

WHY ISN'T A SNOWMAN VERY SMART?

Write the expression in simplest form. For each exercise set, there is one extra answer. Write the letter of this answer in each box containing the number of that exercise set.

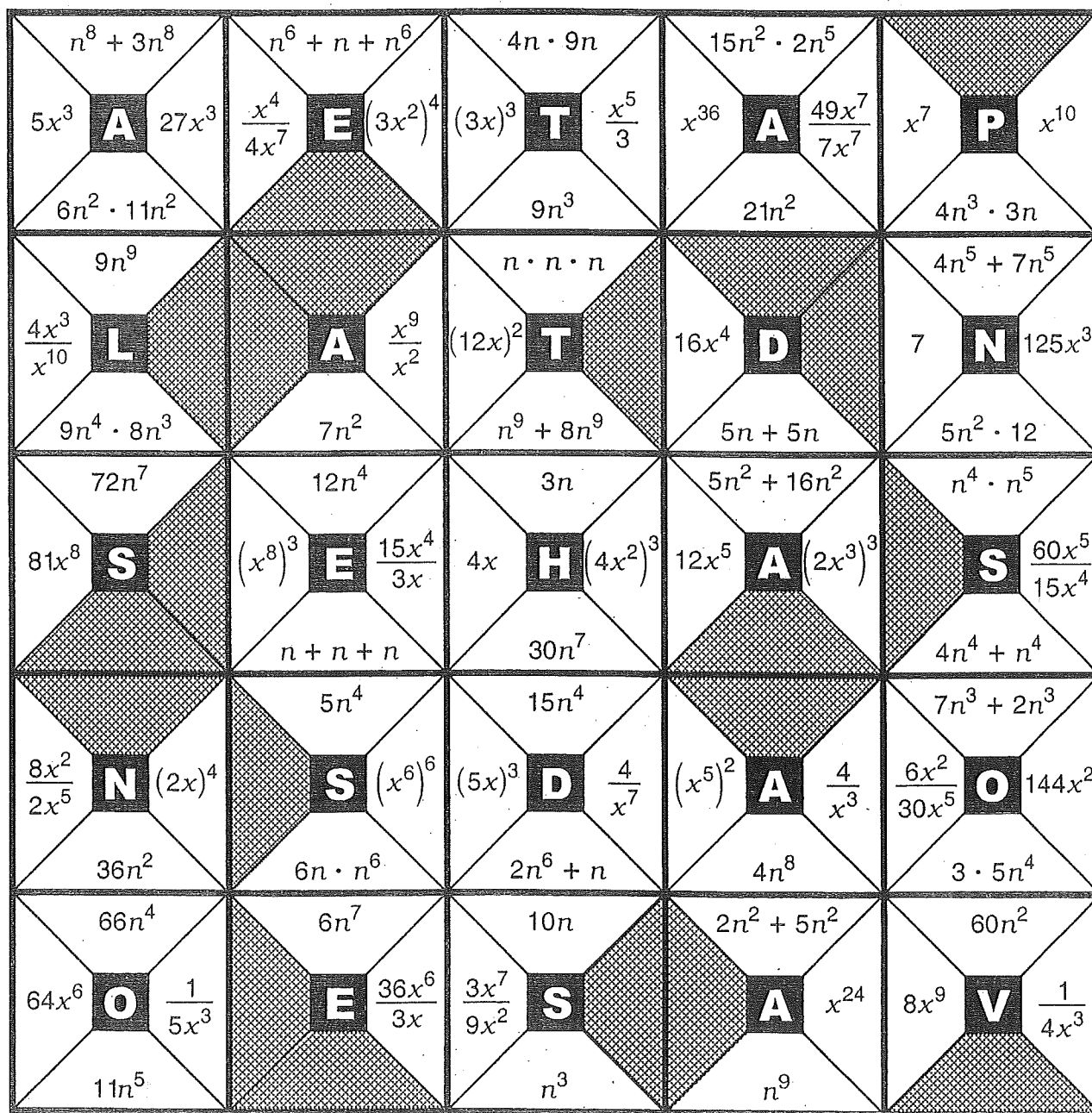
6	3	6	2	10	10	8	1	4	7	9	2	5	8	10
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1	$a. n^2 \cdot n^3$ $b. n^7 \cdot n^4$ $c. 2n^5 \cdot 5n$ $d. 10n^3 \cdot n^8$	Answers (C) $10n^6$ (T) n^5 (E) $10n^{11}$ (O) $10n^8$ (J) n^{11}	6	$a. \frac{m^8}{m^3}$ $b. \frac{m^3}{m^8}$ $c. \frac{40m^{11}}{8m^4}$ $d. \frac{8m^4}{40m^{11}}$	Answers (G) $\frac{1}{m^5}$ (B) $\frac{1}{5m^7}$ (H) $5m^{15}$ (T) m^5 (M) $5m^7$
2	$a. (y^3)^2$ $b. (y^5)^2$ $c. (7y^2)^2$ $d. (5y^4)^3$	Answers (B) $125y^{12}$ (A) $15y^8$ (R) y^{10} (U) $49y^4$ (L) y^6	7	$a. t^6 \cdot t^5$ $b. t^6 + t^5$ $c. 3t \cdot 8t^3$ $d. 3t + 8t^3$	Answers (K) $24t^4$ (L) t^{11} (N) $3t + 8t^3$ (B) $11t^8$ (C) $t^6 + t^5$
3	$a. \frac{v^5}{v^2}$ $b. \frac{v^9}{v^4}$ $c. \frac{20v^8}{5v}$ $d. \frac{44v^7}{11v^6}$	Answers (H) $4v$ (N) v^5 (I) v^3 (T) $4v^7$ (E) $4v^5$	8	$a. (15k)^2$ $b. 15k + 15k$ $c. (2k^6)^5$ $d. (2k^5)^6$	Answers (L) $30k$ (D) $225k^2$ (N) $30k^{30}$ (R) $32k^{30}$ (G) $64k^{30}$
4	$a. 2a^3 \cdot 5a^3$ $b. 2a^3 + 5a^3$ $c. 9a^8 \cdot 4a^8$ $d. 9a^8 + 4a^8$	Answers (L) $10a^6$ (N) $36a^{16}$ (W) $13a^{16}$ (D) $7a^3$ (R) $13a^8$	9	$a. \frac{49x^7}{7x^2}$ $b. \frac{49x^2}{7x^7}$ $c. \frac{7x^7}{49x^2}$ $d. \frac{7x^2}{49x^7}$	Answers (M) $\frac{x^5}{7}$ (Y) $\frac{7}{x^5}$ (U) $\frac{1}{7x^5}$ (R) $7x$ (L) $7x^5$
5	$a. (4q)^3$ $b. 4q + 4q + 4q$ $c. (q^3)^4$ $d. q^3 + q^3 + q^3 + q^3$	Answers (T) $12q$ (I) $4q^{12}$ (R) $64q^3$ (P) $4q^3$ (F) q^{12}	10	$a. (-w^3)^2$ $b. (-w^3)^3$ $c. (-w^3)^4$ $d. (-w^3)^5$	Answers (T) w^6 (F) w^{12} (D) $-w^{15}$ (P) $-w^9$ (S) $-w^{12}$

