Chapter 1: Real Numbers — Answer Key

Class 9 Mathematics (FBISE pattern)

Paper	Questions
2025, 1st Exam Paper 1	Q1 (Version B), Q1 (Version D), Q2(i) (Version B)
2025, 1st Exam Paper 2	Q2(i) (Version D), Q2(ii) OR (Short)
2025, 2nd Exam	Q1, Q2(i)
Model Paper 2026 (50% MCQs)	Q1, Q3, Q1
2026, Paper D	Q1, Q2(i)
2026, Paper M	Q1, Q2(i)
2026, Paper B	Q1, Q2(i)

Full solutions for all 16 questions in the Chapter 1 past-paper PDF, paper by paper. The boxed option in each MCQ is the correct one. Read every step, then try the question again yourself. Rules used: product rule a^m · a^n = a^(m+n), quotient rule a^m ÷ a^n = a^(m−n), power of a power (a^m)^n = a^(mn), negative exponent a^(−n) = 1 ÷ a^n.

2025, 1st Exam Paper 1

Versions B and D · 2025

Section A — MCQ

Q1 (Version B). $\left(\frac{1}{4}\right)^{-\frac{1}{2}} =$

A) $\frac{1}{2}$ B) 2 C) $\sqrt{2}$ D) 16

Solution

Step 1. A negative exponent turns the fraction upside down (reciprocal).

$$\left(\frac{1}{4}\right)^{-\frac{1}{2}} = \left(\frac{4}{1}\right)^{\frac{1}{2}} = 4^{\frac{1}{2}}$$

Step 2. The exponent $\frac{1}{2}$ means square root.

$$4^{\frac{1}{2}} = \sqrt{4} = 2$$

Answer: Option B, 2

Q1 (Version D). $\left(\frac{1}{9}\right)^{-\frac{3}{2}} =$

A) 27 B) $\frac{1}{27}$ C) ± 27 D) $\pm\frac{1}{27}$

Solution

Step 1. Take the reciprocal to remove the negative exponent.

$$\left(\frac{1}{9}\right)^{-\frac{3}{2}} = 9^{\frac{3}{2}}$$

Step 2. Write $\frac{3}{2}$ as (root) then (power): take the square root of 9 first, then cube.

$$9^{\frac{3}{2}} = \left(\sqrt{9}\right)^{3} = 3^{3} = 27$$

Answer: Option A, 27

Section B — Short Questions

Q2(i) (Version B). Simplify the expression:

$$\left[\left(2a^{\frac{1}{2}}b^{3}\right)^{4} \times (4a^{-2}b^{-6})^{-\frac{1}{2}}\right]^{\frac{1}{3}}$$ **[4]**

Solution

Step 1. Solve the first bracket with the power of a product rule, $(ab)^n = a^n b^n$, and the power of a power rule, $(a^m)^n = a^{mn}$.

$$\left(2a^{\frac{1}{2}}b^{3}\right)^{4} = 2^4 \cdot a^{\frac{1}{2}\times 4} \cdot b^{3\times 4} = 16a^2b^{12}$$

Step 2. Solve the second bracket the same way. Remember $4^{-\frac{1}{2}} = \frac{1}{\sqrt{4}} = \frac{1}{2}$.

$$(4a^{-2}b^{-6})^{-\frac{1}{2}} = 4^{-\frac{1}{2}} \cdot a^{(-2)(-\frac{1}{2})} \cdot b^{(-6)(-\frac{1}{2})} = \frac{1}{2}\,a\,b^{3}$$

Step 3. Multiply the two results. Multiply the numbers, and add the powers of the same base (product rule).

$$16a^2b^{12} \times \tfrac{1}{2}ab^3 = 8\,a^{2+1}\,b^{12+3} = 8a^3b^{15}$$

Step 4. Now raise to the power $\frac{1}{3}$ (cube root).

$$(8a^3b^{15})^{\frac{1}{3}} = 8^{\frac{1}{3}} \cdot a^{3\times\frac{1}{3}} \cdot b^{15\times\frac{1}{3}} = 2ab^5$$

Answer: $2ab^5$

2025, 1st Exam Paper 2

Version D, Section B, and Old Curriculum 2006 pages · 2025

Section B — Short Questions

Q2(i) (Version D). Simplify the expression:

$$\left[\left(x^2y^{-3}z^4\right)^5 \times \left(x^{-4}y^7z^{-2}\right)^3\right]^{\frac{1}{2}}$$ **[4]**

