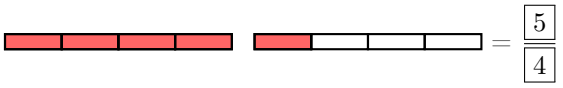
FRACTIONS

A DEFINITIONS

A.1 FINDING FRACTIONS

Ex 1: A bar represents 1. Find the fraction that represents the shaded part:



$= \frac{5}{4}$

Answer:

- A bar (1) is divided into 4 equal parts:
- 5 parts are shaded.
- So, $\frac{5}{4} =$

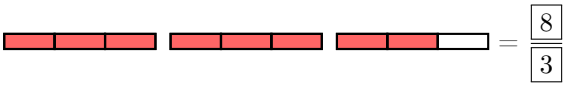
Ex 2: A bar represents 1. Find the fraction that represents the shaded part:

$= \frac{5}{3}$

Answer:

- A bar (1) is divided into 3 equal parts:
- 5 parts are shaded.
- So, $\frac{5}{3} =$

Ex 3: A bar represents 1. Find the fraction that represents the shaded part:

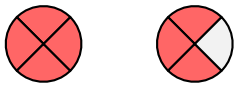


$= \frac{8}{3}$

Answer:

- A bar (1) is divided into 3 equal parts:
- 8 parts are shaded.
- So, $\frac{8}{3} =$

Ex 4: A circle represents 1. Find the fraction that represents the shaded part:

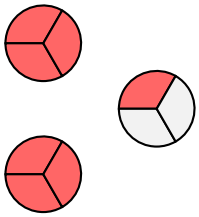


$= \frac{7}{4}$

Answer:

- A circle (1) is divided into 4 equal parts.
- 7 parts are shaded.
- So, $\frac{7}{4} =$

Ex 5: A circle represents 1. Find the fraction that represents the shaded part:



$= \frac{7}{3}$

Answer:

- A circle (1) is divided into 3 equal parts.
- 7 parts are shaded.
- So, $\frac{7}{3} =$

A.2 WRITING FRACTIONS FROM WORDS

Ex 6: Write as fraction:

one over four$= \frac{1}{4}$

Answer:

- one over four $= \frac{1}{4} =$

Ex 7: Write as fraction:

three over five $= \frac{3}{5}$

Answer:

- three over five $= \frac{3}{5} =$

Ex 8: Write as fraction:

three quarters $= \frac{3}{4}$

Answer:

- three quarters $= \frac{3}{4} =$

Ex 9: Write as fraction:

six over hundred $= \frac{6}{100}$

Answer:

- six over hundred (six thousandths) $= \frac{6}{100}$

B ON THE NUMBER LINE

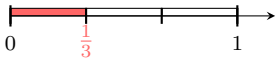
B.1 FINDING FRACTIONS WITH BAR FRACTION MODEL

Ex 10: Find the value of x

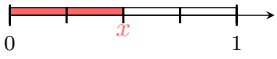
$x = \boxed{\frac{1}{3}}$

Answer:

- 1 is divided in 3 equals parts.
- x is located at 1 part.
- So, $x = \frac{1}{3}$.



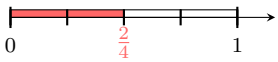
Ex 11: Find the value of x



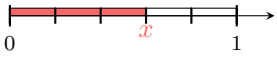
$x = \boxed{\frac{2}{4}}$

Answer:

- 1 is divided in 4 equals parts.
- x is located at 2 parts.
- So, $x = \frac{2}{4}$.



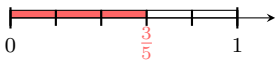
Ex 12: Find the value of x



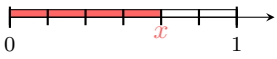
$x = \boxed{\frac{3}{5}}$

Answer:

- 1 is divided in 5 equals parts.
- x is located at 3 parts.
- So, $x = \frac{3}{5}$.



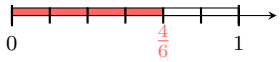
Ex 13: Find the value of x



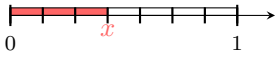
$x = \boxed{\frac{4}{6}}$

Answer:

- 1 is divided in 6 equals parts.
- x is located at 4 parts.
- So, $x = \frac{4}{6}$.



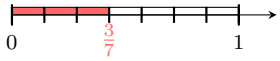
Ex 14: Find the value of x



$x = \boxed{\frac{3}{7}}$

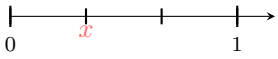
Answer:

- 1 is divided in 7 equals parts.
- x is located at 3 parts.
- So, $x = \frac{3}{7}$.



B.2 FINDING FRACTIONS

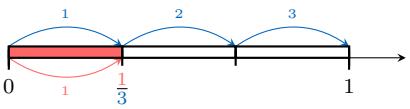
Ex 15: Find the value of x



$x = \boxed{\frac{1}{3}}$

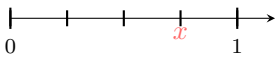
Answer:

- 1 is divided in 3 equals parts.
- x is located at 1 part from 0.



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

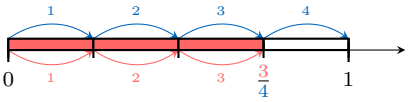
Ex 16: Find the value of x



$x = \boxed{\frac{3}{4}}$

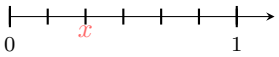
Answer:

- 1 is divided in 4 equals parts.
- x is located at 3 parts from 0.



- So, $x = \frac{3}{4}$.

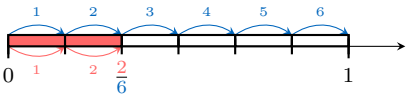
Ex 17: Find the value of x



$$x = \boxed{\frac{2}{6}}$$

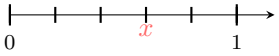
Answer:

- 1 is divided in 6 equals parts.
- x is located at 2 parts from 0.



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

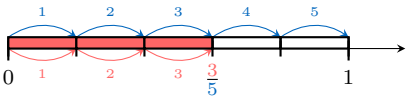
Ex 18: Find the value of x



$$x = \boxed{\frac{3}{5}}$$

Answer:

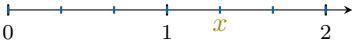
- 1 is divided in 5 equals parts.
- x is located at 3 parts from 0.



- So, $x = \frac{3}{5}$.

B.3 FINDING FRACTIONS GREATER THAN 1

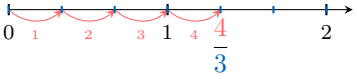
Ex 19: Find the value of x



$$x = \boxed{\frac{4}{3}}$$

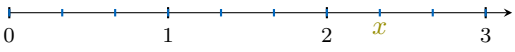
Answer:

- 1 is divided in 3 equals parts.
- x is located at 4 parts from 0.



- So, $x = \frac{4}{3}$.

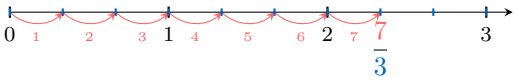
Ex 20: Find the value of x



$$x = \boxed{\frac{7}{3}}$$

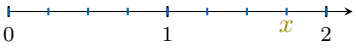
Answer:

- 1 is divided in 3 equal parts.
- x is located at 7 parts from 0.



- So, $x = \frac{7}{3}$.

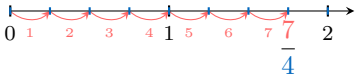
Ex 21: Find the value of x



$$x = \boxed{\frac{7}{4}}$$

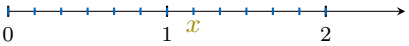
Answer:

- 1 is divided in 4 equal parts.
- x is located at 7 parts from 0.



- So, $x = \frac{7}{4}$.

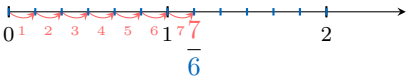
Ex 22: Find the value of x



$$x = \boxed{\frac{7}{6}}$$

Answer:

- 1 is divided into 6 equal parts.
- x is located at 7 parts from 0.



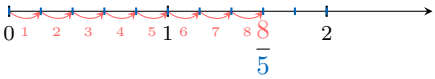
- So, $x = \frac{7}{6}$.

Ex 23: Find the value of x

$$x = \boxed{\frac{8}{5}}$$

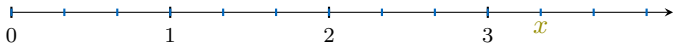
Answer:

- 1 is divided into 5 equal parts.
- x is located at 8 parts from 0.



- So, $x = \frac{8}{5}$.

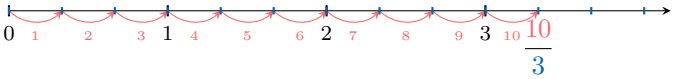
Ex 24: Find the value of x



$$x = \frac{\boxed{10}}{\boxed{3}}$$

Answer:

- 1 is divided into 3 equal parts.
- x is located at 10 parts from 0.



- So, $x = \frac{10}{3}$.

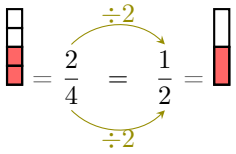
C EQUIVALENT FRACTIONS

C.1 FINDING THE MISSING NUMERATOR

Ex 25:

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

Answer:

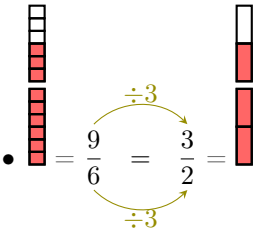
- $\frac{2}{4} = \frac{1\times\cancel{2}}{2\times\cancel{2}} = \frac{1}{2}$
- 

- The second denominator 2 is the first denominator 4 divided by 2 : $4 \times 2 = 2$.
- To keep the fractions equivalent, the numerator must also be divided by 2.
- This means: $2 \div 2 = 1$, so the missing numerator is 1.

Ex 26:

$$\frac{9}{6} = \frac{\boxed{3}}{2}$$

Answer:

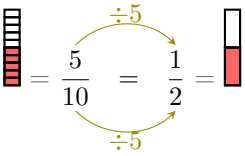
- $\frac{9}{6} = \frac{3\times\cancel{3}}{2\times\cancel{3}} = \frac{3}{2}$
- 

- The second denominator 2 is the first denominator 6 divided by 3 : $6 \div 3 = 2$.
- To keep the fractions equivalent, the numerator must also be divided by 3.
- This means: $9 \div 3 = 3$, so the missing numerator is 3.

Ex 27:

$$\frac{5}{10} = \frac{\boxed{1}}{2}$$

Answer:

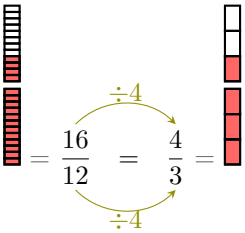
- $\frac{5}{10} = \frac{1\times\cancel{5}}{2\times\cancel{5}} = \frac{1}{2}$
- 

- The second denominator 2 is the first denominator 10 divided by 5 : $10 \div 5 = 2$.
- To keep the fractions equivalent, the numerator must also be divided by 5.
- This means: $5 \div 5 = 1$, so the missing numerator is 1.

Ex 28:

$$\frac{16}{12} = \frac{\boxed{4}}{3}$$

Answer:

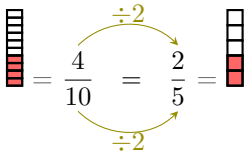
- $\frac{16}{12} = \frac{4\times\cancel{4}}{3\times\cancel{4}} = \frac{4}{3}$
- 

- The second denominator 3 is the first denominator 12 divided by 4 : $12 \div 4 = 3$.
- To keep the fractions equivalent, the numerator must also be divided by 4.
- This means: $16 \div 4 = 4$, so the missing numerator is 4.

Ex 29:

$$\frac{4}{10} = \frac{\boxed{2}}{5}$$

Answer:

- $\frac{4}{10} = \frac{2\times2}{5\times2} = \frac{2}{5}$
- 

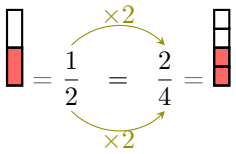
- The second denominator 5 is the first denominator 10 divided by 2 : $10 \div 2 = 5$.
- To keep the fractions equivalent, the numerator must also be divided by 2.
- This means: $4 \div 2 = 2$, so the missing numerator is 2.

