The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, August 17, 1978 — 8:30 to 11:30 a.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.

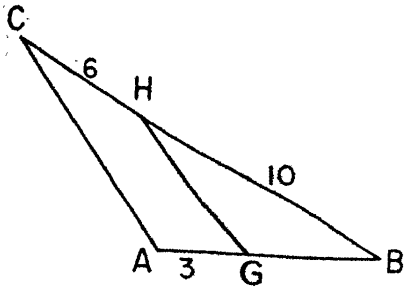
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during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

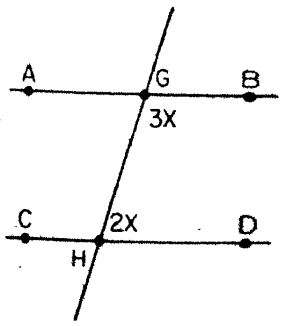
1 In the accompanying diagram, $\triangle ABC$ has $\overline{CHB}$, $\overline{AGB}$, $\overline{GH} \parallel \overline{AC}$, $CH = 6$, $HB = 10$, and $AG = 3$. Find GB.



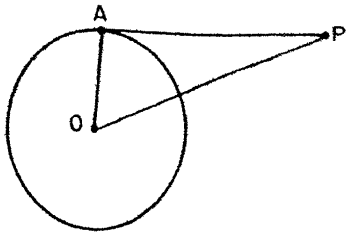
2 In isosceles triangle ABC, $\overline{AC} \cong \overline{BC}$. If the measure of the exterior angle at A is $112°$, find the number of degrees in the measure of angle C.

3 The lengths of the shorter base and the median of a trapezoid are 4 and 8, respectively. Find the length of the longer base.

4 In the accompanying figure, $\overline{AB}$ is parallel to $\overline{CD}$. If $m\angle BGH$ is represented by $3x$ and $m\angle DHC$ is represented by $2x$, find x.



5 In the accompanying diagram, $\overline{PA}$ is tangent to circle O at A. If the length of tangent $\overline{PA}$ is 12 and the radius of circle O is 5, find PO.



6 The length of the radius of circle O is twice the length of the radius of circle Q. What is the ratio of the circumference of circle O to the circumference of circle Q?

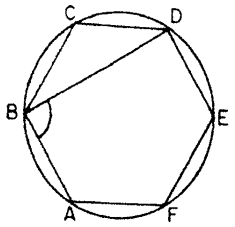
7 The bases of a trapezoid have lengths of 6 and 10. The length of the altitude is 5. Find the area of the trapezoid.

8 Express *in radical form* the length of a diagonal of a square having a side whose length is 7 inches.

9 Parallelogram $ABCD$ has diagonals $\overline{AC}$ and $\overline{DB}$ which intersect at E. If the coordinates of A are $(0,8)$ and the coordinates of C are $(-8,10)$, what are the coordinates of E?

10 The sum of the measures of six of the exterior angles of a polygon of 8 sides is 300 degrees. If the measure of each of the two remaining exterior angles is represented by x, find x.

11 In the accompanying diagram, figure $ABCDEF$ is a regular hexagon inscribed in a circle. Find $m\angle ABD$.

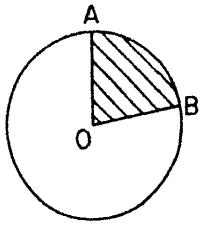


12 In quadrilateral $ABCD$ with diagonal $\overline{AC}$, $AB = 4$, $BC = 3$, and $AC = 5$. Find $m\angle ABC$.

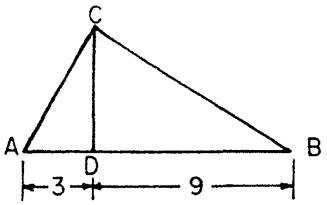
13 The area of a circle is 25π square inches. Find the number of inches in the radius of the circle.

