Do now on writing expressions

WALT *Dividing algebraic terms*
Success Criteria
When dividing algebraic terms containing pronumerals and numbers, follow these steps. Step 1: Write the division as a fraction.
Step 2: Cancel the numbers, if possible.
Step 3: Cancel the pronumerals, if possible.
Step 4: Write your answer as a fraction. (Remember: Cancel means divide the numerator and denominator by the same number or pronumeral.)
Step 4: Write your answer as a fraction.

1 Complete the following to simplify.

a $10y \div 15 = \frac{10y}{\square} = \frac{2y}{\square}$

b $8m \div 12m = \frac{\square}{12m} = \frac{\square}{3}$

c $6x \div 8xy = \frac{\square}{8xy} = \frac{\square}{4y}$

2 Simplify the following.

a $9x \div 18$ **b** $3m \div 12$ **c** $5p \div 25$ **d** $16d \div 4$ **e** $\frac{10c}{2}$

f $\frac{8a}{4}$ **g** $\frac{6a}{12a}$ **h** $\frac{44m}{22m}$ **i** $\frac{12a}{15a}$ **j** $\frac{20d}{10d}$

k $\frac{3f}{9f}$ **l** $\frac{4t}{20t}$ **m** $\frac{18p}{20d}$ **n** $\frac{6xy}{15x}$ **o** $\frac{24ab}{36bc}$

p $\frac{16r}{20qr}$ **q** $\frac{8yz}{40xyz}$ **r** $\frac{70dkl}{10klm}$ **s** $\frac{15pqr}{12q}$ **t** $\frac{14mn}{35mp}$

Challenge

EXAMPLE 2

Simplify the following.

a $\frac{-xy}{-y}$ **b** $\frac{40ac}{-10ac}$ **c** $\frac{-16x^2y}{-8x}$

Remember: When dividing two integers:
If the signs are the same, the result is positive.
If the signs are different, the result is negative.

a $\frac{-xy}{-y} = \frac{\cancel{-}x\cancel{y}}{\cancel{-}\cancel{y}} = x$

b $\frac{40ac}{-10ac} = \frac{{}^{4}\cancel{40ac}}{-{}^{1}\cancel{10ac}} = -4$

c $\frac{-16x^2y}{-8x} = \frac{\cancel{-}{}^{2}16x^2y}{\cancel{-}{}^{1}\cancel{8x}} = 2xy$

3 Complete the following to simplify.

a $\frac{15ab}{-20ac} = \frac{15ab}{\square}$

$= \frac{3b}{\square}$

$= -\frac{3b}{\square}$

b $\frac{-x}{xy} = \frac{\square}{xy}$

$= \frac{\square}{y}$

$= -\frac{\square}{y}$

4 Simplify the following.

a $\frac{-50d}{10d}$ **b** $\frac{-12fg}{-18g}$ **c** $\frac{-6kl}{9l}$ **d** $\frac{12fg}{-3gh}$

e $\frac{-36lm}{9m}$ **f** $\frac{-90y}{99x}$ **g** $\frac{-45c}{-15ac}$ **h** $\frac{-a^2bc}{b^2c}$

i $\frac{-mn}{n^2}$ **j** $\frac{x^2yz^2}{-y^2x}$ **k** $-64p \div -16q$ **l** $-6ac \div -9c$

m $-2mn \div -8mn$ **n** $-10 \div 5mn$ **o** $-3q \div q$ **p** $21pq \div -3p^2$

Extension

Simplify the following divisions by cancelling any common factors.

Cancel numbers and pronumerals where possible

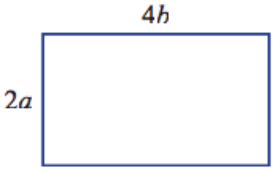
a $\frac{5a}{10a}$ **b** $\frac{7x}{14y}$ **c** $\frac{10xy}{12y}$ **d** $\frac{ab}{4b}$

e $\frac{7xyz}{21yz}$ **f** $\frac{2}{12x}$ **g** $\frac{4xy}{7x}$ **h** $\frac{3abc}{6b}$

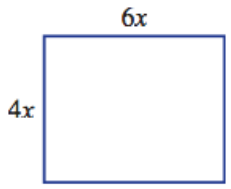
Problem-solving and Reasoning

Write a simplified expression for the area of the following shapes. Recall that rectangle area = width × length.

