The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Friday, January 27, 1984 — 9:15 a.m. to 12:15 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

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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.

1 The lengths of the sides of a triangle are 5, 6, and 9. The midpoints of the three sides are joined by line segments. Find the perimeter of the triangle formed by these segments.

2 The measure of the vertex angle of an isosceles triangle is 30°. Find the number of degrees in the measure of a base angle of the triangle.

3 Two adjacent sides of a rectangle measure 4 and 7. Find the perimeter of the rectangle.

4 Two angles are complementary and the measure of one angle is twice the measure of the other. Find the number of degrees in the measure of the *smaller* angle.

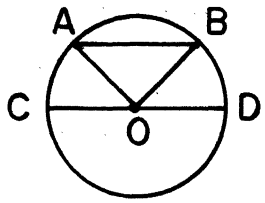
5 In triangle ABC, $m\angle A = 85$ and $m\angle C = 67$. What is the *shortest* side of the triangle?

6 Right triangle ABC, with right angle at C, is inscribed in a circle whose diameter is 10. Find the length of the median to the hypotenuse.

7 In triangle ABC, $\overline{DE}$ is drawn parallel to $\overline{AB}$ and intersects $\overline{AC}$ and $\overline{BC}$ at D and E, respectively. If $CD = 4$, $DA = 2$, and $BE = 3$, find CE.

8 In circle O, the coordinates of the endpoints of diameter $\overline{AB}$ are $A(2,5)$, and $B(8,1)$. What are the coordinates of the center of the circle?

9 In the accompanying diagram, chord $\overline{AB}$ of circle O and diameter $\overline{COD}$ are parallel. Radii $\overline{OA}$ and $\overline{OB}$ are drawn and $m\overset{\frown}{AC} = 50$. Find $m\angle AOB$.

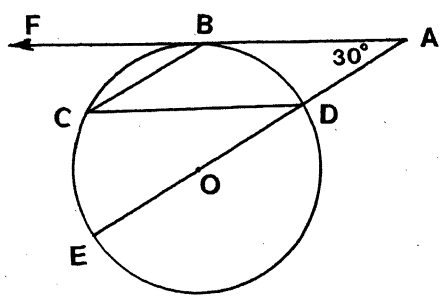


10 A regular hexagon is inscribed in a circle. If the length of a side of the hexagon is 8, what is the diameter of the circle?

11 If the diagonals of a rhombus have lengths 4 and 5, what is the area of the rhombus?

12 Find the distance between the points whose coordinates are (2,7) and (8,−1).

13 In the accompanying diagram, tangent $\overrightarrow{ABF}$ is parallel to chord $\overline{CD}$ and secant $\overline{ADOE}$ is parallel to chord $\overline{BC}$. If $m\angle A = 30$, find $m\overset{\frown}{BD}$.



14 If P is on $\overleftrightarrow{AB}$, what is the total number of points that are 3 centimeters from P and also 2 centimeters from $\overleftrightarrow{AB}$?

15 The lengths of the bases of a trapezoid are 8 and 12. If the area of the trapezoid is 140, find the length of the altitude.

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Directions (16–30): 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 Which statement about triangles is *always* true?

(1) A triangle cannot have any angles measuring greater than 90°.
(2) A triangle must have at least one angle measuring greater than 90°.
(3) A triangle must have at least two angles measuring less than 90°.
(4) A triangle cannot have any angle measuring less than 90°.

17 The lengths of the sides of a triangle are 5, 6, and 7. If the perimeter of a similar triangle is 36, what is the length of the *shortest* side of the similar triangle?

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

18 The sides of a triangle divide a circumscribed circle into three arcs. If the measures of the arcs are in the ratio 2:3:5, the measure of the largest angle of the triangle is

(1) 18° (3) 54°
(2) 36° (4) 90°

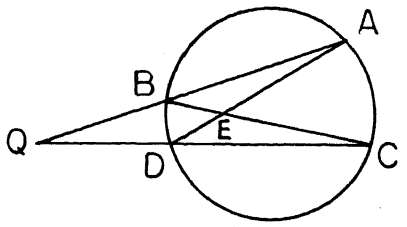
19 Which statement is *not* always true?

(1) If two triangles are congruent, then they are equal in area.
(2) If two triangles are equal in area, then they are congruent.
(3) If two squares are congruent, then they are equal in area.
(4) If two squares are equal in area, then they are congruent.

