The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, August 13, 1987—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 9 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.

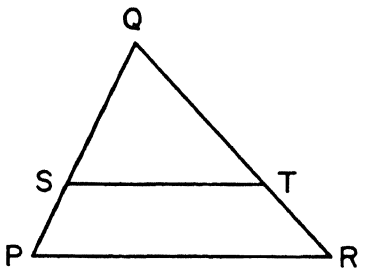
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during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

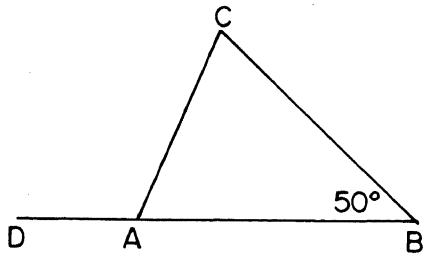
Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form. Write your answers in the spaces provided on the separate answer sheet. [60]

1 In the accompanying diagram of $\triangle PQR$, $\overline{ST} \parallel \overline{PR}$. If $SP = 4$, $QS = 8$, and $TR = 5$, find QT.

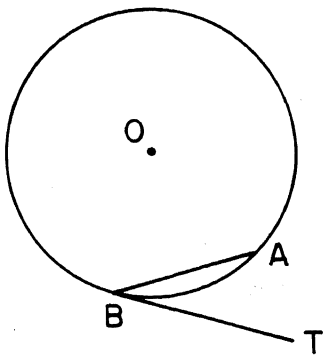


2 In $\triangle XYZ$, $m\angle X = 90$ and $m\angle Y$ is 12 more than $m\angle Z$. Find $m\angle Z$.

3 In the accompanying diagram, $\triangle ABC$ is isosceles with $\overline{AB} \cong \overline{BC}$, $\overline{BA}$ is extended to D, and $m\angle ABC = 50$. Find $m\angle DAC$.

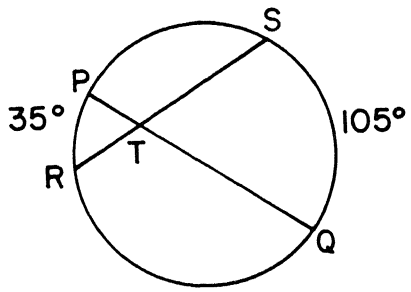


4 In the accompanying figure, $\overline{BT}$ is tangent to circle O at B. If the measure of major arc AB is 300°, find $m\angle ABT$.



5 If the sides of a rectangle have lengths of 8 and 7, find, in radical form, the length of a diagonal of the rectangle.

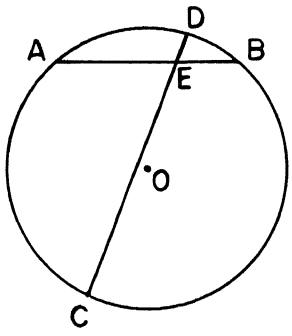
6 In the accompanying figure, chords $\overline{PQ}$ and $\overline{RS}$ intersect at point T. If $m\widehat{PR} = 35$ and $m\widehat{SQ} = 105$, find $m\angle STQ$.



7 If the lengths of the bases of a trapezoid are 5 and 7, and the altitude is 3, find the area of the trapezoid.

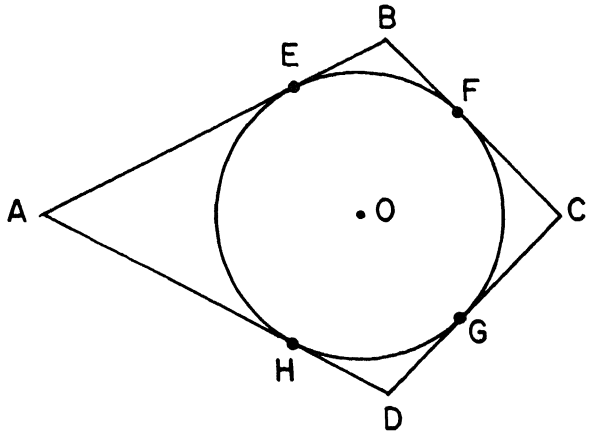
8 Find the coordinates of the midpoint of the line segment whose endpoints are (−6,5) and (4,7).

