

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, January 28, 1997 — 9:15 a.m. to 12:15 p.m., only

Notice . . .

Scientific calculators must be available to all students taking this examination.

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.

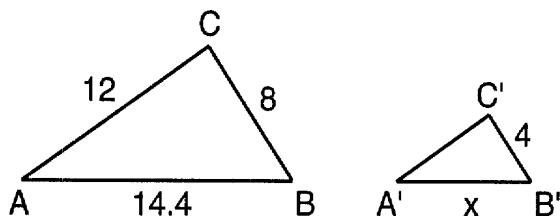
Part I

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. [60]

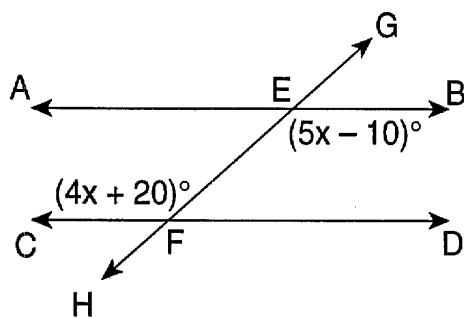
- 1 Using the accompanying table, solve for x if $x * b = a$.

*	a	b	c
a	a	b	c
b	b	a	c
c	c	c	b

- 2 In the accompanying diagram, $\triangle ABC$ is similar to $\triangle A'B'C'$, $AB = 14.4$, $BC = 8$, $CA = 12$, $A'B' = x$, and $B'C' = 4$. Find the value of x .

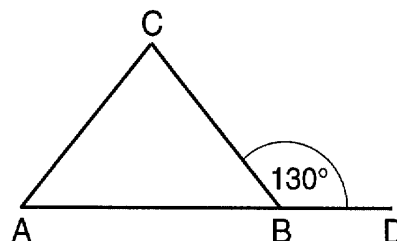


- 3 In the accompanying diagram, parallel lines \overleftrightarrow{AB} and \overleftrightarrow{CD} are intersected by \overleftrightarrow{GH} at E and F , respectively. If $m\angle BEF = 5x - 10$ and $m\angle CFE = 4x + 20$, find x .



- 4 If $\tan A = 0.5400$, find the measure of $\angle A$ to the nearest degree.
- 5 Find the length of a side of a square if two consecutive vertices have coordinates $(-2,6)$ and $(6,6)$.

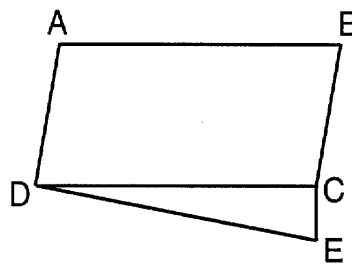
- 6 In the accompanying diagram of isosceles triangle ABC , $CA = CB$ and $\angle CBD$ is an exterior angle formed by extending \overline{AB} to point D . If $m\angle CBD = 130$, find $m\angle C$.



- 7 If \overleftrightarrow{AB} intersects \overleftrightarrow{CD} at E , $m\angle AEC = 3x$, and $m\angle AED = 5x - 60$, find the value of x .

- 8 Point (x,y) is the image of $(2,4)$ after a reflection in point $(5,6)$. In which quadrant does (x,y) lie?

- 9 In the accompanying diagram, $ABCD$ is a parallelogram, $\overline{EC} \perp \overline{DC}$, $\angle B \cong E$, and $m\angle A = 100$. Find $m\angle CDE$.

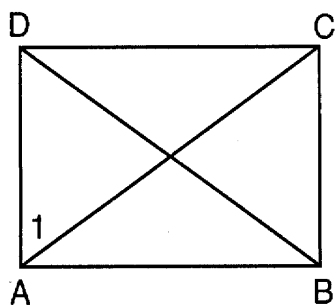


- 10 The lengths of the sides of $\triangle DEF$ are 6, 8, and 10. Find the perimeter of the triangle formed by connecting the midpoints of the sides of $\triangle DEF$.
- 11 The coordinates of the midpoint of line segment \overline{AB} are $(1,2)$. If the coordinates of point A are $(1,0)$, find the coordinates of point B .

