The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Friday, January 26, 2001 — 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]

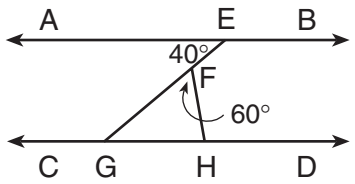
1 In two similar triangles, the ratio of the lengths of a pair of corresponding sides is 7:8. If the perimeter of the larger triangle is 32, find the perimeter of the *smaller* triangle.

2 The accompanying table defines the operation ♥ for set $\{a,e,i,o,u\}$. Using the table, solve for x if $x \heartsuit u = a$.

♥	a	e	i	o	u
a	a	o	u	e	i
e	o	e	a	u	a
i	u	a	i	a	e
o	e	u	a	o	o
u	i	a	e	o	u

3 In which quadrant does the image of point $S(2,-3)$ lie after a reflection in the y-axis?

4 In the accompanying diagram, $\overleftrightarrow{AEB} \parallel \overleftrightarrow{CGHD}$, $\overline{EFG}$ and $\overline{FH}$ are drawn, $m\angle AEF = 40$, and $m\angle GFH = 60$. Find $m\angle FHD$.



5 Solve for the positive value of x:

$$\frac{4}{x} = \frac{x+4}{3}$$

6 If the coordinates of point A are (3,0) and those of point D are (8,12), what is the distance from A to D?

7 In $\triangle ABC$, $m\angle B = 55$ and $m\angle B > m\angle C$. Which side of the triangle is the longest?

8 A translation maps $A(2,6)$ to $A'(5,4)$. Find the coordinates of the image of $(-1,2)$ under the same translation.

9 If $a \bigstar b$ is defined as $\frac{a^2+b}{a+b}$, find the value of $4 \bigstar -1$.

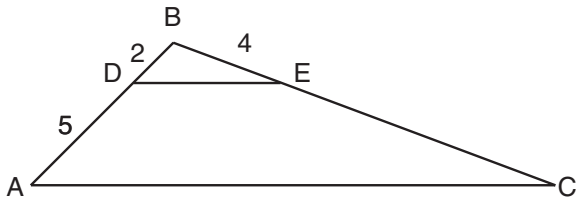
10 If $\sin 38° = \frac{x}{30}$, what is x to the *nearest integer*?

11 The measures of two consecutive angles of a parallelogram are represented by $(x - 14)°$ and $(3x - 10)°$. Find the value of x.

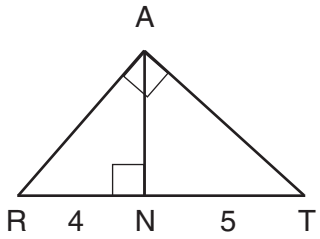
12 Find the number of square units in the area of $\triangle HAT$, whose coordinates are $H(-1,0)$, $A(3,0)$, and $T(3,5)$.

13 If the sides of a rectangle have lengths 7 and 12, find the length of a diagonal to the *nearest tenth*.

14 In the accompanying diagram of $\triangle ABC$, $\overline{DE} \parallel \overline{AC}$, $BD = 2$, $BE = 4$, and $DA = 5$. Find the length of $\overline{BC}$.



15 In the accompanying diagram of right triangle RAT, altitude $\overline{AN}$ divides hypotenuse $\overline{RT}$ into segments with lengths of 4 and 5. Find the length of leg $\overline{RA}$.



16 Factor completely: $2x^3 + 2x^2 - 12x$

Directions (17–34): 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.

17 Which polygon must have congruent diagonals?

(1) rhombus
(2) square
(3) parallelogram
(4) trapezoid

18 Point C (3,4) is the midpoint of $\overline{AB}$. If the coordinates of A are (7,6), the coordinates of B are

(1) (–1,2)
(2) (2,1)
(3) (5,5)
(4) (11,8)

19 Which is the image of point (3,–2) under a dilation of 4 with respect to the origin?

(1) (7,2)
(2) (0,–8)
(3) (12,–8)
(4) (–12,8)

20 What is the converse of the statement "If two triangles are congruent, then they are similar"?

(1) If two triangles are similar, then they are congruent.
(2) If two triangles are not similar, then they are not congruent.
(3) If two triangles are congruent, then they are not similar.
(4) If two triangles are not congruent, then they are not similar.

21 What is the y-intercept of the line whose equation is $2x + y = -3$?

(1) –2
(2) 2
(3) 3
(4) –3

22 Which quadratic equation has –2 and 1 as its roots?

(1) $x^2 + x - 2 = 0$
(2) $x^2 + x + 2 = 0$
(3) $x^2 - x + 2 = 0$
(4) $x^2 - x - 2 = 0$

23 If the measures of three angles of a triangle are represented by $(y + 30)°$, $(4y + 30)°$, and $(10y - 30)°$, then the triangle must be

(1) obtuse
(2) isosceles
(3) scalene
(4) right

24 What is an equation of the straight line that passes through point (–2,7) and is perpendicular to the x-axis?

(1) $x = -2$
(2) $x = 2$
(3) $y = 7$
(4) $y = -7$

25 The number of points equidistant from two parallel lines and also equidistant from two points on one of the given lines is *exactly*

(1) 1
(2) 2
(3) 3
(4) 4

26 If the lengths of two sides of a triangle measure 7 and 15, then the length of the third side could measure

(1) 7
(2) 8
(3) 11
(4) 24

27 The measure of one acute angle of an obtuse triangle is 20° more than the measure of the other acute angle. What is a possible measure of the *smaller* acute angle?

