The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

MATHEMATICS A

Wednesday, August 13, 2008 — 8:30 to 11:30 a.m., only

Print Your Name: Steve Sjöol

Print Your School's Name: JMAP

Print your name and the name of your school in the boxes above. Then turn to the last page of this booklet, which is the answer sheet for Part I. 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.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored. All work should be written in pen, except graphs and drawings, which should be done in pencil.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Write your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, 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 sheet cannot be accepted if you fail to sign this declaration.

Notice. . .

A minimum of a scientific calculator, a straightedge (ruler), and a compass must be available for you to use while taking this examination.

The use of any communications device is strictly prohibited when taking this examination. If you use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

MATHEMATICS A

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [60]

Use this space for computations.

1 If $6.54 \times 10^n = 65{,}400$, what is the value of n?

(1) 5
(2) −5
(3) −3
(4) 4

2 Which letter has both line and point symmetry?

(1) **B**
(2) **T**
(3) **S**
(4) **H**

3 Marilyn selects a piece of candy at random from a jar that contains four peppermint, five cherry, three butterscotch, and two lemon candies. What is the probability that the candy she selects is *not* a cherry candy?

(1) 0
(2) $\frac{5}{14}$
(3) $\frac{9}{14}$
(4) $\frac{14}{14}$

$\frac{4+3+2}{4+5+3+2} = \frac{9}{14}$

4 The formula for converting temperatures in degrees Celsius to degrees Fahrenheit is $F = \frac{9}{5}C + 32$. If the temperature is 20°C, what is the temperature in degrees Fahrenheit?

(1) 68
(2) 43.1
(3) 33.8
(4) 4

$F = \frac{9}{5}(20) + 32$

$= 68$

Use this space for computations.

5 Andy drives 80 miles to get to the Thruway, drives 100 miles on the Thruway, and then drives an additional 75 miles after leaving the Thruway. If the entire trip took 5 hours and he made no stops, what was his average speed, in miles per hour?

(1) 51
(2) 65
(3) 250
(4) 255

$\frac{80+100+75}{5} = 51$

6 Which property is illustrated by the equation $4x(2x - 1) = 8x^2 - 4x$?

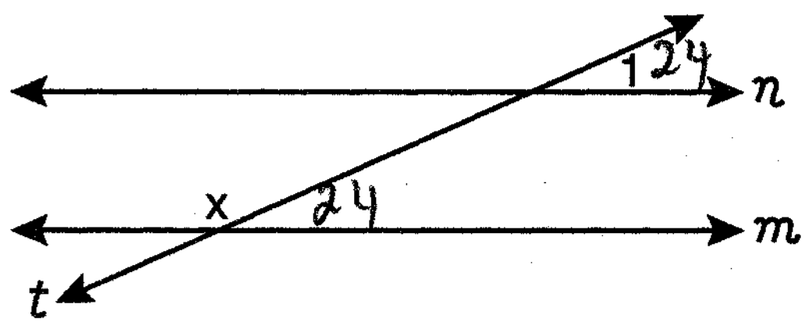
(1) associative
(2) commutative
(3) distributive
(4) identity

7 What is the sum of $2m^2 + 3m - 4$ and $m^2 - 3m - 2$?

(1) $m^2 - 6$
(2) $3m^2 - 6$
(3) $3m^2 + 6m - 6$
(4) $m^2 + 6m - 2$

$2m^2+3m-4$
m^2-3m-2
$3m^2 \quad -6$

8 In the accompanying diagram, line n is parallel to line m, line t is a transversal, and $m\angle 1 = 24$.



What does x equal, in degrees?

(1) 24
(2) 66
(3) 114
(4) 156

$180 - 24 = 156$

Use this space for computations.

9 If a machine that prints designs on T-shirts prints 500 shirts in 3 hours, how many hours will it take to print designs on 1,800 shirts?