12 In $\triangle PQR$, $\angle Q \cong \angle R$. If $PQ = 10x - 14$, $PR = 2x + 50$, and $RQ = 4x - 30$, find the value of x .

13 What is the image of $(-2,4)$ after a reflection in the x -axis?

14 In rectangle $ABCD$, \overline{AC} and \overline{BD} are diagonals. If $m\angle 1 = 55$, find $m\angle ABD$.



15 What is the slope of the line that passes through points $(-1,5)$ and $(2,3)$?

16 The coordinates of the turning point of the graph of the equation $y = x^2 - 2x - 8$ are $(1,k)$. What is the value of k ?

Directions (17–35): 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.

17 Which equation represents the line that has a slope of $\frac{1}{2}$ and contains the point $(0,3)$?

- (1) $y = \frac{1}{3}x + \frac{1}{2}$ (3) $y = \frac{3}{2}x$
 (2) $y = 3x + \frac{1}{2}$ (4) $y = \frac{1}{2}x + 3$

18 If the measures of the angles in a triangle are in the ratio 3:4:5, the measure of an exterior angle of the triangle can *not* be

- (1) 165° (3) 120°
 (2) 135° (4) 105°

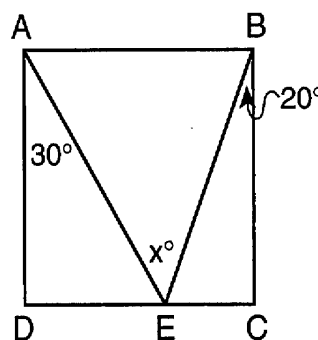
19 According to De Morgan's laws, which statement is logically equivalent to $\sim(p \wedge q)$?

- (1) $\sim p \vee \sim q$ (3) $\sim p \wedge q$
 (2) $\sim p \vee q$ (4) $\sim p \wedge \sim q$

20 One angle of a triangle measures 30° . If the measures of the other two angles are in the ratio 3:7, the measure of the largest angle of the triangle is

- (1) 15° (3) 126°
 (2) 105° (4) 147°

21 In the accompanying diagram, $ABCD$ is a rectangle, E is a point on \overline{CD} , $m\angle DAE = 30$, and $m\angle CBE = 20$.



What is $m\angle x$?

- (1) 25 (3) 60
 (2) 50 (4) 70

22 The graph of the equation $y = ax^2 + bx + c$, $a \neq 0$, forms

- (1) a circle (3) a straight line
 (2) a parabola (4) an ellipse

23 Which set of numbers can represent the lengths of the sides of a triangle?

- (1) {4,4,8} (3) {3,5,7}
 (2) {3,9,14} (4) {1,2,3}

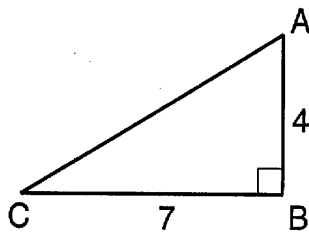
24 Which is an equation of the line that passes through point $(3,5)$ and is parallel to the x -axis?

- (1) $x = 3$ (3) $y = 5$
 (2) $x = 5$ (4) $y = 3$

25 What are the factors of $y^3 - 4y$?

- (1) $y(y - 2)(y - 2)$ (3) $(y^2 + 1)(y - 4)$
 (2) $y(y + 4)(y - 4)$ (4) $y(y + 2)(y - 2)$

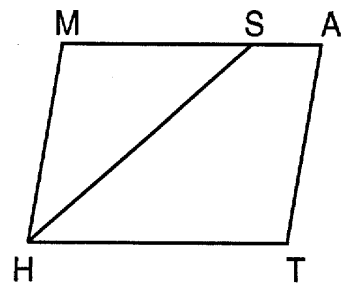
- 26 In the accompanying diagram of right triangle ABC , $AB = 4$ and $BC = 7$.



What is the length of \overline{AC} to the nearest hundredth?

