

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

TENTH YEAR MATHEMATICS

Monday, January 26, 1976 — 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 5 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.

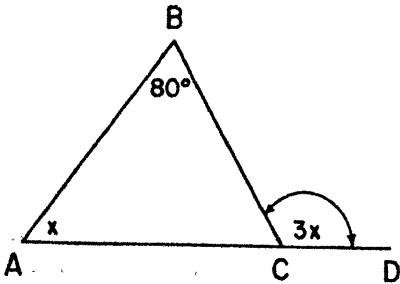
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during 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

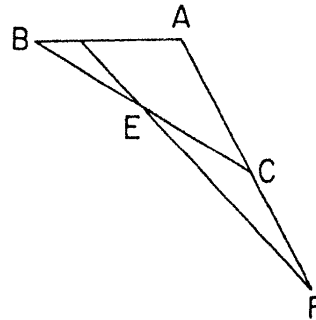
Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form. Write your answers in the spaces provided on the separate answer sheet.

- The measures, in degrees, of angles A , B , and C of $\triangle ABC$ are represented by x , $2x$, and $(3x - 30)$, respectively. What is the number of degrees in the measure of the *smallest* angle?
- The ratio of the lengths of one pair of corresponding sides of two similar triangles is $x:3$. The ratio of the lengths of another pair of corresponding sides of these triangles, taken in the same order, is $5:2$. Find x .
- The measure of an exterior angle of a regular polygon is 40° . Find the number of sides of the polygon.
- Angle ABC is inscribed in circle O and measures 45° . Find the number of degrees in the measure of central angle AOC .
- The coordinates of the vertices of $\triangle ABC$ are $A(2,0)$, $B(0,8)$, and $C(0,0)$. Which is the *longest* side of the triangle?
- In the accompanying figure, $\angle BCD$ is an exterior angle of $\triangle ABC$. If $m\angle BCD = 3x$, $m\angle A = x$, and $m\angle B = 80$, find x .



- The ratio of the measures of two consecutive angles of a parallelogram is $2:3$. Find the number of degrees in the measure of the *larger* angle.
- Chords \overline{AB} and \overline{BC} are drawn in circle O . If $m\widehat{ABC} = 260$, find $m\angle ABC$.
- The center of a wheel rolling along a straight track travels 12π units each time the wheel makes one revolution. What is the radius of the wheel?
- The area of a rhombus is 40 and the length of one of its diagonals is 8. Find the length of the other diagonal.

- Circle O has a radius of 6 inches. Radii \overline{OA} and \overline{OB} are drawn, forming a central angle whose measure is 90° . How many inches are in the length of minor arc \widehat{AB} ? [Answer may be left in terms of π .]
- In the accompanying figure, $\overline{AB} \cong \overline{AC}$, $\overline{EC} \cong \overline{CF}$, and \overline{ACF} . If $m\angle F = 15$, find $m\angle ABC$.



- The length of the longer base of a trapezoid is 18, and the length of the median is 15. Find the length of the *shorter* base of the trapezoid.
- A tangent and a secant are drawn to a circle from the same external point. If the length of the tangent is 10 and the length of the whole secant is 25, find the length of the external segment of the secant.

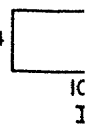
Directions (15–29): Write in the space provided on the separate answer sheet the numeral preceding the expression that best completes *each* statement or answers *each* question.

- The lengths of the sides of a triangle are 4, 9, and 12, respectively. What is the perimeter of a similar triangle if the length of its shortest side is 6?

(1) $16\frac{2}{3}$	(3) $37\frac{1}{2}$
(2) 18	(4) $56\frac{1}{4}$
- How many points in the interior of a given angle A are equidistant from the sides of angle A and also 2 inches from point A ?

