The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Wednesday, August 18, 1982 — 8:30 to 11:30 a.m., only

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.

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

Part I

Answer 30 questions from 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. Where applicable, answers may be left in terms of π or in radical form.

1 Solve for x: $\frac{5}{4} = \frac{x}{12}$

2 In a class of 20 students, 4 are twelve years old, 10 are thirteen years old, 5 are fourteen years old, and 1 is fifteen years old. If one student is chosen at random, what is the probability that the student is thirteen years old?

3 A student correctly answered 12 of 15 questions. What percent of the questions did the student answer correctly?

4 Solve for y: $6(y + 3) = 2y - 2$

5 Solve the following system of equations for x:

$$2x + y = 9$$
$$3x - y = 1$$

6 A rectangle has an area of 3.6 square meters. If the width is 1.2 meters, what is the length, in meters, of the rectangle?

7 Right triangles ABC and DEF are similar. In $\triangle ABC$, the lengths of the legs are 3 and 4. In $\triangle DEF$, the length of the longer of the two legs is 12. What is the length of the shorter leg of $\triangle DEF$?

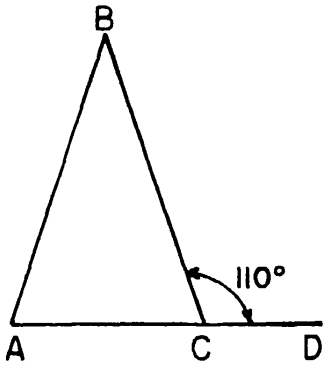
8 A boy has 3 shirts, 2 pairs of slacks, and 3 pairs of shoes. Find the total number of possible outfits he can wear consisting of a shirt, a pair of slacks, and a pair of shoes.

9 What is the mode of the following data?

2.6, 2.8, 2.8, 2.7, 2.9, 2.4

10 The measures of two complementary angles are in the ratio 1:4. Find the measure in degrees of the *smaller* angle.

11 In the accompanying diagram, side $\overline{AC}$ of triangle ABC is extended to D and the measure of angle BCD is 110°. What is the measure in degrees of angle BCA?



12 Given the replacement set {5,6,7,8}. Which member of the replacement set will make the statement $(x < 6) \vee (x < 8)$ *false*?

13 Factor: $x^2 + x - 30$

14 Solve for x: $0.03x + 7.2 = 8.34$

15 Solve for x: $\frac{2}{3}x + 1 = 13$

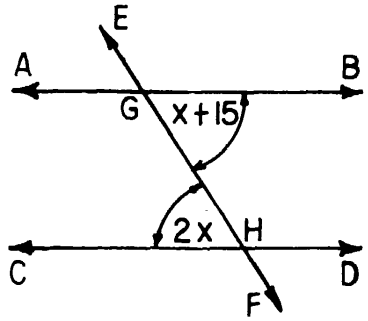
16 The measure of the vertex angle of an isosceles triangle is 40°. Find the measure in degrees of one of the base angles of the triangle.

17 Given the equation $F = \frac{9}{5}C + 32$. Find F when $C = 15$.

18 If the product $(2x + 3)(x + k)$ is $2x^2 + 13x + 15$, find the value of k.

19 If $xy^2 = 18$, find x when $y = -3$.

20 As shown in the accompanying diagram, line $\overleftrightarrow{AB}$ is parallel to line $\overleftrightarrow{CD}$ and transversal $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ at G and H, respectively. If the measure of angle CHG is $2x$ and the measure of angle BGH is $(x + 15)$, find the value of x.



21 Solve for x: $3x + 2 > 32$

Directions (22–34): For *each* question chosen, write on the separate answer sheet the *numeral* preceding the word or expression that best completes the statement or answers the question.

22 If $p \wedge q$ is a true statement, then
(1) p is true and q is false
(2) p is false and q is true
(3) both p and q are true
(4) both p and q are false

23 If p represents "It is cold," and q represents "It is winter," which statement is represented by $p \rightarrow q$?
(1) It is cold if it is winter.
(2) If it is cold, then it is winter.
(3) It is cold and it is winter.
(4) It is winter or it is cold.

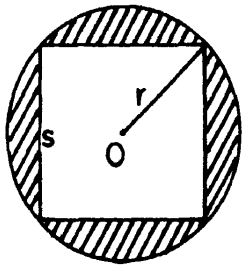
24 Given the true statement: "If the radius of a circle is greater than 1 meter, then the diameter is greater than 2 meters." Which statement *must* also be true?
(1) If the radius of a circle is not greater than 1 meter, then the diameter is greater than 2 meters.
(2) If the radius of a circle is greater than 2 meters, then the diameter is not greater than 1 meter.
(3) If the diameter of a circle is not greater than 2 meters, then the radius is greater than 1 meter.
(4) If the diameter of a circle is not greater than 2 meters, then the radius is not greater than 1 meter.

