



8th
Basic

9th
Advanced

Helping With Math

USA
GRADES

Multiplication of Algebraic Expressions

*Suitable for students
aged 12-14*



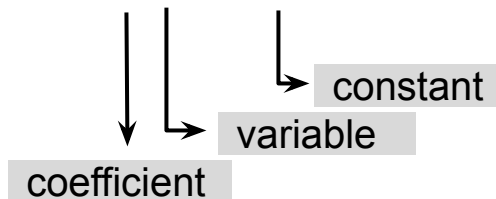
This pack is suitable for learners aged 12 to 14 years old or 8th to 9th graders (USA). The content covers fact files and relevant basic and advanced activities involving multiplication of algebraic expressions.

Algebraic Expressions are:

- expressions that contain variables, coefficient and constants.
- combination of terms and at least one arithmetic operation such as addition, subtraction, multiplication and division.

Parts of Algebraic Expression

$$5x + 6$$



Multiplication of algebraic expressions is done by multiplying each term of the expression by the other and then taking the algebraic sum of these products.



MULTIPLYING ALGEBRAIC EXPRESSIONS

Let's recall the following:

- A. The product of two terms with the like signs is positive, and the product of two terms with unlike signs is negative.

For example:

1. $(x)(3y)(z) = 3xyz$

2. $(-x)(3y)(z) = -3xyz$

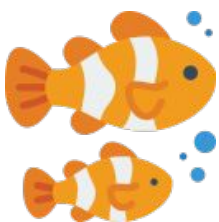
- B. We can add the exponents of the same bases in case of multiplication as $a^m * a^n = a^{m+n}$.

For example:

1. $x^3 * x^2 = x^{3+2} = x^5$

2. $2x^3 * 4x^2 = 8x^{3+2} = 8x^5$

Multiplication of algebraic expressions is done by multiplying each term of the polynomial by the other and then taking the algebraic sum of these products.



ILLUSTRATIVE EXAMPLES

Solve for the product of these algebraic expressions.

1. $5(a+b)$ 2. $(4a)(ac) + 2b(b+1)$ 3. $(x - 2)(8x + 3)$

Solution:

1.) $5(a+b) = 5a + 5b$ (*Distributive property*)

2. $(4a)(ac) + 2b(b+1) = 4a^2c + 2b^2 + 2b$

3. $(x - 2)(8x + 3) = (x)(8x) + (x)(3) - (2)(8x) + (-2)(3)$
 $= 8x^2 + 3x - 16x - 6$
 $= 8x^2 - 13x - 6$



PRACTICE EXERCISES

Solve for the product of these algebraic expressions.

1. $-4x^5(x+2y)$ 2. $(3c^2)(c^6) + 5c(c + 2)$ 3. $(2x - 7)(3x - 1)$

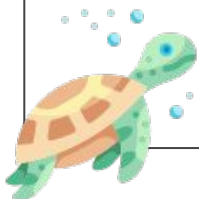


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SAVE OUR OCEANS DAY

G8
Basic

Solve for the product of the following algebraic expressions as an act of supporting the advocacy of saving our oceans.

1.) $2 \square 3a$

2.) $3b \square 5$

3.) $4c \square 2$

4.) $4 \square 5d$

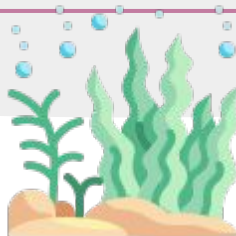
5.) $7e \square 4f$

6.) $6g \square 6h$

7.) $9j \square 7k$



8.) $8m \square 9m$



DEFEND THE SHARK ATTACK

G8
Basic

Defend a shoal of fish from a shark attack by getting the product of the following expressions and match it with the choices below. Make sure that you include your complete solution.

1. $2e \square -3e$



2. $5f \square -g$

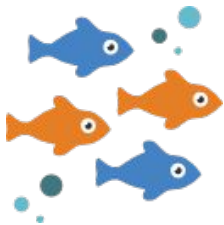
3. $-2h \square 6j$



4. $-7k \square -8m$

5. $12n \square 4n$

6. $-7p \square -11q$



7. $9r \square -13r$

8. $-17s \square 13t$

A. $-5fg$

D. $-12hj$

G. $48n^2$

B. $-6e^2$

E. $-221st$

H. $77pq$

C. $72km$

F. $-117r^2$

I. $-6e^3$



BLUFFING ABOVE THE WATERS

G8
Basic

Can you tell if these sea creatures are bluffing? Make sure to identify which of these given statements are correct by writing TRUE. Otherwise, make the necessary corrections.