(1) 30°
(2) 35°
(3) 40°
(4) 45°

28 What are the roots of the equation $3x^2 + 6x - 2 = 0$?

(1) $\frac{6 \pm \sqrt{60}}{6}$ (3) $\frac{6 \pm \sqrt{12}}{6}$

(2) $\frac{-6 \pm \sqrt{60}}{6}$ (4) $\frac{-6 \pm \sqrt{12}}{6}$

29 What is the slope of the line determined by points (5,2) and (0,–1)?

(1) $-\frac{5}{3}$ (3) $-\frac{3}{5}$

(2) $\frac{5}{3}$ (4) $\frac{3}{5}$

30 Which equation represents the circle whose center is (1,–4) and whose radius is 6?

(1) $(x - 1)^2 + (y + 4)^2 = 6$
(2) $(x - 1)^2 + (y + 4)^2 = 36$
(3) $(x + 1)^2 + (y - 4)^2 = 6$
(4) $(x + 1)^2 + (y - 4)^2 = 36$

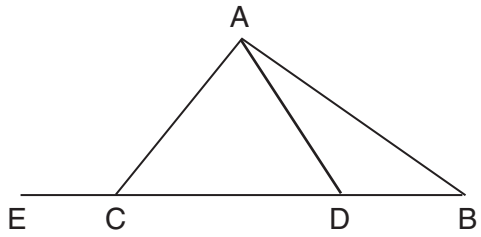
31 If the length of each leg of an isosceles triangle is 13 and the base is 24, the length of the altitude to the base is

(1) 5 (3) 10
(2) 5.5 (4) 11

32 If $a \rightarrow b$ and $\sim c \rightarrow \sim b$, a logical conclusion is that

(1) $a \rightarrow c$ (3) $c \rightarrow a$
(2) $a \rightarrow \sim c$ (4) $c \rightarrow b$

33 In $\triangle ABC$, $\overline{BC}$ is extended to E, and D is a point on $\overline{BC}$.



Which statement must always be true?

(1) $m\angle ADE > m\angle ABC$
(2) $m\angle ADE = m\angle ACB$
(3) $m\angle ACB = m\angle ABC$
(4) $m\angle ABC > m\angle ADE$

34 What is the the total number of different eight-letter arrangements that can be formed from the letters in the word "ALTITUDE"?

(1) 20,160 (3) 56
(2) 40,320 (4) 28

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

35 *On the answer sheet,* construct an equilateral triangle using line segment $\overline{ST}$ as one side.

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 *a* Draw the graph of the equation $y = -x^2 + 4x - 3$ for all values of x in the interval $-1 \leq x \leq 5$. [6]

b Write the equation of the axis of symmetry for the graph drawn in part *a*. [2]

c Which values of x satisfy the equation $-x^2 + 4x - 3 = 0$? [2]

37 Solve the following system of equations algebraically or graphically and check:

$$x^2 + y^2 = 25$$
$$x = y - 1$$ [8,2]

38 Shirley selected 6 mysteries, 3 biographies, and 2 computer manuals to check out of the library. However, she was told that the maximum number of books she could check out was 8.

a What is the total number of different 8-book selections that she could check out? [2]

b What is the total number of 8-book selections that will contain 4 mysteries, 2 biographies, and 2 computer manuals? [4]

c What is the probability that an 8-book selection will contain 4 mysteries, 2 biographies, and 2 computer manuals? [2]

d What is the probability that an 8-book selection will contain no mysteries? [2]

39 *On your answer paper,* write the letters *a* through *e*. Next to each letter write in words a logical conclusion that can be determined using both true statements for each part. If no logical conclusion can be reached, write "NO CONCLUSION."

a If I play tennis, I will be late for dinner.
If I am late for dinner, I cannot go to the movies. [2]

b Either I take a vacation or I work.
I do not take a vacation. [2]

c Ed will not pass the course if he does not finish his project.
Ed passes the course. [2]

d If it rains, the flowers bloom.
The flowers bloom. [2]

e If I exercise, I feel healthy.
I exercise. [2]

40 *a* In right triangle ABC, $\overline{AB}$ is the hypotenuse, $BC = 40$, and $m\angle A = 28$.

(1) Find the area of $\triangle ABC$ to the *nearest tenth.* [4]

(2) Find the perimeter of $\triangle ABC$ to the *nearest tenth.* [3]

b Find, to the *nearest degree,* the measure of a base angle of an isosceles triangle whose sides have lengths 12, 12, and 15. [3]

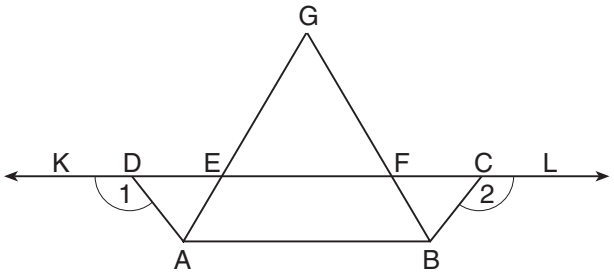
GO RIGHT ON TO THE NEXT PAGE.

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: $\triangle AGB$, $\overline{GEA}$, $\overline{GFB}$, $\overline{GE} \cong \overline{GF}$, $\overleftrightarrow{KDEFCL}$, $\overline{DA}$ and $\overline{CB}$ are drawn, $\angle 1 \cong \angle 2$, and $\overline{DE} \cong \overline{FC}$.



Prove: $\triangle DAE \cong \triangle CBF$ [10]

42 The vertices of quadrilateral *GRID* are *G*(4,1), *R*(7,–3), *I*(11,0), and *D*(8,4). Using coordinate geometry, prove that quadrilateral *GRID* is a square. [10]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH – COURSE II

Friday, January 26, 2001 — 9:15 a.m. to 12:15 p.m., only

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

Tear Here

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 on the other side of this sheet.**
6	16	26	
7	17	27	
8	18	28	
9	19	29	
10	20	30	

Tear Here

35

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