The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

B

TENTH YEAR MATHEMATICS

Friday, June 23, 1978 — 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.

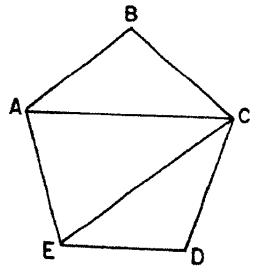
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during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

1 In the accompanying diagram, $ABCDE$ is a regular pentagon and diagonals $\overline{CE}$ and $\overline{CA}$ are drawn. If $CE = 6$, what is the length of $\overline{CA}$?



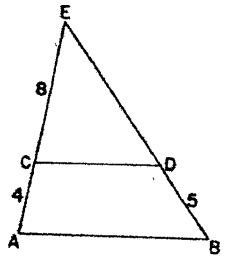
2 In $\triangle ABC$, D is the midpoint of $\overline{AB}$, E is the midpoint of $\overline{BC}$, and $\overline{DE}$ is drawn. If $m\angle A = 75$, find $m\angle BDE$.

3 In triangle RST, $m\angle T = 60$ and $m\angle S > m\angle R$. Which is the longest side of the triangle?

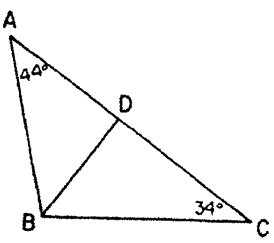
4 In triangle ABC, $\overline{AB} \cong \overline{AC}$ and $m\angle A = 70$. Find the number of degrees in the measure of an exterior angle at C.

5 The lengths of the diagonals of a rhombus are 10 and 15. Find the area of the rhombus.

6 In the accompanying diagram, $\overline{CD}$ is parallel to $\overline{AB}$, $CA = 4$, $DB = 5$, and $EC = 8$. Find ED.



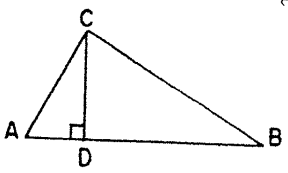
7 In the accompanying figure, $\overrightarrow{BD}$ bisects $\angle ABC$. If $m\angle A = 44$ and $m\angle C = 34$, find $m\angle DBC$.



8 The length of a side of an equilateral triangle is 8. What is the length, in radical form, of an altitude of the triangle?

9 The length of a side of a square is 4. What is the length, in radical form, of a diagonal of the square?

10 In the accompanying diagram, $\triangle ABC$ is a right triangle with $m\angle ACB = 90$, $\overline{ADB}$, and $\overline{CD} \perp \overline{AB}$. If $AB = 8$ and $AD = 2$, find the length of $\overline{AC}$.



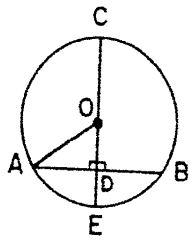
11 Find the distance from point $A(3,-1)$ to point $B(9,7)$.

12 The area of a sector of a circle is 8 square inches and the measure of the central angle of the sector is 90°. Find the number of square inches in the area of the circle.

13 Quadrilateral $ABCD$ is inscribed in a circle. If $m\overset{\frown}{AB} = 70$, $m\overset{\frown}{BC} = 100$, and $m\overset{\frown}{CD} = 130$, find $m\angle ABC$.

14 The length of a side of a triangle is 12 and the length of the altitude drawn to that side is 11. Find the area of the triangle.

15 In the accompanying diagram, diameter $\overline{CE}$ of circle O is perpendicular to chord $\overline{AB}$ at D. If $AB = 8$ and $OD = 3$, find OA.



16 A line which passes through the points $(5,3)$ and $(x,6)$ has a slope of 1. What is the value of x?

17 In tri
$AB =$

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question.

18 Which
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A
B
C
(1) A,
(2) *A* a

19 In the
$\overleftrightarrow{CD}$ ar
respec
$m\angle CH$

(1) 35
(2) 70

20 If the l
the len
(1) 7
(2) 2

21 The ex
x- and
(1) 1
(2) 2

22 Two ta
point. I
tangent
cepted
(1) 20°
(2) 110°

23 Which
(1) To
isos
(2) To
(3) To
they
(4) To
not

17 In triangle ABC, $m\angle C = 90$, $m\angle A = 30$, and $AB = 4$. Find BC.

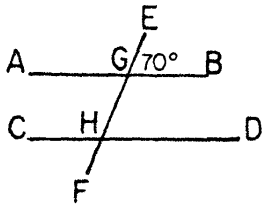
Directions (18–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

18 Which of the following must be true about the diagonals of a rectangle?

A The diagonals are perpendicular.
B The diagonals have the same length.
C The diagonals bisect each other.

