Name: Date: Class:

SHAPING UP

What's a polygon with 5 sides? What's a quadrilateral with sides of equal length? What's a quadrilateral with opposite sides that are parallel and of equal length?

Simplify each problem. Write the exercise number in front of the corresponding answer listed in the grid. To spell out the answers at the bottom of the page, refer to the grid and write the code letter that corresponds to the exercise number given.

Tip: Rearrange the variables at the final stages of simplification (no parenthesis) so that like-variables are next to each other. For example, $x^2y^4x^3yz \rightarrow x^2x^3y^4yz \rightarrow x^5y^5z$. Note that exponents of different variables cannot be added together.

1. $(x^2 \bullet x^3)^3$
2. $(2x)^2$
3. $(-8x^3)^2 \bullet x^3$
4. $(-xy)^2(x^2y^4)$
5. $(2x)^3 \bullet (2x^3)^3$
6. $(-2x)(3xy)(4y)$
7. $(3x)(3x^2)$
8. $(x^2y)(2xy^2)(4xy)$
9. $(xy^2)(x^2y)^2$
10. $(-4x^2)^3$
11. $(-x^3)(4x^3)^2$
12. $(-5xy)^2(x^2y^2)$
13. $(2x^4)^3$
14. $(-3xy^3)^2(-2x)^3$
15. $(5x)^2 \bullet x^3$
16. $(3x^2yz^2)^3(xyz)$
17. $(-x^4)(9x^3)^2$
18. $(-x^3yz)^4(-3z^5)^3$

Code Letter	Exercise #	Answer
A		$-64x^6$
B		$-27x^{12}y^4z^{19}$
C		$64x^9$
D		x^5y^4
E		$-72x^5y^6$
G		$64x^{12}$
H		$-16x^9$
I		$-24x^2y^2$
L		x^{15}
M		$27x^7y^4z^7$
N		x^4y^6
O		$8x^4y^4$
P		$8x^{12}$
Q		$-81x^{10}$
R		$4x^2$
S		$9x^3$
T		$25x^4y^4$
U		$25x^5$

Answer:

13	14	4	12	10	5	8	4	2	11	8	16	18	15	7

13	10	2	10	1	1	14	1	8	5	2	10	16

ame: Date: Class:

BELIEVE IT OR NOT

In 1987, in the country of Australia, 46 people piled onto one of these vehicles and rode on it for one mile. What were they riding?

Simplify the problems. Find each answer in the list provided, and circle the corresponding letter. Unscramble the circled letters to discover the answer to the amazing fact.

Tip: When solving multiplication problems involving exponents, remember $a^m \cdot a^n = a^{m+n}$, $(a^m)^n = a^{m \cdot n}$, and $(ab)^m = a^m \cdot b^m$. Don't forget to apply the exponents to both parts of a variable term. For example,
$3x^2(2x^2)^3 \rightarrow 3x^2(2^3x^6) \rightarrow 3x^2 \cdot 8x^6 \rightarrow 24x^{2+6} \rightarrow 24x^8$.

1. $3^2 \cdot 3^4$
2. $(x^3)^5$
3. $(-4x^2)^3$
4. $x \cdot x^7$
5. $(4 \cdot 3)^2$
6. $7x^3(2x^4)^3$
7. $(-6x)^2$
8. $(3x)^4 \cdot x$
9. $[(7 + x)^4]^3$
10. $(2x^2)^3(-x^4)$

(U) 3^8	(Y) x^{15}	(M) x^8	(O) $56x^{15}$	(C) $-8x^{10}$	(E) $36x^2$
(T) 144	(C) $81x^5$	(I) $-8x^3$	(N) $-9x^8$	(G) $(7 + x)^7$	(B) $3x^4$
(W) $3x^{10}$	(S) $64x^4$	(H) -24^{10}	(R) $(7 + x)^{12}$	(O) $-64x^6$	(L) 3^6

Answer: _____

Name: Date: Class:

IN THE BLINK OF AN EYE

How many times do most people blink their eyes in one minute?

Simplify each term. Shade in the grid boxes that contain your solutions. Read across the remaining unshaded boxes to spell out the two-word answer to the question.

Tip: To divide powers that have the same base, remember that $a^m/a^n = a^{m-n}$. To determine the power of a quotient or a fraction in parenthesis, distribute the power to both the numerator and the denominator: $(a/b)^m = a^m/b^m$, where b ↑ 0.
For example $(-3/4)^3 \rightarrow (-3)^3/4^3 \rightarrow -27/64$.

1. $5^3/5^2$
2. $(2/3)^3$
3. $(-1/4)^2$
4. $(5/6)^{-1}$
5. $(-9)^{-2}/9^{-1}$
6. $2^3/2^{-2}$
7. $(-1/5)^{-3}$
8. $(5 \bullet 5^4)/5^3$
9. $(-3)^2/3^2$
10. $-6^5/6^5$
11. $2^2/2^{-2}$
12. $7^8/7^5$
13. $3^5/3^2$
14. $(-4/7)^{-2}$
15. $8^{-3}/8^{-1}$
16. $(9^{-3} \bullet 9^{-4})/9^{-8}$

A 1/9	F −147	U 49/16	I −3	O 5	H 25	P 16
F 6	B 1	R 8/27	T −32	Q 9	E 14	M 343
E 0	C −125	N 15	Y 1/16	A 1/64	T 8	K 27
I 6/7	D 6/5	M −4	L −1	E 7	R 32	S 21

Answer: _____

Name: Date: Class:

ANCIENT CALCULATOR

Long before calculators were invented, this mathematical tool was used to quickly add numbers. A skilled individual can use this device to add up to fifteen numbers in one minute. What is the tool called?

Simplify the exponential terms. Match your answers to those given. Write in front of each exercise number the letter representing the solution. Use the letters from the odd-numbered problems to spell out the answer to the question.

Tip: Remember that $a^{-n} = 1/a^n$ and $1/a^{-n} = a^n$ and $a^0 = 1$ (when a ↑ 0). Keep in mind that a number in front of a variable with a negative exponent is not inverted. For example, $5x^{-8}y^{-3} = 5/(x^8y^3)$.

____ 1. x^{-5}	(U) y^2
____ 2. $x^{-3}y^4$	(B) y^3/x^6
____ 3. x^{-6}/y^{-3}	(C) 1
____ 4. $1/(x^{-2}y^{-3})$	(N) $-4/y^5$
____ 5. $x^{-1}y$	(U) x^2y^3
____ 6. $(-4x)^0y^{-3}$	(A) $1/x^5$
____ 7. x^0y^0	(K) $1/(25x^2)$
____ 8. $(4x)^{-1}(3y^{-2})$	(T) $1/y^3$
____ 9. $1/(x^0y^{-2})$	(P) y^4/x^3
____ 10. $(-5x)^{-2}$	(A) y/x
____ 11. $3/(x^{-4}y^3)$	(S) $3x^4/y^3$
____ 12. $(-4x^0)(y^{-5})$	(C) $3/(4xy^2)$

Answer: _____