	1. To get $5g^2$, you should multiply $5g$ to g^2 .
	2. If we multiply $-3x$ to $-7x$, the answer is negative.
	3. The degree of the product of $-4x^2$ and $2x$ is 3.
	4. The product of $-3x$ and $4x - 3$ is $9x - 12x^2$.
	5. If we multiply two algebraic expressions that are both fractions, the answer is always a fraction.
	6. The product of $\frac{2x}{3}$ and $6x$ is equal to $4x^2$.



THE MISSING OCTOPUS

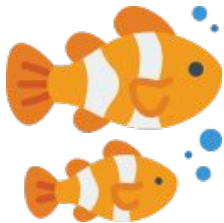
G8
Basic

Help this octopus find his way home by completing the equations below. Provide a checking for your answer.



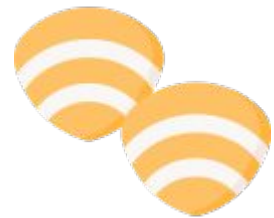
$$5.) \quad \underline{\hspace{2cm}} \square -6h = 72gh$$

$$4.) \quad \underline{\hspace{2cm}} \square 12f = -156ef$$



$$3.) \quad 9c \square \underline{\hspace{2cm}} = 36cd$$

$$2.) \quad 5b \square \underline{\hspace{2cm}} = 30b$$



$$1.) \quad 4 \square \underline{\hspace{2cm}} = 12a$$



MATH BATTLE WITH SEA TURTLE

G8
Basic

Are you in game to a math battle with the smartest sea turtle in the ocean? Try to answer these questions and prove that you can beat him!

- 1.) What is the area of the rectangular marine portion that is under monitoring if the length is $5ab$ and the width is $2ac$ in terms of a , b and c ?
- 2.) William High School of Fisheries has an aquatic field with each side is expressed as $3xy$. What is the area of the field in terms of x and y ?
- 3.) James rode $3x$ miles on a boat and Amie rode $5x$ miles on hers in a week. In terms of x , what is the total number of miles they rode in 3 weeks?
- 4.) A motor boat travels at a rate of $4x^2$. What is the distance this motor boat will travel in $(3x - 8)$ hours?



MARINE SAVER TEST

G9
Advanced

Help Omar pass the qualifying exam of becoming a marine saver.
Encircle the letter of your answer.

- 1.) Justin used the mathematical statement below to show he could change an expression and still get the same answer on both sides: $6 \times (12 \times 7) = (6 \times 12) \times 7$. What mathematical property did Justin use?
 - a. Identity Property of Multiplication
 - b. Commutative Property of Multiplication
 - c. Distributive Property of Multiplication over Addition
 - d. Associative Property of Multiplication

- 2.) Paula has a rectangular garden whose length is $2x^4$ and whose width is x^3 . What is the area of her garden in terms of x ?
 - a. $2x^7$
 - b. $3x^7$
 - c. $2x^{12}$
 - d. $3x^{12}$

- 3.) If $3x^2$ is multiplied by $-5xy^3$ raised to the second power, what would be its answer?
 - a. $30x^4y^6$
 - b. $-75x^4y^6$
 - c. $225x^6y^6$
 - d. $75x^4y^6$

- 4.) Express the product of $-8u^3v$ and the quantity $3u - 2v$ in simplified form.
 - a. $-24u^4v + 16u^3v^2$
 - b. $-11u^3v + 10u^3v^4$
 - c. $24u^4v - 3v$
 - d. $-24u^3v + 27u^3v^2$



MATCH WITH THE JELLYFISH

Play a match with this jellyfish by determining the letter of the correct answer per item. Make sure not to get stung by it!

1.) $-10(11 - 12x) - 2(3x - 1)$

2.) $-4(x + 2) - 9(-2x + 3)$

3.) $-7(-19x - 13) + 14(x - 2)$

4.) $-3(7x - 11) - 5(2 - 9x)$

A. $147x + 63$

B. $114x - 108$

C. $24x + 23$

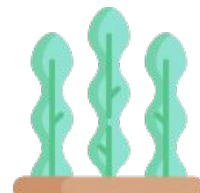
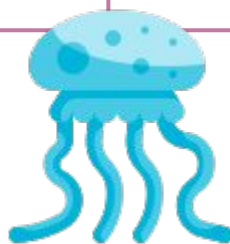
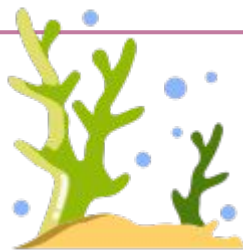
D. $14x - 35$

1.

2.

3.

4.



