Multiplication and division with algebra

H

1 Complete the function machines.

a)

input		output
3	× t	3t
t		t^2
3t		$3t^2$

b)

input		output
8	× $4d$	32d
b		4bd
$\frac{1}{4}$		d

c)

input		output
$9y$	÷ $3y$	3
$3y^2$		y
9yz		$3z$

d)

input		output
k^2t	÷ kt	k
kt^2		t
7kpt		$7p$

e)

input		output
$\frac{8}{w}$	× w	8
$\frac{q}{13}$		q

f)

input		output
$\frac{5}{x}$	÷ x	$\frac{5}{x^2}$
x		1

2 Simplify the expressions.

a) $3 \times 5 =$ 15

b) $18xy \div 6 =$ 3xy

$3a \times 5 =$ 15a

$18xy \div 6\times =$ 3y

$3 \times 5a =$ 15a

$18xy \div xy =$ 18

$3a \times 5a =$ $15a^2$

$18xy \div 3xy =$ 6

$3a \times 5b =$ 15ab

$18x^2y \div 3xy =$ 6x

3 The area of a rectangle is $8ab$.

$8ab$ units^2

Find five possible lengths and widths. Write them in the table.

E.g.

Length	8ab	8a	8b	8	4q
Width	1	b	a	ab	2b

Discuss your approach with a partner. Were you systematic?

4 Sort the expressions into three groups.

$24g + 0g$	$2g \times 12g$	$g \times 4g \times 6g$
$8g^3 + 8g \times 2g^2$	$24g^2$	$\frac{24g^2}{g}$
$48g^3 \div 2g$	$\frac{48g^3}{2}$	$8g \times 3 \times g$
$12g + 12g$	$24g^3$	$3g \times 8$

Group 1	Group 2	Group 3
$24g + 0g$ $12g + 12g$ $\frac{24g^2}{g}$ $3g \times 8$	$48g^3 \div 2g$ $2g \times 12g$ $8g \times 3 \times g$ $24g^2$	$8g^3 + 8g \times 2g^2$ $g \times 4g \times 6g$ $\frac{48g^3}{2}$ $24g^3$

5 The area of a triangle is $3p^2$

Find four possible combinations of bases and heights that would give this area.

E.g.

Base	Perpendicular height
$3p$	$2p$
$6p$	p
p^2	6
$3p^2$	2

6 **a)** Here are four cards showing expressions.

$\frac{3w}{r}$	$3w(r - 8)$	$\frac{2}{5}r$	$w^3 - r^2$

Put the cards in ascending order when $w = 5$ and $r = 11$

$\frac{3w}{r}$	$w^3 - r^2$	$\frac{2}{5}r$	$3w(r-8)$

b) Find values for w and r that will change the order of the expressions.

Show how you worked out your answer.

E.g.

$w =$ 100 $r =$ 1

7 Explain why it is possible to simplify $2b \times 5c$ but not $2b + 5c$

$2b \times 5c = 2 \times b \times 5 \times c = 2 \times 5 \times b \times c = 10bc$

2b and 5c are not like terms so you can't add them.