The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Thursday, August 16, 1990 — 8:30 to 11:30 a.m., only

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 radical form. [60]

1 If $c * d$ is defined as $\frac{d^2}{c} - c$, find the value of $4 * 6$.

2 If the measures of two opposite angles of an isosceles trapezoid are $2x + 20$ and $3x$, what is the value of x?

3 Under a dilation with respect to the origin, the image of $A(1,2)$ is $A'(5,10)$. Under the same dilation, what are the coordinates of B', the image of $B(0,-3)$?

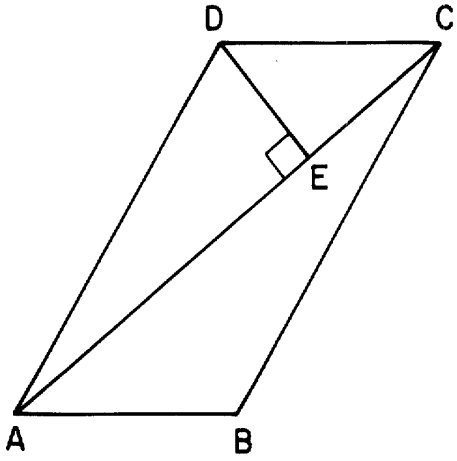
4 What is the image of the point $(-3,2)$ when it is reflected in the x-axis?

5 In isosceles triangle ABC, $AB = 10$ and $BC = 5$. Which is the *smallest* angle of the triangle?

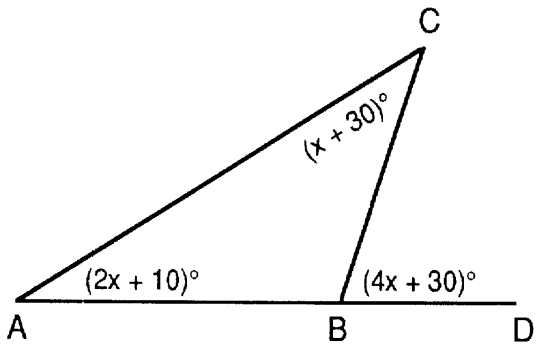
6 If the point $(k,2)$ is on the line whose equation is $2x + 3y = 4$, what is the value of k?

7 In $\triangle ABC$, what is the probability that the median drawn from vertex A will include the midpoint of side $\overline{BC}$?

8 In the accompanying diagram of parallelogram $ABCD$, $\overline{DE}$ is perpendicular to diagonal $\overline{AC}$. If $m\angle BAC = 40$ and $m\angle ADE = 70$, find $m\angle B$.



9 In the accompanying diagram of $\triangle ABC$, side $\overline{AB}$ is extended to D. If $m\angle ACB = x + 30$, $m\angle CAB = 2x + 10$, and $m\angle CBD = 4x + 30$, what is the value of x?



10 In an isosceles triangle, the ratio of the measure of the vertex angle to the measure of a base angle is 1:4. Find the measure of the vertex angle.

11 In a rectangle, the length of the diagonal is 15 and the length of the shorter side is 7. Find, to the *nearest degree*, the number of degrees in the angle formed by the diagonal and the *longer* side of the rectangle.

12 Point P lies on line m. How many points are both 5 units from line m and 6 units from point P?

13 Solve for w: $\frac{1}{6} = \frac{1}{w} + \frac{1}{18}$

14 Find the sum of the measures of the interior angles of a hexagon.

15 If $L = \frac{1}{2}(P - 2W)$, solve for P in terms of L and W.

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 Which is logically equivalent to $\sim(p \vee \sim q)$?

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

17 If the statement $[(p \vee q) \wedge (\sim p)]$ is true, which statement must also be true?

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

18 What is the solution set of the equation $x^2 - 4x - 1 = 0$?

(1) $\{2 \pm \sqrt{3}\}$ (3) $\{4 \pm \sqrt{12}\}$
(2) $\{2 \pm \sqrt{5}\}$ (4) $\{4 \pm \sqrt{5}\}$

19 The lengths of the sides of a triangle are 5, 12, and 13. What is the length of the *longest* side of a similar triangle whose perimeter is 90?

