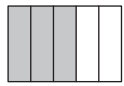


9. [Fractions]

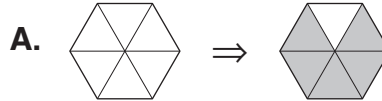
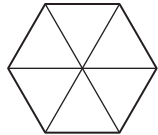
Skill 9.1 Illustrating proper fractions as part of one whole.

MMYellow 11 22 33 44
MMRed 11 22 33 44



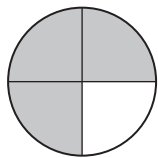
3 numerator - how many parts count
5 denominator - how many equal parts in one whole

Q. Shade in $\frac{5}{6}$ (five sixths) of this hexagon.



$\frac{5}{6}$ The hexagon is divided into 6 equal parts.
The numerator tells us to shade 5 parts.

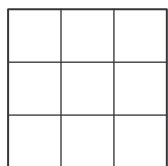
Q. What fraction of this circle is shaded?



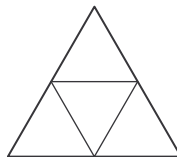
A. $\frac{3}{4}$

The circle is divided into 4 equal parts, so the denominator of the fraction is 4.
Only 3 parts of the circle are shaded so the numerator is 3.
The fraction of the circle that is shaded is three fourths or $\frac{3}{4}$.

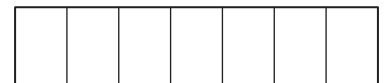
a) Shade in $\frac{5}{9}$ (five ninths) of this square.



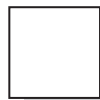
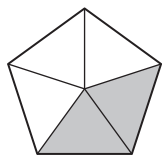
b) Shade in $\frac{1}{4}$ (one quarter) of this triangle.



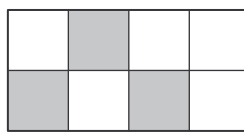
c) Shade in $\frac{4}{7}$ (four sevenths) of this rectangle.



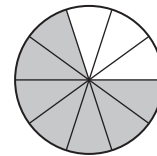
d) What fraction of this pentagon is shaded?



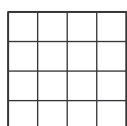
e) What fraction of this rectangle is shaded?



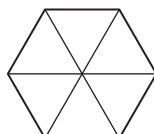
f) What fraction of this circle is shaded?



g) Shade in $\frac{1}{4}$ of this square.



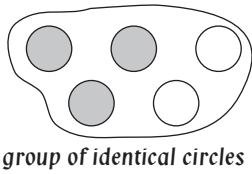
h) Shade in $\frac{1}{2}$ of this hexagon.



i) Shade in $\frac{2}{3}$ of this parallelogram.



Skill 9.2 Illustrating proper fractions as part of a group.

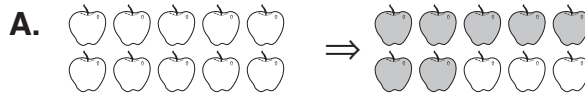
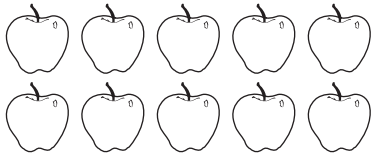


3 - numerator - how many identical circles in the group count
5 - denominator - how many identical circles in the group all together

group of identical circles

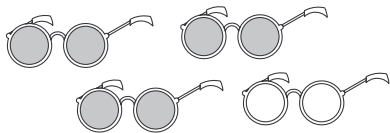
Hint: $\frac{3}{5}$ can read as “three out of five”, which means three objects out of a total of five are counted.

Q. Shade in $\frac{7}{10}$ of this group of apples.



$\frac{7}{10}$ ~~↗~~ The group has 10 identical apples.
~~↘~~ The numerator shows to shade 7 apples.

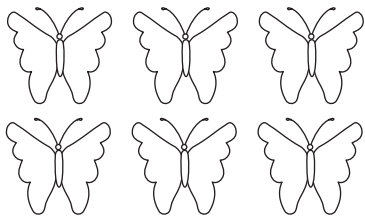
Q. What fraction of this group of sunglasses is shaded?



A. $\frac{3}{4}$

There are 4 sunglasses in the group all together, so the denominator of the fraction is 4. Only 3 sunglasses are shaded so the numerator is 3. The fraction of the group of sunglasses that is shaded is three fourths or $\frac{3}{4}$.

