The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, January 26, 1989 — 1:15 to 4:15 p.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 all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form. Write your answers in the spaces provided on the separate answer sheet. [60]

1 In parallelogram $ABCD$, the measure of $\angle A$ is represented by $(x + 30)°$ and the measure of $\angle B$ is represented by $(2x)°$. Find the value of x.

2 An exterior angle at the base of an isosceles triangle measures 150°. Find the number of degrees in the measure of the vertex angle of the triangle.

3 The point $(-4,k)$ lies on the line whose equation is $y = 3$. Find the value of k.

4 Find the midpoint of the line segment whose endpoints are $(-3,2)$ and $(-1,0)$.

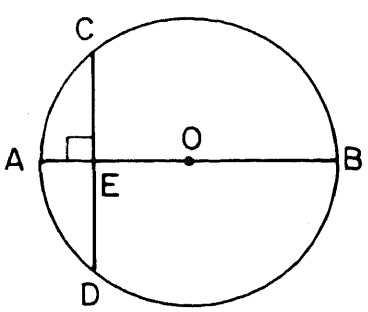
5 If the area of a right triangle is 24 and the length of one leg is 6, what is the length of the other leg?

6 In circle O, $\overline{AB}$ is a diameter. If chords $\overline{AC}$ and $\overline{BC}$ have lengths 5 and 12, respectively, find AB.

7 The length of the base of an isosceles triangle is 20 centimeters, and each base angle measures 57°. Find, to the *nearest centimeter*, the altitude to the base.

8 In $\triangle ABC$, $\overleftrightarrow{DE}$ is drawn parallel to $\overline{BC}$, intersecting $\overline{AB}$ at D and $\overline{AC}$ at E. If $DE = 4$, $BC = 12$, and $AD = 5$, find AB.

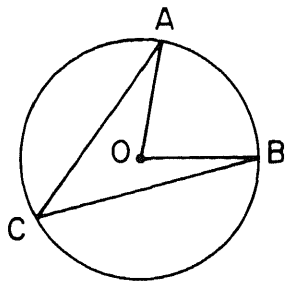
9 In the accompanying figure, diameter $\overline{AB}$ of circle O is perpendicular to chord $\overline{CD}$ at E. If $AE = 2$ and $CE = 4$, find EB.



10 The area of a trapezoid is 72 and its median is 12. Find the altitude of the trapezoid.

11 What is the area of a square with a diagonal of length 6?

12 In the accompanying figure, the measure of central angle AOB is 80°. Find the number of degrees in the measure of inscribed angle ACB.



13 What is the slope of a line parallel to the line whose equation is $y = 3x - 2$?

Directions (14–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

14 The measures of the angles of a triangle are in the ratio 1:4:5. What is the measure of the largest angle?

(1) 72° (3) 108°
(2) 90° (4) 120°

15 The greatest number of lines that can be drawn tangent to two nonintersecting circles is

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

16 If the lengths of two sides of a triangle are 12 and 20 and the third side is represented by x, then

(1) $x = 32$ (3) $x < 8$
(2) $x > 32$ (4) $8 < x < 32$

17 Tangents $\overline{PD}$ and $\overline{PE}$ intersect a circle at D and E, respectively, and chord $\overline{ED}$ is drawn. If $m\angle P = 40$, what is the measure of $\angle PED$?

(1) 70° (3) 40°
(2) 90° (4) 140°

18 In a right triangle, the altitude to the hypotenuse divides the figure into two right triangles which are *always*

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

19 The total number of points in a plane that are distance d from a given straight line and are also distance r from a certain point on the line could *not* be

(1) 0 (3) 3
(2) 2 (4) 4

20 Two parallel lines are cut by a transversal. The bisectors of a pair of interior angles on the same side of the transversal intersect to form an angle that is

(1) always acute
(2) always right
(3) always obtuse
(4) either acute or obtuse, but never right

21 The length of a side of a regular 8-sided polygon is s and the length of its apothem is a. What is the area of the polygon?

(1) $6as$ (3) $3as$
(2) $8as$ (4) $4as$

22 In a regular polygon, the sum of the measures of the interior angles is 540°. What is the total number of sides of this polygon?

