The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Thursday, June 16, 1994 — 9:15 a.m. to 12:15 p.m., only

Notice . . .

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 carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

On page 9 you will find the "Tables of Natural Trigonometric Functions" which you may need to answer e questions in this examination. Fold this page along the perforations, and tear it off also slowly and fully.

When you have completed the examination, you must sign the statement printed at the end of the answer r, indicating that you had no unlawful knowledge of the questions or answers prior to the examination that you have neither given nor received assistance in answering any of the questions during the ination. 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 Segment $\overline{AB}$ is parallel to segment $\overline{CD}$. If the slope of $\overline{AB} = -\frac{3}{7}$ and the slope of $\overline{CD} = -\frac{x}{14}$, find the value of x.

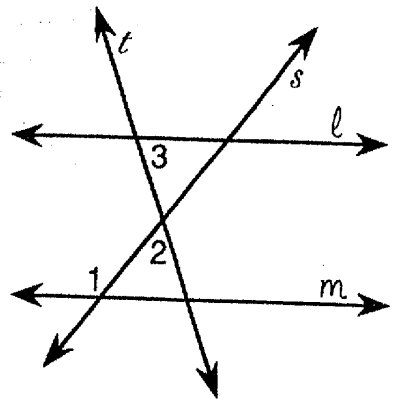
2 Lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at point F. What is the total number of points 4 centimeters from point F and also equidistant from $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$?

3 In the following system, determine the value of $(a \textcircled{?} b) \textcircled{?} c$.

?	a	d	b	c
a	b	a	c	d
d	a	d	b	c
b	c	b	d	a
c	d	c	a	b

4 If a translation maps $(x,y) \rightarrow (x + 2, y + 3)$, what are the coordinates of B', the image of point $B(-3,5)$ after this translation?

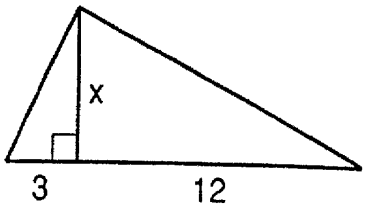
5 In the accompanying diagram, $\ell \parallel m$, t and s are intersecting transversals, $m\angle 1 = 130$, and $m\angle 2 = 60$. Find $m\angle 3$.



6 In $\triangle ABC$, $m\angle A = 65$ and $m\angle C = 60$. Which is the *shortest* side of the triangle?

7 If $\tan A = \frac{3}{4}$, find $m\angle A$ to the *nearest degree*.

8 In the accompanying diagram, the altitude to the hypotenuse of the right triangle divides the hypotenuse into two segments of lengths 3 and 12. What is the length of the altitude?

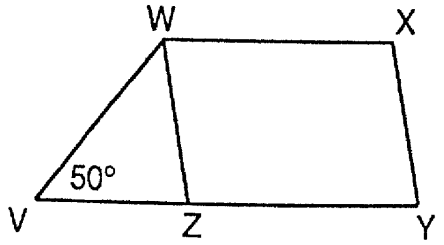


9 What are the coordinates of P', the image of $P(1,2)$ after a reflection in the origin?

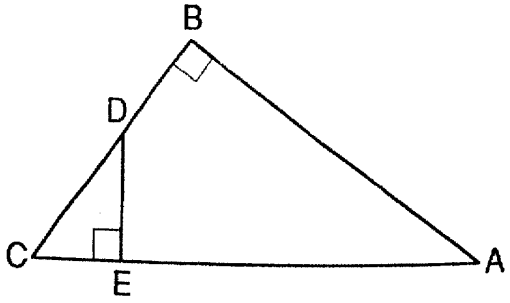
10 The coordinates of A and B are $(2a,4b)$ and $(8a,6b)$, respectively. Express, in terms of a and b, the coordinates of the midpoint of $\overline{AB}$.

11 In isosceles triangle ABC, $\overline{AB} \cong \overline{CB}$. Find $m\angle B$, if $m\angle A = 5x - 4$ and $m\angle C = 2x + 20$.

12 In the accompanying diagram, $WXYZ$ is a parallelogram, line $\overline{YZ}$ is extended to point V, $\overline{WZ} \cong \overline{VZ}$, and $m\angle V = 50$. Find $m\angle ZWX$.



13 In $\triangle ABC$, $\overline{AB} \perp \overline{BC}$ and $\overline{DE} \perp \overline{CA}$. If $DE = 8$, $CD = 10$, and $CA = 30$, find AB.



