

Hojas para la Escuela Preparatoria

Exámen de Matemáticas

Opción Múltiple

El examen de las matemáticas del PSSA se aplica en los grados 3-8, y 11.

- Mira los términos de matemáticas incluidos aquí – tienes que conocerlos para el PSSA
- Mira las fórmulas incluidas aquí – te las dan durante el examen, pero tienes que saber usarlas
- Mira los ejemplos y practica – tu maestro tiene las respuestas correctas
- Lee la pregunta varias veces y subraya o marca la información importante
- Trata de solucionar el problema antes de mirar las opciones de respuestas, para que no te engañe ninguna opción falsa
- Usa el libro de preguntas y papeles blancos para hacer el trabajo de las matemáticas
 - ❑ trabaja despacio y con cuidado para no cometer errores
 - ❑ no trates de hacer mucho trabajo “en tu mente”
 - ❑ escribe con cuidado y en columnas
 - ❑ copia con cuidado de la pregunta
 - ❑ mira con cuidado las unidades de medida
 - ❑ dibuja el problema si te ayudará
 - ❑ si no encuentres la respuesta, no te rindas – trata otra vez, y inténtalo de otra manera diferente
 - ❑ si no hay otro modo, trata de usar las respuestas dadas para ver cuál funciona para contestar la pregunta
- A veces tienes que usar toda la información que se da en la pregunta – pero ten cuidado porque a veces hay información incluida que no es necesaria para solucionar el problema, y tienes que ignorar la información extra
- Puedes usar una calculadora en algunas de las preguntas, pero no todas
- Cuando se permite el uso de la calculadora, **úsala**, al menos para revisar tus respuestas
- Lee las opciones de respuestas con cuidado
- Cuidado con opciones engañosas – lee la pregunta con cuidado y escoge la correcta operación matemática
- Cuando termines, regresa para revisar tu trabajo

Exámen de Matemáticas

Parte Escrita

- Mira el ejemplo incluido aquí y practica usando el “rubric” o instrucciones
- Mira el ejemplo “Sample Response for Category 5” incluido aquí como modelo de una respuesta excelente
- Esto no es opción múltiple – tú tienes que dar la respuesta
- Hay pocas preguntas de este tipo, pero son gran parte de tu calificación total, así que no pases estas preguntas
- Haz todo lo que puedas porque puedes recibir puntos parciales aunque tengas errores
- Lee la pregunta con cuidado, marca la información importante, y toma tu tiempo
- Pon atención a ver cuántas respuestas se piden, y antes de empezar, divide el espacio del papel para tener el espacio suficiente para todas las respuestas
- Escribe claramente
- Hay que mostrar todo el trabajo, aún cuando uses una calculadora
- Si usas una calculadora, explica qué hiciste con la calculadora (por ejemplo, “I entered 3 multiplied by 3 and I got the product 9.”)
- Explica cada paso de las matemáticas, y por qué decidiste hacerlo así – asegúrate de que tu explicación sería fácil para otra persona leer
- Trata de usar palabras como estas cuando escribes tu explicación:
 - to get
 - to find
 - to figure out
 - to show
 - because
 - since
 - therefore
- Es buena idea usar dos columnas para mostrar tu respuesta, así:

WORK

escribes y muestras los cálculos
los números, y las respuestas
aquí

EXPLICACIÓN

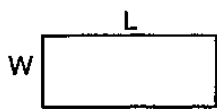
usas palabras para describir todo el trabajo
que hiciste y tus razones por hacer ese
trabajo aquí

Terms used in the Academic Standards for Mathematics through Grade 11

1. Absolute Value
 2. Analytic Geometry
 3. Arc
 4. Arithmetic Series
 5. Chord
 6. Cluster Sampling
 7. Compound Event
 8. Consistent, Inconsistent (System of Equations)
 9. Control Group
 10. Deductive Proof
 11. Direct Proof
 12. Domain
 13. Ellipse
 14. Estimation
 15. Experimental Design
 16. Extrapolation
 17. Finding Roots
 18. Finite Sequence
 19. Hyperbola
 20. Indirect Proof
 21. Infinite Geometric Series
 22. Intercept
 23. Interpolation
 24. Lines, Curves of Best Fit
 25. Logarithm
 26. Matrices
 27. Normal Curve
 28. Odds
 29. Opposite
 30. Parabola
 31. Proof by Contradiction
 32. Radian
 33. Raising to a Power
 34. Rates of Growth/Decay
 35. Reciprocal
 36. Regression
 37. Regression Equation of Best Fit
 38. Secant
 39. Sequences of Areas
 40. Series
 41. Simple Event
 42. Standard Deviation
 43. Statistical Measures of Center, Spread
 44. Tangent
 45. Treatment Group
 46. Trigonometric Functions
 47. Truth Table
 48. t-Test
 49. Two-Way Table
 50. Validity of an Argument
 51. Variance
 52. z-score
-

