

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

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Wednesday, January 26, 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 and 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 some questions in this examination. Fold this page along the perforations, and tear it off also slowly and carefully.

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 The lengths of the sides of a triangle are 4, 6, and 7. If the length of the longest side of a similar triangle is 21, find the perimeter of the larger triangle.

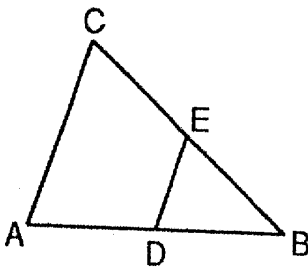
2 The measure of an exterior angle of a triangle is 120° , and the measure of one interior angle of the triangle is 50° . Find the number of degrees in the measure of the largest angle of the triangle.

3 Using the accompanying table, solve for y if $a \heartsuit y = c \heartsuit d$.

\heartsuit	a	b	c	d
a	b	c	d	a
b	c	d	a	b
c	d	a	b	c
d	a	b	c	d

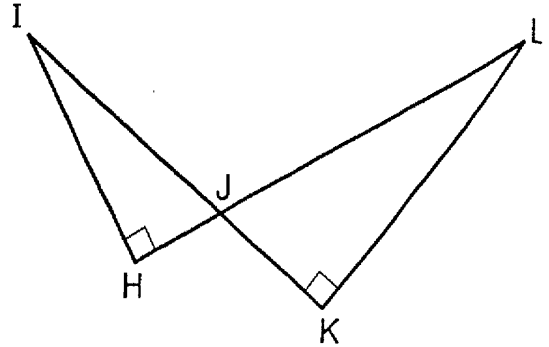
4 If $\sin A = 0.3642$, find the measure of $\angle A$ to the nearest degree.

5 In the accompanying diagram of $\triangle ABC$, D is the midpoint of \overline{AB} and E is the midpoint of \overline{BC} . If $DE = 5$ and $AC = 2x - 20$, find x .



6 If one root of the equation $x^2 + 5x + c = 0$ is -2 , find the value of c .

7 In the accompanying diagram, $\triangle IHJ \sim \triangle LKJ$. If $IH = 5$, $HJ = 2$, and $LK = 7$, find KJ .



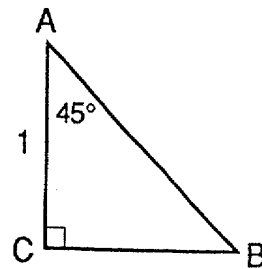
8 Express, in radical form, the distance between the points whose coordinates are $(2,4)$ and $(-2,5)$.

9 Solve for x : $\frac{2}{x} + \frac{1}{7} = \frac{4}{x}$, $x \neq 0$

10 Solve for all values of x :

$$\frac{6}{x-1} = \frac{x}{2}, x \neq 1$$

11 In the accompanying diagram of right triangle ABC , $m\angle C = 90$, $m\angle A = 45$, and $AC = 1$. Find, in radical form, the length of \overline{AB} .



12 What is the total number of ways a committee of three can be chosen from a group of five people?

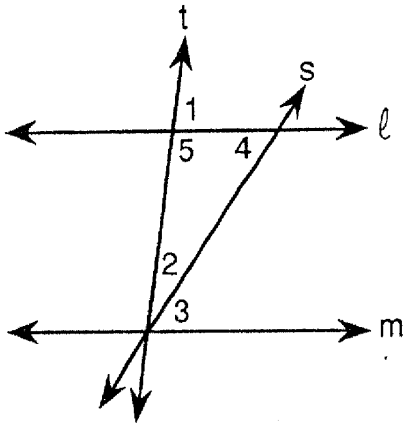
13 Express in lowest terms: $\frac{x^2 - 9}{x^2 + 3x}$, $x \neq 0, -3$

Directions (14-34): 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.

14 The y -intercept of the line whose equation is $y = 3x - 2$ is

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

15 In the accompanying diagram, line ℓ is parallel to line m , and lines s and t are transversals that intersect at a point on line m .