(1) 5 (3) 9
(2) 7 (4) 11

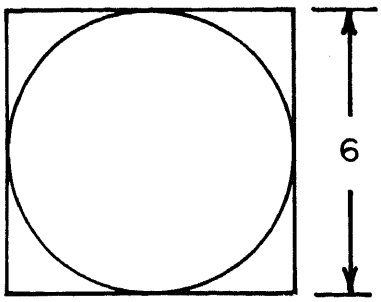
23 The coordinates of the vertices of rectangle $ABCD$ are $A(0,0)$, $B(0,4)$, $C(5,4)$, and $D(5,0)$. The length of a diagonal is

(1) 5 (3) 3
(2) $\sqrt{41}$ (4) 4

24 If $\triangle ABC$ is similar to $\triangle DEF$ with vertices A, B, and C corresponding to vertices D, E, and F, respectively, which statement is true?

(1) $\frac{AB}{DE} = \frac{BC}{DF}$ (3) $\frac{AB}{DE} = \frac{EF}{BC}$
(2) $\frac{AB}{AC} = \frac{DE}{DF}$ (4) $\frac{AB}{AC} = \frac{DF}{DE}$

25 In the accompanying figure, the length of a side of the square is 6. What is the area of the circle inscribed in this square?



(1) 36π (3) 9π
(2) 12π (4) 6π

26 The ratio of the perimeters of two regular pentagons is 4:1. The ratio of their apothems is

(1) 2:1 (3) 8:1
(2) 4:1 (4) 16:1

27 Which quadrilateral can *not* always be inscribed in a circle?

(1) isosceles trapezoid
(2) rectangle
(3) rhombus
(4) square

28 Which statement about a diagonal of a parallelogram is *always* true?

(1) It bisects the other diagonal of the parallelogram.
(2) It bisects an angle of the parallelogram.
(3) It is congruent to the other diagonal of the parallelogram.
(4) It is perpendicular to the other diagonal of the parallelogram.

29 Which equation represents the locus of points equidistant from points (2,4) and (2,2)?

(1) $x = 3$ (3) $x = 2$

(2) $y = 2$ (4) $y = 3$

Directions (30): Leave all construction lines on the answer sheet.

30 *On the answer sheet*, construct the altitude from vertex A to side $\overline{BC}$ of $\triangle ABC$.

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

Part II

Answer four questions from this part. Show all work unless otherwise directed. [40]

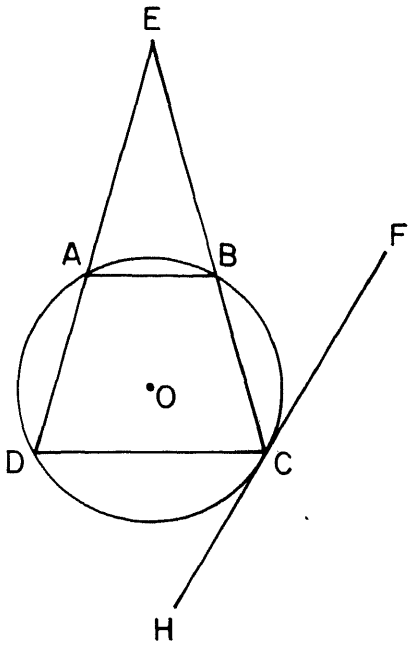
31 Prove either *a* or *b* but *not* both.

a The sum of the measures of the angles of a triangle is 180 degrees. [10]

OR

b Two right triangles are congruent if the hypotenuse and a leg of one are congruent to the corresponding parts of the other. [10]

32 Given: circle O, chord $\overline{AB} \parallel$ chord $\overline{DC}$, secants $\overline{EAD}$ and $\overline{EBC}$, tangent $\overline{HCF}$, $m\overset{\frown}{AD} = 90$, and $m\overset{\frown}{DC} = 120$.



Find: *a* $m\overset{\frown}{AB}$ [2]

b $m\angle D$ [2]

c $m\angle DCH$ [2]

d $m\angle E$ [2]

e $m\angle ABE$ [2]

33 Given: $\overleftrightarrow{AB}$ with M the midpoint of $\overline{AB}$.

a Describe fully the locus of points:

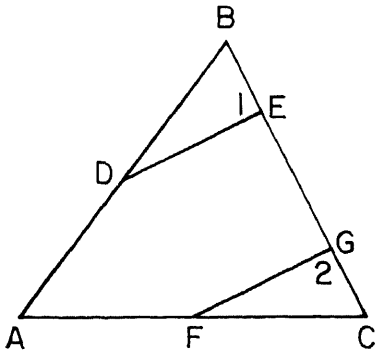
(1) equidistant from points A and B [3]

(2) 4 units from $\overleftrightarrow{AB}$ [3]

(3) 4 units from point M [3]

b What is the total number of points that satisfy all three conditions described in part *a*? [1]

