The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

THREE-YEAR SEQUENCE FOR HIGH SCHOOL MATHEMATICS

COURSE I

Thursday, August 13, 1992 — 8:30 to 11:30 a.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.

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

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, lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at point E. If $m\angle CEA = 2x + 10$ and $m\angle BED = 80$, what is the value of x?
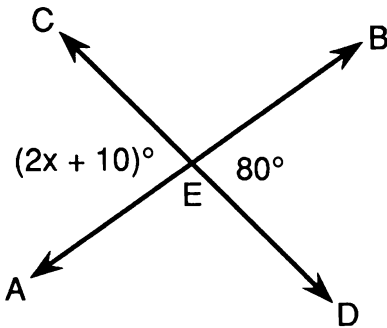
2 On a test, a student answered 12 questions correctly. This number represents 80% of the total number of questions on the test. How many questions were on the test?

3 A girl has three skirts, five blouses, and two jackets. How many different outfits consisting of a skirt, a blouse, and a jacket are possible?

4 The lengths of the diagonals of a rectangle are represented by $2x + 3$ and $4x - 11$. Find the value of x.

5 If the point $(3,k)$ is on the graph of the equation $2x + y = 6$, find the value of k.

6 The lengths of the sides of a triangle are represented by $x + 2$, $3x - 2$, and $2x + 5$. Express the perimeter of the triangle as a binomial in terms of x.

7 Solve the following system of equations for x:
$$4x + 2y = 9$$
$$3x - 2y = 12$$

8 If the number 172,000,000 is expressed in the form 1.72×10^n, what is the value of n?

9 In the accompanying diagram, $\angle DAB$ is an exterior angle of $\triangle ABC$. If $m\angle DAB = 140$ and $m\angle B = 60$, find $m\angle C$.
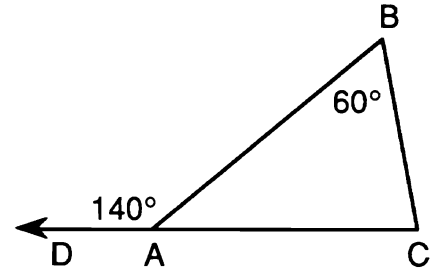
10 Solve for x: $\quad \frac{2}{3}x - 6 = 12$

11 Solve for x in terms of y, m, and b:
$$y = mx + b$$

12 Given the set of numbers $\{30, 42, x, 50, 54, 80\}$. If the median is 49, what is the value of x?

13 Two angles are supplementary. If one of these angles measures 50° more than the other, find the measure of the *smaller* angle.
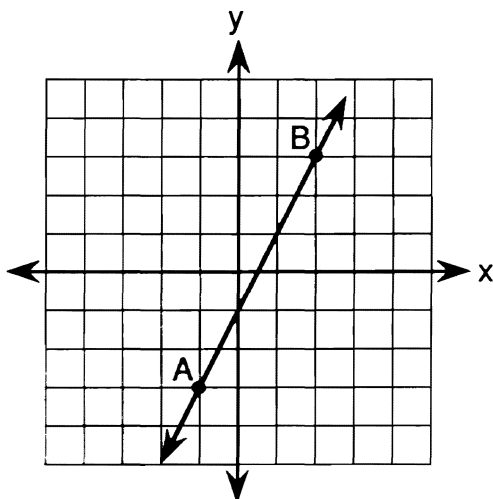
14 Express $\frac{x}{5} - \frac{2x}{3}$ as a single fraction in simplest form.

15 Using the formula $C = \frac{5}{9}(F - 32)$, find the value of C when $F = 5$.

16 Write, in symbolic form, the converse of
$$p \rightarrow \sim q.$$

17 For which value of x is the expression $\dfrac{x - 1}{x + 2}$ undefined?

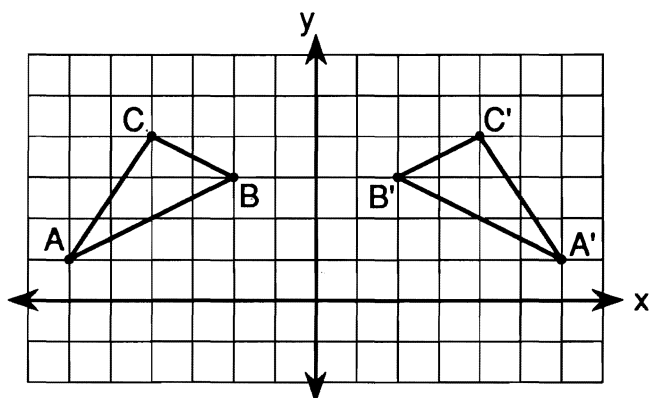18 In the diagram below, what is the slope of $\overleftrightarrow{AB}$?

