REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Monday, January 26, 1970 — 1:15 to 4:15 p.m., only

The last page of the booklet is the answer sheet, which is perforated. Fold the last page along the perforation and then, slowly and carefully, tear off the answer sheet. Now fill in the heading of your answer sheet. When you have finished the heading, you may begin the examination immediately.

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.
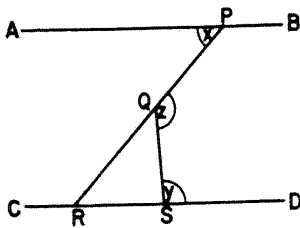
1 In $\triangle ABC$, an exterior angle at A measures 75 degrees. Name the longest side of $\triangle ABC$.

2 Radius $\overline{OE}$, diameter $\overline{CD}$, and chord $\overline{CE}$ are drawn in circle O as shown.
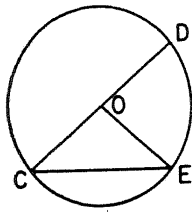
If the measure of angle E is 40, find the measure of angle DOE.

3 In the figure below, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and $\overline{PQR}$ and $\overline{QS}$ are drawn.

If m $\angle x = 47$ and m $\angle y = 94$, find the measure of angle z.

4 In parallelogram $ABCD$, the number of degrees in angle D is 30 less than twice the number of degrees in angle A. Find the number of degrees in angle A.

5 In an isosceles right triangle, the altitude to the hypotenuse is 4 inches. Find the number of inches in the length of the hypotenuse.

6 If the areas of two similar polygons are in the ratio $4:9$, what is the ratio of their perimeters?
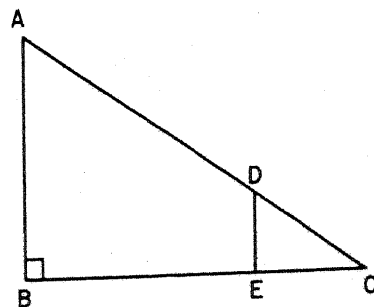
7 The length of the radius of a circle is 9 inches. Find the length of an arc intercepted by an angle of $80°$.

8 In parallelogram $ABCD$ the coordinates of A are $(4,5)$, and the coordinates of C are $(10,1)$. What are the coordinates of the point of intersection of the diagonals?

9 Find the length of one side of a square inscribed in a circle with a diameter of length 10.

10 The length of the bases of an isosceles trapezoid are 8 and 12, respectively. Each of the base angles measures $45°$. Find the length of the altitude of the trapezoid.

11 In the figure below, triangle ABC is a right triangle and $\overline{DE}$ is perpendicular to leg $\overline{BC}$.

If $AB = 12$, $DE = 4$, and $EC = 6$, find BE.

12 A chord 6 units in length is 4 units from the center of a circle. What is the length of the radius of the circle?

[OVER]

13 Write an equation of the locus of points equidistant from the points A (0,0) and B (0,6).

14 The perimeter of a regular hexagon is 12. Find the length of the diameter of the circle which circumscribes this hexagon.

15 In circle O, the area of sector AOB is 20π, and the angle of the sector contains $72°$. Find the length of the radius of the circle.

16 In right triangle ABC, altitude $\overline{CD}$ is drawn to the hypotenuse $\overline{AB}$. If $AB = 9$ and $DB = 4$, find CD.

17 In the figure below, $\overline{AB}$ is tangent to circle O, $\overline{AD}$ is tangent to circle O', and $\overline{AC}$ is a tangent common to both circles.
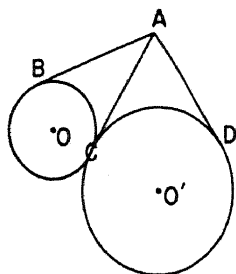
If $AB = 6r - 4$ and $AD = 2r + 8$, what is the value of r?

18 The length of the base of a rectangle is 9 and the length of a diagonal is 18. Find to the *nearest degree* the measure of the angle which this diagonal makes with the base.

19 In a certain regular polygon, the ratio of the number of degrees in an interior angle to the number of degrees in an exterior angle is $3:2$. How many sides has the polygon?

Directions (20-29): For *each* statement or question, write on the separate answer sheet the *number* preceding the word or expression that, of those given, best completes the statement or answers the question.

