

5. [Fraction \times, \div]

Skill 5.1 Multiplying a fraction by a whole number (1).

MM5.2 1 2 2 3 3 4 4
MM6.1 1 1 2 2 3 3 4 4

- Multiply the numerator of the fraction by the whole number.
- Do not change the denominator.
- Simplify the resulting fraction and/or change it to a mixed number if necessary.

EITHER

- Cross simplify where possible before multiplying.

OR

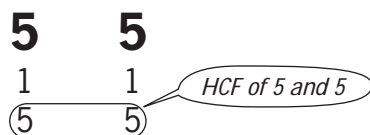
- Simplify at the end.

To find the Highest Common Factor (HCF) of two numbers

- Write all the factors of each number (the factors must divide exactly into the number).
- Find the largest number that appears on both lists.

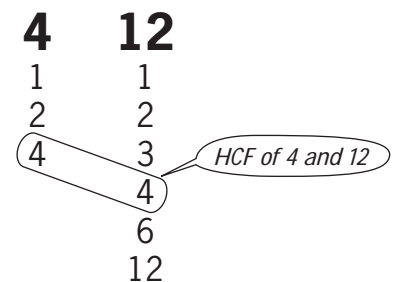
Hint: The Highest Common Factor is the largest number that divides evenly into both numbers.

HCF for Identical numbers



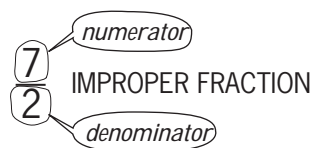
Hint: 5 is the HCF of 5 and 5 because 5 is the largest number that divides into 5 and 5.

HCF when one number divides evenly into the other number



Hint: 4 is the HCF of 4 and 12 because 4 is the largest number that divides into 4 and 12.

To change an improper fraction to a mixed number



- Divide the numerator by the denominator.

$$\frac{7}{2} = 7 \div 2 = 3 \text{ remainder } 1$$

- Write the result as the whole number and the remainder over the denominator.

$$3 \text{ remainder } 1 = 3\frac{1}{2}$$

To cross multiply a fraction and a whole number

- Simplify the denominator of the fraction and the whole number. This means to divide them by the same number, usually by their Highest Common Factor.
- Cross out the denominator of the fraction and the whole number.
- Write the result of the division next to each crossed number.
- Multiply the top numbers together.

$$\begin{aligned} \frac{3}{10} \times 5 &= \frac{3}{\cancel{10} \div 5} \times \cancel{5} \div 5 && \text{Divide 5 and 10 by 5} \\ &= \frac{3}{2} \times 1 && \begin{matrix} 5 \div 5 = 1 \\ 10 \div 5 = 2 \end{matrix} \\ &= \frac{3}{2} = 1\frac{1}{2} \end{aligned}$$

Skill 5.1 Multiplying a fraction by a whole number (2).

MM5.2 1 1 2 2 3 3 4 4
MM6.1 1 1 2 2 3 3 4 4

Q. $\frac{3}{4} \times 2 =$

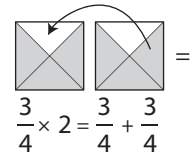
A. $\frac{3}{4} \times 2 =$
 ~~$\frac{3}{4}$~~ $\times \frac{2}{1} =$
 $\frac{3 \times 1}{2}$

