

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

TENTH YEAR MATHEMATICS

Thursday, January 24, 1980 — 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.

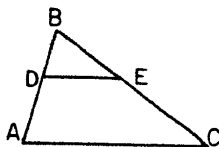
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during 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

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.

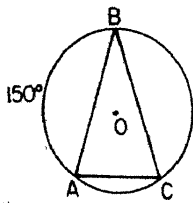
- 1 In the accompanying diagram, $\triangle ABC$, D is a point on \overline{BA} , and E is a point on \overline{BC} such that $\overline{DE} \parallel \overline{AC}$. If $BD = 4$, $BA = 10$, and $BC = 20$, what is the length of \overline{BE} ?



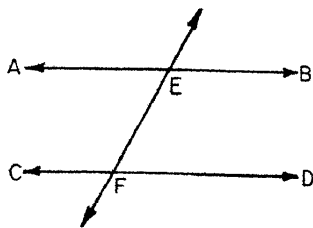
- 2 In parallelogram $ABCD$, $AB = 5x - 4$ and $CD = 2x + 14$. Find the value of x .

- 3 Quadrilateral $ABCD$ is a rectangle. The coordinates of A , B , and C are $A(5,0)$, $B(0,0)$, $C(0,-6)$. What are the coordinates of point D ?

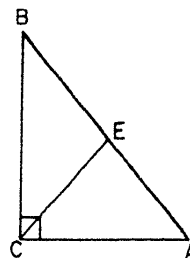
- 4 In the accompanying diagram, isosceles triangle ABC is inscribed in circle O . If $\overline{AB} \cong \overline{BC}$ and $m\widehat{AB} = 150$, find $m\angle B$.



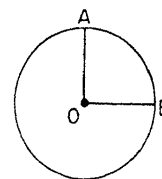
- 5 In the accompanying diagram, \overleftrightarrow{AB} is parallel to \overleftrightarrow{CD} and both lines are intersected by transversal \overleftrightarrow{EF} . If $m\angle BEF$ is twice $m\angle DFE$, find $m\angle DFE$.



- 6 In the accompanying diagram, triangle ABC is a right triangle, \overline{CE} is the median to hypotenuse \overline{AB} , and $AB = 14$. Find CE .

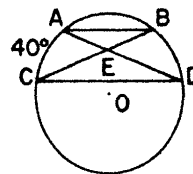


- 7 In the accompanying diagram, circle O , radii \overline{OA} and \overline{OB} , $OA = 4$, and $m\angle AOB = 90$. Express the length of \widehat{AB} in terms of π .



- 8 In parallelogram $ABCD$, $m\angle A = 3x$ and $m\angle B = x + 40$. What is the value of x ?

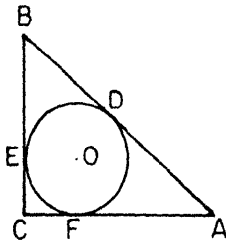
- 9 In the accompanying diagram, circle O , chord $\overline{AB} \parallel$ chord \overline{CD} , and $m\widehat{AC} = 40$. Chords \overline{AD} and \overline{BC} intersect at E . Find $m\angle AEC$.



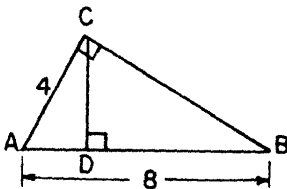
- 10 If the sum of the measures of the interior angles of a polygon equals the sum of the measures of the exterior angles, how many sides does the polygon have?

- 11 Two rectangles are equal in area. The lengths of the base and altitude of the first rectangle are 8 inches and 5 inches, respectively. If the length of the base of the second rectangle is 10 inches, what is the length, in inches, of its altitude?

- 12 In the accompanying figure, \overline{AB} , \overline{BC} , and \overline{AC} are tangent to circle O at points D , E , and F , respectively. If $AF = 5$ and $BE = 4$, find the length of \overline{AB} .



- 13 Express in radical form the length of an altitude of an equilateral triangle whose side has length 10.
- 14 Point M is the midpoint of \overline{CD} . The coordinates of C are $(5, -3)$ and the coordinates of M are $(5, 7)$. What are the coordinates of D ?
- 15 The area of a rhombus is 27. If the length of its shorter diagonal is 6, what is the length of its longer diagonal?
- 16 Find the slope of the line which passes through the points whose coordinates are $(-2, 5)$ and $(3, 9)$.
- 17 In the accompanying diagram, $\triangle ABC$ is a right triangle with right angle at C and $\overline{CD} \perp \overline{AB}$ at D . If $AB = 8$ and $AC = 4$, find AD .