Why Did the Panda Eat Dinner At the Shanghai Diner, Then Fire a Basketball Into the Trash Can Before Walking Out?

This puzzle provides practice in simplifying expressions. First cut out the 25 square puzzle pieces below. Then arrange the pieces so that each expression that can be simplified is next to its simplest form.

When the pieces are properly arranged, the letters inside them will answer the title question!



What Do You Call a Bar of Soap That Doesn't Clean?

Simplify the expression, then cross out the letter pair next to the answer. For each letter pair that you DON'T cross out, write the upper case letter in the box containing the lower case letter.

1 $x^2 \cdot x^5$

2 $7x^3 \cdot x$

3 $4x^4 \cdot 3x$

4 $x \cdot x^3 \cdot x^9$

5 $(-5x^7)(-6x^2)$

6 $x(-x^5)(-x^5)$

f.P $12x^5$

d.H x^{11}

e.J x^7

o.U $30x^4$

b.O x^{13}

g.T $7x^4$

l.W $30x^9$

h.A x^9

7 $(ab^3)(a^3b)$

8 $(2ab)(3ab^5)$

9 $(-4ab^2)(9a^5b)$

10 $ab(-8a^3b^2)$

11 $(-2a^4b)(-7ab^6)$

12 $-3a(12a^2b^7)$

b.S $14a^5b^7$

l.B $6a^3b^5$

n.N $-36a^3b^7$

p.X $6a^2b^6$

j.G $-8a^4b^3$

k.C a^4b^4

e.U $14a^4b^9$

f.V $-36a^6b^3$

13 $(5m^3)(-m^8t^2)$

14 $(-4m^4t)(15t^5)$

15 $(11m^4t^9)(7mt)$

16 $(3m^2)(m^3t^3)(2mt^2)$

17 $(-8mt^4)(-2t)(m^4t^3)$

18 $3t^5(-mt)(20m^7)$

n.L $16m^5t^8$

k.I $-5m^{11}t^2$

j.D $6m^5t^{10}$

g.T $77m^5t^{10}$

i.M $-60m^8t^6$

f.N $6m^6t^5$

b.A $16m^6t^3$

d.S $-60m^4t^6$

19 $(n^2)^3$

20 $(-n^5)^2$

21 $(5n^8)^2$

22 $(-2n^4)^3$

23 $(10n)^3$

24 $(-3n^9)^4$

f.B $81n^{18}$

p.T $-8n^{12}$

c.N $25n^{16}$

d.L $81n^{36}$

m.I n^6

n.D $-8n^{16}$

g.F n^{10}

k.E $1000n^3$

25 $(3x^2y^3)^2$

26 $(5x^4y)^3$

27 $(-7x^5y^2)^2$

28 $(-4xy^8)^3$

29 $(-2x^2y^3)^5$

30 $(3x^7y^2)^4$

k.U $81x^{20}y^6$

a.S $9x^4y^6$

g.L $-32x^{10}y^{15}$

d.R $49x^{12}y^4$

q.E $125x^{12}y^3$

i.N $-64x^3y^{24}$

c.T $81x^{28}y^8$

p.G $49x^{10}y^4$

31 $2kd(5k^2d)^2$

32 $-d(9kd^5)^2$

33 $(kd)^2(kd^2)$

34 $(2k)^4(-k^2)(-d)^2$

35 $(kd^8)(kd)^8(k^8d)$

36 $(-k^2d)^3(-k^2d^3)$

i.R $-81k^2d^{11}$

q.T k^8d^6

c.S k^3d^4

g.B $-81kd^7$

m.I $k^{17}d^{17}$

a.H $50k^5d^3$

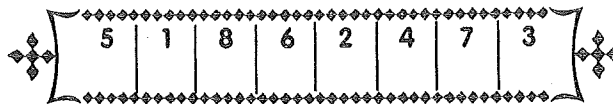
p.D $k^{15}d^{12}$

o.A $-16k^6d^2$

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
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How Does the King's Son Write?

