

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Friday, June 16, 1995 – 9:15 a.m. to 12:15 p.m., only

Notice . . .

Calculators must be available to all students taking this examination.

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.

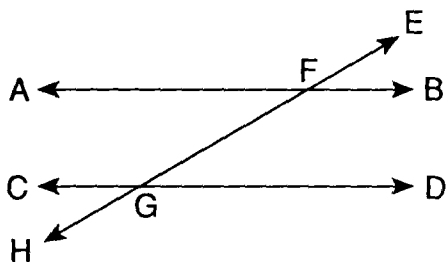
When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during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

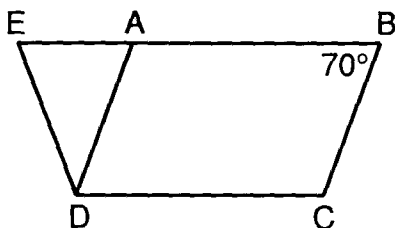
Part I

Answer 30 questions from this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet. Where applicable, answers may be left in terms of π or in radical form. [60]

- 1 In the accompanying diagram, \overleftrightarrow{AB} is parallel to \overleftrightarrow{CD} , and transversal \overleftrightarrow{EH} intersects \overleftrightarrow{AB} and \overleftrightarrow{CD} at F and G , respectively. If $m\angle AFG = 2x + 10$ and $m\angle FGD = x + 20$, find the value of x .



- 2 In the accompanying diagram, $ABCD$ is a parallelogram, $\overline{DA} \cong \overline{DE}$, and $m\angle B = 70$. Find $m\angle E$.

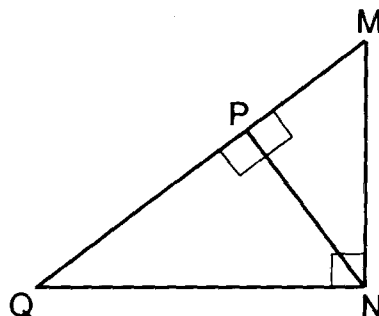


- 3 In $\triangle ABC$, $m\angle A = 35$ and $m\angle C = 77$. Which is the longest side of the triangle?
- 4 The sides of a triangle measure 6, 8, and 10. The shortest side of a similar triangle is 15. Find the perimeter of the larger triangle.
- 5 Rectangle $PROM$ has coordinates $P(2,1)$, $R(8,1)$, $O(8,5)$, and $M(2,5)$. What are the coordinates of the point of intersection of the diagonals?

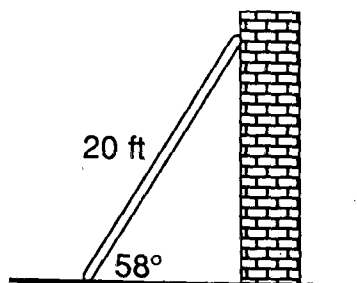
- 6 Find, to the nearest tenth, the distance between points $(1,3)$ and $(-2,0)$.

- 7 Solve for x : $\frac{2x - 4}{3} = \frac{3x + 4}{2}$

- 8 In the accompanying diagram of right triangle MNQ , \overline{NP} is the altitude to hypotenuse \overline{MQ} . If $QP = 16$ and $PM = 9$, find the length of \overline{NP} .



- 9 How many distinct five-letter permutations can be formed using the letters of the word "GAUSS"?
- 10 Under a translation, the image of point $(3,2)$ is $(-1,3)$. What are the coordinates of the image of point $(-2,6)$ under the same translation?
- 11 In $\triangle BAT$, M is the midpoint of \overline{BA} and N is the midpoint of \overline{BT} . If $AT = 3x + 12$ and $MN = 15$, find x .
- 12 How many different bowling teams of five persons can be formed from a group of ten persons?
- 13 A 20-foot ladder is leaning against a wall. The foot of the ladder makes an angle of 58° with the ground. Find, to the nearest foot, the vertical distance from the top of the ladder to the ground.