C.2 FINDING THE MISSING NUMERATOR

Ex 30:

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

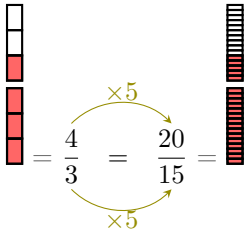
Answer:

- $\frac{1}{2} = \frac{1\times2}{2\times2} = \frac{2}{4}$
- 

Ex 31:

$$\frac{4}{3} = \frac{\boxed{20}}{15}$$

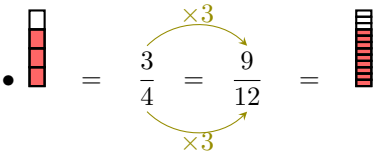
Answer:

- $\frac{4}{3} = \frac{4\times5}{3\times5} = \frac{20}{15}$
- 

Ex 32:

$$\frac{3}{4} = \frac{\boxed{9}}{12}$$

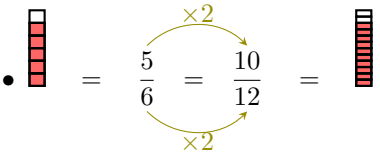
Answer:

- $\frac{3}{4} = \frac{3\times3}{4\times3} = \frac{9}{12}$
- 

Ex 33:

$$\frac{5}{6} = \frac{\boxed{10}}{12}$$

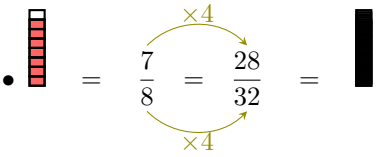
Answer:

- $\frac{5}{6} = \frac{5\times2}{6\times2} = \frac{10}{12}$
- 

Ex 34:

$$\frac{7}{8} = \frac{\boxed{28}}{32}$$

Answer:

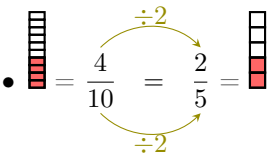
- $\frac{7}{8} = \frac{7\times4}{8\times4} = \frac{28}{32}$
- 

C.3 FINDING THE MISSING DENOMINATOR

Ex 35:

$$\frac{4}{10} = \frac{2}{\boxed{5}}$$

Answer:

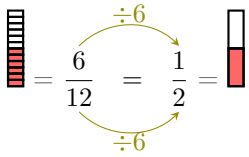
- $\frac{4}{10} = \frac{2\times2}{5\times2} = \frac{2}{5}$
- 

- The second numerator 2 is the first numerator 4 divided by 2 : $4 \div 2 = 2$.
- To keep the fractions equivalent, the denominator must also be divided by 2.
- This means: $10 \div 2 = 5$, so the missing denominator is 5.

Ex 36:

$$\frac{6}{12} = \frac{1}{\boxed{2}}$$

Answer:

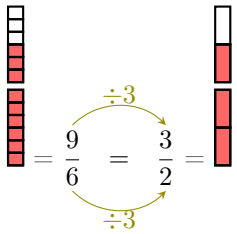
- $\frac{6}{12} = \frac{1 \times \cancel{6}}{2 \times \cancel{6}} = \frac{1}{2}$
- 

- The second numerator 1 is the first numerator 6 divided by 6 : $6 \div 6 = 1$.
- To keep the fractions equivalent, the denominator must also be divided by 6.
- This means: $12 \div 6 = 2$, so the missing denominator is 2.

Ex 37:

$$\frac{9}{6} = \frac{3}{\boxed{2}}$$

Answer:

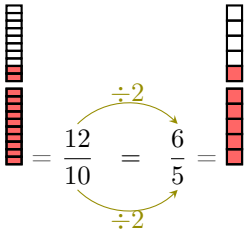
- $\frac{9}{6} = \frac{3 \times \cancel{3}}{2 \times \cancel{3}} = \frac{3}{2}$
- 

- The second numerator 3 is the first numerator 9 divided by 3 : $9 \div 3 = 3$.
- To keep the fractions equivalent, the denominator must also be divided by 3.
- This means: $6 \div 3 = 2$, so the missing denominator is 2.

Ex 38:

$$\frac{12}{10} = \frac{6}{\boxed{5}}$$

Answer:

- $\frac{12}{10} = \frac{6 \times \cancel{2}}{5 \times \cancel{2}} = \frac{6}{5}$
- 

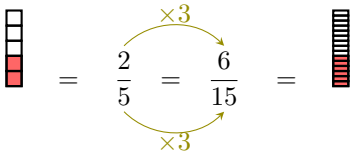
- The second numerator 6 is the first numerator 12 divided by 2 : $12 \div 2 = 6$.
- To keep the fractions equivalent, the denominator must also be divided by 2.
- This means: $10 \div 2 = 5$, so the missing denominator is 5.

C.4 FINDING THE MISSING DENOMINATOR

Ex 39:

$$\frac{2}{5} = \frac{6}{\boxed{15}}$$

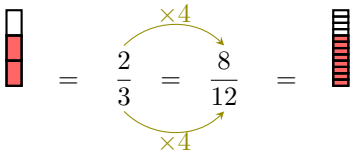
Answer:

- $\frac{2}{5} = \frac{2 \times 3}{5 \times 3} = \frac{6}{15}$
- 

Ex 40:

$$\frac{2}{3} = \frac{8}{\boxed{12}}$$

Answer:

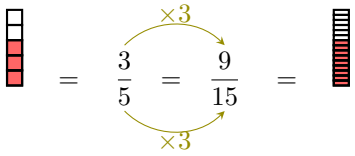
- $\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$
- 

Ex 41:

$$\frac{3}{5} = \frac{9}{\boxed{15}}$$

Answer:

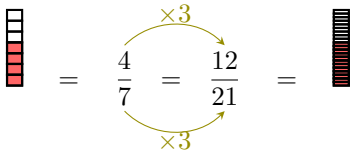
- $\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$

- 

Ex 42:

$$\frac{4}{7} = \frac{12}{\boxed{21}}$$

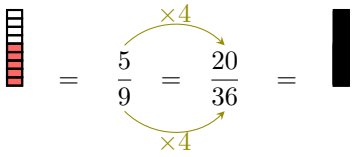
Answer:

- $\frac{4}{7} = \frac{4\times3}{7\times3} = \frac{12}{21}$
- 

Ex 43:

$$\frac{5}{9} = \frac{20}{\boxed{36}}$$

Answer:

- $\frac{5}{9} = \frac{5\times4}{9\times4} = \frac{20}{36}$
- 

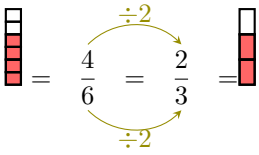
D SIMPLIFICATION

D.1 SIMPLIFYING FRACTIONS

Ex 44: Simplify:

$$\frac{4}{6} = \frac{\boxed{2}}{\boxed{3}}$$

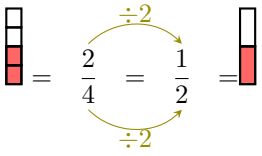
Answer:



Ex 45: Simplify:

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

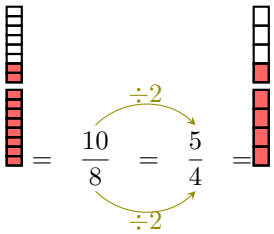
Answer:



Ex 46: Simplify:

$$\frac{10}{8} = \frac{\boxed{5}}{\boxed{4}}$$

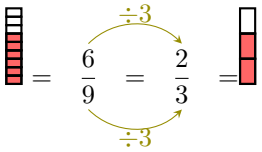
Answer:



Ex 47: Simplify:

$$\frac{6}{9} = \frac{\boxed{2}}{\boxed{3}}$$

Answer:

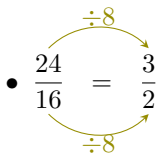


D.2 SIMPLIFYING FRACTIONS

Ex 48: Simplify:

$$\frac{24}{16} = \frac{\boxed{3}}{\boxed{2}}$$

Answer:

- $\frac{24}{16} = \frac{3\times\cancel{8}}{2\times\cancel{8}} = \frac{3}{2}$
- 

Ex 49: Simplify:

$$\frac{12}{20} = \frac{\boxed{3}}{\boxed{5}}$$

Answer:

- $\frac{12}{20} = \frac{3\times4}{5\times4} = \frac{3}{5}$

- $\frac{12}{20} \overset{\div 4}{=} \frac{3}{5}$ ($\div 4$)

Ex 50: Simplify:

$$\frac{30}{100} = \frac{\boxed{3}}{\boxed{10}}$$

Answer:

- $$\frac{30}{100} = \frac{3\times 10}{10\times 10} = \frac{3}{10}$$
- $\frac{30}{100} \overset{\div 10}{=} \frac{3}{10}$ ($\div 10$)

Ex 51: Simplify:

$$\frac{25}{100} = \frac{\boxed{1}}{\boxed{4}}$$

Answer:

- $$\frac{25}{100} = \frac{1\times 25}{4\times 25} = \frac{1}{4}$$
- $\frac{25}{100} \overset{\div 25}{=} \frac{1}{4}$ ($\div 25$)

E CROSS MULTIPLICATION

E.1 SOLVING PROPORTIONS USING CROSS-MULTIPLICATION

Ex 52: Solve x for $\frac{12}{4} = \frac{x}{6}$:

$$x = \boxed{18}$$

Answer:

$\frac{12}{4} = \frac{x}{6}$

$4\times x = 12\times 6$ (cross multiplication)

$x = 12\times 6\div 4$ (dividing both sides by 4)

$x = 18$

Ex 53: Solve x for $\frac{11}{10} = \frac{x}{5}$:

$$x = \boxed{5.5}$$

Answer:

$\frac{11}{10} = \frac{x}{5}$

$10\times x = 11\times 5$ (cross multiplication)

$x = 11\times 5\div 10$ (dividing both sides by 10)

$x = 5.5$

Ex 54: Solve x for $\frac{12}{10} = \frac{18}{x}$:

$$x = \boxed{15}$$

Answer:

$\frac{12}{10} = \frac{18}{x}$

$12\times x = 18\times 10$ (cross multiplication)

$x = 18\times 10\div 12$ (dividing both sides by 12)

$x = 15$

Ex 55: Solve x for $\frac{27}{x} = \frac{30}{10}$:

$$x = \boxed{9}$$

Answer:

$\frac{27}{x} = \frac{30}{10}$

$30\times x = 27\times 10$ (cross multiplication)

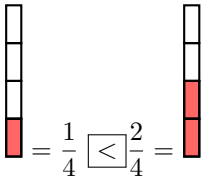
$x = 27\times 10\div 30$ (dividing both sides by 30)

$x = 9$

F ORDERING FRACTIONS

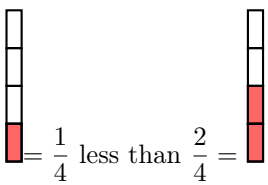
F.1 COMPARING WITH SAME DENOMINATOR WITH BAR MODELS

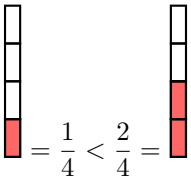
Ex 56: Compare using $>, <, =$:



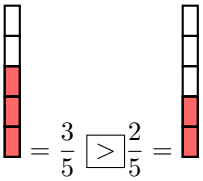
$= \frac{1}{4} \boxed{<} \frac{2}{4} =$

Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*
- 
  $= \frac{1}{4}$ less than $\frac{2}{4} =$

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

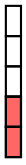
Ex 57: Compare using $>, <, =$:

 $= \frac{3}{5} \boxed{>} \frac{2}{5} =$

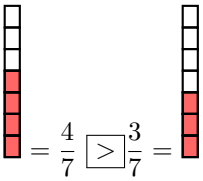
Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*

