



8th
Basic

9th
Advanced

Helping With Math

USA
GRADES

Subtraction of Radical Expressions

*Suitable for students
aged 12-14*

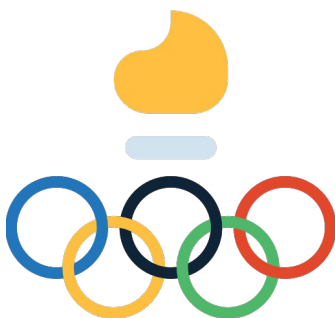


This pack is suitable for learners aged 12 to 14 years old or 8th to 9th graders (USA). The content covers fact files and relevant basic and advanced activities involving subtraction of radical expressions.

A radical expression is a numerical expression or algebraic expression with radical symbol.

To subtract **radical expressions**, you should remember the following:

- ❑ The indices and the term inside the **radical** (called the radicand) must be exactly alike.
- ❑ If the indices and radicands are alike, then combine the terms in front of each like **radical expressions**.
- ❑ If the indices or radicands are not the same, then you can not subtract the **radical expressions**.



For example:

1.) $3\sqrt{5x} - 5\sqrt{5x} = ?$

2.) $-\sqrt{7x} - 3\sqrt{7x} = ?$



SUBTRACTING RADICAL EXPRESSIONS

Solve for the difference of the following radical expressions.

- 1.) $(-2\sqrt{2x} - 5\sqrt{2x}) - 4\sqrt{2x}$
- 2.) $8\sqrt{2ab} - (-\sqrt{2ab}) - 10\sqrt{2ab}$
- 3.) $12\sqrt[3]{5ab} - 8\sqrt[3]{5ab} - 4\sqrt[3]{5ab}$
- 4.) $21\sqrt[3]{15xy} - 13\sqrt[3]{15xy} - 5\sqrt[3]{15xy}$



Solution:

1.) $(-2\sqrt{2x} - 5\sqrt{2x}) - 4\sqrt{2x} = ?$

Check if the indices and radicands are similar before performing addition.

$$\begin{aligned} &= (-2\sqrt{2x} - 5\sqrt{2x}) - 4\sqrt{2x} = (-2 - 5)\sqrt{2x} - 4\sqrt{2x} \\ &= -7\sqrt{2x} - 4\sqrt{2x} = -11\sqrt{2x} \end{aligned}$$

2.) $8\sqrt{2ab} - (-\sqrt{2ab}) - 10\sqrt{2ab} = ?$

$$\begin{aligned} &= 8\sqrt{2ab} - (-\sqrt{2ab}) - 10\sqrt{2ab} = (8 + 1 - 10)\sqrt{2ab} \\ &= (9 - 10)\sqrt{2ab} = -\sqrt{2ab} \end{aligned}$$

This part is left for you to solve.

3.) $12\sqrt[3]{5ab} - 8\sqrt[3]{5ab} - 4\sqrt[3]{5ab}$

4.) $21\sqrt[3]{15xy} - 13\sqrt[3]{15xy} - 5\sqrt[3]{15xy}$



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WELCOME TO SUMMER OLYMPICS

G8
Basic

Let's welcome everyone to the Summer Olympics this year by solving the difference of the following radical expressions.

1) $5\sqrt{3x} - 3\sqrt{3x}$

2) $3\sqrt{5x} - 5\sqrt{5x}$

3) $-\sqrt{7x} - 3\sqrt{7x}$

4) $-2\sqrt{6x} - 4\sqrt{6x}$

5) $-\sqrt{13x} - \sqrt{13x}$

6) $\sqrt{6x} - \sqrt{6x}$

7) $12\sqrt{11x} - (-13\sqrt{11x})$

8) $-5\sqrt{17x} - (-3\sqrt{17x})$



THE TORCH BEARER

G8
Basic

Guide the Olympic Torch Bearer on his way to the stage by finding the difference of these radical expressions.

