The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS B

Monday, June 23, 1975 — 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 The measures of angles B and C of parallelogram $ABCD$ are represented by $4x$ and $5x$, respectively. Find x, in degrees.

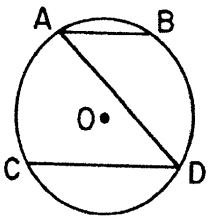
2 In an isosceles triangle, the measure of either of the exterior angles formed by extending the base is 140°. Find the number of degrees in the measure of the vertex angle.

3 A tree 24 feet high casts a shadow of 72 feet. At the same time, a man standing beside the tree casts a shadow of 18 feet. Find, in feet, the height of the man.

4 In $\triangle ABC$, $m\angle A = 60$. If AB is greater than AC, which is the *smallest* angle of the triangle?

5 The lengths of the sides of a pentagon are 5, 7, 8, 10, and 12, respectively. Find the perimeter of a similar pentagon if the length of its smallest side is 10.

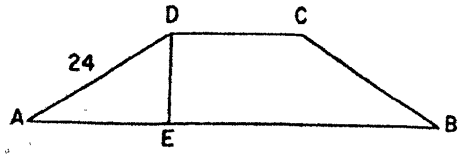
6 In the accompanying figure, chord $\overline{AB}$ in circle O is parallel to chord $\overline{CD}$. If $m\overset{\frown}{AB} = 60$ and $m\overset{\frown}{CD} = 120$, find $m\angle ADC$.



7 Find the length of an altitude of an equilateral triangle whose perimeter is 30.

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

9 As shown in the accompanying figure, $ABCD$ is a trapezoid with $\overline{DC} \parallel \overline{AB}$, $AD = 24$, and $m\angle A = 30$. What is the length of altitude $\overline{DE}$?



10 In circle O, chords $\overline{AB}$ and $\overline{BC}$ are congruent. $\overline{OD}$ is perpendicular to $\overline{AB}$ at D, and $\overline{OE}$ is perpendicular to $\overline{BC}$ at E. If $m\angle DOE = 90$ and $OD = 4$, find DB.

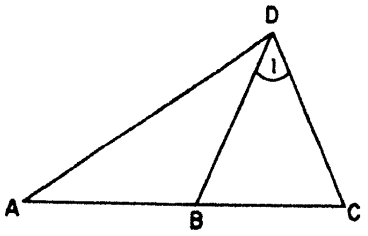
11 The coordinates of the vertices of triangle ABC are $A(1,3)$, $B(5,7)$, and $C(2,11)$. What is the length of the side opposite angle A?

12 The lengths of the bases of a trapezoid are 8 and 6 and the measure of its altitude is 5. What is the area of the trapezoid?

13 What is the number of degrees in the measure of each interior angle of a regular polygon which has 12 sides?

14 The area of a square is 49. What is the length, in radical form, of a diagonal of the square?

15 In the accompanying figure, $\overline{AB} \cong \overline{BD} \cong \overline{DC}$. If $m\angle 1 = 52$, find $m\angle A$.



Directions (16–29) : Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

16 In a given plane, what is the locus of points equidistant from two parallel lines?

(1) one line
(2) one circle
(3) three lines
(4) one point

17 What are the coordinates of the midpoint of the line segment that joins the points (—3,7) and (5,1)?

(1) (—4,3)
(2) (1,4)
(3) (8,6)
(4) (4,—3)

18 Which statement is always true?

(1) All rectangles are similar.
(2) All rhombuses are similar.
(3) All squares are similar.
(4) All parallelograms are similar.

19 The dimensions of a certain rectangle are represented by x and y and the dimensions of a second rectangle are represented by $4x$ and $4y$. What is the ratio of the area of the first rectangle to the area of the second rectangle?

(1) 1:2 (3) 1:8
(2) 1:4 (4) 1:16

20 The length of the hypotenuse of a right triangle is 14 and the length of one leg of the triangle is 12. What is the length of the other leg?