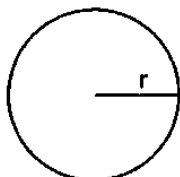
GRADE 11 FORMULA SHEET

Formulas that you may need to work questions on this test are found below. You may refer to this page at any time during the test. A calculator may be used on this test. You may use calculator π or the number 3.14.

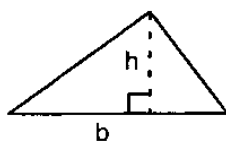


$$A = LW$$

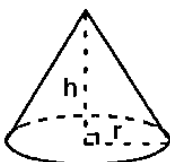
$$P = 2L + 2W$$



$$C = 2\pi r \quad A = \pi r^2$$

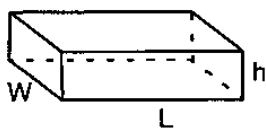


$$A = \frac{1}{2}bh$$



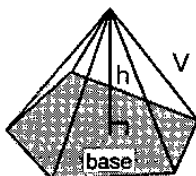
$$A = \pi r^2 + \pi r \sqrt{r^2 + h^2}$$

$$V = \frac{1}{3}\pi r^2 h$$

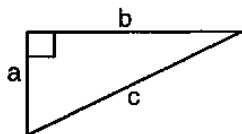


$$A = 2LW + 2Lh + 2Wh$$

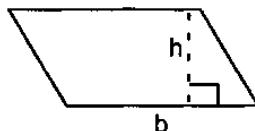
$$V = LWh$$



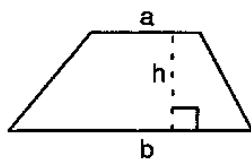
$$V = \frac{1}{3} (\text{Area of the base}) \times (\text{Height})$$



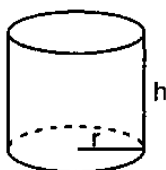
$$a^2 + b^2 = c^2$$



$$A = bh$$

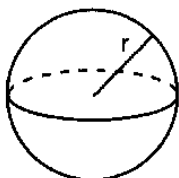


$$A = \frac{h}{2}(a + b)$$



$$A = 2\pi r^2 + 2\pi rh$$

$$V = \pi r^2 h$$



$$A = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3$$

Constant Motion

$$d = rt$$

Simple Interest

$$I = prt$$

Quadratic Formula

$$\text{If } ax^2 + bx + c = 0, \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Compounding Interest
(n times per year)

$$\text{Amount} = p(1 + \frac{r}{n})^n$$

Permutations

$$P(n, r) = \frac{n!}{(n-r)!}$$

Combinations

$$C(n, r) = \frac{n!}{r!(n-r)!}$$

Standard Deviation

$$\sqrt{\frac{\sum_{i=1}^N (x_i - \bar{x})^2}{N}}$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Law of Sines

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Nth Term of an Arithmetic Sequence $a_n = a + (n-1)d$

Nth Term of a Geometric Sequence $a_n = ar^{n-1}$

Sum of an Arithmetic Series $S_n = \frac{n}{2}[2a + (n-1)d]$

Sum of a Geometric Series

$$S_n = \frac{a - ar^n}{1 - r} \quad \text{or} \quad S_n = \frac{a(1 - r^n)}{1 - r}$$

Sum of an Infinite Geometric Series

$$S = \frac{a}{1 - r}$$

$$\log_b x = \frac{\log_c x}{\log_c b}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$z = \frac{x - \mu}{\sigma}$$

You may not use a calculator for items 1–3.

1. Mrs. Ditters and her daughter went to lunch. Their bill came to \$27.29. If a fair tip is between 15 and 20 percent, what would be a fair tip to leave their waiter?