(1) 6
(2) 9.8
(3) 10.8
(4) 12

$\frac{500}{3} = \frac{1800}{x}$

$500x = 5400$

$\frac{500x}{500} = \frac{5400}{500}$

$x = 10.8$

10 The sum of two negative numbers always has to be

(1) negative
(2) positive
(3) zero
(4) an integer

11 The width, w, of a rectangular rug is 4 less than its length, ℓ. Which expression represents the area of the rug?

(1) $\ell(4 - \ell)$
(2) $\ell(\ell - 4)$
(3) $2(\ell - 4) + 2\ell$
(4) $2w + 2\ell$

12 What is the value of m in the equation $2m - (m + 1) = 0$?

(1) 1
(2) –1
(3) $\frac{1}{3}$
(4) 0

$2m - m - 1 = 0$

$m = 1$

13 What is the converse of the statement "If $a^2 + b^2 = c^2$, then ΔABC is a right triangle"?

(1) If ΔABC is a right triangle, then $a^2 + b^2 = c^2$.
(2) $a^2 + b^2 = c^2$ if, and only if, ΔABC is a right triangle.
(3) If ΔABC is not a right triangle, then $a^2 + b^2 \neq c^2$.
(4) If $a^2 + b^2 \neq c^2$, then ΔABC is not a right triangle.

Use this space for computations.

14 Pentagon *ABCDE* is similar to pentagon *FGHIJ*. The lengths of the sides of *ABCDE* are 8, 9, 10, 11, and 12. If the length of the longest side of pentagon *FGHIJ* is 18, what is the perimeter of pentagon *FGHIJ*?

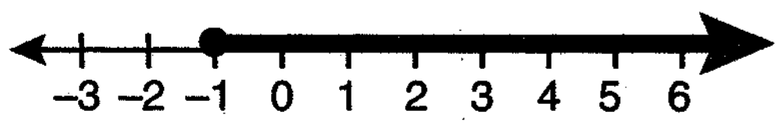
(1) 50
(2) 56
(3) 75
(4) 100

$\frac{18}{12} = 1.5$

perimeter of ABCDE is 50

$50 \times 1.5 = 75$

15 Which inequality is shown on the accompanying graph?



(1) $x < -1$
(2) $x \leq -1$
(3) $x > -1$
(4) $x \geq -1$

16 A teacher wants to divide her class into groups. Which expression represents the number of different 3-person groups that can be formed from a class of 22 students?

(1) 3!
(2) ${}_{22}C_3$
(3) ${}_{22}P_3$
(4) $22 \bullet 21 \bullet 20$

17 What is $6x^3 + 4x^2 + 2x$ divided by $2x$?

(1) $3x^2 + 2x$
(2) $3x^2 + 2x + 1$
(3) $4x^2 + 2x$
(4) $4x^2 + 2x + 1$

$\frac{6x^3}{2x} + \frac{4x^2}{2x} + \frac{2x}{2x}$

$3x^2 + 2x + 1$

18 The greatest common factor of $4a^2b$ and $6ab^3$ is

(1) $2ab$
(2) $2ab^2$
(3) $12ab$
(4) $24a^3b^4$

Use this space for computations.

19 The statement "Maya plays on the basketball team or Maya joins the ski club" is *false*. Which statement is true?

(1) Maya plays on the basketball team and Maya joins the ski club.
(2) Maya plays on the basketball team and Maya does not join the ski club.
(3) Maya does not play on the basketball team and Maya joins the ski club.
(4) Maya does not play on the basketball team and Maya does not join the ski club.

If a disjunction is false, both statements are false

20 The measures of five of the interior angles of a hexagon are 150°, 100°, 80°, 165°, and 150°. What is the measure of the sixth interior angle?