Directions (19–35): 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.

19 The product of $3x^3y^2$ and $6xy^4$ is

(1) $9x^3y^8$ (3) $18x^4y^6$

(2) $18x^3y^8$ (4) $18x^4y^8$

20 In the accompanying diagram, $\triangle A'B'C'$ is the image of $\triangle ABC$.

Which type of transformation is shown in the illustration?

(1) line reflection   (3) translation

(2) rotation   (4) dilation

21 The measures of two angles of a triangle are 70 and 55. This triangle is

(1) a right triangle
(2) a scalene triangle
(3) an obtuse triangle
(4) an isosceles triangle

22 The expression $(m - n) - (n - m)$ is equivalent to

(1) $2m - 2n$ (3) $-2n$

(2) $2m$ (4) $m - n$

23 The volume of a pyramid is equal to $\frac{1}{3}$ the product of the altitude and the area of the base. If the area of the base remains the same and the altitude is doubled, the volume will
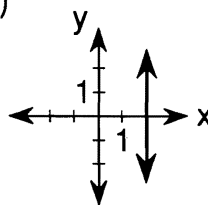
(1) remain the same
(2) double
(3) triple
(4) be multiplied by 4

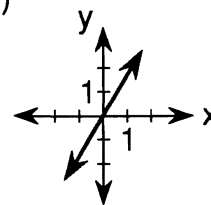24 What is the area of a circle whose circumference is 8π?

(1) 16π (3) 8π

(2) 12π (4) 4π
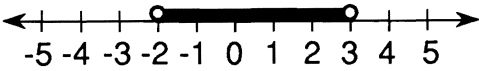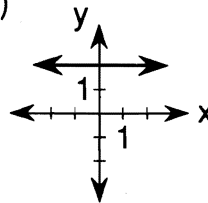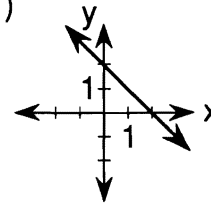
25 Which is the graph of the equation $y = 2$?
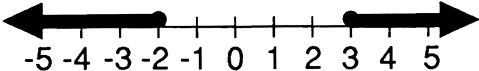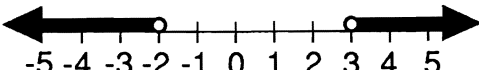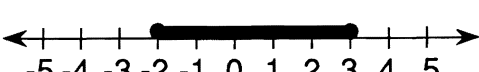

26 The value of $\frac{6!}{2!}$ is

(1) 6   (3) 3

(2) 24   (4) 360

27 If one factor of $6x^2 + 5x - 6$ is $3x - 2$, the other factor is

(1) $3x + 3$ (3) $2x + 3$
(2) $6x + 3$ (4) $2x - 3$

28 Which graph represents the disjunction $(x < -2) \lor (x > 3)$?

(1)
-5 -4 -3 -2 -1 0 1 2 3 4 5

(2)
-5 -4 -3 -2 -1 0 1 2 3 4 5

(3)
-5 -4 -3 -2 -1 0 1 2 3 4 5

(4)
-5 -4 -3 -2 -1 0 1 2 3 4 5

29 Under a certain transformation, $\triangle A'B'C'$ is the image of $\triangle ABC$. The perimeter of $\triangle A'B'C'$ is twice the perimeter of $\triangle ABC$. This transformation is a

(1) dilation (3) rotation
(2) translation (4) reflection

30 If $p \rightarrow q$ is true, then $\sim q \rightarrow \sim p$ is

(1) never true
(2) true only if p is true
(3) true only if p is false
(4) always true

31 The expression $\sqrt{27} - \sqrt{12}$ is equal to

(1) $13\sqrt{3}$ (3) $5\sqrt{6}$
(2) $5\sqrt{3}$ (4) $\sqrt{39}$

32 If p and q represent true statements, which compound statement is also true?

(1) $p \land \sim q$ (3) $q \land \sim p$
(2) $p \rightarrow \sim q$ (4) $q \rightarrow \sim p$