(1) $2\sqrt{13}$ (3) 9
(2) $2\sqrt{85}$ (4) 10

21 Two straight lines, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$, intersect at E. If $m\angle AED$ is represented by $3x$ and $m\angle BEC$ is represented by $(x + 40)$, what is $m\angle BEC$?

(1) 75 (3) 40
(2) 60 (4) 35

22 The slope of the straight line $\overleftrightarrow{AB}$ which passes through point A (—2,3) and point B (—5,5) is

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

23 In isosceles triangle RST, if angle T is obtuse, then which statement is *not* true?

(1) $m\angle R = m\angle S$ (3) $ST = RT$
(2) $m\angle T > m\angle R$ (4) $ST > RS$

24 The circumference of a circle is 10π. What is the area of the circle?

(1) 5π (3) 25π
(2) 20π (4) 100π

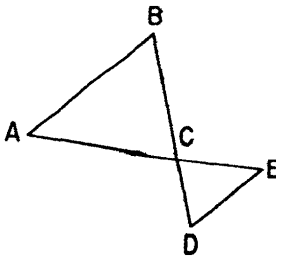
25 In parallelogram $ABCD$, diagonal $AC = 12$ and the line segment from vertex B drawn perpendicular to $\overline{AC}$ measures 8. The area of parallelogram $ABCD$ is

(1) 24 (3) 96
(2) 48 (4) 192

26 The diagonals of a rectangle are always

(1) perpendicular and bisect each other
(2) congruent and perpendicular to each other
(3) congruent and bisect the angles of the rectangle
(4) congruent and bisect each other

27 In the accompanying figure, $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$ and $\overline{AE}$ and $\overline{BD}$ intersect at point C. Which proportion is true?



(1) $\frac{AC}{CD} = \frac{BC}{CE}$ (3) $\frac{AC}{BC} = \frac{BD}{AE}$
(2) $\frac{AC}{CE} = \frac{BC}{CD}$ (4) $\frac{AB}{DE} = \frac{BC}{CE}$

28 In triangle ABC, the lengths of $\overline{AB}$ and $\overline{BC}$ are 3 and 7, respectively. The length of $\overline{AC}$ may be

(1) 9 (3) 3
(2) 10 (4) 4

29 "If Carmen reads a book every week, she does well in English." What is the converse of this statement?

(1) If Carmen does not read a book every week, she does not do well in English.
(2) If Carmen does not do well in English, she does not read a book every week.
(3) If Carmen does well in English, she reads a book every week.
(4) If Carmen does not read a book every week, she does well in English.

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

30 *On the answer sheet,* locate by construction within acute angle ABC a point which is equidistant from the sides of the angle and also at the given distance d from vertex B.

☞ **GO RIGHT ON TO THE NEXT PAGE.**

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 A diameter perpendicular to a chord of a circle bisects the chord and its arcs.

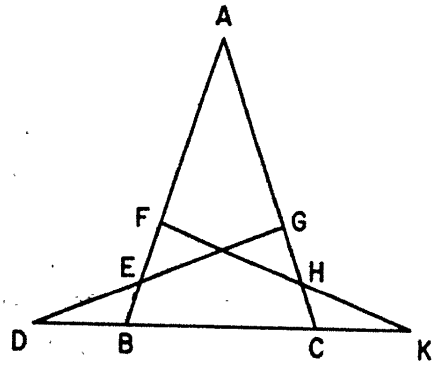
OR

b The area of a triangle is equal to one-half the product of the length of a side and the length of the altitude drawn to that side.

32 Given: $\overline{DBCK}$, $\overline{AFEB}$, $\overline{AGHC}$

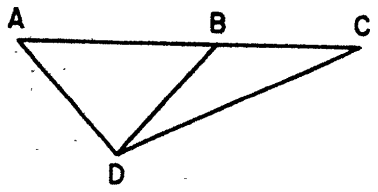
$\overline{AB} \cong \overline{AC}$, $\overline{AF} \cong \overline{AG}$

$\overline{KHF} \perp \overline{AB}$, $\overline{DEG} \perp \overline{AC}$



Prove: $\angle D \cong \angle K$ [10]