(1) 13 (3) 36
(2) 15 (4) 39

20 Which is an equation of the line that is parallel to $y = 3x - 5$ and has the same y-intercept as $y = -2x + 7$?

(1) $y = 3x - 2$ (3) $y = 3x + 7$
(2) $y = -2x - 5$ (4) $y = -2x - 7$

21 Which point is farthest from the origin?

(1) (0,–5) (3) (3,4)
(2) (6,0) (4) (4,2)

22 Which is a solution for the following system of equations?

$$y = x^2$$
$$y = -2x + 15$$

(1) (–3,9) (3) (3,9)
(2) (5,25) (4) (–5,3)

23 How many different ten-letter permutations can be formed from the letters of the word "CALIFORNIA"?

(1) $\frac{10!}{2!2!}$ (3) $\frac{10!}{4!}$
(2) $\frac{10!}{2!}$ (4) $\frac{8!}{2!2!}$

24 A circle has center (3,5) and diameter $\overline{AB}$. The coordinates of A are (–4,6). What are the coordinates of B?

(1) $\left(-\frac{1}{2}, 4\right)$ (3) (10,1)
(2) (10,4) (4) $\left(-3\frac{1}{2}, 5\frac{1}{2}\right)$

25 Which is an equation of the circle whose center is (3,–2) and whose radius is 7?

(1) $x^2 + 3 + y^2 - 2 = 49$
(2) $x^2 - 3 + y^2 + 2 = 49$
(3) $(x + 3)^2 + (y - 2)^2 = 49$
(4) $(x - 3)^2 + (y + 2)^2 = 49$

26 Which is an equation of the axis of symmetry of the graph of $y = x^2 + 6x + 7$?

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

27 In a group of five boys and three girls, how many committees may be formed that consist of two boys and two girls?

(1) 30 (3) 70
(2) 60 (4) 120

28 If the points (3,2) and (x,–5) lie on a line whose slope is $-\frac{7}{2}$, then x equals

(1) 5 (3) $\frac{15}{7}$
(2) 6 (4) 4

29 Under which operation are the even integers *not* closed?

(1) addition (3) multiplication
(2) subtraction (4) division

30 The altitude to the hypotenuse of a right triangle divides the triangle into two triangles that *must* be

(1) congruent
(2) isosceles
(3) equal in area
(4) similar

31 A bag of marbles contains three blue, one black, and four yellow marbles. If two marbles are chosen at random without replacement, what is the probability that both marbles will be yellow?

(1) $\frac{3}{14}$
(2) $\frac{7}{56}$
(3) $\frac{1}{3}$
(4) $\frac{1}{4}$

32 An equation whose roots are 4 and -1 is

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

33 If the perimeter of a square is 8, which is the length of a diagonal?

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

34 In $\triangle ABC$, $\overline{AB} \cong \overline{BC}$, $AB = 17$, and $AC = 30$. The length of the altitude to $\overline{AC}$ is

(1) 17
(2) 15
(3) 8
(4) 4

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

35 *On the answer sheet*, construct an angle DEF on segment $\overline{EF}$ such that $\angle BAC \cong \angle DEF$.

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

Part II

Answer three questions from this part. Show all work unless otherwise directed. [30]

36 Given: points $A(2,2)$ and $B(6,3)$.

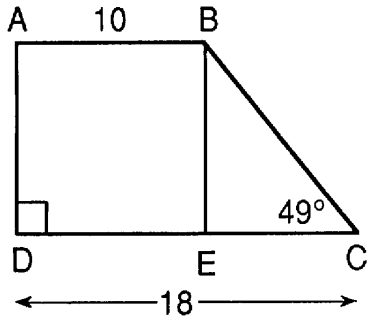
a Find the coordinates of A', the image of A after a dilation of constant 4 with respect to the origin. [2]

b Write the equation of the line $\overleftrightarrow{AA'}$. [2]

c Find the coordinates of B', the image of B after a reflection in line $\overleftrightarrow{AA'}$. [2]

d Show that $ABA'B'$ is *not* a parallelogram. [4]

37 In the accompanying figure of right trapezoid $ABCD$, $AB = 10$, $DC = 18$, $m\angle C = 49$, and $\overline{BE} \perp \overline{DEC}$.



a Find BE to the *nearest integer*. [3]

b Find the area of $ABCD$ to the *nearest integer*. [2]

c Find BC to the *nearest integer*. [3]

d If a dart is thrown at random and lands in trapezoid $ABCD$, what is the probability that the dart will also land in rectangle $ABED$? [Use the answers obtained in parts *a* and *b*.] [2]

