The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, January 24, 1985 — 9:15 a.m. to 12:15 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 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.

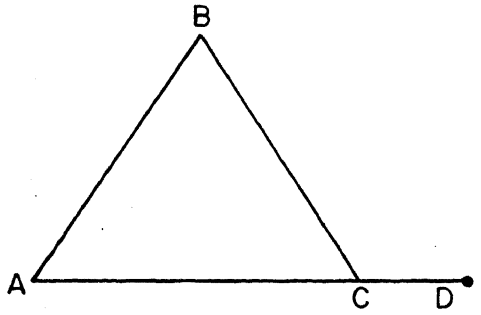
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

Part I

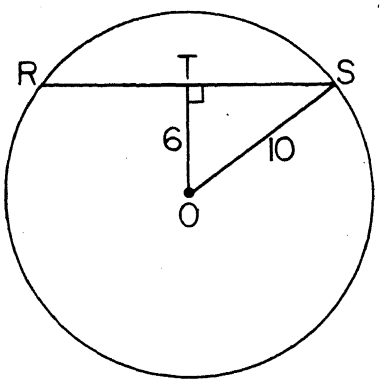
Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form. Write your answers in the spaces provided on the separate answer sheet.

1 A pair of vertical angles measure $x + 12$ and $2x - 1$ degrees. Find the value of x.

2 In the accompanying diagram of $\triangle ABC$, side $\overline{AC}$ is extended through C to D. If $m\angle A = 55$ and $m\angle B = 70$, find $m\angle BCD$.



3 In the accompanying diagram of circle O, radius $OS = 10$ and the distance from center O to chord $\overline{RTS}$ is 6. Find RS.



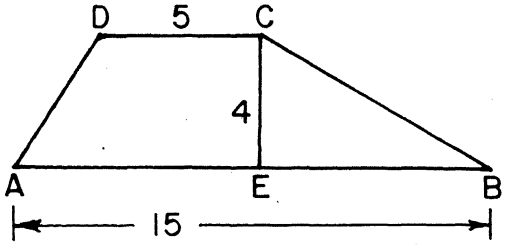
4 A right triangle is inscribed in a circle whose diameter is 13. If one leg of the triangle has length 5, find the length of the other leg.

5 Triangle ABC is congruent to triangle DEF with $\angle A \cong \angle D$ and $\angle B \cong \angle E$. If $AB = 2x$, $BC = 3x - 1$, and $EF = 5x - 9$, find the value of x.

6 In triangle DEF, $DE > EF$ and $DF > DE$. Which is the smallest angle of triangle DEF?

7 Find the slope of the line which passes through the points $(-3,5)$ and $(4,7)$.

8 In the accompanying diagram of trapezoid $ABCD$, $DC = 5$, altitude $CE = 4$, and $AB = 15$. Find the area of trapezoid $ABCD$.

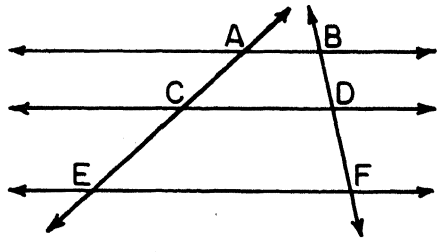


9 In circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at point E. If $AE = EB$, $CE = 4$, and $ED = 9$, find the length of $\overline{AE}$.

10 Point M is the midpoint of $\overline{AB}$. If the coordinates of A are $(7,-3)$ and the coordinates of M are $(7,7)$, what are the coordinates of B?

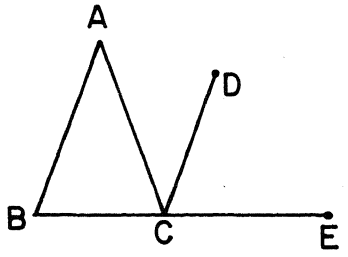
11 The length of $\overline{AB}$ is 5. The coordinates of A are $(2,-4)$, the coordinates of B are $(k,-4)$, and k is a positive integer. What is the value of k?

