The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Tuesday, August 14, 1973 — 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.

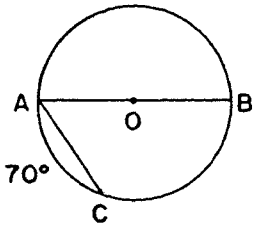
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

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.

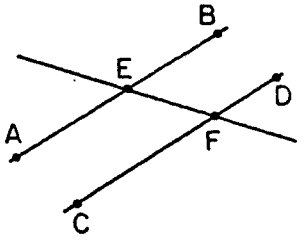
1 Find the number of degrees in the angle which is the complement of an angle of 54 degrees.

2 In the accompanying figure, $\overline{AOB}$ is a diameter of circle O and $\overline{AC}$ is a chord. If $m\overset{\frown}{AC} = 70$, find $m\angle A$.

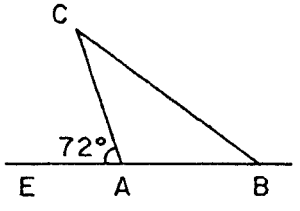


3 The sides of a triangle have lengths of 5, 7, and 8 inches, respectively. If the perimeter of a similar triangle is 60, find the number of inches in the length of its shortest side.

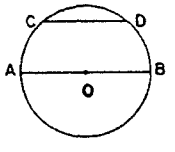
4 In the accompanying diagram, if $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $m\angle BEF = 3x - 10$, and $m\angle EFC = x + 30$, then find x.



5 In the accompanying figure, angle EAC is an exterior angle of triangle ABC and has a measure of 72°. If $\overline{AC} \cong \overline{AB}$, find $m\angle C$.



6 In the accompanying figure, chord $\overline{CD}$ in circle O is parallel to diameter $\overline{AOB}$. If $m\overset{\frown}{AC} = 50$, find $m\overset{\frown}{CD}$.

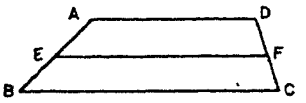


7 Find the number of degrees in the measure of each exterior angle of a regular polygon of 10 sides.

8 The area of a rectangle is 18 square inches. If the length is twice as great as the width, how many inches are there in the width of the rectangle?

9 The vertices of triangle ABC are $A(0,8)$, $B(6,0)$, and $C(0,0)$. Find AB.

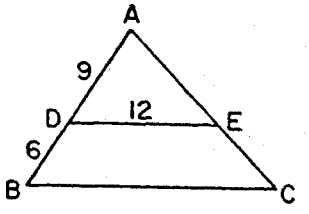
10 In the diagram below, $ABCD$ is a trapezoid with bases $\overline{BC}$ and $\overline{AD}$, E is the midpoint of $\overline{AB}$, and F is the midpoint of $\overline{CD}$. If $AB = 7$, $BC = 18$, $CD = 5$, and $AD = 12$, find EF.



11 Express the area of a circle in terms of π if the circumference of the circle is 6π.

12 The midpoints of sides $\overline{AB}$ and $\overline{CA}$ in triangle ABC are R and S, respectively. If the area of triangle ABC is 32, what is the area of triangle ASR?

13 In the accompanying figure, $\overline{ADB}$, $\overline{AEC}$, $\overline{DE}$ is parallel to $\overline{BC}$. If $AD = 9$, $DB = 6$, and $DE = 12$, find BC.



14 The legs of a right triangle are 3 and 5. Find, to the *nearest degree*, the measure of the smaller acute angle of the triangle.

15 What is the slope of the line whose equation is $3x + y = 6$?

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 Given $\overline{BAC}$, then
(1) $AC + BC = AC$
(2) $BA + AC = BC$
(3) $BA + BC = AC$
(4) $BC + AC = BA$

17 The lines which bisect any two consecutive angles of a rhombus must
(1) be parallel
(2) be perpendicular
(3) be oblique
(4) coincide

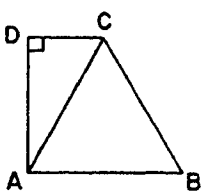
18 A regular hexagon is inscribed in a circle of radius 6. The perimeter of the hexagon is

(1) 12 (3) 36
(2) 18 (4) 42

19 The vertices of parallelogram $ABCD$ are the points $A(0,0)$, $B(2,8)$, $C(6,8)$, and $D(4,0)$. At what point do the diagonals intersect?

(1) (3,4) (3) (1,4)
(2) (4,3) (4) (5,4)

20 In the accompanying figure, triangle ABC is equilateral and angle ADC is a right angle. Which statement is true?



(1) $AB = AD$ (3) $AD > AB$
(2) $AB > CD$ (4) $BC < AD$

21 The lengths of the sides of a right triangle may be

(1) 1, 2, 2 (3) 4, 5, 6
(2) 2, 1, 3 (4) 9, 12, 15

22 The equation of the locus of points whose ordinates exceed their abscissas by 2 is

(1) $y = 2x$ (3) $y = x + 2$
(2) $y = x - 2$ (4) $x = 2y$

23 In a plane, the set of points which are equidistant from all three sides of a given triangle contains

(1) one element
(2) two elements
(3) three elements
(4) infinitely many elements

24 Diameter $\overline{AB}$ of circle O is extended to point C; $\overline{CD}$ is tangent to the circle at D, and $\overline{OD}$ is drawn. If $m\angle ACD = 32$, find $m\angle COD$.

(1) 32 (3) 90
(2) 58 (4) 148

25 The area of a triangle whose vertices are (1,1), (1,—3), and (—2,1) is

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

26 In a circle a central angle measuring 36° intercepts a minor arc 2 inches long. What is the circumference of the circle?

(1) 10 in. (3) 10π in.
(2) 20 in. (4) 20π in.

