

# NCLS Math Program Evaluation Test for Prealgebra B

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Name: \_\_\_\_\_

Grade: \_\_\_\_\_

**Instruction:** this diagnostic test consists of two parts, **Fundamentals** and **Problem Solving**. The student should attempt all of the questions below without a calculator and without any help. There is no time limit.

## Fundamentals

1. **Exponent basics.** Compute:

(a)  $2^5$

(b)  $(-5)^2 - 4^2$

2. **Exponent laws.** Express each of the following as a power of 2:

(a)  $2^4 \cdot 2^3$

(b)  $\frac{2^8}{2^4}$

3. **Number Theory basics:**

(a) Find the least common multiple of 54 and 24.

(b) Find the greatest common divisor of 288 and 684

(c) Find the least common multiple of 72, 120, and 28

4. **Fraction arithmetic.** Compute:

(a)  $\frac{2}{3} + \frac{7}{6} - \frac{1}{4}$

(c)  $10 \div \frac{2}{3}$

(b)  $\frac{3}{4} \cdot \frac{8}{5} \cdot \frac{7}{6}$

(d)  $6\frac{1}{4} - 3\frac{1}{3}$

5. **Fraction and Decimal conversion.** Convert the following decimals to fractions in simplest form:

(a) 0.625

(b) 3.64

(c)  $0.\bar{8}$

Convert the following fractions to decimals:

## NCLS Math Program Evaluation Test for Prealgebra B

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(d)  $\frac{13}{4}$       (e)  $\frac{7}{20}$       (f)  $\frac{5}{6}$

6. Linear Equations. Solve each of the following equations:

(a)  $3r - 4 = 16 - 7r$       (b)  $\frac{2x-3}{5} = \frac{4-3x}{7}$

### 7. Ratio and Rates.

- (a) The ratio of boys to girls at a summer camp is 4 to 5. If the total number of students at the camp is 108, then how many boys are at the camp?
- (b) The ratio of teachers to students in a particular school is 1 to 11. The ratio of female students to the total number of students is 4 to 9. If there are 396 female students, then how many teachers are there?
- (c) A train is traveling 1 mile every 75 seconds. If the train continues at this rate, then how far will it travel in two hours?

### Problem Solving

8. What is the value of the sum  $5 + 10 + 15 + \dots + 95 + 100$ ?
9. Express  $2^5 \cdot 8^3 \cdot 16^2$  as a power of 4.
10. The four-digit number A55B is divisible by 36. What is the sum of A and B?
11. Two-fifths of the students in Central Middle School are boys. One-third of the girls have blond hair and one-quarter of the boys have blond hair. What fraction of the students in Central Middle School have blond hair?

## NCLS Math Program Evaluation Test for Prealgebra B

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12. Douglas writes down his favorite number, which is a two-digit positive integer. He then turns the number into a three-digit number by writing a 7 at the end of his favorite number. This new number is 385 more than Douglas's favorite number. What is Douglas's favorite number?
13. Kayla adds the same number to both the numerator and denominator of the fraction  $\frac{1}{10}$ . Her resulting fraction equals  $\frac{2}{3}$ . What number did she add to both the numerator and denominator of her original fraction?
14. Five workers together can build a road in 20 days. Suppose every worker works at the same rate. Three workers work on the road for 10 days before eleven more workers join them. How much longer will it take the fourteen workers to finish the road?
15. A northbound train from Miami to Jacksonville made the 324-mile journey at an average speed of 50 miles per hour. On its southbound return trip, it made the journey at an average speed of 40 miles per hour. To the nearest tenth of a mile per hour, what was the train's average speed for the 648-mile round trip journey?