12 In the accompanying diagram, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD} \parallel \overleftrightarrow{EF}$ and transversals $\overleftrightarrow{ACE}$ and $\overleftrightarrow{BDF}$ are drawn. If $BD = 4$, $DF = 6$, and $AC = 6$, find CE.



13 In parallelogram $ABCD$, $m\angle A = 3x + 1$ and $m\angle D = 5x - 5$. Find the value of x.

14 In the accompanying diagram, $\overline{AB} \cong \overline{AC}$, $\overline{AB} \parallel \overline{CD}$, $m\angle A = 40$, and $\overline{BC}$ is extended to E. Find $m\angle DCE$.

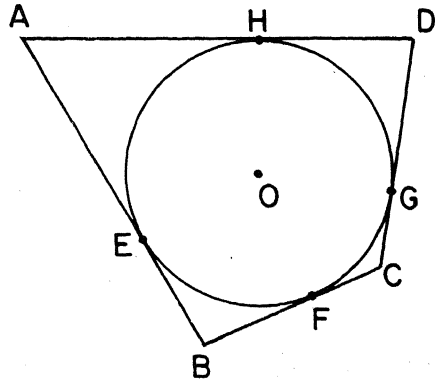


Directions (15–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

15 Each side of an equilateral triangle has length 6. A second triangle is formed by the segments that join the midpoints of the sides of the equilateral triangle. The perimeter of the second triangle is

(1) 6 (3) 12
(2) 9 (4) 18

16 In the accompanying diagram, circle O is inscribed in quadrilateral $ABCD$ and E, F, G, and H are the points of tangency of the sides. If $AH = 6$, $DG = 4$, $CF = 2$, and $BF = 3$, what is the perimeter of quadrilateral $ABCD$?



(1) 15 (3) 24
(2) 21 (4) 30

17 Which statement is *always* true?

(1) All equilateral triangles are similar.
(2) All isosceles triangles are similar.
(3) All obtuse triangles are similar.
(4) All right triangles are similar.

18 What is the measure in degrees of an exterior angle of a regular polygon of 9 sides?

(1) 140 (3) $51\frac{3}{7}$
(2) 20 (4) 40

19 Which statement is *always* true for a right triangle?

(1) The angles measure 30°, 60°, and 90°.
(2) The length of the hypotenuse is equal to the sum of the lengths of the other two sides.
(3) The acute angles are complementary.
(4) Each exterior angle is obtuse.

20 From the same external point, two tangents are drawn to a circle. The tangents intercept arcs whose measures are 300° and 60°. The measure of the angle formed by the tangents is

(1) 60° (3) 240°
(2) 120° (4) 300°

21 A regular hexagon is inscribed in a circle of radius 5. The perimeter of the hexagon is

(1) 60 (3) 30
(2) 25 (4) 40

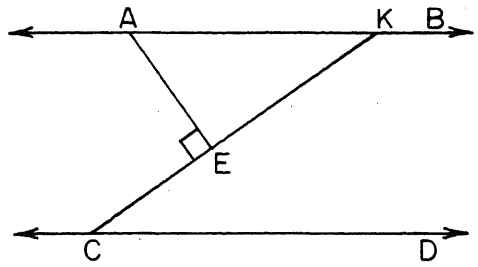
22 Tangents $\overline{PA}$ and $\overline{PB}$ are drawn to circle O from external point P, and chord $\overline{AB}$ is drawn. If $m\angle APB = 60$ and $AB = 8$, PB is equal to

(1) 8 (3) 6
(2) 10 (4) 4

23 What is the area of an equilateral triangle whose side has length 8?

(1) $8\sqrt{3}$ (3) 24
(2) $16\sqrt{3}$ (4) $64\sqrt{3}$

24 In the accompanying diagram, $\overleftrightarrow{AKB} \parallel \overleftrightarrow{CD}$, $\overline{AE} \perp \overline{CK}$, $m\angle KCD = 2x$, and $m\angle KAE = 3x$. What is $m\angle CKB$?



