TENTH YEAR MATHEMATICS

Wednesday, January 26, 1983 — 1:15 to 4:15 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**

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

1 In the accompanying diagram, $\overline{PA}$ is tangent to circle O at A and $\overline{PB}$ is tangent to circle O at B. If $PA = 10$ and $OA = 5$, find the perimeter of quadrilateral $PBOA$.
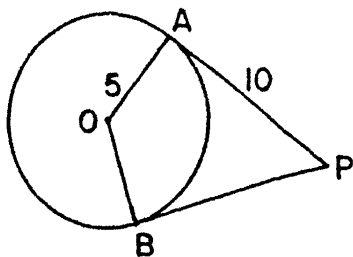
2 If each exterior angle of a regular polygon measures $40°$, how many sides does the polygon have?

3 In the accompanying diagram of quadrilateral $ABCD$, $m\angle A = 120$, $m\angle B = 82$, and $m\angle D = 93$. Find $m\angle C$.
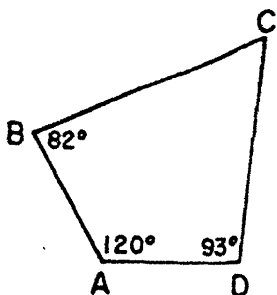
4 In $\triangle ABC$, D is a point on $\overline{AC}$ and E is a point on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AB}$. If $CD = 3$, $CA = 12$, and $CB = 16$, find CE.

5 The lengths of the bases of a trapezoid are 6 and 10. Find the length of the median of the trapezoid.

6 The number of degrees in the measure of ea of a pair of vertical angles formed by two inte secting lines is represented by $2x$ and $3x - 7$ Find the value of x.

7 In rectangle $ABCD$, $BC = 12$ and $CD = 1$ Find BD.

8 In isosceles triangle ABC, $\overline{AB} \cong \overline{BC}$ and $m\angle B = 40$. What is the number of degrees in the measure of an exterior angle vertex C?

9 The diameter of a circle is 6. Express the are of the circle in terms of π.

10 What is the area of a rhombus whose diagonal have lengths 5 and 10?

11 In the accompanying figure, right triangle ABC with $m\angle C = 90$ is inscribed in circle O. If th length of the radius of the circle is 10 an. $m\angle B = 30$, find the length of $\overline{AC}$.
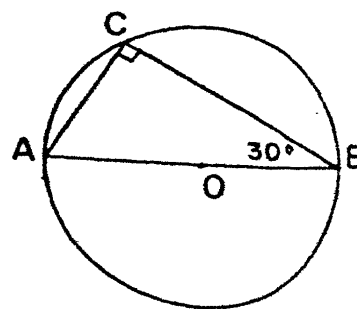

12 What positive number is the mean proportion. between 4 and 9?

13 As shown in the accompanying diagram of circle O, chord $\overline{AB}$ is parallel to chord $\overline{CD}$ and chords $\overline{AD}$ and $\overline{BC}$ intersect at K. If $m\widehat{AB} = 80$ and $m\widehat{CD} = 160$, find $m\angle AKB$.

80°
A
B
K
.O
D
C
160°
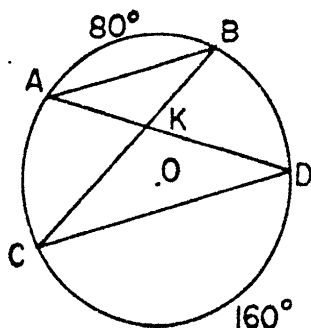
14 In the accompanying figure, two parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are cut by transversal $\overleftrightarrow{EF}$ intersecting $\overleftrightarrow{AB}$ in G and $\overleftrightarrow{CD}$ in H. If $m\angle BGH = (2x + 10)$ and $m\angle GHD = (3x - 20)$, find the value of x.

E
A   G   B
       2X+10
C   3X-20   D
       H
       F
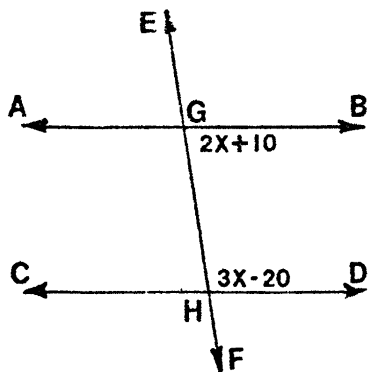
Directions (15–29): Write in the space provided on the separate answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

15 Which statement is *always* true?
(1) A rhombus is a square.
(2) A rectangle is a parallelogram.
(3) A parallelogram is a square.
(4) A parallelogram is a rectangle.

16 In the accompanying diagram, $ABCD$ is a trapezoid with $\overline{BC} \parallel \overline{AD}$ and altitude $\overline{BE}$. If $BC = 7$, $BE = 4$, and $AD = 12$, what is the area of $ABCD$?