Solution

Step 1. Multiply each power inside the first bracket by 5 (power of a power rule).

$$\left(x^2y^{-3}z^4\right)^5 = x^{10}\,y^{-15}\,z^{20}$$

Step 2. Multiply each power inside the second bracket by 3.

$$\left(x^{-4}y^7z^{-2}\right)^3 = x^{-12}\,y^{21}\,z^{-6}$$

Step 3. Multiply the two results. Add the powers of each same base (product rule).

$$x^{10-12}\,y^{-15+21}\,z^{20-6} = x^{-2}\,y^{6}\,z^{14}$$

Step 4. Raise to the power $\frac{1}{2}$, so halve every power.

$$\left(x^{-2}y^{6}z^{14}\right)^{\frac{1}{2}} = x^{-1}\,y^{3}\,z^{7}$$

Step 5. Write the answer with a positive exponent. $x^{-1} = \frac{1}{x}$.

$$x^{-1}y^{3}z^{7} = \frac{y^{3}z^{7}}{x}$$

Answer: $\frac{y^{3}z^{7}}{x}$

Old Curriculum 2006 pages

Q2(ii) OR (Short). Use the law of exponents to simplify:

$$\frac{2^{\frac{1}{3}} \times 27^{\frac{1}{3}} \times 60^{\frac{1}{2}}}{180^{\frac{1}{2}} \times 4^{-\frac{1}{3}} \times 9^{\frac{1}{4}}}$$ **[4]**

Solution

Step 1. Cube root of 27. Since $27 = 3^3$:

$$27^{\frac{1}{3}} = (3^3)^{\frac{1}{3}} = 3$$

Step 2. Put the two square roots together (same index, quotient rule).

$$\frac{60^{\frac{1}{2}}}{180^{\frac{1}{2}}} = \left(\frac{60}{180}\right)^{\frac{1}{2}} = \left(\frac{1}{3}\right)^{\frac{1}{2}} = \frac{1}{\sqrt{3}}$$

Step 3. Write $9^{\frac{1}{4}}$ as a power of 3.

$$9^{\frac{1}{4}} = (3^2)^{\frac{1}{4}} = 3^{\frac{1}{2}} = \sqrt{3}$$

Step 4. Write $4^{-\frac{1}{3}}$ as a power of 2, then divide $2^{\frac{1}{3}}$ by it (subtract the powers).

$$4^{-\frac{1}{3}} = (2^2)^{-\frac{1}{3}} = 2^{-\frac{2}{3}}, \qquad \frac{2^{\frac{1}{3}}}{2^{-\frac{2}{3}}} = 2^{\frac{1}{3}+\frac{2}{3}} = 2^{1} = 2$$

Step 5. Collect all the parts.

$$2 \times 3 \times \frac{1}{\sqrt{3}} \times \frac{1}{\sqrt{3}}$$

Step 6. Since $\sqrt{3} \times \sqrt{3} = 3$:

$$= 2 \times 3 \times \tfrac{1}{3} = 2$$

Answer: 2

2025, 2nd Exam 2025

Section A — MCQ

Q1. Which of the following is equal to $\left(x^{\frac{2}{3}}\right)^9$?

A) x^8 B) x^6 C) $x^{\frac{4}{9}}$ D) $x^{\frac{3}{2}}$

Solution

Step 1. Use the power of a power rule, $(a^m)^n = a^{mn}$. Multiply the exponents.

$$\left(x^{\frac{2}{3}}\right)^9 = x^{\frac{2}{3} \times 9} = x^6$$

Answer: Option B, x^6

Section B — Short Questions

Q2(i). Simplify:

$$\frac{(2x^2)^{-4}}{(-4y^{-1}z^2)^{-2}}$$ **[4]**

Solution

Step 1. Numerator. Apply the power to every factor.

$$(2x^2)^{-4} = 2^{-4}x^{-8} = \frac{1}{16x^8}$$

Step 2. Denominator. Apply the power to every factor. $(-4)^{-2} = \frac{1}{(-4)^2} = \frac{1}{16}$.

$$\left(-4y^{-1}z^2\right)^{-2} = (-4)^{-2}y^2z^{-4} = \frac{y^2}{16z^4}$$

Step 3. Divide: multiply by the reciprocal of the denominator.

