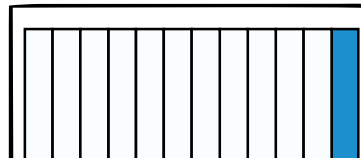
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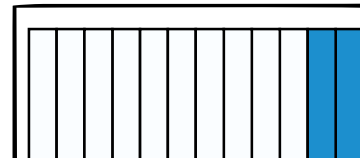
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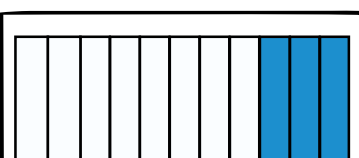
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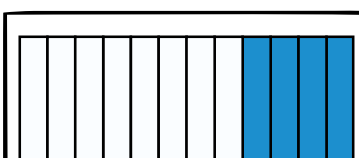
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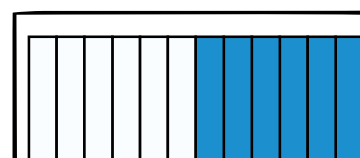
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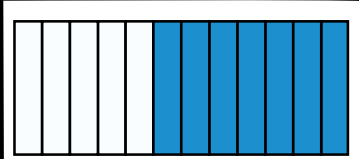
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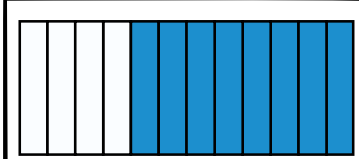
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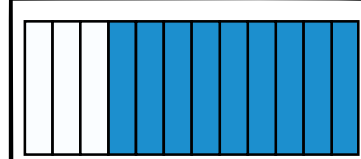
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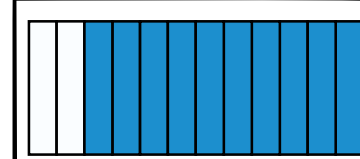
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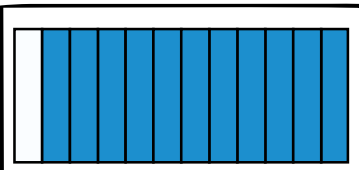
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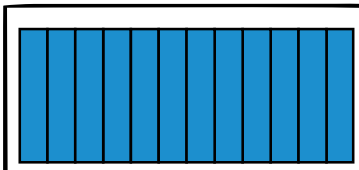
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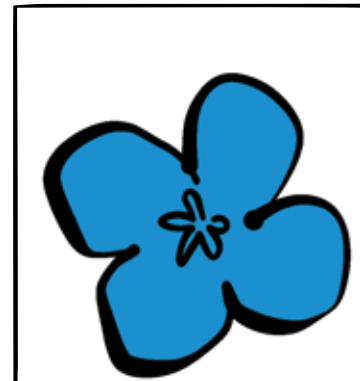


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the other resources.**



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