(1) *A*, only
(2) *A* and *C*, only
(3) *B* and *C*, only
(4) *A*, *B*, and *C*

19 In the accompanying diagram, parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are intersected by transversal $\overleftrightarrow{EF}$ at G and H, respectively. If $m\angle BGE = 70$, then what is $m\angle CHG$?



(1) 35
(2) 70
(3) 90
(4) 110

20 If the lengths of two sides of a triangle are 7 and 10, the length of the third side may be

(1) 7
(2) 2
(3) 3
(4) 17

21 The exact number of points equidistant from the x- and y-axes and also two inches from the origin is

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

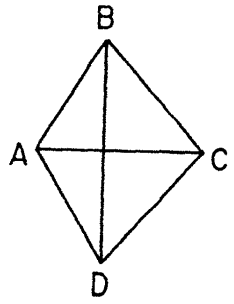
22 Two tangents are drawn to a circle from an exterior point. If the measure of the angle formed by the two tangents is 40°, then the measure of the *minor* intercepted arc is

(1) 20°
(2) 110°
(3) 140°
(4) 220°

23 Which is *not* a good example of indirect reasoning?

(1) To prove a triangle is scalene, prove it is not isosceles and not equilateral.
(2) To prove an angle is acute, prove it is not obtuse.
(3) To prove two lines in a plane intersect, prove they are not parallel.
(4) To prove AB is greater than BC, prove AB is not less than BC and AB is not equal to BC.

24 In the accompanying figure, $\overline{AB} \cong \overline{AD}$ and $\overline{BC} \cong \overline{CD}$. Which statement *must* be true?



(1) $\overline{BD} \perp \overline{AC}$
(2) $\overline{BD} \cong \overline{AC}$
(3) $ABCD$ is a parallelogram.
(4) $\angle BAD \cong \angle BCD$

25 If two circles have exactly three common tangents, then the circles

(1) are internally tangent
(2) are externally tangent
(3) intersect in two distinct points
(4) are nonintersecting

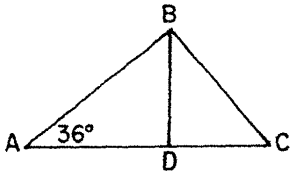
26 An isosceles trapezoid has two base angles whose measures are each 45 degrees. If the bases are 8 and 12, respectively, then the length of an altitude of the trapezoid must be

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

27 What is a converse of the statement, "If the altitude is drawn to the base of an isosceles triangle, then it bisects the base"?

(1) If a triangle is isosceles, then the altitude does not bisect the base.
(2) If a triangle is not isosceles, then the altitude does not bisect the base.
(3) If the altitude bisects the base of a triangle, then the triangle is isosceles.
(4) The altitude bisects the base of an isosceles triangle.

28 In the accompanying diagram, $\overline{BD}$ is an altitude of $\triangle ABC$, $m\angle A = 36$, $AB = 6$, and $AC = 8$. What is the length of $\overline{BD}$ to the *nearest tenth*?



(1) 3.5
(2) 4.7
(3) 4.9
(4) 6.5

29 If the area of a square is 64, then the length of its apothem is

(1) 32 (3) 8

(2) 16 (4) 4

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

30 *On the answer sheet*, locate by construction a point on $\overline{DC}$ that 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.

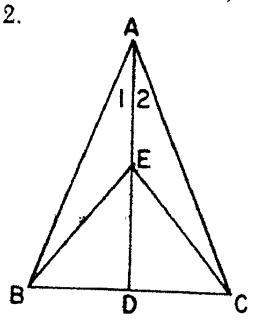
31 Prove *either a* or *b*, but *not* both:

a 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]

OR

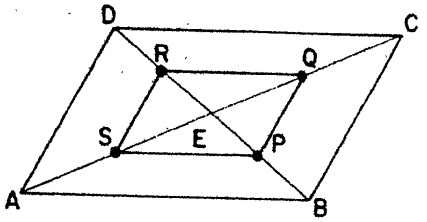
b If three angles of one triangle are congruent to the three angles of another triangle, the triangles are similar. [10]

32 Given: $\triangle ABC$ with $\overline{AB} \cong \overline{AC}$, $\overline{BDC}$, $\overline{AED}$, and $m\angle 1 = m\angle 2$.