20 If the coordinates of point A are $(1,-2)$ and the coordinates of point B are $(-4,-5)$, the length of $\overline{AB}$ is
(1) 9
(2) $\sqrt{34}$
(3) $\sqrt{58}$
(4) $\sqrt{74}$

21 In the figure below, triangle ABC is isosceles with $AB = CB$.
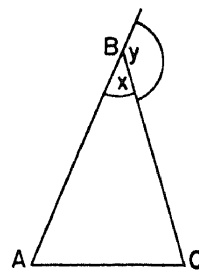
If x is the measure of the vertex angle B and y is the measure of the exterior angle at B, then the measure in degrees of each base angle of the triangle is
(1) $\frac{1}{2}y$
(2) $\frac{1}{2}x$
(3) $90 - y$
(4) $180 - x$

22 The lengths of the diagonals of a rhombus are 48 and 20. The length of a side of the rhombus is
(1) $10\sqrt{2}$
(2) 52
(3) $\sqrt{476}$
(4) 26

23 If the length and the width of a rectangle are both tripled, the ratio of the area of the original rectangle to the area of the enlarged rectangle is
(1) $1:3$
(2) $1:6$
(3) $1:9$
(4) $1:18$

24 The locus of points in a plane at a given distance d from a given line in that plane is
(1) one line
(2) two lines
(3) one circle
(4) two circles

25 Consider the three statements:
(a) The sum of the angles of a triangle is equal to one straight angle.
(b) If two angles of one triangle are equal to two angles of another triangle, the third angles are equal.
(c) If two parallel lines are cut by a transversal, the alternate interior angles are equal.

Which represents a common sequence for the proofs of these statements?
(1) a,b,c
(2) a,c,b
(3) b,a,c
(4) c,a,b

26 An example of a quadrilateral whose diagonals are equal but do not bisect each other is
(1) a regular hexagon
(2) an isosceles trapezoid
(3) a rhombus
(4) a rectangle

27 Given a quadrilateral *ABCD*. The locus of points equidistant from $\overleftrightarrow{AB}$ and $\overleftrightarrow{AD}$ must include point *C* if *ABCD* is a

(1) trapezoid
(2) rectangle
(3) parallelogram
(4) rhombus

28 The accompanying diagram shows the construction of a perpendicular to line *l* at point *M* on *l*. Which of the following is used in the proof of this construction to show that $\triangle AMN \cong \triangle BMN$?
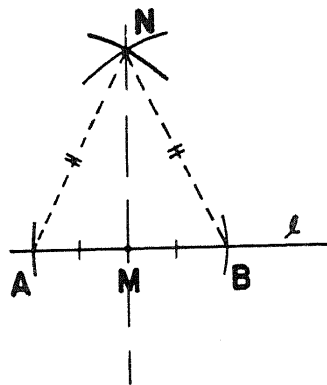
(1) Two right triangles are congruent if the hypotenuse and leg of one are congruent to the corresponding parts of the other.
(2) Two triangles are congruent if two angles and the included side on one are congruent to the corresponding parts of the other.
(3) Two triangles are congruent if the three sides of one are congruent to the three sides of the other.
(4) Two right triangles are congruent if the hypotenuse and an acute angle of one are congruent to the corresponding parts of the other.

29 The circumference of a circle is increased from 30π inches to 50π inches. By how many inches is the length of the radius *increased*?

(1) 10
(2) 15
(3) 20
(4) 25

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

30 *On the answer sheet*, construct and label the altitude $\overline{CD}$ from vertex *C* of triangle *ABC*.

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 If two angles of a triangle are equal, the sides opposite these angles are equal.

OR
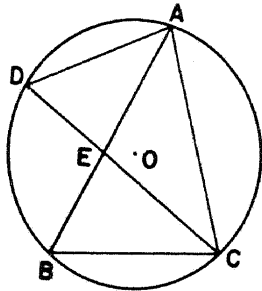
b The area of a trapezoid is equal to one-half the product of the altitude and the sum of the bases.

32 Given: $\overline{AX} \perp \overline{XY}$; $\overline{BY} \perp \overline{XY}$; M, the midpoint of $\overline{XY}$; $\overline{ARM}$, $\overline{BSM}$, $\overline{XR}$, and $\overline{YS}$ so that $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$
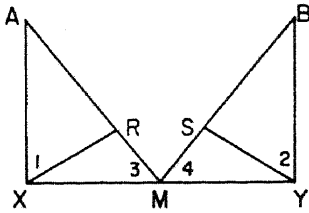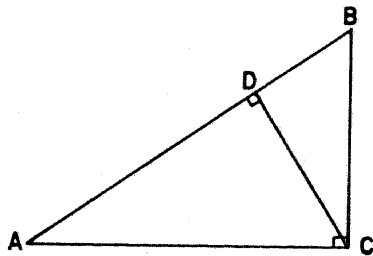

Prove: $\overline{AR} \cong \overline{BS}$ [10]

33 Chords are drawn in circle O as shown in the diagram below. Point B is the midpoint of arc CD.

a Prove: $\triangle ABC \sim \triangle ADE$ [7]
b If $AE = 8$, $EB = 7$, and $AC = 12$, find AD.   [3]

34 In right $\triangle ABC$ as shown in the diagram below, $AB = 17$ and m$\angle A = 22$. Altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$.