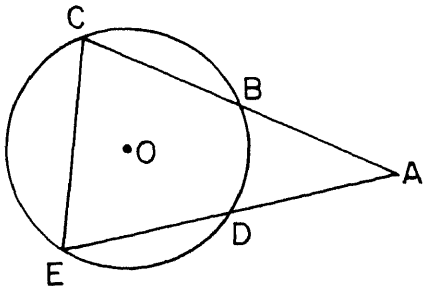
34 Given: $\triangle ABC$, D is the midpoint of $\overline{AB}$, F is the midpoint of $\overline{AC}$, $\overline{BEGC}$, $\overline{BE} \cong \overline{CG}$, $\angle B \cong \angle C$, and $\angle 1$ is supplementary to $\angle 2$.



Prove: *a* $\overline{DE} \cong \overline{FG}$ [7]

b $\overline{DE} \parallel \overline{FG}$ [3]

35 Given: circle O, chord $\overline{CE}$, secants $\overline{ABC}$ and $\overline{ADE}$, and $\overline{BC} \cong \overline{DE}$.



Prove: $\overline{AB} \cong \overline{AD}$ [10]

☞ **GO RIGHT ON TO THE NEXT PAGE.**

36 The radius of a regular 10-sided polygon is 6.

a Find the length of the apothem to the *nearest tenth.* [4]

b Find the length of a side of the polygon to the *nearest tenth.* [4]

c Using the results obtained in parts *a* and *b*, find the area of the polygon to the *nearest integer.* [2]

37 Show, by means of coordinate geometry, that the quadrilateral whose vertices are $A(0,5)$, $B(3,4)$, $C(0,-5)$, and $D(-3,-4)$ is a rectangle. State a reason for your conclusion. [10]

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

DIVISION OF EDUCATIONAL TESTING

Tables of Natural Trigonometric Functions

(For use with 10th Year Mathematics 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

TENTH YEAR MATHEMATICS

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ANSWER SHEET

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

Pupil .....Teacher .....

School .....

Name and author of textbook used .....

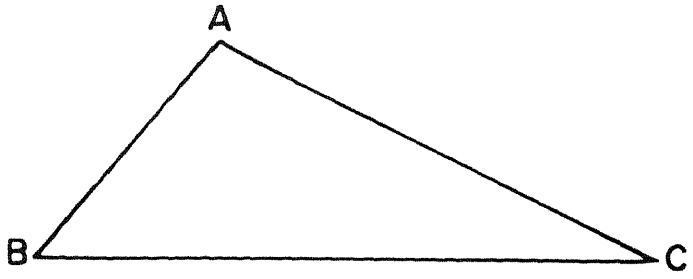
Your answers to Part I should be recorded on this answer sheet.

Part I

Answer all questions in this part.

1	11	21 .....
2	12	22 .....
3	13	23 .....
4	14	24 .....
5	15	25 .....
6	16	26 .....
7	17	27 .....
8	18	28 .....
9	19	29 .....
10	20	30 Answer question 30 on the other side of this sheet.

30



Your answers for Part II 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

10

SCORING KEY

TENTH YEAR MATHEMATICS

Thursday, January 26, 1989 — 1:15 to 4:15 p.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 2 credits for each correct answer; allow no partial credit. For questions 14–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 50

(2) 120

(3) 3

(4) (−2,1) *or* $\begin{matrix} x = -2 \\ y = 1 \end{matrix}$

(5) 8

(6) 13

(7) 15

(8) 15

(9) 8

(10) 6

(11) 18

(12) 40

(13) 3

(14) 2

(15) 4

(16) 4

(17) 1

(18) 3

(19) 3

(20) 2

(21) 4

(22) 1

(23) 2

(24) 2

(25) 3

(26) 2

(27) 3

(28) 1

(29) 4

(30) 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.

(32) *a* 60 [2]
b 75 [2]
c 60 [2]
d 30 [2]
e 75 [2]

(33) *a* (1) the perpendicular bisector of $\overline{AB}$
or [3]
a line perpendicular to $\overline{AB}$ through M

(2) 2 lines parallel to $\overleftrightarrow{AB}$ and 4 units on either side of $\overleftrightarrow{AB}$ [3]

(3) a circle with center M and radius 4 [3]

b 2 [1]

(36) *a* 5.7 [4]
b 3.7 [4]
c 105 [2]

As a reminder . . .

This is the *last* Regents examination based on the Tenth Year Mathematics syllabus.