Simplify each expression. For each set of exercises, there is one extra answer. Write the letter of this answer in the corresponding box at the right.



1 a. $9x \cdot x^5$ b. $5x^2 \cdot 4x^3$ c. $(-8x^4)(-3x)$ d. $(6x^4)(-x^6)$	(K) $24x^5$ (O) $-6x^{10}$ (A) $9x^6$ (E) $24x^{10}$ (L) $20x^5$	5 a. $(5p^2q^3)(p^5q)(2p^4q)$ b. $(2p^5q^2)(9p^3)(-4p^8q)$ c. $(-18q^6)(4p^4q)(-pq^3)$ d. $3pq(-2q^5)(12p^9q^2)$	(H) $72p^{10}q^{12}$ (B) $-72p^{16}q^3$ (G) $10p^{11}q^5$ (L) $72p^5q^{10}$ (M) $-72p^{10}q^8$
2 a. $(7n^3)^2$ b. $(-4n^8)^3$ c. $(5n^4)^4$ d. $(-2n^2)^6$	(W) $64n^{12}$ (I) $625n^{12}$ (U) $-64n^{24}$ (B) $49n^6$ (D) $625n^{16}$	6 a. $(8ut^3)^2(u^2t)^2$ b. $(u^4t)^3(-2ut^5)^4$ c. $(-ut^3)(-ut)^3$ d. $(-u^2t)^4(-u^2t^4)$	(W) $-u^{10}t^8$ (T) $64u^6t^8$ (F) u^4t^6 (S) $16u^{16}t^{23}$ (R) $-u^4t^8$
3 a. $(4m^7d^2)^2$ b. $(-9m^4d^3)^2$ c. $(-m^2d^5)^3$ d. $(-3md^9)^4$	(T) $16m^{14}d^4$ (G) $-m^6d^{15}$ (V) $81m^8d^6$ (E) m^6d^8 (R) $81m^4d^{36}$	7 a. $(3ab^2c^5)^3(a^3b^8c)^2$ b. $(-bc^5)(a^4b^3c^9)(-ab^8)$ c. $(-2ab)^3(ac^3)(11bc^2)$ d. $(a^2bc)^5(a^2bc^5)$	(D) $27a^9b^{22}c^{17}$ (C) $-88a^4b^3c^6$ (G) $a^{12}b^6c^{10}$ (T) $-88a^4b^4c^5$ (K) $a^5b^{12}c^{14}$
4 a. $3xy(5x^2y)^2$ b. $(-7y)(2xy^2)^3$ c. $x^8y^3(-10x^5y^4)^2$ d. $(xy^4)^4(-9y^3)$	(S) $-56x^3y^7$ (N) $100x^{20}y^7$ (C) $75x^5y^3$ (F) $-9x^4y^{19}$ (T) $100x^{18}y^{11}$	8 a. $(\frac{1}{2}k^8v^3)^2(60kv^4)$ b. $(10k^5v)^3(\frac{1}{5}v^3)^2$ c. $-(k^9v^2)(-15v^6)$ d. $(-kv)^2(-kv)^3(-kv)^4$	(P) $-15k^9v^9$ (T) $40k^{15}v^9$ (W) $15k^{17}v^{10}$ (B) $-k^9v^9$ (S) $15k^9v^8$

Why Was the Deck of Cards Always in Trouble?



Simplify the expression. For each set of exercises, there is one extra answer. Write the letter of this answer in each box containing the number of that set.

1	a. $\frac{20x^5}{5x^3}$	b. $\frac{-28x^4}{7x}$	P $-4x^3$	O $-4x$	V $4x^2$											
2	a. $\frac{26m^8n^2}{13m^5n}$	b. $\frac{-60m^9n^6}{-12mn^2}$	I $5m^3n^2$	A $2m^3n$	C $5m^8n^4$											
3	a. $\frac{2ab^5}{a^4b^2}$	b. $\frac{-5a^2b^3}{10b^8}$	F $\frac{2b^3}{a^3}$	S $-\frac{2a^2}{b^3}$	T $-\frac{a^2}{2b^5}$											
4	a. $\frac{(k^2e)^2}{k^3e}$	b. $\frac{(ke)^2(ke^2)}{k^2e}$	N ke^3	L ke	D k^2e^2											
5	a. $\frac{(-3c^3d)^2}{2cd^3}$	b. $\frac{(-c)^3(-d^3)}{5c^8d}$	A $\frac{9c^5}{2d}$	R $\frac{d^2}{5c^5}$	E $\frac{9d}{5c^3}$											
6	a. $\left(\frac{8x}{y^3}\right)^2$	b. $\left(\frac{x^5}{-2y^2}\right)^3$	B $-\frac{x^{15}}{8y^6}$	T $\frac{x^8}{8y^8}$	W $\frac{64x^2}{y^6}$											
7	a. $\left(\frac{6ab^3}{3c^2}\right)^2$	b. $\left(\frac{a^2b^3c^4}{ac^2}\right)^3$	R $\frac{4a^3b^9}{c^4}$	N $a^3b^9c^6$	V $\frac{4a^2b^6}{c^4}$											
8	a. $\frac{(-5vt)^2}{-5vt^2}$	b. $\frac{15(v^2t)^5}{3v^{10}}$	H $5vt^4$	L $-5v$	A $5t^5$											
9	a. $\frac{(-3wh^3)^2}{9w^5h^8}$	b. $\frac{-w(-h)^4}{(-wh)^4}$	J $-\frac{1}{w^2h^2}$	F $-\frac{1}{w^3}$	B $\frac{1}{w^3h^2}$											
10	a. $\left(\frac{5pq^3}{4p^3q}\right)^2$	b. $\left(\frac{-3q^5}{pq}\right)^3$	A $-\frac{27q^{12}}{p^3}$	L $-\frac{27q^6}{p^4}$	N $\frac{25q^4}{16p^4}$											
11	a. $\frac{(-2n)^5}{-2n^5}$	b. $\frac{12n(-n)^3}{-60n^2}$	G $\frac{n^2}{5}$	B 16	K $\frac{n}{8}$											
12	a. $\left(\frac{a^3}{7b^2}\right)^x$	b. $\left(\frac{7a^x}{7b^y}\right)^x$	P $\frac{a^{x^2}}{b^{xy}}$	M $\frac{a^{3x}}{7^x b^{2x}}$	W $\frac{a^{3x}}{7b^x}$											
6	8	5	9	1	11	5	7	3	12	5	7	5	12	2	10	4