33 The product of $-\frac{1}{a}$, $a \neq 0$, and its reciprocal is

(1) 1 (3) $-\frac{1}{a^2}$

(2) –1 (4) a

34 On a math test, 5 out of 20 students scored 70 or below. A score of 70 on this math test would be the

(1) lower quartile (3) upper quartile
(2) median (4) 70th percentile

35 Expressed as meters per minute, 6 km/hr is equivalent to

(1) 3.6 m/min (3) 100 m/min
(2) 36 m/min (4) 1,000 m/min

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

Part II

Answer four 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.   [40]

36 *On your answer paper*, write the letters *a* through *e*. For each example in the left column, choose the expression from the right column that best describes the example. Then write the *numeral* of the expression next to the letter.   [10]

a A photograph ⟶ its enlargement

b

c **S**

d
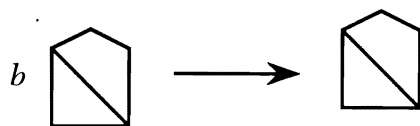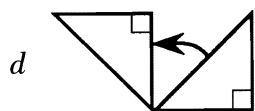
e An isosceles trapezoid

(1) Has exactly one line of symmetry

(2) Illustrates a dilation

(3) Has point symmetry

(4) Illustrates a line reflection

(5) Illustrates a rotation

(6) Has two lines of symmetry

(7) Illustrates a translation

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37 In the accompanying diagram, points *A*, *B*, *C*, and *D* are on circle *O* such that *ABCD* forms a square. Diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *O* and *AC* = 6.
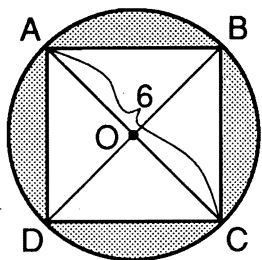
a Express the length of $\overline{AD}$ in simplest radical form.   [3]

b Find the number of square units in the area of square *ABCD*.   [2]

c Express the area of circle *O* in terms of π.   [2]

d Find, to the *nearest tenth*, the number of square units in the area of the shaded portion. [Use π = 3.14]   [3]

38 Each card below is printed with either a vowel (A, E, I, O, or U) or a consonant (a letter other than a vowel). The cards are either plain or striped.

a The cards are shuffled and a card is drawn at random. Find the probability that the card drawn will be
   (1) a vowel   [1]
   (2) striped and a vowel   [2]
   (3) striped or a vowel   [2]

b One card is drawn and the letter is noted. The card is then replaced and a second card is drawn. Find the probability that both cards drawn will be vowels.   [2]

c Two cards are drawn without replacement. What is the probability that the two cards drawn will both be vowels?   [3]

39 *a* Each part below consists of a set of three statements. *On your answer paper,* write the numerals 1 through 3 and next to each numeral write the truth value (TRUE or FALSE) for the third statement in each part, based on the values given for the first two statements. If the truth value cannot be determined from the information given, write "CANNOT BE DETERMINED."

(1) Sue is 16 or John is 20. John is not 20. Sue is 16.	T T ?	[2]
(2) It snows and it is cold. It is cold. It snows.	F F ?	[2]
(3) If it is July, then it is warm. It is not warm. It is not July.	T T ?	[2]

b Let p represent "John passes math" and let q represent "John studies." Write *each* of the following statements in symbolic form.

(1) It is not true that John studies and does not pass math. [2]

(2) If John studies, then John passes math. [2]

40 Solve the following system of equations graphically and check:

$$y = -2x - 3$$
$$x - 2y = -6 \qquad [8,2]$$

41 In $\triangle ABC$, the measure of $\angle B$ is twice the measure of $\angle A$. If the measure of $\angle A$ is subtracted from the measure of $\angle C$, the difference is 20. Find the measure of the *smallest* angle of the triangle. [*Show or explain the procedure used to obtain your answer.*] [10]

42 Three numbers are in the ratio 2:3:5. If the smallest number is multiplied by 5, the result is 32 more than the sum of the second and third numbers. Find the numbers. [*Only an algebraic solution will be accepted.*] [5,5]