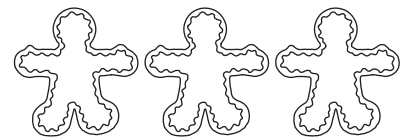
a) Shade in $\frac{5}{6}$ of this group of butterflies.



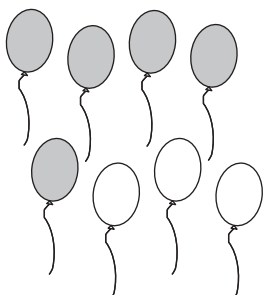
b) Shade in $\frac{2}{5}$ of this group of houses.



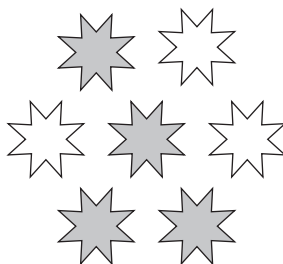
c) Shade in $\frac{2}{3}$ of this group of ginger bread men.



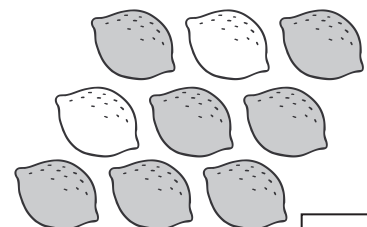
d) What fraction of this group of balloons is shaded?

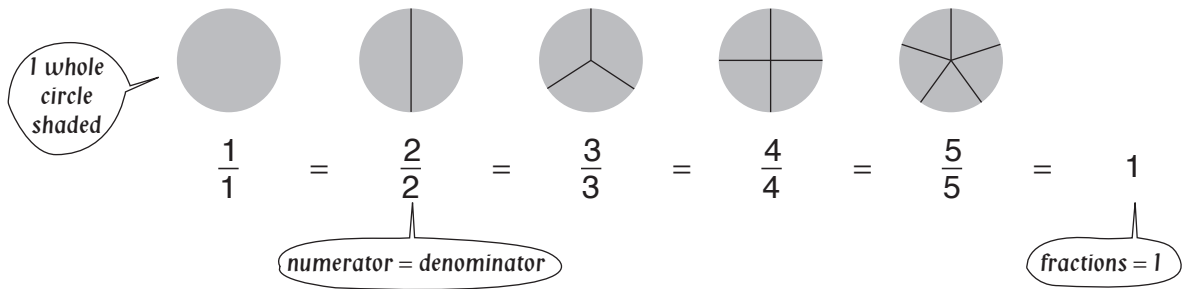


e) What fraction of this group of stars is shaded?



f) What fraction of this group of lemons is shaded?





Q. Which of the following fractions equal 1?

- A) $\frac{3}{3}$ B) $\frac{4}{3}$ C) $\frac{2}{3}$ D) $\frac{4}{4}$

A. **A and D**

The only fractions in which the numerator is the same as the denominator are $\frac{3}{3}$ and $\frac{4}{4}$.

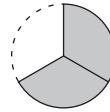
$\frac{3}{3} = 1$ (three thirds make a whole)

$\frac{4}{4} = 1$ (four fourths or quarters make a whole)

Q. If one third of the birthday cake was eaten, what fraction of the cake remains?

A. $\frac{2}{3}$

Three thirds make the whole cake. If one third was eaten, there are two thirds left.



a) Which of the following fractions equal 1?

- A) $\frac{3}{3}$ B) $\frac{1}{8}$ C) $\frac{8}{8}$ D) $\frac{3}{8}$

and

b) Which of the following fractions equal 1?

- A) $\frac{5}{2}$ B) $\frac{2}{2}$ C) $\frac{1}{2}$ D) $\frac{5}{5}$

and

c) Which of the following fractions equal 1?

- A) $\frac{1}{7}$ B) $\frac{7}{7}$ C) $\frac{1}{1}$ D) $\frac{7}{1}$

and

d) Write a fraction equal to 1 that has a denominator of 8.

e) Write a fraction equal to 1 that has a denominator of 5.

f) Write a fraction equal to 1 that has a denominator of 12.

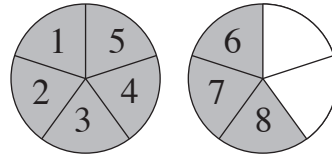
g) Luke has spent one sixth of his pocket money. What fraction of the money is left?

h) If three fifths of the show is over, what fraction of the performance is left?

