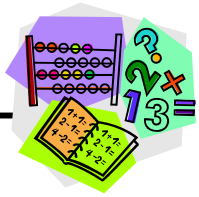
Mixed Numbers and Improper Fractions



Fractions that have numerators larger than their denominators are called **improper fractions**.

Example

Here are three identical shapes.
Two of the shapes have all four squares shaded.
One square out of four is shaded in the last shape.

In total, 9 fourths are shaded.

$\frac{9}{4}$ is an improper fraction.

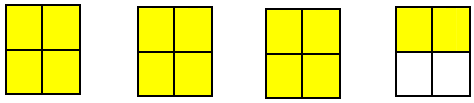
Improper fractions can also be shown as **mixed numbers**.

Mixed numbers have a whole number and a fraction; for example, $2\frac{1}{2}$, $3\frac{1}{4}$, $7\frac{3}{4}$.

Mixed numbers and equivalent improper fractions represent the same quantity.

Examples

A)



3 whole shapes are shaded = 3

plus 2 of 4 parts are shaded = $\frac{2}{4}$

In total, there are $3\frac{2}{4}$ shaded. $3\frac{2}{4}$ is a mixed number.

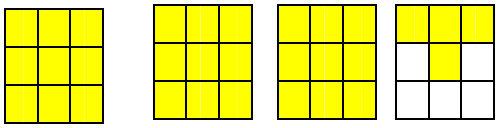
OR There are 4 parts shaded in 3 shapes
plus 2 parts shaded in 1 shape.
14 parts are shaded.

In total, there are $\frac{14}{4}$ shaded. $\frac{14}{4}$ is an improper fraction.

$$3\frac{2}{4} = \frac{14}{4}$$

B)

Here are 4 identical shapes.
Three of the shapes are completely shaded.
Four of the squares are shaded in the last shape.



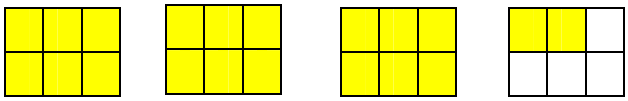
$1 + 1 + 1 + \frac{4}{9} = 3\frac{4}{9}$

$\frac{\mathbf{31}}{\mathbf{9}} = 3\frac{4}{9}$

OR

Three whole shapes are shaded.
Four of 9 are shaded in the last shape.
In total, 31 ninths are shaded $\frac{31}{9}$.

C)



In the shapes above, there are:
3 whole shapes shaded = 3
2 of 6 parts shaded = $\frac{2}{6}$

In total, there are, $3\frac{2}{6}$ shaded.

$3\frac{2}{6}$ is a mixed number.

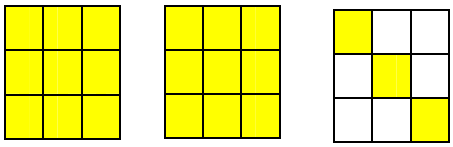
OR

There are 6 parts in each shape.
In total, 20 parts are shaded.

$\frac{20}{6}$ is an improper fraction.

$3\frac{2}{6} = \frac{20}{6}$

D)



In the shapes above, there are:
2 whole shapes shaded = 2
3 of 9 parts shaded = $\frac{3}{9}$
In total, there are $2\frac{3}{9}$.

OR

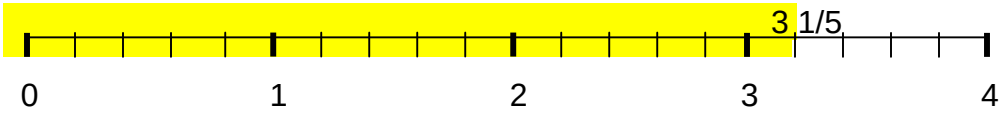
$$2\frac{3}{9} = \frac{21}{9}$$

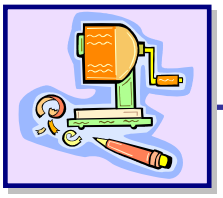
There are:
9 equal parts in each shape
21 squares are shaded = 21.
In total, there are $\frac{21}{9}$.

Number Lines

Mixed numbers can also be represented on a number line.

Example: $3\frac{1}{5}$





Practice: Identifying Proper and Improper Fractions

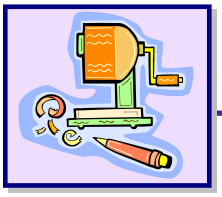
1. Identify the following as proper and improper fractions by placing a checkmark in the appropriate column.

Fraction	Proper Fraction	Improper Fraction
$\frac{16}{14}$		☑
$\frac{5}{9}$	☑	
$\frac{12}{13}$		
$\frac{5}{6}$		
$\frac{7}{10}$		
$\frac{8}{6}$		
$\frac{3}{7}$		
$\frac{9}{6}$		
$\frac{12}{5}$		

2. Identify four other proper fractions. Represent each using a diagram.

3. Identify four new improper fractions. Represent each using a diagram.

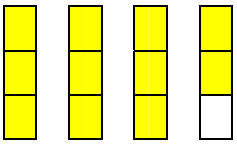
4. Write out a rule for identifying improper fractions, using the terms numerator and denominator.