(1) 75°
(2) 80°
(3) 105°
(4) 180°

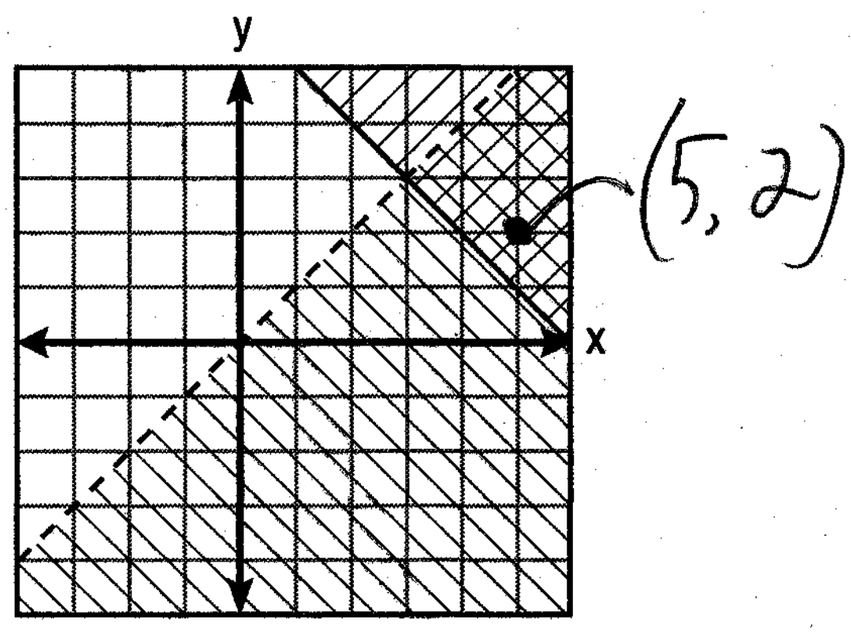
$(n-2)180$
$(6-2)180 = 720$
$720-(150+100+80+165+150)$
$=75$

21 For which value of x is the expression $\frac{3x-3}{x-5}$ undefined?

(1) 1
(2) –1
(3) 5
(4) –5

$5-5=0$

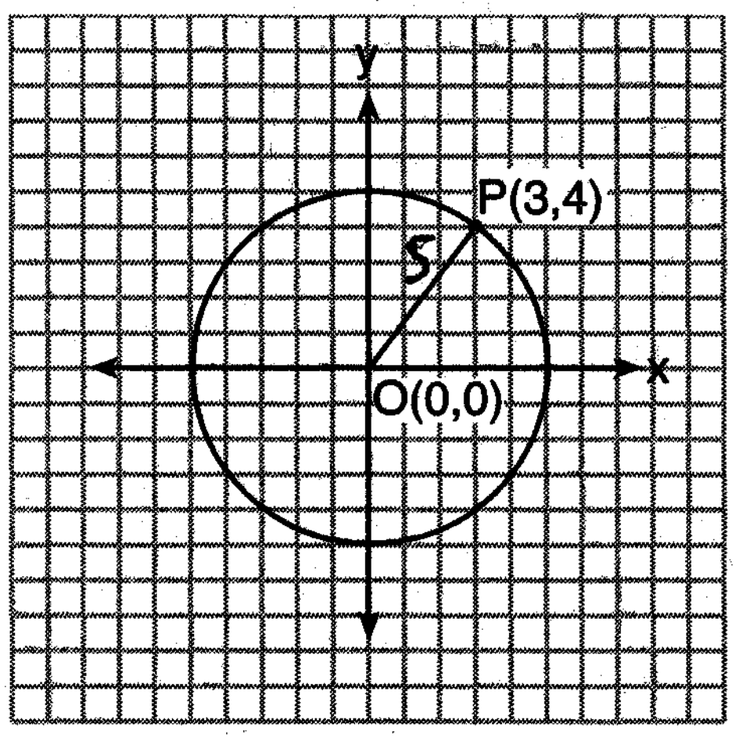
22 Which point is in the solution set of the system of inequalities shown on the accompanying graph?



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

Use this space for computations.

23 In the accompanying diagram, the center of circle O is (0,0), and the coordinates of point P are (3,4). If $\overline{OP}$ is a radius, what is the equation of the circle?