Which statement must be true?

- (1) $m\angle 1 = m\angle 4$
(2) $m\angle 4 = m\angle 2$
(3) $m\angle 1 = m\angle 2 + m\angle 3$
(4) $m\angle 5 = m\angle 2 + m\angle 3$

16 Given: line ℓ and point P not on ℓ . According to the Euclidean parallel postulate, how many lines pass through P that are parallel to ℓ ?

- (1) 1
(2) 2
(3) an infinite number
(4) 0

17 Which is an equation of the locus of points whose ordinates are three less than twice their abscissas?

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

18 A translation moves point $A(4,-2)$ onto point $A'(0,2)$. What is the image of (x,y) under this translation?

- (1) $(x + 2, y)$ (3) $(x - 2, y + 2)$
(2) $(x - 4, y + 4)$ (4) $(x + 4, y + 2)$

19 Which statement would *never* be used to prove that a figure is a rhombus?

- (1) The figure is a quadrilateral.
(2) The figure has a pair of equal adjacent sides.
(3) The figure is a parallelogram.
(4) The figure is a rectangle.

20 The diagonals of a rhombus are 10 centimeters and 24 centimeters. A side of the rhombus measures

- (1) 10 cm (3) 24 cm
(2) 13 cm (4) 26 cm

21 Given: points $A(1,2)$, $B(4,5)$, and $C(6,7)$. Which statement is true?

- (1) \overline{AB} is equal to \overline{BC} .
(2) \overline{AB} is perpendicular to \overline{BC} .
(3) Points A , B , and C are collinear.
(4) The slope of \overline{AC} is -1 .

22 In $\triangle QRS$, $m\angle Q = x$, $m\angle R = 8x - 40$, and $m\angle S = 2x$. Which type of triangle is $\triangle QRS$?

- (1) isosceles (3) acute
(2) right (4) obtuse

23 Which statement is logically equivalent to

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

24 The coordinates of the image of $P(3,-4)$ under a reflection in the x -axis are

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

25 Which is an equation of a line that is perpendicular to the line whose equation is $y = \frac{1}{3}x - 2$?

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

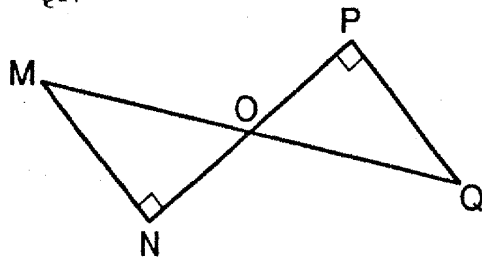
- 26 If the lengths of two sides of a triangle are 4 and 7, the length of the third side can *not* be
- (1) 11 (3) 5
 (2) 7 (4) 4

- 27 Which is an equation of the circle whose center is (0,4) and whose radius is 3?
- (1) $x^2 + (y - 4)^2 = 3$
 (2) $x^2 + (y - 4)^2 = 9$
 (3) $(x - 4)^2 + (y - 3)^2 = 0$
 (4) $(x - 4)^2 + y^2 = 9$

- 28 A set contains four distinct quadrilaterals: a parallelogram, a rectangle, a rhombus, and a square. If one quadrilateral is selected from the set at random, what is the probability that the diagonals of that quadrilateral bisect each other?
- (1) 1 (3) $\frac{2}{4}$
 (2) $\frac{1}{4}$ (4) $\frac{3}{4}$

- 29 Which transformation moves (x,y) to $(5x,5y)$?
- (1) reflection (3) translation
 (2) rotation (4) dilation

- 30 In the accompanying diagram, $\overline{MN} \perp \overline{NP}$, $\overline{QP} \perp \overline{PN}$, O is the midpoint of \overline{NP} , and $\overline{MN} \cong \overline{QP}$.