B   7   C
   4
A   E   D
|———— 12 ————|
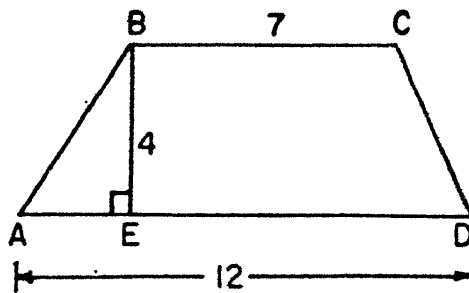
(1) 23   (3) 76
(2) 38   (4) 336

17 Two sides of a triangle have lengths of 3 centimeters and 4 centimeters. Which can *not* be the length of the third side of the triangle?
(1) 1 cm   (3) 3 cm
(2) 2 cm   (4) 4 cm

18 The lengths of the three sides of a triangle are 6, 8, and 10. If the perimeter of a similar triangle is 72, what is the length of the *shortest* side of the second triangle?
(1) 54   (3) 18
(2) 24   (4) 12

19 The three medians of a right triangle meet at a point which lies
(1) inside the triangle
(2) at the midpoint of the hypotenuse of the triangle
(3) at a vertex of the triangle
(4) outside the triangle

20 Which statement is *not* always true for parallelograms?
(1) The opposite sides are congruent.
(2) Opposite angles are congruent.
(3) Consecutive angles are supplementary.
(4) The diagonals are perpendicular.

21 The slope of the straight line that passes through the points $(0,1)$ and $(5,4)$ is

(1) $-\frac{3}{5}$ (3) $\frac{5}{3}$

(2) $\frac{3}{5}$ (4) $-\frac{5}{3}$

22 Point $M(4,0)$ is equidistant from points A and B. If the coordinates of A are $(4,3)$, the coordinates of B are

(1) $(-4,3)$ (3) $(-3,4)$
(2) $(-4,-3)$ (4) $(4,-3)$

23 In the accompanying figure, triangle ABC is a right triangle with m$\angle C = 90$ and m$\angle A = 45$. Which statement is true about the value of tan A?
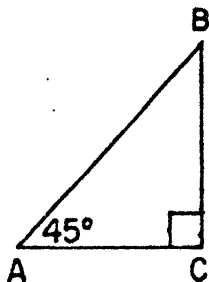
(1) Tan A is greater than sin A.
(2) Tan A is equal to cos A.
(3) Tan A is less than sin A.
(4) Tan A is less than cos A.

24 Which is an equation of the line that passes through the point $(0,0)$ and has a slope of $-\frac{2}{3}$?

(1) $y = -\frac{3}{2}x$ (3) $y = \frac{2}{3}x$

(2) $y = -\frac{2}{3}x$ (4) $y = \frac{3}{2}x$

25 The area of a triangle is 42. If the length of base is 14, what is the length of the altit_ drawn to this base?
(1) 12   (3) 3
(2) 8   (4) 6

26 Given the true statement: "In a regular h agon, a diagonal is longer than a side." Wh: statement is also true?
(1) If a diagonal is longer than a side, the fig: is a regular hexagon.
(2) If the figure is not a hexagon, a diagona! not longer than a side.
(3) If a diagonal is not longer than a side, t figure is not a regular hexagon.
(4) If a diagonal is not longer than a side, t figure is a regular hexagon.

27 What is the distance between the points whc coordinates are $(3,-2)$ and $(-4,5)$?
(1) $5\sqrt{2}$ (3) $\sqrt{10}$
(2) $7\sqrt{2}$ (4) 14

28 What is the locus of points in a plane that are centimeters from the y-axis?
(1) one point   (3) one line
(2) one circle   (4) two lines

29 Circles O and O' are tangent externally. Th maximum number of common tangents th. they may have is
(1) 1   (3) 3
(2) 2   (4) 4

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

30 On the answer sheet, construct a line perpen dicular to line n and containing point P.

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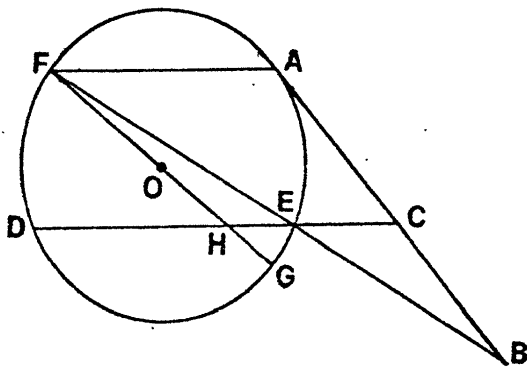
31 Prove *either* a or b but *not* both.

a The sum of the measures of the angles of a triangle is 180 degrees. [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: circle O, chord $\overline{AF}$, tangent $\overline{BCA}$, secants $\overline{BEF}$ and $\overleftrightarrow{CEHD}$, $\overleftrightarrow{AF} \parallel \overleftrightarrow{DC}$, diameter $\overline{FOHG}$, and $m\widehat{FA}:m\widehat{AE}:m\widehat{EG} = 5:3:1$.

