Outcome 1 – Simplify Surds

Bronze examples…

Examples… $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

You need to know the perfect square numbers to simplify a surd!

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, …

$\sqrt{20} = \sqrt{4 \times 5}$
$= 2\sqrt{5}$

$\sqrt{90} = \sqrt{9 \times 10}$
$= 3\sqrt{10}$

Think of the BIGGEST perfect square number that divides into 20

Silver example

Examples… **Simplify all the surds then gather like terms**

Simplify…

$\sqrt{72} + \sqrt{2} + \sqrt{50}$

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

$\sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$

$= 6\sqrt{2} + \sqrt{2} + 5\sqrt{2}$
$= 12\sqrt{2}$

Gold examples

Examples… $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$

Simplify…

$\sqrt{7} \times \sqrt{12} = \sqrt{84}$
$= \sqrt{4 \times 21} = 2\sqrt{21}$

$\sqrt{3}(\sqrt{3} + \sqrt{6}) = 3 + \sqrt{18}$
$= 3 + \sqrt{9 \times 2} = 3 + 3\sqrt{2}$

Bronze Questions

Simplify the following surds…

1. $\sqrt{18}$
2. $\sqrt{40}$
3. $\sqrt{50}$
4. $\sqrt{28}$
5. $\sqrt{72}$
6. $\sqrt{80}$
7. $\sqrt{48}$
8. $\sqrt{75}$
9. $\sqrt{128}$
10. $\sqrt{147}$

Silver Questions

Simplify the following expressions…

1. $\sqrt{48} + \sqrt{12} + \sqrt{3}$
2. $\sqrt{18} + \sqrt{2} + \sqrt{8}$
3. $\sqrt{125} - \sqrt{20} + \sqrt{5}$
4. $\sqrt{700} + \sqrt{28} - \sqrt{7}$
5. $\sqrt{162} - \sqrt{32} - \sqrt{2}$
6. $\sqrt{10} + \sqrt{490} - \sqrt{250}$

Gold Questions

Simplify the following surds…

1. $\sqrt{8} \times \sqrt{12}$
2. $\sqrt{6} \times \sqrt{14}$
3. $\sqrt{20} \times \sqrt{2}$
4. $\sqrt{5} \times \sqrt{15}$
5. $\sqrt{8} \times \sqrt{10}$
6. $\sqrt{24} \times \sqrt{3}$
7. $\sqrt{5}(\sqrt{5} + \sqrt{8})$
8. $\sqrt{8}(\sqrt{8} + \sqrt{3})$
9. $\sqrt{6}(\sqrt{12} + \sqrt{6})$
10. $\sqrt{7}(\sqrt{8} + \sqrt{7})$

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Bronze Answers

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

Silver Answers

1. $7\sqrt{3}$
2. $6\sqrt{2}$
3. $4\sqrt{5}$
4. $11\sqrt{7}$
5. $4\sqrt{2}$
6. $3\sqrt{10}$

Gold Answers

1. $4\sqrt{3}$
2. $2\sqrt{21}$
3. $2\sqrt{10}$
4. $5\sqrt{3}$
5. $4\sqrt{5}$
6. $6\sqrt{2}$
7. $5 + 2\sqrt{10}$
8. $8 + 2\sqrt{6}$
9. $6\sqrt{2} + 6$
10. $2\sqrt{14} + 7$

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