NINTH YEAR MATHEMATICS

Monday, June 16, 1980 — 1:15 to 4:15 p.m., only

1979-1980
PART 2

The last page of the booklet is the answer sheet. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

On page 5 you will find the "Tables of Natural Trigonometric Functions" which you may need to answer some questions in this examination. Fold this page along the perforations, and tear it off also slowly and carefully.

When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer paper cannot be accepted if you fail to sign this declaration.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

485

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet.

1 Solve for x: $3x - 5 = 16$

2 Find the value of $|-4| - |8|$.

3 The length of a rectangle is 8 centimeters and its width is 6 centimeters. Find the number of centimeters in the length of the diagonal.

4 The perimeter of a square is represented by $8x - 12$. Express the length of one side of the square in terms of x.

5 Express $\frac{5}{7}$ as a decimal, rounded to the *nearest hundredth*.

6 Find the numerical value of the expression $c + xy$ when $c = 3$, $x = 4$, and $y = -5$.

7 Combine into a single term: $3\sqrt{12} + 2\sqrt{3}$

8 Express the product of $(a - b)$ and $(a + b)$ as a binomial.

9 Solve for x: $0.2x + 0.3 = 8.1$

10 Solve for c: $\frac{1}{3}c + 2 = 4$

11 Find $\sqrt{42}$ to the *nearest tenth*.

12 If 60% of a number is 144, what is the number?

13 Factor: $x^2 - 10x - 56$

14 Solve for the positive value of x: $x^2 - 81 = 0$

15 Solve for x in terms of a and b: $3x - b = a$

16 A vertical flagpole casts a shadow 16 meters long at the same time that a nearby tree 5 meters in height casts a shadow 4 meters long. What is the number of meters in the height of the flagpole?

17 Solve the following system of equations for y:
$$3x + 2y = 7$$
$$-3x + y = 8$$

18 In the accompanying figure, $AC = 4$, $BC = 3$, and $AB = 5$. Express as a single fraction: $\sin A + \cos A$
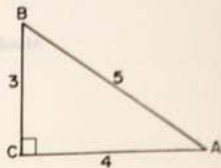
19 The sum of two polynomials is zero. If one of the polynomials is $3x^2 + 5x - 7$, what is the other polynomial?

Directions (20–30): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

20 The expression $\dfrac{-12x^4y^2}{3x^3y}$ is equivalent to
(1) $9x^3y^2$
(2) $4x^4y$
(3) $-4x^3y$
(4) $-4x^4y$

21 When $12x^3 + 8x^2 - 4x$ is divided by $4x$, the quotient is
(1) $3x^3 + 2x^2 - 1x$
(2) $3x^2 + 2x - 1$
(3) $3x^2 - 2x - 1$
(4) $3x^2 + 2x$

22 Two complementary angles are in the ratio 4:3. What is the measure in degrees of the smaller angle?
(1) 10
(2) 40
(3) 50
(4) 80

23 The expression $-6x - 7(4 + 3x)$ is equivalent to
(1) $-3x - 28$
(2) $-21x - 4$
(3) $-27x - 28$
(4) $-9x - 28$

Math. 9–June '80

[2]

24 The expression $\frac{x}{3} + \frac{x}{5}$ is equivalent to

(1) $\frac{8}{15}$

(3) $\frac{2x}{15}$

(2) $\frac{8x}{15}$

(4) $\frac{2x}{8}$

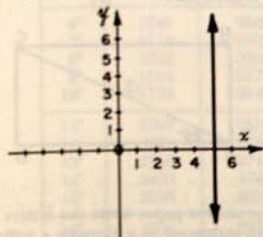25 The greatest common factor of the numbers 16, 20, and 40 is

(1) 320

(3) 40

(2) 2

(4) 4

26 The graph of which equation is shown in the accompanying diagram?

(1) $x = 5$

(3) $y = 5x$

(2) $y = 5$

(4) $y = x + 5$

27 If $n + 1$ represents an even integer, which expression also represents an even integer?

(1) n

(3) $n + 3$

(2) $n + 2$

(4) $n - 2$

28 Which ordered pair is in the solution set of $x < 6 - y$?

(1) $(0,6)$

(3) $(0,5)$

(2) $(6,0)$

(4) $(7,0)$

29 If a and b are natural numbers, which expression *must* represent a natural number?

(1) $a - b$

(3) $\frac{a}{b}$

(2) $a + b$

(4) $b \div a$

30 Which statement is true for the set of whole numbers (0,1,2,3, etc.)?

(1) The multiplicative identity element is 0.
(2) The additive identity element is 1.
(3) Some elements of the set are irrational.
(4) The set has the closure property under addition.