(1) $x^2 + y^2 = 5$
(2) $x^2 + y^2 = 9$
(3) $x^2 + y^2 = 16$
(4) $x^2 + y^2 = 25$

24 The expression $(-4a^3b)^2$ is equivalent to

(1) $-16a^6b^2$
(2) $16a^6b^2$
(3) $16a^5b^2$
(4) $8a^6b^2$

25 For which equation is the solution set {–5,2}?

(1) $x^2 + 3x - 10 = 0$
(2) $x^2 - 3x = 10$
(3) $x^2 + 3x = -10$
(4) $x^2 - 3x + 10 = 0$

$x^2+3x-10=0$
$(x+5)(x-2)=0$
$x=-5 \quad x=2$

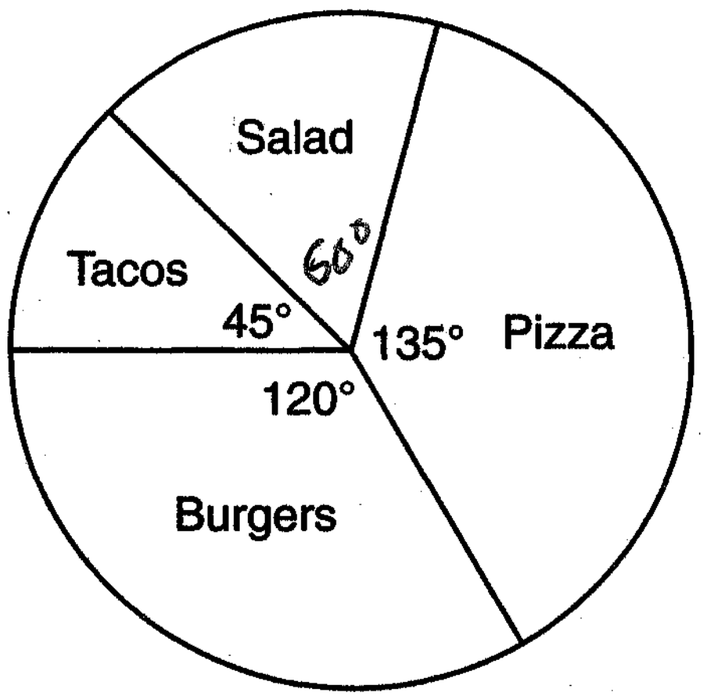
26 When the Smith family decided to have their new house built, they found that there were 60 different choices involving location, style, and color. If they had their choice of 2 locations and 5 styles, how many choices of color did they have?

(1) 6
(2) 12
(3) 50
(4) 53

$2 \cdot 5 \cdot x = 60$
$\frac{10x}{10} = \frac{60}{10}$
$x = 6$

Use this space for computations.

27 In a survey, 450 high school students were asked for their preference of fast food for lunch. The accompanying circle graph represents the results.



How many students preferred salad?

(1) 60
(2) 75
(3) 150
(4) 300

$360-(135+120+45)=60$

$\frac{60}{360}=\frac{x}{450}$

$\frac{360x}{360}=\frac{27000}{360}$

$x=75$

28 A line with a slope of $\frac{1}{3}$ passes through the point (3,6). Which point also lies on this line?

(1) (6,3)
(2) (7,6)
(3) (−3,−3)
(4) (−6,3)

$y-y_1=m(x-x_1)$

$y-6=\frac{1}{3}(x-3)$

$y-6=\frac{1}{3}x-1$

$y=\frac{1}{3}x+5$

$=\frac{1}{3}(-6)+5$

$-2+5$

3

Use this space for computations.

29 Which statement is logically equivalent to "If I sleep, then I will not eat"?

(1) If I do not sleep, then I will eat.
(2) If I eat, then I will not sleep.
(3) If I eat, then I will sleep.
(4) If I do not eat, then I will sleep.

30 Phil is cutting a triangular piece of tile. If the triangle is scalene, which set of numbers could represent the lengths of the sides?

(1) {2,4,7} 2+4≠7
(2) {4,5,6}
(3) {3,5,8} 3+5≠8
(4) {5,5,8} Isosceles

Part II

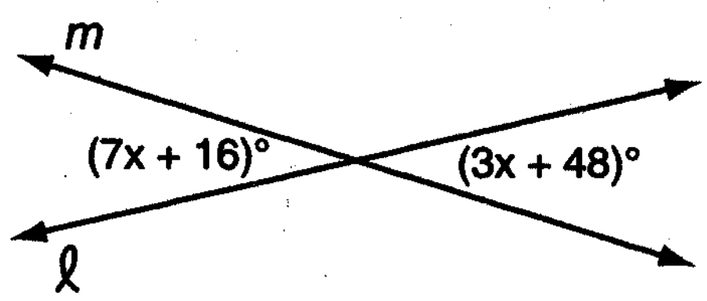
Answer all questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [10]