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

17 Figure of p:



Wh
(1)
(2)

18 A ci of o diar rect
(1)
(2)

19 If tl ther x is
(1)
(2)

20 If t whi
(1)
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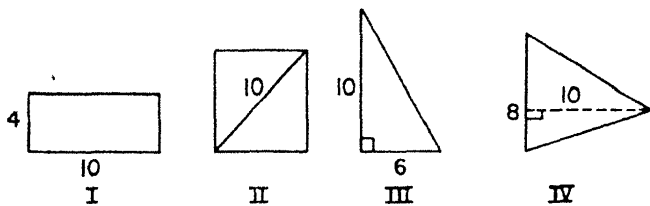
21 In r sine
(1)
(2)
(3)
(4)

22 A c the
(1)
(2)

23 In t AC EA
(1)
(2)

Math. 10

- 17 Figure I is a rectangle, II is a square, III is a right triangle, and IV is an acute scalene triangle. The lengths of particular segments of the figures are indicated.



Which figure has the greatest area?

- (1) I (3) III
(2) II (4) IV
- 18 A circle is circumscribed about a rectangle. The length of one side of the rectangle is 12 and the length of the diameter of the circle is 13. What is the perimeter of the rectangle?
- (1) 17 (3) 29
(2) 25 (4) 34
- 19 If the length of a side of a square is represented by x , then the length of the diagonal of the square in terms of x is
- (1) $x\sqrt{3}$ (3) $\frac{x\sqrt{3}}{2}$
(2) $x\sqrt{2}$ (4) $\frac{x\sqrt{2}}{2}$
- 20 If two parallel lines are intersected by a transversal, which angles must be supplementary?
- (1) a pair of alternate interior angles
(2) a pair of alternate exterior angles
(3) two corresponding angles
(4) two interior angles on the same side of the transversal
- 21 In right triangle ABC , leg $AC = 6$ and leg $BC = 8$. The sine of angle A is always equal to the
- (1) sine of angle B
(2) cosine of angle B
(3) tangent of angle B
(4) cosine of angle A
- 22 A circle has its center at the origin and passes through the point $(3,4)$. What is the area of the circle?
- (1) 7π (3) 25π
(2) 12π (4) 144π
- 23 In trapezoid $ABCD$ with bases \overline{AB} and \overline{DC} , if diagonals \overline{AC} and \overline{BD} intersect at E , then triangles ECD and EAB are always
- (1) similar (3) equal in area
(2) congruent (4) scalene

- 24 The coordinates of the endpoints of the base of an isosceles triangle are $(2,1)$ and $(8,1)$. The coordinates of the vertex of this triangle may be

- (1) $(1,5)$ (3) $(2,-6)$
(2) $(2,5)$ (4) $(5,-6)$

- 25 The length of an altitude of an equilateral triangle is $6\sqrt{3}$. The area of the triangle is

- (1) $9\sqrt{3}$ (3) $36\sqrt{3}$
(2) $18\sqrt{3}$ (4) $72\sqrt{3}$

- 26 Given the statement "If two angles are right angles, then they are congruent." Which of the following sentences is correct?

- (1) The statement is true and its converse is true.
(2) The statement is true but its inverse is false.
(3) The statement is false and its inverse is false.
(4) The statement is false but its converse is true.

- 27 To prove that a parallelogram is a rectangle, it is sufficient to show that the

- (1) diagonals are congruent
(2) diagonals are perpendicular to each other
(3) opposite sides are congruent
(4) adjacent sides are congruent

- 28 If the ratio of the circumferences of two circles is 9:4, what is the ratio of the diameters of the two circles?

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

- 29 The point whose coordinates are $(4,-2)$ lies on a line whose slope is $\frac{3}{2}$. The coordinates of another point on this line may be

- (1) $(1,0)$ (3) $(6,1)$
(2) $(2,1)$ (4) $(7,0)$

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

- 30 On the answer sheet, construct an apothem PR of the regular hexagon $ABCDEF$, whose center is the point P .

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.

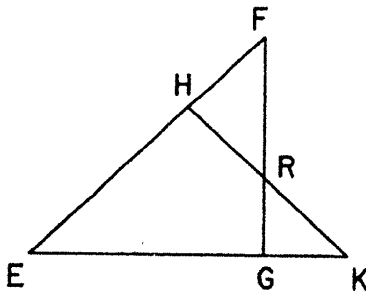
31 Prove either *a* or *b*, but not both.