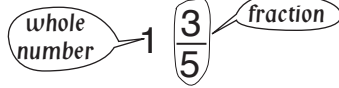
i) Three quarters of the students are girls. What fraction of the students are boys?

Skill 9.4 Illustrating and converting mixed numbers to improper fractions.

- Consider the mixed number as two bits:
A whole number.
A fraction.
- Draw and shade both bits.
- Count the total parts shaded.
- Write this total over the same denominator.



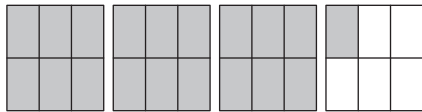
MIXED NUMBER



$$1 \frac{3}{5} = \frac{8}{5}$$

numerator - 8 parts count
IMPROPER FRACTION
denominator - 5 equal parts in one whole

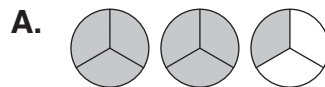
Q. Name the mixed number represented by these shaded rectangles.



A. $3 \frac{1}{6}$

Three whole rectangles are shaded and one sixth of another rectangle is shaded. The total number of rectangles shaded is three and one sixth, or $3 \frac{1}{6}$.

Q. Shade these circles to show that $2 \frac{1}{3} = \frac{7}{3}$



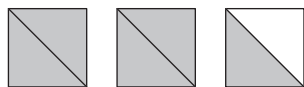
$$2 \frac{1}{3} = 1 + 1 + \frac{1}{3}$$

$$\frac{7}{3} = \frac{3}{3} + \frac{3}{3} + \frac{1}{3}$$

Shade two whole circles and a third of the remaining circle. In total 7 thirds have been shaded.

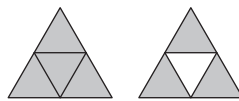
This shows that $2 \frac{1}{3} = \frac{7}{3}$

a) Name the mixed number represented by these shaded squares.

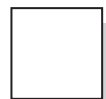


$$1 + 1 + \frac{1}{2} = 2 \frac{1}{2}$$

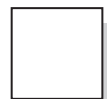
b) Name the mixed number represented by these shaded triangles.



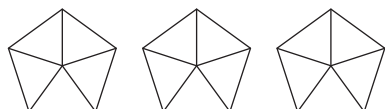
$$1 + \frac{3}{4}$$



c) Name the mixed number represented by these shaded hexagons.



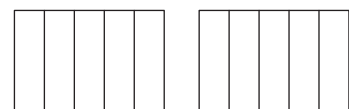
d) Shade these pentagons to show that $3 = \frac{15}{5}$



e) Shade these circles to show that $2 \frac{2}{3} = \frac{8}{3}$



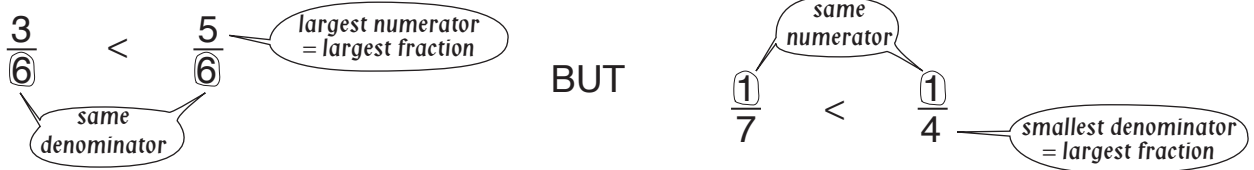
f) Shade these rectangles to show that $1 \frac{3}{5} = \frac{8}{5}$



Skill 9.5 Comparing fractions.

- First illustrate each fraction by shading the appropriate proportion of the identical shapes.
- Then compare the size of the shaded areas to decide which is largest or smallest.

Hint:



Q. Which fraction is larger?

$$\frac{1}{3} \text{ or } \frac{1}{4}$$

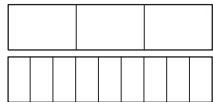


A. $\frac{1}{3}$

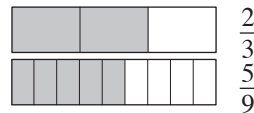
The shaded area corresponding to $\frac{1}{3}$ is bigger than the area shaded for $\frac{1}{4}$, which means that $\frac{1}{3}$ is larger than $\frac{1}{4}$.