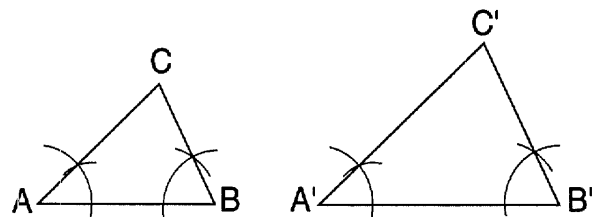
- (1) 5.74 (3) 8.06
 (2) 5.75 (4) 8.08
- 27 Which is the converse of the statement "If today is Presidents' Day, then there is no school"?
- (1) If there is school, then today is not Presidents' Day.
 (2) If there is no school, then today is Presidents' Day.
 (3) If today is Presidents' Day, then there is school.
 (4) If today is not Presidents' Day, then there is school.
- 28 How many different eight-letter permutations can be formed from the letters in the word "PARALLEL"?
- (1) $\frac{8!}{3!2!}$ (3) 360
 (2) $8!$ (4) $\frac{8!}{3!}$
- 29 Which equation describes the locus of points equidistant from $A(-3,2)$ and $B(-3,8)$?
- (1) $x = -3$ (3) $x = 5$
 (2) $y = -3$ (4) $y = 5$
- 30 A translation maps $A(1,2)$ onto $A'(-1,3)$. What are the coordinates of the image of the origin under the same translation?
- (1) $(0,0)$ (3) $(-2,1)$
 (2) $(2,-1)$ (4) $(-1,2)$
- 31 The solution set of the equation $x^2 + 5x = 0$ is
- (1) $\{0\}$ (3) $\{-5\}$
 (2) $\{5\}$ (4) $\{0,-5\}$

- 32 In the accompanying diagram of parallelogram $MATH$, $m\angle T = 100$ and \overline{SH} bisects $\angle MHT$.



What is $m\angle HSA$?

- (1) 80 (3) 120
 (2) 100 (4) 140
- 33 What are the roots of the equation $x^2 + 9x + 12 = 0$?
- (1) $\frac{-9 \pm \sqrt{33}}{2}$ (3) $\frac{-9 \pm \sqrt{129}}{2}$
 (2) $\frac{9 \pm \sqrt{33}}{2}$ (4) $\frac{9 \pm \sqrt{129}}{2}$
- 34 The vertices of trapezoid $ABCD$ are $A(-3,0)$, $B(-3,4)$, $C(2,4)$, and $D(4,0)$. What is the area of trapezoid $ABCD$?
- (1) 6 (3) 28
 (2) 24 (4) 48
- 35 The accompanying diagram shows how $\triangle A'B'C'$ is constructed similar to $\triangle ABC$.



Which statement proves the construction?

- (1) If two triangles are congruent, they are similar.
 (2) If two triangles are similar, the angles of one triangle are congruent to the corresponding angles of the other triangle.
 (3) Two triangles are similar if two angles of one triangle are congruent to two angles of the other triangle.
 (4) The corresponding sides of two similar triangles are proportional.

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

Part II

Answer three questions from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown. [30]

- 36 Answer both *a* and *b* for all values of *y* for which these expressions are defined.

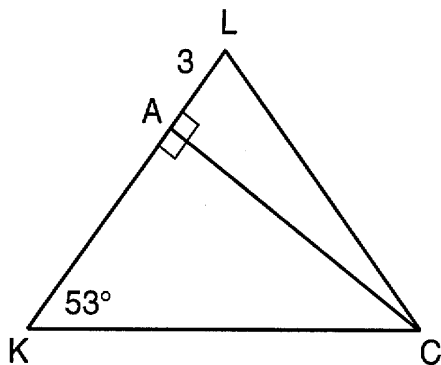
a Express as a single fraction in lowest terms:

$$\frac{y-4}{2y} + \frac{3y-5}{5y} \quad [4]$$

b Simplify:

$$\frac{y^2 - 7y + 10}{5y - y^2} + \frac{y^2 - 4}{25y^3} \quad [6]$$

- 37 In the accompanying diagram of isosceles triangle *KLC*, $\overline{LK} \cong \overline{LC}$, $m\angle K = 53$, altitude \overline{CA} is drawn to leg \overline{LK} , and $LA = 3$. Find the perimeter of $\triangle KLC$ to the nearest integer. [10]



- 38 *a* On graph paper, draw the graph of the equation $y = -x^2 + 6x - 8$ for all values of *x* in the interval $0 \leq x \leq 6$. [6]
b What is the maximum value of *y* in the equation $y = -x^2 + 6x - 8$? [2]
c Write an equation of the line that passes through the turning point and is parallel to the *x*-axis. [2]

- 39 At a video rental store, Elyssa has only enough money to rent three videos. She has chosen four comedies, six dramas, and one mystery movie to consider.