Divide 4 and 2 by 2

OR

A. $\frac{3}{4} \times 2 =$
 $\frac{3 \times 2}{4}$

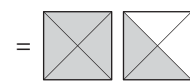
Multiply 3 by 2



$= \frac{3}{2}$

Change to mixed number

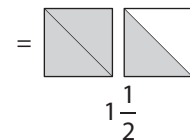
$= \frac{6}{4}$



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

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

Simplify



a) $4 \times \frac{3}{7} =$

$= \frac{4 \times 3}{7}$

$= \frac{12}{7}$

$= \boxed{1 \frac{5}{7}}$

b) $\frac{2}{9} \times 5 =$

$=$

$= \boxed{}$

c) $6 \times \frac{2}{5} =$

$=$

$= \boxed{}$

d) $\frac{7}{10} \times 3 =$

$=$

$= \boxed{}$

e) $2 \times \frac{6}{7} =$

$=$

$= \boxed{}$

f) $\frac{1}{3} \times 4 =$

$=$

$= \boxed{}$

g) $6 \times \frac{1}{12} =$

$= \frac{6}{12} \times \frac{1}{1} =$

Divide 6 and 12 by 6

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

$= \boxed{}$

h) $3 \times \frac{5}{9} =$

$=$

$= \boxed{}$

i) $2 \times \frac{1}{8} =$

$=$

$= \boxed{}$

j) $5 \times \frac{3}{10} =$

$=$

$= \boxed{}$

k) $10 \times \frac{2}{15} =$

$=$

$= \boxed{}$

l) $8 \times \frac{5}{6} =$

$=$

$= \boxed{}$

Skill 5.2 Multiplying two fractions (1).

MM5.2 1 1 2 2 3 3 4 4
MM6.1 1 1 2 2 3 3 4 4

- Multiply the numerators of the fractions.
 - Multiply the denominators of the fractions.
- To simplify:

EITHER

- Simplify where possible before multiplying.

OR

- Simplify at the end.

To cross multiply two fractions

- Simplify the numbers in the fractions diagonally (in a cross). This means to divide top and bottom numbers by the same number, usually by their Highest Common Factor. (see skill 5.1, page 49)
- Cross out the numbers in the fractions diagonally (in a cross).
- Write the result of the division next to each crossed number.
- Multiply the top results together.
- Multiply the bottom results together.

$$\frac{3}{4} \times \frac{8}{9} = \frac{\overset{\div 3}{\cancel{3}} \times \overset{\div 4}{\cancel{8}}}{\underset{\div 4}{\cancel{4}} \times \underset{\div 3}{\cancel{9}}} = \frac{1 \times 2}{1 \times 3} = \frac{2}{3}$$

Divide 3 and 9 by 3

Divide 4 and 8 by 4

“Of” means “times”

A quarter of a box of 8 pencils equals 2.



$$\frac{1}{4} \text{ of } 8 = \frac{1}{4} \times \frac{8}{1} = 2$$

4 ÷ 4 = 1
8 ÷ 4 = 2

Divide 4 and 8 by 4

Q. $\frac{2}{3} \times \frac{3}{4} =$

A. $\frac{2}{3} \times \frac{3}{4} =$

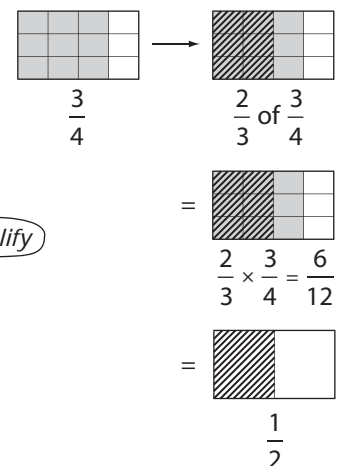
$$= \frac{\overset{\div 3}{\cancel{2}} \times \overset{\div 3}{\cancel{3}}}{\underset{\div 2}{\cancel{3}} \times \underset{\div 2}{\cancel{4}}} = \frac{1 \times 1}{1 \times 2} = \frac{1}{2}$$

Divide 3 and 3 by 3

Divide 2 and 4 by 2

OR A. $\frac{2}{3} \times \frac{3}{4} =$

$$= \frac{2 \times 3}{3 \times 4} = \frac{6}{12} \xrightarrow{\text{Simplify}} \frac{1}{2}$$



a) $\frac{3}{4} \times \frac{1}{5} =$

$$= \frac{3 \times 1}{4 \times 5} = \boxed{\frac{3}{20}}$$

b) $\frac{2}{3} \times \frac{1}{7} =$

$$= \boxed{\frac{2}{21}}$$

c) $\frac{1}{6} \times \frac{5}{8} =$

$$= \boxed{\frac{5}{48}}$$

Skill 5.2 Multiplying two fractions (2).