$$6) -3\sqrt[3]{ab} - 5\sqrt[3]{ab} - (-\sqrt[3]{ab}) - (-\sqrt[3]{ab})$$

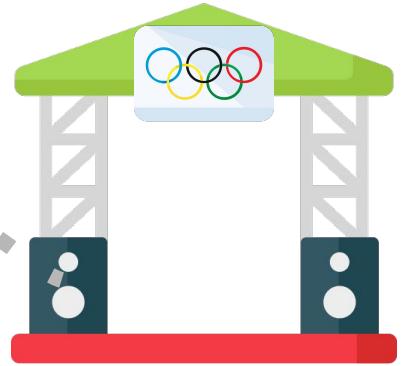
$$5) 12\sqrt[3]{15ab} - 3\sqrt[3]{15ab} - 5\sqrt[3]{15ab}$$

$$4) 5\sqrt[3]{5ab} - 2\sqrt[3]{5ab} - \sqrt[3]{5ab}$$

$$3) 6\sqrt{2ab} - (-\sqrt{2ab}) - 3\sqrt{2ab}$$

$$2) (-2\sqrt{7ab} - 5\sqrt{7ab}) - 2\sqrt{7ab}$$

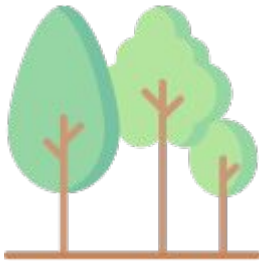
$$1) 5\sqrt{13ab} - (3\sqrt{13ab} - \sqrt{13ab})$$



THE FINEST VOLLEYBALL PLAYERS

G8
Basic

Assist these finest volleyball players on their way to their dorm by identifying the letter of the correct answer on each item.



1) $4x\sqrt{5xy} - 4x\sqrt{5xy}$

2) $6x\sqrt{7xy} - 8x\sqrt{7xy}$

3) $-19\sqrt{19xy} - 19\sqrt{19xy}$

4) $-\sqrt{15xy} - (-3\sqrt{15xy})$

5) $5y\sqrt{11xy} - (-3y\sqrt{11xy})$

6) $-3\sqrt{29xy} - 6\sqrt{29xy}$



A. $-9\sqrt{29xy}$

B. $-38\sqrt{19xy}$

C. $2\sqrt{15xy}$

D. $-8x\sqrt{5xy}$

E. $-2x\sqrt{7xy}$

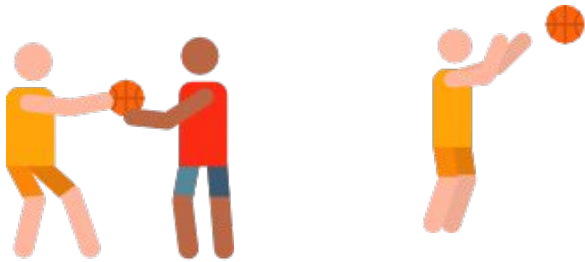
F. $8y\sqrt{11xy}$



NO ROOM FOR TURNOVERS

G8
Basic

As the olympics already started, Coach Phil reminded his basketball team to free themselves with any error. Make sure to also free your answers from error in completing the following.



1.) $5\sqrt{7}m - \underline{\hspace{2cm}} = -\sqrt{7}m$

2.) $-4\sqrt{5}m - \underline{\hspace{2cm}} = -7\sqrt{5}m$

3.) $7\sqrt{21}m - \underline{\hspace{2cm}} = 5\sqrt{21}m$

4.) $\underline{\hspace{2cm}} - 4\sqrt{3}m = -9\sqrt{3}m$

5.) $\underline{\hspace{2cm}} - 5\sqrt{10}m = 10\sqrt{10}m$

6.) $\underline{\hspace{2cm}} - 2\sqrt{99}m = 4\sqrt{99}m$

Space for solution:



THE BEST HOCKEY TEAM

G8

Basic

Looks like the best hockey team is having a good time in remembering their lessons about radical expressions. Help them complete this task.

$$1) -5h\sqrt{3h^2} - 2h\sqrt{27h^2}$$

$$2) h\sqrt{24h^2} - 5h\sqrt{6h^2}$$

$$3) -h\sqrt{3h^4} - 3h\sqrt{12h^4}$$

$$4) 7h\sqrt{54h^4} - 4h\sqrt{6h^4}$$



BREAK A LEG

G9
Advanced

We usually say “break a leg” to our team or someone who is about to participate in a contest or game. Imagine that you will be sent as a contestant in a game. We wish you to break a leg by solving these radical expressions.