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

OR

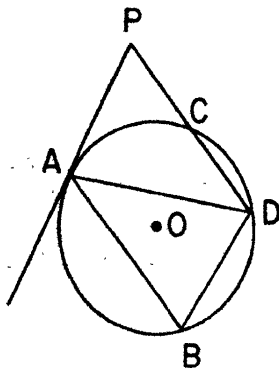
b The square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths of the legs. [10]

32 Given: \overline{EHF} , \overline{HK} intersects \overline{FG} at R , $\overline{FG} \perp \overline{EGK}$, $\angle E \cong \angle K$



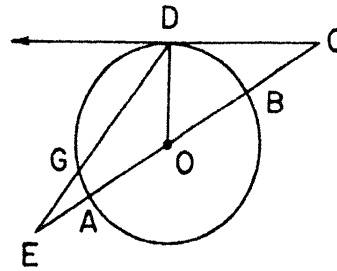
Prove: $\triangle HFR$ is isosceles [10]

33 In the accompanying diagram, \overrightarrow{PA} is tangent to circle O at A and intersects secant \overline{PCD} at P . Chord \overline{AB} is parallel to \overline{PCD}



Prove: $\frac{PD}{AD} = \frac{AD}{AB}$ [10]

35 Given: circle O , secant \overleftrightarrow{EC} containing diameter \overline{AB} , secant \overline{EGD} , \overline{CD} tangent to circle O at D , and radius \overline{OD}



If $m\angle CDE = 128$, $m\angle E = 20$, find:

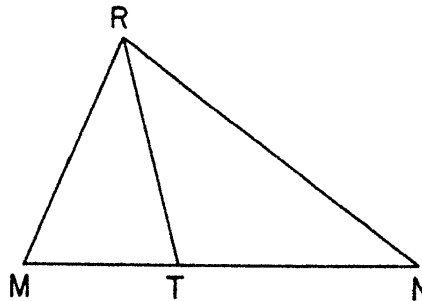
a $m\angle C$ [2]

b $m\widehat{DB}$ [3]

c $m\widehat{AG}$ [3]

d $m\widehat{GD}$ [2]

36 Given: $\triangle MRN$, \overline{RT} bisects $\angle MRN$



Prove: $RN > TN$ [10]

*37 The coordinates of the vertices of rhombus $ABCD$ are $A(-3,1)$, $B(2,6)$, $C(x,y)$, and $D(4,0)$.

a Find the numerical coordinates of point C . [2]

b Verify, by means of coordinate geometry, that $AB = AD$. [4]

c Verify, by means of coordinate geometry, that diagonals \overline{AC} and \overline{BD} are perpendicular to each other. [4]

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

34 The perimeter of a regular 10-sided polygon is 60.

a Find, to the nearest tenth, the length of the apothem of the polygon. [7]

b Using the result found in part *a*, find the area of the polygon. [3]

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
 BUREAU OF ELEMENTARY AND SECONDARY 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	

Pupil....

School..

Name a

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The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION
TENTH YEAR MATHEMATICS
Monday, January 26, 1976 — 1:15 to 4:15 p.m., only

ANSWER SHEET

Part I Score:

Rater's Initials:
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Pupil.....Teacher.....

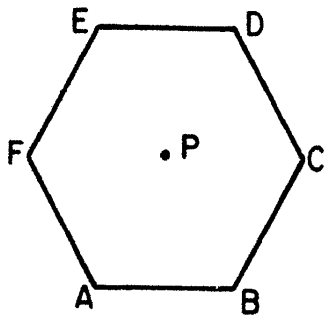
School.....

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. |



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

TENTH YEAR MATHEMATICS

Monday, January 26, 1976 — 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.

SCORING KEY

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 15–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 35	(11) 3π	(21) 2
(2) $7\frac{1}{2}$ or 7.5	(12) 30	(22) 3
(3) 9	(13) 12	(23) 1
(4) 90	(14) 4	(24) 4
(5) \overline{AB} or AB or c	(15) 3	(25) 3
(6) 40	(16) 1	(26) 2
(7) 108	(17) 2	(27) 1
(8) 50	(18) 4	(28) 2
(9) 6	(19) 2	(29) 3
(10) 10	(20) 4	

[OVER]

TENTH YEAR MATHEMATICS — *concluded*

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* 9.2 [7]

b 276 [3]

(35) *a* 32 [2]

b 58 [3]

c 18 [3]

d 104 [2]

(37) *a* (9,5) [2]

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