14 Write an equation of the line that passes through points (2,3) and (4,5).

15 What is the positive root of the equation $c^2 - 6c = 27$?

16 If the length of one side of a rectangle is 8 and the length of a diagonal is 10, find the area of the rectangle.

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 Two consecutive angles of a parallelogram measure $2x + 10$ and $x - 10$. What is the value of x?

(1) 30
(2) 60
(3) 120
(4) –20

18 What is the length of the line segment joining points $J(1,5)$ and $K(3,9)$?

(1) $2\sqrt{5}$
(2) $\sqrt{13}$
(3) $13\sqrt{2}$
(4) $2\sqrt{13}$

19 Which statement is logically equivalent to $\sim(a \wedge \sim b)$?

(1) $\sim a \wedge b$
(2) $\sim a \wedge \sim b$
(3) $\sim a \vee \sim b$
(4) $\sim a \vee b$

20 Which statement is equivalent to the inequality $9 - 4x \leq 3x - 5$?

(1) $x > -2$
(2) $x < 2$
(3) $x \leq -2$
(4) $x \geq 2$

21 Which polygon must have congruent diagonals?

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

22 What is the y-intercept of the graph of the equation $y = 2x^2 - 5x + 7$?

(1) –5
(2) 2
(3) 7
(4) –7

23 If the statements $m \rightarrow n$ and $\sim m \rightarrow s$ are true, then which statement is a logical conclusion?

(1) $n \rightarrow s$
(2) $s \rightarrow n$
(3) s
(4) $\sim n \rightarrow s$

24 Which equation describes the locus of points 5 units from point (3,–4)?

(1) $(x + 3)^2 + (y - 4)^2 = 5$
(2) $(x - 3)^2 + (y + 4)^2 = 5$
(3) $(x - 3)^2 + (y + 4)^2 = 25$
(4) $(x + 3)^2 + (y - 4)^2 = 25$

25 In the solution of this problem, which property of real numbers justifies statement 5?

Statements	Reasons
1. $3x = 6$	1. Given
2. $\frac{1}{3}(3x) = \frac{1}{3}(6)$	2. Multiplication axiom
3. $\left(\frac{1}{3} \cdot 3\right)x = 2$	3. Associative property
4. $1 \cdot x = 2$	4. Multiplicative inverse
5. $x = 2$	5. _____

(1) Closure
(2) Identity
(3) Commutative
(4) Inverse

26 How many 9-letter arrangements can be formed from the letters in the word "SASSAFRAS"?

(1) $\frac{4!}{3!}$
(2) $\frac{9!}{4!3!}$
(3) $\frac{9!}{7!}$
(4) 9!

27 If the length of each leg of an isosceles triangle is 17 and the base is 16, the length of the altitude to the base is

(1) 8
(2) $8\frac{1}{2}$
(3) 15
(4) $\sqrt{32}$

28 Which equation represents the line that passes through point (0,6) and is perpendicular to the line whose equation is $y = 3x - 2$?

(1) $y = -\frac{1}{3}x + 6$
(2) $y = \frac{1}{3}x + 6$
(3) $y = -3x + 6$
(4) $y = 3x + 6$

as a fraction in lowest terms, $\frac{x}{-2}$, $x \neq 2,0,-2$, is equivalent to

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

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

of two sides of a triangle are 7 and th of the third side may be

(3) 3
(4) 8

ssion is *not* equivalent to ${}_7C_5$?

(3) $\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$

(4) ${}_7C_2$

roots of the equation
$= 0$?

(3) $\frac{3 \pm \sqrt{3}}{2}$

(4) $\frac{3 \pm \sqrt{15}}{2}$

33 The sum of $\frac{x+4}{x}$ and $\frac{x-4}{4}$ is

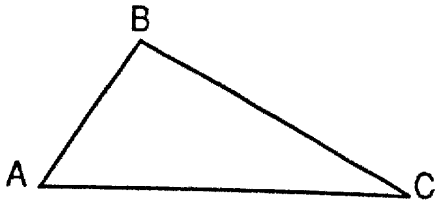
(1) $\frac{1}{2}$

(2) $4 + x$

(3) $\frac{x^2 + 16}{4x}$

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

34 In the accompanying diagram, $\triangle ABC$ is a scalen triangle.



If the median is drawn from vertex B, what is th probability that its length will be greater than th length of the altitude?

(1) 1

(2) 0

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

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

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

35 *On the answer sheet*, construct the ray tha bisects $\angle B$.

