# 10. [Fraction ×,÷]

MM4.2 **1** 1 2 2 3 3 4 4
MM5.1 **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.

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**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).
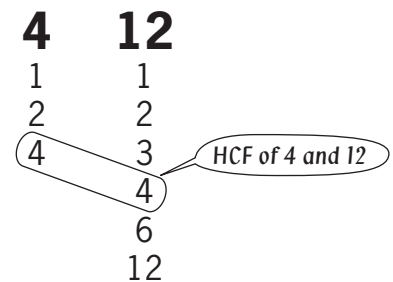- Find the largest number that appears on both lists.
  Hint:   The Highest Common Factor is the largest number that divides evenly into both numbers.

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**HCF for Identical numbers**

$$5 \qquad 5$$
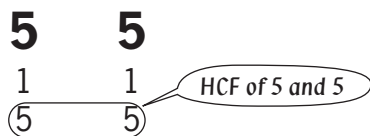
1        1     HCF of 5 and 5
⑤        ⑤

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**

$$4 \qquad 12$$

1        1
2        2
④        3     HCF of 4 and 12
         ④
         6
         12

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**

$\dfrac{7}{2}$   
numerator
IMPROPER FRACTION
denominator

- 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.

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

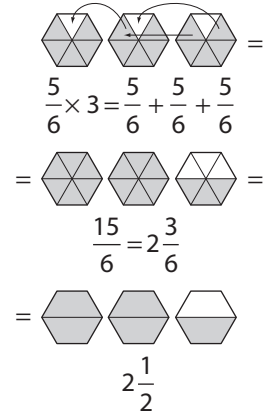**To cross multiply a fraction and a whole number**

- 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.

$$\frac{3}{10} \times 5 = \frac{3}{10 \times 5} \begin{smallmatrix}\div 5\\ \div 5\end{smallmatrix}$$   Divide 5 and 10 by 5

$$= \frac{3}{10 \times 5}\begin{smallmatrix}1\\2\end{smallmatrix}$$   5 ÷ 5 = 1
10 ÷ 5 = 2   $$= \frac{3}{2} = 1\frac{1}{2}$$

**Q.** $\dfrac{5}{6} \times 3 =$    **A.** $\dfrac{5}{\cancel{6}}\times \cancel{3}^{1} =$    *OR*  **A.** $\dfrac{5}{6} \times 3 =$    Multiply 5 by 3

$= \dfrac{5 \times 1}{2}$    Divide 6 and 3 by 3    $= \dfrac{5 \times 3}{6}$

$\dfrac{5}{6}\times 3 = \dfrac{5}{6}+\dfrac{5}{6}+\dfrac{5}{6}$

$= \dfrac{5}{2}$    Change to mixed number    $= \dfrac{15}{6}$

$\dfrac{15}{6} = 2\dfrac{3}{6}$

$= 2\dfrac{1}{2}$    $= 2\dfrac{3 \div 3}{6 \div 3}$    Simplify

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

$2\dfrac{1}{2}$

---

**a)** $9 \times \dfrac{2}{5} =$

$= \dfrac{9 \times 2}{5} = \dfrac{18}{5}$    Change to mixed number

$= 18 \div 5$    $= \boxed{3\dfrac{3}{5}}$

**b)** $\dfrac{5}{6} \times 5 =$

$=$

$=$  ☐

**c)** $3 \times \dfrac{5}{8}$

$=$

$=$  ☐

**d)** $\dfrac{4}{5} \times 3 =$

$=$

$=$  ☐

**e)** $2 \times \dfrac{4}{7} =$

$=$

$=$  ☐

**f)** $2 \times \dfrac{2}{9} =$

$=$

$=$  ☐

**g)** $8 \times \dfrac{3}{4} =$

$= \cancel{8}^{2}\times \dfrac{3}{\cancel{4}_{1}}$    Divide 8 and 4 by 4

$= \dfrac{2 \times 3}{1}$    $= \boxed{6}$

**h)** $\dfrac{5}{8} \times 2 =$

$=$

$=$  ☐

**i)** $2 \times \dfrac{5}{12} =$

$=$

$=$  ☐

**j)** $6 \times \dfrac{5}{12} =$

$=$

$=$  ☐

**k)** $\dfrac{3}{7} \times 14 =$

$=$

$=$  ☐

**l)** $\dfrac{3}{4} \times 20 =$

$=$

$=$  ☐

**m)** $2 \times \dfrac{5}{6} =$

$=$

$=$  ☐

**n)** $\dfrac{1}{4} \times 16 =$

$=$

$=$  ☐

**o)** $12 \times \dfrac{3}{4} =$

$=$

$=$  ☐

## Skill 10.2  Finding a fraction of a quantity.

- Replace the word "of" with the multiplication symbol.
- Multiply the fraction by the whole number.  (see skill 10.1, page 55)
- Write the unit of measurement in the result.

