Simplifying Surds (1)

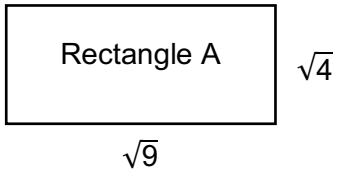
1 The table below shows a set of numbers. Shade in the numbers below that have at least one **factor** that is a square number bigger than 1. One has been done for you and full working is shown.

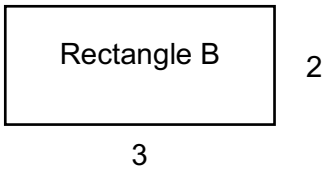
2	5	8	10	13
18	20	24	28	35
44	45	50	51	59
66	68	72	77	80
84	88	90	94	99

20 = 4 x 5, and 4 is a square number.

51 has factors: 1, 51, 3, 17. None of these are square numbers.

2 The diagrams below show two identical rectangles





a) Explain why the two rectangles are identical.

b) What is the relationship between the areas of the two rectangles?

Andy does some investigations about the areas of the two rectangles. His working out is shown below:

Rectangle A	Rectangle B
$A = l \times w$	$A = l \times w$
$A = \sqrt{9} \times \sqrt{4}$	$A = 3 \times 2$
$A = 3 \times 2$	$A = 6$
$A = 6$	$A = \sqrt{36}$
$A = \sqrt{36}$	$A = \sqrt{9 \times 4}$
$A = \sqrt{9 \times 4}$	

c) What do you notice about $\sqrt{4} \times \sqrt{9}$ and $\sqrt{4 \times 9}$?

d) Betsy says $\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$ is always true. Pick 5 different pairs of square numbers for a and b to see if it works for your numbers.

3 For this question you are going to use the numbers that you shaded in question **1**.

Using the numbers that you shaded in question **1**, simplify the square root of these numbers.

An example is shown below.

Example: Simplify $\sqrt{20}$

$\sqrt{20}$

$=\sqrt{4 \times 5}$

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

$=2 \times \sqrt{5}$

$=2\sqrt{5}$

4 Simplify the following surds into their simplest form. Show all of your working.

a) $\sqrt{8}$ b) $\sqrt{12}$ c) $\sqrt{24}$

d) $\sqrt{72}$ e) $\sqrt{144}$ f) $\sqrt{288}$

g) $\sqrt{432}$ h) $\sqrt{108}$ i) $\sqrt{27}$

j) $\sqrt{45}$ k) $\sqrt{90}$ l) $\sqrt{160}$

m) $\sqrt{1600}$ n) $\sqrt{\frac{1600}{100}}$ o) $\frac{\sqrt{1600}}{\sqrt{100}}$

p) $\sqrt{\frac{16}{9}}$ q) $\sqrt{\frac{16}{25}}$ r) $\frac{\sqrt{16}}{\sqrt{25}}$

s) $\frac{\sqrt{16}}{\sqrt{36}}$ t) $\frac{\sqrt{32}}{\sqrt{72}}$ u) $\sqrt{\frac{32}{72}}$

v) $\frac{\sqrt{96}}{\sqrt{72}}$ w) $\sqrt{\frac{96}{72}}$ x) $\frac{\sqrt{288}}{\sqrt{72}}$

Extenstion Question

Sketch as many different polygons as you can that have an area of $3\sqrt{2}$ cm^2.