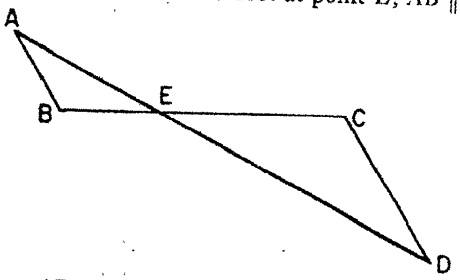
Prove: $\triangle BDE \cong \triangle CDE$ [10]

33 In the accompanying diagram, $ABCD$ is a parallelogram, and diagonals $\overline{AC}$ and $\overline{DB}$ intersect at E. The midpoints of $\overline{AE}$, $\overline{BE}$, $\overline{CE}$, and $\overline{DE}$ are S, P, Q, and R, respectively.



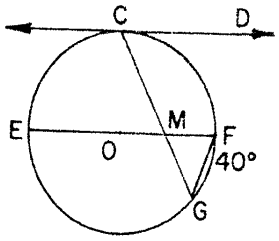
Prove: $PQRS$ is a parallelogram. [10]

34 Given: $\overline{AD}$ and $\overline{BC}$ intersect at point E, $\overline{AB} \parallel \overline{CD}$.



Prove: $AB \times DE = DC \times AE$ [10]

35 In the accompanying diagram, $\overline{EOF}$ is a diameter of circle O, $\overleftrightarrow{CD}$ is tangent to the circle at C, $\overleftrightarrow{CD} \parallel \overleftrightarrow{EF}$, and $m\overset{\frown}{FG} = 40$. Chords $\overline{CG}$ and $\overline{EF}$ intersect at M, and $\overline{FG}$ is drawn.



a Find $m\angle EFG$. [2]

b Find $m\overset{\frown}{CF}$. [2]

c Find $m\angle DCG$. [3]

d Find $m\angle EMG$. [3]

36 The vertices of parallelogram $ABCD$ are $A(4,6)$, $B(3,-7)$, $C(6,-8)$, and $D(r,t)$.

a Find the coordinates of the midpoint of $\overline{AC}$. [2]

b Find the coordinates of the midpoint of $\overline{BD}$ in terms of r and t. [4]

c Find the numerical value of r. [2]

d Find the numerical value of t. [2]

37 The vertices of triangle ABC are $A(-4,4)$, $B(6,4)$, and $C(5,1)$.

a Using graph paper, draw $\triangle ABC$. [1]

b Using methods of coordinate geometry, show that triangle ABC is a right triangle, and state a reason for your conclusion. [5]

c Using methods of coordinate geometry, show that the median to the hypotenuse equals one-half the hypotenuse. [4]

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	

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Friday, June 23, 1978 — 1:15 to 4:15 p.m., only

B

Part I Score: .....

Rater's Initials:

.....

ANSWER SHEET

Pupil.....Teacher.....

School.....

Name and author of textbook used .....

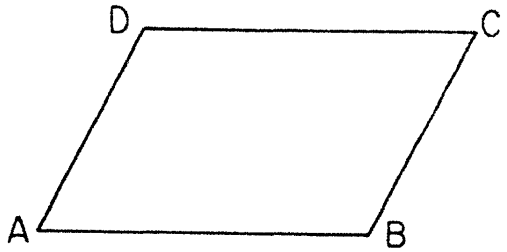
Your answers to Part I should be recorded on this answer sheet.

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

22

FOR TEACHERS ONLY

10 SCORING KEY TENTH YEAR MATHEMATICS B

Friday, June 23, 1978 — 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 18–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 6

(2) 75

(3) $\overline{TR}$ *or* s

(4) 125

(5) 75

(6) 10

(7) 51

(8) $4\sqrt{3}$ *or* $\sqrt{48}$

(9) $4\sqrt{2}$ *or* $\sqrt{32}$

(10) 4

(11) 10

(12) 32

(13) 95

(14) 66

(15) 5

(16) 8

(17) 2

(18) 3

(19) 4

(20) 1

(21) 4

(22) 3

(23) 2

(24) 1

(25) 2

(26) 2

(27) 3

(28) 1

(29) 4

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* 70 [2]

b 90 [2]

c 65 [3]

d 115 [3]

(36) *a* $(5,-1)$ *or* $x = 5,\ y = -1$ [2]

b $\left(\frac{3+r}{2}, \frac{-7+t}{2}\right)$

or

$x = \frac{3+r}{2},\ y = \frac{-7+t}{2}$ [4]

c 7 [2]

d 5 [2]

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