# Timester Challenge

## Rationalising Surds

| | | |
|---|---|---|
| Rationalise $\frac{1}{\sqrt{5}}$ <br><br> Bronze | Rationalise the denominator and simplify $$\frac{7}{4\sqrt{3}}$$ <br> Silver | Simplify $$\frac{3\sqrt{5}}{2+\sqrt{5}}$$ <br> Gold |
| Express $\frac{9}{\sqrt{3}}$ in the form $a\sqrt{b}$, where a and b are positive integers. <br><br> Bronze | Write $\frac{\sqrt{50}+6}{\sqrt{2}}$ in the form of $a + b\sqrt{2}$, where a and b are integers. <br><br> Silver | Show that $\frac{6+2\sqrt{3}}{2-\sqrt{3}}$ can be simplified to $18 + 10\sqrt{3}$ . <br><br> Gold |

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### Answers

| | | |
|---|---|---|
| Rationalise $\frac{1}{\sqrt{5}}$<br>$\frac{1}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$<br>$= \frac{\sqrt{5}}{5}$<br>Bronze | Rationalise the denominator and simplify<br>$\frac{7}{4\sqrt{3}}$<br>$\frac{7}{4\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{7\sqrt{3}}{4 \times 3} = \frac{7\sqrt{3}}{12}$<br>Silver | Simplify<br>$\frac{3\sqrt{5}}{2+\sqrt{5}}$<br>$\frac{3\sqrt{5}}{(2+\sqrt{5})} \times \frac{(2-\sqrt{5})}{(2-\sqrt{5})} = \frac{6\sqrt{5} - 3 \times 5}{4-5}$<br>$= \frac{6\sqrt{5}-15}{-1} = 15 - 6\sqrt{5}$<br>Gold |
| Express $\frac{9}{\sqrt{3}}$ in the form $a\sqrt{b}$, where a and b are positive integers.<br>$\frac{9}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$<br>$= \frac{9\sqrt{3}}{3} = 3\sqrt{3}$<br>Bronze | Write $\frac{\sqrt{50}+6}{\sqrt{2}}$ in the form of $a + b\sqrt{2}$, where a and b are integers.<br>$\frac{\sqrt{50}+6}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{100}+6\sqrt{2}}{2}$<br>$= \frac{10+6\sqrt{2}}{2} = 5 + 3\sqrt{2}$<br>Silver | Show that $\frac{6+2\sqrt{3}}{2-\sqrt{3}}$ can be simplified to $18 + 10\sqrt{3}$ .<br>$\frac{(6+2\sqrt{3})}{(2-\sqrt{3})} \times \frac{(2+\sqrt{3})}{(2+\sqrt{3})}$<br>$= \frac{12 + 4\sqrt{3} + 6\sqrt{3} + 2 \times 3}{4-3}$<br>$= \frac{18+10\sqrt{3}}{1} = 18 + 10\sqrt{3}$<br>Gold |

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