-  $= \frac{3}{5}$ greater than $\frac{2}{5} =$ 

-  $= \frac{3}{5} > \frac{2}{5} =$ 

Ex 58: Compare using $>, <, =$:

 $= \frac{4}{7} \boxed{>} \frac{3}{7} =$

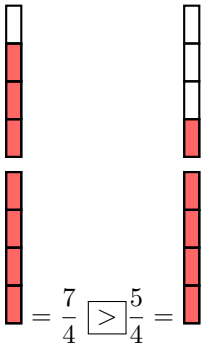
Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*

-  $= \frac{4}{7}$ greater than $\frac{3}{7} =$ 

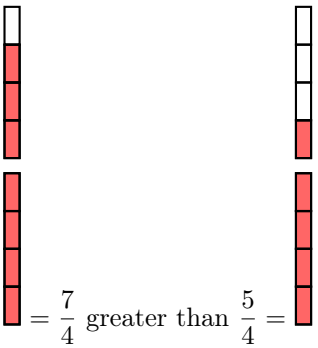
-  $= \frac{4}{7} > \frac{3}{7} =$ 

Ex 59: Compare using $>, <, =$:

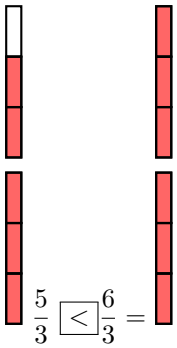


Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*

- 

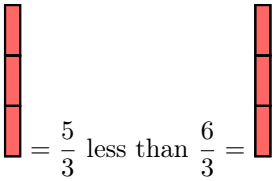
Ex 60: Compare using $>, <, =$:

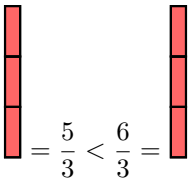


Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*

-  $= \frac{5}{3}$ less than $\frac{6}{3} =$



-  $= \frac{5}{3} < \frac{6}{3} =$

F.2 COMPARING WITH SAME DENOMINATOR

Ex 61: Compare using $>, <, =$:

$$\frac{7}{3} \boxed{>} \frac{6}{3}$$

Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*

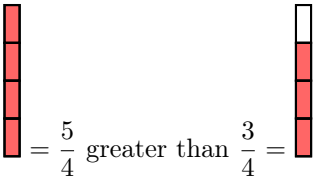
-  $= \frac{7}{3}$ less than $\frac{6}{3} =$
- So $\frac{7}{3} > \frac{6}{3}$

Ex 62: Compare using $>, <, =$:

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

Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*



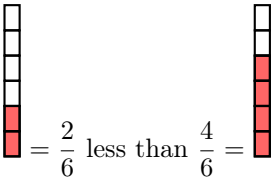
- $= \frac{5}{4}$ greater than $\frac{3}{4} =$
- So $\frac{5}{4} > \frac{3}{4}$

Ex 63: Compare using $>, <, =$:

$$\frac{2}{6} \boxed{<} \frac{4}{6}$$

Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*



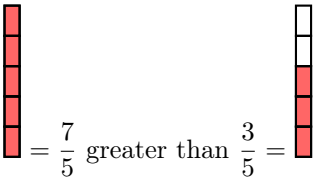
- $= \frac{2}{6}$ less than $\frac{4}{6} =$
- So $\frac{2}{6} < \frac{4}{6}$

Ex 64: Compare using $>, <, =$:

$$\frac{7}{5} \boxed{>} \frac{3}{5}$$

Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*



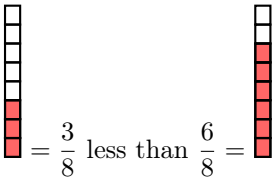
- $= \frac{7}{5}$ greater than $\frac{3}{5} =$
- So $\frac{7}{5} > \frac{3}{5}$

Ex 65: Compare using $>, <, =$:

$$\frac{3}{8} \boxed{<} \frac{6}{8}$$

Answer:

- $>$ means *greater than.*
  $<$ means *less than.*
  $=$ means *equal to.*

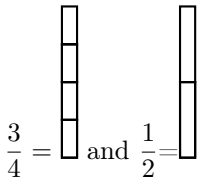
-  $= \frac{3}{8}$ less than $\frac{6}{8} =$
- So $\frac{3}{8} < \frac{6}{8}$

F.3 COMPARING FRACTIONS WITH DIFFERENT DENOMINATORS

Ex 66: Compare using $>, <, =$:

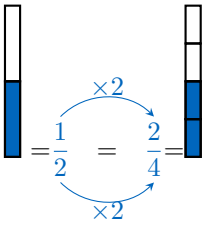
$$\frac{3}{4} \boxed{>} \frac{1}{2}$$

Hint: color the bars below to help you compare the fractions.

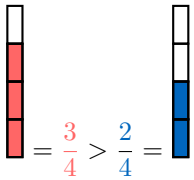


Answer:

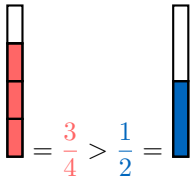
- Find equivalent fractions with the same denominator:



- Compare with same denominator:



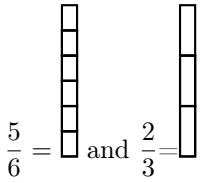
- So



Ex 67: Compare using $>, <, =$:

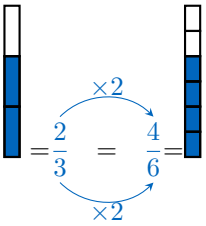
$$\frac{5}{6} \boxed{>} \frac{2}{3}$$

Hint: color the bars below to help you compare the fractions.

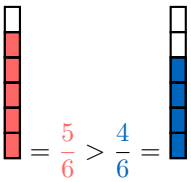


Answer:

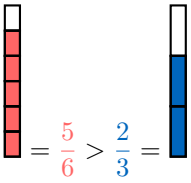
- Find equivalent fractions with the same denominator:



- Compare with same denominator:



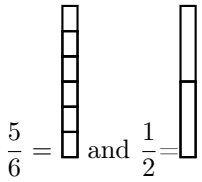
- So



Ex 68: Compare using $>, <, =$:

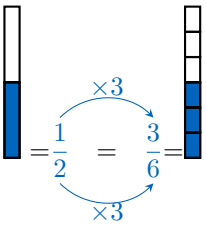
$$\frac{5}{6} \boxed{>} \frac{1}{2}$$

Hint: color the bars below to help you compare the fractions.

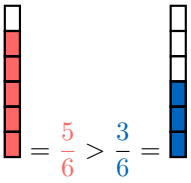


Answer:

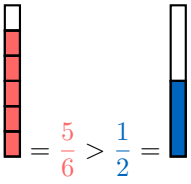
- Find equivalent fractions with the same denominator:



- Compare with same denominator:



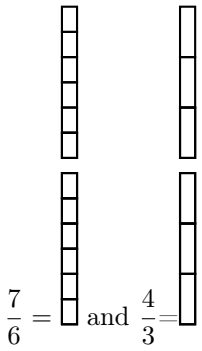
- So



Ex 69: Compare using $>, <, =$:

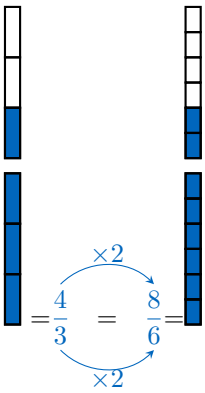
$$\frac{7}{6} \boxed{<} \frac{4}{3}$$

Hint: color the bars below to help you compare the fractions.

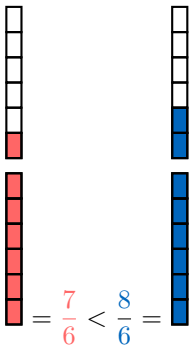


Answer:

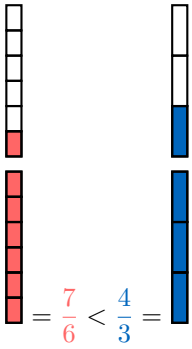
- Find equivalent fractions with the same denominator:



- Compare with same denominator:



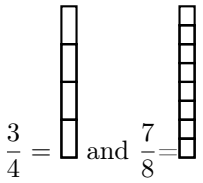
- So



Ex 70: Compare using $>, <, =$:

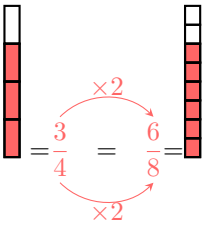
$$\frac{3}{4} \boxed{<} \frac{7}{8}$$

Hint: color the bars below to help you compare the fractions.

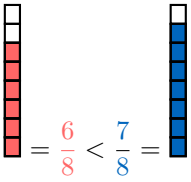


Answer:

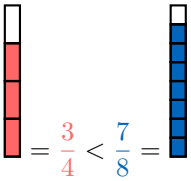
- Find equivalent fractions with the same denominator:



- Compare with same denominator:



- So



F.4 COMPARING FRACTIONS TO REAL-WORLD PROBLEMS

MCQ 71: Hugo spends $\frac{3}{8}$ of his money on Pokemon cards and $\frac{1}{4}$ of his money to buy a tennis racket. On which does he spend more money?

☒ Pokemon cards

☐ Tennis racquet

Answer:

- Convert to a common denominator: $\frac{1}{4} = \frac{2}{8}$ (×2 / ×2)
- Since $\frac{2}{8} < \frac{3}{8}$, $\frac{1}{4} < \frac{3}{8}$
- So, Hugo spends more money on Pokemon cards than on a tennis racquet.

MCQ 72: Sophie spends $\frac{1}{2}$ of her money on clothes and $\frac{3}{8}$ of her money on books. On which does she spend more money?

☒ Clothes

☐ Books

Answer:

- Convert to a common denominator: $\frac{1}{2} \overset{\times 4}{=} \frac{4}{8}$
- Since $\frac{4}{8} > \frac{3}{8}$, $\frac{1}{2} > \frac{3}{8}$
- So, Sophie spends more money on clothes than on books.

MCQ 73: For her cake recipe, Sarah uses $\frac{2}{5}$ of a cup of butter and $\frac{3}{10}$ of a cup of sugar. Which ingredient does she use more of?

☒ Butter

☐ Sugar

Answer:

- Convert to a common denominator: $\frac{2}{5} \overset{\times 2}{=} \frac{4}{10}$
- Since $\frac{4}{10} > \frac{3}{10}$, Sarah uses more butter than sugar.

MCQ 74: In Class A, $\frac{6}{10}$ of the students are girls, and in Class B, $\frac{13}{20}$ of the students are girls. In which class is the proportion of girls higher?

☐ Class A

☒ Class B

Answer:

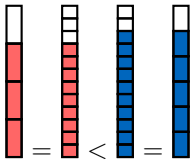
- Convert to a common denominator: $\frac{6}{10} \overset{\times 2}{=} \frac{12}{20}$
- Since $\frac{12}{20} < \frac{13}{20}$, the proportion of girls is higher in Class B.