9 In the accompanying figure of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. If $AE = 4$, $BE = 2$, and $DE = 1$, find CE.

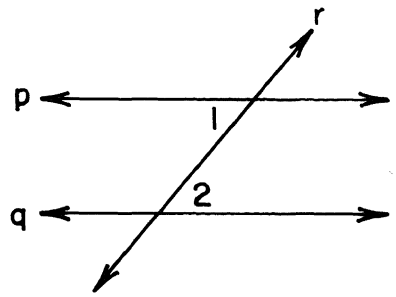


10 The measure of an exterior angle of a regular polygon is 12°. Find the number of sides of the polygon.

11 In the accompanying figure, quadrilateral $ABCD$ is circumscribed about circle O, $AB = 8$, $FC = 3$, and $AH = 6$. Find BC.

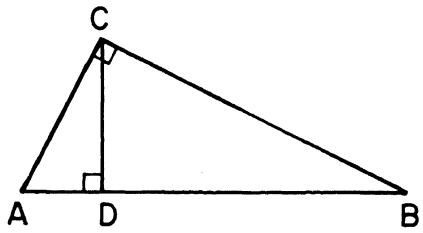


12 In the accompanying diagram, line p is parallel to line q, and line r is a transversal. If the measure of $\angle 1$ is 50° less than twice the measure of $\angle 2$, find $m\angle 1$.



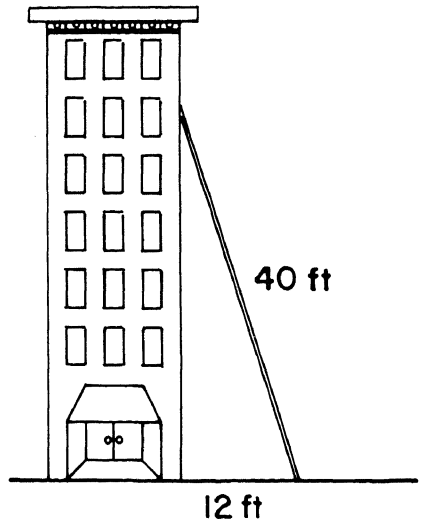
13 The line that passes through the points $(1,a)$ and $(7,2a)$ has a slope of $\frac{1}{3}$. Find the value of a.

14 In the accompanying diagram, $\overline{CD} \perp \overline{AB}$ at D, $m\angle ACB = 90$, $CD = 10$, and $AD = 5$. Find DB.



15 Find, in radical form, the distance between the points (3,–7) and (–2,–3).

16 As shown in the accompanying diagram, a 40-foot ladder is leaning against a building. If the base of the ladder is 12 feet from the building, find, to the *nearest degree*, the angle that the ladder makes with the ground.



17 In parallelogram $ABCD$, $m\angle A = 3x - 20$ and $m\angle B = x$. Find x.

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 The measure of a central angle of a regular hexagon is

(1) 30°
(2) 60°
(3) 90°
(4) 120°

19 What is the area of a right triangle whose legs have lengths 6 and 8?

(1) 24
(2) 48
(3) 30
(4) 40

20 In a circle, chords $\overline{AEB}$ and $\overline{CED}$ are drawn. Which statement concerning these chords must be true?

(1) They are parallel.
(2) They are vertical.
(3) They intersect.
(4) They are horizontal.

21 What is the circumference of a circle whose area is 16π?

(1) 64π
(2) 32π
(3) 8π
(4) 4π

22 In a plane, the total number of points that are equidistant from two given intersecting lines and that are also 2 centimeters from the point of intersection is

(1) 1
(2) 2
(3) 8
(4) 4

23 A right triangle is inscribed in a circle. If the length of the diameter of the circle is 12, which statement *must* be true?