14 In quadrilateral $ABCD$, $m\angle A = 57$, $m\angle B = 65$, and $m\angle C = 118$. What is the measure of an exterior angle at D ?

15 Under a dilation with constant of dilation k , the image of the point $(2,3)$ is $(8,12)$. What is the value of k ?

Directions (16–34): For each question chosen, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question.

16 An equation of the line that passes through point $(0,3)$ and whose slope is -2 is

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

17 Given: $p \rightarrow q$
 $\frac{p}{\therefore q}$

What is this argument called?

- (1) DeMorgan's Law
 (2) Law of Detachment
 (3) Law of Disjunctive Inference
 (4) Law of Contrapositive

18 If $x \clubsuit y = \frac{x^2 - 2xy + y^2}{x - y}$ defines the binary

operation \clubsuit , what is the value of $5 \clubsuit 3$?

- (1) 1 (3) 9
 (2) 2 (4) 32

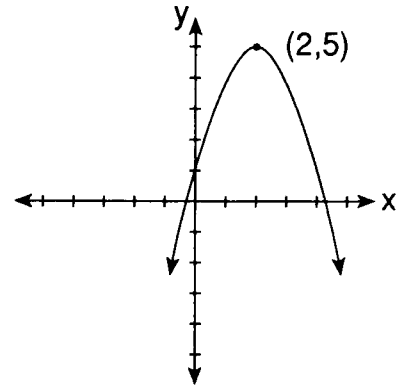
19 If $(x - 3)$ and $(x + 7)$ are the factors of the trinomial $x^2 + ax - 21$, what is the value of a ?

- (1) -3 (3) 7
 (2) -4 (4) 4

20 Which statement is *not* always true about a parallelogram?

- (1) Opposite sides are parallel.
 (2) Opposite sides are congruent.
 (3) Opposite angles are congruent.
 (4) Diagonals are congruent.

21 The parabola shown in the diagram is reflected in the x -axis.



What is the image of the turning point after the reflection?

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

22 If $\angle C$ is the complement of $\angle A$, and $\angle S$ is the supplement of $\angle A$, which statement is *always* true?

- (1) $m\angle C + m\angle S = 180$
 (2) $m\angle C + m\angle S = 90$
 (3) $m\angle C > m\angle S$
 (4) $m\angle C < m\angle S$

23 Which equation describes the locus of points equidistant from points $(2,2)$ and $(2,6)$?

- (1) $y = 8$ (3) $x = 8$
 (2) $y = 4$ (4) $x = 4$

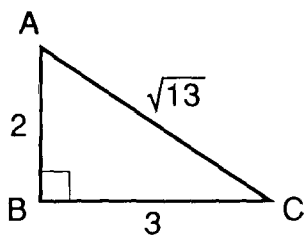
24 In equilateral triangle ABC , the bisectors of angles A and B intersect at point F . What is $m\angle AFB$?

- (1) 60 (3) 120
 (2) 90 (4) 150

25 Two sides of a triangle have lengths 5 and 8 . Which length can *not* be the length of the third side?

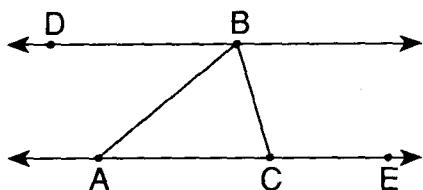
- (1) 5 (3) 3
 (2) 6 (4) 4

- 26 In the accompanying diagram of right triangle ABC , what is $\tan C$?



- (1) $\frac{2}{3}$ (3) $\frac{\sqrt{13}}{3}$
 (2) $\frac{3}{2}$ (4) $\frac{2}{\sqrt{13}}$

- 27 In the accompanying diagram, \overleftrightarrow{ACE} is parallel to \overleftrightarrow{DB} , $m\angle DBA = 40$, and $m\angle BCE = 105$.



Which statement is true?