   *Hint:  To find a fraction of a whole number divide that number by the denominator of the fraction, and then multiply the result by the numerator.*

**Q.**  $\dfrac{5}{9}$ of $180 =$

**A.**  $\dfrac{5}{9}$ *of $180 =$*

$$= \dfrac{5}{\cancel{9}_1} \times \cancel{180}^{20}$$

*Divide 9 and 180 by 9*

$$= \dfrac{5 \times 20}{1}$$

$$= \$100 \quad \text{Add the \$ sign}$$

**OR  A.**  *To find $\dfrac{5}{9}$ of $180$:*

$180 \div 9 = 20$

$20 \times 5 = \boldsymbol{\$100}$

---

**a)**  $\dfrac{3}{7}$ of 35 mL $=$

$$= \dfrac{3}{\cancel{7}_1} \times \cancel{35}^{5} \quad \text{Divide 7 and 35 by 7}$$

$$= \dfrac{3 \times 5}{1} \qquad = \boxed{15 \text{ mL}}$$

**b)**  $\dfrac{1}{2}$ of 360 kg $=$

$$= \dfrac{1}{2} \times 360$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**c)**  $\dfrac{1}{4}$ of $72 =$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**d)**  $\dfrac{3}{10}$ of 150 L $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**e)**  $\dfrac{1}{5}$ of 1000 m $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**f)**  $\dfrac{1}{9}$ of $45 =$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**g)**  $\dfrac{2}{3}$ of 600 L $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**h)**  $\dfrac{1}{6}$ of 120 cm $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**i)**  $\dfrac{3}{4}$ of 60 m $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**j)**  $\dfrac{1}{9}$ of 720 g $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**k)**  $\dfrac{4}{5}$ of 40 mL $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

**l)**  $\dfrac{3}{8}$ of 80 kg $=$

$$=$$

$$= \qquad = \boxed{\phantom{xxxx}}$$

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## Skill 10.3  Dividing a whole number by a fraction (1).

- Copy the whole number and change "divide by" (÷) into "times" (×).
- Invert the fraction.
- Multiply the whole number by the numerator of the fraction.  Do not change the denominator.
  To simplify:

EITHER
- Cross simplify where possible before multiplying.
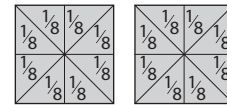  (see skill 10.1, page 55)

OR
- Simplify at the end.

---

**Q.**  $2 \div \dfrac{1}{8} =$

*Change the sign to "×"*

**A.**  $2 \div \dfrac{1}{8} =$  *Invert fraction*

$= 2 \times \dfrac{8}{1}$

$= \dfrac{2 \times 8}{1}$

$= 16$

How many eighths are there in two wholes?

There are 16 eighths in two wholes.

$2 \div \dfrac{1}{8} = 2 \times 8 = 16$

---

**a)**  $3 \div \dfrac{3}{5} =$  *Invert fraction*

$= 3 \times \dfrac{5}{3}$

$= \overset{1}{\cancel{3}} \times \dfrac{5}{\underset{1}{\cancel{3}}}$  *Divide 3 and 3 by 3*

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

$= \boxed{5}$

**b)**  $5 \div \dfrac{5}{8} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**c)**  $4 \div \dfrac{4}{7} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**d)**  $6 \div \dfrac{6}{10} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**e)**  $7 \div \dfrac{7}{9} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**f)**  $5 \div \dfrac{5}{11} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**g)**  $3 \div \dfrac{1}{6} =$  *Invert fraction*