Practice: Identifying Improper Fractions and Mixed Numbers

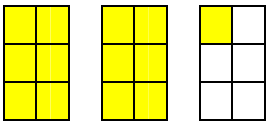
1. Examine the shapes below. Write each as a mixed number.
   Hint: How many shapes are completely shaded? What fraction of the final shape is shaded?

a)



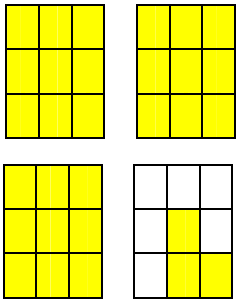
Mixed number: _____

b)



Mixed number: _____

c)



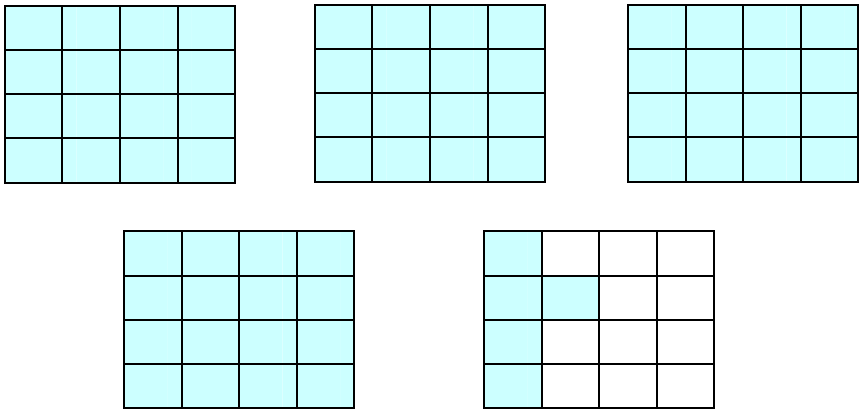
Mixed number: _____

Compare your answers with a classmate or your teacher.

2. Use number lines to illustrate each of answers to the question above.

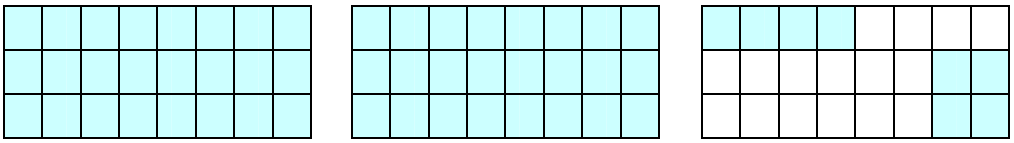
3. Identify the following shapes in mixed number and improper fraction forms.

a.



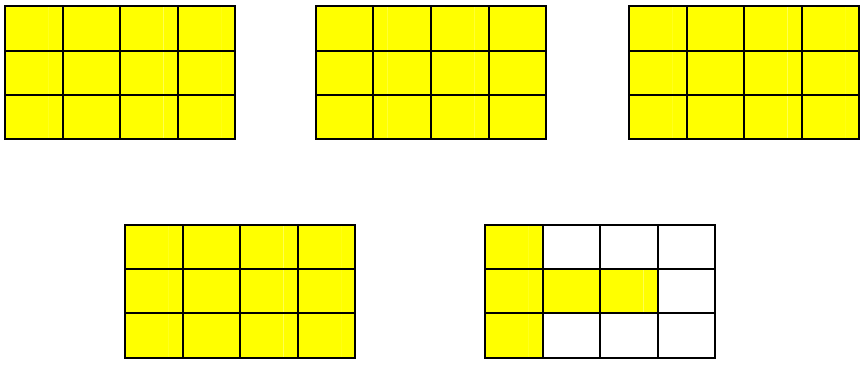
Mixed Number: _____ Improper Fraction: _____

b.



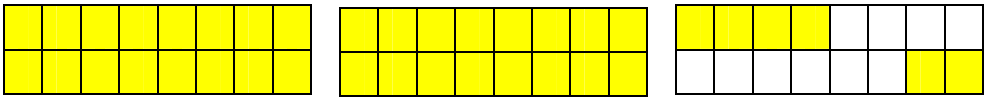
Mixed Number: _____ Improper Fraction: _____

c.



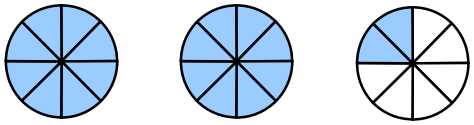
Mixed Number: _____ Improper Fraction: _____

d.



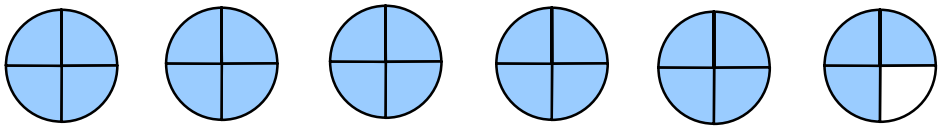
Mixed Number: _____ Improper Fraction: _____

e.



Mixed Number: _____ Improper Fraction: _____

f.



Mixed Number: _____ Improper Fraction: _____