(1) The length of the hypotenuse of the triangle is greater than 12.
(2) The length of the hypotenuse of the triangle is less than 12.
(3) The sum of the lengths of the legs of the triangle is greater than 12.
(4) The sum of the lengths of the legs of the triangle is less than 12.

24 If the circumference and the diameter of a circle are represented by C and d, respectively, π is *exactly* equal to

(1) $\frac{d}{C}$
(2) $\frac{C}{d}$
(3) $\frac{22}{7}$
(4) 3.1416

25 The area of an equilateral triangle is $16\sqrt{3}$. The length of a side of the triangle is

(1) 48
(2) 8
(3) $\sqrt{32}$
(4) 4

26 The center of a circle inscribed in a scalene triangle is the point of intersection of the

(1) angle bisectors
(2) medians
(3) altitudes
(4) perpendicular bisectors of the sides

27 Which statement is *false*?

(1) If two sides of a triangle are congruent, the angles opposite those sides are congruent.
(2) If two angles of a triangle are congruent, the sides opposite those angles are congruent.
(3) Parallel lines intercept congruent arcs on a circle.
(4) If two lines intercept congruent arcs on a circle, the lines are parallel.

28 The ratio of the areas of two similar polygons is 4:9. What is the ratio of the perimeters of the two polygons?

(1) 4:9
(2) 2:3
(3) 16:81
(4) 8:18

29 Which line divides *any* triangle into two triangles of equal area?

(1) a median
(2) an altitude
(3) an angle bisector
(4) a perpendicular bisector of a side

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

30 *On the answer sheet*, locate by construction a point on circle O that is equidistant from the sides of central angle AOB.

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. [40]

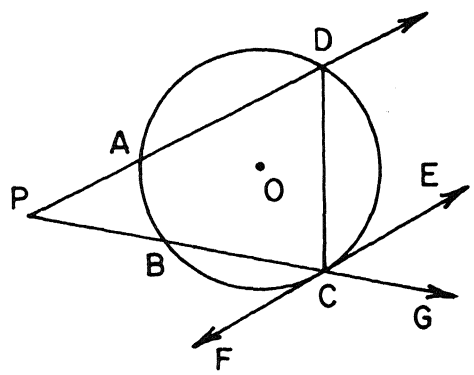
31 Prove either *a* or *b* but *not* both.

a The measure of an angle formed by two secants is equal to one-half the difference of the measures of the intercepted arcs. [10]

OR

b If, in a right triangle, the altitude is drawn upon the hypotenuse, the two triangles thus formed are similar to the given triangle and similar to each other. [10]

32 Given: circle O with secants $\overrightarrow{PAD}$ and $\overrightarrow{PBCG}$, chords $\overline{AD}$, $\overline{BC}$, and $\overline{DC}$, tangent $\overleftrightarrow{FCE}$, and $m\overset{\frown}{AD}:m\overset{\frown}{DC}:m\overset{\frown}{CB}:m\overset{\frown}{BA} = 3:3:2:1$.



Find: *a* $m\overset{\frown}{AD}$ [2]

b $m\angle APC$ [2]

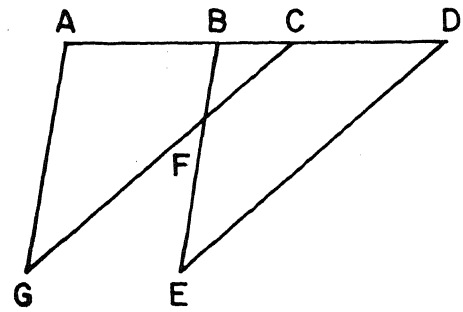
c $m\angle DCE$ [2]

d $m\angle BCD$ [2]

e $m\angle FCG$ [2]