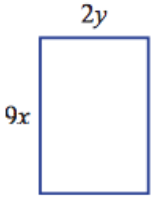
a



b



c



Simplify the following completely.

a $2a \times 3b + 5ab$

b $6q \times 2r + 4q \times 3r$

c $10x \times 2y - 3y \times 6x$

You can combine any like terms.

Fill in the missing terms to make the following equivalences true.

a $3x \times \square \times z = 6xyz$ **b** $4a \times \square = 12ab$

c $\frac{\square}{4r} = 7s$ **d** $\frac{\square}{2ab} = 4b$

Joanne claims that the following three expressions are equivalent: $\frac{2a}{5}, \frac{2}{5} \times a, \frac{2}{5a}$.

a Is she right? Try different values of a.

b Which two expressions are equivalent?

c There are two values of a that make all three expressions are equal. State one of them.

Check if you can work on it

a Simplify $2a \times 3b + 5b \times 2a$ to a single term.

b State another way to fill in the blanks to make the simplification correct:

$\square a \times \square b + \square b \times \square a = 16ab$

c Give an example of an even longer expression that is equivalent to $16ab$.

Check your answers

1 a $\frac{{}^{2}10y}{{}^{3}15} = \frac{2y}{3}$ c $\frac{{}^{2}8{}^{1}m}{{}^{3}12{}^{1}m} = \frac{2}{3}$ c $\frac{{}^{3}6{}^{1}x}{{}^{4}8{}^{1}xy} = \frac{3}{4y}$

2 a $\frac{x}{2}$ b $\frac{m}{4}$ c $\frac{p}{5}$ d $4d$ e $5c$

f $2a$ g $\frac{1}{2}$ h 2 i $\frac{4}{5}$ j 2

k $\frac{1}{3}$ l $\frac{1}{5}$ m $\frac{9p}{10d}$ n $\frac{2y}{5}$ o $\frac{2a}{3c}$

p $\frac{4}{5q}$ q $\frac{1}{5x}$ r $\frac{7d}{m}$ s $\frac{5pr}{4}$ t $\frac{2n}{5p}$

3 a $\frac{{}^{3}15{}^{1}ab}{-{}^{4}20{}^{1}ac} = -\frac{3b}{4c}$ b $\frac{-{}^{1}x}{{}^{1}xy} = -\frac{1}{y}$

4 a -5 b $\frac{2f}{3}$ c $-\frac{2k}{3}$ d $-\frac{4f}{h}$

e $-4l$ f $-\frac{10y}{11x}$ g $\frac{3}{a}$ h $-\frac{a^2}{b}$

i $-\frac{m}{n}$ j $-\frac{xz^2}{y}$ k $\frac{4p}{q}$ l $\frac{2a}{3}$

m $\frac{1}{4}$ n $-\frac{2}{mn}$ o -3 p $-\frac{7q}{p}$

Extension answers

a $\frac{1}{2}$ **b** $\frac{x}{2y}$ **c** $\frac{5x}{6}$ **d** $\frac{a}{4}$

e $\frac{x}{3}$ **f** $\frac{1}{6x}$ **g** $\frac{4y}{7}$ **h** $\frac{ax}{2}$

a $8ab$ **b** $24x^2$ **c** $18xy$

a $11ab$ **b** $24qr$ **c** $2xy$

a $2y$ **b** $3b$ **c** $28rs$ **d** $8ab^2$

a no **b** $\frac{2a}{5}$ and $\frac{2}{5} \times a$ **c** $a = 1$ or $a = -1$

a $16ab$ **b** 2, 5, 6, 1 others possible

c $2a \times 3b + 3a \times 2b + 4a \times b$. Others possible.