

# The Number System

Level 1 – 2

1. Show that the following numbers are rational.

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|---------------|---------------|
| a) 4 .....    | b) 1.5 .....  |
| c) 0.3 .....  | d) -3.7 ..... |
| a) 9 .....    | b) 2.9 .....  |
| c) -0.5 ..... | d) 100 .....  |

2. Circle the irrational numbers:

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|--------------|-------------|-------------|-------------|-------------|-------------|
| $\sqrt{5}$   | $\sqrt{16}$ | $\sqrt{1}$  | $\sqrt{9}$  | $\sqrt{11}$ | $\sqrt{19}$ |
| $\sqrt{144}$ | $\sqrt{2}$  | $\sqrt{81}$ | $-\sqrt{7}$ | $\pi$       | $\sqrt{8}$  |

3. Put an X in the box to show which numbers belong to which sets:

Number	R	Z	Q	Q'	N
$\sqrt{4}$					
1.7					
$\pi$					
-0.5					
$\sqrt{7}$					
10					

4. True or false?

- |  |                           |                         |
|--|---------------------------|-------------------------|
| a) $4 \in Q$ .....   | b) $\pi \in R$ .....      | c) $1.3 \notin R$ ..... |
| d) $-2 \in Q'$ .....   | e) $\sqrt{2} \in Q$ ..... | f) $0 \in Z$ .....      |
| g) If $A = \{x \mid 3 \leq x < 7, x \in Z\}$ then $A = \{3,4,5,6,7\}$ .....  |                           |                         |
| h) If $B = \{x \mid 0 < x < 5, x \in Z\}$ and $C = \{x \mid 0 \leq x \leq 5, x \in Z\}$ then $B \subseteq C$ ..... |                           |                         |

5. Show, with full working out, that  $3.\dot{2}$  is rational.

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6. Show, with full working out, that  $1.\dot{6}\dot{2}$  is rational.

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7. Write down, as fractions, five different rational numbers between  $\sqrt{2}$  and  $\sqrt{3}$ . Clearly show your method.

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8. Write down, as fractions, five different rational numbers between  $\sqrt{13}$  and  $\sqrt{14}$ . Clearly show your method.

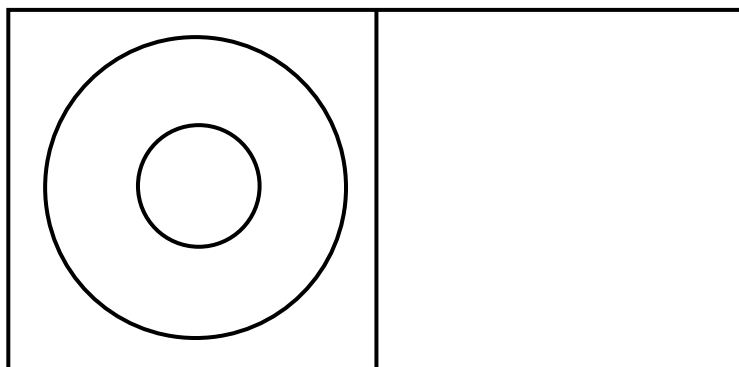
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9. a) The following is a Venn diagram of the number system. Label the correct set with Z, Q, Q' and N.  
The entire rectangle represents R.



- b) Place the following numbers in the correct position in the Venn diagram.

3

$\pi$

-2.1

0

$\sqrt{5}$

$\frac{1}{2}$

*Level 5 – 6*

10. Show, with full working out, that  $1.1\dot{2}$  ( $= 1.122222\dots$ ) is rational.

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11. Show, with full working out, that  $-3.0\dot{6}$  is rational.

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12. Write down five different irrational numbers between 8 and 9. Clearly show your method.

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13. Write down five different irrational numbers between 11 and 12. Clearly show your method.

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14. Show that  $0.\dot{9} = 1$ .

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15. Give examples to show that an irrational number multiplied by an irrational number can sometimes be rational and sometimes be irrational.

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16. a) The number  $x$  is rational. Immediately after the decimal point there are  $n$  integers which repeat continuously. For example:

$$1.\dot{5}7 = 1.57575757\dots$$

In this case  $n$  is equal to 2

$$1.\dot{8} = 1.88888888\dots$$

In this case  $n$  is equal to 1

$$1.\dot{3}2\dot{6}2 = 1.326232623262\dots$$

In this case  $n$  is equal to 4

If  $x$  is written as a fraction, determine an expression (involving  $n$ ) for the denominator that will work for any value of  $x$ .

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b) Explain why any number with recurring decimals is rational

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17. What can you say about the decimal expansion of an irrational number? Give as much detail as possible.

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