38 The vertices of $\triangle ABC$ are $A(-3,1)$, $B(-2,-1)$, and $C(2,1)$.

a Find the lengths of the three sides of $\triangle ABC$. [5]

b Show that $\triangle ABC$ is a right triangle. [3]

c Find the area of $\triangle ABC$. [2]

39 *a* Factor and simplify:

$$\frac{2x + 6}{x^2 - 9} \cdot \frac{x^2 - 3x}{10}, \quad x \neq \pm 3 \qquad [4]$$

b Combine:

$$\frac{6}{y} - \frac{5}{2y}, \quad y \neq 0 \qquad [2]$$

c Solve for x: $\frac{2}{3} + \frac{x + 7}{x} = 4, \; x \neq 0$ [4]

40 Solve the following system of equations and check:

$$y = x^2 - 4x + 3 \qquad [8,2]$$
$$y = 2x - 2$$

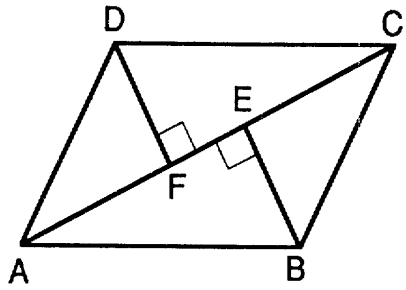
☞ **GO RIGHT ON TO THE NEXT PAGE.**

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

Part III

Answer one question from this part. Show all work unless otherwise directed. [10]

41 Given: quadrilateral $ABCD$, $\overline{AFEC}$, $\overline{AB} \cong \overline{CD}$, $\overline{AD} \cong \overline{CB}$, $\overline{DF} \perp \overline{AC}$, and $\overline{BE} \perp \overline{AC}$.



Prove: $\overline{DF} \cong \overline{BE}$

42 Given: If Kim and Lynette play soccer, then Glenda plays golf.

If Glenda plays golf, then Helen does not play field hockey.

Lynette plays soccer.

Helen plays field hockey.

Let K represent: "Kim plays soccer."
Let L represent: "Lynette plays soccer."
Let G represent: "Glenda plays golf."
Let H represent: "Helen plays field hockey."

Prove: Kim does not play soccer. [2,8]

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

DIVISION OF EDUCATIONAL TESTING

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, August 16, 1990 — 8:30 to 11:30 a.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 .....

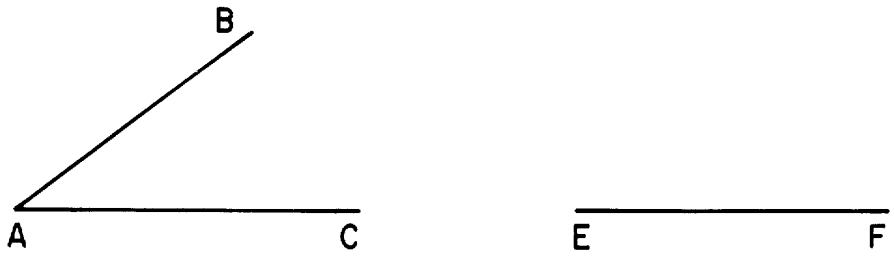
Your answers to Part I should be recorded on this answer sheet.

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

FOR TEACHERS ONLY

SCORING KEY

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Thursday, August 16, 1990 — 8:30 to 11:30 a.m., only

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

(1) 5

(2) 32

(3) (0,–15)

(4) (–3,–2)

(5) A

(6) –1

(7) 1

(8) 120

(9) 10

(10) 20°

(11) 28

(12) 4

(13) 9

(14) 720°

(15) $2L + 2W$

(16) 3

(17) 4

(18) 2

(19) 4

(20) 3

(21) 2

(22) 3

(23) 1

(24) 2

(25) 4

(26) 3

(27) 1

(28) 1

(29) 4

(30) 4

(31) 1

(32) 2

(33) 1

(34) 3

(35) construction

[OVER]

Part II

Please refer to the Department publication *Guide for Rating Regents Examinations in Mathematics*. 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* $A'(8,8)$ [2]
b $y = x$ [2]
c $B'(3,6)$ [2]

(37) *a* 9 [3]
b 126 [2]
c 12 [3]
d $\frac{90}{126}$ [2]

(38) *a* $5, 2\sqrt{5}, \sqrt{5}$ [5]
c 5 [2]

(39) *a* $\frac{x}{5}$ [4]
b $\frac{7}{2y}$ [2]
c 3 [4]

(40) (1,0) and (5,8) [8]