

**Starter:**

1. Work out $\sqrt{36}$
2. List the first 10 square numbers
3. Write $\sqrt{32}$ in surd form
4. Write $\sqrt{27}$ in surd form

Skills:

1. Simplify $\sqrt{10} \times \sqrt{6}$. Write your answer in surd form.
2. Simplify $3\sqrt{2} \times \sqrt{6}$. Write your answer in surd form.
3. Simplify $\sqrt{8} + \sqrt{18}$. Write your answer in surd form.
4. Rationalise $\frac{7}{\sqrt{2}}$

Top Tips!

- Look for factors that are square numbers when writing roots in surd form
- $\sqrt{a} \times \sqrt{a} = a$
- $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$
- $\sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$
- Treat surds like algebraic like terms $3\sqrt{2} + 4\sqrt{2} = 7\sqrt{2}$
- To rationalise a surd you must rationalise the denominator

E.g. 1 Rationalise $\frac{2}{\sqrt{3}}$

Multiply the numerator and denominator by $\sqrt{3}$

$$= \frac{2 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{9}} = \frac{2\sqrt{3}}{3}$$

E.g. 2 Rationalise $\frac{7}{5+\sqrt{2}}$

Multiply the numerator and denominator by $5 - \sqrt{2}$

$$= \frac{7}{(5+\sqrt{2})} \times \frac{(5-\sqrt{2})}{(5-\sqrt{2})} = \frac{7(5-\sqrt{2})}{(25-2)} = \frac{7(5-\sqrt{2})}{23}$$

Examination Question:**2016 November (new) Mathematics U1 Higher Q17**

Simplify

$$\frac{(5\sqrt{3})^2 - 2\sqrt{18}}{\sqrt{32} \times \sqrt{2}}$$

and state whether your answer is rational or irrational.

Assessment for Learning

Video / QR code

**Starter:**

- Work out $\sqrt{36}$
6 (or -6)
- List the first 10 square numbers
1, 4, 9, 16, 25, 36, 49, 64, 81, 100
- Write $\sqrt{32}$ in surd form
 $4\sqrt{2}$
- Write $\sqrt{27}$ in surd form
 $3\sqrt{3}$

Skills:

- Simplify $\sqrt{10} \times \sqrt{6}$. Write your answer in surd form.
 $2\sqrt{15}$
- Simplify $3\sqrt{2} \times \sqrt{6}$. Write your answer in surd form.
 $6\sqrt{3}$
- Simplify $\sqrt{8} + \sqrt{18}$. Write your answer in surd form.
 $5\sqrt{2}$
- Rationalise $\frac{7}{\sqrt{2}}$
 $\frac{7\sqrt{2}}{2}$

Top Tips!

- Look for factors that are square numbers when writing roots in surd form
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- Treat surds like algebraic like terms $3\sqrt{2} + 4\sqrt{2} = 7\sqrt{2}$
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E.g. 2 Rationalise $\frac{7}{5+\sqrt{2}}$

Multiply the numerator and denominator by $5 - \sqrt{2}$

$$= \frac{7}{(5+\sqrt{2})} \times \frac{(5-\sqrt{2})}{(5-\sqrt{2})} = \frac{7(5-\sqrt{2})}{(25-2)} = \frac{7(5-\sqrt{2})}{23}$$

Examination Question:**2016 November (new) Mathematics U1 Higher Q17**

Simplify

$$\frac{(5\sqrt{3})^2 - \frac{2\sqrt{18}}{\sqrt{2}}}{\sqrt{32} \times \sqrt{2}}$$

and state whether your answer is rational or irrational.

Numerator: $(5\sqrt{3})^2 = 5\sqrt{3} \times 5\sqrt{3} = 25\sqrt{9} = 25 \times 3 = 75$
 $\frac{2\sqrt{18}}{\sqrt{2}} = \frac{6\sqrt{2}}{\sqrt{2}} = 6$
 $75 - 6 = 69$

Denominator: $\sqrt{32} \times \sqrt{2} = \sqrt{64} = 8$

Answer: $\frac{69}{8}$

The answer is rational as $\frac{69}{8}$ is a terminating decimal.

Assessment for Learning

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