

DIVISION OF LIBERAL ARTS AND HUMAN SERVICES

MATHEMATICS DEPARTMENT

DIAGNOSTIC TEST

GENERAL GUIDELINES

This is a mathematics placement test for students entering the college. Its primary purpose is to place the student in the appropriate mathematics course.

The test consists of sixty (60) multiple choice questions divided into three sections. The Pre-Algebra section consists of twenty (20) questions and a score of 14 or more exempts a student from taking Pre-Algebra (Math 096). The Basic Algebra section consists of twenty (20) questions and a score of 14 or more exempts the student from taking Basic Algebra (Math 097). The Intermediate Algebra section consists of twenty (20) questions and a score of 14 or more exempts the student from taking Intermediate Algebra (Math 098). The student's score is based on the number of correct answers. No credit will be deducted for incorrect answers.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. Attempt **ALL** questions. **CALCULATORS ARE NOT ALLOWED**
2. **TIME ALLOWED** for this test is 2 hours. It is recommended that you spend a maximum of 40 minutes on any one section. Do not spend too much time on any one question. If you have difficulty with a question, go on to the next one. Later, if you have time, you can return to the incomplete questions.
3. In addition to this test booklet, you should also have an answer sheet. There are four (4) suggested answers for each question. After selecting the answer you think is correct, shade the appropriate letter on the answer sheet.
4. If you would like to change your answer, mark an **X** over your previous answer and shade your new choice.
5. No student will be allowed to leave the examination room during the first thirty (30) minutes.
6. **ALL** booklets and answer sheets **MUST BE** returned to the invigilator before leaving the examination room.

Pre Algebra

- (1) 0.375 as a fraction is
- (a) $\frac{3}{10}$ (b) $\frac{3}{8}$ (c) $\frac{37}{100}$ (d) $\frac{3}{9}$
- (2) The quantity $7\frac{3}{5} - \frac{4}{5}$ is equal to
- (a) $7\frac{1}{5}$ (b) $7\frac{7}{5}$ (c) $6\frac{1}{5}$ (d) $6\frac{4}{5}$
- (3) $\frac{45}{14} \div \frac{9}{7}$ is equal to
- (a) $2\frac{1}{2}$ (b) $2\frac{1}{7}$ (c) $2\frac{1}{9}$ (d) $2\frac{1}{14}$
- (4) 4,876,251 written to five significant figures is
- (a) 48,762 (b) 4,800,000 (c) 5,000,000 (d) 4,876,300
- (5) 15% of 225 is
- (a) 33.75 (b) 3.375 (c) 0.3375 (d) 337.5

Basic Algebra

- (1) When simplified, the expression $5x - 3y + z - 4x + 2y - 5z$ becomes
- (a) $x + 5y + 5z$ (b) $x + y + 6z$ (c) $x - y - 4z$ (d) $x - y + 4z$
- (2) Given that $f : x \rightarrow \frac{3x-1}{x-2}$, $f(3)$ is equal to
- (a) 0 (b) 3 (c) 7 (d) 8
- (3) Given that $A = \{2, 3, 4\}$, $B = \{3, 6, 8\}$ and $C = \{2, 4, 8\}$, $A \cap B \cap C$, is
- (a) $\{2\}$ (b) $\{3, 6, 8\}$ (c) $\{\}$ (d) $\{2, 3, 4, 6, 8\}$
- (4) Given that $2x - 1 = 3x - 7$, then $x = ?$
- (a) 3 (b) 6 (c) 5 (d) -6
- (5) Given that $1 - 4x \geq -3x - 4$, then
- (a) $-5 \leq x$ (b) $x \leq 5$ (c) $x \leq -5$ (d) $5 \leq x$

Intermediate Algebra

(1) $3^8 \times 3^{-5}$ equals

- (a) 3^{13} (b) 3^3 (c) 3^{-3} (d) 3^{-13}

(2) Given that $x = 2, y = -3, z = 5$ determine the value of

$$\frac{2x + y - 3z}{x + y + z}$$

- (a) $\frac{-14}{4}$ (b) undefined (c) 0 (d) 22

(3) The expansion of is $(a - b)^2$

- (a) $a^2 + b^2$ (b) $a^2 + 2ab + b^2$ (c) $a^2 - b^2$ (d) $a^2 - 2ab + b^2$

(4) The solutions of $(x+1)(x-3) = 0$ are;

- (a) $x = 1, -3$ (b) $x = 1, 3$ (c) $x = -1, 3$ (d) $x = -1, -3$

(5) If y varies directly with x and $y = 12$ when $x = 36$, what is y when $x = 24$?