MM5.2 1 1 2 2 3 4
MM6.1 1 1 2 2 3 3 4 4

d) $\frac{5}{8} \times \frac{3}{10} =$

$= \frac{\overset{1}{\cancel{5}}}{8} \times \frac{3}{\underset{2}{\cancel{10}}}$ *Divide 5 and 10 by 5*

$= \frac{1 \times 3}{8 \times 2} = \boxed{}$

e) $\frac{3}{4} \times \frac{2}{5} =$

$=$
 $=$
 $= \boxed{}$

f) $\frac{2}{3} \times \frac{6}{11} =$

$=$
 $=$
 $= \boxed{}$

g) $\frac{2}{3} \times \frac{3}{8} =$

$= \frac{\overset{1}{\cancel{2}}}{\cancel{3}} \times \frac{\overset{1}{\cancel{3}}}{8}$ *Divide 3 and 3 by 3*

$= \frac{1 \times 1}{1 \times 4} = \boxed{}$ *Divide 2 and 8 by 2*

h) $\frac{7}{10} \times \frac{2}{7} =$

$=$
 $=$
 $= \boxed{}$

i) $\frac{4}{9} \times \frac{9}{20} =$

$=$
 $=$
 $= \boxed{}$

j) $\frac{5}{16} \times \frac{4}{5} =$

$=$
 $=$
 $= \boxed{}$

k) $\frac{2}{11} \times \frac{11}{12} =$

$=$
 $=$
 $= \boxed{}$

l) $\frac{3}{20} \times \frac{5}{6} =$

$=$
 $=$
 $= \boxed{}$

m) $\frac{6}{10} \times \frac{5}{24} =$

$=$
 $=$
 $= \boxed{}$

n) $\frac{5}{7} \times \frac{14}{25} =$

$=$
 $=$
 $= \boxed{}$

o) $\frac{11}{12} \times \frac{6}{22} =$

$=$
 $=$
 $= \boxed{}$

p) $\frac{2}{15} \times \frac{5}{6} =$

$=$
 $=$
 $= \boxed{}$

q) $\frac{7}{27} \times \frac{18}{35} =$

$=$
 $=$
 $= \boxed{}$

r) $\frac{6}{40} \times \frac{8}{15} =$

$=$
 $=$
 $= \boxed{}$

s) $\frac{4}{9} \times \frac{3}{10} =$

$=$
 $=$
 $= \boxed{}$

t) $\frac{7}{8} \times \frac{6}{21} =$

$=$
 $=$
 $= \boxed{}$

u) $\frac{8}{15} \times \frac{3}{10} =$

$=$
 $=$
 $= \boxed{}$

Skill 5.3 Multiplying a mixed number by a fraction or by another mixed number.

- Change the mixed numbers to improper fractions before multiplying. (see skill 5.1, page 49)
 - Multiply the numerators of the fractions.
 - Multiply the denominators of the fractions.
- To simplify:

EITHER

- Cross simplify where possible before multiplying. (see skill 5.2, page 51)

OR

- Simplify at the end.

