The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, August 14, 1980 — 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.

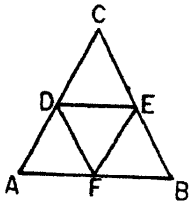
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during 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 figure, the length of a side of equilateral triangle ABC is 10. If D, E, and F are the midpoints of sides $\overline{AC}$, $\overline{CB}$, and $\overline{AB}$, respectively, find the perimeter of triangle DEF.

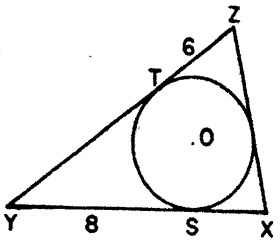


2 The sum of the measures of three angles of a quadrilateral is 275°. Find the number of degrees in the measure of the fourth angle.

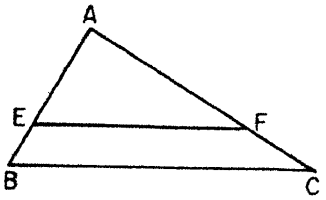
3 A triangle has sides of lengths 4 meters, 5 meters, and 7 meters. The perimeter of a second triangle similar to the first triangle is 32 meters. What is the length in meters of the *longest* side of the second triangle?

4 In parallelogram $ABCD$, the measure of angle B is 5 times the measure of angle A. Find the number of degrees in the measure of angle A.

5 As shown in the accompanying diagram, triangle XYZ is circumscribed about circle O. If points S and T are points of tangency such that $TZ = 6$ and $SY = 8$, find YZ.



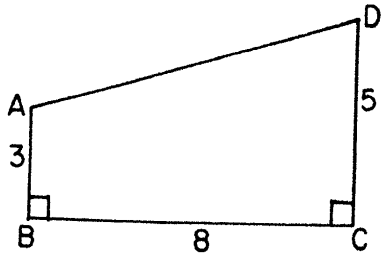
6 In the accompanying diagram, $\overline{EF} \parallel \overline{BC}$, $AE = 6$, $EB = 2$, and $AC = 12$. Find AF.



7 If the measure of each exterior angle of a regular polygon is 40°, how many sides does the polygon have?

8 The coordinates of the endpoints of line segment $\overline{AB}$ are $A(-2,6)$ and $B(4,8)$. What are the coordinates of the midpoint of $\overline{AB}$?

9 As shown in the accompanying diagram of trapezoid $ABCD$, $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, $AB = 3$, $BC = 8$, and $DC = 5$. What is the area of trapezoid $ABCD$?



10 In circle O, a central angle measuring 60° intercepts an arc 2π centimeters in length. Express in terms of π the number of centimeters in the circumference of the circle.

11 The top of a ladder 30 feet long is placed against a vertical wall. The base of the ladder forms an angle measuring 66° with the horizontal ground. Find, to the *nearest foot*, the distance from the base of the ladder to the base of the wall.

12 What is the slope of the line that contains the points (3,5) and (9,8)?

13 If an equilateral triangle has a side of length 8, what is the length of an altitude of the triangle?

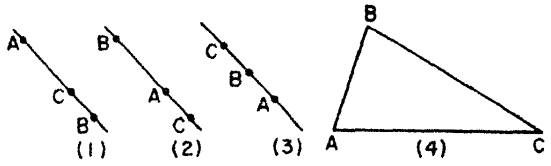
14 The perimeter of a regular polygon is 40, and the length of its apothem is 5. Find the area of the polygon.

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 In a right triangle, the measures in degrees of the acute angles are $4x$ and $5x$. What is the value of x?

(1) 10
(2) 20
(3) 30
(4) 40

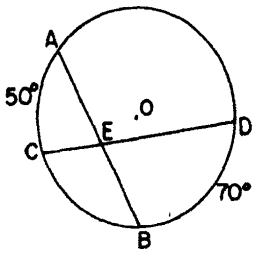
16 In which diagram does $AB + BC - AC = 0$?



17 What is the converse of the statement, "If two parallel lines are cut by a transversal, the alternate interior angles are congruent"?