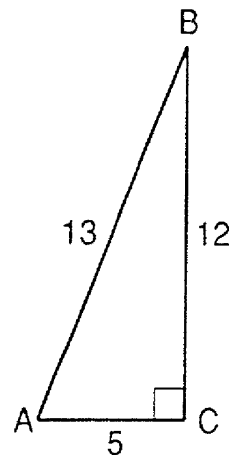
Which reason would be *least* likely to be used to prove $\triangle MNO \cong \triangle QPO$?

- (1) $HL \cong HL$ (3) $SAS \cong SAS$
 (2) $AAS \cong AAS$ (4) $ASA \cong ASA$

- 31 Which is an equation of the axis of symmetry of the graph of the equation $y = 2x^2 - 5x + 3$?

- (1) $x = -\frac{5}{2}$ (3) $x = -\frac{5}{4}$
 (2) $x = \frac{5}{2}$ (4) $x = \frac{5}{4}$

- 32 In the accompanying diagram, the legs of right triangle ABC are 5 and 12 and the hypotenuse is 13.



What is the value of $\cos A$?

- (1) $\frac{12}{13}$ (3) $\frac{5}{13}$
 (2) $\frac{13}{5}$ (4) $\frac{12}{5}$

- 33 Given the true statements:

$$\sim a \vee \sim b$$

$$b$$

$$c \rightarrow a$$

Which statement is also true?

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

- 34 Which statement is logically equivalent to the statement: "If you are not part of the solution, then you are part of the problem"?

- (1) If you are part of the solution, then you are not part of the problem.
 (2) If you are not part of the problem, then you are part of the solution.
 (3) If you are part of the problem, then you are not part of the solution.
 (4) If you are not part of the problem, then you are not part of the solution.

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

- 35 On the answer sheet, construct an angle congruent to angle B of hexagon $ABCDEF$, using point W as the vertex.

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 On graph paper, draw the graph of the equation $y = x^2 - 4x + 3$, including all values of x in the interval $-1 \leq x \leq 5$. [4]

b On the same set of axes, draw the graph of the image of the graph drawn in part a after the translation which moves (x,y) to $(x + 3, y + 2)$, and label this graph b. [3]

c On the same set of axes, draw the graph of the image of the graph drawn in part b after a reflection in the x -axis, and label this graph c. [3]

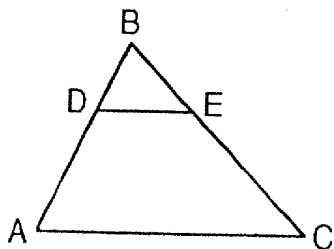
37 a For all values of x for which these expressions are defined, express the product in simplest form:

$$\frac{4x - 24}{x^2 - 36} \cdot \frac{x^2 + 4x - 12}{x^2 + x - 6} \quad [4]$$

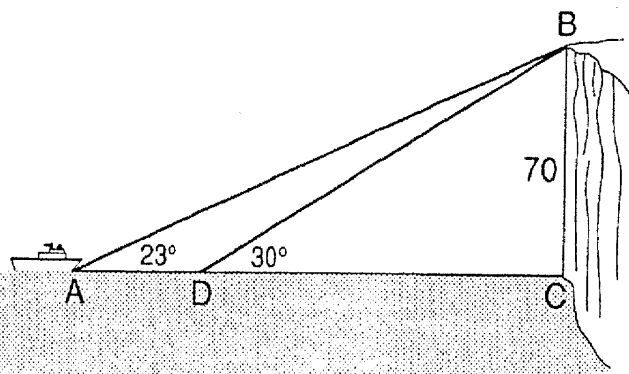
b Solve the following system of equations:

$$\begin{aligned} y &= x + 5 \\ x^2 + y^2 &= 97 \end{aligned} \quad [6]$$

38 In the accompanying diagram of $\triangle ABC$, D is a point on \overline{AB} and E is a point on \overline{BC} such that \overline{DE} is parallel to \overline{AC} . If DB is 2 less than AD , AC is 5 more than AD , and $DE = 4$, find the length of \overline{AD} to the nearest tenth. [5.5]



