IPC2 Diagnostic Exam

Transfer Exam

Introduction

Students come into the IP Course from all parts of the world, at all levels of English, as well as at various levels of mathematics proficiency. Rather than picking any country's standard of math at this grade level, the IPC Mathematics department has decided to test on the content taught in the IPC program before the date of the entrance exam. That content is outlined in the following pages and there are example problems for each topic tested.

In addition, examinees are responsible for interpreting mathematical symbols and units where notation and measurements may be different from standards students are used to. Some examples of different issues students may encounter include:

- Comma usage, or their absence, for large numbers (e.g., $1\ 000\ 000 = 1000000 = 1{,}000{,}000$)
- Period usage and leading zeroes for decimals (e.g., $0.01 = .01$)
- Units and their abbreviations ("kilograms" becomes "kg", "centimeters" becomes "cm", etc). Understanding the units will not affect whether the student can answer the problem (see example 3 from Topic 2 below).

Furthermore, effort is made to try and simplify the vocabulary used in word problems, but students are expected to understand mathematical vocabulary appropriate of this grade level. Many of the examples below illustrate this point.

Last, the exam is 7 two-mark questions and 12 three-mark questions, totaling to 50 marks. Students have 30 minutes to finish the math portion of the IPC diagnostic exams. If a student finds themselves spending too much time on one question, they are encouraged to skip it and come back to it later provided there is time remaining.

Topic 1 – Number Sense and Patterns

This section makes up roughly 40% of the exam. Students should have a strong understanding of fractions, decimals, and percentages and how to evaluate them under all basic operations. Students should also understand number systems and their properties. Examples from this section include:

1. Evaluate:
   a. $\frac{7}{3}-\frac{7}{2}+1\frac{1}{4}$
   b. $(18\div 3+3)\div(4\times 4-7)$
   c. $\frac{1}{3}\div\left(\frac{2}{5}\right)^2$
   d. $\frac{0.08}{0.004}$
2. Find $\frac{3}{7}$ of $\$434$.
3. Find 36% of 4200 yen.
4. Final all possible values of $\square$ if the number "$89\square 12$" is divisible by 3, and $\square$ represents a single digit.
5. Which of the following are natural numbers?

$$1 \quad -1 \quad \frac{1}{2} \quad 0.1 \quad 10$$

6. State the next 3 numbers in the sequence: $243, 81, 27, 9, \ldots$.
7. The ratio of teachers to students in a school is $1:15$. If there are 675 students, how many teachers are there?

Topic 2 – Expressions and Equations

This is the next largest section of the test, making up roughly 35% of the exam. Students should be able to simplify expressions, substitute into expressions, and solve equations. Example problems from this topic include:

1. The first three figures pictured right are made up of 4, 7, and 10 "sticks" respectively. Find the number of "sticks" in the 15th figure.

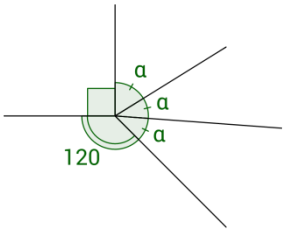
2. Simplify $2(2x+y+1)+(x+1)+(y-1)+x$.
3. If $x=3$, $y=-2$, and $z=-1$ evaluate:
   a. $3(3x+4y)$
   b. $z^{10}+\frac{x}{2y}-y^2$
4. Solve for x:
   a. $\frac{x}{4}+5=-8$
   b. $3x+2=x+14$
   c. $5(x-2)+3(1-2x)=6$

Topic 3 – Geometry

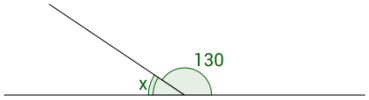
This is a relatively small section of the test, making up roughly 15% of the exam. Example problems include:

1. Solve for the missing values:

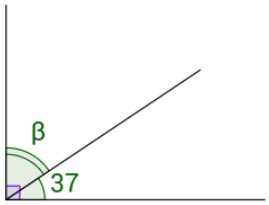
Find α:



Find x:

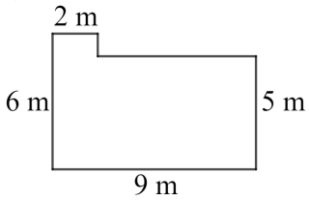


Find β:

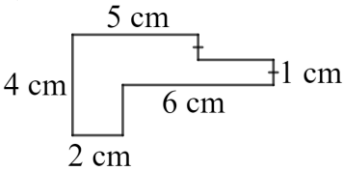


2. Find the perimeters of the figures below. Assume that all corners are right angles.

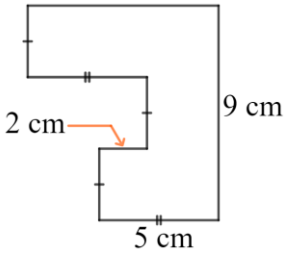
a)



b)



c)



Topic 4 – Statistics

This is a relatively small section of the test, making up roughly 10% of the exam. Students will likely be asked on one or two of the 3 M's (mean, median, and mode). Example problems include:

1. What is the mean and median of the data set:

   0 1 2 3 3 4 5 5 5 6 7 9

2. In math, the *mode* is defined as the most occurring number. Given the data set below, what is the *mode*?

   0 1 2 3 3 4 5 5 5 6 7 9

3. Bob has earned the following scores in his subjects: Math (80%), English (70%), Science (75%), and Social Studies (90%). If Bob's overall score is an average of his four scores, find Bob's overall score.

Solutions

Topic 1

1.
   a. $\frac{1}{12} = 0.08\overline{3}$
   b. 1
   c. $\frac{25}{12} = 2\frac{1}{12} = 2.08\overline{3}$
   d. 20
2. 186
3. 1512
4. $1, 4, 7$
5. $1, 10$
6. $3, 1, \frac{1}{3}$
7. 45

Examiner's note: credit will be given for any form of an answer (decimal, fraction, percentage, or mixed number), unless directed to answer in a specific form.

Topic 2

1. 46
2. $6x + 3y + 2$ (accept any order of terms)
3.
   a. 3
   b. $-\frac{15}{4} = -3\frac{3}{4} = -3.75$
4.
   a. -52
   b. 6
   c. -13

Examiner's note: students may be asked to simplify an answer, and if given that direction no credit will be awarded otherwise.

Topic 3

1.
   a. $\alpha = 50$
   b. $x = 50$
   c. $\beta = 53$
2.
   a. 30
   b. 24
   c. 38

Examiner's note: the answer sheets will already include the correct units for any problems that have them, so students do not need to concern themselves with that aspect of the problem. See the sample answer sheet on the next page.

Topic 4

1. $\text{mean} = 4\frac{1}{6} = 4.1\overline{6}$, $\text{median} = 4.5$
2. $\text{mode} = 5$
3. 78.75%

Examiner's note: word problems do not need to be answered in the form of a sentence. The answer sheets will include countable or non-countable nouns. See the sample answer sheet on the next page.

IPC2 Mathematics SAMPLE Answer Sheet

Student name:

Registration number:

Section A (2 marks each)

1		
2		
3 coins		
4a degrees	4b degrees	4c degrees
5		

Section B (3 marks each)

6a	6b	6c	6d
7			
8 kilometers			
9			
10 apples			
11a	11b	11c	11d