

# 6:08 | Addition and Subtraction of Surds

Name: \_\_\_\_\_

Class: \_\_\_\_\_

## Examples



We add and subtract like surds just as in algebra.

Simplify.

$$\begin{aligned} 1 \quad & 8\sqrt{6} - 3\sqrt{6} \\ & = 5\sqrt{6} \end{aligned}$$

$$\begin{aligned} 2 \quad & 5\sqrt{2} + 7\sqrt{2} \\ & = 12\sqrt{2} \end{aligned}$$

$$\begin{aligned} 3 \quad & 4\sqrt{7} + 2\sqrt{5} - 3\sqrt{7} + 8\sqrt{5} \\ & = 4\sqrt{7} - 3\sqrt{7} + 2\sqrt{5} + 8\sqrt{5} \\ & = \sqrt{7} + 10\sqrt{5} \end{aligned}$$

$$\begin{aligned} 4 \quad & 4\sqrt{2} + \sqrt{50} - \sqrt{2} \\ & = 4\sqrt{2} + 5\sqrt{2} - \sqrt{2} \\ & = 8\sqrt{2} \end{aligned}$$

$$\begin{aligned} 5 \quad & \sqrt{45} + 2\sqrt{5} + 7\sqrt{5} \\ & = 3\sqrt{5} + 2\sqrt{5} + 7\sqrt{5} \\ & = 12\sqrt{5} \end{aligned}$$

## Exercise

1 Simplify.

a  $3\sqrt{5} + \sqrt{5}$

b  $2\sqrt{7} - \sqrt{7}$

c  $\sqrt{6} + \sqrt{6}$

d  $5\sqrt{3} + \sqrt{3}$

e  $8\sqrt{10} - 3\sqrt{10}$

f  $6\sqrt{11} + 7\sqrt{11}$

g  $6\sqrt{2} + 9\sqrt{2}$

h  $3\sqrt{5} - 3\sqrt{5}$

i  $15\sqrt{15} - 14\sqrt{15}$

j  $17\sqrt{6} - 6\sqrt{6}$

k  $3\sqrt{13} + 9\sqrt{13}$

l  $5\sqrt{2} - 8\sqrt{2}$

2 Simplify by collecting like surds.

a  $5\sqrt{3} + \sqrt{2} + \sqrt{3}$

b  $6\sqrt{5} - 4\sqrt{3} + 7\sqrt{3}$

c  $2\sqrt{6} + 7\sqrt{6} - 3\sqrt{3}$

d  $2\sqrt{6} + 4\sqrt{5} - 5\sqrt{6}$

e  $5\sqrt{2} + 4\sqrt{3} - 7\sqrt{2}$

f  $3\sqrt{5} - 4\sqrt{2} + \sqrt{5}$

g  $2\sqrt{10} + 5\sqrt{10} - 8\sqrt{10}$

h  $3\sqrt{7} + 3\sqrt{3} - 4\sqrt{3}$

i  $4\sqrt{5} - 2\sqrt{5} + \sqrt{5}$

j  $\sqrt{3} - 2\sqrt{2} - 3\sqrt{2}$

k  $6\sqrt{2} - 7\sqrt{6} - 2\sqrt{2}$

l  $12\sqrt{2} + 6\sqrt{2} + 3\sqrt{2}$

m  $4\sqrt{7} - 3\sqrt{7} + 4\sqrt{11} - \sqrt{7}$

n  $8\sqrt{10} - 3\sqrt{10} - 5\sqrt{15} + \sqrt{15}$

o  $3\sqrt{7} - 4\sqrt{6} + 2\sqrt{6} - \sqrt{7}$

p  $\sqrt{2} + 5\sqrt{5} - 2\sqrt{2} - 3\sqrt{5}$

q  $\sqrt{7} + 3\sqrt{11} - \sqrt{11} + 5\sqrt{7}$

r  $4\sqrt{6} - 3\sqrt{6} + 5\sqrt{6} - 6\sqrt{3}$

3 Simplify, then collect like surds.

a  $\sqrt{2} + \sqrt{18}$

b  $\sqrt{6} + \sqrt{24}$

c  $\sqrt{12} - \sqrt{3}$

d  $\sqrt{20} + 5\sqrt{5}$

e  $\sqrt{8} + 5\sqrt{2}$

f  $\sqrt{27} + 4\sqrt{3}$

g  $\sqrt{32} - 3\sqrt{2}$

h  $\sqrt{90} - \sqrt{10}$

i  $10\sqrt{3} - \sqrt{48}$

j  $\sqrt{45} + \sqrt{5}$

k  $\sqrt{75} - 2\sqrt{3}$

l  $\sqrt{72} - 3\sqrt{2}$

### 6:o8 Addition and Subtraction of Surds

- |                            |                             |                           |                           |
|----------------------------|-----------------------------|---------------------------|---------------------------|
| 1 a $4\sqrt{5}$            | b $\sqrt{7}$                | c $2\sqrt{6}$             | d $6\sqrt{3}$             |
| e $5\sqrt{10}$             | f $13\sqrt{11}$             | g $15\sqrt{2}$            | h 0                       |
| i $\sqrt{15}$              | j $11\sqrt{6}$              | k $12\sqrt{13}$           | l $-3\sqrt{2}$            |
| 2 a $6\sqrt{3} + \sqrt{2}$ | b $6\sqrt{5} + 3\sqrt{3}$   | c $9\sqrt{6} - 3\sqrt{3}$ | d $4\sqrt{5} - 3\sqrt{6}$ |
| e $-2\sqrt{2} + 4\sqrt{3}$ | f $4\sqrt{5} - 4\sqrt{2}$   | g $-\sqrt{10}$            | h $3\sqrt{7} - \sqrt{3}$  |
| i $3\sqrt{5}$              | j $\sqrt{3} - 5\sqrt{2}$    | k $4\sqrt{2} - 7\sqrt{6}$ | l $21\sqrt{2}$            |
| m $4\sqrt{11}$             | n $5\sqrt{10} - 4\sqrt{15}$ | o $2\sqrt{7} - 2\sqrt{6}$ | p $-\sqrt{2} + 2\sqrt{5}$ |
| q $6\sqrt{7} + 2\sqrt{11}$ | r $6\sqrt{6} - 6\sqrt{3}$   |                           |                           |
| 3 a $4\sqrt{2}$            | b $3\sqrt{6}$               | c $\sqrt{3}$              | d $7\sqrt{5}$             |
| e $7\sqrt{2}$              | f $7\sqrt{3}$               | g $\sqrt{2}$              | h $2\sqrt{10}$            |
| i $6\sqrt{3}$              | j $4\sqrt{5}$               | k $3\sqrt{3}$             | l $3\sqrt{2}$             |