Q. Shade this diagram to compare $\frac{2}{3}$ and $\frac{5}{9}$.

Which fraction is larger?



A. $\frac{2}{3}$

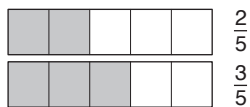


Shade two thirds of the first rectangle. Shade five ninths of the second rectangle.

The fractions are close in value however $\frac{2}{3}$ is slightly greater than $\frac{5}{9}$.

a) Which fraction is larger?

$$\frac{2}{5} \text{ or } \frac{3}{5}$$

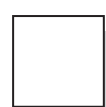
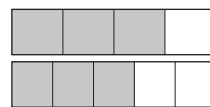


$\frac{2}{5}$
 $\frac{3}{5}$

$\frac{3}{5}$

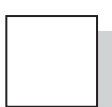
b) Which fraction is larger?

$$\frac{3}{4} \text{ or } \frac{3}{5}$$



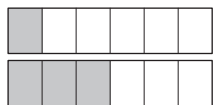
c) Which fraction is larger?

$$\frac{4}{7} \text{ or } \frac{4}{9}$$



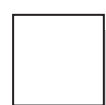
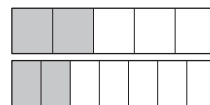
d) Which fraction is smaller?

$$\frac{1}{6} \text{ or } \frac{3}{6}$$



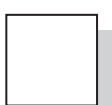
e) Which fraction is smaller?

$$\frac{2}{5} \text{ or } \frac{2}{7}$$

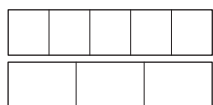


f) Which fraction is smaller?

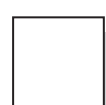
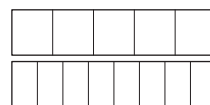
$$\frac{2}{3} \text{ or } \frac{2}{5}$$



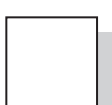
g) Shade this diagram to compare $\frac{2}{5}$ and $\frac{1}{3}$. Which fraction is smaller?



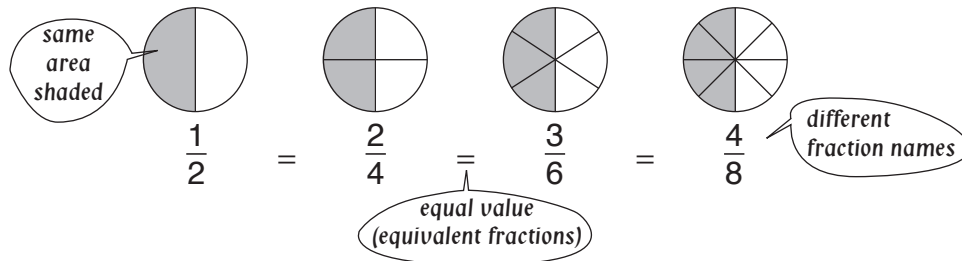
h) Shade this diagram to compare $\frac{2}{5}$ and $\frac{7}{8}$. Which fraction is larger?



i) Shade this diagram to compare $\frac{3}{4}$ and $\frac{5}{6}$. Which fraction is smaller?

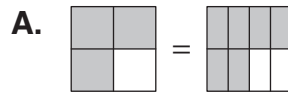
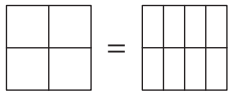


Skill 9.6 Illustrating and finding equivalent fractions.



Q. Shade this diagram to show the equivalent fractions:

$\frac{3}{4} = \frac{6}{8}$



Shade three fourths inside the first square.

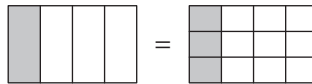
Shade six eighths inside the second square.

The same area of each square has been shaded. This shows that $\frac{3}{4} = \frac{6}{8}$

Q. Complete to form equivalent fractions:

$\frac{1}{4} = \frac{\square}{12}$

A. $\frac{1}{4} = \frac{3}{12}$

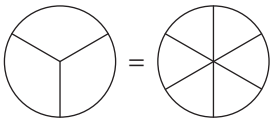


The rectangle on the left has 4 equal parts. Shade one part.

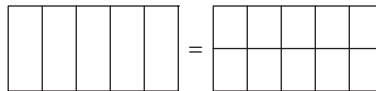
The rectangle on the right has 12 equal parts. Shade the same area as in the first rectangle. Three out of twelve parts have been shaded. One fourth is the same as three twelfths.