(1) If two parallel lines are cut by a transversal, the corresponding angles are congruent.
(2) If two lines are cut by a transversal so that the alternate interior angles are congruent, the lines are parallel.
(3) If two parallel lines are cut by a transversal, the alternate exterior angles are not congruent.
(4) If two nonparallel lines are cut by a transversal, the alternate interior angles are not congruent.

18 As shown in the accompanying diagram, chords $\overline{AB}$ and $\overline{CD}$ of circle O intersect at E. If $m\overset{\frown}{AC} = 50$ and $m\overset{\frown}{BD} = 70$, what is $m\angle AEC$?



(1) 10
(2) 20
(3) 60
(4) 120

19 A circle whose radius is 8 has its center at the origin. The point whose coordinates are (5,5) must lie

(1) outside the circle
(2) inside the circle but not at its center
(3) on the circle
(4) at the center of the circle

20 In triangle ABC, if median $\overline{AD}$ is perpendicular to side $\overline{BC}$, then triangle ABC *must* be

(1) obtuse
(2) acute
(3) scalene
(4) isosceles

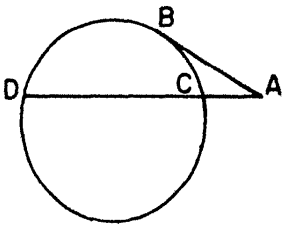
21 Which set of numbers can *not* be the lengths of the sides of a right triangle?

(1) {5,17,18}
(2) {5,12,13}
(3) {3,4,5}
(4) {6,8,10}

22 If the circumference of a circle is 12π, the area of the circle is

(1) 6π
(2) 12π
(3) 24π
(4) 36π

23 In the accompanying diagram, $\overline{AB}$ is tangent to the circle at B and $\overline{ACD}$ is a secant. If $AD = 12$ and $AC = 3$, the length of $\overline{AB}$ is



(1) 6
(2) 9
(3) 15
(4) 36

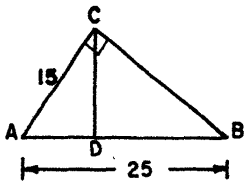
24 If the perpendicular bisectors of the sides of a triangle all meet at a point outside the triangle, the triangle *must* be

(1) acute
(2) right
(3) obtuse
(4) equilateral

25 Lines ℓ_1 and ℓ_2 are parallel and 4 units apart. Point P lies on line ℓ_1. What is the locus of points at a distance 3 units from P and also equally distant from ℓ_1 and ℓ_2?

(1) one point
(2) two points
(3) one line
(4) two lines

26 In the accompanying diagram of right triangle ABC, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. If $AB = 25$ and $AC = 15$, then AD is equal to



(1) $1\frac{2}{3}$
(2) 5
(3) 3
(4) 9

27 Two parallel lines are cut by a transversal so that two interior angles on the same side of the transversal have measures of $x°$ and $(2x - 15)°$. What is the value of x?

(1) 65
(2) 55
(3) 50
(4) 45

28 Which is an equation of the locus of points that are equidistant from the points (4,2) and (8,2)?

(1) $x = 6$
(2) $y = 6$
(3) $x = 12$
(4) $y = 12$

29 A square is inscribed in a circle whose diameter has length 10. The area of the square is

(1) 12.5
(2) 25
(3) 50
(4) 100

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

30 *On the answer sheet,* locate by construction the center of the given circle.

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.

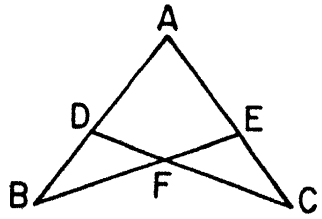
31 Prove *either a* or *b* but *not* both.

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

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. [10]

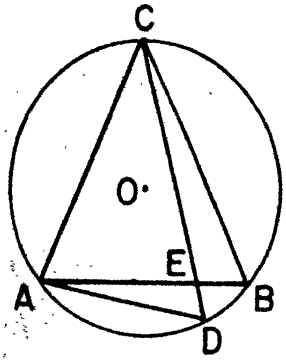
32 Given: $\overline{ADB}$, $\overline{AEC}$, $\overline{BFE}$, $\overline{CFD}$, $\overline{AB} \cong \overline{AC}$, $\overline{AD} \cong \overline{AE}$.