Directions (18–29): Write in the space provided on the separate answer sheet the numeral preceding the expression that best completes each statement or answers each question.

- 18 The sides of a triangle have lengths 6, 8, and 10. What is the length of the *shortest* side of a similar triangle that has a perimeter of 12?
- (1) 6 (3) 3
(2) 8 (4) 4
- 19 The measures of the angles of a triangle are in the ratio of 2:3:4. The measure in degrees of the *smallest* angle of the triangle is
- (1) 20 (3) 60
(2) 40 (4) 80

- 20 In parallelogram $ABCD$, diagonals \overline{AC} and \overline{DB} intersect at E . Which statement is *always* true?
- (1) Triangle AED is isosceles.
(2) Triangle ABD is a right triangle.
(3) Triangle AEB is congruent to triangle AED .
(4) Triangle ABC is congruent to triangle CDA .

- 21 Which set of numbers could represent the lengths of the sides of a triangle?
- (1) $\{1, 2, 3\}$ (3) $\{3, 5, 7\}$
(2) $\{2, 4, 6\}$ (4) $\{5, 10, 20\}$

- 22 The lengths of the sides of a rectangle are 3 and 8. The length of a diagonal of the rectangle is
- (1) $\sqrt{55}$ (3) $\sqrt{75}$
(2) $\sqrt{73}$ (4) 11

- 23 Triangle ABC is inscribed in circle O . If the center of the circle is a point on \overline{AB} , then triangle ABC must be

- (1) acute (3) right
(2) obtuse (4) isosceles

- 24 The coordinates of the endpoints of a diameter of a circle are $(1, 1)$ and $(7, 9)$. The length of a radius of the circle is
- (1) 5 (3) 8
(2) 2 (4) 15

- 25 In $\triangle ABC$, if $m\angle C = 90$, then $\tan A$ is equal to

- (1) $\frac{AB}{AC}$ (3) $\frac{BC}{AB}$
(2) $\frac{AC}{AB}$ (4) $\frac{BC}{AC}$

- 26 What is the area of a circle whose circumference is 16π ?

- (1) 64π (3) 8π
(2) 16π (4) 4π

- 27 Parallel lines l and m are 4 centimeters apart and P is a point on line l . The total number of points that are equidistant from l and m and also 2 centimeters from point P is

- (1) 1 (3) 3
(2) 2 (4) 0

- 28 Which statement about the diagonals of an isosceles trapezoid is *always* true?

- (1) They bisect each other.
(2) They are congruent.
(3) They are perpendicular to each other.
(4) They divide the trapezoid into four congruent triangles.

29 Assume that the statement, "All geniuses have studied geometry," is true. Which statement must also be true?

- (1) Ron has studied geometry; therefore, Ron is a genius.
- (2) Mary is not a genius; therefore, Mary has not studied geometry.
- (3) Lance has not studied geometry; therefore, Lance is not a genius.
- (4) If Lucy studies geometry, Lucy is a genius.

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

30 *On the answer sheet,* locate by construction the center of the circle which can be circumscribed about triangle PQR .

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*.

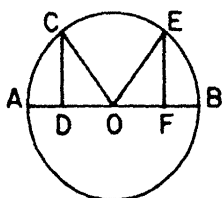
a If two sides of a triangle are congruent, the angles opposite these sides are congruent. [10]

OR

b The measure of an angle formed by two chords intersecting inside the circle is equal to one-half the sum of the measures of the intercepted arcs. [10]

32 Given: circle O , diameter \overline{ADOFB} , arc \overline{ACEB} ,

$\overline{AD} \cong \overline{BF}$, $\overline{CD} \perp \overline{AB}$, and $\overline{EF} \perp \overline{AB}$.



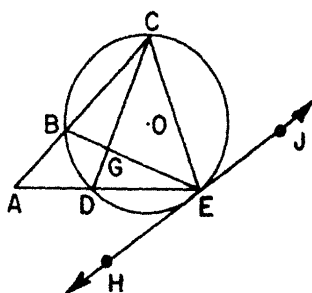
Prove: $\widehat{AC} \cong \widehat{EB}$ [10]

33 Given: circle O with secants \overline{ABC} and \overline{ADE} , chord \overline{EC} ,

chords \overline{BE} and \overline{CD} intersect at G , \overleftrightarrow{HJ} tangent at E ,

$m\widehat{CE} = 150$, $m\widehat{BD} = 40$, $m\widehat{BC} = 3x$, and

$m\widehat{DE} = 2x$.