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

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

$= \boxed{\phantom{0}}$

**h)**  $4 \div \dfrac{1}{5} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**i)**  $4 \div \dfrac{1}{7} =$

$=$

$=$

$= \boxed{\phantom{0}}$

**j)**  $2 \div \dfrac{3}{8} =$  *Invert fraction*

$= 2 \times \dfrac{8}{3}$

$= \dfrac{2 \times 8}{3} = \dfrac{16}{3}$   $= \boxed{5\dfrac{1}{3}}$

**k)**  $4 \div \dfrac{3}{5} =$

$=$

$=$    $=$ ☐

**l)**  $2 \div \dfrac{5}{6} =$

$=$

$=$    $=$ ☐

**m)**  $3 \div \dfrac{7}{8} =$

$=$

$=$    $=$ ☐

**n)**  $5 \div \dfrac{6}{7} =$

$=$

$=$    $=$ ☐

**o)**  $6 \div \dfrac{7}{8} =$

$=$

$=$    $=$ ☐

**p)**  $6 \div \dfrac{2}{9} =$  *Invert fraction*

$= 6 \times \dfrac{9}{2}$

$= \overset{3}{\cancel{6}} \times \dfrac{9}{\underset{1}{\cancel{2}}}$  *Divide 6 and 2 by 2*

$= \dfrac{3 \times 9}{1}$   $=$ ☐

**q)**  $4 \div \dfrac{4}{9} =$

$=$    $=$ ☐

**r)**  $5 \div \dfrac{5}{12} =$

$=$    $=$ ☐

**s)**  $4 \div \dfrac{3}{6} =$

$=$    $=$ ☐

**t)**  $4 \div \dfrac{2}{5} =$

$=$

$=$    $=$ ☐

**u)**  $10 \div \dfrac{2}{3} =$

$=$

$=$    $=$ ☐

**v)**  $8 \div \dfrac{2}{7} =$

$=$ ☐

**w)**  $9 \div \dfrac{3}{7} =$

$=$ ☐

**x)**  $8 \div \dfrac{4}{11} =$

$=$ ☐

- 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 10.1, page 55)
- 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.

*Divide 3 and 9 by 3*    *Divide 4 and 8 by 4*

$$\frac{3}{4} \times \frac{8}{9} = \frac{3}{4} \times \frac{8}{9} = \frac{3}{4} \times \frac{8}{9} = \frac{1 \times 2}{1 \times 3} = \frac{2}{3}$$

---

**Q.** $\frac{3}{4} \times \frac{2}{9} =$

**A.** $\frac{3}{4} \times \frac{2}{9} =$

$$= \frac{3}{4} \times \frac{2}{9} = $$   *Divide 3 and 9 by 3*   *Divide 2 and 4 by 2*

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

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

*OR*

**A.** $\frac{3}{4} \times \frac{2}{9} =$

$$= \frac{3 \times 2}{4 \times 9}$$

$$= \frac{6 \div 6}{36 \div 6}$$   *Simplify*

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

---

**a)** $\frac{1}{4} \times \frac{1}{7} =$

$$= \frac{1 \times 1}{4 \times 7}$$   $= \boxed{\dfrac{1}{28}}$

**b)** $\frac{3}{5} \times \frac{3}{4} =$

$=$   $= \square$

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

$=$   $= \square$

**d)** $\frac{7}{10} \times \frac{1}{2} =$

$=$   $= \square$

**e)** $\frac{2}{9} \times \frac{4}{5} =$

$=$   $= \square$

**f)** $\frac{3}{5} \times \frac{4}{7} =$

$=$   $= \square$

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

$=$   $= \square$

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

$=$   $= \square$

**i)** $\frac{1}{4} \times \frac{3}{11} =$

$=$   $= \square$

**j)** $\dfrac{2}{3} \times \dfrac{1}{2} =$

$= \dfrac{{}^1 \cancel{2}}{3} \times \dfrac{1}{\cancel{2}_1}$  — Simplify

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

**k)** $\dfrac{5}{6} \times \dfrac{6}{7} =$

$=$ .............

$=$ ............. $= \square$

**l)** $\dfrac{3}{5} \times \dfrac{2}{3} =$

$=$ .............

$=$ ............. $= \square$

**m)** $\dfrac{7}{9} \times \dfrac{2}{7} =$

$=$ .............

$=$ ............. $= \square$

**n)** $\dfrac{1}{2} \times \dfrac{4}{9} =$

$=$ .............

$=$ ............. $= \square$

**o)** $\dfrac{3}{5} \times \dfrac{1}{6} =$

$=$ .............

