Math 10C — Number Unit

Practice Test

(Prime Factors · Rational/Irrational · Number Systems · Radicals & Mixed Radicals)

Instructions. Show work in the space beside each question. Calculators permitted unless instructed otherwise. For **Numerical Response**, print your answer as an integer in the boxes from left to right.

Multiple Choice (1–4)

1) Which of the following numbers is **not** a prime factor of 12 320?

   A. 7

   B. 11

   C. 5

   D. 13

2) How many numbers in the list 5, 7, 11, 13 are prime factors of 2 772?

   A. 1

   B. 2

   C. 3

   D. 4

3) The lowest common multiple of 21 and 70 can be written as a product of prime factors in the form $a \times b \times c \times d$ where a, b, c, d are primes with $a < b < c < d$. The value of c is

   A. 2

   B. 3

   C. 5

   D. 7

4) If a number is **irrational**, its decimal representation must be

   A. terminating and repeating

   B. terminating and non-repeating

   C. non-terminating and repeating

   D. non-terminating and non-repeating

Numerical Response (5–7)

Record your answer in the boxes.

5) The **greatest common factor** of 6 510 and 8 190 is ☐☐☐

6) The **sum of the distinct prime factors** of 45 045 is ☐☐☐

7) When $4\sqrt[3]{5}$ is written as an **entire radical**, the value of the **radicand** is ☐☐☐

Multiple Choice (8–16)

8) Which of the following numbers are **rational**?

I. $1.2020020002\ldots$ II. $\sqrt[3]{\frac{27}{64}}$ III. $\sqrt{0.09}$ IV. $0.\overline{142857}$

A. III only
B. II, III and IV only
C. I, II and III only
D. I, II, III and IV

9) The rational number 2.375 can be written as an improper fraction $\frac{c}{d}$ in simplest form. The value of c is

A. 10
B. 15
C. 19
D. 23

10) Consider the numbers $\sqrt{19}$, $\sqrt[3]{98}$, $\sqrt{67}$, $\sqrt[5]{201}$. The **largest** of these numbers is

A. $\sqrt{19}$
B. $\sqrt[3]{98}$
C. $\sqrt{67}$
D. $\sqrt[5]{201}$

11) In the radical $\sqrt[5]{12\,000}$, the **index** and **radicand** are, respectively,

A. 5 and 12 000
B. 12 and 5
C. 5 and 12
D. 12 000 and 5

12) Which statements about radicals are true (assume all variables are non-negative)?

I. $\sqrt{48} = 4\sqrt{3}$ II. $\sqrt[3]{54} = 3\sqrt[3]{2}$ III. $\sqrt{a} \cdot \sqrt{b} = \sqrt{a+b}$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

13) Three students rewrote $\sqrt{4050}$ in another form.
Student I: $405\sqrt{10}$ **Student II:** $45\sqrt{2}$ **Student III:** $9\sqrt{50}$
Which response is **correct**?

A. only Student II

B. Students I and II only

C. all three students

D. some other combination

14) A circle has area 120π cm^2. The **exact** length of its radius is

A. 10

B. $\sqrt{30}$

C. $2\sqrt{30}$

D. $4\sqrt{30}$

15) Which equations are always true for $x, y, z \geq 0$?

$$\text{I. } 4\sqrt{3x} = \sqrt{48x} \qquad \text{II. } \sqrt{\frac{5y}{9}} = \frac{\sqrt{5}}{3}\sqrt{y} \qquad \text{III. } \sqrt[3]{16z} = 2\sqrt[3]{2z}$$

A. I only

B. I and II only

C. II and III only

D. I, II and III

16) Which is **equivalent** to $\dfrac{3}{\sqrt{2}}$ (written with a rational denominator)?

A. $\dfrac{3\sqrt{2}}{4}$

B. $\dfrac{\sqrt{18}}{2}$

C. $\dfrac{3\sqrt{2}}{2}$

D. $\sqrt{\dfrac{3}{2}}$

Written Response — 5 marks

A small card game uses points based on the real number system. Each card shows one number. A card's score is the **sum** of points for every set it belongs to:

Natural : 4 pts Whole : 5 Integer : 6 Rational : 3 Irrational : 10 Non-real : 1

1. The number on a card is 0. Explain which sets 0 belongs to and compute its total points. (2 marks)

2. Three students draw three cards each. Who wins (highest total points)? Show how you classified each number. (3 marks)

   - **Student A:** $\frac{3}{4},\ \sqrt{16},\ 0$
   - **Student B:** $-3,\ \sqrt{15},\ \pi$
   - **Student C:** $-\sqrt{36},\ \sqrt{\frac{1}{9}},\ 5$

Answer Key

1) D	9) C
2) B	10) C
3) C	11) A
4) D	12) A
5) $\boxed{210}$	13) A
6) $\boxed{039}$	14) C
7) $\boxed{320}$	15) D
8) B	16) C

Notes/Justification

- 5) $\gcd(6510, 8190) = 210$.
- 6) $45{,}045 = 3^2 \cdot 5 \cdot 7 \cdot 11 \cdot 13$; sum of distinct primes $= 3 + 5 + 7 + 11 + 13 = 39$.
- 7) $4\sqrt[3]{5} = \sqrt[3]{4^3 \cdot 5} = \sqrt[3]{320}$.
- 8) II $= \frac{3}{4}$, III $= 0.3$, IV repeating decimal $\Rightarrow$ rational; I is non-repeating $\Rightarrow$ irrational.
- 12) I true ($48 = 16 \cdot 3$), II true ($54 = 27 \cdot 2$), III false; $\sqrt{a}\sqrt{b} = \sqrt{ab}$.
- 13) $\sqrt{4050} = \sqrt{81 \cdot 50} = 9\sqrt{50} = 45\sqrt{2}$; only Student II is simplified.
- 14) $\pi r^2 = 120\pi \Rightarrow r = \sqrt{120} = 2\sqrt{30}$.
- 15) All three identities hold for $x, y, z \geq 0$.
- 16) $\dfrac{3}{\sqrt{2}} = \dfrac{3\sqrt{2}}{2}$.