# TENTH YEAR MATHEMATICS

Tuesday, June 16, 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 The diagonals of a rhombus are 10 inches and 24 inches, respectively. How many inches long is a side of this rhombus?
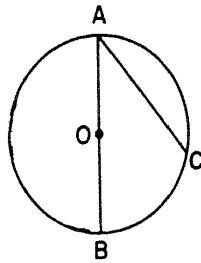
2 In the accompanying figure, angle A is formed by diameter $\overline{AB}$ and chord $\overline{AC}$. If $m\angle A = 40$, what is the measure of minor arc AC?

3 In triangle ABC, $\overline{AB} = \overline{BC}$. If the number of degrees in angle B is represented by x and the number of degrees in angle A is represented by $(2x - 30)$, find the value of x.

4 The bases of an isosceles trapezoid are 8 and 14, respectively, and a leg is 5. Find the altitude of the trapezoid.

5 In the accompanying figure, BD is the bisector of angle ABC, and $\overleftrightarrow{EF}$ is parallel to $\overleftrightarrow{BC}$.
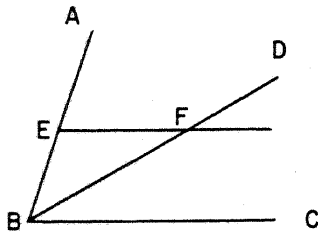

If $m\angle ABC$ is 70, find the measure of angle BFE.

6 The radii of two circles are in the ratio of $4:3$. If the area of the larger circle is 16π, what is the area of the smaller circle?

7 The coordinates of the endpoints of a diameter of circle O are $(2,5)$ and $(6,-1)$, respectively. What are the coordinates of point O?

8 In the accompanying figure, $\overline{AD}$ is perpendicular to $\overline{DC}$ in $\triangle ADC$, and $\overline{EF}$ is perpendicular to $\overline{AD}$ at E.

If $DC = 8$, $AD = 12$, and $AE = 6$, find EF.
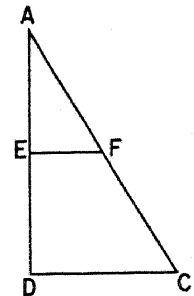
9 The area of an equilateral triangle is $9\sqrt{3}$. Find a side of the triangle.

10 Two chords, $\overline{AB}$ and $\overline{CD}$, intersect inside circle O at point E. The length of AE is 6, and the length of EB is 8. If CE is represented by x and ED by $3x$, find the value of x.

11 What is the area of a square whose diagonal is 6?

12 An exterior angle at the base of an isosceles triangle contains $110°$. How many degrees are in the measure of the vertex angle of the triangle?

13 The side of a regular pentagon is 4 and the apothem is represented by a. Express the area of the pentagon in terms of a.

14 The coordines of A are $(-4,-3)$, and the coordinates of C are $(-2,6)$. Find AC.

15 Two tangents to a circle from an external point intercept a major arc of 280° on the circle. Find the number of degrees in the angle formed by the two tangents.

16 In a circle whose radius is 12, the area of a sector is 24π. Find the number of degrees in the central angle of the sector.

17 In the accompanying figure, $\overline{AB}$ is a tangent to circle O, and $\overline{ACD}$ is a secant.
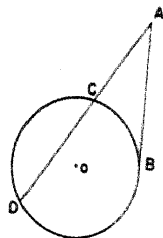
If $AB = 6$ and $AC = 4$, find AD.

Directions (18-29): 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.

18 If each interior angle of a regular polygon contains 150°, how many sides has the polygon?
(1) 12
(2) 9
(3) 3
(4) 6

19 If the midpoints of the sides of any quadrilateral are joined in order, the resulting quadrilateral must be a
(1) rhombus
(2) rectangle
(3) square
(4) parallelogram

20 Two radii of a circle, $\overline{OA}$ and $\overline{OB}$, are perpendicular to each other and chord $\overline{AB}$ is drawn. If AB is 10, the length of the radius of the circle is
(1) 5
(2) 10
(3) $5\sqrt{2}$
(4) $10\sqrt{2}$