What Did Professor Utterbunk Say When Asked: Have You Ever Heard of the Planet Saturn?

Simplify each expression. Write the letter of the answer in the box containing the exercise number.

1 5^3

Answers 1-8:

T $\frac{1}{144}$

M $\frac{1}{125}$

2 5^{-3}

P -1

R $-\frac{1}{64}$

3 3^{-5}

I 125

L 144

4 $(-5)^{-3}$

U 1

N $\frac{1}{243}$

5 $(-12)^{-2}$

O $-\frac{1}{125}$

F -125

6 -12^{-2}

E $\frac{1}{64}$

S $-\frac{1}{144}$

8 $(-4)^{-3}$

17 $7ab^0$

Answers 17-23:

I $\frac{2y^8}{x^3}$

A $\frac{7a}{b^4}$

18 $7ab^{-4}$

R $2x^3y^8$

O $7ab^4$

19 $\frac{7}{ab^{-4}}$

F $\frac{7b^4}{a}$

L $\frac{1}{2x^3y^8}$

20 $\frac{7^{-2}a}{b^{-1}}$

S $7a$

A $\frac{ab}{49}$

21 $2x^3y^{-8}$

M $\frac{2x^3}{y^8}$

N $\frac{b}{49a}$

22 $\frac{2x^{-3}}{y^{-8}}$

23 $\frac{2^{-1}x^{-3}}{y^8}$

9 -4^{-3}

Answers 9-16:

O 16

I $\frac{1}{75}$

10 10^{-5}

T $-\frac{1}{75}$

E $-\frac{1}{64}$

11 $(-10)^{-5}$

A $-\frac{1}{16}$

N $\frac{1}{1000}$

12 10^0

T 1

R -75

13 75^{-1}

S -64

H $\frac{1}{16}$

14 -75^{-1}

B $\frac{1}{100,000}$

15 $(-2)^{-4}$

U $-\frac{1}{100,000}$

16 -2^{-4}

24 $\frac{3n^2}{t^{-5}}$

Answers 24-30:

T $\frac{64c}{5d^6}$

G $-\frac{5}{64c}$

25 $3^4n^{-2}t^5$

I $3n^2t^5$

I $320d^6$

26 $\frac{3^{-4}t^{-5}}{n^{-2}}$

R $\frac{n^2}{81t^5}$

A $\frac{81t^5}{n^2}$

27 $\frac{8^2c^{-1}d^{-6}}{5}$

E $320cd^6$

S $81n^2t^5$

28 $\frac{(-8)^2c^0}{5^{-1}d^{-6}}$

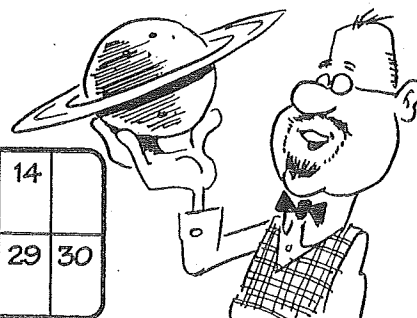
R $\frac{64}{5cd^6}$

N $\frac{c}{320d^6}$

29 $\frac{(-8)^{-2}d^{-6}}{5c^{-1}}$

30 $\frac{-8^{-2}}{5^{-1}cd^0}$

1	2		3	4	5		6	7	8	9		10	11	12		13	14	
15	16	17		18		19	20	21	22	23	24	25	26		27	28	29	30



PARTNER A (top)

TEAM NAME

PARTNER B (bottom)

What Did People Say After Two Satellite Dishes Got Married?

Simplify the expression. Write the exercise letter in the box containing the number of the answer. Partner A should do the top half and Partner B the bottom half.