Q. $2\frac{3}{5} \times 1\frac{1}{4} =$

A. $2\frac{3}{5} \times 1\frac{1}{4} =$

Change to improper fractions

$= \frac{13}{5} \times \frac{5}{4}$

Divide 5 and 5 by 5

$= \frac{13 \times 1}{1 \times 4}$

$= \frac{13}{4}$

Change to mixed number

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

OR

A. $2\frac{3}{5} \times 1\frac{1}{4} =$

$= \frac{13}{5} \times \frac{5}{4}$

$= \frac{13 \times 5}{5 \times 4}$

$= \frac{65 \div 5}{20 \div 5}$ *Simplify*

$= \frac{13}{4} = 3\frac{1}{4}$

a) $1\frac{1}{2} \times \frac{5}{6} =$

$= \frac{1 \cancel{3}}{2} \times \frac{5}{\cancel{6}_2}$ *Divide 3 and 6 by 2*

$= \frac{1 \times 5}{2 \times 2}$

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

b) $1\frac{1}{11} \times 3\frac{2}{3} =$

$=$

$=$

$=$

$=$

$= \boxed{}$

c) $3\frac{3}{4} \times 1\frac{1}{5} =$

$=$

$=$

$=$

$=$

$= \boxed{}$

d) $4\frac{1}{2} \times \frac{4}{15} =$

$=$

$=$

$=$

$= \boxed{}$

e) $1\frac{1}{5} \times 1\frac{7}{8} =$

$=$

$=$

$=$

$=$

$= \boxed{}$

f) $1\frac{4}{5} \times \frac{5}{12} =$

$=$

$=$

$=$

$=$

$= \boxed{}$

g) $3\frac{1}{6} \times \frac{3}{4} =$

$=$

$=$

$=$

$= \boxed{}$

h) $2\frac{7}{10} \times 1\frac{2}{3} =$

$=$

$=$

$=$

$=$

$= \boxed{}$

i) $\frac{5}{6} \times 1\frac{5}{7} =$

$=$

$=$

$=$

$=$

$= \boxed{}$

Skill 5.4 Multiplying three fractions.

MM5.2 11 22 33 44
MM6.1 11 22 33 44

- Multiply the numerators of the fractions.
 - Multiply the denominators of the fractions.
- To simplify:

EITHER

- Cross simplify where possible before multiplying.
(see skill 5.2, page 51)

OR

- Simplify at the end.

Q. $\frac{1}{8} \times \frac{6}{7} \times \frac{7}{9} =$

A. $\frac{1}{8} \times \frac{2}{7} \times \frac{1}{3} =$

$= \frac{1}{8} \times \frac{2}{1} \times \frac{1}{3}$

$= \frac{1 \times 1 \times 1}{4 \times 1 \times 3}$

$= \frac{1}{12}$

OR A. $\frac{1}{8} \times \frac{6}{7} \times \frac{7}{9} =$

$= \frac{1 \times 6 \times 7}{8 \times 7 \times 9}$

$= \frac{42 \div 6}{504 \div 6}$

$= \frac{7 \div 7}{84 \div 7}$

$= \frac{1}{12}$

a) $\frac{1}{2} \times \frac{1}{4} \times \frac{4}{5} =$

$= \frac{1 \times 1 \times 1}{2 \times 1 \times 5}$

$= \frac{1}{10}$

b) $\frac{2}{5} \times \frac{2}{3} \times \frac{1}{2} =$

$=$

$=$

$=$

c) $\frac{2}{3} \times \frac{1}{8} \times \frac{3}{4} =$

$=$

$=$

$=$

d) $\frac{5}{6} \times \frac{3}{4} \times \frac{2}{5} =$

$=$

$=$

$=$

e) $\frac{3}{4} \times \frac{3}{10} \times \frac{5}{6} =$

$=$

$=$

$=$

f) $\frac{7}{10} \times \frac{2}{3} \times \frac{6}{7} =$

$=$

$=$

$=$

g) $\frac{7}{9} \times \frac{2}{14} \times \frac{3}{4} =$

$=$

$=$

$=$

h) $\frac{2}{3} \times \frac{9}{10} \times \frac{4}{9} =$

$=$

$=$

$=$

i) $\frac{3}{10} \times \frac{5}{12} \times \frac{6}{15} =$

$=$

$=$

$=$

j) $\frac{4}{5} \times \frac{10}{11} \times \frac{3}{8} =$

$=$

$=$

$=$

k) $\frac{5}{6} \times \frac{4}{15} \times \frac{9}{16} =$

$=$

$=$

$=$

l) $\frac{5}{11} \times \frac{11}{18} \times \frac{6}{25} =$

$=$

$=$

$=$

Skill 5.5 Dividing two fractions.

- Copy the first fraction and change “divide by” (\div) into “times” (\times).
- Invert the second fraction.
- Multiply the numerators of the fractions.
- Multiply the denominators of the fractions.

To simplify:

EITHER

- Cross simplify where possible before multiplying.
(see skill 5.2, page 51)

OR

- Simplify at the end.