21 On $\overline{ABC}$ and $\overline{DEF}$, $\overline{AB} \cong \overline{DE}$ and $\overline{BC} \cong \overline{EF}$. It follows that
(1) $AB + DE = BC + EF$
(2) $AB \times EF = BC \times DE$
(3) $AB - BC = EF - DE$
(4) $\overline{AD} \cong \overline{CF}$

22 If the altitude to the hypotenuse of a right triangle is 8, the segments of the hypotenuse formed by the altitude may be
(1) 8 and 12
(2) 2 and 32
(3) 3 and 24
(4) 6 and 8

23 If for two given circles only two common tangents are possible, the circles
(1) intersect in two points
(2) are concentric
(3) are tangent internally
(4) are tangent externally

24 If a square and rhombus have equal areas, which statement must be true?
(1) The square of a side of the square equals the square of a side of the rhombus.
(2) The product of the diagonals of the square equals the product of the diagonals of the rhombus.
(3) The sum of the sides of the square equals the sum of the sides of the rhombus.
(4) The sum of the diagonals of the square equals the sum of the diagonals of the rhombus.

25 It is *not* possible for the lengths of the sides of a triangle to be
(1) 3, 3, 2
(2) 4, 3, 2
(3) 5, 4, 2
(4) 6, 3, 2

26 An equation of the locus of points which are at a distance of 5 units from the origin is
(1) $x = 5$
(2) $y = 5$
(3) $x^2 + y^2 = 5$
(4) $x^2 + y^2 = 25$

27 If the lengths of the sides of a triangle are 3, 4, and 5, respectively, the value of the tangent of the smallest angle is
(1) $\dfrac{3}{5}$
(2) $\dfrac{3}{4}$
(3) $\dfrac{4}{5}$
(4) $\dfrac{4}{3}$

28 If each of the statements $AB < CD$ and $AB = CD$ leads to a contradiction, then $AB > CD$. This type of reasoning is referred to as
(1) inductive
(2) indirect
(3) direct
(4) deductive

Directions (29–30): Leave all construction lines on the answer sheet.

29 Given $\triangle ABC$ with P on side $\overline{AC}$. On the answer sheet, construct a line through point P parallel to $\overline{AB}$.

30 *On the answer sheet*, locate by construction and label the midpoint M of minor arc AB in circle O.

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 A diameter perpendicular to a chord of a circle bisects the chord and its arcs.

OR

 b An angle inscribed in a circle is measured by one-half its intercepted arc. [Consider only the case where one side of the angle is a diameter.]

32 In the accompanying figure, $\overline{CM}$ is the median to side $\overline{AB}$ of triangle ABC. $\overline{AE}$ and $\overline{BF}$ are perpendicular to $\overleftrightarrow{CM}$, and $\overline{AF}$ and $\overline{BE}$ are drawn.
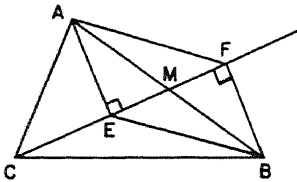
Prove: $AEBF$ is a parallelogram.   [10]

33 Secants $\overline{PAB}$ and $\overline{PCD}$ are drawn to a circle from external point P so that m $\angle P = 20$ and m $\angle ADC = 10$. If $m\widehat{AC}$ is represented by $(3x + y)$ and $m\widehat{BD}$ by $(8x + 4y)$:

 a write a pair of equations which can be used to solve for x and y [4]
 b solve these equations to find values for x and y [4]
 c find m $\angle BAD$ [2]

34 Given quadrilateral $ABCD$ with vertices at A (—3,0), B (9,0), C (9,9), and D (0,12). If diagonal $\overline{AC}$ is drawn, find the:

 a length of AB [1]
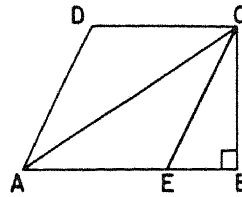 b length of BC [1]
 c measure of angle BAC to the nearest degree   [2]
 d length of diagonal $\overline{AC}$ [2]
 e area of quadrilateral $ABCD$ [4]

35 In the accompanying figure, $AECD$ is a rhombus and $\overline{CB} \perp \overleftrightarrow{AE}$ at B.

If $AC = 24$ and m $\angle CAB = 30$, find the:

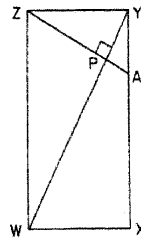 a length of BC [2]
 b measure of $\angle CEB$ [2]
 c length of CE [2]
 d area of $ABCD$ [4]

36 Given rectangle $WXYZ$ with A a point on $\overline{XY}$ such that $\overline{WY}$ intersects $\overline{ZA}$ at point P and $\overline{WY} \perp \overline{ZA}$.

