

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

**THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS**

**COURSE II**

Wednesday, January 27, 1999 — 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.

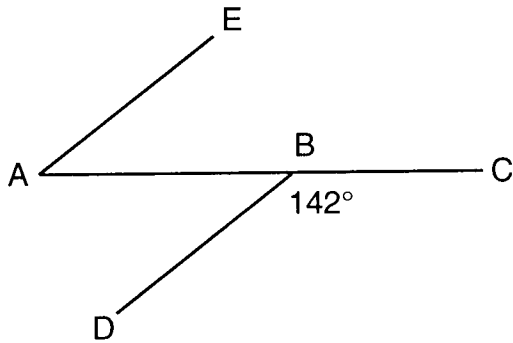
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during 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  $\pi$  or in radical form. [60]

- 1 In the accompanying diagram,  $\overline{AB}$  is extended to  $C$ ,  $m\angle DBC = 142$ , and  $\overrightarrow{AE} \parallel \overrightarrow{DB}$ . Find  $m\angle EAB$ .



- 2 The corresponding altitudes of two similar triangles are 6 and 4. If the perimeter of the larger triangle is 18, what is the perimeter of the smaller triangle?

- 3 What is the identity element for the operation @ in the following system?

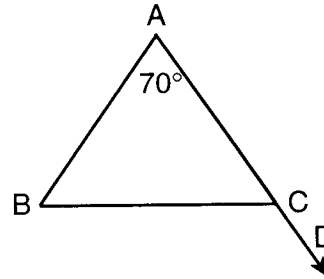
@	A	B	C	D
A	D	A	B	C
B	A	B	C	D
C	B	C	D	A
D	C	D	A	B

- 4 What are the coordinates of  $P'$ , the image of  $P(2,-5)$  after a reflection in the  $y$ -axis?

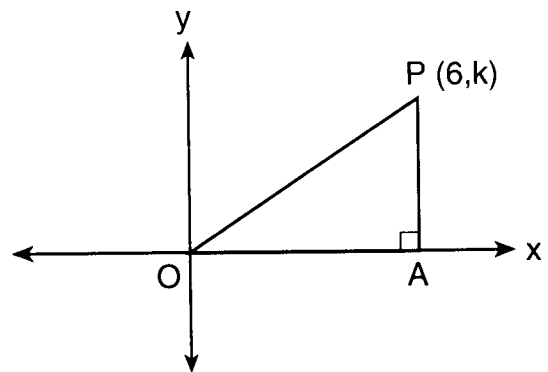
- 5 Parallelogram  $STAR$  has coordinates  $S(0,0)$ ,  $T(6,-1)$ ,  $A(4,2)$ , and  $R(-2,3)$ . What are the coordinates of the point of intersection of the diagonals?

- 6 If the operation  $\star$  is defined as  $a \star b = \sqrt{a} + b^2$ , what is the value of  $16 \star 3$ ?

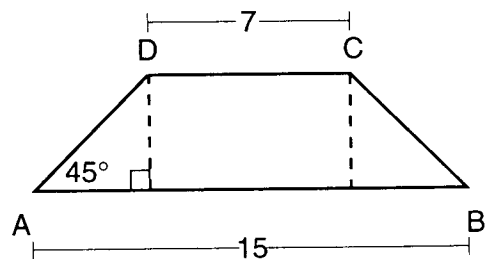
- 7 In the accompanying diagram of isosceles triangle  $BAC$ , vertex angle  $A$  measures  $70^\circ$  and  $\overline{AC}$  is extended to  $D$ . Find  $m\angle BCD$ .



- 8 In the accompanying diagram of right triangle  $OAP$ , the coordinates of  $P$  are  $(6,k)$ . Find the value of  $k$  if the area of  $\triangle OAP$  is 12.

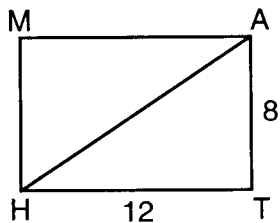


- 9 In the accompanying diagram, the lengths of the bases of isosceles trapezoid  $ABCD$  are 7 and 15. Each leg makes an angle of  $45^\circ$  with the longer base. Find the length of the altitude of the trapezoid.