$=$ ............. $= \square$

**p)** $\dfrac{3}{4} \times \dfrac{8}{11} =$

$=$ .............

$=$ ............. $= \square$

**q)** $\dfrac{2}{5} \times \dfrac{3}{4} =$

$=$ .............

$=$ ............. $= \square$

**r)** $\dfrac{4}{5} \times \dfrac{1}{2} =$

$=$ .............

$=$ ............. $= \square$

**s)** $\dfrac{7}{9} \times \dfrac{1}{14} =$

$=$ .............

$=$ ............. $= \square$

**t)** $\dfrac{5}{7} \times \dfrac{3}{10} =$

$=$ .............

$=$ ............. $= \square$

**u)** $\dfrac{5}{12} \times \dfrac{6}{7} =$

$=$ .............

$=$ ............. $= \square$

**v)** $\dfrac{3}{12} \times \dfrac{4}{6} =$

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

$=$ ............. $= \square$

**w)** $\dfrac{2}{5} \times \dfrac{10}{14} =$

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

$=$ ............. $= \square$

**x)** $\dfrac{3}{10} \times \dfrac{2}{9} =$

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

$=$ ............. $= \square$

**y)** $\dfrac{3}{10} \times \dfrac{5}{9} =$

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

$=$ ............. $= \square$

**z)** $\dfrac{3}{4} \times \dfrac{8}{15} =$

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

$=$ ............. $= \square$

**A)** $\dfrac{4}{9} \times \dfrac{3}{16} =$

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

$=$ ............. $= \square$

## Skill 10.5   Dividing a fraction by a whole number (1).

- Copy the fraction and write the whole number as an improper fraction with denominator 1.
- Change "divide by" (÷) into "times" (×).
- Invert the second fraction.
- Multiply the fractions.   (see skill 10.4, page 60)
  To simplify:
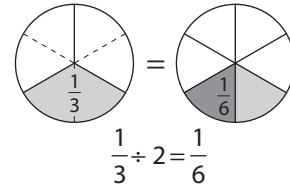
EITHER
- Cross simplify where possible before dividing.

OR
- Simplify at the end.

---

**Q.** $\dfrac{1}{3} \div 2 =$

**A.** $\dfrac{1}{3} \div 2 =$

*Invert second fraction*

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

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

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

$= \dfrac{1}{6}$

What is one third divided into 2 equal parts?



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

This can also be thought of as one half of a third.

$\dfrac{1}{2}$ of $\dfrac{1}{3} = \dfrac{1}{2} \times \dfrac{1}{3} = \dfrac{1}{6}$

---

**a)** $\dfrac{4}{9} \div 4 =$

$= \dfrac{4}{9} \div \dfrac{4}{1}$

$= \dfrac{4}{9} \times \dfrac{1}{4}$

$= \dfrac{1\,\cancel{4}}{9} \times \dfrac{1}{\cancel{4}\,_1}$   *Divide 4 and 4 by 4*

