The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Tuesday, June 21, 1988—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]

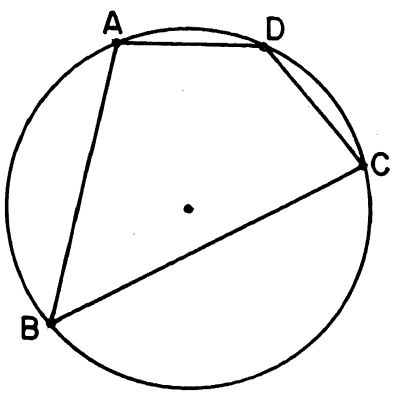
1 In right triangle ABC, $\overline{AB}$ is the hypotenuse, $m\angle A = x$, and $m\angle B = 4x + 10$. What is the value of x?

2 How many degrees are in the measure of an exterior angle of a regular ten-sided polygon?

3 Two parallel lines are cut by a transversal, forming a pair of alternate interior angles whose measures are $(x + 20)°$ and $(2x)°$. Find x.

4 The measures of the angles of a triangle are in the ratio 3:4:5. Find the measure, in degrees, of the *smallest* angle of the triangle.

5 In the accompanying diagram, quadrilateral $ABCD$ is inscribed in a circle. If $m\overset{\frown}{AB} = 110$ and $m\overset{\frown}{BC} = 150$, find $m\angle ABC$.



6 The area of a square is 16. Find, in radical form, the length of a diagonal of the square.

7 The area of $\triangle PQR$ is 30 and $PR = 10$. Find the length of the altitude drawn to $\overline{PR}$.

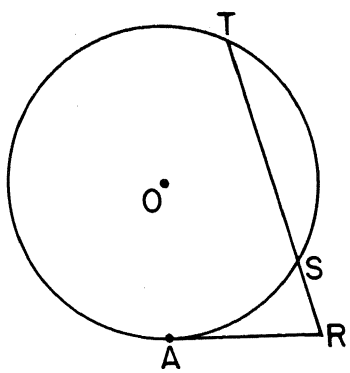
8 Write an equation of the line that has a slope of 0 and a y-intercept of 6.

9 Find the area of a regular polygon whose perimeter is 40 and apothem is 5.

10 The coordinates of A are (4,6) and the coordinates of B are (−2,5). Find, in radical form, the length of $\overline{AB}$.

11 In parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. If $AE = 3x - 5$ and $EC = 2x + 3$, find x.

12 In the accompanying diagram, tangent $\overline{RA}$ and secant $\overline{RST}$ are drawn to circle O from the same external point. If $RS = 4$ and $ST = 12$, find RA.



13 In parallelogram $ABCD$, $m\angle B = 4x$ and $m\angle D = x + 60$. Find x.

14 Which is the longest side of $\triangle ABC$ if $m\angle A = 70$ and $m\angle B = 38$?

15 Triangle DEF is a right triangle with $m\angle F = 90$, $DE = 8$, and $DF = 6$. Find, to the *nearest degree*, the measure of $\angle E$.

Directions (16–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

16 If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and the slopes of $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are $\frac{1}{2}$ and $\frac{x-2}{4}$, respectively, what is the value of x?

(1) 8
(2) 2
(3) 10
(4) 4

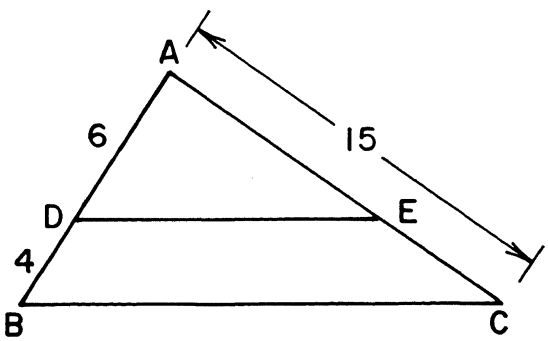
17 The vertices of isosceles triangle ABC are $A(0,0)$, $B(4,0)$, and $C(x,5)$. If $\overline{AB}$ is the base, the value of x is

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

18 If the circumference of a circle is 72π centimeters, the length of the radius of the circle is

(1) $\frac{36}{\pi}$ cm
(2) $\frac{72}{\pi}$ cm
(3) 18 cm
(4) 36 cm

19 In the accompanying diagram of $\triangle ABC$, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$, such that $\overline{DE} \parallel \overline{BC}$. If $AC = 15$, $AD = 6$, and $DB = 4$, what is the length of $\overline{EC}$?