$\frac{1}{4} = \frac{3}{12}$ are equivalent fractions.

a) Shade this diagram to show the equivalent fractions: $\frac{2}{3} = \frac{4}{6}$



b) Shade this diagram to show the equivalent fractions: $\frac{4}{5} = \frac{8}{10}$



c) Shade this diagram to show the equivalent fractions: $\frac{3}{4} = \frac{12}{16}$



d) Complete to form equivalent fractions:

$\frac{1}{3} = \frac{\square}{9}$

e) Complete to form equivalent fractions:

$\frac{6}{12} = \frac{\square}{2}$

f) Complete to form equivalent fractions:

$\frac{4}{5} = \frac{16}{\square}$

g) Complete to form equivalent fractions:

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

h) Complete to form equivalent fractions:

$\frac{2}{8} = \frac{1}{\square}$

i) Complete to form equivalent fractions:

$\frac{3}{10} = \frac{9}{\square}$

Skill 9.7 Adding and subtracting fractions with the same denominators.

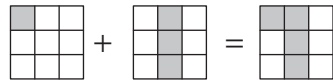
- Add or subtract the numerators (top numbers of the fractions).
Don't add or subtract the denominators (bottom numbers of the fractions).

Q. $\frac{1}{9} + \frac{3}{9} =$

A. $\frac{4}{9}$

Add the fractions:

One ninth plus three ninths is four ninths.
Add only the top numbers.



one ninth + three ninths = four ninths

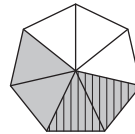
$$\frac{1}{9} + \frac{3}{9} = \frac{4}{9}$$

Q. $\frac{4}{7} - \frac{2}{7} =$

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

Subtract the fractions:

Four sevenths minus two sevenths is two sevenths.
Subtract only the top numbers.



four sevenths - two sevenths = two sevenths

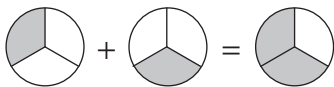
$$\frac{4}{7} - \frac{2}{7} = \frac{2}{7}$$

a) $\frac{1}{3} + \frac{1}{3} =$

$\frac{2}{3}$

b) $\frac{2}{7} + \frac{3}{7} =$

c) $\frac{2}{5} + \frac{2}{5} =$



d) $\frac{3}{8} + \frac{2}{8} =$

e) $\frac{3}{10} + \frac{4}{10} =$

f) $\frac{5}{12} + \frac{6}{12} =$

g) $\frac{2}{3} - \frac{1}{3} =$

h) $\frac{4}{5} - \frac{1}{5} =$

i) $\frac{6}{9} - \frac{2}{9} =$

j) $\frac{3}{5} - \frac{2}{5} =$

k) $\frac{9}{10} - \frac{6}{10} =$

l) $\frac{8}{12} - \frac{3}{12} =$

m) $\frac{1}{6} + \frac{4}{6} =$

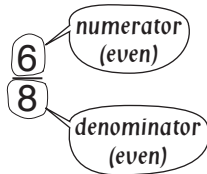
n) $\frac{6}{7} - \frac{3}{7} =$

o) $\frac{7}{11} - \frac{2}{11} =$

Skill 9.8 Simplifying fractions.

- Decide if the fraction can be simplified.
If both numbers, top (numerator) and bottom (denominator), can be divided by the same number then the fraction can be simplified.

Hint: If the numbers are both even then you can start with dividing by 2.



- Always divide both the numerator and the denominator by the same number.

$$\frac{6}{8} \div 2 = \frac{3}{4}$$

Q. Simplify: $\frac{6}{10}$

A. $\frac{6}{10} =$
 $= \frac{6 \div 2}{10 \div 2} = \frac{3}{5}$

Both 6 and 10 are even numbers.
They can be divided by 2.
The fraction can be simplified.

a) Simplify: $\frac{12}{18}$

$$\frac{12}{18} \div 6 = \frac{6}{9} \div 3 = \frac{2}{3}$$

b) Simplify: $\frac{4}{6}$

c) Simplify: $\frac{9}{12}$

d) Simplify: $\frac{4}{20}$

e) Simplify: $\frac{10}{25}$

f) Simplify: $\frac{20}{70}$

g) Which of the following fractions cannot be simplified?

- A) $\frac{3}{15}$ B) $\frac{4}{15}$ C) $\frac{5}{15}$ D) $\frac{13}{15}$

B and D

h) Which of the following fractions cannot be simplified?