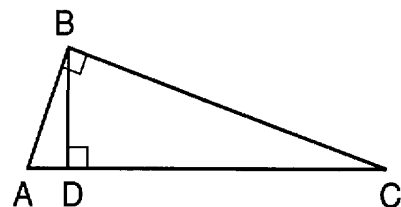
a How many different selections of three videos may she rent from the movies she has chosen? [2]

b How many selections of three videos will consist of one comedy and two dramas? [3]

c What is the probability that a selection of three videos will consist of one of each type of video? [3]

d Elyssa decides to rent one comedy, one drama, and one mystery movie. In how many different orders may she view these videos? [2]

- 40 In the accompanying diagram of right triangle *ABC*, altitude \overline{BD} is drawn to hypotenuse \overline{AC} , $AC = 20$, $AD < DC$, and $BD = 6$.



- a* If $AD = x$, express DC in terms of *x*. [1]
b Solve for *x*. [6]
c Find AB in simplest radical form. [3]

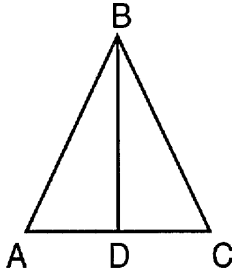
GO RIGHT ON TO THE NEXT PAGE.

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

Part III

Answer one question from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown. [10]

- 41 Given: $\triangle ABC$; \overline{BD} is both the median and the altitude to \overline{AC} .



Prove: $\overline{BA} \cong \overline{BC}$ [10]

- 42 Quadrilateral $ABCD$ has vertices $A(-6,3)$, $B(-3,6)$, $C(9,6)$, and $D(-5,-8)$. Prove that quadrilateral $ABCD$ is

a trapezoid [6]

b not an isosceles trapezoid [4]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH – COURSE II

Tuesday, January 28, 1997 — 9:15 a.m. to 12:15 p.m., only

Part I Score
Part II Score
Part III Score
Total Score
Rater's Initials:

ANSWER SHEET

Pupil Sex: Male Female Grade

Teacher School

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 |
| 6 | 16 | 26 | |
| 7 | 17 | 27 | |
| 8 | 18 | 28 | |
| 9 | 19 | 29 | |
| 10 | 20 | 30 | |

Your answers for Part II and Part III 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

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Tuesday, January 28, 1997 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the student's work by making insertions or changes of any kind. Use checkmarks to indicate student 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 17–35, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) b	(11) (1,4)	(21) 2	(31) 4
(2) 7.2	(12) 8	(22) 2	(32) 4
(3) 30	(13) $(-2,-4)$	(23) 3	(33) 1
(4) 28	(14) 35	(24) 3	(34) 2
(5) 8	(15) $-\frac{2}{3}$	(25) 4	(35) 3
(6) 80	(16) -9	(26) 3	
(7) 30	(17) 4	(27) 2	
(8) I	(18) 1	(28) 1	
(9) 10	(19) 1	(29) 4	
(10) 12	(20) 2	(30) 3	

[OVER]

Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics*, 1996 Edition. 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.

$$(36) \ a \ \frac{11y - 30}{10y} \quad [4]$$

$$b \ \frac{-25y^2}{y + 2} \quad [6]$$

$$(37) \ 35 \quad [10]$$

$$(38) \ b \ 1 \quad [2]$$

$$c \ y = 1 \quad [2]$$

$$(39) \ a \ 165 \quad [2]$$

$$b \ 60 \quad [3]$$

$$c \ \frac{24}{165} \quad [3]$$

$$d \ 6 \quad [2]$$

$$(40) \ a \ 20 - x \quad [1]$$

$$b \ 2 \quad [6]$$

$$c \ 2\sqrt{10} \quad [3]$$