20 Which is the converse of the statement "If this is math, then this is fun"?

(1) If this is not fun, then this is not math.
(2) If this is not math, then this is fun.
(3) If this is fun, then this is math.
(4) If this is not math, then this is not fun.

21 In the accompanying diagram, secants $\overline{QBA}$ and $\overline{QDC}$ are drawn to a circle from external point Q. Chords $\overline{AD}$ and $\overline{CB}$ intersect at point E. If $m\angle ABC = 40$ and $m\angle DCB = 20$, what is $m\angle AEC$?



(1) 120 (3) 20
(2) 60 (4) 15

22 The measure of an arc of a circle is 40°. If the diameter of the circle is 18, what is the length of the arc?

(1) π (3) 3π
(2) 2π (4) 4π

23 The distance from the center of a circle to a chord is 3. If the length of the chord is 8, the length of the radius of the circle is

(1) 10 (3) 5
(2) 7 (4) 4

24 What is the measure of an interior angle of a regular polygon of 8 sides?

(1) 144° (3) 120°
(2) 135° (4) 108°

25 An isosceles triangle has a perimeter of 5. Which could *not* be the length of a side of the triangle?

(1) 1 (3) 3
(2) 2 (4) 2.25

26 The lengths of the sides of a triangle are 3, 4, and 5. What is the value of the sine of the larger acute angle of the triangle?

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

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27 What is the slope of the line whose equation is $2y = 3x - 10$?

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

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

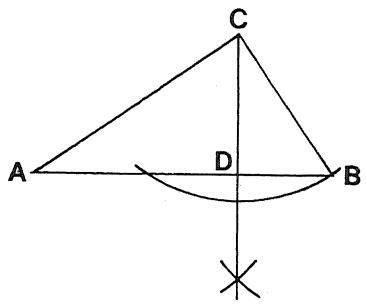
28 The median of an isosceles trapezoid *always* divides the trapezoid into

(1) one triangle and one parallelogram
(2) two trapezoids of equal area
(3) two isosceles trapezoids
(4) two congruent trapezoids

29 If the midpoints of the sides of a quadrilateral are joined consecutively, the figure formed *must* be a

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

30 In the accompanying diagram, triangle ABC is scalene. According to the construction shown, what is $\overline{CD}$?



(1) the altitude to side $\overline{AB}$
(2) the bisector of angle C
(3) the median to side $\overline{AB}$
(4) the perpendicular bisector of side $\overline{AB}$

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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.

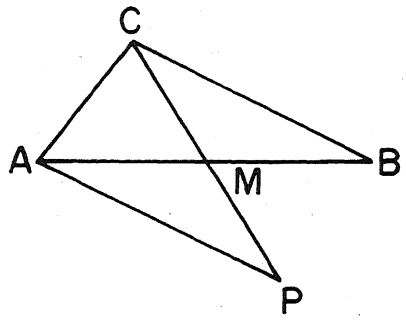
31 Prove *either* *a* or *b* but *not* both.

a The area of a regular polygon is equal to one-half the product of its perimeter and the length of its apothem. [10]

OR

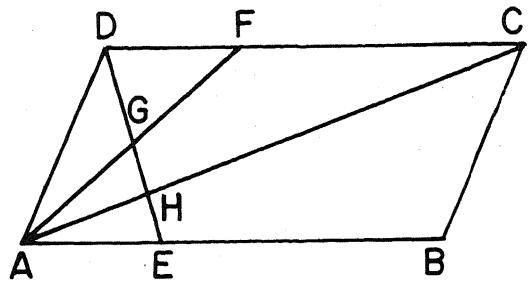
b The measure of an angle formed by two chords intersecting inside a circle is equal to one-half the sum of the measures of the intercepted arcs. [10]

32 Given: $\triangle ABC$, $\overline{CM}$ is the median to $\overline{AB}$, $\overline{CM}$ is extended to point P such that $\overline{CM} \cong \overline{MP}$, and $\overline{AP}$ is drawn.



