CHAPTER

9

Add and Subtract Fractions

Vocabulary:

numerator
denominator
common multiple
unlike denominator
like denominator

Chapter Outcomes:

- Develop and apply procedures to solve problems involving fractions and the four operations.

When you work you have to be able to give clear instructions. Many of these instructions include accurate calculations in addition and subtraction of fractions. Workers in all areas must be able to calculate fractions. The workers who construct our roads and highways use addition and subtraction of fractions to calculate road lengths, amount of material and so on.

Getting Ready for Chapter 9

1. Choose the best term from the box.

common multiple	simplest form
numerator	denominator

a) The multiple that two or more numbers have in common is called a _____.

b) The _____ represents the total number of parts in all.

c) The number above the fraction bar in a fraction is known as the _____.

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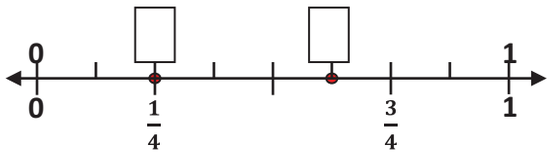
2. Write the missing equivalent fractions.



3. What is $\frac{3}{6} + \frac{2}{6}$?

4. Subtract $\frac{2}{8}$ from $\frac{5}{8}$.

5. What is $\frac{1}{4}$ of 12?

Add and Subtract Fractions with Like Denominators

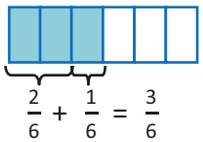
Teaching Point 1:

When can you add and subtract parts of a whole?

Alina ate $\frac{2}{6}$ of a sandwich and Mark ate $\frac{1}{6}$ of the sandwich. How much of the sandwich did they eat in total?

Find $\frac{2}{6} + \frac{1}{6}$

Use a model.



Use a rule.

The denominators are the **same** so, **add** the numerators.

$\frac{2}{6} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6}$

They ate $\frac{3}{6}$ of the sandwich.

Mary used $\frac{6}{8}$ of a length of fabric and Jane used $\frac{2}{8}$ of the length of fabric. How much more fabric did Mary used than Jane?

Find $\frac{6}{8} - \frac{2}{8}$.

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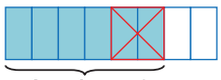
Use a model.



$\frac{6}{8} - \frac{2}{8} = \frac{4}{8}$

Use a rule.

The denominators are the **same** so, **subtract** the numerators.

$\frac{6}{8} - \frac{2}{8} = \frac{6-2}{8} = \frac{4}{8}$

Mary used $\frac{4}{8}$ more of the fabric than Jane.

Activity 1:

Add or subtract.

1. $\frac{3}{6} + \frac{2}{6} =$	**2.** $\frac{1}{3} + \frac{1}{3} =$	**3.** $\frac{5}{10} - \frac{3}{10} =$
4. $\frac{1}{4} + \frac{2}{4} =$	**5.** $\frac{3}{5} - \frac{2}{5} =$	**6.** $\frac{6}{7} - \frac{2}{7} =$
7. $\frac{1}{6} + \frac{4}{6} =$	**8.** $\frac{4}{9} - \frac{2}{9} =$	**9.** $\frac{2}{8} + \frac{4}{8} =$
10. $\frac{2}{7} + \frac{3}{7} - \frac{1}{7} =$		**11.** $\frac{2}{8} + \frac{2}{8} + \frac{3}{8} =$

12. What is the sum of three fifths and one fifth?

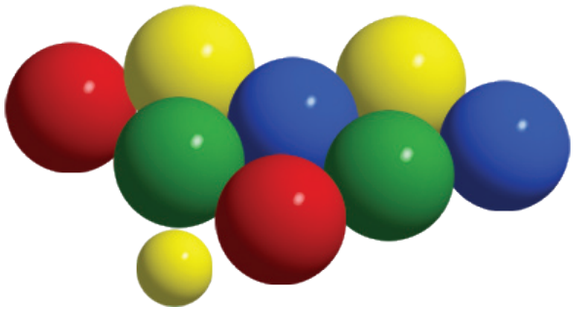
13. Find the missing value in the number statement below.

$\frac{4}{12} + \frac{\square}{12} - \frac{3}{12} = \frac{2}{12}$

14. Mother buys 6 oranges, 2 pawpaws and some mangoes. If she buys 12 fruits in all, what fraction of the fruits are mangoes?

15. Andrew had a whole pizza. He gave a fraction of the pizza to his friends. He now has $\frac{3}{12}$ of the pizza left. How much of the pizza did he give away?

16. Vinod painted $\frac{2}{7}$ of a wall, then he painted another $\frac{3}{7}$ of the wall. How much of the wall did he paint in all?



17. What fraction of the set of balls is either red or yellow?

18. A piece of ribbon is $\frac{9}{10}$ m long. A piece measuring $\frac{4}{10}$ m is cut off. What is the length of the remaining piece?

Add Fractions to a Whole Number

Teaching Point 1:

How can you add a fraction to a whole number?

Christian has 2 oranges and Mike has $\frac{1}{2}$ of an orange. How many oranges do they have altogether?

Find $2 + \frac{1}{2}$.

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Use real objects.	Use a model.
 $1 + 1 + \frac{1}{2} = 2\frac{1}{2}$	 $1 + 1 + \frac{1}{2} = 2\frac{1}{2}$

They have $2\frac{1}{2}$ oranges altogether.

Activity 1:

Add the fractions to the whole numbers.