A 8^3

B 8^{-3}

E $(-8)^3$

L $(-8)^{-3}$

I $(-25)^2$

T $(-25)^{-2}$

E -25^{-2}

D $(-44)^0$

T 3^{-4}

N -3^{-4}

U $5ab^{-3}$

W $\frac{5^3 a^{-3}}{b}$

D $\frac{5^{-3} a}{b^{-3}}$

H $2^4 a^0 b^{-8}$

S $\frac{2^{-4}}{a^{-1} b^8}$

W $\frac{7^{-1} k^5}{n^2}$

L $\frac{7^{-2} k^{-5}}{n^{-2}}$

G $\frac{7^{-3} n^{-2}}{k^0}$

D $\frac{(-7)^{-2}}{2kn^{-2}}$

U $\frac{-7^{-2} n^2}{2k^{-5}}$

9 625

10 $-\frac{1}{81}$

19 $-\frac{1}{512}$

22 $\frac{1}{512}$

17 1

14 512

6 $-\frac{1}{625}$

16 -81

12 -625

1 $\frac{1}{81}$

3 -512

24 $\frac{1}{625}$

11 $\frac{1}{343n^2}$

15 $\frac{a}{16b^8}$

23 $\frac{5a}{b^3}$

8 $\frac{ab^3}{125}$

18 $-\frac{n^2 k^5}{98}$

4 $\frac{n^2}{343}$

20 $\frac{n^2}{49k^5}$

2 $\frac{16}{b^8}$

5 $\frac{k^5}{7n^2}$

13 $\frac{125}{a^3 b}$

21 $\frac{k^5}{98n}$

7 $\frac{n^2}{98k}$

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O 7^3

E 7^{-3}

A $(-7)^3$

H $(-7)^{-3}$

T $(-20)^2$

E $(-20)^{-2}$

A -20^{-2}

S $(-99)^0$

E 4^{-4}

I -4^{-4}

T $9ab^{-2}$

E $\frac{9^2 a^{-2}}{b}$

T $\frac{9^{-2} a}{b^{-2}}$

W $4^3 a^0 b^{-10}$

R $\frac{4^{-3}}{a^{-1} b^{10}}$

G $\frac{6^{-1} k^8}{n^3}$

N $\frac{6^{-2} k^{-8}}{n^{-3}}$

C $\frac{6^{-3} n^{-3}}{k^0}$

R $\frac{(-6)^{-2}}{4kn^{-3}}$

P $\frac{-6^{-2} n^3}{4k^{-8}}$

23 $-\frac{1}{400}$

13 343

17 -343

22 $\frac{1}{343}$

1 -256

7 $\frac{1}{400}$

12 $-\frac{1}{256}$

18 1

3 $-\frac{1}{343}$

11 400

15 -625

4 $\frac{1}{256}$

10 $-\frac{n^3 k^8}{144}$

16 $\frac{64}{b^{10}}$

6 $\frac{a}{64b^{10}}$

24 $\frac{9a}{b^2}$

20 $\frac{k^8}{6n^3}$

9 $\frac{81}{a^2 b}$

21 $\frac{n^3}{144k}$

19 $\frac{81a}{b^2}$

8 $\frac{1}{216n^3}$

5 $\frac{b^{10}}{64a}$

14 $\frac{n^3}{36k^8}$

2 $\frac{ab^2}{81}$

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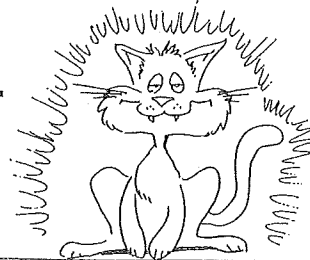
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What Is Special About a Radioactive Cat?

Choose the correct answer for each exercise and circle the letter pair next to it. Write the uppercase letter in the box containing the lowercase letter.



In Exercises 1-2, choose the number that is written in scientific notation.

1. **r·Y** 34.5×10^5 **m·D** 3.45×10^6 **y·P** 0.345×10^7
 2. **b·G** 0.77×10^{-3} **i·R** $7.7 + 10^{-4}$ **s·L** 7.7×10^{-4}

In Exercises 3-6, find the value of n .

3. $94,000,000 = 9.4 \times 10^n$ **n·O** 8 **e·A** 7
 4. $555,500,000,000 = 5.555 \times 10^n$ **i·I** 11 **k·C** 10
 5. $0.00006 = 6 \times 10^n$ **w·S** -4 **j·G** -11
 6. $0.0000000000375 = 3.75 \times 10^n$ **f·U** -12 **y·E** -5

In Exercises 7-12, write the number in decimal form.

7. 3.8×10^5 **r·A** 38,000,000 **p·R** 0.00038
 8. 3.8×10^{-5} **d·L** 3,800,000 **w·I** 380,000
 9. 3.80×10^7 **b·T** 0.000038 **o·D** 38,000
 10. 6.25×10^4 **a·A** 0.000000625 **n·E** 62,500
 11. 6.25×10^{-3} **v·M** 625,000 **k·H** 0.0000000625
 12. 6.25×10^{-8} **z·S** 0.00625 **h·L** 0.00062

In Exercises 13-18, write the number in scientific notation.

13. 72,000 **q·F** 7.2×10^{10} **q·W** 7.2×10^5
 14. 7,200,000,000,000 **f·S** 7.2×10^{12} **o·N** 7.2×10^{-7}
 15. 0.00000072 **a·I** 7.2×10^4 **t·D** 7.2×10^{-6}
 16. 41,900,000 **v·L** 4.19×10^{-3} **x·T** 4.19×10^{-5}
 17. 0.00419 **l·R** 4.19×10^{-10} **d·H** 4.19×10^7
 18. 0.0000000000419 **c·S** 4.19×10^6 **h·E** 4.19×10^{-11}

In Exercises 19-22, write the number in scientific notation.