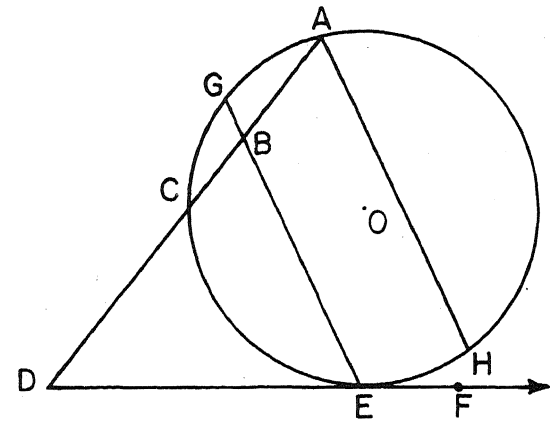
Prove: $\overline{AP} \parallel \overline{CB}$ [10]

33 Given: parallelogram $ABCD$, F is a point on $\overline{DC}$ such that $\overline{AC}$ bisects $\angle FAB$, $\overline{DE}$ intersects $\overline{AF}$ at G, $\overline{AC}$ at H, $\overline{AB}$ at E, and $\overline{AG} \cong \overline{AE}$.



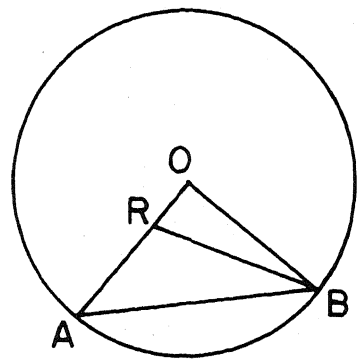
Prove: $\triangle AHG \sim \triangle CHD$ [10]

34 Given: circle O, $\overline{DEF}$ is tangent at E, secant $\overline{DCBA}$, $\overset{\frown}{AG} \cong \overset{\frown}{GC}$, $\overline{EBG} \parallel \overline{HA}$, $m\overset{\frown}{HA} = 160$, and $m\overset{\frown}{HE} = 30$.



Find: *a* $m\overset{\frown}{AG}$ [2]
b $m\angle D$ [2]
c $m\angle EBD$ [2]
d $m\angle HAD$ [2]
e $m\angle FEG$ [2]

35 Given: circle O, radii $\overline{OA}$ and $\overline{OB}$, R is a point on $\overline{OA}$, and $\overline{RB}$ and $\overline{AB}$ are drawn.



Prove: $RB > RA$ [10]

☞ **GO RIGHT ON TO THE NEXT PAGE.**

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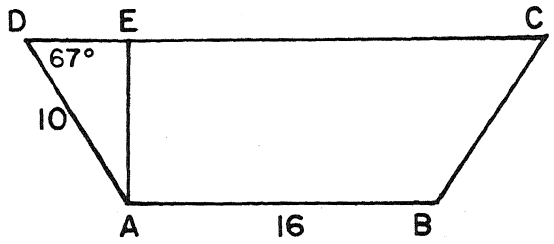
36 Given: isosceles trapezoid $ABCD$, with altitude $\overline{AE}$, $AD = 10$, $AB = 16$, and $m\angle D = 67$.



a Find DE to the *nearest integer*. [3]
b Find DC to the *nearest integer*. [2]
c Find AE to the *nearest integer*. [3]
d Using the results from parts *b* and *c*, find the area of trapezoid $ABCD$. [2]

*37 Triangle ABC has coordinates $A(2,3)$, $B(6,0)$, and $C(12,8)$.

a Show, by means of coordinate geometry, that $\triangle ABC$ is a right triangle and state a reason for your conclusion. [5]
b Find the area of $\triangle ABC$. [5]

* This question is based on an optional topic in the syllabus.

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THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

DIVISION OF EDUCATIONAL TESTING

Tables of Natural Trigonometric Functions

(For use with 9th and 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	

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REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Friday, January 27, 1984 — 9:15 a.m. to 12:15 p.m., only

Part I Score:.....
Rater's Initials:
.....

ANSWER SHEET

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.....

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

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FOR TEACHERS ONLY

SCORING KEY

10 TENTH YEAR MATHEMATICS

Friday, January 27, 1984 — 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 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 16–30, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 10

(2) 75

(3) 22

(4) 30

(5) $\overline{AC}$ *or* AC *or* b

(6) 5

(7) 6

(8) (5,3)

(9) 80

(10) 16

(11) 10

(12) 10

(13) 60

(14) 4

(15) 14

(16) 3

(17) 1

(18) 4

(19) 2

(20) 3

(21) 2

(22) 2

(23) 3

(24) 2

(25) 3

(26) 4

(27) 1

(28) 3

(29) 4

(30) 1

[OVER]

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Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers 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.

(34) *a* 30 [2]
b 40 [2]
c 70 [2]
d 70 [2]
e 110 [2]

(36) *a* 4 [3]
b 24 [2]
c 9 [3]
d 180 [2]

(37) *b* 25 [5]

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