$$\frac{1}{16x^8} \div \frac{y^2}{16z^4} = \frac{1}{16x^8} \times \frac{16z^4}{y^2}$$

Step 4. Cancel 16.

$$= \frac{z^4}{x^8 y^2}$$

Answer: $\frac{z^4}{x^8 y^2}$

Model Paper 2026 (50% MCQs)

National Curriculum 2022-23, 50% MCQs and 50% Descriptive

Section A — MCQ

Q1. The radical form of $2^{\frac{3}{4}} \times 27$ is:

A) $3 \times \sqrt[3]{2^4}$ B) $3^3 \times \sqrt[4]{2^3}$ C) $3^3 \times \sqrt[3]{2^4}$ D) $3^4 \times \sqrt[4]{2^4}$

Solution

Step 1. Write 27 as a power of 3.

$$27 = 3^3$$

Step 2. In $b^{\frac{m}{n}}$ the denominator n is the index of the root and the numerator m is the power. Here $n = 4, m = 3$.

$$2^{\frac{3}{4}} = \sqrt[4]{2^3}$$

Step 3. Put them together.

$$2^{\frac{3}{4}} \times 27 = 3^3 \times \sqrt[4]{2^3}$$

Answer: Option B, $3^3 \times \sqrt[4]{2^3}$

Q3. The temperature in a freezer was $-\frac{9}{2}\,^\circ\text{C}$. It increased by $\frac{5}{2}\,^\circ\text{C}$. What is the new temperature?

A) $7\,^\circ\text{C}$ B) $2\,^\circ\text{C}$ C) $-2\,^\circ\text{C}$ D) $-7\,^\circ\text{C}$

Solution

Step 1. An increase means add. Both fractions have the same denominator, so add the numerators.

$$-\frac{9}{2} + \frac{5}{2} = \frac{-9+5}{2} = \frac{-4}{2} = -2$$

Answer: Option C, $-2\,^\circ\text{C}$

Section B — Short Questions

Q1. Using the laws of exponents, simplify:

$$\left(\frac{2187 \times a^5 \times b^{17}}{a^{12} \times b^3}\right)^{\frac{1}{7}}$$ **[3]**

Solution

Step 1. Write 2187 as a power of 3. Since $3^7 = 2187$:

$$2187 = 3^7$$

Step 2. Use the quotient rule, $\frac{a^m}{a^n} = a^{m-n}$, on a and on b.

$$\frac{a^5}{a^{12}} = a^{5-12} = a^{-7}, \quad \frac{b^{17}}{b^3} = b^{17-3} = b^{14}$$

Step 3. So the bracket becomes

$$(3^7\, a^{-7}\, b^{14})^{\frac{1}{7}}$$

Step 4. Multiply each power by $\frac{1}{7}$ (power of a power rule).

$$3^{7\times\frac{1}{7}}\, a^{-7\times\frac{1}{7}}\, b^{14\times\frac{1}{7}} = 3\, a^{-1}\, b^2$$

Step 5. Write with a positive exponent.

$$= \frac{3b^2}{a}$$

Answer: $\frac{3b^2}{a}$

2026, Paper D

2026

Section A — MCQ

Q1. $16^{\frac{1}{2}} =$

A) 2 B) 8 C) 4 D) 16

Solution

Step 1. The exponent $\frac{1}{2}$ means square root.

$$16^{\frac{1}{2}} = \sqrt{16} = 4$$

Answer: Option C, 4

Section B — Short Questions

Q2(i). Simplify:

$$\sqrt[4]{\frac{a^3}{b^3}} \times \sqrt[4]{\frac{b^3}{c^3}} \times \sqrt[4]{\frac{c^3}{a^3}}$$ **[4]**

Solution

Step 1. All three radicals have the same index 4, so use the product rule for radicals, $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$, to combine them.

$$\sqrt[4]{\frac{a^3}{b^3} \times \frac{b^3}{c^3} \times \frac{c^3}{a^3}}$$

Step 2. Cancel a^3, b^3 and c^3 from top and bottom.

$$= \sqrt[4]{1}$$

Step 3. The fourth root of 1 is 1.

$$= 1$$

Step 4. Check with exponents: each term gives $a^{\frac{3}{4}}$, $b^{-\frac{3}{4}}$ and so on, and every base cancels to power 0.