Find: a $m\widehat{EG}$ [2]

b $m\widehat{FD}$ [2]

c $m\angle AFG$ [2]

d $m\angle ACD$ [2]

e $m\angle DHF$ [2]

33 In the accompanying diagram, $\triangle LRS$ is inscribed in circle O. The length of diameter $\overline{LOS}$ is 10. Altitude $\overline{RP}$ is drawn so that $PO = 3$.
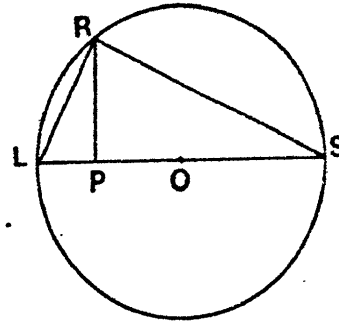
a Find $m\angle LRS$. [2]
b Find RP. [3]
c Using the result from part b, find
(1) $m\angle L$ to the *nearest degree* [3]
(2) $m\angle PRS$ to the *nearest degree* [2]

34 Given: $\triangle ABC$ and $\triangle BCD$ are inscribed in circle O, $\overline{BD}$ intersects $\overline{AC}$ at E, and $\widehat{AB} \cong \widehat{CD}$.
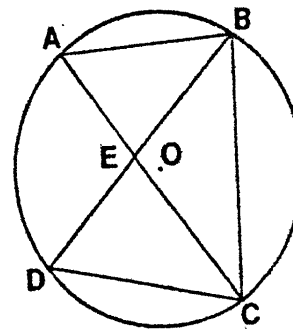
Prove: a $\triangle ABE \cong \triangle DCE$ [5]
b $\triangle ABC \cong \triangle DCB$ [5]

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35 Given: $\overline{AC}$ is tangent to circle O at A, $\overline{BD}$ is a diameter, chord $\overline{AB}$ is drawn, and $\overline{BC} \perp \overline{AC}$.
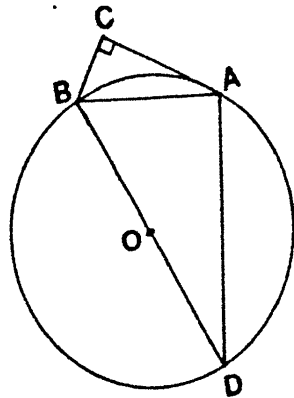
Prove: $(AB)^2 = BD \times BC$ [10]

36 Given: right triangle ABC, $\angle BCA$ the right angle, point E on $\overline{AB}$ such that $CE > BC$.
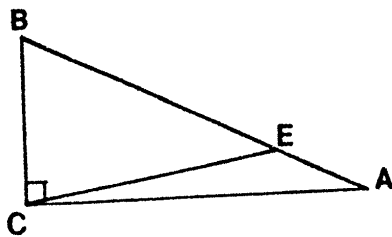
Prove: $\overline{BC}$ is *not* congruent to $\overline{AC}$.   [10]

*37 The vertices of a triangle are $A(-3,7)$, $B(2,$ and $C(11,3)$. Show, by means of coord geometry, that triangle ABC is an isos right triangle and state reasons for your co sions.   [10]

* This question is based on an optional to 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	

TENTH YEAR MATHEMATICS

Wednesday, January 26, 1983 — 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....................	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.

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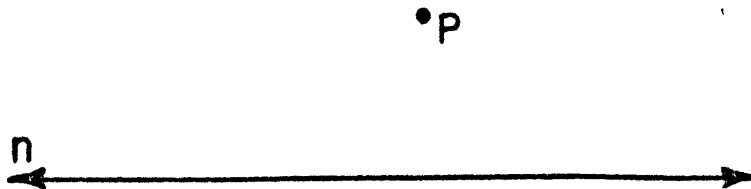
Your answers for Part II should be placed on paper provided by the school.

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

SCORING KEY

10

TENTH YEAR MATHEMATICS

Wednesday, January 26, 1983 — 1:15 to 4:15 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) 30	(11) 10	(21) 2
(2) 9	(12) 6	(22) 4
(3) 65	(13) 120	(23) 1
(4) 4	(14) 38	(24) 2
(5) 8	(15) 2	(25) 4
(6) 75	(16) 2	(26) 3
(7) 20	(17) 1	(27) 2
(8) 110	(18) 3	(28) 4
(9) 9π	(19) 1	(29) 3
(10) 25	(20) 4	(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* 20   [2]
    b 60   [2]
    c 40   [2]
    d 50   [2]
    e 40   [2]

(33) *a* 90   [2]
    b 4   [3]
    c (1) 63   [3]
       (2) 63   [2]