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Thursday, June 16, 1994 — 9:15 a.m. to 12:15 p.m., only

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 17–34, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 6

(2) 4

(3) b

(4) (-1,8)

(5) 70

(6) $\overline{AC}$

(7) 37

(8) 6

(9) (-1,-2)

(10) $(5a,5b)$

(11) 108

(12) 80

(13) 24

(14) $y = x + 1$

(15) 9

(16) 48

(17) 2

(18) 1

(19) 4

(20) 4

(21) 2

(22) 3

(23) 4

(24) 3

(25) 2

(26) 2

(27) 3

(28) 1

(29) 1

(30) 4

(31) 1

(32) 3

(33) 3

(34) 1

(35) construction

[OVER]

Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics* and its supplement. 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* $\frac{x+3}{x+4}$ [6]

b $-9, 4$ [4]

(37) *d* 3 [2]

(38) *a* 120 [2]

b (1) $\frac{30}{120}$ [3]

(2) $\frac{10}{120}$ [3]

(3) 0 [2]

(39) *a* 100 [3]

b 52 [4]

c 28 [3]

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

Part II

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

swer both a and b for all values of x for which se expressions are defined.

Express the product in simplest form:

$$\frac{x^2 - 9}{x^2 - x - 20} \cdot \frac{4x^2 - 20x}{4x^2 - 12x} \quad [6]$$

olve for x: $\frac{x - 3}{2} = \frac{6}{x + 8}$ [4]

n graph paper, draw the graph of the equation $y = x^2 - 4x + 4$, including all values of x om $x = -1$ to $x = 5$. Label the graph a. [4]

n the same set of axes, draw the image of e graph drawn in part a after a translation at maps $(x,y) \rightarrow (x - 2, y + 3)$. Label the nage b. [2]

n the same set of axes, draw the image of the aph drawn in part b after a reflection in the axis. Label the image c. [2]

hich equation could represent the graph awn in part c? [2]

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

has three detective books, two books about and five comic books. He plans to lend books to his friend David.

ow many different selections of three books n Alan lend his friend? [2]

nd the probability that a three-book selecn will contain
one book of each type [3]
comic books, only [3]
books about cars, only [2]

39 Trapezoid $ABCD$ has coordinates $A(-6,0)$, $B(17,0)$, $C(2,8)$, and $D(0,8)$. Find the

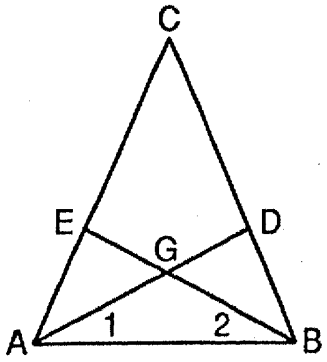
a area of trapezoid $ABCD$ [3]

b perimeter of trapezoid $ABCD$ [4]

c measure of $\angle B$ to the *nearest degree* [3]

40 *On your answer paper*, write the numerals 1 through 8, and next to each numeral, give a reason for each statement in the proof. For statement 1, write "Given."

Given: $\triangle ABC$, $\overline{AC} \cong \overline{BC}$, $\overline{AD}$ and $\overline{BE}$ intersect at G, and $\angle 1 \cong \angle 2$.



Prove: $\overline{EG} \cong \overline{DG}$

Statements	Reasons
(1) $\triangle ABC$, $\overline{AC} \cong \overline{BC}$, $\angle 1 \cong \angle 2$	(1) Given
(2) $\angle CAB \cong \angle CBA$	(2) [2]
(3) $\overline{AB} \cong \overline{BA}$	(3) [1]
(4) $\triangle EAB \cong \triangle DBA$	(4) [2]
(5) $\angle AEB \cong \angle BDA$, $\overline{AE} \cong \overline{BD}$	(5) [1]
(6) $\angle EGA \cong \angle DGB$	(6) [1]
(7) $\triangle EGA \cong \triangle DGB$	(7) [2]
(8) $\overline{EG} \cong \overline{DG}$	(8) [1]

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: If pro basketball players compete in the Olympics, then college players do not play.
If college players do not play, then the team is not an amateur team.
If the team is not an amateur team and the team does not win the gold medal, then the people are not happy.
Pro basketball players compete in the Olympics.
The people are happy.

Let P represent: "Pro basketball players compete in the Olympics."
Let C represent: "College players play."
Let A represent: "The team is an amateur team."
Let G represent: "The team wins the gold medal."
Let H represent: "The people are happy."