Prove: *a* $\angle B \cong \angle C$ [4]

b $\overline{DF} \cong \overline{EF}$ [6]

33 Given: isosceles triangle ABC inscribed in circle O with $\overline{AC} \cong \overline{BC}$. Chords $\overline{CD}$ and $\overline{AB}$ intersect at E. Chord $\overline{AD}$ is drawn.



Prove: *a* $\angle CAD \cong \angle CEA$ [5]

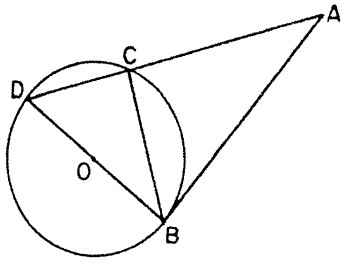
b $(AC)^2 = CE \times CD$ [5]

34 The coordinates of the vertices of quadrilateral $ABCD$ are $A(2,0)$, $B(10,2)$, $C(6,7)$, and $D(2,6)$.

a Show by coordinate geometry that $\overline{AB} \parallel \overline{CD}$ and state a reason for your conclusion. [5]

b Show by coordinate geometry that quadrilateral $ABCD$ is *not* a parallelogram and state a reason for your conclusion. [5]

35 In the accompanying diagram, $\overline{AB}$ is tangent to circle O at B, $\overline{ACD}$, $\overline{BD}$ is a diameter, $m\overset{\frown}{BC}:m\overset{\frown}{CD} = 3:2$.



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

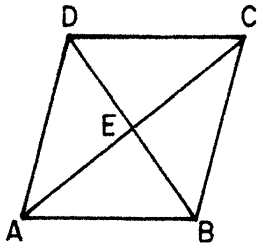
b $m\angle CBA$ [2]

c $m\angle CBD$ [2]

d $m\angle A$ [2]

e $m\angle ACB$ [2]

36 In rhombus $ABCD$, the length of each side is 20 and the measure of $\angle DAB$ is 74°. Diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.

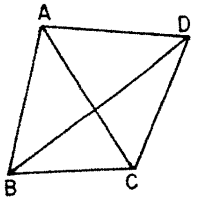


a Find AC to the *nearest integer*. [4]

b Find BD to the *nearest integer*. [4]

c Using your results from parts *a* and *b*, find the area of the rhombus. [2]

37 Given: Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$.



Prove: $AB + 2(BC) + CD > AC + BD$ [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 14, 1980 — 8:30 to 11:30 a.m., only

Part I Score: .....
Rater's Initials:
.....

ANSWER SHEET

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

School.....

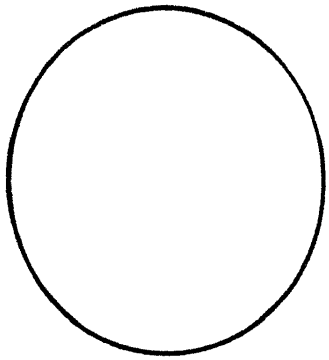
Name and author of textbook used.....

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.**



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 14, 1980 — 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 15–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 15

(2) 85

(3) 14

(4) 30

(5) 14

(6) 9

(7) 9

(8) (1,7) *or* $\begin{matrix} x = 1 \\ y = 7 \end{matrix}$

(9) 32

(10) 12π

(11) 12

(12) $\frac{1}{2}$

(13) $4\sqrt{3}$ *or* $\sqrt{48}$

(14) 100

(15) 1

(16) 3

(17) 2

(18) 3

(19) 2

(20) 4

(21) 1

(22) 4

(23) 1

(24) 3

(25) 2

(26) 4

(27) 1

(28) 1

(29) 3

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* 108 [2]

b 54 [2]

c 36 [2]

d 36 [2]

e 90 [2]

(36) *a* 32 [4]

b 24 [4]

c 384 [2]