1. **Rational number is** a real number that can be written as a simple/irregular fraction, i.e as a proportion $\frac{a}{b}$.
2. A rational number is a reoccurring decimal. Can be proved using remainder and Pigeonhole principle.

Decimal fractions:

$$\frac{2}{7}$$

Find simple fractions for $0.\overline{3}$, $0.\overline{71}$,

$0.\overline{3} = \text{x, multiply by 10.}$

$3.\overline{3} = 10\text{x} \rightarrow 3 + 0.\overline{3} = 10\text{x} \rightarrow 3 + \text{x} = 10\text{x}$

Equations:

$7x = 2$ $\qquad \frac{3}{8}x = \frac{1}{3}$ $\qquad \frac{3x+2a}{2a-5x} = -1$

Operations with powers: $\qquad a^n = a \cdot a \cdots a\,(n\,times)$

$$(a \cdot b)^n = a^n \cdot b^n$$

$$a^m \cdot a^n = a^{m+n};$$

$$a^m \div a^n = a^{m-n}$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

1. Simplify the following and show the answer in the exponent form

a) $\dfrac{3^7 \cdot 2^7}{2^3 \cdot 2^4} =$

b) $\dfrac{6^5 \cdot 2^4}{3^5 \cdot 2^2} =$

c) $\dfrac{7^9 \cdot 2^5}{7^2 \cdot 2^4} =$

d) $\dfrac{11^4}{11^2 \cdot 5^2 \cdot 5^3} =$

e) $7^4 \cdot 11^2 \cdot 11^{-5} \cdot 7^2 =$

f) $\dfrac{3^{-5} \cdot 2^7}{3^{-3} \cdot 2^4} =$

g) $\dfrac{42^2}{6^2} =$

h) $\dfrac{3^5 \cdot 3^{-5}}{3^9} =$

i) $\dfrac{x^2 \cdot y^2 \cdot x^{-3}}{x^2} =$

2. Find a simple fraction form for the following repeating decimals:
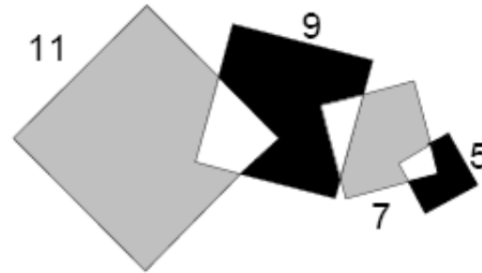
a) $0.\overline{6}$

b) $0.\overline{7}$

c) $0.\overline{8}$

3. Find the area…..

In the picture four squares are shown and the **lengths of their sides** are indicated. What is **the difference** between the combined area of the shaded regions and the combined area of the black regions?

11

9

5

7

4. Find the area…..

John has a chocolate bar consisting of square pieces 1 cm x 1 cm in size. He has already eaten some of the corner pieces (see the picture). How many pieces does John have left?

11 cm

6 cm

4 cm

8 cm
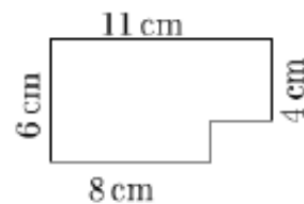
5.

A new chess piece Kangaroo jumps 3 squares vertically, 1 horizontally, or 3 squares horizontally, and 1 vertically. What is the minimum number of moves the kangaroo needs to make in order to get from red square to A? You may choose color pencils to show.

A