1. $2 + \frac{3}{6} + \frac{2}{6} =$	**2.** $\frac{1}{3} + \frac{1}{3} + 8 =$
3. $\frac{1}{4} + 4 + \frac{2}{4} =$	**4.** $1 + \frac{3}{5} + \frac{2}{5} =$
5. $6 + \frac{1}{6} + 3 =$	**6.** $\frac{4}{9} + 2 + \frac{2}{9} + 3 =$

7. What is the sum of 3 and $\frac{5}{7}$?

8. Mother made a fruit salad. She used 1 and $\frac{2}{4}$ pineapples, 1 pawpaw and $\frac{1}{4}$ of a watermelon. How much fruits did she use in total?

9. Rianna puts 2 and $\frac{2}{6}$ spoonfuls of rice on her plate. She puts 3 spoonfuls of rice on her sister's plate and $\frac{3}{6}$ of a spoonful on her brother's plate. How many spoonfuls did they all have on their plates?

10. Maria used $\frac{3}{10}$ kg of flour to make some cupcakes and 2 kg of flour to make bread. How much flour did she use in all?

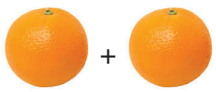
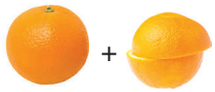
Subtract Fractions from a Whole Number

Teaching Point 1:

How can you subtract a fraction from a whole number?

Subtract $\frac{1}{2}$ from 2.

Method 1:

First, change the whole number to mixed number.	Then, subtract like fractions.
 $2 = 1 + 1$  $2 = 1 + \frac{2}{2} = 1\frac{2}{2}$	 $1\frac{2}{2} - \frac{1}{2} = 1\frac{1}{2}$

So, $2 - \frac{1}{2} = 1\frac{1}{2}$.

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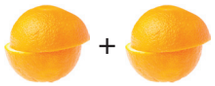
Method 2:

 $2 = \frac{2}{2} + \frac{2}{2} = \frac{4}{2}$ or $2 = \frac{2}{1} \overset{\times 2}{=} \frac{4}{2}$	Convert the whole number to an improper fraction.
 $\frac{4}{2} - \frac{1}{2} = \frac{3}{2}$	Subtract like fractions.
 $\frac{3}{2} = 1\frac{1}{2}$	Convert the improper fraction to a mixed number.

So, $2 - \frac{1}{2} = 1\frac{1}{2}$.

Activity 1:

Find each difference.

1. $2 - \frac{3}{7} =$	**2.** $5 - \frac{4}{9} =$
3. $4 - \frac{2}{4} =$	**4.** $1 - \frac{3}{5} =$
5. $6 - \frac{1}{6} =$	**6.** $2 - \frac{2}{9} =$
7. $1 - \frac{7}{12} =$	**8.** $3 - \frac{4}{16} =$
9. $8 - \frac{1}{3} + \frac{2}{3} =$	**10.** $7 - \frac{1}{2} + \frac{1}{2} =$

11. A jug has 4 litres of juice. Andrew pours $\frac{3}{4}$ litre of juice in a glass. How much juice is left in the jug?

12. Hanifah's pencil is 7 cm long. Keisha's pencil is $\frac{6}{10}$ cm shorter than Hanifah's pencil. What is the length of Keisha's pencil?

5 kg

$\frac{2}{5}$ kg

13. What is the difference between the mass of the watermelon and the mass of the bananas?

14. Mrs. Ali bought 2 metres of fabric. She used $\frac{1}{2}$ metre to make a pillow case. How much of the fabric is left?

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15. Ming and Lin shared a pizza. Ming ate $\frac{3}{8}$ of the pizza and Lin ate $\frac{4}{8}$ of the pizza. What fraction of the pizza was left?

16. Alaina had 2 metres of ribbon. She cut off $\frac{3}{8}$ of a metre. What fraction of the ribbon is left?

17. Baby Matthew weighed 9 kg on his first birthday. One month before he was $\frac{7}{10}$ kg less. What was his weight one month before his first birthday?

18. On Sunday Tariq sold 4 buckets of mangoes. On Monday he sold $\frac{5}{8}$ of a bucket of mangoes. How much more mangoes did he sell on Sunday than on Monday?

Add Fractions with One Denominator a Multiple of the Other

Teaching Point 1:

How can you use equivalent fractions to add fractions?

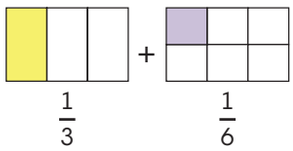
Pranaya ate $\frac{1}{3}$ of a pizza. Malika ate $\frac{1}{6}$ of the same pizza. What fraction of the pizza did they eat altogether?

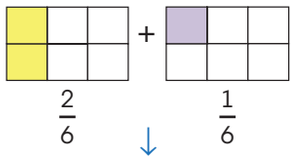
Find $\frac{1}{3} + \frac{1}{6}$.

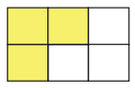
Method 1: Model $\frac{1}{3} + \frac{1}{6}$.

Use fraction models for $\frac{1}{3}$ and $\frac{1}{6}$.

Change the model for the $\frac{1}{3}$ so that the whole has the same number of parts as the model for the $\frac{1}{6}$.
Then add $\frac{1}{6}$ to the model for $\frac{2}{6}$.







$$\frac{2+1}{6} = \frac{3}{6}$$

Method 2: Use an equivalent fraction.

$$\frac{1}{3} + \frac{1}{6} = \frac{1 \times 2}{3 \times 2} + \frac{1}{6}$$

$$= \frac{2}{6} + \frac{1}{6}$$

$$= \frac{2+1}{6}, \text{ or } \frac{3}{6}$$

Find an **equivalent fraction** to $\frac{1}{3}$ that has the **same denominator** as $\frac{1}{6}$. Then **add**.