31 Solve for x: $0.35x + 0.6 = 0.1x + 1$

$.25x = .4$

$x = 1.6$

32 The accompanying diagram shows intersecting lines ℓ and m. Solve for the value of x.

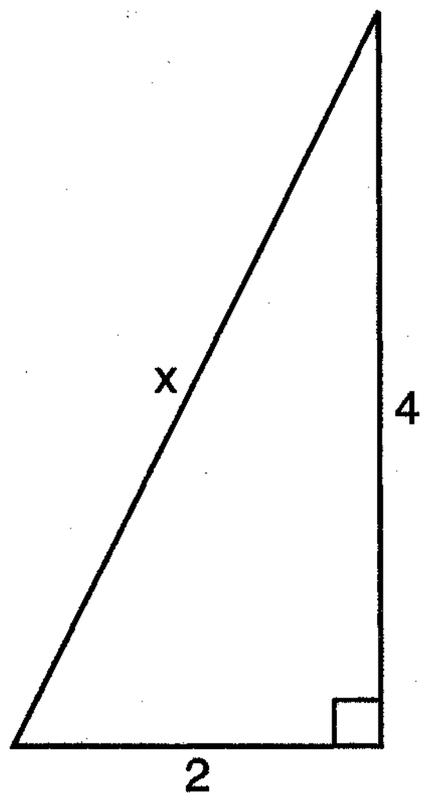


$7x + 16 = 3x + 48$

$\frac{4x}{4} = \frac{32}{4}$

$x = 8$

33 Theo determined that the correct length of the hypotenuse of the right triangle in the accompanying diagram is $\sqrt{20}$. Fiona found the length of the hypotenuse to be $2\sqrt{5}$. Is Fiona's answer also correct? Justify your answer.



