Simplify the 26 expressions below.

expression	simplified	letter
$y^2 \times y^2$		A
$y^4 \times y^{-8}$		B
$y^4 \times y^7$		C
$y^4 \div y^7$		D
$2y^2 \times 3y^8$		E
$y^7 \div y^2$		F
$y^4 \div y^5$		G
$\left(y^3\right)^5$		H
$6y^7 \div 3y^2$		I
$y^3 \times y^{-2}$		J
$4y^4 \times 2y^{-3}$		K
$\left(y^3\right)^2$		L
$2y^2 \times 3y$		M

expression	simplified	letter
$\left(y^{12}\right)^5$		N
$y^7 \div y^{-3}$		O
$8y^{-4} \times y^7$		P
$y^8 \div y$		Q
$12y^7 \div 2y^2$		R
y^0		S
$y^5 \div y^7$		T
$\left(y^3\right)^3$		U
$4y \times 2y$		V
$\left(y^{-1}\right)^{-2}$		W
$12y^6 \div 4y^2$		X
$4y^2 \times y^3$		Y
$y^2 \div y^8$		Z

Substitute the expressions in the code with the corresponding letters above, to reveal a hidden message.

y^{15}	y^{10}	y^2		y^{-3}	y^{10}		$4y^5$	y^{10}	y^9		$8y$	y^{60}	y^{10}	y^2
y^4	y^{60}		$6y^{10}$	y^6	$6y^{10}$	$8y^3$	y^{15}	y^4	y^{60}	y^{-2}		$2y^5$	1	
$2y^5$	y^{60}		y^{-2}	y^{15}	$6y^{10}$		y^{-4}	y^4	y^{-2}	y^{15}	?			
y^{60}	y^{10}	y^{-2}		y^4		y^6	y^{10}	y^{-2}		y^{10}	y^5			
$6y^5$	y^{10}	y^{10}	$6y^3$		y^5	y^{10}	$6y^5$		$4y^5$	y^{10}	y^9	$6y^5$		
y^{-3}	y^9	y^{11}	$8y$	.										

Simplify the 26 expressions below, leaving your answers as fractions where appropriate.

expression	simplified	letter
$y^2 \times y^2$		A
$y^4 \times y^{-8}$		B
$y^4 \times y^7$		C
$y^4 \div y^7$		D
$2y^2 \times 3y^8$		E
$\frac{y^7}{y^2}$		F
$y^4 \div y^5$		G
$\left(y^3\right)^5$		H
$6y^7 \div 3y^2$		I
$y^3 \times y^{-2}$		J
$4y^4 \times \frac{2}{y^3}$		K
$\left(y^3\right)^2$		L
$2y^2 \times 3y$		M

expression	simplified	letter
$\left(y^{12}\right)^5$		N
$\frac{y^7}{y^{-3}}$		O
$\frac{8}{y^4} \times y^7$		P
$\frac{y^8}{y}$		Q
$12y^7 \div 2y^2$		R
y^0		S
$y^5 \div y^7$		T
$\left(y^3\right)^3$		U
$4y \times 2y$		V
$\frac{1}{\left(y^{-1}\right)^2}$		W
$12y^6 \div 4y^2$		X
$4y^2 \times y^3$		Y
$y^2 \div y^8$		Z

Substitute the expressions in the code with the corresponding letters above, to reveal a hidden message.

y^{15}	y^{10}	y^2		$\frac{1}{y^3}$	y^{10}		$4y^5$	y^{10}	y^9		$8y$	y^{60}	y^{10}	y^2
y^4	y^{60}		$6y^{10}$	y^6	$6y^{10}$	$8y^3$	y^{15}	y^4	y^{60}	$\frac{1}{y^2}$		$2y^5$	1	
$2y^5$	y^{60}		$\frac{1}{y^2}$	y^{15}	$6y^{10}$		$\frac{1}{y^4}$	y^4	$\frac{1}{y^2}$	y^{15}	?			
y^{60}	y^{10}	$\frac{1}{y^2}$		y^4		y^6	y^{10}	$\frac{1}{y^2}$		y^{10}	y^5			
$6y^5$	y^{10}	y^{10}	$6y^3$		y^5	y^{10}	$6y^5$		$4y^5$	y^{10}	y^9	$6y^5$		
$\frac{1}{y^3}$	y^9	y^{11}	$8y$	.										

Teaching notes

This resource contains two differentiated sheets on simplifying integer indices. The second sheet essentially provides the same questions as the first, but reinforces how negative indices can be shown as fractions. The code breaker is the same for both sheets.

Answers

Sheet 1 (basic)	Sheet 2 (fractions)	letter
y^4		A
y^{-4}	$\frac{1}{y^4}$	B
y^{11}		C
y^{-3}	$\frac{1}{y^3}$	D
$6y^{10}$		E
y^5		F
y^{-1}	$\frac{1}{y}$	G
y^{15}		H
$2y^5$		I
y		J
$8y$		K
y^6		L
$6y^3$		M

expression	simplified	letter
y^{60}		N
y^{10}		O
$8y^3$		P
y^7		Q
$6y^5$		R
1		S
y^{-2}	$\frac{1}{y^2}$	T
y^9		U
$8y^2$		V
y^2		W
$3y^4$		X
$4y^5$		Y
y^{-6}	$\frac{1}{y^6}$	Z

H	O	W		D	O		Y	O	U		K	N	O	W
A	N		E	L	E	P	H	A	N	T		I	S	
I	N		T	H	E		B	A	T	H	?			
N	O	T		A		L	O	T		O	F			
R	O	O	M		F	O	R		Y	O	U	R		
D	U	C	K	.										