Find to the *nearest tenth:*
a AC [4]
b CD [6]

35 In circle O if $\overline{OBA}$ and $\overline{OC}$ are radii and $\overline{BC}$ is drawn, prove:
a $OB + BC > OA$ [5]
b $BC > BA$ [5]

36 In triangle ABC, the coordinates of B are $(-3,-2)$ and those of C are $(5,4)$. The midpoint of $\overline{AB}$ is M whose coordinates are $(-3,2)$.
Find the:

a coordinates of vertex A [2]
b coordinates of N, the midpoint of $\overline{BC}$ [2]
c length of $\overline{MN}$ [2]
d area of $\triangle MNC$ [4]

*37 The vertices of parallelogram $ABCD$ are A $(-2,4)$, B $(2,6)$, C $(7,2)$, and D $(k,0)$.

a Find the slope of $\overleftrightarrow{AB}$.   [2]

b Express the slope of $\overleftrightarrow{CD}$ in terms of k.   [2]
c Using the results obtained in answer to a and b, find the value of k.   [3]

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

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

The University of the State of New York

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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........................	9........................	17........................
2........................	10........................	18........................
3........................	11........................	19........................
4........................	12........................	20........................
5........................	13........................	21........................
6........................	14........................	22........................
7........................	15........................	23........................
8........................	16........................	24........................

Questions 25 through 30 should be answered on the back of this page.
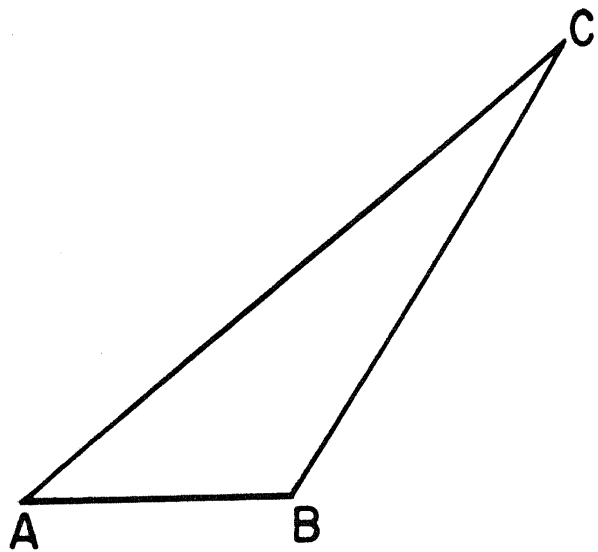
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25...........................

26...........................

27...........................

28...........................

29...........................

30

218

FOR TEACHERS ONLY

10

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.

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 20-29, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) *BC or a*

(2) 80

(3) 133

(4) 70

(5) 8

(6) 2:3

(7) 4π

(8) (7,3)

(9) $\sqrt{50}$ *or* $5\sqrt{2}$

(10) 2

(11) 12

(12) 5

(13) $y = 3$

(14) 4

(15) 10

(16) $\sqrt{20}$ *or* $2\sqrt{5}$

(17) 3

(18) 60

(19) 5

(20) 2

(21) 1

(22) 4

(23) 3

(24) 2

(25) 4

(26) 2

(27) 4

(28) 3

(29) 1

[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.

(33) *b* 10   [3]

(34) *a* 15.8   [4]
      5.9   [6]

(36) *a* (—3,6)   [2]
     b (1,1)   [2]
     c $\sqrt{17}$ [2]
     d 8   [4]

*(37) *a* $\frac{1}{2}$ [2]
     b $\dfrac{2}{7-k}$ [2]
     c 3   [3]
     d $y = \frac{1}{2}x - \frac{3}{2}$ [3]

DO YOU KNOW...

... that 400 classroom teachers were involved in preparing Regents examinations last year?

- Teachers wrote the questions.

- Other teachers assembled the examinations.

- Still other teachers reviewed the finished product.

And a committee of principals approved all of the examinations before they went to the printer.