

GRADE 8 MATHS

Number System & Real Numbers

Complete Printable Worksheet Pack

6 Worksheets • Rational & Irrational Numbers • Real Numbers • Square Roots • Operations • Reasoning & Challenge

Worksheet 1: Rational, Irrational & Real Numbers

Name: _____ Date: _____

1. Classify: $\frac{3}{5}$, $\sqrt{2}$, 0.75, π , -7 , $\sqrt{49}$.
2. Which are integers? -8 , $\frac{3}{4}$, 0, 5.2, 12.
3. Write 0.375 as a fraction in simplest form.
4. Is 0.121212... rational or irrational? Explain.
5. Give one rational and one irrational number between 2 and 3.
6. Explain why every integer is rational.
7. Classify $\sqrt{81}$, $\sqrt{18}$ and $\sqrt{121}$ as rational or irrational.
8. Give one irrational number between 5 and 6.
9. Which is greater: $\sqrt{50}$ or 7? Explain without a calculator.
10. A student says, "All decimals are rational." Is this correct? Explain.

Answer Key — Worksheet 1

1. $\frac{3}{5}$ R; $\sqrt{2}$ I; 0.75 R; π I; -7 R; $\sqrt{49}$ R.
2. -8 , 0 , 12 .
3. $\frac{3}{8}$.
4. Rational; it is recurring and equals $\frac{4}{33}$.
5. Examples: $\frac{5}{2}$ and $\sqrt{5}$.
6. $n=n/1$, a ratio of integers.
7. $\sqrt{81}=9$ R; $\sqrt{18}=3\sqrt{2}$ I; $\sqrt{121}=11$ R.
8. Example $\sqrt{26}\approx 5.10$.
9. $\sqrt{50}>7$ because $50>49=7^2$.
10. No. Terminating and recurring decimals are rational; non-terminating non-recurring decimals are irrational.

Worksheet 2: Comparing & Ordering Real Numbers

Name: _____ Date: _____

1. Arrange ascending: -2.5 , $\sqrt{5}$, 2.1 , 0 , $-\sqrt{9}$.
2. Compare $\sqrt{7}$ and 2.6 .
3. Arrange: $3/2$, $\sqrt{2}$, 1.45 , 1.6 .
4. Which is closer to 5: $\sqrt{24}$ or 4.8 ?
5. Between which two consecutive integers does $\sqrt{70}$ lie?
6. Between which two consecutive integers does $\sqrt{150}$ lie?
7. Arrange: $-\sqrt{5}$, -2 , -2.2 , $-\sqrt{9}$ from least to greatest.
8. Which is greater: $3\sqrt{2}$ or 4 ?
9. Give one rational and one irrational value of x satisfying $3.1 < x < \sqrt{10}$.
10. Is $\sqrt{200}$ greater or less than 14 ? Explain without finding its exact value.

Answer Key — Worksheet 2

1. $-\sqrt{9}$, -2.5 , 0 , 2.1 , $\sqrt{5}$.
2. $\sqrt{7} > 2.6$ because $7 > 6.76$.
3. $1.45 < \sqrt{2} < 3/2 < 1.6$.
4. $\sqrt{24} \approx 4.899$, so $\sqrt{24}$ is closer to 5 than 4.8.
5. $8 < \sqrt{70} < 9$.
6. $12 < \sqrt{150} < 13$.
7. $-\sqrt{9}$, $-\sqrt{5}$, -2.2 , -2 .
8. $3\sqrt{2} > 4$ because $18 > 16$ after squaring.
9. Rational example 3.12 ; irrational example $\sqrt{9.8}$.
10. Greater, because $200 > 196 = 14^2$.

Worksheet 3: Squares, Roots & Number Sense

Name: _____ Date: _____

1. Find $\sqrt{144}$, $\sqrt{225}$ and $\sqrt{400}$.
2. Which are perfect squares: 72, 81, 100, 121, 130?
3. Estimate $\sqrt{60}$ to the nearest tenth.
4. Find the smallest integer n such that $n^2 > 150$.
5. A square has area 324 cm^2 . Find side length and perimeter.
6. Find $\sqrt{0.81}$.
7. Between which two whole numbers is $\sqrt{95}$?
8. Find $\blacksquare$ if $\blacksquare^2 = 529$.
9. A square garden has area 625 m^2 . Find its perimeter.
10. How can you quickly test whether a whole number is a perfect square?