So, $\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$.

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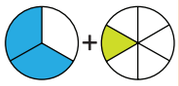
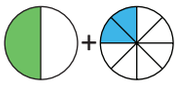
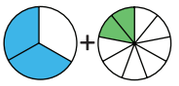
Activity 1:

Use a model to find each sum.

1. $\frac{2}{3} + \frac{1}{6} =$ 	**2.** $\frac{1}{2} + \frac{2}{8} =$ 	**3.** $\frac{1}{3} + \frac{2}{9} =$ 
4. $\frac{3}{8} + \frac{1}{4} =$	**5.** $\frac{3}{12} + \frac{1}{3} =$	**6.** $\frac{2}{5} + \frac{5}{10} =$
7. $\frac{4}{10} + \frac{1}{5} =$	**8.** $\frac{3}{7} + \frac{5}{21} =$	**9.** $\frac{4}{24} + \frac{2}{6} =$
10. $\frac{1}{5} + \frac{3}{10} + \frac{4}{20} =$	**11.** $\frac{2}{8} + \frac{1}{4} + \frac{3}{16} =$	
12. $\frac{2}{9} + \frac{3}{18} + \frac{1}{3} =$	**13.** $\frac{1}{2} + \frac{2}{7} + \frac{1}{14} =$	

Use any method to add.

14. Find the sum of $\frac{1}{6}$ and $\frac{3}{12}$.

15. Add $\frac{1}{2}$, $\frac{2}{8}$ and $\frac{3}{16}$.

16. What is $\frac{2}{7} + \frac{4}{21}$?

17. Aman spent $\frac{1}{10}$ of his weekly allowance on a box of coloured pencils and $\frac{2}{5}$ of it on a colouring book. What fraction of Aman's allowance is this altogether?

18. A cake was cut into 8 equal-sized pieces. Stacy ate $\frac{1}{4}$ of the cake. Adam ate $\frac{3}{8}$ of the cake. What part of the cake did Stacy and Adam eat in all?

19. Ming uses $\frac{1}{4}$ metre of blue string and $\frac{3}{8}$ metre of red string for an art project. What is the total length of string Ming uses?

20. Anton filled $\frac{2}{6}$ of his plate with rice and $\frac{1}{3}$ of the plate with stewed chicken. He left the rest of the plate empty. How much of his plate did Anton fill with food?

21. Mrs. Smith used $\frac{1}{4}$ litre of orange juice, $\frac{1}{2}$ litre of grapefruit juice and $\frac{1}{8}$ litre of lime juice to make fruit punch. How much fruit juice did she use in total?

22. Maya makes a salad by combining $\frac{1}{3}$ cup of lettuce, $\frac{1}{4}$ cup of tomatoes, and $\frac{1}{12}$ cup of carrots. What is the total amount of vegetables in her salad?

23. A farmer plants $\frac{7}{10}$ of his garden in pumpkin. After a few weeks, the pumpkin spread to cover another $\frac{1}{5}$ of the garden. What fraction of the garden is now covered in pumpkin?

24. Mickell uses $\frac{1}{5}$ litre to water a small plant, and he uses $\frac{5}{10}$ litre to water a large plant. Now he has $\frac{2}{10}$ litre left in the pitcher. How much water did Mickell have in the beginning?

25. Malika measures the lengths of 3 ribbons. Ribbon A is $\frac{1}{3}$ metre long. Ribbon B is $\frac{3}{6}$ metre long, and Ribbon C is $\frac{2}{12}$ metre long. What is the total length of all three ribbons.

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Subtract Fractions with One Denominator a Multiple of the Other

Teaching Point 1:

How can you use equivalent fractions to subtract fractions?

Malik has $\frac{2}{3}$ of a cake. He gave away $\frac{3}{6}$ of the cake. What fraction of the cake did he have left?

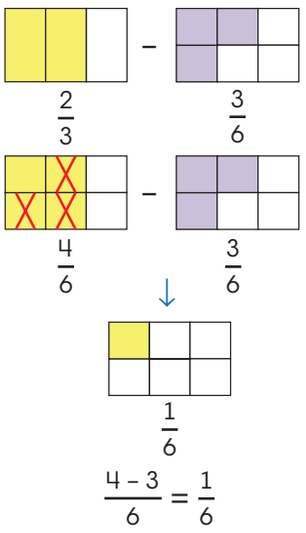
Find $\frac{2}{3} - \frac{3}{6}$.

Method 1: Model $\frac{2}{3} - \frac{3}{6}$.

Use fraction models for $\frac{2}{3}$ and $\frac{3}{6}$.

Change the model for the $\frac{2}{3}$ so that it has the same number of parts as the model for the $\frac{3}{6}$.

Then **remove** $\frac{3}{6}$ from the model for $\frac{4}{6}$.



$\frac{4-3}{6} = \frac{1}{6}$

Method 2: Use an equivalent fraction.

$\frac{2}{3} - \frac{3}{6} = \frac{2 \times 2}{3 \times 2} - \frac{3}{6}$

$= \frac{4}{6} - \frac{3}{6}$

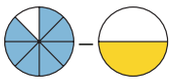
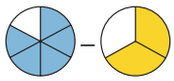
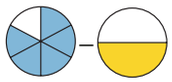
$= \frac{4-3}{6}$, or $\frac{1}{6}$

Find an **equivalent fraction** to $\frac{2}{3}$ that has the **same denominator** as $\frac{3}{6}$. Then **subtract**.

So, $\frac{2}{3} - \frac{3}{6} = \frac{1}{6}$.

Activity 1:

Use models to find each difference.