A. \$ 2.00
B. \$ 2.72
C. \$ 5.00
D. \$20.00

2. Add and simplify.

$$\begin{array}{r} 2\frac{3}{4} \\ + 5\frac{1}{3} \\ \hline \end{array}$$

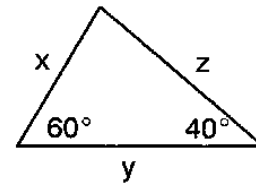
A. $7\frac{1}{12}$
B. $7\frac{4}{7}$
C. $8\frac{1}{12}$
D. $8\frac{12}{13}$

3. If the rate of tax is 6%, find the tax on a bicycle that costs \$90.00.

A. \$ 15.00
B. \$ 6.00
C. \$.54
D. \$ 5.40

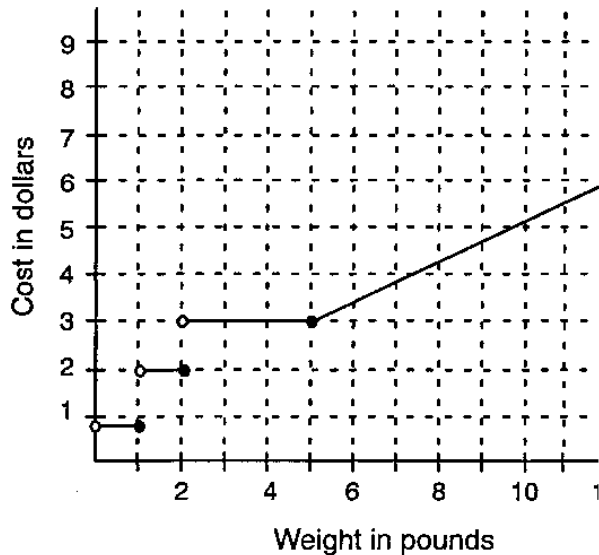
You may use a calculator for the rest of the questions on this test.

4. Classify the triangle.



- A. scalene, obtuse
B. isosceles, acute
C. scalene, acute
D. isosceles, right
5. Sam works after school and earns \$4.50 an hour. Which sentence describes Sam's weekly pay (p) if he works different hours (h) each week?
- A. $ph = 4.50$
B. $p = 4.50h$
C. $h = 4.50p$
D. $p = h$

6. The graph below represents the cost of shipping a package. What is the approximate difference in cost of shipping 2 five-pound packages as opposed to 1 ten-pound package?



- A. \$1
 B. \$2
 C. \$8
 D. \$6
7. Which equation describes the relationship in the table?

x	y
1	3
2	6
3	11
4	18

- A. $y = x + 4$
 B. $y = 2x^2$
 C. $y = 3x$
 D. $y = x^2 + 2$

8. A ruler is marked in eighths of an inch. Between which of the following marks would 0.66 inches be located?

- A. $\frac{1}{4}$ and $\frac{3}{8}$
 B. $\frac{5}{8}$ and $\frac{3}{4}$
 C. $\frac{1}{2}$ and $\frac{5}{8}$
 D. $\frac{3}{8}$ and $\frac{1}{2}$

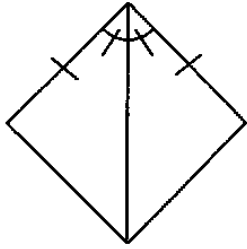
9. The junior high school student council has decided to add three students for an "at large" position that would represent the student body. These new members will not be elected but will be selected by a random drawing. Which is the **best** method for determining the new members?

- A. Randomly pick three names from the honor roll.
 B. Randomly pick three names of students involved in extracurricular activities.
 C. Randomly pick three names from the absentee list.
 D. Randomly pick three names from the school enrollment list.

10. The Bucko Belt Company is valued at 2 million dollars. The Federal debt is at least 327 billion dollars. Approximately how many companies with a value equal to Bucko would it take to equal the Federal debt?