(1) 10
(2) 9
(3) 6
(4) 4

20 In $\triangle ABC$, if $m\angle A = 60$ and $m\angle B > m\angle A$, then $\triangle ABC$ can *not* be

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

21 Point P is 3 centimeters from line m. What is the total number of points that are 2 centimeters from line m and also 4 centimeters from point P?

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

22 In a circle, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. If $AE = 3$, $CE = 5$, and $ED = 6$, then EB is

(1) $2\frac{1}{2}$
(2) $3\frac{3}{5}$
(3) 10
(4) 15

23 Circles O and O' are internally tangent to each other. The maximum number of common tangents that they may have is

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

24 Segment AB is the longer base of trapezoid $ABCD$, and diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. Which statement is true?

(1) $\triangle ABE \sim \triangle DEC$
(2) $\triangle ABC \sim \triangle ACD$
(3) $\triangle ABE \cong \triangle BCE$
(4) $\triangle ADE \cong \triangle ABE$

25 Two similar triangles have corresponding altitudes with lengths of 9 and 16. What is the ratio of the perimeter of the smaller triangle to the perimeter of the larger?

(1) 81:256
(2) 9:16
(3) 3:4
(4) $\sqrt{3}$:2

26 In isosceles triangle ABC, $CA = CB = 10$ and $AB = 12$. What is the length of the altitude from C to $\overline{AB}$?

(1) 5
(2) 6
(3) 8
(4) 10

27 Circle O has a radius of 10 and central angle AOB measures 60°. The length of $\overline{AB}$ is

(1) $5\sqrt{3}$
(2) $10\sqrt{3}$
(3) 5
(4) 10

28 If the altitude to the hypotenuse of a right triangle has length 8, the segments of the hypotenuse may have lengths of

(1) 4 and 16
(2) 5 and 11
(3) 3 and 24
(4) 7 and 9

29 In $\triangle ABC$, $m\angle C = 90$ and $m\angle A = 60$. What is the ratio of AC to AB?

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

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

30 *On the answer sheet*, construct the bisector of $\angle ABC$.

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]

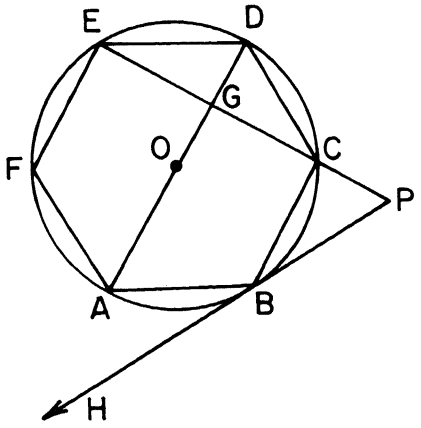
31 Prove either *a* or *b* but *not* both.

a If two angles of a triangle are congruent, the sides opposite these angles are congruent. [10]

OR

b The square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths of the legs. [10]

32 Given: regular hexagon *ABCDEF* inscribed in circle *O*, diameter $\overline{AOGD}$, secant $\overline{PCGE}$, and tangent $\overrightarrow{PBH}$.



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

b $m\angle ABC$ [2]

c $m\angle DGC$ [2]

d $m\angle P$ [2]

e $m\angle ABH$ [2]

33 Given: points $A(2,7)$ and $B(6,7)$.

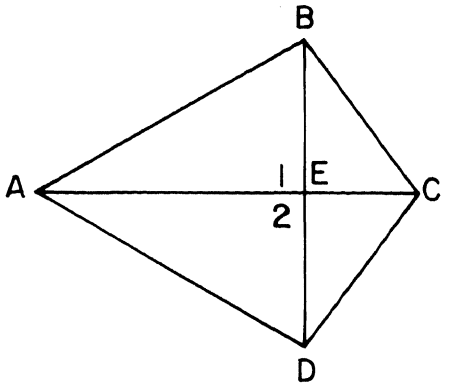
a Write an equation of $\overleftrightarrow{AB}$. [2]

b Describe the locus of points equidistant from
(1) points *A* and *B* [3]
(2) the *x*- and *y*-axes on a coordinate plane [3]

c How many points satisfy both conditions obtained in part *b*? [2]