- 10 If  $x + 15$  and  $2x + 27$  represent the number of degrees in the measures of two consecutive angles of a parallelogram, find the value of  $x$ .

- 11 In rectangle  $MATH$ ,  $AT = 8$  and  $TH = 12$ . Find the length of diagonal  $\overline{HA}$  to the nearest tenth.



- 12 Solve for the positive value of  $x$ :  $\frac{4}{x+2} = \frac{x-2}{15}$
- 13 Write an equation of the line that passes through point  $(8,3)$  and is parallel to the  $x$ -axis.
- 14 What is the total number of different six-letter arrangements that can be formed from the letters of the word "REDUCE"?
- 15 Find, in radical form, the distance between points  $(-3,7)$  and  $(4,2)$ .

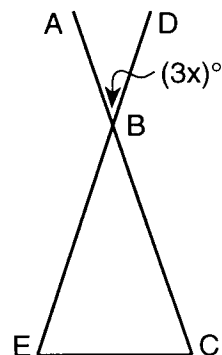
*Directions (16–34):* For each question chosen, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question.

- 16 The measure of an exterior angle of a triangle can not be
- (1) less than  $90^\circ$   
 (2) between  $90^\circ$  and  $180^\circ$   
 (3) exactly  $90^\circ$   
 (4) greater than  $180^\circ$
- 17 If two angles of a triangle measure  $56^\circ$  and  $68^\circ$ , the triangle is
- (1) scalene (3) obtuse  
 (2) isosceles (4) right
- 18 Which statement is logically equivalent to  $\sim(p \wedge \sim q)$ ?
- (1)  $\sim p \wedge q$  (3)  $\sim p \wedge \sim q$   
 (2)  $\sim p \vee q$  (4)  $\sim p \vee \sim q$

- 19 If two sides of a scalene triangle measure 10 and 12, the length of the third side could be

- (1) 10 (3) 15  
 (2) 2 (4) 22

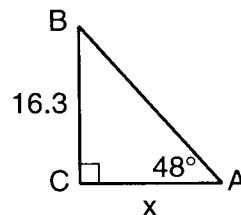
- 20 In the accompanying diagram,  $\overline{ABC}$ ,  $\overline{DBE}$ , and  $\overline{EC}$  are drawn and  $m\angle ABD = 3x$ .



What is the sum of  $m\angle C$  and  $m\angle E$ ?

- (1)  $2x$  (3)  $180 - x$   
 (2)  $3x$  (4)  $180 - 3x$

- 21 In the accompanying diagram of right triangle  $ABC$ ,  $m\angle C = 90$ ,  $m\angle BAC = 48$ ,  $AC = x$ , and  $CB = 16.3$ .



Which equation could be used to find the length of  $\overline{AC}$ ?

- (1)  $\sin 48 = \frac{16.3}{x}$  (3)  $\tan 48 = \frac{16.3}{x}$   
 (2)  $\cos 48 = \frac{x}{16.3}$  (4)  $\tan 48 = \frac{x}{16.3}$

- 22 What is the image of  $(4,-1)$  after a dilation of 2?

- (1)  $(6,1)$  (3)  $(6,-1)$   
 (2)  $(2,-3)$  (4)  $(8,-2)$

- 23 Which expression is a factored form of  $2x^2 - 2x - 12$ ?

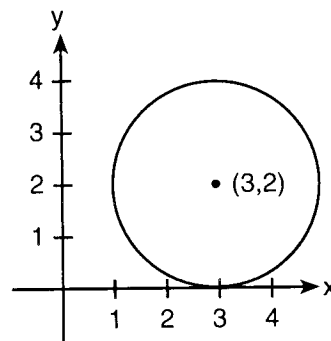
- (1)  $2(x+2)(x-3)$  (3)  $2(x+3)(x-2)$   
 (2)  $2(x+6)(x-1)$  (4)  $2(x+1)(x-6)$