14 The ratio of the areas of two similar triangles is 4:25. What is the ratio of the length of a side of the smaller triangle to the length of the corresponding side of the larger triangle?

15 In the accompanying diagram, the ratio of the area of sector AOB to the area of the circle is 2:9. Find $m\angle AOB$.



16 In the accompanying diagram of triangle ABC, $m\angle ACB = 90$ and altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. If $AD = 3$ and $DB = 9$, find AC.



17 In $\triangle ABC$, $m\angle C = 90$. If $AB = 3$ and $AC = 2$, find the measure of $\angle A$ to the *nearest degree*.

Directions (18–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

18 Which is *not* always true of the diagonals of a rhombus?
(1) They bisect each other.
(2) They are perpendicular to each other.
(3) They are congruent.
(4) They bisect the angles of the rhombus.

19 Two triangles are *not* necessarily congruent if the triangles have
(1) the three angles of one congruent to the three angles of the other (AAA)
(2) two angles and the included side of one congruent to the corresponding parts of the other (ASA)
(3) the three sides of one congruent to the three sides of the other (SSS)
(4) two sides and the included angle of one congruent to the corresponding parts of the other (SAS)

20 The lengths of two sides of triangle ABC are 5 and 7. The third side could have a length of
(1) 1 (3) 3
(2) 2 (4) 12

21 Points A and B are 5 inches apart. What is the total number of points that are 2 inches from A and also 4 inches from B?
(1) 1 (3) 3
(2) 2 (4) 4

22 The graph of the equation $y = 3$ is a line
(1) through the point (3,1) and the origin
(2) parallel to the x-axis
(3) parallel to the y-axis
(4) through the point (1,3) and the origin

23 Which statement is true concerning an isosceles triangle?
(1) It may be a scalene triangle.
(2) It must be an obtuse triangle.
(3) It must be a right triangle.
(4) It may be an acute triangle.

24 If the distance between the centers of two circles is greater than the sum of their radii, the maximum number of common tangents is
(1) 1 (3) 3
(2) 2 (4) 4

25 A median of a triangle divides the triangle into two triangles that are *always*
(1) congruent (3) equal in area
(2) similar (4) equal in perimeter

26 The vertices of triangle ABC are $A(0,5)$, $B(5,0)$, and $C(0,0)$. An equation of the perpendicular bisector of side $\overline{AB}$ is
(1) $y = 5$ (3) $y = x$
(2) $x = 5$ (4) $y = x - 5$

27 In $\triangle ABC$, if $m\angle A > m\angle B > m\angle C$, then
(1) $BC > AB$ (3) $AC > BC$
(2) $AB > BC$ (4) $AB > AC$

28 What is the converse of the statement, "If two angles are right angles, then they are congruent"?
(1) If two angles are congruent, then they are right angles.
(2) If two angles are right angles, then they are adjacent.
(3) If two angles are right angles, then they are not congruent.
(4) If two angles are not congruent, then they are not right angles.

29 The area of a regular polygon is 64 and the length of the apothem is 4. What is the perimeter of the polygon?
(1) 12 (3) 32
(2) 16 (4) 64

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

30 *On the answer sheet*, construct an angle having a measure equal to 60° with its vertex at point O and $\overrightarrow{OA}$ as one side.

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

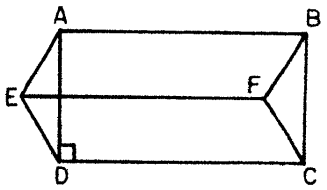
OR

b The area of a parallelogram is equal to the product of the length of one side and the length of the altitude drawn to that side. [10]

32 Given: triangle MNP, $\overline{MN} \cong \overline{MP}$, points R and S such that $\overline{MRN}$, $\overline{MSP}$, $\overline{MR} \cong \overline{MS}$, and $\overline{RP}$ and $\overline{SN}$ are drawn.