Find:

a x [2]

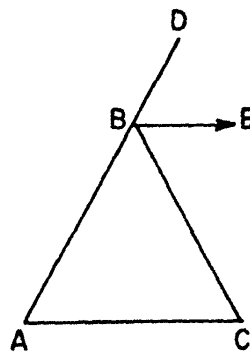
b $m\angle A$ [2]

c $m\angle CGE$ [2]

d $m\angle AEH$ [2]

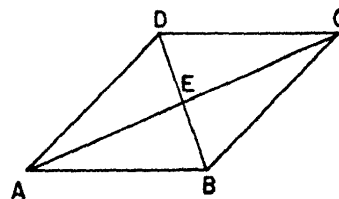
e $m\angle BCE$ [2]

34 Given: $\triangle ABC$, \overline{ABD} , \overrightarrow{BE} bisects $\angle CBD$, $\overleftrightarrow{BE} \parallel \overleftrightarrow{AC}$.



Prove: $\overline{AB} \cong \overline{BC}$ [10]

35 Given: rhombus $ABCD$ with diagonals \overline{BD} and \overline{AC} intersecting at E , $AB = 13$, and $AC = 24$.



Find:

a BD [3]

b area of rhombus $ABCD$ [2]

c $m\angle EAB$ to the nearest degree [5]

36 The vertices of triangle ABC are $A(4,4)$, $B(12,10)$, and $C(6,13)$.

a Show that $\triangle ABC$ is *not* equilateral. [4]

b Find the area of $\triangle ABC$. [6]

37 The coordinates of the vertices of quadrilateral $ABCD$ are $A(-4,0)$, $B(6,0)$, $C(8,5)$, and $D(-2,5)$.

a Show by means of coordinate geometry that quadrilateral $ABCD$ is a parallelogram and state a reason for your conclusion. [6]

b Find the length of the altitude from D to \overline{AB} . [2]

c Find the area of $ABCD$. [2]

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, January 24, 1980 — 1:15 to 4:15 p.m., only

Part I Score:
Rater's Initials:

ANSWER SHEET

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

School.....

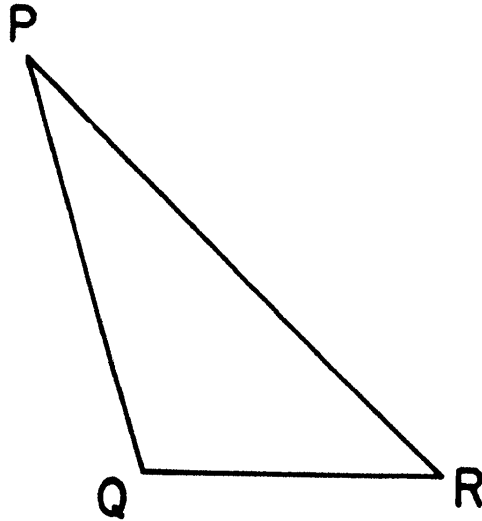
Name and author of textbook used.....

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, January 24, 1980 — 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 18–29, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

- | | | |
|--|---|--------|
| (1) 8 | (11) 4 | (21) 3 |
| (2) 6 | (12) 9 | (22) 2 |
| (3) $(5, -6)$ or $\begin{matrix} x = 5 \\ y = -6 \end{matrix}$ | (13) $5\sqrt{3}$ or $\sqrt{75}$ | (23) 3 |
| (4) 30 | (14) $(5, 17)$ or $\begin{matrix} x = 5 \\ y = 17 \end{matrix}$ | (24) 1 |
| (5) 60 | (15) 9 | (25) 4 |
| (6) 7 | (16) $\frac{4}{5}$ | (26) 1 |
| (7) 2π | (17) 2 | (27) 1 |
| (8) 35 | (18) 3 | (28) 2 |
| (9) 40 | (19) 2 | (29) 3 |
| (10) 4 | (20) 4 | |

[OVER]

TENTH YEAR MATHEMATICS — *concluded*

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* 34 [2]
b 55 [2]
c 95 [2]
d 34 [2]
e 54 [2]

(36) *b* 30 [6]

(37) *b* 5 [2]
c 50 [2]

(35) *a* 10 [3]
b 120 [2]
c 23 [5]