$$1) -5\sqrt{5c^2d^2} - \sqrt{5c^2d^2} - \sqrt{5c^2d^2}$$

$$2) -2\sqrt{20j^2k^4} - 4\sqrt{125j^2k^4} - \sqrt{5j^2k^4}$$

$$3) 2\sqrt{48r^4s^2} - 2\sqrt{12r^4s^2} - 3\sqrt{27r^4s^2}$$

$$4) -3\sqrt{18tv^2} - 3v\sqrt{8t} - \sqrt{32tv^2}$$



BRING HOME THE BACON

G9
Advanced

Bring home the bacon means to bring something rewarding upon returning home. If there will be a reward once you got a perfect score

$$1) -2\sqrt{3y^2} - 2\sqrt{27y^2}$$

$$2) 3\sqrt{54y^2} - 3\sqrt{24y^2}$$



$$3) 5\sqrt{75y^2} - 5\sqrt{12y^2} - 5\sqrt{27y^2}$$

$$4) 2\sqrt{20y^2} - 3\sqrt{5y^2} - 3\sqrt{45y^2}$$



THE OLYMPIC MEDALISTS

G9
Advanced

Here are the olympic medalists! Make sure to give them the correct medal and award by solving the following correctly.

- 1.) Complete the equation $\sqrt{3}bc - \underline{\hspace{2cm}} = -5\sqrt{3}bc$
- 2.) What will you subtract from $\sqrt{20}hk$ to get $-3\sqrt{5}hk$?
- 3.) If the subtrahend is $-4\sqrt{5}dg$ and the difference is $\sqrt{5}dg$, what is the minuend?
- 4.) From what expression should $7\sqrt{3}xy$ be subtracted to get $-10\sqrt{3}xy$?



THE AMAZING WEIGHTLIFTERS

G9
Advanced

Look at these amazing weightlifters! Aside from the weights they are also solving some math problems. Can you help them answer it all?

- 1.) Fill in the blank with the missing term..
 $3\sqrt{6y^3} - \underline{\hspace{2cm}} + 2y\sqrt{54y} = 5y\sqrt{6y}$



- 2.) Fill in the blank with the missing term..
 $\underline{\hspace{2cm}} - 2x\sqrt{50y^4x} - 3\sqrt{18y^4x^3} = -17y^2x\sqrt{2x}$



CHESS GRANDMASTERS

G9
Advanced

The chess players are using their critical thinking and imagination to win a game. Their strategy is vital to get a win. Apply the concept of critical thinking and reasoning to answer the following problems.

1.) Can we subtract radicals with different variables? Why or why not?

2.) How do we subtract radical expressions? Explain in your own words.

3.) Can we apply rationalization when dealing with subtraction of radical expressions? Why or why not? _____



ANSWER GUIDE

Activity 1

- 1.) $2\sqrt{3x}$ 2.) $-2\sqrt{5x}$ 3.) $-4\sqrt{7x}$ 4.) $-6\sqrt{6x}$
5.) $-2\sqrt{13x}$ 6.) 0 7.) $25\sqrt{11x}$ 8.) $8\sqrt{17x}$

Activity 2

- 1.) $3\sqrt{13ab}$ 2.) $-9\sqrt{7ab}$ 3.) $4\sqrt{2ab}$
4.) $2\sqrt[3]{5ab}$ 5.) $4\sqrt[3]{15ab}$ 6.) $-6\sqrt[3]{ab}$

Activity 3

- 1.) D 2.) E 3.) B 4.) C 5.) F 6.) A

Activity 4

- 1.) $6\sqrt{7m}$ 2.) $3\sqrt{7m}$ 3.) $2\sqrt{21m}$
4.) $-5\sqrt{3m}$ 5.) $15\sqrt{10m}$ 6.) $6\sqrt{99m}$

Activity 5

- 1.) $-11h^2\sqrt{3}$ 2.) $-3h^2\sqrt{6}$ 3.) $-7h^3\sqrt{3}$ 4.) $-17h^3\sqrt{6}$

Activity 6

- 1.) $-7cd\sqrt{5}$ 2.) $-25jk^2\sqrt{5}$ 3.) $-5r^2s\sqrt{3}$ 4.) $-19v\sqrt{2t}$



ANSWER GUIDE

Activity 7

1.) $-8y\sqrt{3}$ 2.) $3y\sqrt{6}$ 3.) 0 4.) $-8y\sqrt{5}$

Activity 8

1.) $6\sqrt{3bc}$ 2.) $5\sqrt{5hk}$ 3.) $-3\sqrt{5dg}$ 4.) $-3\sqrt{3xy}$

Activity 9

1.) $2\sqrt{24y^3}$ or $4y\sqrt{6y}$ 2.) $2y^2\sqrt{2x^3}$

Activity 10

- 1.) No. As explained in the rules, in order to subtract radical expressions, the indices and radicands should be similar.
- 2.) Answers may vary
- 3.) We cannot apply rationalization in subtracting radicals because it is only used whenever we divide radicals/radical expressions.



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