

Boost Free Lessons - Year 10 Maths

Lesson 8: Simplifying Surds

Name: _____ Grade: _____ Date: _____

Worked Example 1

Simplify $\sqrt{72}$

1. Look for the largest perfect square that divides 72. The perfect squares are 4, 9, 16, 25, 36 and so on.
2. 36 divides into 72, because $72 = 36 \times 2$.
3. Split the surd: $\sqrt{72} = \sqrt{36} \times \sqrt{2}$.
4. $\sqrt{36} = 6$, so the answer is $6\sqrt{2}$.

= $6\sqrt{2}$

Worked Example 2

Simplify $3\sqrt{8} + \sqrt{50}$

1. Simplify each surd on its own first.
2. $\sqrt{8} = \sqrt{4} \times \sqrt{2} = 2\sqrt{2}$, so $3\sqrt{8} = 6\sqrt{2}$.
3. $\sqrt{50} = \sqrt{25} \times \sqrt{2} = 5\sqrt{2}$.
4. Both are now like surds, so add the numbers in front: $6 + 5 = 11$.

= $11\sqrt{2}$

Remember: Take out the largest perfect square factor. You can only add or subtract surds when the number under the root is the same, and $\sqrt{a} \times \sqrt{a} = a$.



Question 1: Simplify the following surds.

1. $\sqrt{8}$

2. $\sqrt{12}$

3. $\sqrt{18}$

4. $\sqrt{20}$

5. $\sqrt{27}$

6. $\sqrt{32}$

7. $\sqrt{45}$

8. $\sqrt{48}$

9. $\sqrt{50}$

10. $\sqrt{75}$



Question 2: Simplify the following.

1. $\sqrt{2} + 3\sqrt{2}$

2. $5\sqrt{3} - 2\sqrt{3}$

3. $\sqrt{8} + \sqrt{2}$

4. $\sqrt{27} - \sqrt{12}$

5. $\sqrt{3} \times \sqrt{3}$

6. $\sqrt{2} \times \sqrt{8}$

7. $2\sqrt{5} \times 3\sqrt{5}$

8. $\sqrt{18} + \sqrt{50}$



Question 3: Answer the following questions.

1. Simplify $\sqrt{200}$.
2. Simplify $\sqrt{12} + \sqrt{75}$.
3. A square has an area of 48 cm^2 . Find its exact side length.
4. Simplify $4\sqrt{6} \times 2\sqrt{6}$.
5. Explain why $\sqrt{2} + \sqrt{3}$ cannot be simplified.





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Answers: Simplifying Surds**Question 1**

- | | |
|----------------|-----------------|
| 1. $2\sqrt{2}$ | 6. $4\sqrt{2}$ |
| 2. $2\sqrt{3}$ | 7. $3\sqrt{5}$ |
| 3. $3\sqrt{2}$ | 8. $4\sqrt{3}$ |
| 4. $2\sqrt{5}$ | 9. $5\sqrt{2}$ |
| 5. $3\sqrt{3}$ | 10. $5\sqrt{3}$ |

Question 2

- | | |
|----------------|----------------|
| 1. $4\sqrt{2}$ | 5. 3 |
| 2. $3\sqrt{3}$ | 6. 4 |
| 3. $3\sqrt{2}$ | 7. 30 |
| 4. $\sqrt{3}$ | 8. $8\sqrt{2}$ |

Question 3

1. $10\sqrt{2}$
2. $7\sqrt{3}$
3. $4\sqrt{3}$ cm
4. 48
5. They are unlike surds, with different numbers under the root, so they cannot be combined.

