

UNIVERSITY OF NEW BRUNSWICK
and
UNIVERSITÉ DE MONCTON

JUNIOR HIGH SCHOOL MATHEMATICS COMPETITION

May 17, 1991

GRADE 8

PART A

1. If I climb a staircase 2 steps at a time, one step is left over. Climbing 3 steps at a time gives 2 steps left over, while climbing 4 at a time gives 3 left over. How many steps are there if there are fewer than 20?

(A) 11 (B) 13 (C) 15 (D) 17 (E) 19

2. A cottage is constructed on a rectangular lot measuring 30 m. by 40 m. The cottage has an area of 90 square meters; the rest of the lot is lawn. What is the area of this lawn?

(A) 610 m^2 (B) 900 m^2 (C) 1110 m^2 (D) 1120 m^2
(E) none of the previous answers

3. Find the largest number of points of intersection for 10 lines in a plane.

(A) 22 (B) 30 (C) 36 (D) 45 (E) 55

4. How many animals do I have if all but two are dogs, all but two are cats and all but two are hamsters?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

5. A box contains 24 identical cubes. How many cubes can be placed in another box each of whose dimensions is double that of the original box?

(A) 48 (B) 96 (C) 144 (D) 192 (E) not enough information

6. A mouse takes 12 sec. to run once around a circular track, whereas another mouse takes 16 sec. The two mice leave the starting line at the same time and end their race 1 minute 40 seconds later. How many times after the start do the two mice find themselves simultaneously at the starting line?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

7. The tens digit of a number is one third of the units digit, and the sum of these two digits is 8. What is the number?

(A) 13 (B) 17 (C) 26 (D) 35 (E) 44

8. If n is an integer and $2n$ is a multiple of 3, then $5n$ is a multiple of

(A) 6 (B) $\frac{15}{2}$ (C) 10 (D) 15 (E) none of the previous numbers

9. Which number does not belong in the list 2, 3, 5, 7, 9, 11, 13, 17, 19, 23, 29, 31, ...?

(A) 2 (B) 7 (C) 9 (D) 13 (E) 29

10. The cost of mailing a package is \$3.00 for the first kilogram and $\frac{1}{5}$ cent for each additional gram. To the nearest cent, what is the cost of mailing a 3500 gram package?

(A) \$8.00 (B) \$9.60 (C) \$10.00 (D) \$10.50 (E) none of these

PART B

11. Claude has in his hand 15 coins (either pennies, nickels or dimes) worth 79 cents in total. How many dimes does he have?
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
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12. What is the hundredth term in the sequence 0, 2, 6, 12, 20, 30, 42, ...?
- (A) 9000 (B) 9702 (C) 9900 (D) 10100 (E) 10302
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13. In how many years will a 53 year old man be 10 times the age of his son who is now 8 years of age?
- (A) 3 (B) 7 (C) 10 (D) 17 (E) none of the previous answers
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14. In the high school auditorium the number of rows of seats is double the number of seats in each row. If there are the same number of seats in each row and 1352 seats in total, how many rows are there?
- (A) 12 (B) 26 (C) 37 (D) 52 (E) none of the previous answers
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15. Three numbers a, b, c are called Pythagorean if they satisfy $a^2 + b^2 = c^2$ (eg. $a = 3, b = 4, c = 5$). Which of the following triples of numbers is not Pythagorean?
- (A) $(1, \sqrt{3}, 2)$ (B) (10, 24, 26) (C) (6, 8, 10) (D) (5, 12, 13) (E) (6, 17, 18)
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16. On her birthday Chantal received an aquarium of length 48 cm. and width 30 cm. She filled the tank with water to height 28 cm. How many fish can Chantal buy if each fish needs 1000 cm^3 of water to live?
- (A) 38 (B) 39 (C) 40 (D) 41 (E) 42
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17. On an exam with q questions, Marie correctly answered 15 of the first 20 but just $\frac{1}{3}$ of the rest. If her total score was 50%, what was q ?
- (A) 29 (B) 50 (C) 55 (D) 65 (E) 100
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18. A set of 10 numbers has sum 100. Each number of the set is increased by 20, then multiplied by 20 then decreased by 20. What is the sum of the numbers in the new set?

(A) 1200 (B) 2000 (C) 5800 (D) 6000 (E) not enough information

19. Suppose M is a two digit number and that N is obtained by reversing the digits of M . If $M + N = 132$, how many different values can M have?

(A) 4 (B) 7 (C) 8 (D) 10 (E) 12

20. Of the whole numbers 1 to 1000 inclusive, how many are multiples of 3 but not multiples of 5?

(A) 123 (B) 200 (C) 267 (D) 334 (E) none of these

PART C

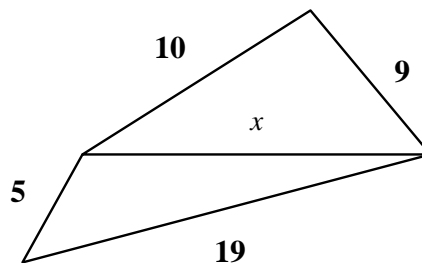
21. Three workers are named X , Y and Z . Suppose that together X and Y can do a job in 4 hours, X and Z can do it in 6 hours and X , Y and Z can do the job in 3 hours. How many hours will Y alone need to do the job?

(A) 6 hrs. (B) 8 hrs. (C) 10 hrs. (D) 12 hrs. (E) none of the previous answers

22. The average of the first 100000 odd positive integers is

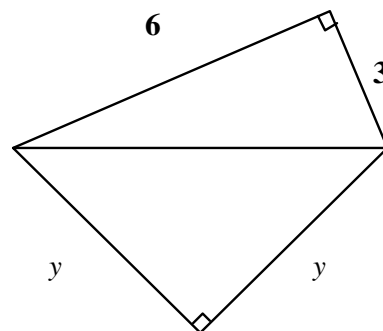
(A) 100,000 (B) 1,000,000 (C) 10,000,000 (D) 100,000,000 (E) 1,000,000,000

23. The distance x is known to be one of the following answers. Which is it?



(A) 9 (B) 10 (C) 14 (D) 15 (E) 20

24. Determine y from the following figure (in which two 90 degree angles are indicated).



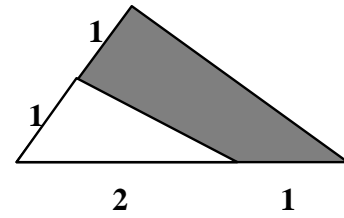
(A) $3/\sqrt{5}$ (B) $3\sqrt{2}$ (C) $3\sqrt{2.5}$ (D) 4.5 (E) not enough information given

25. Find the value of this product of 98 numbers:

$$\left(1 - \frac{2}{3}\right) \left(1 - \frac{2}{4}\right) \left(1 - \frac{2}{5}\right) \dots \left(1 - \frac{2}{98}\right) \left(1 - \frac{2}{99}\right) \left(1 - \frac{2}{100}\right).$$

(A) $\frac{1}{10}$ (B) $\frac{98}{100}$ (C) $\frac{1}{6}$ (D) $\frac{1}{582120}$ (E) $\frac{1}{4950}$

26. What fraction of the area of the large triangle is shaded?



- (A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{3}{5}$ (D) $\frac{2}{3}$ (E) not enough information
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