F.5 COMPARING FRACTIONS WITH UNLIKE DENOMINATORS

Ex 75:

$$\frac{3}{4} \boxed{<} \frac{5}{6}$$

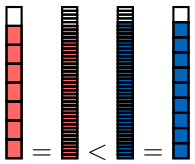
Answer:

- Find a common denominator :
  - The multiples of 4 are: 4, 8, **12**, 16, ...
  - The multiples of 6 are: 6, **12**, 18, ...
  - So, the common denominator is **12**.
- Write them with a denominator equal to 12:
  - $\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$
  - $\frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$
- Compare: $\frac{3}{4} = \frac{9}{12} < \frac{10}{12} = \frac{5}{6}$
- 

Ex 76:

$$\frac{7}{8} \boxed{<} \frac{9}{10}$$

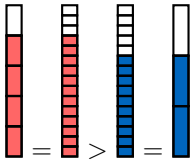
Answer:

- Find a common denominator :
  - The multiples of 8 are: 8, 16, 24, 32, **40**, ...
  - The multiples of 10 are: 10, 20, 30, **40**, ...
  - So, the common denominator is **40**.
- Write them with a denominator equal to 40:
  - $\frac{7}{8} = \frac{7 \times 5}{8 \times 5} = \frac{35}{40}$
  - $\frac{9}{10} = \frac{9 \times 4}{10 \times 4} = \frac{36}{40}$
- Compare: $\frac{7}{8} = \frac{35}{40} < \frac{36}{40} = \frac{9}{10}$
- 

Ex 77:

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

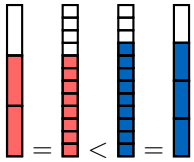
Answer:

- Find a common denominator :
  - The multiples of 5 are: 5, 10, **15**, ...
  - The multiples of 3 are: 3, 6, 9, 12, **15**, 18, ...
  - So, the common denominator is **15**.
- Write them with a denominator equal to 15:
  - $\frac{4}{5} = \frac{4 \times 3}{5 \times 3} = \frac{12}{15}$
  - $\frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$
- Compare: $\frac{4}{5} = \frac{12}{15} > \frac{10}{15} = \frac{2}{3}$
- 

Ex 78:

$$\frac{2}{3} \boxed{<} \frac{3}{4}$$

Answer:

- Find a common denominator :
  - The multiples of 3 are: 3, 6, 9, **12**, 15, 18, ...
  - The multiples of 4 are: 4, 8, **12**, 16, 20, ...
  - So, the common denominator is **12**.
- Write them with a denominator equal to 12:
  - $\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$
  - $\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$
- Compare: $\frac{2}{3} = \frac{8}{12} < \frac{9}{12} = \frac{3}{4}$
- 

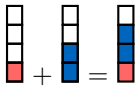
G ADDITION AND SUBTRACTION WITH COMMON DENOMINATORS

G.1 ADDING FRACTIONS WITH COMMON DENOMINATORS

Ex 79:

$$\frac{1}{4} + \frac{2}{4} = \boxed{\frac{3}{4}}$$

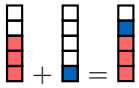
Answer:

- 
- $\frac{1}{4} + \frac{2}{4} = \frac{1+2}{4} = \frac{3}{4}$

Ex 80:

$$\frac{3}{5} + \frac{1}{5} = \boxed{\frac{4}{5}}$$

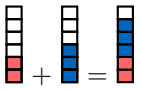
Answer:

- 
- $\frac{3}{5} + \frac{1}{5} = \frac{3+1}{5} = \frac{4}{5}$

Ex 81:

$$\frac{2}{6} + \frac{3}{6} = \boxed{\frac{5}{6}}$$

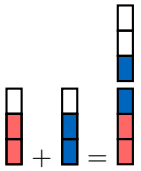
Answer:

- 
- $\frac{2}{6} + \frac{3}{6} = \frac{2+3}{6} = \frac{5}{6}$

Ex 82:

$$\frac{2}{3} + \frac{2}{3} = \boxed{\frac{4}{3}}$$

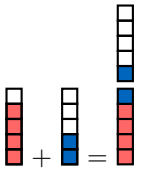
Answer:

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

Ex 83:

$$\frac{4}{5} + \frac{2}{5} = \boxed{\frac{6}{5}}$$

Answer:

- 
- $\frac{4}{5} + \frac{2}{5} = \frac{4+2}{5} = \frac{6}{5}$

G.2 SUBTRACTING FRACTIONS WITH COMMON DENOMINATORS

Ex 84:

$$\frac{3}{4} - \frac{2}{4} = \boxed{\frac{1}{4}}$$

Answer:

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

Ex 85:

$$\frac{4}{5} - \frac{3}{5} = \boxed{\frac{1}{5}}$$

Answer:

- 
- $\frac{4}{5} - \frac{3}{5} = \frac{4-3}{5} = \frac{1}{5}$

Ex 86:

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

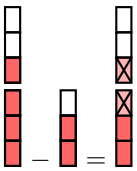
Answer:

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

Ex 87:

$$\frac{4}{3} - \frac{2}{3} = \boxed{\frac{2}{3}}$$

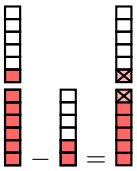
Answer:

- 
- $\frac{4}{3} - \frac{2}{3} = \frac{4-2}{3} = \frac{2}{3}$

Ex 88:

$$\frac{7}{6} - \frac{2}{6} = \boxed{\frac{5}{6}}$$

Answer:

- 
- $\frac{7}{6} - \frac{2}{6} = \frac{7-2}{6} = \frac{5}{6}$

H ADDITION AND SUBTRACTION WITH DIFFERENT DENOMINATORS

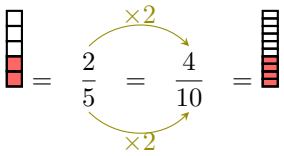
H.1 ADDING FRACTIONS

Ex 89:

$$\frac{2}{5} + \frac{3}{10} = \boxed{\frac{7}{10}}$$

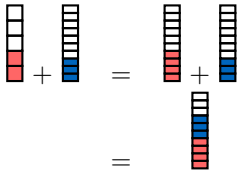
Answer:

- Since $\frac{2}{5}$ and $\frac{3}{10}$ have different denominators, rewrite $\frac{2}{5}$ with the denominator 10:



This ensures the fractions have the same denominator.

- $\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$

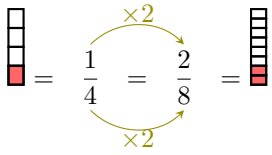
- 

Ex 90:

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

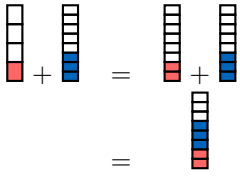
Answer:

- Since $\frac{1}{4}$ and $\frac{3}{8}$ have different denominators, rewrite $\frac{1}{4}$ with the denominator 8:



This ensures the fractions have the same denominator.

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

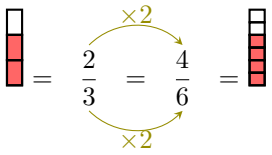
- 

Ex 91:

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

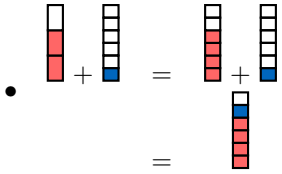
Answer:

- Since $\frac{2}{3}$ and $\frac{1}{6}$ have different denominators, rewrite $\frac{2}{3}$ with the denominator 6:



  This ensures the fractions have the same denominator.

- $$\frac{2}{3}+\frac{1}{6}=\frac{4}{6}+\frac{1}{6}$$
$$=\frac{5}{6}$$

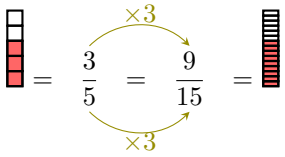
- 

Ex 92:

$$\frac{3}{5}+\frac{2}{15}=\boxed{\frac{11}{15}}$$

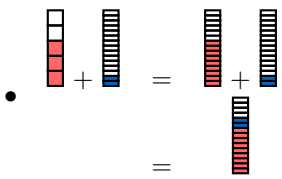
Answer:

- Since $\frac{3}{5}$ and $\frac{2}{15}$ have different denominators, rewrite $\frac{3}{5}$ with the denominator 15:



  This ensures the fractions have the same denominator.

- $$\frac{3}{5}+\frac{2}{15}=\frac{9}{15}+\frac{2}{15}$$
$$=\frac{11}{15}$$

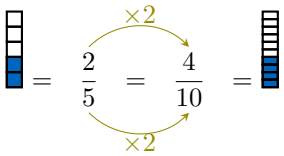
- 

Ex 93:

$$\frac{3}{10}+\frac{2}{5}=\boxed{\frac{7}{10}}$$

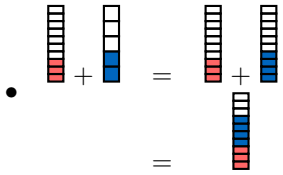
Answer:

- Since $\frac{3}{10}$ and $\frac{2}{5}$ have different denominators, rewrite $\frac{2}{5}$ with the denominator 10:



  This ensures the fractions have the same denominator.

- $$\frac{3}{10}+\frac{2}{5}=\frac{3}{10}+\frac{4}{10}$$
$$=\frac{7}{10}$$

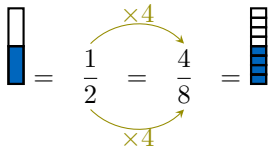
- 

Ex 94:

$$\frac{3}{8}+\frac{1}{2}=\boxed{\frac{7}{8}}$$

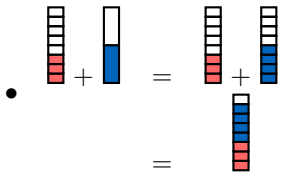
Answer:

- Since $\frac{3}{8}$ and $\frac{1}{2}$ have different denominators, rewrite $\frac{1}{2}$ with the denominator 8:



  This ensures the fractions have the same denominator.

- $$\frac{3}{8}+\frac{1}{2}=\frac{3}{8}+\frac{4}{8}$$
$$=\frac{7}{8}$$

- 

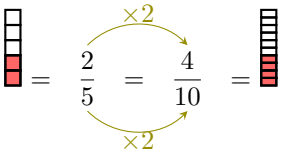
H.2 SUBTRACTING FRACTIONS

Ex 95:

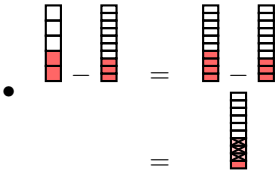
$$\frac{2}{5}-\frac{3}{10}=\boxed{\frac{1}{10}}$$

Answer:

- Since $\frac{2}{5}$ and $\frac{3}{10}$ have different denominators, rewrite $\frac{2}{5}$ with the denominator 10:



This ensures the fractions have the same denominator.

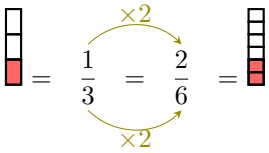
- $$\begin{aligned}\frac{2}{5}-\frac{3}{10}&=\frac{4}{10}-\frac{3}{10}\\&=\frac{4-3}{10}\\&=\frac{1}{10}\end{aligned}$$
- 

Ex 96:

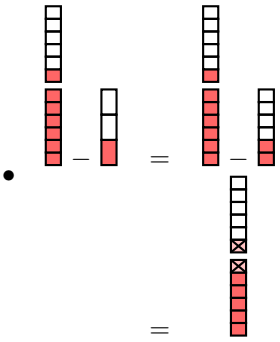
$$\frac{7}{6}-\frac{1}{3}=\boxed{\frac{5}{6}}$$

Answer:

- Since $\frac{7}{6}$ and $\frac{1}{3}$ have different denominators, rewrite $\frac{1}{3}$ with the denominator 6:



This ensures the fractions have the same denominator.

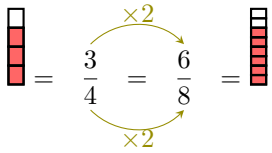
- $$\begin{aligned}\frac{7}{6}-\frac{1}{3}&=\frac{7}{6}-\frac{2}{6}\\&=\frac{7-2}{6}\\&=\frac{5}{6}\end{aligned}$$
- 

Ex 97:

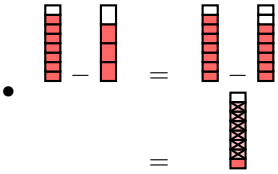
$$\frac{7}{8}-\frac{3}{4}=\boxed{\frac{1}{8}}$$

Answer:

- Since $\frac{7}{8}$ and $\frac{3}{4}$ have different denominators, rewrite $\frac{3}{4}$ with the denominator 8:



This ensures the fractions have the same denominator.