Answer Key — Worksheet 3

1. 12, 15, 20.
2. 81, 100, 121.
3. ≈ 7.7 .
4. 13.
5. Side 18 cm; perimeter 72 cm.
6. 0.9.
7. $9 < \sqrt{95} < 10$.
8. 23 (or -23 if solving $x^2=529$).
9. Side 25 m; perimeter 100 m.
10. Check whether its square root is a whole number.

Worksheet 4: Real-Number Operations & Algebra

Name: _____ Date: _____

1. Evaluate: $-7+12-5$.
2. Evaluate: $(-6)(-4)-15$.
3. Evaluate: $3/4+5/8$.
4. Evaluate: $2.5-0.875$.
5. Simplify: $4(3-7)+5$.
6. Simplify: $7(2x+3)$.
7. Find x: $5x-8=27$.
8. Evaluate: $3^2+\sqrt{81}-2^3$.
9. A temperature falls from 6.5°C by 11.8°C . Find the new temperature.
10. Explain why subtraction is not commutative using an example.

Answer Key — Worksheet 4

1. 0.
2. 9.
3. $11/8 = 1 \frac{3}{8}$.
4. 1.625.
5. -11.
6. $14x + 21$.
7. $x = 7$.
8. 10.
9. -5.3°C .
10. $8 - 3 = 5$ but $3 - 8 = -5$.

Worksheet 5: Real Numbers in Real Life & Reasoning

Name: _____ Date: _____

1. A square floor has area 196 m^2 . Find its side length.
2. A circular track has diameter 14 m. Using $\pi \approx 22/7$, find its circumference.
3. A measurement is written 2.7182818... Can these displayed digits alone prove it is rational? Explain.
4. A square tile has area 50 cm^2 . Is its side rational or irrational?
5. A map distance is $\sqrt{2} \text{ km}$. Rational or irrational?
6. Why is 1.4142 only an approximation to $\sqrt{2}$?
7. Points are at $-\sqrt{4}$, -1.5 , $\sqrt{2}$ and 2. Which is farthest from 0?
8. A square has diagonal $10\sqrt{2} \text{ cm}$. Find its side.
9. Why is $\sqrt{36}$ rational even though it has a radical sign?
10. Give a real-life situation where an irrational number can occur exactly.

Answer Key — Worksheet 5

1. 14 m.
2. 44 m.
3. No; the displayed digits do not tell us the full decimal expansion.
4. Irrational; $\text{side} = \sqrt{50} = 5\sqrt{2}$ cm.
5. Irrational.
6. $\sqrt{2}$ has a non-terminating, non-recurring decimal expansion; 1.4142 is rounded.
7. $-\sqrt{4}$, because its distance is 2.
8. 10 cm.
9. $\sqrt{36} = 6$, a whole number.
10. Example: a diagonal of a square with rational side length 1 has exact length $\sqrt{2}$.

Worksheet 6: Number System & Real Numbers Challenge

Name: _____ Date: _____

1. Find the smallest integer n for which $10 < \sqrt{n} < 11$.
2. Give two irrational numbers whose sum is rational.
3. Give two irrational numbers whose product is rational.
4. Is $\sqrt{2} + \sqrt{8}$ rational or irrational? Simplify.
5. Is $\sqrt{12} + \sqrt{27}$ rational or irrational? Simplify.
6. Express $\sqrt{72}$ in simplest radical form.
7. Find $(\sqrt{5})^2 + (\sqrt{3})^2$.
8. Solve $x^2 = 50$ over the real numbers.
9. Give an irrational number between 3.1 and 3.2 and explain why it lies there.
10. Give a counterexample to: "The sum of any two irrational numbers is irrational."

Answer Key — Worksheet 6

1. 101.
2. $\sqrt{2}$ and $-\sqrt{2}$; sum 0.
3. $\sqrt{2} \times \sqrt{2} = 2$.
4. $3\sqrt{2}$, irrational.
5. $5\sqrt{3}$, irrational.
6. $6\sqrt{2}$.
7. 8.
8. $x = \pm 5\sqrt{2}$.
9. $\sqrt{10} \approx 3.1623$, which lies between 3.1 and 3.2.
10. $\sqrt{2} + (-\sqrt{2}) = 0$, rational.