- (1) \overline{AB} is the longest side of $\triangle ABC$.
 (2) \overline{AC} is the longest side of $\triangle ABC$.
 (3) $\triangle ABC$ is an isosceles triangle.
 (4) $\triangle ABC$ is an obtuse triangle.

- 28 Which equation represents the circle whose center is $(-4, 2)$ and whose radius is 3?

- (1) $(x + 4)^2 + (y - 2)^2 = 9$
 (2) $(x + 4)^2 + (y - 2)^2 = 3$
 (3) $(x - 4)^2 + (y + 2)^2 = 9$
 (4) $(x - 4)^2 + (y + 2)^2 = 3$

- 29 If two legs of a right triangle measure 3 and $\sqrt{10}$, then the hypotenuse must measure

- (1) 1 (3) 10
 (2) $\sqrt{19}$ (4) 19

- 30 Which statement is equivalent to "If a quadrilateral is a rectangle, the diagonals are congruent"?

- (1) If the diagonals of a quadrilateral are congruent, the quadrilateral is a rectangle.
 (2) If a quadrilateral is not a rectangle, the diagonals of the quadrilateral are not congruent.
 (3) If the diagonals of a quadrilateral are not congruent, the quadrilateral is not a rectangle.
 (4) If a quadrilateral is a parallelogram, the diagonals are congruent.

- 31 In how many points do the graphs of the equations $x^2 + y^2 = 9$ and $y = 2x - 1$ intersect?

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

- 32 Which quadratic equation has irrational roots?

- (1) $x^2 + 2x - 8 = 0$ (3) $x^2 - 3x + 2 = 0$
 (2) $x^2 - x - 30 = 0$ (4) $x^2 - 4x - 7 = 0$

- 33 Which equation represents the axis of symmetry of the graph of the equation $y = x^2 - 6x + 5$?

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

- 34 Which equation represents a line that is parallel to the line whose equation is $y = \frac{1}{2}x - 2$?

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

Directions (35): Leave all construction lines on the answer sheet.

- 35 *On the answer sheet*, construct the angle bisector of $\angle C$ of $\triangle ABC$.

Answers to the following questions are to be written on paper provided by the school.

Part II

Answer three questions from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown. [30]

36 *a* On graph paper, draw the graph of the equation $y = x^2 - 2x - 3$ for all values of x in the interval $-2 \leq x \leq 4$. [6]

b What are the roots of the equation $x^2 - 2x - 3 = 0$? [2]

c On the same set of axes, draw the image of the graph drawn in part *a* after a reflection in the y -axis. [2]

37 Answer both *a* and *b* for all values of x for which these expressions are defined.

a Simplify: $\frac{x^2 + 9x + 20}{x^2 - 16} \div \frac{x^2 + 5x}{4x - 16}$ [6]

b Solve for x : $\frac{2}{x} = \frac{x - 3}{5}$ [4]

38 A debating team of four persons is to be chosen from five juniors and three seniors.

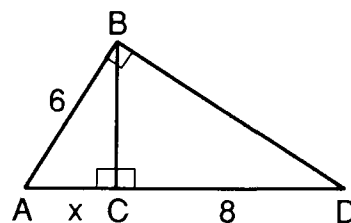
a How many different four-member teams are possible? [2]

b How many of these teams will consist of exactly two juniors and two seniors? [3]

c What is the probability that one of the four-member teams will consist of exactly one junior and three seniors? [3]

d What is the probability that one four-member team will consist of juniors only? [2]

39 In the accompanying diagram of right triangle ABD , $AB = 6$ and altitude \overline{BC} divides hypotenuse \overline{AD} into segments of lengths x and 8.




a Find AC to the nearest tenth. [7]

b Using the answer from part *a*, find the measure of $\angle A$ to the nearest degree. [3]

40 An 8- by 10-inch photo has a frame of uniform width placed around it.

a If the uniform width of the frame is x inches, express the outside dimensions of the picture frame in terms of x . [4]

b If the area of the picture and frame is 143 in^2 , what is the uniform width of the frame? [6]

 GO RIGHT ON TO THE NEXT PAGE.