$a^2 + b^2 = x^2$

$2^2 + 4^2 = x^2$

$\sqrt{20} = x$

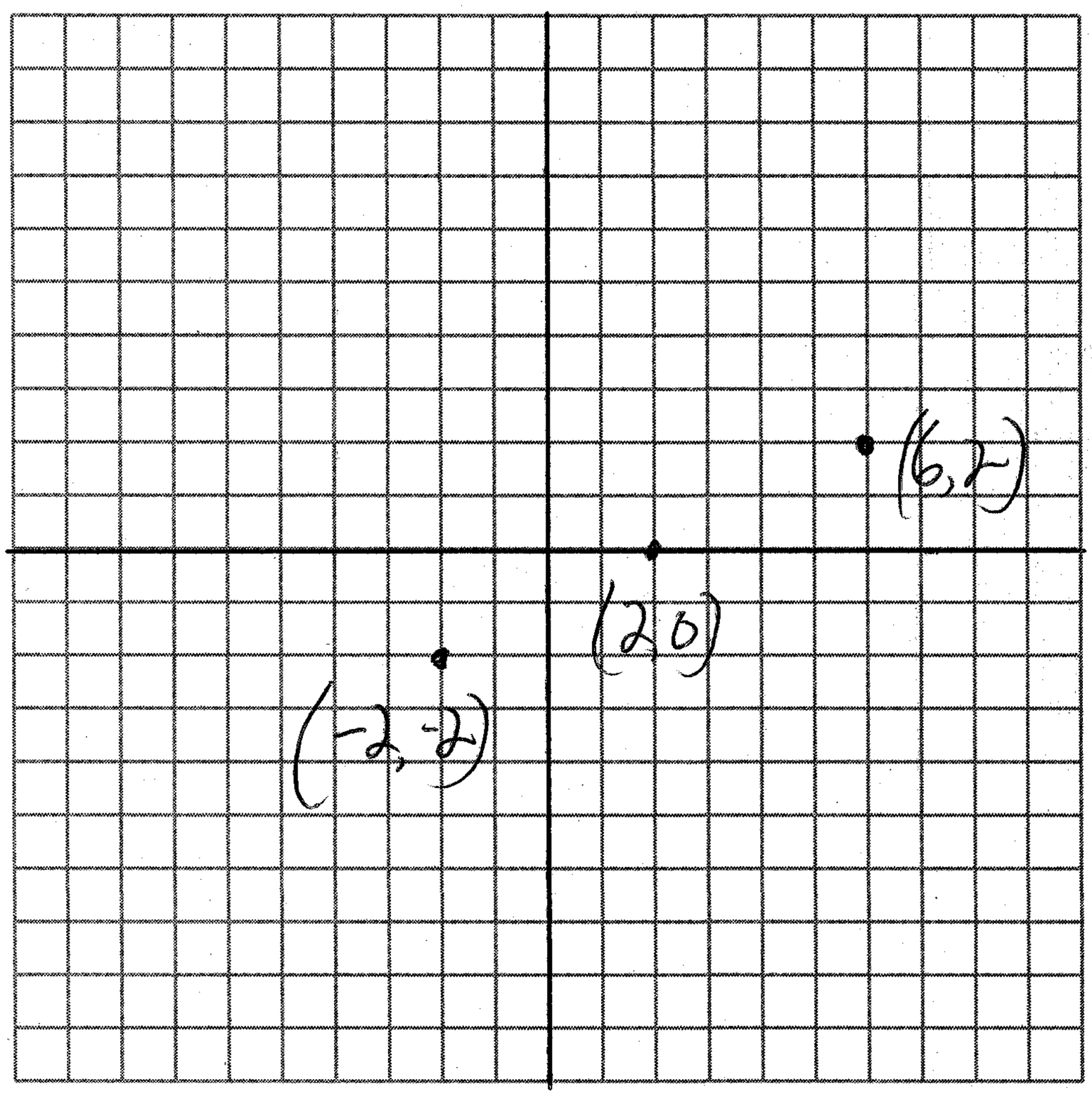
YES

$\sqrt{4}\sqrt{5}$

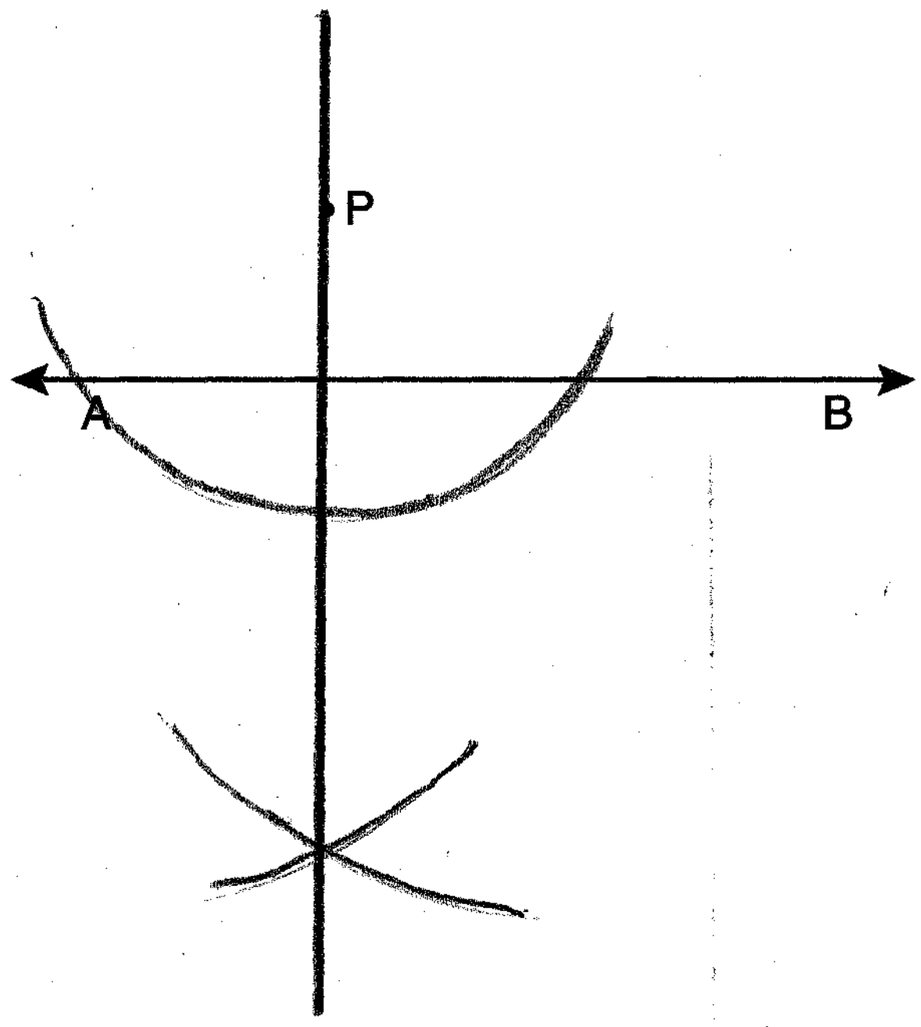
$2\sqrt{5}$

$\sqrt{20} = 2\sqrt{5}$

34 One endpoint of a line segment is (6,2). The midpoint of the segment is (2,0). Find the coordinates of the other endpoint. [The use of the accompanying grid is optional.]



35 Using a compass and straightedge, construct the line that is perpendicular to $\overleftrightarrow{AB}$ and that passes through point P. Show all construction marks.



Part III

Answer all questions in this part. Each correct answer will receive 3 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [6]

36 The mean of three numbers is 25. The second number is four less than twice the first. The third number is two more than four times the first. Find the *smallest* number.