39 As shown in the accompanying diagram, a ship is headed directly toward a coastline formed by a vertical cliff \overline{BC} , 70 meters high. At point A, the angle of elevation from the ship to B, the top of the cliff, is 23° . A few minutes later at point D, the angle of elevation increased to 30° .



a To the nearest meter, find:

(1) DC [3]

(2) AC [3]

(3) AB [3]

b To the nearest meter, what is the distance between the ship's position at the two sightings? [1]

40 Given: If Ronnie does not waste time in class, then she does well in Course II.
If Ronnie is absent from class, then her grades will go down.
Either Ronnie does not waste time in class or Ronnie is absent from class.
Ronnie's grades do not go down.

Let T represent: "Ronnie wastes time in class."

Let A represent: "Ronnie is absent from class."

Let S represent: "Ronnie's grades go down."

Let B represent: "Ronnie does well in Course II."

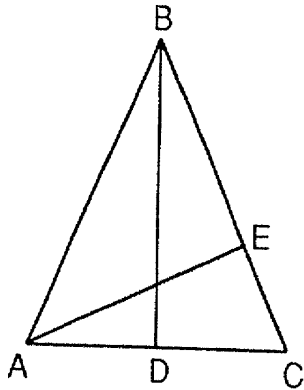
Prove: Ronnie does well in Course II. [10]

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 ABC , $\overline{BA} \cong \overline{BC}$,
 $\overline{AE} \perp \overline{BC}$, and $\overline{BD} \perp \overline{AC}$.



Prove: $\frac{AC}{BA} = \frac{AE}{BD}$ [10]

- 42 Quadrilateral $MATH$ has vertices $M(-1,4)$,
 $A(4,7)$, $T(7,2)$, and $H(2,-1)$. Prove that
 $MATH$ is a square. [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

Wednesday, January 26, 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

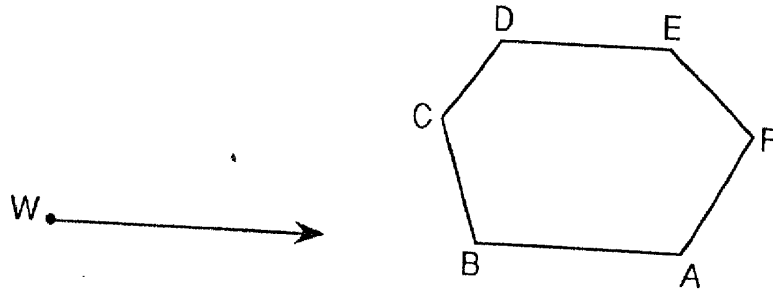
Teacher School

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 | |



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 during 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 II

Wednesday, January 26, 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 14–34, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

- | | | | |
|--------------------|----------------------|--------|-------------------|
| (1) 51 | (11) $\sqrt{2}$ | (21) 3 | (31) 4 |
| (2) 70 | (12) 10 | (22) 4 | (32) 3 |
| (3) b | (13) $\frac{x-3}{x}$ | (23) 3 | (33) 3 |
| (4) 21 | (14) 1 | (24) 3 | (34) 2 |
| (5) 15 | (15) 3 | (25) 1 | (35) construction |
| (6) 6 | (16) 1 | (26) 1 | |
| (7) $\frac{14}{5}$ | (17) 2 | (27) 2 | |
| (8) $\sqrt{17}$ | (18) 2 | (28) 1 | |
| (9) 14 | (19) 4 | (29) 4 | |
| (10) 4, -3 | (20) 2 | (30) 1 | |

[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.

(37) *a* $\frac{4}{x+3}$ [4]

b (4,9) and (-9,-4) [6]

(38) 5.4 [5.5]

(39) *a* (1) 121 [3]

(2) 165 [3]

(3) 179 [3]

b 44 [1]