Prove: The team wins the gold medal. [10]

42 The coordinates of the vertices of $\triangle TAG$ are $T(1,3)$, $A(8,2)$, and $G(5,6)$. Prove that $\triangle TAG$ is an isosceles right triangle. [10]

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

Tables of Natural Trigonometric Functions

(For use with Sequential Math – Course II Regents Examinations)

Angle	Sine	Cosine	Tangent	Angle	Sine	Cosine	Tangent
1°	.0175	.9998	.0175	46°	.7193	.6947	1.0355
2°	.0349	.9994	.0349	47°	.7314	.6820	1.0724
3°	.0523	.9986	.0524	48°	.7431	.6691	1.1106
4°	.0698	.9976	.0699	49°	.7547	.6561	1.1504
5°	.0872	.9962	.0875	50°	.7660	.6428	1.1918
6°	.1045	.9945	.1051	51°	.7771	.6293	1.2349
7°	.1219	.9925	.1228	52°	.7880	.6157	1.2799
8°	.1392	.9903	.1405	53°	.7986	.6018	1.3270
9°	.1564	.9877	.1584	54°	.8090	.5878	1.3764
10°	.1736	.9848	.1763	55°	.8192	.5736	1.4281
11°	.1908	.9816	.1944	56°	.8290	.5592	1.4826
12°	.2079	.9781	.2126	57°	.8387	.5446	1.5399
13°	.2250	.9744	.2309	58°	.8480	.5299	1.6003
14°	.2419	.9703	.2493	59°	.8572	.5150	1.6643
15°	.2588	.9659	.2679	60°	.8660	.5000	1.7321
16°	.2756	.9613	.2867	61°	.8746	.4848	1.8040
17°	.2924	.9563	.3057	62°	.8829	.4695	1.8807
18°	.3090	.9511	.3249	63°	.8910	.4540	1.9626
19°	.3256	.9455	.3443	64°	.8988	.4384	2.0503
20°	.3420	.9397	.3640	65°	.9063	.4226	2.1445
21°	.3584	.9336	.3839	66°	.9135	.4067	2.2460
22°	.3746	.9272	.4040	67°	.9205	.3907	2.3559
23°	.3907	.9205	.4245	68°	.9272	.3746	2.4751
24°	.4067	.9135	.4452	69°	.9336	.3584	2.6051
25°	.4226	.9063	.4663	70°	.9397	.3420	2.7475
26°	.4384	.8988	.4877	71°	.9455	.3256	2.9042
27°	.4540	.8910	.5095	72°	.9511	.3090	3.0777
28°	.4695	.8829	.5317	73°	.9563	.2924	3.2709
29°	.4848	.8746	.5543	74°	.9613	.2756	3.4874
30°	.5000	.8660	.5774	75°	.9659	.2588	3.7321
31°	.5150	.8572	.6009	76°	.9703	.2419	4.0108
32°	.5299	.8480	.6249	77°	.9744	.2250	4.3315
33°	.5446	.8387	.6494	78°	.9781	.2079	4.7046
34°	.5592	.8290	.6745	79°	.9816	.1908	5.1446
35°	.5736	.8192	.7002	80°	.9848	.1736	5.6713
36°	.5878	.8090	.7265	81°	.9877	.1564	6.3138
37°	.6018	.7986	.7536	82°	.9903	.1392	7.1154
38°	.6157	.7880	.7813	83°	.9925	.1219	8.1443
39°	.6293	.7771	.8098	84°	.9945	.1045	9.5144
40°	.6428	.7660	.8391	85°	.9962	.0872	11.4301
41°	.6561	.7547	.8693	86°	.9976	.0698	14.3007
42°	.6691	.7431	.9004	87°	.9986	.0523	19.0811
43°	.6820	.7314	.9325	88°	.9994	.0349	28.6363
44°	.6947	.7193	.9657	89°	.9998	.0175	57.2900
45°	.7071	.7071	1.0000	90°	1.0000	.0000	

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

SEQUENTIAL MATH — COURSE II

Thursday, June 16, 1994 — 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 .....

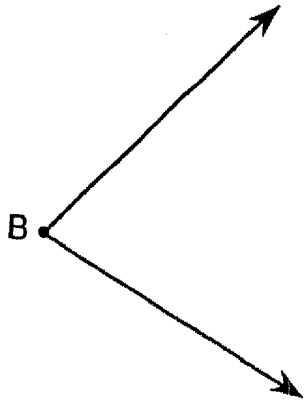
Your answers to Part I should be recorded on this answer sheet.

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

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