$$a^{\frac{3}{4}-\frac{3}{4}} b^{-\frac{3}{4}+\frac{3}{4}} c^{-\frac{3}{4}+\frac{3}{4}} = a^0 b^0 c^0 = 1$$

Answer: 1

2026, Paper M

2026

Section A — MCQ

Q1. $\left(\frac{1}{9}\right)^{-\frac{1}{2}}$ equals:

A) 3 B) 6 C) 9 D) 81

Solution

Step 1. Take the reciprocal to remove the negative exponent.

$$\left(\frac{1}{9}\right)^{-\frac{1}{2}} = 9^{\frac{1}{2}}$$

Step 2. The exponent $\frac{1}{2}$ means square root.

$$9^{\frac{1}{2}} = \sqrt{9} = 3$$

Answer: Option A, 3

Section B — Short Questions

Q2(i). Simplify:

$$\sqrt{(216)^{\frac{2}{3}} \times \frac{(25)^{\frac{1}{2}}}{(0.04)^{-\frac{1}{2}}}}$$ [4]

Solution

Step 1. Find $216^{\frac{2}{3}}$. Since $216 = 6^3$:

$$216^{\frac{2}{3}} = (6^3)^{\frac{2}{3}} = 6^2 = 36$$

Step 2. Find $25^{\frac{1}{2}}$.

$$25^{\frac{1}{2}} = \sqrt{25} = 5$$

Step 3. Find $(0.04)^{-\frac{1}{2}}$. Since $0.04 = \frac{1}{25}$, the negative exponent gives the reciprocal.

$$(0.04)^{-\frac{1}{2}} = \left(\frac{1}{25}\right)^{-\frac{1}{2}} = 25^{\frac{1}{2}} = 5$$

Step 4. Put the values inside the square root.

$$\sqrt{36 \times \frac{5}{5}} = \sqrt{36 \times 1} = \sqrt{36}$$

Step 5. Take the square root.

$$= 6$$

Answer: 6

2026, Paper B

2026

Section A — MCQ

Q1. $\left(\frac{1}{16}\right)^{-\frac{3}{2}} =$

A) $\frac{1}{4}$ B) 4 C) 16 D) 64

Solution

Step 1. Take the reciprocal to remove the negative exponent.

$$\left(\frac{1}{16}\right)^{-\frac{3}{2}} = 16^{\frac{3}{2}}$$

Step 2. Square root first, then cube.

$$16^{\frac{3}{2}} = \left(\sqrt{16}\right)^3 = 4^3 = 64$$

Answer: Option D, 64

Section B — Short Questions

Q2(i). Simplify the following expression using laws of indices:

a. $\frac{2^{\frac{2}{3}} \cdot 2^{\frac{1}{7}}}{2^{\frac{1}{2}}}$

b. $\frac{3^{-\frac{1}{2}} \cdot 3^{\frac{1}{2}}}{3^{\frac{1}{2}}}$ **[2+2]**

Solution

Step 1. Part (a). Numerator: same base 2, so add the exponents (product rule). LCD of 3 and 7 is 21.

$$2^{\frac{2}{3}} \cdot 2^{\frac{1}{7}} = 2^{\frac{2}{3}+\frac{1}{7}} = 2^{\frac{14+3}{21}} = 2^{\frac{17}{21}}$$

Step 2. Part (a). Divide by $2^{\frac{1}{2}}$: same base, so subtract the exponents (quotient rule). LCD of 21 and 2 is 42.

$$\frac{2^{\frac{17}{21}}}{2^{\frac{1}{2}}} = 2^{\frac{17}{21} - \frac{1}{2}} = 2^{\frac{34-21}{42}} = 2^{\frac{13}{42}}$$

Step 3. Part (a) answer. It can also be written as a radical.

$$2^{\frac{13}{42}} = \sqrt[42]{2^{13}}$$

Step 4. Part (b). Numerator: add the exponents. $-\frac{1}{2} + \frac{1}{2} = 0$.

$$3^{-\frac{1}{2}} \cdot 3^{\frac{1}{2}} = 3^{-\frac{1}{2} + \frac{1}{2}} = 3^{0} = 1$$

Step 5. Part (b). Divide by $3^{\frac{1}{2}}$.

$$\frac{1}{3^{\frac{1}{2}}} = 3^{-\frac{1}{2}} = \frac{1}{\sqrt{3}}$$

Answer: (a) $2^{\frac{13}{42}}$ (b) $\frac{1}{\sqrt{3}}$