(1) 18
(2) 36
(3) 110
(4) 144

25 Which statement is *not* always true?
(1) The diagonals of a rectangle are congruent.
(2) The diagonals of a rhombus bisect each other.
(3) The diagonals of a parallelogram are perpendicular to each other.
(4) The diagonals of an isosceles trapezoid are congruent.

26 The number of points 3 centimeters from a given line and also 2 centimeters from a point on that line is
(1) 1
(2) 2
(3) 0
(4) 4

27 Which statement is the converse of the statement, "If two angles are right angles, they are congruent"?
(1) If two angles are not right angles, they are not congruent.
(2) If two angles are not congruent, they are not right angles.
(3) If two angles are congruent, they may or may not be right angles.
(4) If two angles are congruent, they are right angles.

28 The number of square centimeters in the area of a circle is equal to the number of centimeters in its circumference. What is the length, in centimeters, of the radius of the circle?
(1) 1
(2) 2
(3) 8
(4) 4

29 Which is an equation for the locus of points that are equidistant from (1,0) and (7,0)?
(1) $x = 4$
(2) $y = 0$
(3) $y = x$
(4) $y = 4$

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

30 *On the answer sheet*, circumscribe a circle about given square $ABCD$.

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.

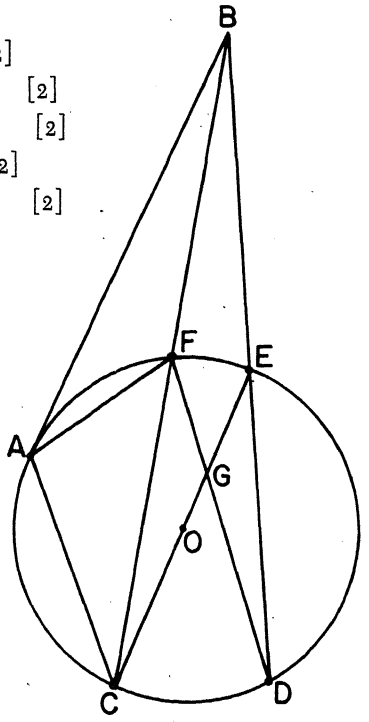
a The measure of an angle formed by two chords intersecting inside the circle is equal to one-half the sum of the measures of the intercepted arcs. [10]

OR

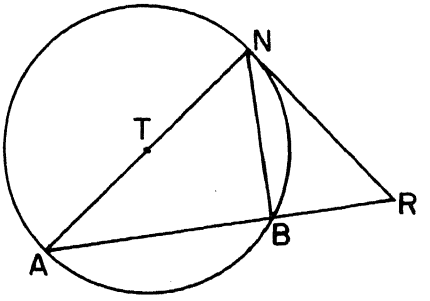
b If two angles of a triangle are congruent, the sides opposite these angles are congruent. [10]

32 Given: circle O with tangent $\overline{AB}$, secants $\overline{BFC}$ and $\overline{BED}$, chords $\overline{AF}$ and $\overline{AC}$, and diameter $\overline{COE}$ intersects chord $\overline{FD}$ at G;
$m\overset{\frown}{EF}:m\overset{\frown}{FA}:m\overset{\frown}{AC} = 1:2:3$ and $m\angle CGD = 42$.

Find: *a* $m\overset{\frown}{FA}$ [2]
b $m\angle BAF$ [2]
c $m\angle CED$ [2]
d $m\overset{\frown}{ED}$ [2]
e $m\angle BEC$ [2]

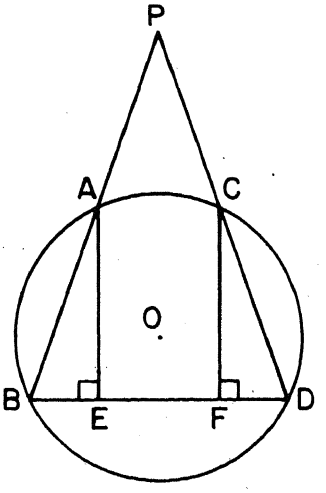


33 Given: $\overline{RN}$ tangent to circle T at N, and diameter $\overline{AN}$.



Prove: $(AN)^2 = AR \times AB$ [10]