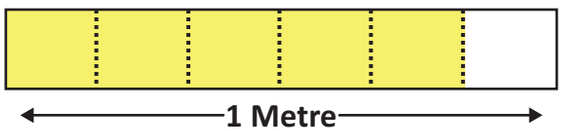
1. $\frac{7}{8} - \frac{1}{2} =$ 	**2.** $\frac{5}{6} - \frac{2}{3} =$ 	**3.** $\frac{5}{6} - \frac{1}{2} =$ 
4. $\frac{5}{8} - \frac{1}{4} =$	**5.** $\frac{3}{4} - \frac{4}{12} =$	**6.** $\frac{3}{5} - \frac{5}{10} =$
7. $\frac{4}{9} - \frac{1}{3} =$	**8.** $\frac{9}{14} - \frac{2}{7} =$	**9.** $\frac{9}{12} - \frac{3}{6} =$
10. $\frac{7}{12} - \frac{2}{4} =$	**11.** $\frac{14}{16} - \frac{3}{4} =$	**12.** $\frac{8}{9} - \frac{2}{3} =$

Use any method to add and subtract.

13. Find $\frac{2}{6} + \frac{1}{3} - \frac{3}{12} =$ using a model or a common denominator.

14. Find $\frac{1}{2} - \frac{1}{4} + \frac{4}{8} =$ using a model or a common denominator.

15. Jervon ate $\frac{1}{2}$ of a pizza and Lauren ate $\frac{3}{8}$ of a same sized pizza. Who ate more pizza? How much more pizza?



16. The diagram above shows what Tina had left from a metre of fabric. She now uses $\frac{2}{3}$ metre of fabric to make

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a curtain. How much of the fabric does Tina have left after making the curtain?

17. Which fraction correctly completes the statement?

$$\frac{2}{3} - \frac{\square}{\square} = \frac{1}{6}$$

18. Danielle poured $\frac{3}{4}$ litre of water from a filled $\frac{7}{8}$ litre bucket of water. How much water is left in the bucket?

19. You use $\frac{3}{10}$ litre lime juice and $\frac{1}{2}$ litre grapefruit drink to make a punch. You drink $\frac{2}{10}$ litre. How much punch do you have left?

20. Aleem is making a jug of juice. He mixes $\frac{1}{4}$ litre of orange juice and $\frac{1}{2}$ litre of water.

a) How much juice did he make?

b) If he had $\frac{5}{8}$ litre of orange juice at first, how much is left after making the jug of juice?

21. Three friends share a pizza divided into eighths. If each person eats one slice, how many more slices must be eaten so that $\frac{1}{4}$ of the pizza remains?

22. Alina and Alex each ordered a medium pizza. Alina ate $\frac{3}{5}$ of her pizza for lunch and $\frac{2}{10}$ for a snack. Alex ate $\frac{1}{2}$ of his pizza for lunch and $\frac{4}{10}$ for a snack. How much more pizza did Alex eat?

23. Amara spent $\frac{1}{4}$ of her savings on a bicycle and $\frac{3}{12}$ of her savings on a gift for her family at Christmas. What fraction of her savings is left?

Add and Subtract Fractions and Mixed Numbers

Teaching Point 1:

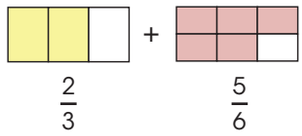
How can you express the sum of fractions as a mixed number?

Varun played football for $\frac{2}{3}$ of an hour on Sunday and $\frac{5}{6}$ of an hour on Monday. How long did Varun play on both days?

Find $\frac{2}{3} + \frac{5}{6}$.

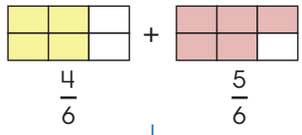
Method 1: Model $\frac{2}{3} + \frac{5}{6}$.

Use fraction models for $\frac{2}{3}$ and $\frac{5}{6}$.



$\frac{2}{3}$ $\frac{5}{6}$

Change the model for the $\frac{2}{3}$ so that it has the same number of parts as the model for the $\frac{5}{6}$.



$\frac{4}{6}$ $\frac{5}{6}$

Add the fractions.

$$\frac{4+5}{6} = \frac{9}{6}$$

Then Simplify.

$$\frac{9}{6} = \frac{6}{6} + \frac{3}{6}$$

$$= 1\frac{3}{6}$$

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Method 2: Use an equivalent fraction to add.

$\frac{2}{3} + \frac{5}{6} = \frac{2 \times 2}{3 \times 2} + \frac{1}{6}$

↓

$= \frac{4}{6} + \frac{5}{6}$

$= \frac{4 + 5}{6}$,

or $\frac{9}{6}$

The **denominator** 6 is a **multiple** of 3.
Write $\frac{2}{3}$ as $\frac{4}{6}$.
Then **add**.

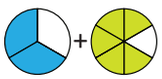
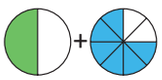
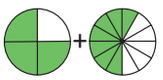
Express $\frac{9}{6}$ as $1\frac{3}{6}$.

$\frac{9}{6} = \frac{6}{6} + \frac{3}{6} = 1\frac{3}{6}$

So, Varun played for $1\frac{3}{6}$ hours.

Activity 1:

Find each sum. Express improper fractions as mixed numbers.