25 If $(a,3)$ is a point on the graph of the equation $3x + y = 12$, what is the value of a?
(1) 1 (3) 3
(2) 2 (4) 4

26 The product of $9a^3$ and $3a^4$ is
(1) $27a^7$ (3) $12a^7$
(2) $27a^{12}$ (4) $12a^{12}$

27 The expression $5!$ is equivalent to
(1) 5 (3) 20
(2) 15 (4) 120

28 As shown in the accompanying diagram, a square with side s is inscribed in a circle with radius r. Which expression represents the area of the shaded region?



(1) $s^2 - \pi r^2$ (3) $\pi r^2 - 4s$
(2) $\pi r^2 - s^2$ (4) $4s - \pi r^2$

29 The line whose equation is $y = \frac{1}{2}x + 3$ has a slope of

(1) $\frac{1}{2}$ (3) 3

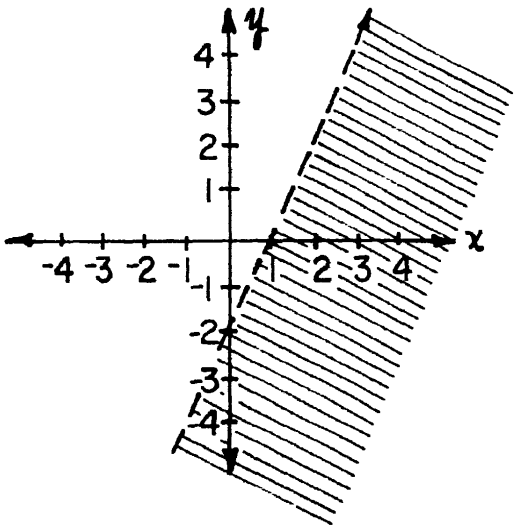
(2) 2 (4) $\frac{1}{3}$

30 The value of 3^{-2} is

(1) -9 (3) $-\frac{1}{9}$

(2) -6 (4) $\frac{1}{9}$

31 Which inequality is represented by the accompanying graph?



(1) $y < 2x - 2$ (3) $y > 2x - 2$

(2) $y \leq 2x - 2$ (4) $y \geq 2x - 2$

32 The solution set of the equation $x^2 - 2x - 3 = 0$ is

(1) $\{-1,-2\}$ (3) $\{-1,3\}$

(2) $\{-2,-3\}$ (4) $\{1,-3\}$

33 If both the base and the altitude of a triangle are doubled, the area of the triangle will be multipled by

(1) $\frac{1}{2}$ (3) $\frac{1}{4}$

(2) 2 (4) 4

34 Which is equivalent to $\sqrt{40}$?

(1) 20 (3) $10\sqrt{2}$

(2) $2\sqrt{10}$ (4) $4\sqrt{10}$

Directions: (35): Leave all construction lines on the answer sheet.

35 *On the answer sheet,* using line segment $\overline{AB}$ as the base, construct an isosceles triangle whose equal sides are congruent to $\overline{CD}$. [Use compasses and straightedge.]

Answers to the following questions are to be written on paper provided by the school.

Part II

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

36 *a* On a set of coordinate axes, graph the following system of equations:

$$y = 2x - 1$$
$$y - x = 1$$ [6]

b Solve algebraically the system of equations in part *a*. [4]

37 The measure of the base of a parallelogram is 4 meters greater than the measure of the altitude to that base. If the area of the parallelogram is 32 square meters, find the number of meters in the measures of the base and altitude. [*Only an algebraic solution will be accepted.*] [5,5]

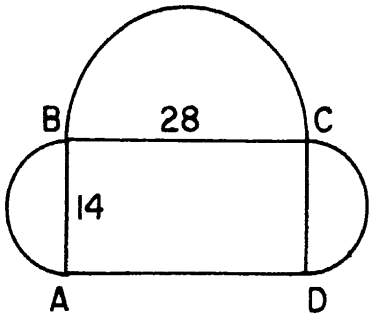
38 The Math Club wants to elect a chairperson and a secretary. Ann, Bob, and Clara are candidates for chairperson. Dave, Ellen, and Florence are candidates for secretary.

a Make a tree diagram or write a sample space of all possible pairs of candidates, consisting of a chairperson and a secretary, that could be elected. [2]

b If each person is equally likely to be elected, find the probability that:

(1) two girls are elected [2]
(2) a boy and a girl are elected [2]
(3) two boys are elected [2]
(4) Bob is elected chairperson [2]