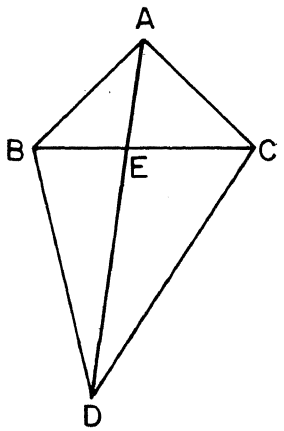
34 Given: secants $\overline{PAB}$ and $\overline{PCD}$ are drawn to circle O, $\overline{PAB} \cong \overline{PCD}$, and $\overline{AE}$ and $\overline{CF}$ are perpendicular to $\overline{BD}$ at points E and F, respectively.



Prove: $\overline{AE} \cong \overline{CF}$ [10]

☞ **GO RIGHT ON TO THE NEXT PAGE.**

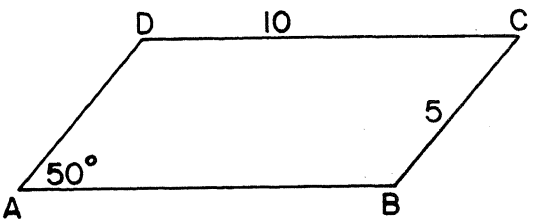
35 Given: $\overline{AB} \cong \overline{AC}$, $\overline{BD} \ncong \overline{CD}$, $\overline{BEC}$, and $\overline{AED}$.



Prove: $\overline{BE} \ncong \overline{EC}$ [10]

36 Quadrilateral $QRST$ has coordinates $Q(a,b)$, $R(a + h,b + k)$, $S(0,k)$, and $T(-h,0)$.
Show that $QRST$ is a parallelogram and state a reason for your conclusion. [10]

*37 Given: parallelogram $ABCD$ with $m\angle A = 50$, $CD = 10$, and $CB = 5$.



Find the area of parallelogram $ABCD$ to the *nearest tenth.* [10]

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

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, January 24, 1985 — 9:15 a.m. to 12:15 p.m., only

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

ANSWER SHEET

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

School .....

Name and author of textbook used .....

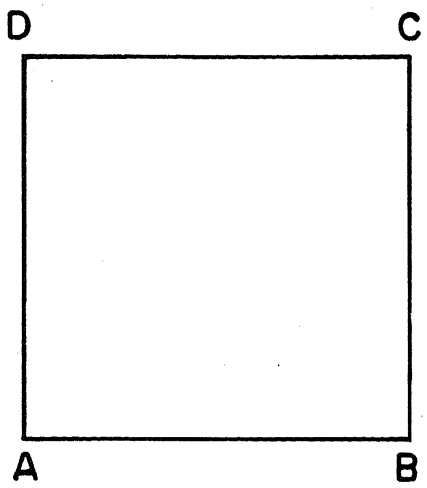
Your answers to Part I should be recorded on this answer sheet.

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, January 24, 1985 — 9:15 a.m. to 12:15 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 15–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 13

(2) 125

(3) 16

(4) 12

(5) 4

(6) *D or EDF*

(7) $\frac{2}{7}$

(8) 40

(9) 6

(10) (7,17) *or* $\begin{matrix} x = 7 \\ y = 17 \end{matrix}$

(11) 7

(12) 9

(13) 23

(14) 70

(15) 2

(16) 4

(17) 1

(18) 4

(19) 3

(20) 2

(21) 3

(22) 1

(23) 2

(24) 4

(25) 3

(26) 3

(27) 4

(28) 2

(29) 1

(30) construction

[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.

(32) *a* 60 [2]
b 30 [2]
c 27 [2]
d 126 [2]
e 153 [2]

(37) 38.3 [10]