- A) $\frac{5}{10}$ B) $\frac{6}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

and

i) Which of the following fractions cannot be simplified?

- A) $\frac{7}{18}$ B) $\frac{9}{18}$ C) $\frac{12}{18}$ D) $\frac{17}{18}$

and

Skill 9.9 Adding and subtracting mixed numbers.

- Add or subtract the whole numbers first.

Hint: For subtractions you may need to convert 1 whole number to an equivalent fraction.

Example: $1 = \frac{5}{5}$  *one whole equals five fifths*

- Then add or subtract the numerators (top numbers of the fractions).
Don't add or subtract the denominators (bottom numbers of the fractions).

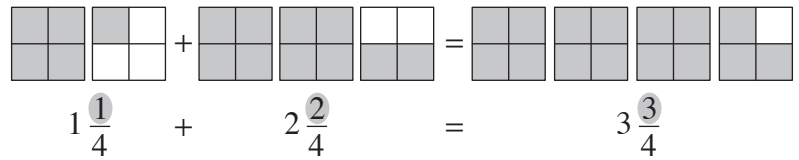
Q. $1\frac{1}{4} + 2\frac{2}{4} =$

A. $3\frac{3}{4}$

Add the whole numbers first: $1 + 2 = 3$

Add the fractions:

One fourth plus two fourths is three fourths. Add only the top numbers.

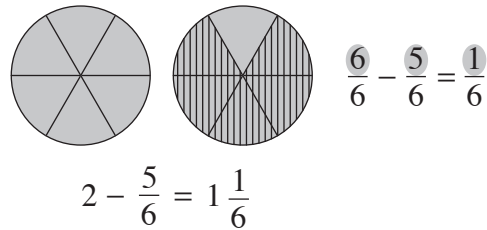


Q. $2 - \frac{5}{6} =$

A. $1\frac{1}{6}$

The two can be seen as one whole and six sixths.

Six sixths minus five sixths is one sixth.



a) $2\frac{3}{7} + 3\frac{3}{7} =$

$5\frac{6}{7}$

b) $2\frac{2}{8} + 1\frac{5}{8} =$

c) $2\frac{3}{10} + 2\frac{4}{10} =$

d) $4\frac{1}{6} + 1\frac{4}{6} =$

e) $3\frac{2}{5} + 1\frac{1}{5} =$

f) $2\frac{2}{9} + 4\frac{3}{9} =$

g) $2 - \frac{1}{3} =$

h) $4 - \frac{1}{2} =$

i) $3 - \frac{2}{7} =$

j) $2 - \frac{1}{4} =$

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

l) $9 - \frac{5}{9} =$

m) $1 - \frac{3}{5} =$

n) $5 - \frac{3}{4} =$

o) $6 - \frac{5}{6} =$

Skill 9.10 Finding a fraction of a number.

- First find one fraction of the number by dividing by the denominator.
- Then multiply the number of fractions you need by the result.

Example: Three fifths of 10?

First find one fifth of 10 by dividing 10 by 5.

$$10 \div 5 = 2$$

Then find three fifths of 10 by multiplying 3 by 2.

$$2 + 2 + 2 = 3 \times 2 = 6$$

So three fifths of 10 is 6.

Q. Eric kicked two thirds of his team's 12 goals. How many goals did he kick?

A. 8

Find one third of 12 \Rightarrow
divide 12 by 3

$$12 \div 3 = 4$$

Find two thirds of 12 \Rightarrow
multiply 2 by 4

$$2 \times 4 = 8$$

a) Three fourths of the 28 students in the class are boys. How many boys are in the class?

one fourth of 28 = $28 \div 4 = 7$

three fourths of 28 = $3 \times 7 =$

b) Two fifths of the 50 children at the day care had the flu. How many children were ill?

one fifth of 50 =

two fifths of 50 =

c) Ian scored five eighths of the 40 points on the test. How many points did he score?

one eighth of 40 =

five eighths of 40 =

d) Of the 24 students in a class, one third are chosen for the school play. How many students are chosen for the play?

one third of 24 =

e) Of the 100 cakes at a party, seven tenths were eaten in the first hour. How many cakes were eaten in the first hour?

.....
.....
.....

f) Five sixths of the 30 horses in the race jumped over the first hurdle. How many horses passed the first hurdle?

.....
.....
.....