27 Two triangles are *not always* congruent if

(1) two sides and the included angle of one triangle are congruent to two sides and the included angle of the other triangle
(2) two angles and a side of one triangle are congruent to the corresponding two angles and a side of the other triangle
(3) two sides and an angle of one triangle are congruent to the corresponding two sides and an angle of the other triangle
(4) three sides of one triangle are congruent to the corresponding three sides of the other triangle

28 A diagonal of a square has a measure of 6. The measure of one of the sides of the square is

(1) $3\sqrt{2}$ (3) 3
(2) $6\sqrt{2}$ (4) 6

29 The lengths of two sides of a triangle are 5 and 8, respectively. The length of the third side may be

(1) 13 (3) 3
(2) 2 (4) 8

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

30 Given angle A, one of the base angles of an isosceles triangle. *On the answer sheet*, construct the vertex angle of the triangle.

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]

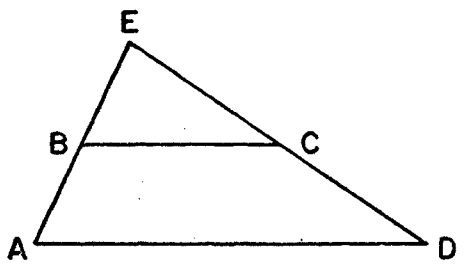
a The square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths of the legs.

OR

b 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.

32 If a parallelogram is not equilateral, prove that the bisectors of one pair of opposite angles are parallel. [10]

33 Given: Trapezoid $ABCD$, legs $\overline{AB}$ and $\overline{DC}$ are extended through B and C, respectively, and meet at point E.



Prove: $AE \times BC = BE \times AD$ [10]

34 In triangle ABC, the coordinates of the vertices are $A(-3,-2)$, $B(-1,6)$, and $C(7,4)$.

a Find the coordinates of midpoint D of $\overline{AB}$ and the midpoint E of $\overline{BC}$. [4]

b Show, by means of coordinate geometry, that $\overline{DE} \parallel \overline{AC}$, stating a reason for the conclusion. [6]

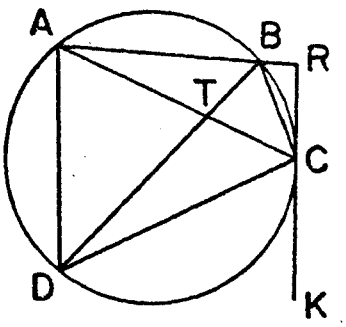
35 In right triangle ABC, in which angle C is the right angle, altitude $\overline{CD}$ drawn to the hypotenuse divides the hypotenuse so that $BD = 4$ and $DA = 9$.

a Find the length of $\overline{CD}$. [2]

b Using the result obtained in answer to *a*, find, to the *nearest degree*, the measure of angle CAB. [4]

c Find, to the *nearest integer*, the length of $\overline{BC}$. [4]

36 In the figure below, quadrilateral $ABCD$ is inscribed in a circle, diagonals $\overline{AC}$ and $\overline{DB}$ intersect at T, $\overline{AB}$ is extended through B to R, $\overleftrightarrow{RK}$ is tangent to the circle at C.



If $m\overset{\frown}{BC} = 42$, $m\overset{\frown}{AD} = 102$, and $m\overset{\frown}{AB} = 86$, find:

a $m\overset{\frown}{DC}$ [2]
b $m\angle ATD$ [2]
c $m\angle DCK$ [2]
d $m\angle ARK$ [2]
e $m\angle CBR$ [2]

*37 In quadrilateral $ABCD$, the coordinates of the vertices are $A(-7,-2)$, $B(-4,6)$, $C(11,10)$, and $D(2,-3)$.

a Using graph paper, draw quadrilateral $ABCD$. [1]

b Using slopes, show that the diagonals of the quadrilateral are perpendicular to each other, stating a reason for the conclusion. [4]

c Write an equation of the line through D parallel to the x-axis. [2]

d Write an equation of $\overleftrightarrow{BD}$. [3]

* 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	

FOR TEACHERS ONLY

10 TENTH YEAR MATHEMATICS

Tuesday, August 14, 1973 — 8:30 to 11:30 a.m., only

Just before the start of the examination period, distribute one examination booklet, face up, to each pupil. Instruct the pupils to read the directions on the cover of the examination booklets, detach the answer sheet and reference tables, and fill in the heading on their answer sheet. When each pupil has received a booklet and finished filling in the heading of the answer sheet, instruct the pupils to open their examination booklets and begin work.

Use only *red* ink or 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) 36

(2) 55

(3) 15

(4) 20

(5) 36

(6) 80 *or* 280

(7) 36

(8) 3

(9) 10

(10) 15

(11) 9π

(12) 8

(13) 20

(14) 31

(15) —3

(16) 2

(17) 2

(18) 3

(19) 1

(20) 2

(21) 4

(22) 3

(23) 1

(24) 2

(25) 2

(26) 2

(27) 3

(28) 1

(29) 4

[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* (—2,2), (3,5) [4]

(35) *a* 6 [2]
b 34 [4]
c 7 [4]

(36) *a* 130 [2]
b 72 [2]
c 65 [2]
d 95 [2]
e 64 [2]

(37) *c* $y = -3$ [2]
d $y = -\frac{3}{2}x$ [3]

DO YOU KNOW ...

... that practically all objective questions used on the Regents examinations have been "pretested" on a representative sample of students in New York State schools?

Over 6,000 questions in 16 subject areas were tried out in May 1972. These questions were assembled into 267 pretest forms that could be administered in a single classroom period. Some 53,000 students in 355 schools throughout New York State participated in this pretesting of questions for possible use in future Regents examinations.