What is a Surd?

Most of the numbers that you have come across so far have all be able to be written as a fraction. These are called rational numbers.

Example 1

$\frac{3}{7}$,   0.124, $\sqrt[3]{8}$, $0.\dot{1}$,   5

But sometimes we cannot write a number as a fraction. If this is the case, they called irrational numbers.

Example 2

$$\sqrt{2}, \quad \sqrt{3}, \quad \sqrt{6} \quad \sqrt{7}, \quad \pi$$

These irrational numbers can only be written to a specific degree of accuracy. E.g.

$$\sqrt{5} = 2.3607 \ to \ 4 \ d.p.$$
$$\sqrt{5} = 2.4 \ to \ 1 \ d.p$$

A surd is the square root of any number that produces an irrational number. In Example 2, they are all surds except for π.

Exercise A

1) Which of the following are surds?

a) $\sqrt{2}$ b) $\sqrt{3}$ c) $\sqrt{4}$ d) $\sqrt{5}$

e) $\sqrt{7}$ f) $\sqrt{9}$ g) $\sqrt{11}$ h) $\sqrt{13}$

i) $\sqrt{16}$ j) $\sqrt{17}$ k) $\sqrt{19}$ l) $\sqrt{\pi}$

2) Do you notice something about those that are surds?

Answers

1a) Yes   b) Yes   c) No   d) Yes   e) Yes
f) No   g) Yes   h) Yes   i) No   j) Yes
k) Yes   l) Yes 2a) All the surds are not square numbers.