1. $\frac{2}{3} + \frac{5}{6} =$ 	2. $\frac{1}{2} + \frac{6}{8} =$ 	3. $\frac{3}{4} + \frac{7}{12} =$ 
4. $\frac{5}{8} + \frac{2}{4} =$	5. $\frac{9}{12} + \frac{2}{3} =$	6. $\frac{4}{5} + \frac{7}{10} =$
7. $\frac{8}{10} + \frac{3}{5} =$	8. $\frac{5}{7} + \frac{15}{21} =$	9. $\frac{6}{8} + \frac{9}{16} =$
10. $\frac{2}{5} + \frac{6}{10} + \frac{4}{5} =$		11. $\frac{3}{8} + \frac{1}{2} + \frac{3}{4} =$
12. $\frac{6}{9} + \frac{3}{18} + \frac{2}{3} =$		13. $\frac{1}{2} + \frac{3}{7} + \frac{4}{14} =$

14. Anisha rides $\frac{7}{10}$ of a kilometre to the park on her bicycle. Then she rides $\frac{4}{5}$ of a kilometre to the shop. How many kilometres did she ride in all?

15. Miss Browne sold 6 out of 12 slices of chocolate cake and 4 out of 6 slices of sponge cake at the bazaar. How much cake did she sell altogether?

16. The depth of the water in a tank is $\frac{3}{4}$ of a metre. Mark pours water into the tank and the depth increases by $\frac{1}{2}$ metre. How deep is the water in the tank now?

17. One recipe calls for $\frac{5}{8}$ of a litre of milk. Another recipe calls for $\frac{3}{4}$ of a litre of milk. You have $1\frac{1}{2}$ litres of milk at home. Do you have enough milk to make both recipes? Explain.

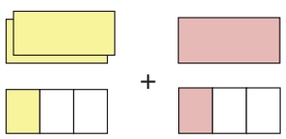
Teaching Point 2:

How can you add and subtract mixed numbers and fractions with like denominators?

Find $2\frac{1}{3} + 1\frac{1}{3}$.

Method 1: Model $2\frac{1}{3} + 1\frac{1}{3}$.

1. Use **fraction models** for $2\frac{1}{3}$ and $1\frac{1}{3}$.



$2\frac{1}{3}$ + $1\frac{1}{3}$

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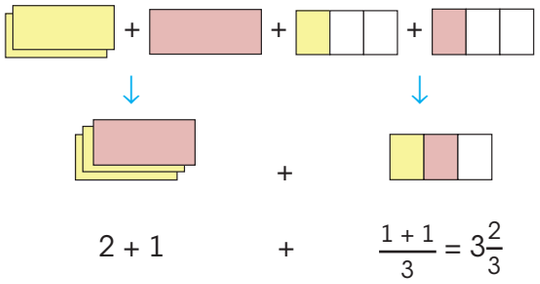
2. **Add** the **wholes** and add the **fractions**.



$2 + 1 + \frac{1+1}{3} = 3\frac{2}{3}$

So, $\mathbf{2\frac{1}{3} + 1\frac{1}{3} = 3\frac{2}{3}}$.

Activity 2:

Find each sum. Simplify.

1. $1\frac{2}{9} + 2\frac{1}{9} =$	**2.** $3\frac{1}{4} + 3\frac{2}{4} =$
3. $1\frac{2}{8} + 2\frac{1}{8} + 1\frac{3}{8} =$	**4.** $\frac{3}{12} + 1\frac{2}{12} + 3\frac{2}{12} =$
5. $\frac{5}{9} + 1\frac{3}{9} + 1\frac{4}{9} =$	**6.** $1\frac{2}{10} + 3\frac{5}{10} + 2\frac{3}{10} =$
7. $3\frac{4}{6} + 1\frac{2}{6} + 1\frac{5}{6} =$	**8.** $\frac{2}{5} + 1\frac{3}{5} + 1\frac{1}{5} =$
9. $2\frac{1}{7} + \frac{3}{7} + 1\frac{5}{7} =$	**10.** $1\frac{1}{2} + 2\frac{1}{2} + 1\frac{1}{2} =$

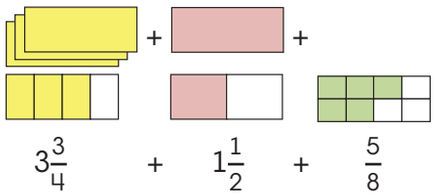
Teaching Point 3:

How can you add mixed numbers and fractions with unlike denominators?

Vitali made a fruit punch with $3\frac{3}{4}$ litres of water, $1\frac{1}{2}$ litres of orange juice, and $\frac{5}{8}$ of a litre of lemon juice. How much fruit punch did he make?

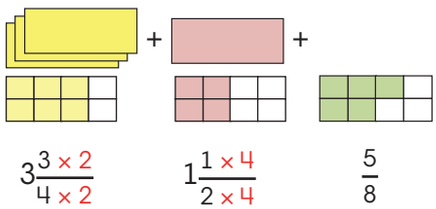
Find $\mathbf{3\frac{3}{4} + 1\frac{1}{2} + \frac{5}{8}}$.

1. Use **fraction models** for $3\frac{3}{4}$, $1\frac{1}{2}$ and $\frac{5}{8}$.



$3\frac{3}{4} + 1\frac{1}{2} + \frac{5}{8}$

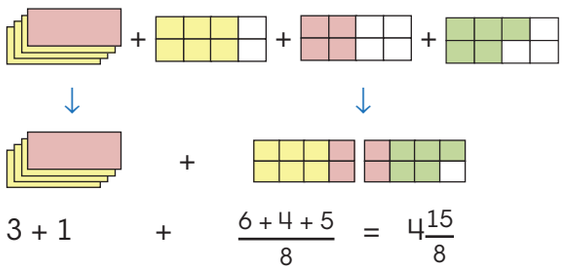
2. **Change** the **models** for the $\frac{3}{4}$ and $\frac{1}{2}$ so that they have the same number of parts as $\frac{5}{8}$.



