hegartymaths

Simplifying surds

Getting ready for A-Level Maths...

*"The most important investment you can make is in **yourself**."*

Simplifying surds

What is a surd?

A **surd** is the answer to a root (square root, cube root etc) which is an **irrational** number (i.e. it is a non-terminating, non-recurring decimal).

Simplifying surds

Important rules

$$\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$$

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

Be careful...

$$\sqrt{a} + \sqrt{b} \neq \sqrt{a + b}$$

$$\sqrt{a} - \sqrt{b} \neq \sqrt{a - b}$$

Learn by heart...

1^2	$= 1 \times 1$	$= \mathbf{1}$
2^2	$= 2 \times 2$	$= \mathbf{4}$
3^2	$= 3 \times 3$	$= \mathbf{9}$
4^2	$= 4 \times 4$	$= \mathbf{16}$
5^2	$= 5 \times 5$	$= \mathbf{25}$
6^2	$= 6 \times 6$	$= \mathbf{36}$
7^2	$= 7 \times 7$	$= \mathbf{49}$
8^2	$= 8 \times 8$	$= \mathbf{64}$
9^2	$= 9 \times 9$	$= \mathbf{81}$
10^2	$= 10 \times 10$	$= \mathbf{100}$
11^2	$= 11 \times 11$	$= \mathbf{121}$
12^2	$= 12 \times 12$	$= \mathbf{144}$
13^2	$= 13 \times 13$	$= \mathbf{169}$
14^2	$= 14 \times 14$	$= \mathbf{196}$
15^2	$= 15 \times 15$	$= \mathbf{225}$

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How to simplify a surd

$\sqrt{20}$

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My turn

Simplify $\sqrt{50}$ by writing it in the form $a\sqrt{b}$ where b is prime. State the values of a and b.

$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$
$11^2 = 121$
$12^2 = 144$
$13^2 = 169$
$14^2 = 196$
$15^2 = 225$

Your turn

Simplify $\sqrt{32}$ by writing it in the form $a\sqrt{b}$ where b is prime. State the values of a and b.

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My turn

Simplify $6\sqrt{45}$ by writing it in the form $a\sqrt{b}$ where b is prime. State the values of a and b.

1^2	= **1**
2^2	= **4**
3^2	= **9**
4^2	= **16**
5^2	= **25**
6^2	= **36**
7^2	= **49**
8^2	= **64**
9^2	= **81**
10^2	= **100**
11^2	= **121**
12^2	= **144**
13^2	= **169**
14^2	= **196**
15^2	= **225**

Your turn

Simplify $7\sqrt{99}$ by writing it in the form $a\sqrt{b}$ where b is prime. State the values of a and b.

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My turn

Simplify $\frac{\sqrt{450}}{3}$ by writing it in the form $a\sqrt{b}$ where b is prime. State the values of a and b.

1^2	= **1**
2^2	= **4**
3^2	= **9**
4^2	= **16**
5^2	= **25**
6^2	= **36**
7^2	= **49**
8^2	= **64**
9^2	= **81**
10^2	= **100**
11^2	= **121**
12^2	= **144**
13^2	= **169**
14^2	= **196**
15^2	= **225**

Your turn

Simplify $\frac{\sqrt{288}}{4}$ by writing it in the form $a\sqrt{b}$ where b is prime. State the values of a and b.

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My turn

Show that $\sqrt{27}+\sqrt{192}= a\sqrt{b}$. State the values of a and b.

Your turn

Show that $\sqrt{28}+\sqrt{63}= a\sqrt{b}$. State the values of a and b.

1^2	= **1**
2^2	= **4**
3^2	= **9**
4^2	= **16**
5^2	= **25**
6^2	= **36**
7^2	= **49**
8^2	= **64**
9^2	= **81**
10^2	= **100**
11^2	= **121**
12^2	= **144**
13^2	= **169**
14^2	= **196**
15^2	= **225**

Simplifying surds

Review Exercise

1. Write down the first 15 square numbers from memory.

2. Simplify $\sqrt{72}$ by writing it in the form $a\sqrt{b}$ where b is prime.
State the values of a and b.

3. Simplify $5\sqrt{63}$ by writing it in the form $a\sqrt{b}$ where b is prime.
State the values of a and b.

4. Simplify $\frac{\sqrt{392}}{2}$ by writing it in the form $a\sqrt{b}$ where b is prime.
State the values of a and b.

5. Show that $\sqrt{32}+\sqrt{128}= a\sqrt{b}$. State the values of a and b.

Simplifying surds

Review Exercise (Answers)

1. Write down the first 15 square numbers from memory
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

2. Simplify $\sqrt{72}$ by writing it in the form $a\sqrt{b}$ where b is prime.
State the values of a and b. $6\sqrt{2}$

3. Simplify $5\sqrt{63}$ by writing it in the form $a\sqrt{b}$ where b is prime.
State the values of a and b. $15\sqrt{7}$

4. Simplify $\frac{\sqrt{392}}{2}$ by writing it in the form $a\sqrt{b}$ where b is prime.
State the values of a and b. $7\sqrt{2}$

5. Show that $\sqrt{32}+\sqrt{128}= a\sqrt{b}$ where b is prime.

State the values of a and b. $12\sqrt{2}$