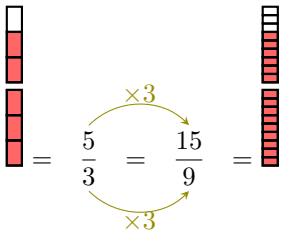
- $$\begin{aligned}\frac{7}{8}-\frac{3}{4}&=\frac{7}{8}-\frac{6}{8}\\&=\frac{7-6}{8}\\&=\frac{1}{8}\end{aligned}$$
- 

Ex 98:

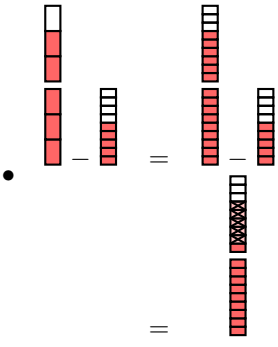
$$\frac{5}{3}-\frac{5}{9}=\boxed{\frac{10}{9}}$$

Answer:

- Since $\frac{5}{3}$ and $\frac{5}{9}$ have different denominators, rewrite $\frac{5}{3}$ with the denominator 9:



This ensures the fractions have the same denominator.

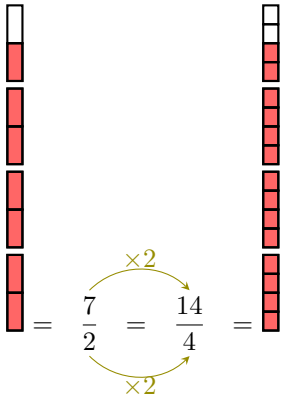
- $$\begin{aligned}\frac{5}{3}-\frac{5}{9}&=\frac{15}{9}-\frac{5}{9}\\&=\frac{15-5}{9}\\&=\frac{10}{9}\end{aligned}$$
- 

Ex 99:

$$\frac{7}{2} - \frac{7}{4} = \boxed{\frac{7}{4}}$$

Answer:

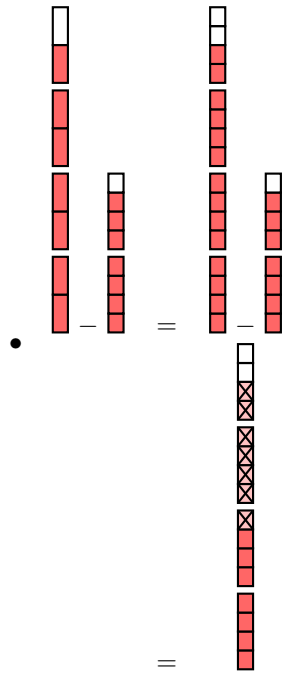
- Since $\frac{7}{2}$ and $\frac{7}{4}$ have different denominators, rewrite $\frac{7}{2}$ with the denominator 4:



$$= \frac{7}{2} = \frac{14}{4} =$$

This ensures the fractions have the same denominator.

- $$\frac{7}{2} - \frac{7}{4} = \frac{14}{4} - \frac{7}{4}$$
$$= \frac{14-7}{4}$$
$$= \frac{7}{4}$$

- 

H.3 SOLVING REAL-WORLD PROBLEMS

Ex 100: Louis has a whole cake. He cuts it into 8 equal slices and eats 3 slices. What fraction of the whole cake remains?

$\boxed{\frac{5}{8}}$ of the cake

Answer:

- **Represent the cake as a fraction**
The whole cake is divided into 8 slices, so the whole cake is $\frac{8}{8}$.

- **Subtract the slices eaten by Louis**
Louis eats 3 slices, which is $\frac{3}{8}$ of the cake. Remaining cake after Louis eats:
$$\frac{8}{8} - \frac{3}{8} = \frac{5}{8}.$$

- **Final Answer:**
The fraction of the cake that remains is $\frac{5}{8}$.

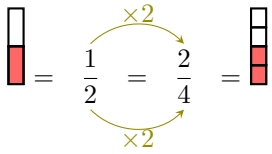
Ex 101: Today, Louis eats $\frac{1}{2}$ of a croissant. Then, Louis eats $\frac{1}{4}$ of another croissant. How much croissant did Louis eat in total?

$\boxed{\frac{3}{4}}$ of a croissant

Answer:

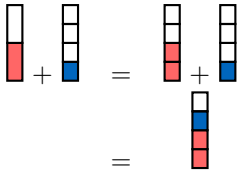
- **Represent the croissants as fractions**
Louis eats $\frac{1}{2}$ of the first croissant and $\frac{1}{4}$ of the second croissant. To find the total, add the two fractions:
$$\frac{1}{2} + \frac{1}{4}.$$

- **Find a common denominator**
The denominators are 2 and 4. The least common denominator is 4. Convert $\frac{1}{2}$ to a fraction with denominator 4:



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

- **Add the fractions**
$$\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$$
$$= \frac{3}{4}$$



- **Final Answer:**
Louis ate a total of $\frac{3}{4}$ of a croissant.

Ex 102: At the beginning, there are $\frac{5}{6}$ of a cake. After eating, there are $\frac{2}{3}$ of the cake. What quantity of cake did Louis eat?

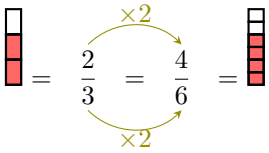
$\boxed{\frac{1}{6}}$ of the cake

Answer:

- **Represent the cake as fractions**
  At the beginning, there is $\frac{5}{6}$ of the cake. After eating, $\frac{2}{3}$ of the cake remains. To find the quantity Louis ate, subtract the remaining cake from the initial amount:

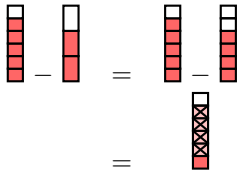
$$\frac{5}{6} - \frac{2}{3}.$$

- **Find a common denominator**
  The denominators are 6 and 3. The least common denominator is 6. Convert $\frac{2}{3}$ to a fraction with denominator 6:



- **Subtract the fractions**

$$\frac{5}{6} - \frac{2}{3} = \frac{5}{6} - \frac{4}{6}$$
$$= \frac{1}{6}$$



- **Final Answer:**
  Louis ate $\frac{1}{6}$ of the cake.

Ex 103: At the beginning, there are $\frac{7}{8}$ of a pizza. After eating, there are $\frac{3}{4}$ of the pizza. What quantity of pizza did Louis eat?

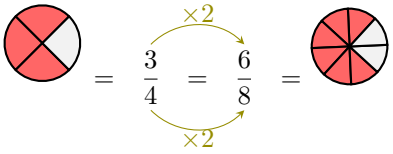
$\boxed{\frac{1}{8}}$ of the pizza

Answer:

- **Represent the pizza as fractions**
  At the beginning, there is $\frac{7}{8}$ of the pizza. After eating, $\frac{3}{4}$ of the pizza remains. To find the quantity Louis ate, subtract the remaining pizza from the initial amount:

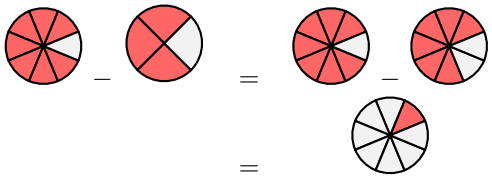
$$\frac{7}{8} - \frac{3}{4}.$$

- **Find a common denominator**
  The denominators are 8 and 4. The least common denominator is 8. Convert $\frac{3}{4}$ to a fraction with denominator 8:



- **Subtract the fractions**

$$\frac{7}{8} - \frac{3}{4} = \frac{7}{8} - \frac{6}{8}$$
$$= \frac{1}{8}$$



- **Final Answer:**
  Louis ate $\frac{1}{8}$ of the pizza.

Ex 104: Louis read $\frac{2}{5}$ of his book on Saturday and $\frac{3}{10}$ of his book on Sunday. How much of his book did Louis read in total?

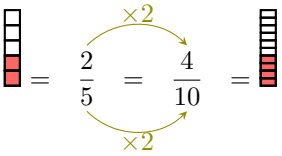
$\boxed{\frac{7}{10}}$ of the book

Answer:

- **Represent the book as fractions**
  Louis read $\frac{2}{5}$ of the book on Saturday and $\frac{3}{10}$ of the book on Sunday. To find the total, add the two fractions:

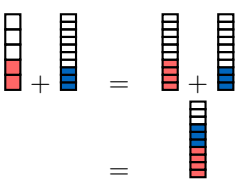
$$\frac{2}{5} + \frac{3}{10}.$$

- **Find a common denominator**
  The denominators are 5 and 10. The least common denominator is 10. Convert $\frac{2}{5}$ to a fraction with denominator 10:



- **Add the fractions**

$$\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10}$$
$$= \frac{7}{10}$$



- **Final Answer:**
  Louis read a total of $\frac{7}{10}$ of his book.

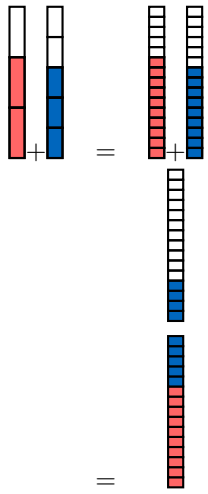
H.4 ADDING FRACTIONS WITH UNLIKE DENOMINATORS

Ex 105: Calculate and simplify:

$$\frac{2}{3}+\frac{3}{5}=\boxed{\frac{19}{15}}$$

Answer:

- **Find a common denominator**:To add fractions, they must have the same denominator.
  - Multiples of 3: 3, 6, 9, 12, **15**, ...
  - Multiples of 5: 5, 10, **15**, 20, ...
  - The smallest common denominator is **15**.
- $$\begin{aligned}\frac{2}{3}+\frac{3}{5}&=\frac{2\times 5}{3\times 5}+\frac{3\times 3}{5\times 3}\\&=\frac{10}{15}+\frac{9}{15}\quad\text{(common denominator = 15)}\\&=\frac{10+9}{15}\\&=\frac{19}{15}\end{aligned}$$
- **Visual representation**:

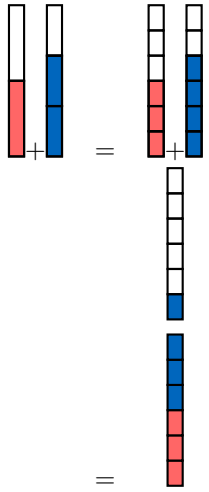


Ex 106: Calculate and simplify:

$$\frac{1}{2}+\frac{2}{3}=\boxed{\frac{7}{6}}$$

Answer:

- **Find a common denominator**:To add fractions, they must have the same denominator.
  - Multiples of 2: 2, 4, **6**, 8, 10, ...
  - Multiples of 3: 3, **6**, 9, 12, ...
  - The smallest common denominator is **6**.
- $$\begin{aligned}\frac{1}{2}+\frac{2}{3}&=\frac{1\times 3}{2\times 3}+\frac{2\times 2}{3\times 2}\\&=\frac{3}{6}+\frac{4}{6}&&\text{(common denominator = 6)}\\&=\frac{3+4}{6}&&\text{(adding numerators)}\\&=\frac{7}{6}\end{aligned}$$
- **Visual representation**:

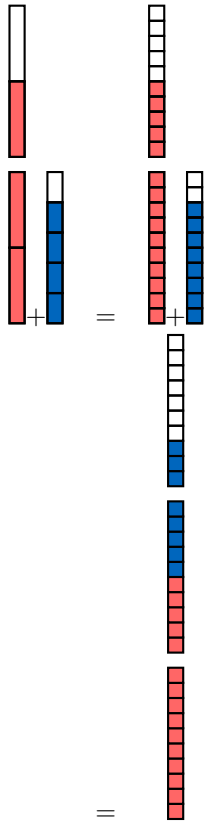


Ex 107: Calculate and simplify:

$$\frac{3}{2}+\frac{4}{5}=\boxed{\frac{23}{10}}$$

Answer:

- **Find a common denominator**:To add fractions, they must have the same denominator.
  - Multiples of 2: 2, 4, 6, 8, **10**, ...
  - Multiples of 5: 5, **10**, 15, ...
  - The smallest common denominator is **10**.
- $$\begin{aligned}\frac{3}{2}+\frac{4}{5}&=\frac{3\times 5}{2\times 5}+\frac{4\times 2}{5\times 2}\\&=\frac{15}{10}+\frac{8}{10}\quad\text{(common denominator = 10)}\\&=\frac{15+8}{10}\\&=\frac{23}{10}.\end{aligned}$$
- **Visual representation**:

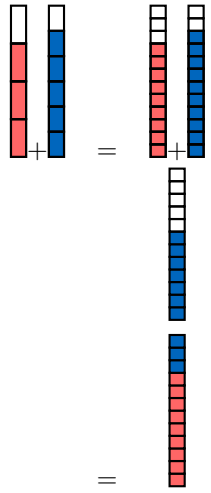


Ex 108: Calculate and simplify:

$$\frac{3}{4}+\frac{5}{6}=\boxed{\frac{19}{12}}$$

Answer:

- **Find a common denominator**:To add fractions, they must have the same denominator.
  - Multiples of 4: 4, 8, **12**, 16, 20, ...
  - Multiples of 6: 6, **12**, 18, 24, ...
  - The smallest common denominator is **12**.
- $$\begin{aligned}\frac{3}{4}+\frac{5}{6}&=\frac{3\times 3}{4\times 3}+\frac{5\times 2}{6\times 2}\\&=\frac{9}{12}+\frac{10}{12} && \text{(common denominator = 12)}\\&=\frac{9+10}{12} && \text{(adding numerators)}\\&=\frac{19}{12}\end{aligned}$$
- **Visual representation**:

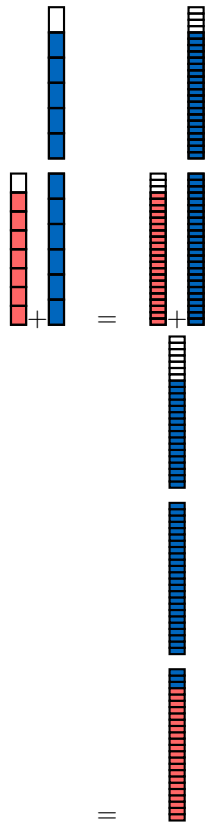


Ex 109: Calculate and simplify:

$$\frac{7}{8}+\frac{11}{6}=\boxed{\frac{65}{24}}$$

Answer:

- **Find a common denominator**:To add fractions, they must have the same denominator.
  - Multiples of 8: 8, 16, **24**, 32, ...
  - Multiples of 6: 6, 12, 18, **24**, 30, ...
  - The smallest common denominator is **24**.
- $$\begin{aligned}\frac{7}{8}+\frac{11}{6}&=\frac{7\times 3}{8\times 3}+\frac{11\times 4}{6\times 4}\\&=\frac{21}{24}+\frac{44}{24} && \text{(common denominator = 24)}\\&=\frac{21+44}{24}\\&=\frac{65}{24}\end{aligned}$$
- **Visual representation**:



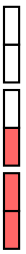
I FRACTION AS QUOTIENT

I.1 CONVERTING DIVISION TO FRACTIONS

Ex 110: Write as a fraction:

$$3 \div 2 = \frac{\boxed{3}}{\boxed{2}}$$

Answer:

- $3 \div 2 =$ 
- $3 \div 2 = \frac{3}{2}$

Ex 111: Write as a fraction:

$$2 \div 5 = \frac{\boxed{2}}{\boxed{5}}$$

Answer:

- $2 \div 5 =$ 
- $2 \div 5 = \frac{2}{5}$

Ex 112: Write as a fraction:

$$3 \div 4 = \frac{\boxed{3}}{\boxed{4}}$$

Answer:

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

Ex 113: Write as a fraction:

$$5 \div 3 = \frac{\boxed{5}}{\boxed{3}}$$

Answer:

- $5 \div 3 =$ 
- $5 \div 3 = \frac{5}{3}$

I.2 CONVERTING FRACTIONS TO DIVISION EXPRESSIONS

Ex 114: Convert the fraction into a division expression:

$$\frac{2}{5} = \boxed{2} \div \boxed{5}$$

Answer: The fraction $\frac{2}{5}$ can be written as the division $2 \div 5$.

Ex 115: Convert the fraction into a division expression:

$$\frac{4}{7} = \boxed{4} \div \boxed{7}$$

Answer: The fraction $\frac{4}{7}$ can be written as the division $4 \div 7$.

Ex 116: Convert the fraction into a division expression:

$$\frac{3}{8} = \boxed{3} \div \boxed{8}$$

Answer: The fraction $\frac{3}{8}$ can be written as the division $3 \div 8$.

Ex 117: Convert the fraction into a division expression:

$$\frac{6}{9} = \boxed{6} \div \boxed{9}$$

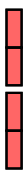
Answer: The fraction $\frac{6}{9}$ can be written as the division $6 \div 9$.

I.3 CONVERTING FRACTIONS TO WHOLE NUMBERS

Ex 118: Convert the fraction into a whole number:

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

Answer:

- $\frac{4}{2} = 4 \div 2$
  $= 2$
-  $= 2$

Ex 119: Convert the fraction into a whole number:

$$\frac{9}{3} = \boxed{3}$$

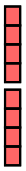
Answer:

- $\frac{9}{3} = 9 \div 3$
  $= 3$
-  $= 3$

Ex 120: Convert the fraction into a whole number:

$$\frac{8}{4} = \boxed{2}$$

Answer:

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

Ex 121: Convert the fraction into a whole number:

$$\frac{5}{5} = \boxed{1}$$

Answer:

- $\frac{5}{5} = 5 \div 5$
  $= 1$
-  $= 1$

I.4 FINDING FRACTIONS IN WORD PROBLEMS

Ex 122: Four friends share 3 cakes equally. What fraction does each friend get?

$$\frac{\boxed{3}}{\boxed{4}} \text{ of a cake}$$

Answer:

- When you share equally, you divide the 3 cakes by 4 friends:

$$3 \div 4 = \frac{3}{4}$$

- 
- So, each friend gets $\frac{3}{4}$ of a cake.

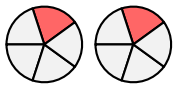
Ex 123: Five friends share 2 pizzas equally. What fraction does each friend get?

$$\frac{\boxed{2}}{\boxed{5}} \text{ of a pizza}$$

Answer:

- When you share equally, you divide the 2 pizzas by 5 friends:

$$2 \div 5 = \frac{2}{5}$$

- 
- So, each friend gets $\frac{2}{5}$ of a pizza.

Ex 124: A couple shares 5 chocolate bars equally. What fraction of a chocolate bar does each person get?

$$\frac{\boxed{5}}{\boxed{2}} \text{ of a chocolate bar}$$

Answer:

- When you share equally, you divide the 5 chocolate bars by 2 people:

$$5 \div 2 = \frac{5}{2}$$

- 
- So, each person gets $\frac{5}{2}$ chocolate bars, which is 2 whole bars and half of another one.

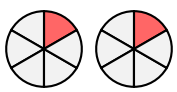
Ex 125: Six family members share 2 apple pies equally. What fraction of a pie does each family member get?

$$\frac{\boxed{2}}{\boxed{6}} \text{ of a pie}$$

Answer:

- When you share equally, you divide the 2 apple pies by 6 family members:

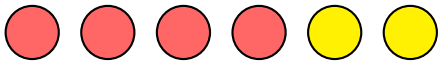
$$2 \div 6 = \frac{2}{6}$$

- 
- So, each family member gets $\frac{2}{6}$ of an apple pie.

J FRACTION AS RATIO

J.1 IDENTIFYING FRACTIONS IN REAL-LIFE CONTEXTS

Ex 126:

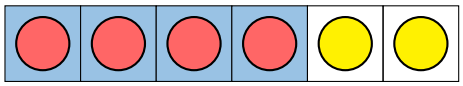


What fraction of the circles are red ? (Simplify your answer.)

$\boxed{\frac{2}{3}}$ of the circles are red.

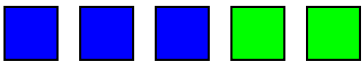
Answer:

- There are 6 circles.
- 4 of the circles are red.



- $\frac{4}{6} = \frac{2}{3}$ of the circles are red.

Ex 127:

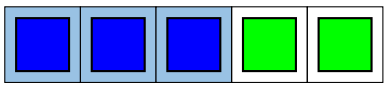


What fraction of the squares are blue? (Simplify your answer.)

$\boxed{\frac{3}{5}}$ of the squares are blue.

Answer:

- There are 5 squares.
- 3 of the squares are blue.



- $\frac{3}{5}$ of the squares are blue.

Ex 128:

What fraction of the children are girls? (Simplify your answer.)

$\boxed{\frac{1}{2}}$ of the children are girls.

Answer:

- There are 4 children.
- 2 of the children are girls.
- $\frac{2}{4} = \frac{1}{2}$ of the children are girls.

Ex 129:

What fraction of the children raised their hand? (Simplify your answer.)

$\boxed{\frac{1}{4}}$ of the children raised their hand.

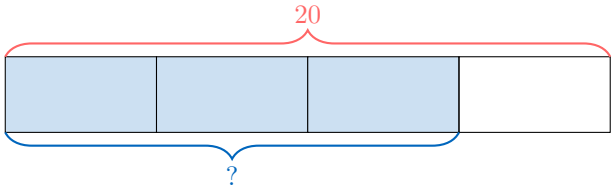
Answer:

- There are 4 children.
- 1 of the children raised their hand.
- $\frac{1}{4}$ of the children raised their hand.

J.2 CALCULATING FRACTIONS OF A WHOLE

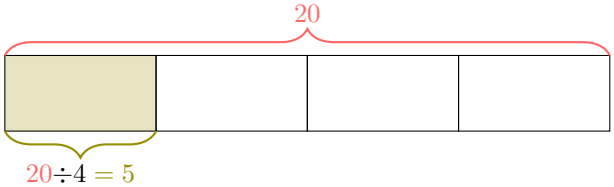
Ex 130:

$\frac{3}{4}$ of $20 = \boxed{15}$

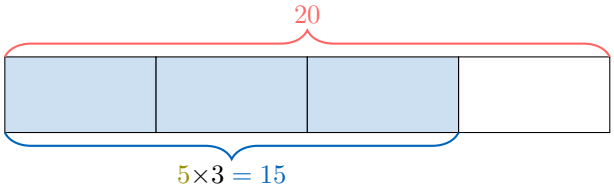


Answer:

- Find the quantity of 1 part:



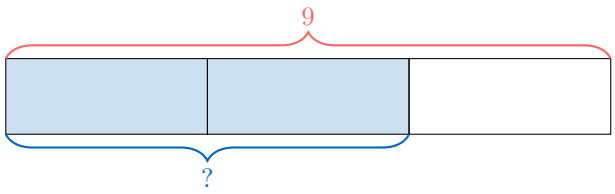
- Find the quantity of 3 parts:



- $\frac{3}{4}$ of $20 = 15$

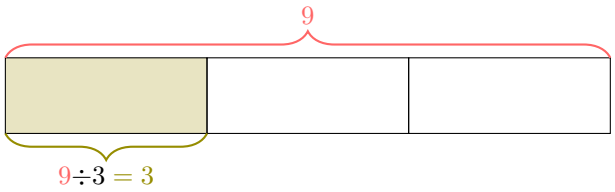
Ex 131:

$\frac{2}{3}$ of $9 = \boxed{6}$

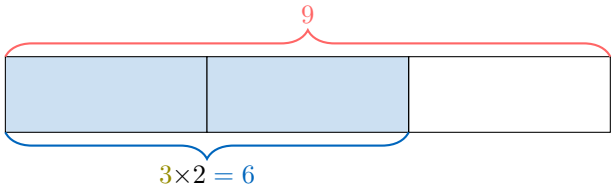


Answer:

- Find the quantity of 1 part:



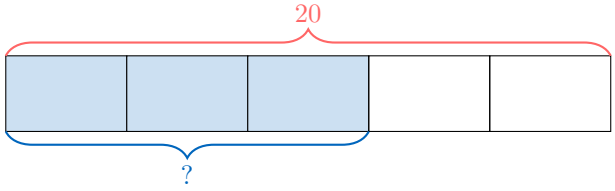
- Find the quantity of 2 parts:



- $\frac{2}{3}$ of $9 = 6$

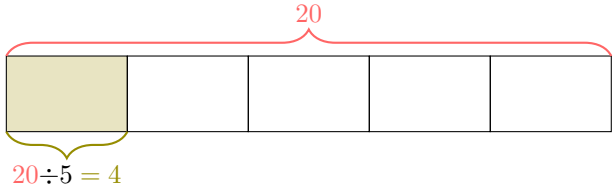
Ex 132:

$\frac{3}{5}$ of $20 = \boxed{12}$

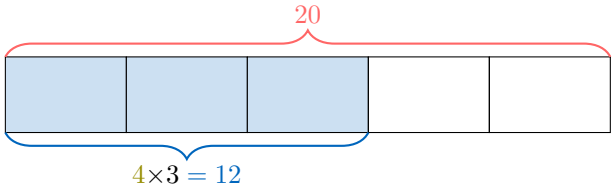


Answer:

- Find the quantity of 1 part:



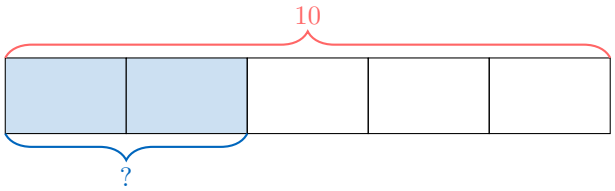
- Find the quantity of 3 parts:



- $\frac{3}{5}$ of $20 = 12$

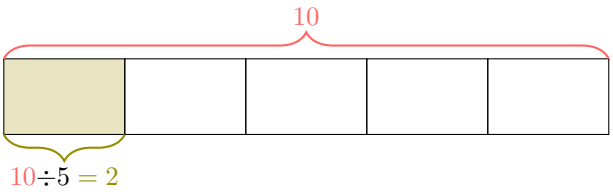
Ex 133:

$\frac{2}{5}$ of $10 = \boxed{4}$

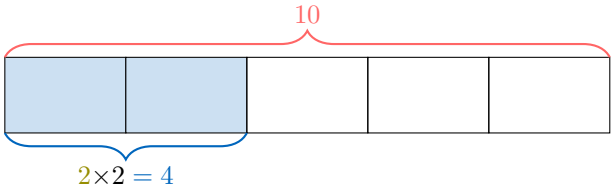


Answer:

- Find the quantity of 1 part:



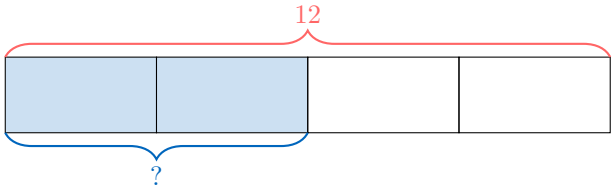
- Find the quantity of 2 parts:



- $\frac{2}{5}$ of $10 = 4$

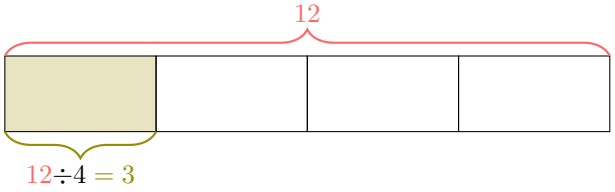
Ex 134:

$\frac{2}{4}$ of $12 = \boxed{6}$

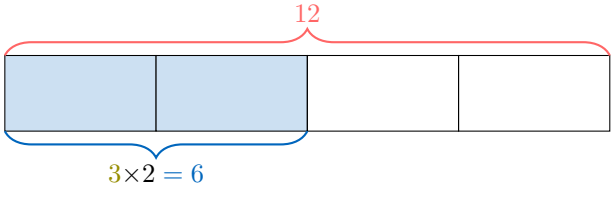


Answer:

- Find the quantity of 1 part:



- Find the quantity of 2 parts:



- $\frac{2}{4}$ of $12 = 6$

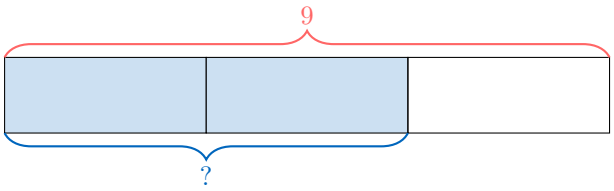
J.3 APPLYING FRACTIONS TO REAL-WORLD PROBLEMS

Ex 135: In a class of 9 students, $\frac{2}{3}$ of the students are girls. How many of the students are girls?

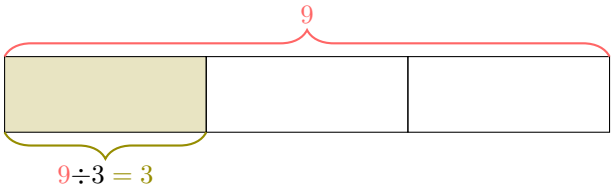
$\boxed{6}$ girls

Answer:

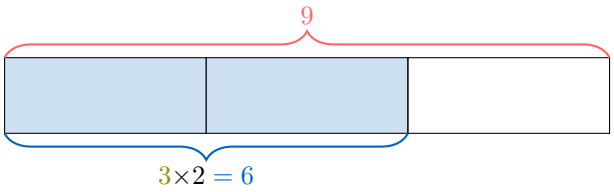
- **Method 1** (unitary method):
  - Number of girls $= \frac{2}{3}$ of 9



  - Find the quantity of 1 part:



  - Find the quantity of 2 parts:



  - $\frac{2}{3}$ of $9 = 6$
- **Method 2** (calculation using a formula):

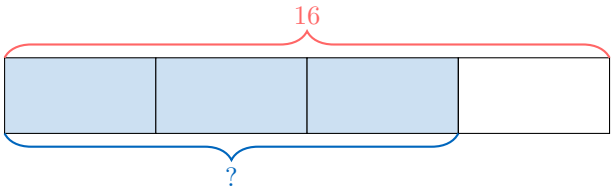
$$\begin{aligned}\text{Number of girls} &= \frac{2}{3} \text{ of } 30\\ &= \frac{2}{3} \times 30\\ &= (2 \div 3) \times 30\\ &= 20\end{aligned}$$

Ex 136: In a group of 16 fruits, $\frac{3}{4}$ of them are apples. How many of the fruits are apples?

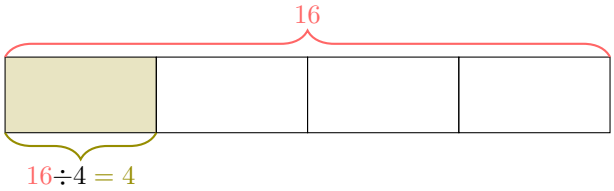
$\boxed{12}$ apples

Answer:

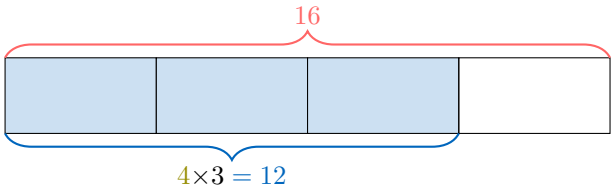
- **Method 1** (unitary method):
  - Number of apples $= \frac{3}{4}$ of 16



  - Find the quantity of 1 part:



  - Find the quantity of 3 parts:



  - $\frac{3}{4}$ of $16 = 12$
- **Method 2** (calculation using a formula):

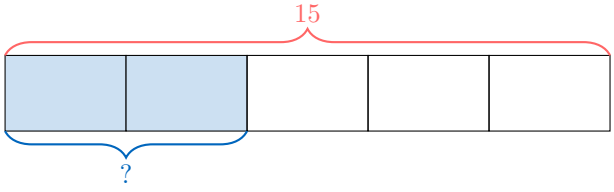
$$\begin{aligned}\text{Number of apples} &= \frac{3}{4} \text{ of } 16\\ &= \frac{3}{4} \times 16\\ &= (3 \div 4) \times 16\\ &= 12\end{aligned}$$

Ex 137: In a collection of 15 books, $\frac{2}{5}$ of them are novels. How many of the books are novels?

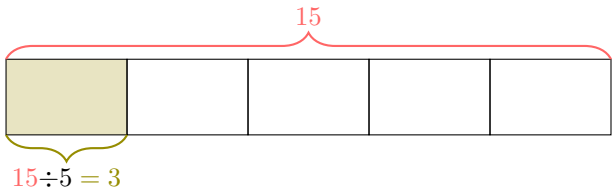
$\boxed{6}$ novels

Answer:

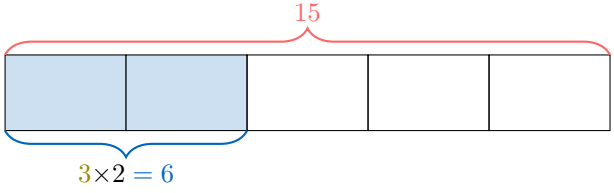
- **Method 1** (unitary method):
  - Number of novels $= \frac{2}{5}$ of 15



  - Find the quantity of 1 part:



  - Find the quantity of 2 parts:



  - $\frac{2}{5}$ of $15 = 6$

- **Method 2** (calculation using a formula):

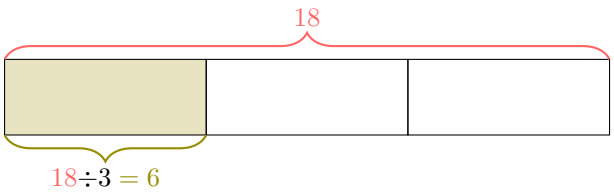
$$\begin{aligned}\text{Number of novels} &= \frac{2}{5} \text{ of } 15\\ &= \frac{2}{5} \times 15\\ &= (2 \div 5) \times 15\\ &= 6\end{aligned}$$

Ex 138: For a refreshing drink recipe, the mixture consists of $\frac{1}{3}$ lemon and $\frac{2}{3}$ water for a total of 18 cl. How much lemon and water are used in the drink?

