Surds

Simplify, multiply, divide, add, and subtract surds.

Name _____ **Date** _____

Show your method

Find the largest perfect-square factor to simplify a surd. To multiply or divide, combine both surds under one root first, then simplify.

Worked example

Simplify $\sqrt{72}$.

$$\boxed{\sqrt{72}} = \boxed{\sqrt{36 \times 2}} = \boxed{\sqrt{36} \times \sqrt{2}} = \boxed{6\sqrt{2}}$$

largest square factor — split the root — $\sqrt{36} = 6$

$$\sqrt{72} = \sqrt{36 \times 2}$$
$$= \sqrt{36} \times \sqrt{2}$$
$$= 6\sqrt{2}$$

1. Simplify $\sqrt{80}$.

$\boxed{\sqrt{80}} = \boxed{\sqrt{16 \times 5}} = \boxed{\sqrt{16} \times \sqrt{5}} = \boxed{4\sqrt{5}}$

largest square factor — split the root — $\sqrt{16} = 4$

2. Simplify $\sqrt{54}$.

$\boxed{\sqrt{54}} = \boxed{\sqrt{9 \times 6}} = \boxed{\sqrt{9} \times \sqrt{6}} = \boxed{3\sqrt{6}}$

largest square factor — split the root — $\sqrt{9} = 3$

3. Simplify $\sqrt{28}$.

$\boxed{\sqrt{28}} = \boxed{\sqrt{4 \times 7}} = \boxed{\sqrt{4} \times \sqrt{7}} = \boxed{2\sqrt{7}}$

largest square factor — split the root — $\sqrt{4} = 2$

4. Simplify $\sqrt{2} \times \sqrt{18}$.

$\boxed{\sqrt{2} \times \sqrt{18}} = \boxed{\sqrt{2 \times 18}} = \boxed{\sqrt{36}} = \boxed{6}$

one root — multiply — simplify

5. Simplify $\sqrt{32} \div \sqrt{2}$.

$\boxed{\sqrt{32} \div \sqrt{2}} = \boxed{\sqrt{\frac{32}{2}}} = \boxed{\sqrt{16}} = \boxed{4}$

one root — divide — simplify

6. Simplify $\sqrt{7} \times \sqrt{7}$.

$\boxed{\sqrt{7} \times \sqrt{7}} = \boxed{\sqrt{7 \times 7}} = \boxed{\sqrt{49}} = \boxed{7}$

one root — multiply — simplify

7. Simplify $5\sqrt{6} + 3\sqrt{6}$.

8. Simplify $9\sqrt{2} - 5\sqrt{2}$.

9. Is $\sqrt{24}$ fully simplified as $2\sqrt{6}$? Explain.

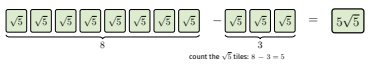
Surds (continued)

Combining like surds, harder simplifying, and rationalising a denominator.

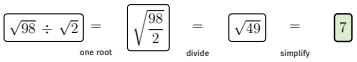
Name _____ **Date** _____

10. Simplify $4\sqrt{3} + 6\sqrt{3}$.

11. Simplify $8\sqrt{5} - 3\sqrt{5}$.



12. Simplify $\sqrt{98} \div \sqrt{2}$.



13. Simplify $\sqrt{3} \times \sqrt{48}$.

14. Simplify $\sqrt{72} \div \sqrt{8}$.

15. A square has side length $\sqrt{18}$ cm. Find its area.

16. Rationalise the denominator of $\frac{7}{\sqrt{7}}$.

17. Rationalise the denominator of $\frac{20}{\sqrt{5}}$.

18. Simplify $\sqrt{50} + \sqrt{8} - \sqrt{2}$.