- (a) 36 (b) 0 (c) 8 (d) 18

Answers

Pre Algebra

1. $0.375 = \frac{375}{1000}$

Simplify by dividing both numerator and denominator by the highest common factor, 125.

$$0.375 = \frac{375}{1000} = \frac{3}{8} \quad \text{(b)}$$

2. $7\frac{3}{5} - \frac{4}{5} = \frac{38}{5} - \frac{4}{5} = \frac{34}{5} = 6\frac{4}{5} \quad \text{(d)}$

3. $\frac{45}{14} \div \frac{9}{7} = \frac{45}{14} \times \frac{7}{9} = \frac{5}{2} = 2\frac{1}{2} \quad \text{(a)}$

4. 4,876,251 written to five significant figures:

First choose the *target* digit, which in this case, is 2.

Look at the digit to the right of the *target*. If that digit is less than 5, the target remains the same.

If the digit is 5 or more, add one to the target digit.

Here, the digit to the right of the target is 5, so we add one to the target.

4,876,251 written to five significant figures is 4,876,300. **(d)**

$$5. 15\% \text{ of } 225 = \frac{15}{100} \times \frac{225}{1} = \frac{135}{4} = 33\frac{3}{4} = 33.75 \text{ (a)}$$

Basic Algebra

$$1. 5x - 3y + z - 4x + 2y - 5z$$

Collect all "like" terms.

$$5x - 3y + z - 4x + 2y - 5z = x - y - 4z \text{ (d)}$$

$$2. f : x \rightarrow \frac{3x-1}{x-2}$$

$$f(3) = \frac{3(3)-1}{3-2} = \frac{9-1}{1} = 8 \text{ (d)}$$

3. Given that $A = \{2, 3, 4\}$, $B = \{3, 6, 8\}$ and $C = \{2, 4, 8\}$, $A \cap B \cap C$, is an empty set since there are no elements that are in all of the three sets. The empty set can be represented by the symbol $\{ \}$. (c)

$$4. 2x - 1 = 3x - 7$$

$$2x - 1 - 2x = 3x - 7 - 2x$$

$$-1 = x - 7$$

$$-1 + 7 = x - 7 + 7$$

$$6 = x \text{ (b)}$$

$$5. 1 - 4x \geq -3x - 4$$

$$1 - 4x + 4x \geq -3x - 4 + 4x$$

$$1 \geq -4 + x$$

$$1 + 4 \geq -4 + x + 4$$

$$5 \geq x \text{ (b)}$$

Intermediate Algebra

$$1. 3^8 \times 3^{-5}$$

When multiplying and the bases are the same, we add the exponents or powers.

$$3^8 \times 3^{-5} = 3^{8+(-5)} = 3^3 \text{ (b)}$$

$$2. \text{ Given } x = 2, y = -3, z = 5$$

$$\frac{2x + y - 3z}{x + y + z} = \frac{2(2) + (-3) - 3(5)}{2 + (-3) + 5} = \frac{4 - 3 - 15}{2 - 3 + 5} = \frac{-14}{4} \text{ (a)}$$

$$3. (a - b)^2 = (a - b)(a - b)$$

$$= a^2 - ab - ab + b^2$$

$$= a^2 - 2ab + b^2 \text{ (d)}$$

$$4. (x + 1)(x - 3) = 0$$

Using the Zero Factor Property, which states that if $ab = 0$ then $a = 0$ or $b = 0$ or both $a = 0$ and $b = 0$:

$$x + 1 = 0 \text{ and } x - 3 = 0$$

$$x = -1 \text{ and } x = 3 \text{ (c)}$$

5. **y varies directly with x** can be translated to the equation $y = kx$

Given $y = 12$ when $x = 36$, you can find k in the equation $y = kx$ by substitution.

$$12 = k(36)$$

$$\frac{12}{36} = k$$

$$\frac{1}{3} = k$$

Therefore, $y = \frac{1}{3}x$

When $x = 24$ $y = \frac{1}{3}(24) = 8$ (c)

SAMPLE