Prove: a $\triangle WPZ \sim \triangle WZY$ [3]
   b $\triangle WPZ \sim \triangle YPA$ [3]
   c $\dfrac{YP}{WZ} = \dfrac{YA}{WY}$ [4]

*37 Given trapezoid $ABCD$ with bases $\overline{AB}$ and $\overline{DC}$ and vertices at A (0,0), B (10,10), C (k,10), and D (0,6).

 a Find the slope of $\overleftrightarrow{AB}$.   [2]
 b Find the value of k.   [3]
 c Using the value of k obtained in answer to b, show by coordinate geometry that the median of the trapezoid is equal to one-half the sum of the bases.   [5]

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

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Tuesday, June 16, 1970 — 1:15 to 4:15 p.m., only

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.

25. . . . .

26. . . . .

27. . . . .

28. . . . .
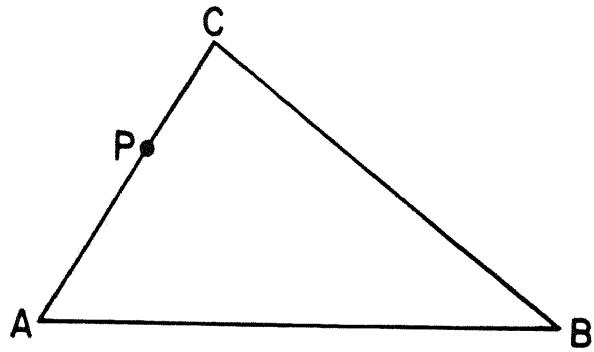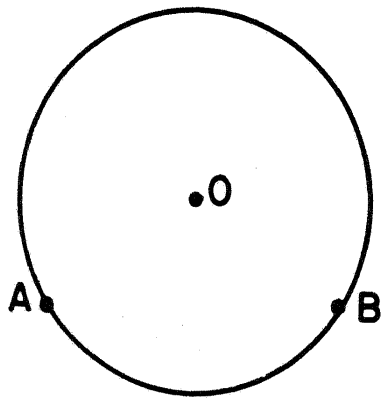
29

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FOR TEACHERS ONLY

10

SCORING KEY
TENTH YEAR MATHEMATICS
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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 18–28, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3, or 4.

(1) 13	(10) 4	(19) 4
(2) 100	(11) 18	(20) 3
(3) 48	(12) 40	(21) 2
(4) 4	(13) $10a$	(22) 2
(5) 35	(14) $\sqrt{85}$	(23) 1
(6) 9π	(15) 100	(24) 2
(7) (4,2)	(16) 60	(25) 4
(8) 4	(17) 9	(26) 4
(9) 6	(18) 1	(27) 2
		(28) 2

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) a $10 = \frac{1}{2}(3x + y)$
     $20 = \frac{1}{2}(5x + 3y)$ [4]

   b $x = 5, y = 5$ [4]
   c 30   [2]

(34) a 12   [1]
   b 9   [1]
   c 37   [2]
   d 15   [2]
   e $112\frac{1}{2}$ [4]

(35) a 12   [2]
   b 60   [2]
   c $8\sqrt{3}$ [2]
   d $120\sqrt{3}$ [4]

(37) a 1   [2]
   b 4   [3]

DO YOU KNOW . . .

   . . . that most questions used on Regents examinations have been tried out in advance in representative classrooms throughout the State?

   Each year more than 40,000 pupils in about 300 schools " pretest " questions intended for use in future Regents examinations. When committees of classroom teachers meet to assemble Regents examinations, the information obtained from this pretesting is to aid them in determining which questions are appropriate, which questions need revision, and which questions should be eliminated.

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ERRATA SHEET

At the start of the examination in Tenth Year Mathematics, please inform your pupils, either orally or by writing the correction on the chalk board, that the word "coordines" in question 14 on page 1 should read "coordinates."