$= \dfrac{1 \times 1}{9 \times 1}$   $=$ ☐

**b)** $\dfrac{2}{5} \div 2 =$

$=$

$=$

$=$

$=$ ☐

**c)** $\dfrac{3}{7} \div 3 =$

$=$

$=$

$=$

$=$ ☐

**d)** $\dfrac{1}{3} \div 4 =$

$=$

$=$   $=$ ☐

**e)** $\dfrac{1}{5} \div 6 =$

$=$

$=$   $=$ ☐

**f)** $\dfrac{1}{7} \div 3 =$

$=$

$=$   $=$ ☐

---

**g)** $\dfrac{2}{5} \div 8 =$

$= \dfrac{2}{5} \div \dfrac{8}{1}$

$= \dfrac{2}{5} \times \dfrac{1}{8}$

$= \dfrac{{}^1 2}{5} \times \dfrac{1}{8_4}$ $= \boxed{\dfrac{1}{20}}$

**h)** $\dfrac{3}{7} \div 12 =$

$=$

$=$

$= \square$

**i)** $\dfrac{6}{11} \div 3 =$

$=$

$=$

$= \square$

**j)** $\dfrac{5}{8} \div 15 =$

$=$

$=$

$= \square$

**k)** $\dfrac{2}{7} \div 10 =$

$=$

$=$

$= \square$

**l)** $\dfrac{2}{9} \div 16 =$

$=$

$=$

$= \square$

**m)** $\dfrac{2}{3} \div 9 =$

$=$

$=$

$= \square$

**n)** $\dfrac{5}{6} \div 4 =$

$=$

$=$

$= \square$

**o)** $\dfrac{2}{11} \div 3 =$

$=$

$=$

$= \square$

**p)** $\dfrac{3}{4} \div 4 =$

$= \square$

**q)** $\dfrac{3}{5} \div 2 =$

$= \square$

**r)** $\dfrac{7}{10} \div 6 =$

$= \square$

- Copy the first fraction and change "divide by" (÷) into "times" (×).
- Invert the second fraction.
- Multiply the fractions.   (see skill 10.4, page 60)
  To simplify:
EITHER
- Cross simplify where possible before multiplying.
  (see skill 10.4, page 60)

OR
- Simplify at the end.

---

**Q.** $\dfrac{2}{9} \div \dfrac{1}{3} =$

**A.** $\dfrac{2}{9} \div \dfrac{1}{3} =$ — *Invert second fraction*

$= \dfrac{2}{9} \times \dfrac{3}{1}$

$= \dfrac{2}{9} \times \dfrac{3}{1}$ — *Divide 9 and 3 by 3*

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

$= \dfrac{2}{3}$

*OR* **A.** $\dfrac{2}{9} \div \dfrac{1}{3} =$

$= \dfrac{2}{9} \times \dfrac{3}{1}$

$= \dfrac{2 \times 3}{9 \times 1}$

$= \dfrac{6^{\div 3}}{9_{\div 3}}$ — *Simplify*

$= \dfrac{2}{3}$

---

**a)** $\dfrac{3}{4} \div \dfrac{2}{5} =$

$= \dfrac{3}{4} \times \dfrac{5}{2}$

$= \dfrac{3 \times 5}{4 \times 2} = \dfrac{15}{8}$     $= \boxed{1\dfrac{7}{8}}$

**b)** $\dfrac{2}{9} \div \dfrac{3}{7} =$

$=$

$=$   $\Box$

**c)** $\dfrac{2}{7} \div \dfrac{3}{5} =$

$=$

$=$   $\Box$

**d)** $\dfrac{2}{3} \div \dfrac{3}{8} =$

$=$

$=$   $\Box$

**e)** $\dfrac{4}{9} \div \dfrac{7}{11} =$

$=$

$=$   $\Box$

**f)** $\dfrac{5}{12} \div \dfrac{2}{7} =$

$=$

$=$   $\Box$

**g)** $\dfrac{2}{3} \div \dfrac{3}{4} =$

$=$

$=$   $\Box$

**h)** $\dfrac{3}{7} \div \dfrac{5}{8} =$

$=$

$=$   $\Box$

**i)** $\dfrac{3}{10} \div \dfrac{2}{9} =$

$=$

$=$   $\Box$

**j)** $\dfrac{7}{10} \div \dfrac{1}{5} =$

$= \dfrac{7}{10} \times \dfrac{5}{1}$

$= \dfrac{7}{{}_2 \cancel{10}} \times \dfrac{\cancel{5}^{\,1}}{1}$    *Divide 10 and 5 by 5*

$= \dfrac{7 \times 1}{2 \times 1} = \dfrac{7}{2}$    $=$ ☐

**k)** $\dfrac{7}{9} \div \dfrac{2}{3} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**l)** $\dfrac{2}{3} \div \dfrac{1}{6} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**m)** $\dfrac{1}{4} \div \dfrac{1}{2} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**n)** $\dfrac{1}{12} \div \dfrac{2}{3} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**o)** $\dfrac{9}{10} \div \dfrac{2}{5} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**p)** $\dfrac{5}{6} \div \dfrac{1}{3} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**q)** $\dfrac{5}{8} \div \dfrac{1}{2} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**r)** $\dfrac{3}{4} \div \dfrac{5}{16} =$

$=$ .........................

$=$ .........................

$=$    $=$ ☐

**s)** $\dfrac{4}{5} \div \dfrac{3}{10} =$

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

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

$=$ ☐

**t)** $\dfrac{5}{12} \div \dfrac{1}{6} =$

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

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

$=$ ☐

**u)** $\dfrac{7}{10} \div \dfrac{3}{20} =$

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

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

$=$ ☐