- 24 What is the slope of the line  $y + 6x = 3$ ?
- (1)  $-6$  (3)  $3$   
 (2)  $-3$  (4)  $6$
- 25 The graph of which equation passes through points  $(0,6)$  and  $(4,-1)$ ?
- (1)  $y = \frac{7}{4}x + 6$  (3)  $y = -\frac{7}{4}x + 6$   
 (2)  $y = \frac{4}{7}x + 6$  (4)  $y = -\frac{4}{7}x + 6$
- 26 Which statements describe properties of the diagonals of a rectangle?
- I. The diagonals are congruent.  
 II. The diagonals are perpendicular.  
 III. The diagonals bisect each other.
- (1) II and III, only (3) I and III, only  
 (2) I and II, only (4) I, II, and III
- 27 Given:  $d \rightarrow \sim e$   
 $e$   
 $\sim d \rightarrow c$
- Which statement is true?
- (1)  $d \vee \sim c$  (3)  $d$   
 (2)  $c$  (4)  $c \wedge \sim e$
- 28 What are the roots of the equation  $x^2 - 6x - 3 = 0$ ?
- (1)  $3 \pm 2\sqrt{3}$  (3)  $3, 1$   
 (2)  $3, 2$  (4)  $-3 \pm 2\sqrt{3}$
- 29 What is an equation of the axis of symmetry of the graph of the parabola  $y = -3x^2 + 12x - 17$ ?
- (1)  $x = -2$  (3)  $x = -4$   
 (2)  $x = 2$  (4)  $x = 4$
- 30 In  $\triangle PQR$ ,  $m\angle P = 51$  and  $m\angle Q = 57$ . Which expression is true?
- (1)  $QR > PQ$  (3)  $PQ = QR$   
 (2)  $PR > PQ$  (4)  $PQ > QR$
- 31 The expression  ${}_6C_2$  is equivalent to
- (1)  $360$  (3)  ${}_6C_4$   
 (2)  ${}_2C_6$  (4)  ${}_6P_2$

32 Which statement is the converse of "If quadrilateral  $ABCD$  is a trapezoid, then it has only two opposite sides that are parallel"?

- (1) If quadrilateral  $ABCD$  is not a trapezoid, then it does not have two and only two opposite sides that are parallel.  
 (2) If quadrilateral  $ABCD$  has only two opposite sides that are parallel, then it is a trapezoid.  
 (3) If quadrilateral  $ABCD$  is a trapezoid, then it does not have two and only two opposite sides that are parallel.  
 (4) If quadrilateral  $ABCD$  does not have two and only two opposite sides that are parallel, then it is not a trapezoid.

33 Which equation is represented by the graph drawn in the accompanying diagram?



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

34 Which statement is an illustration of the commutative property of real numbers?

- (1)  $5 + 3 = 3 + 5$   
 (2)  $5(6 + 7) = 5(6) + 5(7)$   
 (3)  $(\frac{1}{2} + \frac{1}{3}) + \frac{1}{4} = \frac{1}{2} + (\frac{1}{3} + \frac{1}{4})$   
 (4)  $-5 + 0 = -5$

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

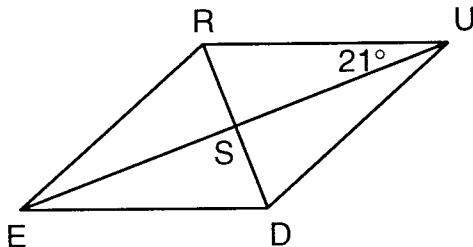
35 *On the answer sheet,* construct the bisector of obtuse angle  $MAE$ .

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]

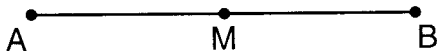
- 36 In the accompanying diagram of rhombus  $RUDE$ ,  $m\angle RUE = 21$  and  $UE = 20$ .



Find, to the nearest tenth, the

- a length of  $\overline{RD}$  [5]  
 b perimeter of  $RUDE$  [5]

- 37 In the accompanying diagram,  $M$  is the midpoint of  $\overline{AB}$ .