19. 22.2×10^3 **p·O** 2.22×10^5 **l·T** 2.22×10^7
 20. 0.222×10^8 **t·F** 2.22×10^4 **c·S** 2.22×10^9
 21. 0.54×10^{-4} **g·L** 5.4×10^{-6} **u·P** 5.4×10^{-16}
 22. 54×10^{-15} **q·H** 5.4×10^{-14} **x·V** 5.4×10^{-5}

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
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What Did Mr. Cabinetmaker Say To Mrs. Cabinetmaker?

Simplify the expression. Write the letter of the exercise in the box above the answer.

D $x^{-2} \cdot x^5$

E $x^2 \cdot x^{-5}$

F $x(x^{-2})(x^7)$

E $3x \cdot 4x^4$

D $7x(2x^{-3})$

T $(3x^{-3})(5x^{-4})(2x^{-5})$

I $(2x^{-3})(-5x^8)$

N $(8x^{-2})(x^{-4})$

E $-15x^8(3x^{-1})(x^{-4})$

O $(-9x)(4x^{-1})$

W $(-3x^{-5})(-10x)$

N $(-4x)(-4x^3)(-4x^{-12})$

$\frac{30}{x^4}$	$12x^5$	$\frac{-64}{x^5}$	$\frac{8}{x^6}$	$-45x^3$	$\frac{1}{x^3}$	x^3	$14x$	$\frac{30}{x^{12}}$	-36	$\frac{-45}{x^4}$	x^6	$-10x^5$	$\frac{-64}{x^8}$	$\frac{14}{x^2}$
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R $(2a^4b^{-3})(9ab^8)$

O $(8a^{-3}b^2)(-ab^9)$

F $(3a^2b^5)(4a^{-4}b^9)(4ab^{-1})$

O $(-5a^{-1}b^9)(-4a^5b^{-2})$

R $(16a^5b^4)(3a^{-5}b^{-1})$

H $-6a^2b^2(-2b^5)(ab^{-7})$

S $ab^{-4}(12a^2b^{-3})$

U $-20a^{-7} \cdot a^6b^6$

O $(-5a^{-3}b^{-4})(-5a^6b)(-4a^{-15})$

D $(7a^{-1}b^{-4})(-7a^{-5}b)$

M $(0.5ab^{-2})(36a^{-4}b^{-15})$

R $(4ab^{-1})(-a^5b)(2b^8)$

$\frac{12a^2}{b^8}$	$\frac{18}{a^3b^{17}}$	$\frac{-100}{a^{12}b^3}$	$\frac{18a^5b^5}{18a^5b^5}$	$\frac{-49}{a^6b^3}$	$\frac{48}{ab^3}$	$\frac{12a^3}{12a^3}$	$\frac{-8b^{11}}{a^2}$	$\frac{-20b^6}{a}$	$\frac{-8a^6b^8}{-8a^6b^8}$	$\frac{12a^3}{b^7}$	$\frac{-100}{a^{10}b^4}$	$\frac{48b^{13}}{a}$	$\frac{20a^4b^7}{20a^4b^7}$	$\frac{48b^3}{48b^3}$
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E $(2 \times 10^5)(3 \times 10^2)$

O $(4 \times 10^{-3})(9 \times 10^7)$

V $(4.5 \times 10^{-9})(1.6 \times 10^2)$

S $(8 \times 10^5)(3 \times 10^2)$

H $(5 \times 10^{-4})(5 \times 10^{-3})$

R $(5.0 \times 10^5)(4.8 \times 10^{-16})$

E $(12,000,000,000)(0.000003)$

S $(0.0000008)(0.000000000000009)$

U The speed of light in space is 3×10^5 km/s. It takes light 5×10^2 seconds to travel from the sun to the earth. How far away is the sun (in km)?

L The human body contains about 3.2×10^{-2} liters of blood for each pound of body weight. Each liter of blood contains about 5×10^{12} red blood cells. About how many red blood cells are in the body of a 100-pound person?

2.4×10^{-8}	3.6×10^5	1.5×10^8	2.4×10^{-10}	1.6×10^{15}	7.2×10^{-19}	2.5×10^{-6}	6×10^7	1.6×10^{13}	7.2×10^{-7}	3.6×10^4	2.4×10^8	7.2×10^{-16}
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How Did the Absent-Minded Professor Burn His Ear?

Simplify the expression. Write the letter of the expression in the box that contains the number of the answer.