Q. $\frac{1}{6} \div \frac{3}{8} =$

A. $\frac{1}{6} \div \frac{3}{8} =$ *Invert second fraction*

$$= \frac{1}{6} \times \frac{8}{3}$$

$$= \frac{1}{\cancel{6}^4} \times \frac{\cancel{8}_2}{3}$$

Divide 6 and 8 by 2

$$= \frac{1 \times 4}{3 \times 3}$$

$$= \frac{4}{9}$$

OR A. $\frac{1}{6} \div \frac{3}{8} =$

$$= \frac{1}{6} \times \frac{8}{3}$$

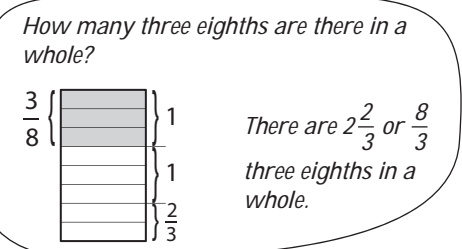

$$= \frac{1 \times 8}{6 \times 3}$$

$$= \frac{8 \div 2}{18 \div 2}$$

Simplify

$$= \frac{4}{9}$$

How many three eighths are there in a whole?

$$\frac{1}{6} \text{ of } \frac{8}{3} = \frac{1}{6} \times \frac{8}{3} = \frac{8}{18}$$

a) $\frac{1}{8} \div \frac{3}{5} =$

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

$$= \frac{1 \times 5}{8 \times 3} = \boxed{\frac{5}{24}}$$

b) $\frac{1}{3} \div \frac{3}{4} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

c) $\frac{2}{7} \div \frac{5}{8} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

d) $\frac{3}{10} \div \frac{3}{4} =$

$$= \frac{3}{10} \times \frac{4}{3}$$

Divide 3 and 3 by 3

$$= \frac{\cancel{3}^1}{5 \cancel{10}_2} \times \frac{\cancel{4}_2}{\cancel{3}_1}$$

Divide 10 and 4 by 2

$$= \frac{1 \times 2}{5 \times 1} = \boxed{\phantom{\frac{5}{24}}}$$

e) $\frac{5}{8} \div \frac{1}{2} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

f) $\frac{2}{3} \div \frac{1}{6} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

g) $\frac{5}{8} \div \frac{5}{12} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

h) $\frac{9}{10} \div \frac{3}{8} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

i) $\frac{5}{9} \div \frac{15}{18} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{24}}}$$

Skill 5.6 Dividing a whole number by a fraction.

MM5.2 11 22 3 4 4
MM6.1 11 22 3 3 4 4

- Copy the whole number and change “divide by” (\div) into “times” (\times).
 - Invert the fraction.
 - Multiply the whole number by the numerator of the fraction. Don't change the denominator.
- To simplify:

EITHER

- Cross simplify where possible before multiplying.
(see skill 5.2, page 51)

OR

- Simplify at the end.

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

A. $2 \div \frac{1}{4} =$ *Invert fraction*

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

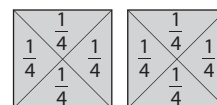
$$= \frac{2 \times 4}{1}$$

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

$$= 8$$

How many quarters are there in two wholes?

There are 8 quarters in two wholes.



$$2 \div \frac{1}{4} = 2 \times 4 = 8$$

a) $5 \div \frac{5}{6} =$ *Invert fraction*

$$= 5 \times \frac{6}{5}$$

$$= \frac{1}{\cancel{5}} \times \frac{6}{\cancel{5}_1}$$
 Divide 5 and 5 by 5

$$= \frac{1 \times 6}{1} = \boxed{6}$$

b) $2 \div \frac{2}{7} =$

$$=$$

$$=$$

$$=$$

$$= \boxed{}$$

c) $7 \div \frac{7}{9} =$

$$=$$

$$=$$

$$=$$

$$= \boxed{}$$

d) $4 \div \frac{2}{5} =$

$$=$$

$$=$$

$$= \boxed{}$$

e) $9 \div \frac{3}{8} =$

$$=$$

$$=$$

$$= \boxed{}$$

f) $8 \div \frac{1}{2} =$

$$=$$

$$=$$

$$= \boxed{}$$

g) $12 \div \frac{8}{11} =$

$$=$$

$$=$$

$$= \boxed{}$$

h) $8 \div \frac{6}{7} =$

$$=$$

$$=$$

$$= \boxed{}$$

i) $10 \div \frac{4}{9} =$

$$=$$

$$=$$

$$= \boxed{}$$

Skill 5.7 Dividing a fraction by a whole number.

