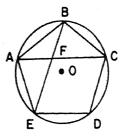The last page of the booklet is the answer sheet, which is perforated. Fold the last page along the perforation and then, slowly and carefully, tear off the answer sheet. Now fill in the heading of your answer sheet. On page 5, which is perforated, you will find the "Tables of Natural Trigonometric Functions," which you will need to answer some questions in this examination. Fold this page along the perforation, and tear it off. When you have torn off these two pages and finished the heading, you may begin the examination immediately.

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 measures of the angles of a triangle are in the ratio $2:3:4$. Find the number of degrees in the measure of the largest angle.

2 Two adjacent sides of a parallelogram are 6 and 7, and the included angle measures $30°$. What is the area of this parallelogram?

3 The midpoint of $\overline{AB}$ is M. The coordinates of A are $(6,-5)$ and those of M are $(1,-2)$. Find the coordinates of B.

4 In isosceles trapezoid $ABCD$ with $\overline{AB}$ the longer base, $m\angle A = x$ and $m\angle C = (2x - 60)$. Find x.

5 Tangents $\overline{BA}$ and $\overline{BC}$ are drawn to circle O from external point B and $m\angle ABC = 50$. How many degrees are there in minor arc AC?

6 Find the area of a square that is inscribed in a circle whose radius is 6.

7 Find, to the *nearest degree*, the measure of the angle of elevation of the sun when a 27-foot tree casts a 12-foot shadow.

8 Find the number of degrees in the measure of each interior angle of a regular polygon of 10 sides.

9 The perimeter of triangle ABC is 18, and $AB = 8$. If the ratio of AC to BC is $2:3$, what is the length of $\overline{AC}$?

10 In a circle, a central angle measuring $80°$ intercepts an arc whose length is 8π. What is the radius of the circle?

11 The length of a side of an equilateral triangle is 10. Find the area of the triangle.

12 What is the ratio of corresponding sides of two similar triangles whose areas are 36 square inches and 144 square inches?

13 An exterior angle at the base of an isosceles triangle measures $110°$. Find the number of degrees in the measure of the vertex angle of this triangle.

14 What is the radius of a circle whose center is at the origin and which passes through the point $(-4,3)$?

15 In rhombus $ABCD$, diagonal $\overline{AC}$ is congruent to side $\overline{AB}$. Find $m\angle ABC$.

16 In a $30°-60°-90°$ triangle the length of the hypotenuse is 12. Find the length of the longer leg of the triangle.

17 A tangent and a secant are drawn to a circle from an external point. The length of the whole secant is four times the length of the external segment of the secant. The length of the tangent is 6. Find the length of the external segment of the secant.

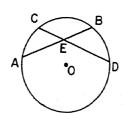18 In the accompanying diagram $ABCDE$ is a regular pentagon inscribed in circle O.

Find $m\angle AFB$.

19 Given $\triangle ABC$. If D, the midpoint of $\overline{AC}$, is joined to B, it can be deduced that $\angle ABD \cong \angle DBC$ whenever

(1) $\overline{AD} \cong \overline{DC}$ (3) $m \angle DCB = 30$

(2) $\overline{AB} \cong \overline{BC}$ (4) $m \angle DAB = 90$

20 The lengths of the sides of a right triangle may be

(1) 5,7,8   (3) 7,9,11

(2) 7,8,12   (4) 8,15,17

21 Which statement is false for *some* parallelograms?

(1) The diagonals bisect each other.

(2) The diagonals are congruent.

(3) The opposite angles are congruent.

(4) The opposite sides are congruent.

22 The ratio of the circumference of a circle to its diameter is exactly equal to

(1) π (3) 3.14

(2) 2π (4) $^{22}\!/_7$

23 "If p then q" is a conditional statement. Then

(1) "if not q then p" is the inverse of the converse

(2) "if p then not q" is the inverse

(3) "if q then p" is the converse

(4) "if not p then q" is the converse of the inverse

24 In the accompanying figure, chords $\overline{AB}$ and $\overline{CD}$ of circle O intersect at E.

Which relationship must *always* be true?

(1) $AE = ED$

(2) $AE = EB$

(3) $AE + EB = CE + ED$

(4) $AE \times EB = CE \times ED$

25 In $\triangle ABC$, side $\overline{CB}$ is extended through B to D. If $m \angle ABC = x$ and $m \angle ABD = y$, then for all triangles ABC

(1) $m \angle y > m \angle x$ (3) $m \angle C < m \angle x$

(2) $m \angle y > m \angle C$ (4) $m \angle y = m \angle C$

26 The locus of points in the plane of a given triangle equidistant from the three vertices of the triangle, consists of

(1) one point   (3) one line

(2) one circle   (4) two lines

27 If, in circle O, chord $\overline{AB}$ is parallel to chord $\overline{CD}$, then it is always true for the minor arcs that

(1) $m\overparen{AB} > m\overparen{AC}$ (3) $m\overparen{AC} = m\overparen{BD}$

(2) $m\overparen{BD} < m\overparen{CD}$ (4) $m\overparen{AB} = m\overparen{CD}$

28 An equation of the straight line parallel to the x-axis and passing through the point $(3,2)$ is

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

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

29 Tangents $\overline{PA}$ and $\overline{PB}$ are drawn from external point P to circle O at points A and B, respectively. Angle PAB is always

(1) a right angle

(2) an acute angle

(3) the supplement of angle OAB

(4) congruent to angle APB

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

30 *On the answer sheet*, by construction, locate and label two points, M and N, on the circle each of which is equidistant from points A and B.