E $n^2 \cdot n^5$

N $(n^2)^5$

H $(n^{-2})^5$

A $(n^9)^4 n^3$

O $(n^2)(n^3)^{-2}$

I $(n^4)^{-3}(n^4)^{-1}$

E $(n^{10})^{10}(n^{-8})^3$

Answers • Part 1

29 n^{76} 31 n^{42}

20 n^{81} 18 n^7

33 n^{10} 5 n^{39}

27 $\frac{1}{n^4}$ 8 $\frac{1}{n^{16}}$

4 $\frac{1}{n^{12}}$ 22 $\frac{1}{n^{10}}$

N $(7d)^2$

H $(4d^2)^3$

S $(-4d^2)^3$

A $(4d^2)^{-3}$

O $(-5d)^2(d^3)^2$

E $8(d^2)^2(-2d)^3$

H $(3d^5)^{-4}(d^{-1})^9$

Answers • Part 2

23 $-64d^7$ 17 $64d^6$

6 $-64d^6$ 30 $25d^{10}$

13 $49d^2$ 10 $25d^8$

9 $\frac{1}{81d^{18}}$ 1 $\frac{1}{81d^{29}}$

32 $\frac{1}{64d^6}$ 12 $\frac{64}{d^9}$

I $(x^5y^4)^2$

N $(10xy^2)^3(x^2)$

H $(-x^3y^8)^3$

E $(x^2y)^5(x^2y^5)$

G $(9x^3y^4)^2(xy)^{-6}$

T $(3x^{-2})^4(x^2y^4)^3$

W $(-5y^{-5})^3(-x^4y)^2$

Answers • Part 3

14 $81y^2$ 3 $1000x^6y^2$

12 $x^{10}y^8$ 26 $-x^9y^{24}$

2 $x^{12}y^{10}$ 19 $1000x^5y^6$

16 $\frac{81y^7}{x^4}$ 4 $\frac{125x^8}{y^{13}}$

21 $\frac{81y^{12}}{x^2}$ 25 $\frac{125x^9}{y^{12}}$

N $(-6m^7t^4)^2$

R $(3m^2t)^2(3m^2t^2)$

W $(-2mt)^3(-2mt^3)$

G $-m^5t^2(15mt^5)^2$

N $(4mt^{-3})^2(-4m^{-3}t)^2$

P $(5mt)^2 + 5m^2t^2$

R $(mt^4)^{-1}(mt^4)$

Answers • Part 4

25 $30m^2t^2$ 34 $-225m^7t^{12}$

16 $16m^4t^6$ 24 $-225m^6t^{10}$

9 1 11 $36m^{14}t^8$

31 $27m^6t^4$ 7 $27m^5t^6$

15 $\frac{256m^2}{t^3}$ 28 $\frac{256}{m^4t^4}$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
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How Would You Describe a Window in the Kitchen Eating Area?

Simplify the expression, then cross out the letter pair next to the correct answer. For each letter pair that you DON'T cross out, write the upper case letter in the box containing the lower case letter.

1 $\frac{7a^8}{21a^3}$

2 $\frac{6a^2}{15a^9}$

7 $\frac{xy^{-4}}{x^3y^{-1}}$

8 $\frac{3^2x^7y^2}{3^5x^3y^{-5}}$

3 $\frac{-2a^3}{16a^{10}}$

4 $\frac{18a^{-2}}{9a^7}$

9 $\frac{-24x^2y}{-8x^9y^4}$

10 $\frac{60x^{-1}y^6}{-5x^6y^3}$

5 $\frac{8a^{-3}}{12a^{-4}}$

6 $\left(\frac{5}{a^3}\right)^3$

11 $\left(\frac{2x}{5y^4}\right)^2$

12 $\left(\frac{2x}{5y^4}\right)^{-2}$

d A $125a^6$

h W $-\frac{1}{8a^7}$

r C $\frac{a^5}{3}$

h I $\frac{25x}{4y^4}$

a T $\frac{3}{x^7y^3}$

i P $-\frac{12y^3}{x^7}$

m J $\frac{2}{5a^7}$

p O $\frac{2a^2}{5}$

a V $\frac{125}{a^9}$

c S $\frac{4x^2}{25y^8}$

o F $\frac{1}{x^2y^3}$

m E $-\frac{12}{x^3y^3}$

l Y $\frac{2a}{3}$

b S $\frac{2}{a^9}$

f E $-\frac{1}{8a^9}$

r K $\frac{x^4}{9y^3}$

k U $\frac{25y^8}{4x^2}$

g N $\frac{x^4y^7}{27}$

13 $\left(\frac{3m^2t^5}{2m^3t^{-1}}\right)^2$

14 $\left(\frac{3m^2t^5}{2m^3t^{-1}}\right)^{-2}$

19 $\frac{9 \times 10^5}{3 \times 10^9}$

20 $\frac{6.5 \times 10^4}{1.3 \times 10^{-7}}$

15 $\left(\frac{4m^4t^{-9}}{mt^{-2}}\right)^{-3}$

16 $\frac{m^{-5}t^{-2}}{(3m^2t)^3}$

21 $\frac{4.5 \times 10^{-8}}{2.5 \times 10^{-3}}$

22 $\frac{3.2 \times 10^{-6}}{6.4 \times 10^2}$

17 $\frac{-36m^2t^{-3}}{9m^{-2}t^{-7}}$

18 $\left(\frac{m^{-5}t^8}{2mt^3}\right)^{-4}$

23 $\frac{72,000,000}{0.00024}$

24 $\frac{0.000000441}{0.0098}$

c D $-4m^4t^4$

i N $-4m^8t^2$

o T $\frac{t^{21}}{64m^9}$

q R 5×10^{11}

e S 3×10^{-4}

o N 4.5×10^{-2}

a A $\frac{t^{18}}{64m^6}$

k G $\frac{16m^{24}}{t^{20}}$

q L $\frac{4m^2}{9t^{12}}$

b L 1.8×10^{-5}

g W 3×10^{11}

k T 1.8×10^{11}

e R $\frac{9t^{12}}{4m^2}$

j E $\frac{1}{27m^{11}t^5}$

l H $\frac{16m^{21}}{t^{10}}$

c P 3×10^8

j D 5×10^{-9}

n M 4.5×10^{-5}

- 25 The Quadrangle College Library estimates that the average book on its shelves is 3.2×10^{-2} m thick. The library has a total of 8×10^3 m of shelf space. How many books will fit in the library?

q O 2.5×10^6

b T 2.7×10^5

- 26 The speed of light in space is 3×10^8 km/s. Sirius A, the brightest star in the heavens, is 8.1×10^{13} km from the earth. How many seconds does it take for light to travel from Sirius A to the earth?

n R 2.5×10^5

e N 2.7×10^4

EXTRA: Convert your answer to days.