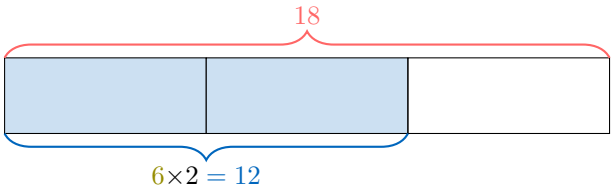
$\boxed{6}$ cl of lemon
$\boxed{12}$ cl of water

Answer:

- **Method 1** (unitary method):
  - Total volume = 18 cl
  - Find the quantity of 1 part (which represents the lemon part):



  - Find the quantity of 2 parts (which represents the water part):



  - $\frac{1}{3}$ of 18 cl = 6 cl of lemon
  - $\frac{2}{3}$ of 18 cl = 12 cl of water
- **Method 2** (calculation using a formula):

$$\begin{aligned}\text{Quantity of lemon} &= \frac{1}{3} \text{ of } 18\\ &= \frac{1}{3} \times 18\\ &= (1 \div 3) \times 18\\ &= 6 \text{ cl of lemon}\end{aligned}$$

$$\begin{aligned}\text{Quantity of water} &= \frac{2}{3} \text{ of } 18\\ &= \frac{2}{3} \times 18\\ &= (2 \div 3) \times 18\\ &= 12 \text{ cl of water}\end{aligned}$$

K FRACTION AS DECIMAL NUMBER

K.1 CONVERTING FRACTIONS TO DECIMALS

Ex 139: Convert to a decimal number:

$$\frac{3}{4} = \boxed{0.75}$$

Answer:

- **Division Method**:

$$\begin{aligned}\frac{3}{4} &= 3 \div 4\\ &= 0.75\end{aligned}$$

$$\begin{array}{r} 0.75 \\ 4\overline{)3.00} \\ \underline{2.8} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

- **Power of 10 Denominator Method**:

$$\begin{aligned}\frac{3}{4} &= \frac{3\times25}{4\times25}\\ &= \frac{75}{100}\\ &= 75 \div 100\\ &= 0.75\end{aligned}$$

Ex 140: Convert to a decimal number:

$$\frac{2}{5} = \boxed{0.4}$$

Answer:

- **Division Method**:

$$\begin{aligned}\frac{2}{5} &= 2 \div 5\\ &= 0.4\end{aligned}$$

$$\begin{array}{r} 0.4 \\ 5\overline{)2.0} \\ \underline{2.0} \\ 0 \end{array}$$

- **Power of 10 Denominator Method**:

$$\begin{aligned}\frac{2}{5} &= \frac{2\times2}{5\times2}\\ &= \frac{4}{10}\\ &= 4 \div 10\\ &= 0.4\end{aligned}$$

Ex 141: Convert to a decimal number:

$$\frac{3}{20} = \boxed{0.15}$$

Answer:

- **Division Method**:

$$\begin{aligned}\frac{3}{20} &= 3 \div 20\\ &= 0.15\end{aligned}$$

$$\begin{array}{r} 0.15 \\ 20\overline{)3.00} \\ \underline{2.0} \\ 1.00 \\ \underline{1.00} \\ 0 \end{array}$$

- **Power of 10 Denominator Method**:

$$\begin{aligned}\frac{3}{20} &= \frac{3\times 5}{20\times 5}\\ &= \frac{15}{100}\\ &= 15 \div 100\\ &= 0.15\end{aligned}$$

Ex 142: Convert to a decimal number:

$$\frac{40}{50} = \boxed{0.8}$$

Answer:

- **Division Method**:

$$\begin{aligned}\frac{40}{50} &= 40 \div 50\\ &= 0.8\end{aligned}$$

$$\begin{array}{r} 0.8 \\ 50\overline{)40.0} \\ \underline{40.0} \\ 0 \end{array}$$

- **Power of 10 Denominator Method**:

$$\begin{aligned}\frac{40}{50} &= \frac{40\times 2}{50\times 2}\\ &= \frac{80}{100}\\ &= 80 \div 100\\ &= 0.8\end{aligned}$$

K.2 CONVERTING DECIMALS TO FRACTIONS

Ex 143: Convert to a fraction:

$$1.3 = \frac{\boxed{13}}{\boxed{10}}$$

Answer:

$$\begin{aligned}1.3 &= \frac{1.3 \times 10}{10}\\ &= \frac{13}{10}\end{aligned}$$

Ex 144: Convert 0.3 to a fraction:

$$0.3 = \frac{\boxed{3}}{\boxed{10}}$$

Answer:

$$\begin{aligned}0.3 &= \frac{0.3 \times 10}{10}\\ &= \frac{3}{10}\end{aligned}$$

Ex 145: Convert 10.7 to a fraction:

$$10.7 = \frac{\boxed{107}}{\boxed{10}}$$

Answer:

$$\begin{aligned}10.7 &= \frac{10.7 \times 10}{10}\\ &= \frac{107}{10}\end{aligned}$$

Ex 146: Convert 0.99 to a fraction:

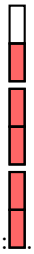
$$0.99 = \frac{\boxed{99}}{\boxed{100}}$$

Answer:

$$\begin{aligned}0.99 &= \frac{0.99 \times 100}{100}\\ &= \frac{99}{100}\end{aligned}$$

L PROPER AND IMPROPER FRACTIONS

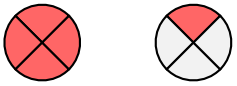
L.1 SOLVING REAL-WORLD PROBLEMS

Ex 147: I eat $\frac{5}{2}$ of a pain au chocolat:  .

So I eat $\boxed{2}$ whole pains au chocolat and $\frac{\boxed{1}}{\boxed{2}}$ of another pain au chocolat.

Answer: $\frac{5}{2} = \frac{2\times 2+1}{2}$ (division by 2: $5 = 2\times 2+1$)

$$\begin{aligned}&= \frac{2\times \cancel{2}}{\cancel{2}} + \frac{1}{2}\\ &= 2 + \frac{1}{2}\end{aligned}$$

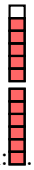
Ex 148: I eat $\frac{5}{4}$ of a pizza:  .

So I eat $\boxed{1}$ whole pizza and $\frac{\boxed{1}}{\boxed{4}}$ of another pizza.

Answer: $\dfrac{5}{4} = \dfrac{1\times 4+1}{4}$ (division by 4: $5 = 1\times 4+1$)

$= \dfrac{1\times \cancel{4}}{\cancel{4}} + \dfrac{1}{4}$

$= 1 + \dfrac{1}{4}$

Ex 149: I have $\dfrac{11}{6}$ of a ribbon:  .

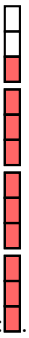
So I have $\boxed{1}$ whole ribbon and $\dfrac{\boxed{5}}{\boxed{6}}$ of another ribbon.

Answer: $\dfrac{11}{6} = \dfrac{1\times 6+5}{6}$ (division by 6: $8 = 1\times 6+2$)

$= \dfrac{1\times \cancel{6}}{\cancel{6}} + \dfrac{5}{6}$

$= 1 + \dfrac{5}{6}$

$= 1\dfrac{5}{6}$

Ex 150: I have $\dfrac{10}{3}$ of a wood plank:  .

So I have $\boxed{3}$ whole wood planks and $\dfrac{\boxed{1}}{\boxed{3}}$ of another wood plank.

Answer: $\dfrac{10}{3} = \dfrac{3\times 3+1}{3}$ (division by 3: $10 = 3\times 3+1$)

$= \dfrac{3\times \cancel{3}}{\cancel{3}} + \dfrac{1}{3}$

$= 3 + \dfrac{1}{3}$

$= 3\dfrac{1}{3}$

L.2 FINDING MIXED NUMBERS FROM BAR MODELS

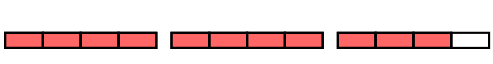
Ex 151: Write the mixed number shown in the diagram:

 $= \boxed{2}\ \dfrac{\boxed{1}}{\boxed{3}}$

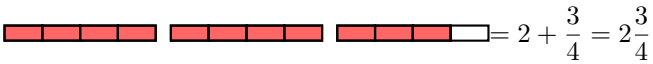
Answer:

-  $= 2 + \dfrac{1}{3} = 2\dfrac{1}{3}$

Ex 152: Write the mixed number shown in the diagram:

 $= \boxed{2}\ \dfrac{\boxed{3}}{\boxed{4}}$

Answer:

-  $= 2 + \dfrac{3}{4} = 2\dfrac{3}{4}$

Ex 153: Write the mixed number shown in the diagram:

 $= \boxed{4}\ \dfrac{\boxed{1}}{\boxed{2}}$

Answer:

- $= 4 + \dfrac{1}{2} = 4\dfrac{1}{2}$

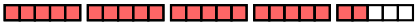
Ex 154: Write the mixed number shown in the diagram:

 $= \boxed{3}\ \dfrac{\boxed{3}}{\boxed{4}}$

Answer:

-  $= 3 + \dfrac{3}{4} = 3\dfrac{3}{4}$

Ex 155: Write the mixed number shown in the diagram:

 $= \boxed{4} + \dfrac{\boxed{2}}{\boxed{5}}$

Answer:

-  $= 4 + \dfrac{2}{5} = 4\dfrac{2}{5}$

L.3 FINDING FRACTIONS FROM MIXED NUMBERS

Ex 156: Convert into improper fraction:

$$2\frac{1}{3} = \frac{\boxed{7}}{\boxed{3}}$$

Answer:

- $2\dfrac{1}{3} = 2 + \dfrac{1}{3}$

  $= \dfrac{2\times 3}{1\times 3} + \dfrac{1}{3}$ $\left(2 = \dfrac{2}{1}\right)$

  $= \dfrac{6}{3} + \dfrac{1}{3}$

  $= \dfrac{7}{3}$
- 

Ex 157: Convert into an improper fraction:

$$3\frac{2}{5} = \frac{\boxed{17}}{\boxed{5}}$$

Answer:

- $3\dfrac{2}{5} = 3 + \dfrac{2}{5}$

  $= \dfrac{3\times 5}{1\times 5} + \dfrac{2}{5}$ $\left(3 = \dfrac{3}{1}\right)$

  $= \dfrac{15}{5} + \dfrac{2}{5}$

  $= \dfrac{17}{5}$

- 

Ex 158: Convert into an improper fraction:

$$2\frac{3}{4} = \frac{\boxed{11}}{\boxed{4}}$$

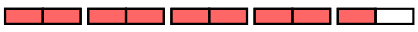
Answer:

- $2\frac{3}{4} = 2 + \frac{3}{4}$
  $= \frac{2\times4}{1\times4} + \frac{3}{4} \quad \left(2 = \frac{2}{1}\right)$
  $= \frac{8}{4} + \frac{3}{4}$
  $= \frac{11}{4}$
- 

Ex 159: Convert into an improper fraction:

$$4\frac{1}{2} = \frac{\boxed{9}}{\boxed{2}}$$

Answer:

- $4\frac{1}{2} = 4 + \frac{1}{2}$
  $= \frac{4\times2}{1\times2} + \frac{1}{2} \quad \left(4 = \frac{4}{1}\right)$
  $= \frac{8}{2} + \frac{1}{2}$
  $= \frac{9}{2}$
- 

L.4 FINDING MIXED NUMBERS FROM FRACTIONS

Ex 160: Convert into mixed number:

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

Answer:

- $\frac{3}{2} = \frac{1\times2+1}{2}$ (division of 3 by 2: $3 = 1\times2+1$)
  $= \frac{1\times\cancel{2}}{\cancel{2}} + \frac{1}{2}$
  $= 1 + \frac{1}{2}$
  $= 1\frac{1}{2}$
- $\frac{3}{2} =$ $= 1 + \frac{1}{2} = 1\frac{1}{2}$

Ex 161: Convert into a mixed number:

$$\frac{7}{3} = \boxed{2}\ \frac{\boxed{1}}{\boxed{3}}$$

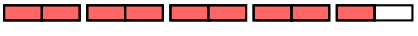
Answer:

- $\frac{7}{3} = \frac{2\times3+1}{3}$ (division of 7 by 3: $7 = 2\times3+1$)
  $= \frac{2\times\cancel{3}}{\cancel{3}} + \frac{1}{3}$
  $= 2 + \frac{1}{3}$
  $= 2\frac{1}{3}$
- $\frac{7}{3} =$  $= 2 + \frac{1}{3} = 2\frac{1}{3}$

Ex 162: Convert into a mixed number:

$$\frac{9}{2} = \boxed{4}\ \frac{\boxed{1}}{\boxed{2}}$$

Answer:

- $\frac{9}{2} = \frac{4\times2+1}{2}$ (division of 9 by 2: $9 = 4\times2+1$)
  $= \frac{4\times\cancel{2}}{\cancel{2}} + \frac{1}{2}$
  $= 4 + \frac{1}{2}$
  $= 4\frac{1}{2}$
- $\frac{9}{2} =$  $= 4 + \frac{1}{2} = 4\frac{1}{2}$

Ex 163: Convert into a mixed number:

$$\frac{13}{5} = \boxed{2}\ \frac{\boxed{3}}{\boxed{5}}$$

Answer:

- $\frac{13}{5} = \frac{2\times5+3}{5}$ (division of 13 by 5: $13 = 2\times5+3$)
  $= \frac{2\times\cancel{5}}{\cancel{5}} + \frac{3}{5}$
  $= 2 + \frac{3}{5}$
  $= 2\frac{3}{5}$
- $\frac{13}{5} =$  $= 2 + \frac{3}{5} = 2\frac{3}{5}$