$3\frac{3\times2}{4\times2} \quad 1\frac{1\times4}{2\times4} \quad \frac{5}{8}$

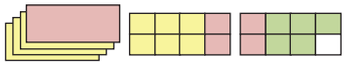
$3\frac{6}{8} + 1\frac{4}{8} + \frac{5}{8}$

3. **Add** the **wholes** and the **fraction**.



$3 + 1 + \frac{6+4+5}{8} = 4\frac{15}{8}$

4. **Simplify**. Change the improper fraction to a mixed number.



$4\frac{15}{8} = 4 + 1 + \frac{7}{8} = 5\frac{7}{8}$

So, Vitali made $5\frac{7}{8}$ litres of fruit punch.

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Activity 3:

Find the sum. Write your answer in simplest form.

1. $1\frac{2}{6} + 2\frac{1}{2} =$	**2.** $3\frac{2}{4} + 1\frac{3}{8} =$
3. $1\frac{2}{7} + 2\frac{3}{14} =$	**4.** $\frac{7}{12} + 1\frac{2}{4} + 3\frac{1}{3} =$
5. $\frac{5}{9} + 1\frac{2}{3} + 1\frac{4}{18} =$	**6.** $1\frac{2}{10} + \frac{1}{2} + 2\frac{3}{5} =$
7. $4\frac{1}{8} + 2\frac{2}{6} + 1\frac{4}{24} =$	**8.** $5\frac{5}{6} + 2\frac{3}{4} + 1\frac{2}{12} =$
9. $6\frac{3}{4} + 1\frac{5}{8} + 2\frac{1}{2} =$	**10.** $1\frac{1}{4} + \frac{1}{2} + 3\frac{6}{8} =$

Solve the problems.

11. Mother had $4\frac{1}{2}$ kilograms of flour at home. She bought $2\frac{3}{4}$ kilograms more. How much flour does she have now?

12. A cake shop sold $4\frac{6}{12}$ chocolate cakes, $2\frac{1}{2}$ sponge cakes and 1 cheese cake. How many cakes did the shop sell altogether?

13. Alex jogged $3\frac{1}{3}$ times around the savannah on Monday and $4\frac{5}{6}$ times around the savannah on Tuesday. How many times did he jog around the savannah on both days?

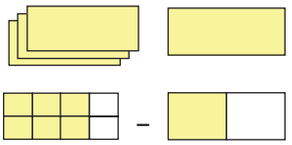
14. Alisha is making some juice. She mixes $2\frac{3}{4}$ litres of orange juice and $1\frac{1}{2}$ litres of grapefruit juice. How much water must she add to the juice to make 5 litres of juice?

15. Kris used $7\frac{8}{10}$ cm of tape to wrap her sister's gift and $6\frac{1}{2}$ cm more to wrap her brother's gift. What is the total amount of tape Kris used to wrap the gifts?

Teaching Point 4:

How can you subtract mixed numbers with unlike denominators?

Javan has $2\frac{6}{8}$ litres of soft drink. He gave away $1\frac{1}{2}$ litres. How much soft drink does he have left?

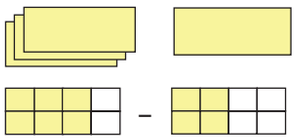


Find $2\frac{6}{8} - 1\frac{1}{2}$.

1. Use **fraction models** for $2\frac{6}{8}$ and $1\frac{1}{2}$.

$2\frac{6}{8}$ $\quad$ $1\frac{1}{2}$

2. **Change** the **model** for the $\frac{1}{2}$ so that it has the same number of parts as $\frac{6}{8}$.



$2\frac{6}{8} - 1\frac{1 \times 4}{2 \times 4}$

$\downarrow \qquad \downarrow$

$2\frac{6}{8} - 1\frac{4}{8}$

3. **Subtract** the **whole** and the **fraction**.

$2 - 1 = 1$ $\qquad$ $\frac{6-4}{8} = \frac{2}{8}$

$\downarrow$

$1\frac{2}{8}$

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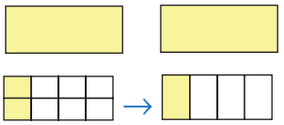
4. **Simplify** $\frac{2}{8}$.

Reduce $\frac{2}{8}$ to its lowest term.



$$1\frac{2 \div 2}{8 \div 2} \rightarrow 1\frac{1}{4}$$

So, Javan had $1\frac{1}{4}$ litres of soft drink left.

Activity 4:

Find each sum or difference. Simplify.

1. $2\frac{5}{6} - 2\frac{2}{3} =$	**2.** $3\frac{2}{4} - 1\frac{3}{8} =$
3. $4\frac{5}{7} - 2\frac{3}{14} =$	**4.** $1\frac{3}{4} - \frac{4}{12} =$
5. $7\frac{7}{10} - 2\frac{4}{20} =$	**6.** $4\frac{6}{8} - 2\frac{1}{2} =$
7. $6\frac{2}{3} - 1\frac{3}{9} =$	**8.** $5\frac{1}{2} - 2\frac{2}{10} =$
9. $4\frac{1}{8} + 2\frac{2}{4} - 2\frac{3}{8} =$	**10.** $5\frac{1}{6} + \frac{2}{3} - 1\frac{3}{12} =$
11. $6\frac{1}{5} + 1\frac{6}{10} - 4\frac{4}{10} =$	**12.** $3\frac{1}{2} - 1\frac{1}{4} + 1\frac{1}{8} =$

Solve the problems.

Three students walk to school each day. The table shows the distances they walk to get to school.