39 In the diagram below, arcs $\overset{\frown}{AB}$, $\overset{\frown}{BC}$, and $\overset{\frown}{CD}$ are semicircles with diameters $\overline{AB}$, $\overline{BC}$, and $\overline{CD}$, respectively. $ABCD$ is a rectangle, $BC = 28$, and $AB = 14$. [Answers may be left in terms of π.]



a Find the area of rectangle $ABCD$. [1]

b Find the area of the region enclosed by diameter $\overline{BC}$ and semicircle $\overset{\frown}{BC}$. [4]

c Find the area of the region enclosed by diameter $\overline{AB}$ and semicircle $\overset{\frown}{AB}$. [3]

d Find the area of the entire region. [2]

40 Answer *both a* and *b*.

a The sale price of a refrigerator is $510 after a 15% discount has been given. Find the original price of the refrigerator. [*Only an algebraic solution will be accepted.*] [3,3]

b The following data are test scores: 88, 96, 100, 96, 94, 94, 89, 89, 72

(1) What is the median? [2]
(2) What is the mean to *the nearest whole number*? [2]

☞ GO RIGHT ON TO THE NEXT PAGE.

41 Let p represent, "Triangle ABC is a right triangle."

Let q represent, "The square of the hypotenuse is equal to the sum of the squares of the legs."

a Write in words: $p \rightarrow q$ [2]

b Write in words the contrapositive of $p \rightarrow q$. [2]

c If the hypotenuse is 19 and the legs are 13 and 14, respectively, is q a true statement? [2]

d If p is false, what is the truth value of $p \rightarrow q$? [2]

e Using your answer to part *d*, determine the truth value of the contrapositive of $p \rightarrow q$. [2]

42 The degree measures of the three angles of a triangle are $(x + 10)$, $(2x + 20)$, and $(2x - 25)$.

a Find x. [*Only an algebraic solution will be accepted.*] [5]

b Find the number of degrees in *each* of the three angles of the triangle. [3]

c Based on your answer to part *b*, which is the most accurate description of the triangle?

(1) right and isosceles
(2) isosceles but not right
(3) right but not isosceles
(4) not right and not isosceles [2]

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SEQUENTIAL MATH — COURSE I

Wednesday, August 18, 1982 — 8:30 to 11:30 a.m., only

Part I Score: .....

Rater's Initials:

.....

ANSWER SHEET

Pupil .....Teacher.....

School .....Grade.....

Your answers to Part I should be recorded on this answer sheet.

Part I

Answer 30 questions from this part.

1	11	21	31 .....
2	12	22	32 .....
3	13	23	33 .....
4	14	24	34 .....
5	15	25	35 Answer question 35 on the other side of this sheet.
6	16	26	
7	17	27	
8	18	28	
9	19	29	
10	20	30	

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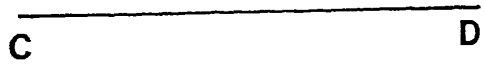
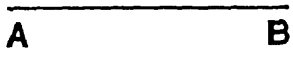
35





Your answers for Part II should be placed on paper provided by the school.

The declaration below should be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination, and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Wednesday, August 18, 1982 — 8:30 to 11:30 a.m., only

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use checkmarks to indicate pupil errors.

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 a total of 60 credits, 2 credits for each of 30 of the following: [If more than 30 are answered, only the first 30 answered should be considered.] Allow no partial credit. For questions 22–34, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 15

(2) $\frac{10}{20}$

(3) 80

(4) -5

(5) 2

(6) 3

(7) 9

(8) 18

(9) 2.8

(10) 18

(11) 70

(12) 8

(13) $(x + 6)(x - 5)$

(14) 38

(15) 18

(16) 70

(17) 59

(18) 5

(19) 2

(20) 15

(21) $x > 10$

(22) 3

(23) 2

(24) 4

(25) 3

(26) 1

(27) 4

(28) 2

(29) 1

(30) 4

(31) 1

(32) 3

(33) 4

(34) 2

(35) Construction

[OVER]

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.

(36) *b* $x = 2$
$y = 3$ [4]

(37) Analysis [5]
4, 8 [5]

(38) *b* (1) $\frac{4}{9}$ [2]

(2) $\frac{4}{9}$ [2]

(3) $\frac{1}{9}$ [2]

(4) $\frac{3}{9}$ [2]

(39) *a* 392 [1]
b 98π [4]

c $\frac{49\pi}{2}$ [3]

d $147\pi + 392$ [2]

(40) *a* Analysis [3]
600 [3]
b (1) 94 [2]
(2) 91 [2]

(42) *a* Analysis [3]
35 [2]
b 45, 45, 90 [3]
c Answer is based on student's answer to part *b*. [2]