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
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Why Were the Bones Chasing the Skull?



Write the letter of each exercise in the box containing the number of the answer.

Write the number in scientific notation.

E. 5,900,000,000,000 mi (distance that light travels in one year)

17. 5.9×10^{12} mi 20. 5.9×10^{11} mi

T. 6,020,000,000,000,000,000,000 kg (mass of the earth)

10. 6.02×10^{22} kg 9. 6.02×10^{24} kg

A. 0.000000000128 m (wavelength of one type of X ray)

15. 1.28×10^{-9} m 24. 1.28×10^{-10} m

H. 0.000000000000000000000000091 g (mass of an electron)

7. 9.1×10^{-29} g 2. 9.1×10^{-28} g

Write the number in scientific notation.

O. 72.5×10^5 A. 0.725×10^5 20. 7.25×10^4 14. 7.25×10^6

E. 38.3×10^{-4} T. 0.383×10^{-4} 1. 3.83×10^{-5} 10. 3.83×10^{-3}

Express each factor in scientific notation, then multiply. Express the product in scientific notation.

A. (15,000,000,000)(400,000) 16. 6×10^{16} 7. 6×10^{15}

D. (3,800,000,000)(0.000005) 25. 1.9×10^4 6. 1.9×10^3

E. (0.000000022)(0.0045) 3. 9.9×10^{-11} 11. 9.9×10^{-10}

T. (0.000000000076)(90,000,000) 4. 6.84×10^{-5} 18. 6.84×10^{-3}

Express each number in scientific notation, then divide. Express the quotient in scientific notation.

D. $\frac{91,000,000,000,000}{700,000}$ 11. 1.3×10^8 22. 1.3×10^7

Y. $\frac{16,000}{2,500,000,000}$ 19. 6.4×10^{-4} 4. 6.4×10^{-6}

T. $\frac{630,000,000}{0.00018}$ 13. 3.5×10^{12} 8. 3.5×10^4

W. $\frac{0.00232}{0.00000058}$ 12. 4×10^5 6. 4×10^3

Fill in the blank in each statement comparing these four numbers.

$a = 3.3 \times 10^4$ $b = 3.3 \times 10^5$ $c = 3.3 \times 10^8$ $d = 6.6 \times 10^4$

H. b is _____ times larger than a .

N. c is _____ times larger than b . 16. 2 8. 1000

E. c is _____ times larger than a . 22. 10 23. 10,000

G. d is _____ times larger than a . 15. 100 19. 100,000

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

PARTNER A (left side)

TEAM NAME

PARTNER B (right side)

For Whom Was Mr. Bachelor Rabbit Searching?

Simplify each expression. Partner A should do the left side and Partner B the right side. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

SET 1

I. $5n^3 \cdot n^2$

E. $2n^4 \cdot 9n$

15. $3n^2 \cdot 6n^3$

5. $5n^8 \cdot 3n$

T. $-3n^2(8n^{-5})$

S. $(-15n)(-n^8)$

1. $-2n^4(12n^{-7})$

9. $(-5n)(-n^4)$

SET 2

O. $\frac{9x^7}{3x^2}$

H. $\frac{-30x^3}{5x^5}$

17. $\frac{10x^9}{2x}$

13. $\frac{-15x^8}{-5x^3}$

U. $\frac{40x^7}{8x^{-1}}$

A. $\frac{-2x^{-5}}{-6x^{-2}}$

10. $\frac{4x^{-1}}{12x^2}$

2. $\frac{18x^{-5}}{-3x^{-3}}$

SET 3

E. $(5cd^2)(6c^2d^3)$

Y. $4cd^7(3c^4d^{-3})$

T. $(9cd^5)(2c^3d)^2$

S. $36c^5d^3(cd^2)^3$

20. $(6cd^3)(2c^4d)$

7. $3c^2d^7(10cd^{-2})$

12. $(4c^4d^7)(3c^2d)^2$

4. $36cd^4(c^2d)^3$

SET 4

N. $\left(\frac{4at^5}{a^3t^{-1}}\right)^2$

A. $\left(\frac{3a^4t^{-2}}{a^2t}\right)^4$

L. $\left(\frac{-2t^4}{at}\right)^6$

M. $\left(\frac{4a^3t^2}{9at^6}\right)^{-3}$

3. $\left(\frac{9a^5t^{-1}}{at^5}\right)^2$

11. $\left(\frac{4at^4}{a^3t^{-2}}\right)^3$

18. $\left(\frac{-2t^5}{at^2}\right)^4$

14. $\left(\frac{8a^4t}{27at^7}\right)^{-2}$

SET 5

P. $(5x^6y)(2y^3)(3x^{-2}y^{-9})$

N. $(4xy)^2(4xy^2)$

C. $(xy)^{-3}(-x^7y^2)(30x^2)$

B. $x^9y^4(4x^{-1}y^2)^3$

8. $(-x^9y^2)(10y^5)(3x^{-3}y^{-8})$

16. $(2xy)^5(2xy^5)$

6. $(xy)^{-2}(30x^5)(xy^{-3})$

19. $8x^6y(2x^{-1}y)^3$

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