$$\frac{x + (2x-4) + (4x+2)}{3} = 25$$

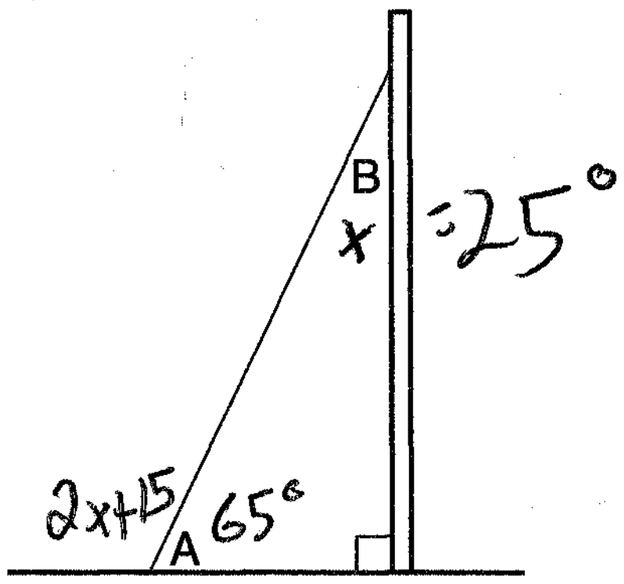
$$7x - 2 = 75$$

$$\frac{7x}{7} = \frac{77}{7}$$

$$x = 11$$

11, 18, 46

37. A billboard on level ground is supported by a brace, as shown in the accompanying diagram. The measure of angle A is 15° greater than twice the measure of angle B. Determine the measure of angle A and the measure of angle B.



$90 + x + 2x + 15 = 180$

$\frac{3x}{3} = \frac{75}{3}$

$x = 25°$

$2(25) + 15 = 65°$

Part IV

Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [8]

38 On the accompanying set of axes, draw ΔABC, whose coordinates are $A(-7,9)$, $B(-2,8)$, and $C(-3,4)$. Then draw, label, and state the coordinates of $\Delta A'B'C'$, the image of ΔABC after the transformation that maps (x,y) to $(-x,-y)$. Based on your diagram, identify the type of transformation that was performed.