Prove: $\angle NRP \cong \angle PSN$ [10]

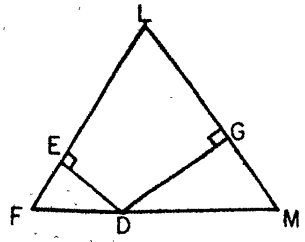
33 Given: parallelogram $ABFE$, parallelogram $EFCD$, $\overline{AD} \perp \overline{DC}$.



Prove: *a* $ABCD$ is a parallelogram. [8]

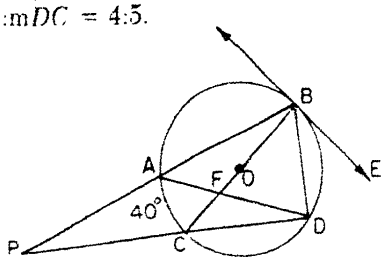
b $ABCD$ is a rectangle. [2]

34 Given: ΔFLM, $\overline{FL} \cong \overline{LM}$, $\overline{DE} \perp \overline{FL}$, $\overline{DG} \perp \overline{LM}$, $\overline{FEL}$, $\overline{LGM}$, $\overline{MDF}$.



Prove: $FE \times DG = DE \times MG$ [10]

35 In circle O, diameter $\overline{BOC}$ intersects chord $\overline{AD}$ at F, line $\overleftrightarrow{BE}$ is tangent to circle O at B, secants $\overline{PAE}$ and $\overline{PCD}$ are drawn, $m\widehat{AC} = 40$, and $m\widehat{BD} : m\widehat{DC} = 4:5$.



Find:

a $m\angle ABC$ [2]

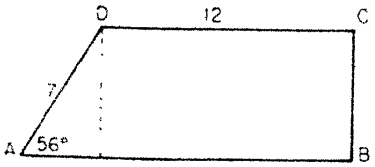
b $m\widehat{BD}$ [2]

c $m\angle EBD$ [2]

d $m\angle P$ [2]

e $m\angle CFD$ [2]

36 In trapezoid $ABCD$, $\overline{AB}$ is the longer base, $\overline{BC} \perp \overline{DC}$, $m\angle A = 56$, $DC = 12$, and $AD = 7$.



a Find to the *nearest integer* the altitude of the trapezoid [3]

b Find to the *nearest integer* the length of the longer base of the trapezoid. [5]

c Using the answers found in parts *a* and *b*, find the area of the trapezoid. [2]

*37 The vertices of quadrilateral $ABCD$ are $A(4,6)$, $B(-3,8)$, $C(-4,10)$, and $D(6,13)$.

a Using methods of coordinate geometry, show that $\overleftrightarrow{AB} \perp \overleftrightarrow{AD}$, and state a reason for your conclusion. [5]

b Write an equation of $\overleftrightarrow{AC}$. [5]

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

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	

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, August 17, 1978 — 8:30 to 11:30 a.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 **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, August 17, 1978 — 8:30 to 11:30 a.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 18–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 5

(2) 44

(3) 12

(4) 36

(5) 13

(6) 2 *or* 2:1

(7) 40

(8) $7\sqrt{2}$ *or* $\sqrt{98}$

(9) $(-4,9)$ *or* $\begin{array}{l} x = -4 \\ y = 9 \end{array}$

(10) 30

(11) 90

(12) 90

(13) 5

(14) $\frac{2}{5}$ *or* 2:5

(15) 80

(16) 6

(17) 48

(18) 3

(19) 1

(20) 3

(21) 2

(22) 2

(23) 4

(24) 4

(25) 3

(26) 3

(27) 1

(28) 1

(29) 3

ination, z

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.

(35) *a* 20 [2]
b 80 [2]
c 40 [2]
d 20 [2]
e 120 [2]

(36) *a* 6 [3]
b 16 [5]
c 84 [2]

(37) *b* $(y - 6) = -\frac{1}{2}(x - 4)$ [5]

or

$(y - 10) = -\frac{1}{2}(x + 4)$

or

$x + 2y = 16$