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Rational and Irrational Numbers

Student Worksheet

Questions & Working Space

IGCSE Mathematics

Name: _____

Date: _____

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Note

How to use this worksheet. These questions are built *strictly* on the *Rational and Irrational Numbers* notes: the number system ($\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$), rational numbers and their decimal forms, converting recurring decimals to fractions, irrational numbers, the closure properties, and real-world applications.
Notation. A dot above a digit shows that the digit recurs, and dots above the first and last digits of a block show that the whole block recurs. So

$$0.\dot{7} = 0.7777\ldots, \qquad 0.\dot{2}\dot{7} = 0.272727\ldots, \qquad 0.1\dot{6} = 0.16666\ldots$$

Working space. Ruled lines are provided after each question — show *all* of your working there, justify each classification with a reason, and simplify every fraction to its lowest terms. Harder questions have a teal **Hint** box; try the question first and use the hint only if you are stuck.
Checking your answers. Full step-by-step solutions, a marking scheme for the exam paper, and a quick answer key are in the separate booklet *"Rational and Irrational Numbers — Solutions & Answer Key."* Try each question honestly before you look.

1 Part I — Topic-by-Topic Exercises

1.1 The Number System

Exercise N1 *[Basic]*

From the list

$$-6, \quad \tfrac{3}{4}, \quad \sqrt{49}, \quad 2.7, \quad \sqrt{15}, \quad 0, \quad \tfrac{\pi}{2}$$

write down:

(a) all the integers

(b) all the irrational numbers

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Exercise N2 *[Basic]*

Explain why every integer is also a rational number, using 13 and -13 as your examples.

Exercise N3 *[Standard]*

State whether each statement is **true** or **false**, giving a short reason each time:

(a) Every natural number is an integer.

(b) Every rational number is an integer.

(c) Every irrational number is a real number.

(d) Some real numbers are neither rational nor irrational.

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Exercise N4 *[Standard]*

Sort the following numbers into three groups — *integers*, *rational but not integers*, and *irrational*:

$$-5, \qquad \tfrac{9}{2}, \qquad \sqrt{64}, \qquad 0.181818\ldots, \qquad \sqrt{31}, \qquad 7\pi$$

Preview ends here

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