



2025 TESTIFI EXAMINATION

Rational Numbers

Solutions and Marking Guidelines

Section I

2 marks

Questions 1–2

Question 1 (1 mark)

1

C

$\sqrt{2}$ is irrational because it cannot be expressed as a fraction of two integers. The decimal expansion of $\sqrt{2} \approx 1.414213\dots$ is non-terminating and non-recurring. The other options are rational: $0.\overline{3} = \frac{1}{3}$, $\pi \approx 3.14159\dots$ appears irrational but option shows 3.14 which terminates, and $0.125 = \frac{1}{8}$.

Question 2 (1 mark)

1

A

All numbers in option A are rational. $\frac{3}{4}$ is already in fraction form, $0.6 = \frac{3}{5}$, and $25\% = \frac{1}{4}$. Option B contains $\sqrt{5}$ which is irrational. Option C contains π which is irrational. Option D contains $\sqrt{7}$ which is irrational.

Section II

10 marks

Questions 3–5

Question 3 (3 marks)

3

A rational number can be written in the form $\frac{a}{b}$ where a and b are integers and $b \neq 0$.

- a) 0.625 is rational because it is a terminating decimal. It can be written as $\frac{625}{1000} = \frac{5}{8}$.
- b) $0.\overline{27} = 0.272727\dots$ is rational because it is a recurring decimal. All recurring decimals can be expressed as fractions. This equals $\frac{27}{99} = \frac{3}{11}$.
- c) $-\frac{5}{8}$ is rational because it is already expressed as a fraction where both numerator and denominator are integers and the denominator is not zero.
- d) $75\% = 0.75 = \frac{3}{4}$ is rational because percentages can be written as fractions with integer numerator and denominator.

Question 4 (3 marks)

3

A rational number can be written in the form $\frac{a}{b}$ where a and b are integers and $b \neq 0$.

- a) 0.375 is rational because it is a terminating decimal. It can be written as $\frac{375}{1000} = \frac{3}{8}$.
- b) $0.\overline{6} = 0.666\dots$ is rational because it is a recurring decimal. This equals $\frac{2}{3}$.
- c) $-\frac{7}{4}$ is rational because it is already expressed as a fraction where both numerator and denominator are integers and the denominator is not zero.
- d) $40\% = 0.4 = \frac{2}{5}$ is rational because percentages can be written as fractions with integer numerator and denominator.

Question 5 (4 marks)

4

- a) $0.\overline{142857}$ is rational because it has a repeating decimal pattern. Any number with a repeating decimal can be expressed as a fraction. This equals $\frac{1}{7}$.
- b) 1.41421356... is irrational. This appears to be $\sqrt{2}$, which is a non-repeating, non-terminating decimal that cannot be expressed as a fraction of integers.
- c) $33.\overline{3}\% = 33.333\dots\% = \frac{33.\overline{3}}{100} = \frac{1}{3}$ is rational because it can be expressed as a fraction in the form $\frac{a}{b}$ where both a and b are integers.
- d) π is irrational because it is a non-repeating, non-terminating decimal that cannot be expressed as a fraction of integers.