MM5.2 1 1 2 2 3 3 4 4
MM6.1 1 1 2 2 3 3 4 4

- Copy the fraction and write the whole number as an improper fraction with denominator 1.
 - Change “divide by” (\div) into “times” (\times).
 - Invert the second fraction.
 - Multiply the numerators of the fractions.
 - Multiply the denominators of the fractions.
- To simplify:

EITHER

- Cross simplify where possible before dividing.
(see skill 5.2, page 51)

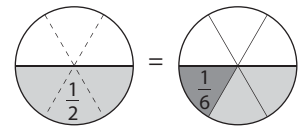
OR

- Simplify at the end.

Q. $\frac{1}{2} \div 3 =$

A. $\frac{1}{2} \div 3 =$
 $= \frac{1}{2} \div \frac{3}{1} =$ *Invert second fraction*
 $= \frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$

What is one half divided into 3 equal parts?



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

a) $\frac{4}{5} \div 8 =$
 $= \frac{4}{5} \div \frac{8}{1}$
 $= \frac{4}{5} \times \frac{1}{8}$ *Divide 4 and 8 by 4*
 $= \frac{1}{5} \times \frac{1}{2} = \frac{1}{10}$

b) $\frac{3}{5} \div 9 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

c) $\frac{6}{7} \div 3 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

d) $\frac{6}{7} \div 12 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

e) $\frac{3}{8} \div 15 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

f) $\frac{8}{9} \div 16 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

g) $\frac{4}{11} \div 20 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

h) $\frac{5}{12} \div 25 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

i) $\frac{6}{13} \div 15 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

Skill 5.8 Dividing a mixed number by a fraction or by another mixed number. MM5.2 1 1 2 2 3 3 4 4
MM6.1 1 1 2 2 3 3 4

- Change the mixed numbers to improper fractions before dividing. (see skill 5.1, page 49)
- Copy the first fraction and change “divide by” (\div) into “times” (\times).
- Invert the second fraction.
- Multiply the numerators of the fractions.
- Multiply the denominators of the fractions.

To simplify:

EITHER

- Cross simplify where possible before multiplying. (see skill 5.2, page 51)

OR

- Simplify at the end.

Q. $2\frac{2}{3} \div 1\frac{1}{3} =$

A. $\frac{8}{3} \div \frac{4}{3} =$ *Invert second fraction*
 $= \frac{8}{3} \times \frac{3}{4}$
Divide 8 and 4 by 4
 $= \frac{2}{3} \times \frac{3}{1} = \frac{2}{1} = 2$
Divide 3 and 3 by 3

OR A. $\frac{8}{3} \div \frac{4}{3} =$ *Invert second fraction*
 $= \frac{8}{3} \times \frac{3}{4}$
 $= \frac{8 \times 3}{3 \times 4}$
Simplify
 $= \frac{24 \div 12}{12 \div 12} = \frac{2}{1} = 2$

a) $2\frac{1}{4} \div \frac{3}{4} =$ *Change to improper fraction*
 $= \frac{9}{4} \div \frac{3}{4}$
 $= \frac{9}{4} \times \frac{4}{3}$
 $= \frac{9}{1} \times \frac{1}{3} = \boxed{3}$

b) $1\frac{3}{5} \div \frac{4}{5} =$
 $=$
 $=$
 $=$
 $= \boxed{}$

c) $5\frac{1}{3} \div 4 =$
 $=$
 $=$
 $=$
 $= \boxed{}$

d) $2\frac{3}{4} \div 6\frac{3}{5} =$
 $=$
 $=$
 $=$
 $= \boxed{}$

e) $2\frac{2}{9} \div 1\frac{3}{7} =$
 $=$
 $=$
 $=$
 $= \boxed{}$

f) $3\frac{1}{3} \div 3\frac{3}{4} =$
 $=$
 $=$
 $=$
 $= \boxed{}$

g) $2\frac{2}{5} \div \frac{6}{25} =$
 $=$
 $=$
 $=$
 $= \boxed{}$

h) $2\frac{1}{3} \div 1\frac{5}{9} =$
 $=$
 $=$
 $=$
 $= \boxed{}$

i) $1\frac{5}{6} \div 1\frac{5}{12} =$
 $=$
 $=$
 $=$
 $= \boxed{}$