Point reflection

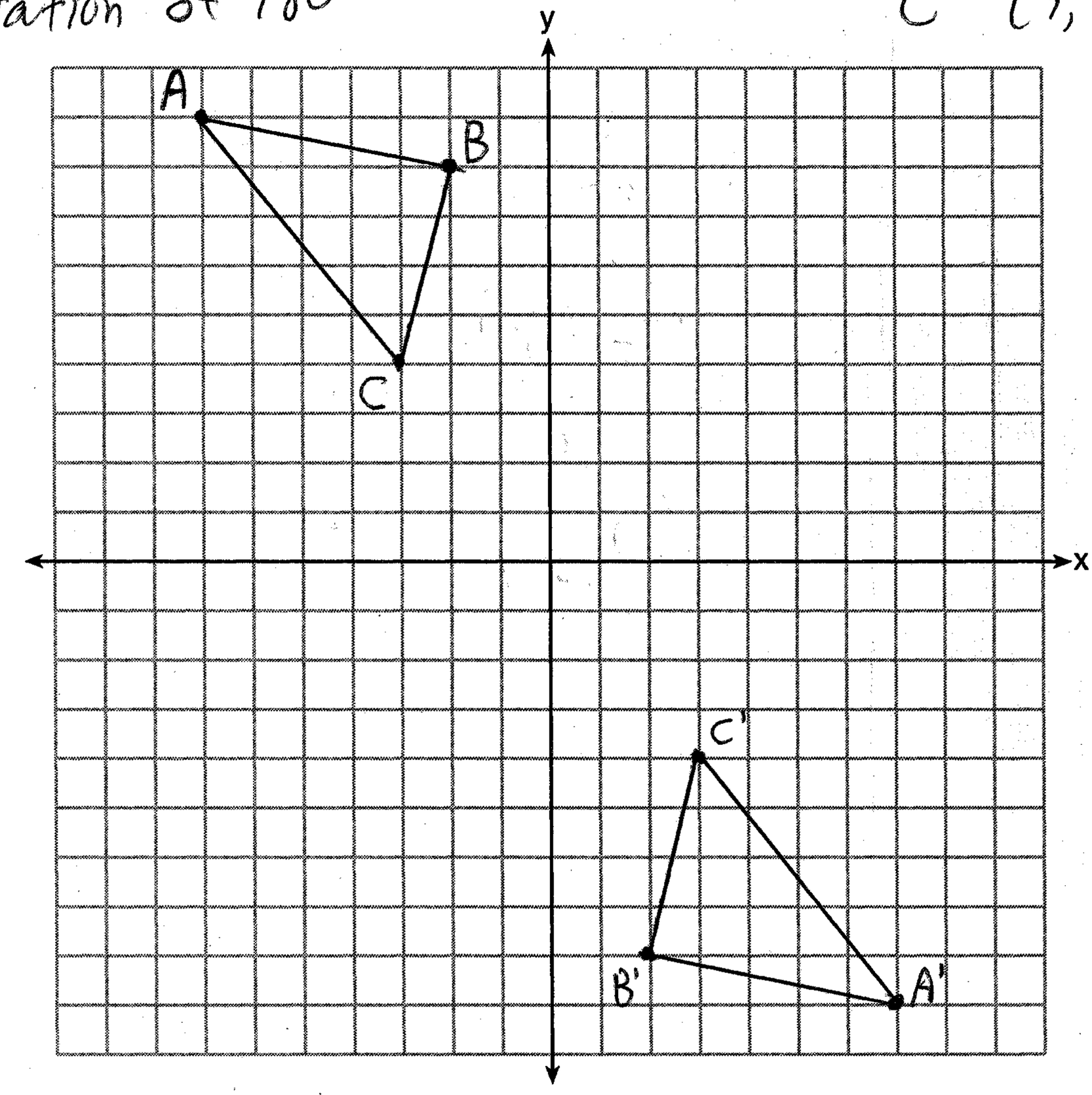
Dilation of -1

Rotation of 180°

A' (7, -9)

B' (2, -8)

C' (3, -4)



39 Solve the following system of equations algebraically or graphically for x and y:

$$y = x^2 + 4x + 6$$
$$y = 2x + 6$$

$x^2 + 4x + 6 = 2x + 6$

$x^2 + 2x = 0$

$x(x + 2) = 0$

$x = 0 \quad x = -2$

$y = 2(0) + 6 \quad y = 2(-2) + 6$

$= 6 \quad = 2$

$(0, 6) \quad (-2, 2)$

Question 39 continued