33 Given: $\triangle ACD$, $\overline{ABC}$, and $\overline{AD} \cong \overline{DB} \cong \overline{BC}$



Prove: $m\angle A = 2m\angle C$ [10]

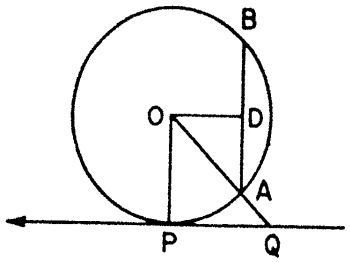
34 A regular pentagon is inscribed in a circle whose radius has length 22.

a Find the length of a side of the pentagon to the *nearest integer.* [4]

b Find the length of its apothem to the *nearest integer.* [3]

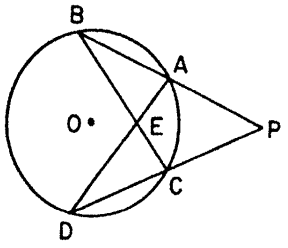
c Using the results found in parts *a* and *b*, find the number of square units in the area of the regular pentagon. [3]

35 Given: circle O, $\overleftrightarrow{PQ}$ is tangent to the circle O at point P. $\overline{OD}$ is perpendicular to chord $\overline{AB}$. Radius $\overline{OP}$. $\overline{AB}$, $\overline{BDA}$ and $\overline{OAQ}$.



Prove: $AD \times PQ = DO \times OP$ [10]

36 In the accompanying diagram, secants $\overline{PAB}$ and $\overline{PCD}$ intersect at P and chords $\overline{BC}$ and $\overline{AD}$ intersect at E. $\overline{AB} \cong \overline{CD}$, $m\overset{\frown}{AB} = 70$, and $m\angle APC = 50$.



a If $m\overset{\frown}{AC} = x$, express $m\overset{\frown}{BD}$ in terms of x. [2]

b Find the numerical value of:

(1) $m\overset{\frown}{AC}$ [2]
(2) $m\angle DAB$ [2]
(3) $m\angle DEB$ [2]
(4) $m\angle ECP$ [2]

*37 The vertices of a triangle are $A(-3,1)$, $B(-2,4)$, and $C(1,3)$.

a Find the lengths of the sides of $\triangle ABC$. [4]

b Show that $\triangle ABC$ is a right triangle and state a reason for the conclusion. [4]

c Find the area of $\triangle ABC$. [2]

*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	

Pupil

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Name

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Math.

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, June 23, 1975 — 1:15 to 4:15 p.m., only

B

Part I Score: .....

Rater's Initials:

.....

ANSWER SHEET

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

School .....

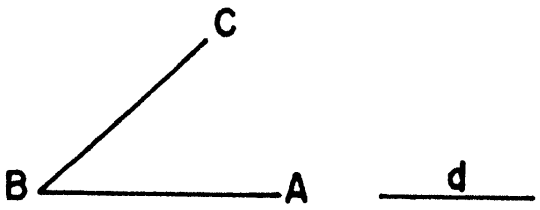
Name and author of textbook used .....

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.



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 B

Monday, June 23, 1975 — 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 16–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 20

(2) 100

(3) 6

(4) $\angle B$ *or* B

(5) 84

(6) 45

(7) $5\sqrt{3}$ *or* $\sqrt{75}$

(8) 4

(9) 12

(10) 4

(11) 5

(12) 35

(13) 150

(14) $7\sqrt{2}$ *or* $\sqrt{98}$

(15) 32

(16) 1

(17) 2

(18) 3

(19) 4

(20) 1

(21) 2

(22) 1

(23) 4

(24) 3

(25) 3

(26) 4

(27) 2

(28) 1

(29) 3

[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.

(34) *a* 26 [4]

b 18 [3]

c 1,170 [3]

(36) *a* $220 - x$
or
$100 + x$ [2]

b (1) 60 [2]
(2) 80 [2]
(3) 110 [2]
(4) 100 [2]

(37) *a* $AB = \sqrt{10}$
$BC = \sqrt{10}$
$AC = \sqrt{20}$ *or* $2\sqrt{5}$ [4]

c 5 [2]