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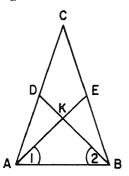
Part II

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

31 Prove *either* a or b but *not* both: [10]

a Two right triangles are congruent if the hypotenuse and a leg of one are equal to the corresponding parts of the other.
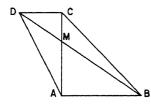
OR

b An angle formed by two chords intersecting inside a circle is measured by one-half the sum of the intercepted arcs.

32 Given: $\triangle ABC$ with $\overline{CA} \cong \overline{CB}$ and $\overline{AE}$ and $\overline{BD}$ intersecting at K so that $\angle 1 \cong \angle 2$
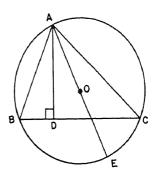

Prove: $\overline{DK} \cong \overline{KE}$

33 In the accompanying figure, $ABCD$ is a trapezoid with $\overline{AB} \parallel \overline{DC}$. Diagonal $\overline{CA}$ is perpendicular to base $\overline{AB}$.

If $AB = 28.0$, $DC = 12.0$, and the measure of the angle included between diagonal $\overline{BD}$ and base $\overline{AB}$ is 24°, find:
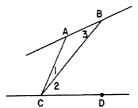
a the length of $\overline{AC}$ to the *nearest tenth* [7]
b the area of trapezoid $ABCD$ using the answer obtained in part a [3]

34 Given: A (0,8), B (—10,0), and C (6,0)

a Find the length of $\overline{AC}$. [2]
b Find the coordinates of point D so that $ABCD$ is a parallelogram. [3]
c Find the coordinates of point E so that $ABEC$ is a parallelogram. [3]
d What is the greatest number of parallelograms possible with the points A, B, and C as three of the vertices? [2]

35 Triangle ABC is inscribed in circle O so that the center of the circle lies in the interior of the triangle. The diameter $\overline{AE}$ and the altitude $\overline{AD}$ are drawn.
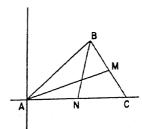
Prove: $AB \times AC = AD \times AE$

36 Given: $\overleftrightarrow{AB}$ is *not* parallel to $\overleftrightarrow{CD}$ and $\overline{AB} \cong \overline{AC}$

Prove: $\angle 1 \neq \angle 2$

*37 In the accompanying figure, $\overline{AM}$ and $\overline{BN}$ are medians of $\triangle ABC$.

a The coordinates of A, B, and C are (0,0), (6k,4k), and (8k,0), respectively.
(1) What are the coordinates of point M in terms of k? [2]
(2) What is the numerical value of the slope of $\overleftrightarrow{AM}$? [2]
(3) Write an equation of $\overleftrightarrow{AM}$. [2]

b If $k = 3$, write an equation of $\overleftrightarrow{BN}$. [4]

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

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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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS
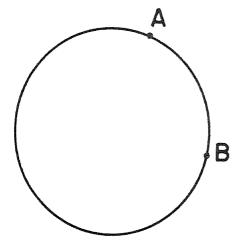
Monday, January 25, 1971 — 1:15 to 4:15 p.m., only

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..........................	

Answer question 30 on the back of this page.

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FOR TEACHERS ONLY

10

SCORING KEY

TENTH YEAR MATHEMATICS

Monday, January 25, 1971 — 1:15 to 4:15 p.m., only

Use only *red* ink or 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 19–29, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) 80	(11) $25\sqrt{3}$	(21) 2
(2) 21	(12) ½	(22) 1
(3) (—4,1)	(13) 40	(23) 3
(4) 80	(14) 5	(24) 4
(5) 130	(15) 60	(25) 2
(6) 72	(16) $6\sqrt{3}$	(26) 1
(7) 66	(17) 3	(27) 3
(8) 144	(18) 108	(28) 2
(9) 4	(19) 2	(29) 2
(10) 18	(20) 4	

[OVER]

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.

(33) *a* 17.8   [7]
    b 356   [3]

(34) *a* 10   [2]
    b (16,8)   [3]
    c (—4,—8)   [3]
    d 3   [2]

(37) *a* (1) $(7k,2k)$ [2]
        (2) $\frac{2}{7}$ [2]
        (3) $7y = 2x$ [2]
    b $y = 2x — 24$ [4]

DO YOU KNOW ...

  . . . that most questions used on Regents examinations have been tried out in advance in representative classrooms throughout the State?

  Each year more than 40,000 pupils in about 300 schools "pretest" questions intended for use in future Regents examinations. When committees of classroom teachers meet to assemble Regents examinations, the information obtained from this pretesting is to aid them in determining which questions are appropriate, which questions need revision, and which questions should be eliminated.