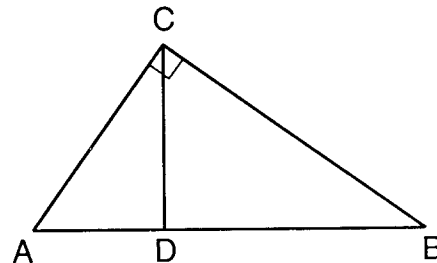
- a Describe fully the locus of points in a plane that are
- (1) equidistant from  $A$  and  $B$  [2]
  - (2) 4 units from  $\overline{AB}$  [3]
  - (3)  $d$  units from  $M$  [3]
- b For which value of  $d$  will there be exactly two points that satisfy all the conditions in part a? [2]

- 38 Solve the following system of equations either graphically or algebraically and check.

$$\begin{aligned} y &= x^2 - 4x + 9 \\ 2x - y + 1 &= 0 \end{aligned} \quad [8,2]$$

- 39 Find the area of quadrilateral  $MATH$ , whose vertices are  $M(4,5)$ ,  $A(9,7)$ ,  $T(11,2)$ , and  $H(2,1)$ . [10]

- 40 In the accompanying diagram of right triangle  $ABC$ , altitude  $\overline{CD}$  is drawn to hypotenuse  $\overline{AB}$ .  $CA = 6$ , and  $AB$  is 7 more than  $AD$ .



- a Find  $AD$  to the nearest hundredth. [7]  
 b Using the results from part a, find the length of altitude  $\overline{CD}$  to the nearest tenth. [3]

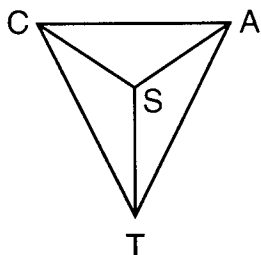
GO RIGHT ON TO THE NEXT PAGE.

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: isosceles triangle  $CAT$ ,  $\overline{CT} \cong \overline{AT}$ ,  $\overline{ST}$  bisects  $\angle CTA$ , and  $\overline{SC}$  and  $\overline{SA}$  are drawn.



Prove:  $\angle SCA \cong \angle SAC$  [10]

- 42 Given:  $A \rightarrow \sim B$   
 $D \rightarrow \sim C$   
 $(\sim D \wedge \sim E) \rightarrow F$   
 $C \vee B$   
 $A$   
 $\sim F$

Prove:  $E$  [10]

SEQUENTIAL MATH – COURSE II

Wednesday, January 27, 1999 — 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.

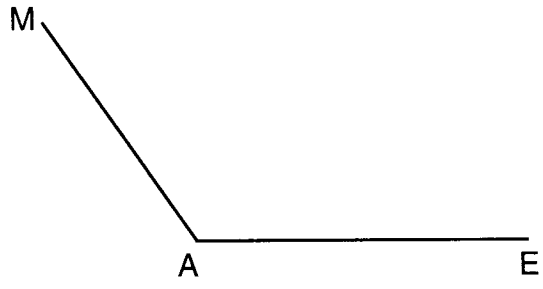
Part I

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 Answer question 35<br>on the other side<br>of this sheet. |
| 6 .....  | 16 ..... | 26 ..... |  |
| 7 .....  | 17 ..... | 27 ..... |  |
| 8 .....  | 18 ..... | 28 ..... |  |
| 9 .....  | 19 ..... | 29 ..... |  |
| 10 ..... | 20 ..... | 30 ..... |  |

Tear Here

Tear Here



**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

Wednesday, January 27, 1999 — 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 16–34, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 38	(11) 14.4	(21) 3	(31) 3
(2) 12	(12) 8	(22) 4	(32) 2
(3) <i>B</i>	(13) $y = 3$	(23) 1	(33) 4
(4) (-2,-5)	(14) 360	(24) 1	(34) 1
(5) (2,1)	(15) $\sqrt{74}$	(25) 3	(35) Construction
(6) 13	(16) 4	(26) 3	
(7) 125	(17) 2	(27) 2	
(8) 4	(18) 2	(28) 1	
(9) 4	(19) 3	(29) 2	
(10) 46	(20) 4	(30) 4	

[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)  $a$  7.7 [5]  
 $b$  42.8 [5]

(38) (2,5) and (4,9) [8]  
 Check [2]

(37)  $a$  (1) the perpendicular bisector of  $\overline{AB}$  [2]  
 (2) two lines parallel to  $\overline{AB}$  and 4 units  
 from it [3]  
 (3) a circle with center at  $M$  having a  
 radius of  $d$  [3]  
 $b$  4 [2]

(39) 31.5 [10]

(40)  $a$  3.45 [7]  
 $b$  4.9 [3]