Answers to the following questions are to be written on paper provided by the school.

Part III

Answer one question from this part. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Calculations that may be obtained by mental arithmetic or the calculator do not need to be shown. [10]

41 a Given:

Either I go to camp or I get a summer job.
If I get a summer job, then I will earn money.

If I earn money, then I will buy new sneakers.

I do not buy new sneakers.

Let C represent: "I go to camp."

Let J represent: "I get a summer job."

Let M represent: "I earn money."

Let S represent: "I buy new sneakers."

Prove: I go to camp. [8]

b Given the true statements:

If Michael is an athlete and he is salaried,
then Michael is a professional.

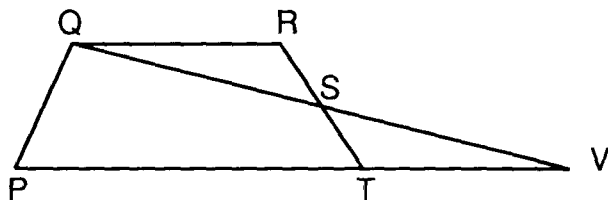
Michael is not a professional.

Michael is an athlete.

Which statement must be true? [2]

- (1) Michael is an athlete and he is salaried.
- (2) Michael is a professional or he is salaried.
- (3) Michael is not salaried.
- (4) Michael is not an athlete.

42 Given: quadrilateral $PQRT$, \overline{QS} , \overline{RS} , \overline{PT} , \overline{QV}
bisects \overline{RT} , and $\overline{QR} \parallel \overline{PV}$.

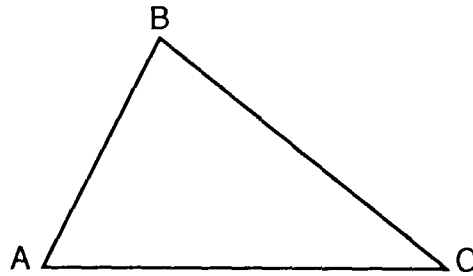


Prove: $\overline{QS} \cong \overline{VS}$ [10]

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT

Tables of Natural Trigonometric Functions
(For use with Sequential Math – Course II 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	



Your answers for Part II and Part III 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

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE II

Friday, June 16, 1995 – 9:15 a.m. to 12:15 p.m., only

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the student's work by making insertions or changes of any kind. Use checkmarks to indicate student 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 a total of 60 credits, 2 credits for each of 30 of the following. [If more than 30 are answered, only the first 30 answered should be considered.] Allow no partial credit. For questions 16–34, allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

- | | | | |
|---------------------|-----------------|--------|-------------------|
| (1) 10 | (11) 6 | (21) 1 | (31) 2 |
| (2) 70 | (12) 252 | (22) 4 | (32) 4 |
| (3) \overline{AB} | (13) 17 | (23) 2 | (33) 3 |
| (4) 60 | (14) 60° | (24) 3 | (34) 3 |
| (5) (5,3) | (15) 4 | (25) 3 | (35) construction |
| (6) 4.2 | (16) 1 | (26) 1 | |
| (7) -4 | (17) 2 | (27) 1 | |
| (8) 12 | (18) 2 | (28) 1 | |
| (9) 60 | (19) 4 | (29) 2 | |
| (10) (-6,7) | (20) 4 | (30) 3 | |

SEQUENTIAL MATH — COURSE II — *concluded*

Part II

Please refer to the Department's publication *Guide for Rating Regents Examinations in Mathematics* and its supplement. 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.

(36) b -1 and 3 [2]

(39) a 3.2 [7]

b 58° [3]

(37) a $\frac{4}{x}$ [6]

b 5 and -2 [4]

(40) a $l = 10 + 2x$ [4]

$w = 8 + 2x$

b 1.5 [6]

(38) a 70 [2]

b 30 [3]

c $\frac{5}{70}$ [3]

d $\frac{5}{70}$ [2]

Part III

(41) b 3 [2]