34 Show, by means of coordinate geometry, that the quadrilateral whose vertices are $A(-2,3)$, $B(4,6)$, $C(3,2)$, and $D(-3,-1)$ is a parallelogram. State a reason for your conclusion. [10]

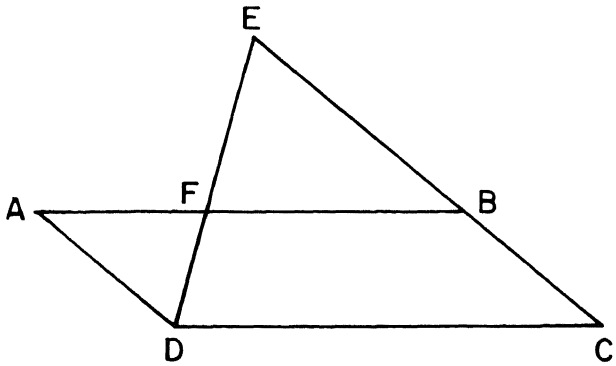
35 Given: quadrilateral *ABCD*, $\overline{AEC}$, $\overline{BED}$, $\overline{AB} \cong \overline{AD}$, and $\overline{BC} \cong \overline{DC}$.



Prove: $\angle 1 \cong \angle 2$ [10]

☞ **GO RIGHT ON TO THE NEXT PAGE.**

36 Given: parallelogram $ABCD$, $\overline{CB}$ is extended through B to E, and $\overline{DE}$ is drawn intersecting $\overline{AB}$ at F.



a Prove: $\frac{EB}{DA} = \frac{BF}{AF}$ [7]

b If $DF = 4$, $EF = 6$, EB is represented by x, and AD is represented by $x - 3$, find x. [3]

37 In rhombus $ABCD$, $AC = 40$ and $m\angle DAB \doteq 72$.

a Find DB to the *nearest tenth*. [5]

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

c Find the length of a side of rhombus $ABCD$ to the *nearest integer*. [3]

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

Tuesday, June 21, 1988—1:15 to 4:15 p.m., only

ANSWER SHEET

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

ıpil .....Teacher .....

hool .....

ıme and author of textbook used .....

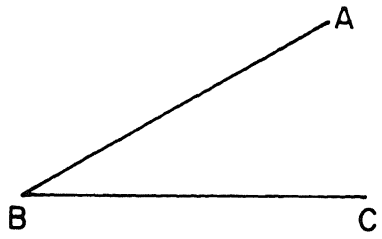
Your answers to Part I should be recorded on this answer sheet.

Part I

Answer all questions in this part.

.....	11	21 .....
.....	12	22 .....
.....	13	23 .....
.....	14	24 .....
.....	15	25 .....
.....	16	26 .....
.....	17	27 .....
.....	18	28 .....
.....	19	29 .....
.....	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

Tuesday, June 21, 1988 — 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 16–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 16

(2) 36

(3) 20

(4) 45

(5) 50

(6) $4\sqrt{2}$ *or* $\sqrt{32}$

(7) 6

(8) $y = 6$

(9) 100

(10) $\sqrt{37}$

(11) 8

(12) 8

(13) 20

(14) $\overline{AB}$ *or* AB *or* c

(15) 49

(16) 4

(17) 2

(18) 4

(19) 3

(20) 4

(21) 2

(22) 3

(23) 1

(24) 1

(25) 2

(26) 3

(27) 4

(28) 1

(29) 3

(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 120 [2]
c 90 [2]
d 60 [2]
e 30 [2]

(33) *a* $y = 7$ [2]
b (1) $x = 4$
or [3]
the perpendicular bisector of $\overline{AB}$
(2) $y = x$ and $y = -x$
or [3]
the two lines which bisect the angles formed by the intersection
c 2 [2]

(36) *b* 9 [3]

(37) *a* 29.1 [5]
b 582 [2]
c 25 [3]

As a reminder . . .

Regents examinations based on the Tenth Year Mathematics syllabus will not be offered after January 1989.