Distances Students Walk	
Student	**Distance in km**
Aliya	$1\frac{1}{2}$ km
Shenelle	$2\frac{4}{5}$ km
Aleke	$3\frac{5}{10}$ km

13. How much farther does Aleke walk than Aliya?

14. What is the distance that the three children walked altogether?

15. If Shenelle walked her distance twice in one day, how much farther would she have walked than Aleke?

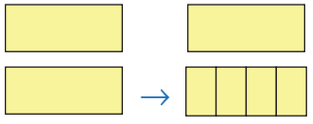
Teaching Point 5:

How can you subtract a fraction from a whole number?

A cupboard is 2 metres tall. Vanna is $1\frac{1}{4}$ metres tall. How much taller is the cupboard than Vanna?

Find $2 - 1\frac{1}{4}$.

1. 0 quarters is less than $\frac{1}{4}$. **Convert** 2 to $1\frac{4}{4}$ to show more **quarters**.



$2 = 1\frac{4}{4}$

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2. **Subtract** the **whole** and the **fraction**.

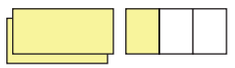
$1 - 1 = 0$ $\quad \frac{4-1}{4} = \frac{3}{4}$

The cupboard is $\frac{3}{4}$ of a metre taller than Vanna.

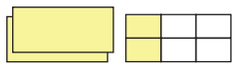
Find $2\frac{1}{3} - 1\frac{3}{6}$.

1. **Write an equivalent fraction.**

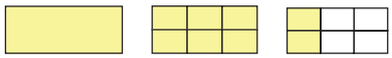
$2\frac{1}{3} - 1\frac{3}{6} = 2\frac{1 \times 2}{3 \times 2} - 1\frac{3}{6}$



$= 2\frac{2}{6} - 1\frac{3}{6}$

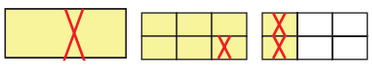


2. $\frac{2}{6}$ is less than $\frac{3}{6}$. So **convert** $2\frac{2}{6}$ to show more **sixths**.



$2\frac{2}{6} \rightarrow 1\frac{2+6}{6} = 1\frac{8}{6}$

3. **Subtract** the **whole** and the **fraction**.



$1 - 1 = 0$ $\quad \frac{8-3}{6} = \frac{5}{6}$

So, $2\frac{1}{3} - 1\frac{3}{6} = \frac{5}{6}$.

Activity 5:

Solve and write the answer in its simplest form.

1. $4 - 1\frac{7}{10} =$	**2.** $5 - 2\frac{7}{8} =$
3. $3 - 2\frac{7}{14} =$	**4.** $3\frac{3}{4} - \frac{10}{12} =$
5. $7\frac{2}{10} - 2\frac{9}{10} =$	**6.** $4\frac{1}{4} - 2\frac{6}{8} =$
7. $8\frac{2}{3} - 4\frac{7}{9} =$	**8.** $3\frac{1}{2} - 1\frac{8}{10} =$
9. $4\frac{1}{8} + 2\frac{1}{4} - 2\frac{6}{8} =$	**10.** $3\frac{1}{6} + \frac{2}{3} - 1\frac{11}{12} =$

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11. Mummy bought 5 kilograms of flour. She used $2\frac{3}{10}$ kilograms to make some bread. How much flour is left over?

12. Jenny lives $6\frac{1}{2}$ kilometres away from the school. She took a bus to go to school. After travelling $4\frac{6}{10}$ kilometres, of the distance, the bus broke down. How far does Jenny need to walk to get to school?

13. Miss Ali had 3 litres of oil. She used $\frac{7}{8}$ litre to make roti. How much oil had she left?

14. Mark spent $2\frac{1}{2}$ hours to do his chores. David spent $\frac{3}{4}$ of an hour less to do his chores. How much time did they spend altogether doing their chores?

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15. Three commercials are played in a row between two parts of a cartoon show. The three commercials fill exactly 4 minutes of time. If the first commercial uses $1\frac{1}{6}$ minutes, and the second uses $1\frac{1}{3}$ of a minute, how long is the third commercial?

16. Mother bought 5 litres of orange juice. She used $1\frac{2}{3}$ litres to make fruit punch and gave her children $1\frac{5}{6}$ litres to drink. How much juice does she have left?

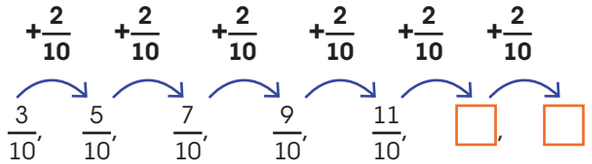
Number Patterns with Fractions

Teaching Point 2:

How can you describe and use patterns?

Write the next two elements in the sequence.

1. First find the **pattern rule**.



The **rule** is ***add*** $\frac{2}{10}$.

2. Then use the rule to find the missing elements.

Therefore, the missing elements are $\frac{13}{10}$ and $\frac{15}{10}$.

Activity 1:

Complete each pattern. Write the rule.

1. $\frac{1}{4}, \frac{3}{4}, \frac{5}{4}, \square, \frac{9}{4}, \frac{11}{4}, \square$