MR. SEAHORSE SAYS

G9
Advanced

Listen to what Mr. Seahorse is saying about these algebraic expressions. Don't miss out the trivia at the bottom page!



1.) What will you multiply to $-12x^4$ to get $30x^6y$?

2.) What should be placed in the blank in the equation $4x^5y^2 \square 3x^2y = \underline{\hspace{2cm}} \square 2x^2y$ to make both sides equal?

3.) What will you get if you square the product of $-3x^3y$ and $2y^5$?



TRIVIA: The female deposits fertilized eggs into the male's pouch, where they gestate safely. Males seen expelling the hatchlings from their pouch gave rise to the old wives tale that males were the ones giving birth.

Source: <https://www.leisurepro.com/blog/explore-the-blue/10-fun-facts-about-seahorses/>



OMAR THE OCEAN DRIVER

G9
Advanced

Aside from taking care of the ocean, Omar is also a math enthusiast. Can you solve these given?

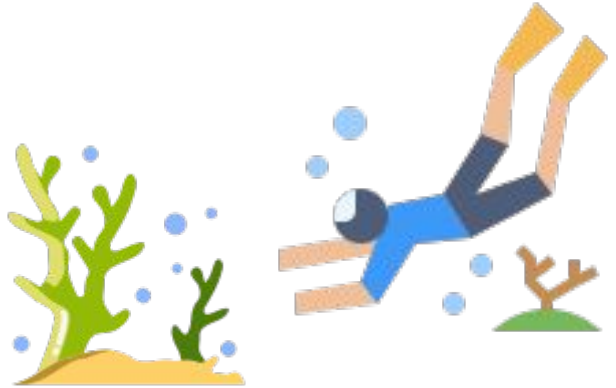
Multiply the following.

1.) $6x(3x - 2)(2x + 5)$

2.) $-4(7x - 8)(7x + 8)$

3.) $-3x(2x - 5)^2$

4.) $(x - 2)(x + 2)(x + 2)^3$



Solution here:



ISLAND PROBLEMS

G9
Advanced

Solve the following word problems to become a volunteer in saving the seas and oceans.

- 1.) A number, x , increased by 5 is multiplied by the same number, x , increased by 7. What is the product of the two numbers in terms of x ?
- 2.) Kyle's marine sanctuary has an area that can be expressed as the trinomial $x^2 + 6x + 9$. In terms of x , what are the dimensions of the sanctuary?
- 3.) The dimensions of a rectangular prism-shaped aquarium can be expressed as $x + 2$, $x - 3$, and $x + 5$. In terms of x , what is the volume of the aquarium?
- 4.) The area of the base of a prism-shaped aquarium can be expressed as $x^2 + 3x + 2$ and the height of the prism can be expressed as $x - 5$. What is the volume of this prism in terms of x ?



ANSWER GUIDE

Activity 1

- | | | |
|---------|----------|----------------------|
| 1.) 6a | 4.) 20d | 7.) 63jk |
| 2.) 15b | 5.) 28ef | 8.) 72m ² |
| 3.) 6c | 6.) 36gh | |

Activity 2

- | | | |
|-------|-------|-------|
| 1.) B | 4.) C | 7.) F |
| 2.) A | 5.) G | 8.) E |
| 3.) D | 6.) H | |

Activity 3

- | | |
|-------------------------|------------------------|
| 1.) 5g - 5 | 4.) True |
| 2.) Negative - positive | 5.) Always - sometimes |
| 3.) True | 6.) True |

Activity 4

- | | |
|--------|----------|
| 1.) 3a | 4.) -13e |
| 2.) 6 | 5.) -12g |
| 3.) 4d | |

Activity 5

- | | |
|------------------------------------|---|
| 1.) 10a ² bc | 4.) 12x ³ - 32x ² |
| 2.) 9x ² y ² | |
| 3.) 24x | |



ANSWER GUIDE

Activity 6

1.) B

2.) A

3.) D

4.) A

Activity 7

1.) B

2.) D

3.) A

4.) C

Activity 8

1.) $2.5x^2y$

2.) $6x^5y^2$

3.) $36x^6y^{12}$

Activity 9

1.) $36x^3 + 66x^2 - 60x$

2.) $-196x^2 + 256$

3.) $-12x^3 + 60x^2 - 75x$

4.) $x^5 + 6x^4 + 8x^3 - 16x^2 - 48x - 32$

Activity 10

1.) $x^2 + 12x + 35$

2.) $(x + 3)(x + 3)$

3.) $x^3 + 4x^2 - 11x - 30$

4.) $x^3 - 2x^2 - 13x - 10$



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