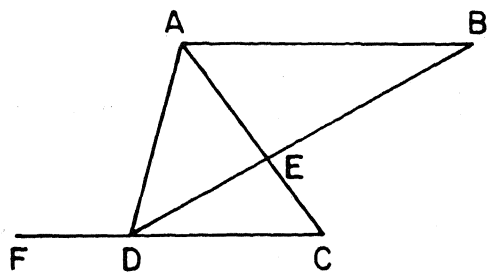
33 The vertices of a triangle are $A(1,6)$, $B(9,-2)$, and $C(-3,2)$. Using graph paper, draw triangle ABC and find its area. [10]

34 Given: $\overline{ABCD}$, $\overline{AG}$, $\overline{BFE}$, $\overline{CFG} \parallel \overline{DE}$, $\overline{CG} \cong \overline{DE}$, and $\overline{AB} \cong \overline{CD}$.



Prove: $\angle BFC \cong \angle AGC$ [10]

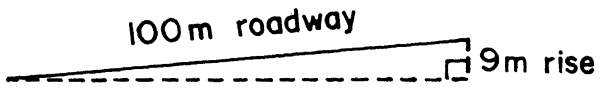
35 Given: $\overline{FDC}$, $\overline{BED}$, $\overline{AEC}$, and $\angle ADF \cong \angle DAB$.



Prove: $AB \times DE = CD \times BE$ [10]

☞ **GO RIGHT ON TO THE NEXT PAGE.**

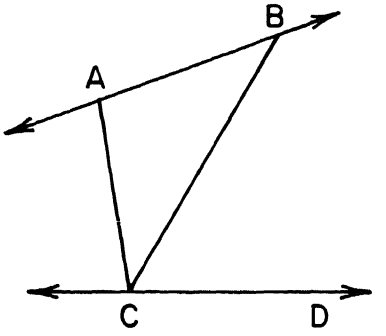
36 When a new road was built, every 100 meters of roadway resulted in a rise in elevation of 9 meters.



a To the *nearest meter*, how many meters of roadway would result in a rise of elevation of 40 meters? [4]

b Determine the measure of the angle of elevation of the roadway to the *nearest degree*. [6]

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



Prove: $\overline{CB}$ does *not* bisect $\angle ACD$. [10]

THE UNIVERSITY OF THE STATE OF NEW YORK

THE STATE EDUCATION DEPARTMENT

DIVISION OF 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 13, 1987—8:30 to 11:30 a.m., only

ANSWER SHEET

Part I Score	
Part II Score	
Total	
Rater's Initials:	

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

School .....

Name and author of textbook used .....

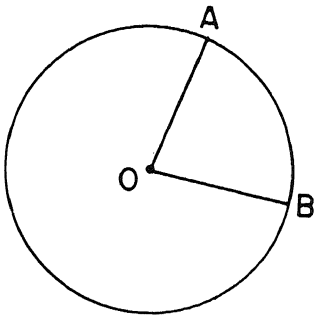
Your answers to Part I should be recorded on this answer sheet.

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 13, 1987 — 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) 10

(2) 39

(3) 115

(4) 30

(5) $\sqrt{113}$

(6) 70

(7) 18

(8) $(-1,6)$ *or* $\begin{matrix} x = \\ y = \end{matrix} \bar{6}^{1}$

(9) 8

(10) 30

(11) 5

(12) 50

(13) 2

(14) 20

(15) $\sqrt{41}$

(16) 73

(17) 50

(18) 2

(19) 1

(20) 3

(21) 3

(22) 4

(23) 3

(24) 2

(25) 2

(26) 1

(27) 4

(28) 2

(29) 1

(30) construction

[OVER]

Part II

Please refer to the Department publication *Guide for Rating Regents Examinations 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.

(32) *a* 120 [2]
b 40 [2]
c 60 [2]
d 80 [2]
e 140 [2]

(33) 32 [10]

(36) *a* 444 [4]
b 5 [6]

As a reminder . . .

Regents examinations based on the Tenth Year Mathematics syllabus will not be offered after January 1989.