☞ GO RIGHT ON TO THE NEXT PAGE.

Part II

Answer four questions from this part. Show all work unless otherwise directed.

31 Solve graphically and check:

$$2y = x + 6$$
$$y = 3x - 2 \qquad [8,2]$$

32 Answer *both* a and b.

  a Solve for y and check:

$$\frac{y - 3}{6} + \frac{y - 25}{5} = 0 \qquad [4,1]$$

  b From the product of $(2x - 1)$ and $(x + 3)$, subtract $x^2 + 4x + 2$. [5]

33 Write an equation or system of equations that can be used to solve *each* of the following problems. In *each* case state what the variable or variables represent. [*Solution of the equations is not required.*]

  a The tens digit of a two-digit number exceeds twice the units digit by one. If seven is added to the number, the result is equal to eight times the sum of the digits. Find the number. [5]

  b Two cars are 210 miles apart. They leave at the same time, traveling toward each other, and meet in 3 hours. If the rate of one car is ten miles an hour more than that of the other, what is the rate of the slower car? [5]

34 The cost of a high school textbook was $5 if purchased before June, and $7 thereafter. The total receipts from the sale of 150 books was $810. How many books were purchased at each price? [*Only an algebraic solution will be accepted.*] [5,5]

35 The square of a positive number is 42 more than the number itself. What is the number? [5,5]

36 Answer *both* a and b.

  a In right triangle ABC, the hypotenuse AB and leg BC is 4. Find the measure of angle A to the nearest degree. [5]

  b As shown in the accompanying figure, the diagonal of rectangle ABCD is 12 meters and makes an angle of 25° with $\overline{AD}$. Find the length of $\overline{AB}$ to the nearest meter. [5]
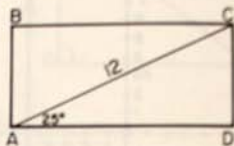
37 On your answer paper write the letters a through e. For each statement in a through e write the number of the property of the real number system, chosen from the list below, which justifies the statement. [10]

Properties

(1) Additive inverse property
(2) Multiplicative identity property
(3) Commutative property of addition
(4) Commutative property of multiplication
(5) Associative property of addition
(6) Associative property of multiplication
(7) Distributive property of multiplication over addition

  a $7 + (3 + 2) = (7 + 3) + 2$
  b $(-5)(1) = -5$
  c $3(x + 2) = 3x + 6$
  d $4 + (-4) = 0$
  e $7(8) = 8(7)$

FOR TEACHERS ONLY

9

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Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 20-30, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 7	(11) 6.5	(21) 2
(2) −4	(12) 240	(22) 2
(3) 10	(13) $(x - 14)(x + 4)$	(23) 3
(4) $2x - 3$	(14) 9	(24) 2
(5) .71	(15) $\dfrac{a + b}{3}$	(25) 4
(6) −17	(16) 20	(26) 1
(7) $8\sqrt{3}$	(17) 5	(27) 3
(8) $a^2 - b^2$	(18) $\frac{7}{5}$ or $1\frac{2}{5}$	(28) 3
(9) 39	(19) $-3x^2 - 5x + 7$	(29) 2
(10) 6	(20) 4	(30) 4

493

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(10) 6	(20) 4	(30) 4

493

Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers in Mathematics*. Care should be exercised in making deductions as to whether the error is purely a mechanical one or due to a violation of some principle. A mechanical error generally should receive a deduction of 10 percent, while an error due to a violation of some cardinal principle should receive a deduction ranging from 30 percent to 50 percent, depending on the relative importance of the principle in the solution of the problem.

(32) *a* 15   [4]
    check   [1]

   b $x^2 + x - 5$ [5]

(33) *a* t = tens digit
    u = units digit
    $t = 2u + 1$
    $10t + u + 7 = 8(t + u)$ [5]

   b r = rate of slower car
    $3r + 3(r + 10) = 210$ [5]

(34) Analysis   [5]
    120 @ \$5
    30 @ \$7   [5]

(35) Analysis   [5]
    7   [5]

(36) *a* 21   [5]

   b 11   [5]

(37) *a* 5   [2]

   b 2   [2]

   c 7   [2]

   d 1   [2]

   e 4   [2]