2. $5\frac{1}{2}, 5, \square, 4, 3\frac{1}{2}, \square, 2\frac{1}{2}$

3. $\square, 1\frac{2}{3}, 2\frac{2}{3}, 3\frac{2}{3}, \square,$

4. $10\frac{1}{10}, 8\frac{3}{5}, 7\frac{1}{10}, 5\frac{3}{5}, \square, \square$

5. $\frac{16}{4}, \frac{14}{4}, \square, \square, \frac{8}{4}, \frac{6}{4}$

6. $\frac{2}{8}, \frac{4}{8}, \frac{6}{8}, \square, 1\frac{2}{8}, \square$

7. $\frac{5}{6}, 1\frac{3}{6}, \square, 2\frac{5}{6}, \square, 4\frac{1}{6}$

8. $2\frac{2}{3}, 2\frac{1}{3}, 2, \square, \square, \square$

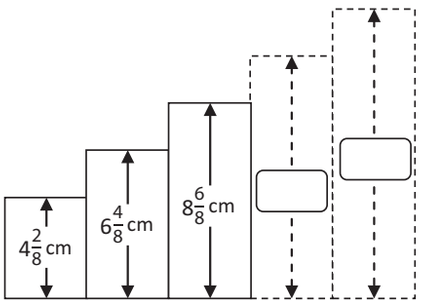
9. $6, 5\frac{2}{5}, \square, 4\frac{1}{5}, 3\frac{3}{5}, \square$

10. $3\frac{1}{2}, 4\frac{5}{6}, 6\frac{1}{6}, 7\frac{1}{2}, \square, \square$

Solve the pattern problems.

11. Kiara walked each day for a week. The first day she walked $\frac{1}{8}$ km, the second day she walked $\frac{3}{8}$ km, and the third day she walked $\frac{5}{8}$ km. By how much did she increase the distance she walked each day?

12. Mark is replacing 2 steps at the front a model house. The steps are shown below.



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If the height of each step rise by the same pattern as the first three, what would be the height of the last two steps.

13. Mother is making juice for dinner. She starts with 1 litre of water and adds $\frac{1}{4}$ litre of juice for each person. If she made $4\frac{3}{4}$ litres of juice, how many persons are having dinner?

Chapter Review

Solve the problems below.

1. $3\frac{2}{8} - 1\frac{3}{4} =$

2. $2\frac{4}{5} + 1\frac{7}{10} =$

3. Calculate the sum of $1\frac{3}{4}$ and $\frac{1}{2}$.

4. Complete the number sequence below:
$4\frac{8}{12}$, ☐, 4, $3\frac{8}{12}$, ☐

5. Jane and David shared an apple. Jane ate $\frac{2}{5}$ of the apple and David ate $\frac{3}{10}$ of the apple. What fraction of the apple was left?

6. Mother has $2\frac{1}{4}$ kilograms of flour. She wants to make roti that calls for $4\frac{1}{2}$ kilograms of flour. How much more flour does she need?

7. In Mr. Gaya's class $\frac{1}{3}$ of the children walk to school and $\frac{1}{6}$ of the children drive to school with their parents and the others take the bus. What fraction of the class takes the bus?

8. Ishwar spends $\frac{1}{4}$ of his free time playing video games and $\frac{3}{8}$ of his free time watching television.
   a) What fraction of his free time is spent playing video games and watching television together?
   b) If the remaining time is spent on reading, what fraction is spent on reading?
   c) On which activity does Ishwar spend most of his free time?

9. A bucket has $4\frac{3}{4}$ litres of water in it. Today, $2\frac{1}{2}$ litres of the water is used. Then, the bucket is filled with another $6\frac{3}{4}$ litres of water. What is the amount of water in the bucket now?

10. The mall is $6\frac{2}{10}$ kilometres from Alisha's house. The nearest grocery is $3\frac{4}{5}$ kilometres from her house. How much farther is the mall than the grocery from Alisha's house?

11. Lianne and Javan are hiking the trail to the waterfall. They have already hiked $\frac{2}{8}$ of a kilometre. How much farther do they have to hike to reach the $\frac{3}{4}$ kilometre mark?

12. A craft store sold $7\frac{2}{9}$ metres of green ribbon to Mrs. Ali and $2\frac{1}{3}$ metres

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more red ribbon than green ribbon to Mrs. Thomas. How many metres of red ribbon did the store sell to Mrs. Thomas?

13. Three friends share a pizza. Marcus ate $\frac{3}{8}$ of the pizza. Huan ate $\frac{1}{4}$ of the pizza and Alex ate the rest of the pizza.

a) What fraction of the pizza did Alex eat?

b) Who ate most of the pizza? Use calculations to show how you arrived at your answer.

14. Michael's dog is 5 years old. Kristian's dog is $1\frac{1}{6}$ years younger. How old is Kristian's dog?

15. Alisha walked $\frac{1}{4}$ km on Monday, $\frac{3}{4}$ km on Tuesday, and $1\frac{1}{4}$ km on Wednesday. If the pattern continues, how many kilometres will she walk on Sunday?

16. Leanne mixed $4\frac{4}{6}$ litres of water, $3\frac{1}{3}$ litres of orange juice to make juice. She drank $1\frac{1}{2}$ litres of the juice. How much juice does she have left?

17. After a party, a caterer had several boxes, each with 2 sixth-size pieces of cake remaining. The caterer was able to combine these pieces to make 2 whole cakes. How many boxes did the caterer combine?

18. In one week, Lexi ran $2\frac{1}{4}$ km for five days. If she began running on Monday, on which day would she have completed 8 km?

19. Jared painted his room $\frac{1}{3}$ blue and $\frac{2}{6}$ white. What fraction of the room was not blue or white?

20. Marcus has 24 marbles. He gave $\frac{1}{4}$ of his marbles to Alex, and $\frac{1}{3}$ of the remainder to his brother. How many marbles did he have at the end?

21. An athlete drank 12 litres of water in three days. If he drank $2\frac{4}{5}$ litres of water on the first day, and $3\frac{7}{10}$ litres on the second day, how much does he drink on the third day?

22. During his vacation Michael hiked three days to a waterfall, which was 8 km away. On the first day he hiked $2\frac{2}{5}$ km. On the second day he hiked $1\frac{3}{10}$ km further than on the first day. On the third day he hiked the rest of the way. How far did he hike on the third day?

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