- A. 163
 B. 1,630
 C. 16,300
 D. 163,000

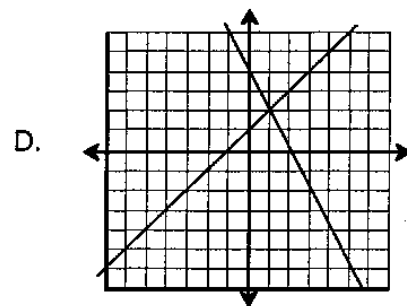
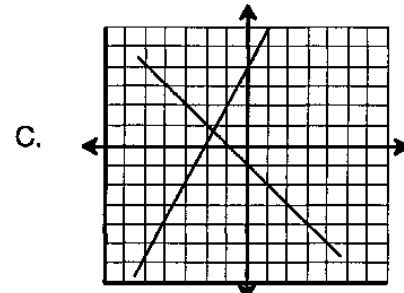
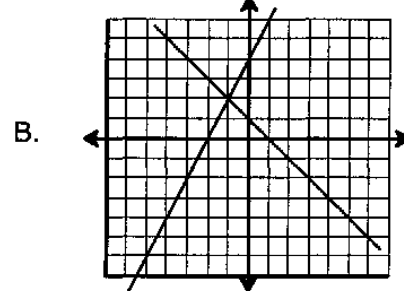
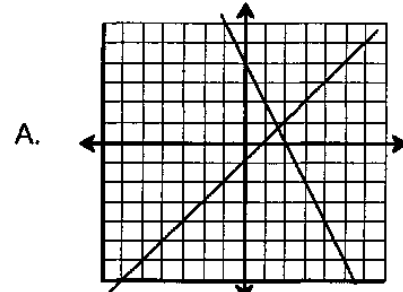
11. If enough information is given, which postulate or theorem verifies the congruence of the triangles shown?



- A. SSS
 B. SAS
 C. AAS
 D. Not enough information has been given.
12. A prolific saver of pennies has $N = 3^t$ pennies after t days. Solve: $6500 = 3^t$ to find how many days until at least \$65 is saved.
- A. 8 days
 B. 18 days
 C. 186 days
 D. 2166 days

13. Which figure shows the graphic solution to the equations below?

$$\begin{cases} y = x + 1 \\ y = -2x + 4 \end{cases}$$



14. In a group of 10 people, 7 people speak English, 4 speak French and 2 speak neither of the two languages. How many people speak both languages?

A. 1
B. 2
C. 3
D. 4

15. Kim needs a certain shade of pink paint for a handmade toy. This shade is made by mixing white and red paint in a ratio of 1 to 3. How many fluid ounces of **red paint** would be needed to make 12 fluid ounces of this pink paint?

A. 4 fluid ounces
B. 6 fluid ounces
C. 8 fluid ounces
D. 9 fluid ounces

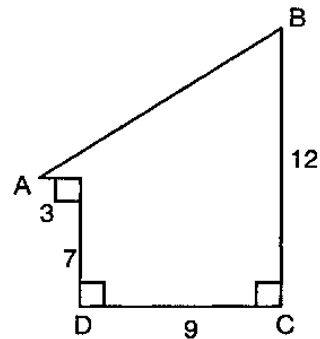
16. At the start of the month, the counter on the copy machine read 6,583. At the end of the month, it read 82,110. The copies cost $1\frac{1}{3}$ cents a piece. What was the approximate total cost of the copies for this month?

A. \$10,000.00
B. \$ 2,200.00
C. \$ 1,000.00
D. \$ 200.00

17. A square has an area of 16 square meters. Find the length of the diagonal.

A. 8
B. 4
C. $4\sqrt{2}$
D. $8\sqrt{2}$

18. Find the length of segment AB in the figure below.



Note: Figure is **NOT** drawn to scale.

A. 8
B. 13
C. 14
D. 15

19. Which of the following represents the largest value?

A. 10^3
B. $(5 + 5) \times 10$
C. $\frac{10^8}{10^2}$
D. $10^3 \times (10)^2$

20. If the range of a set of data is 110 and the lowest number in the data set is 98, what is the **greatest** number of that data set?
- A. 104
 B. 110
 C. 198
 D. 208

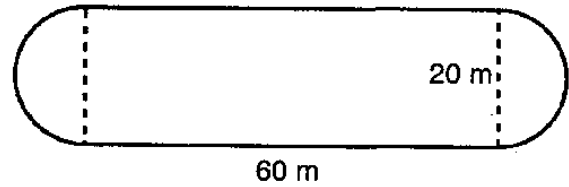
21. A case of spring water contains 24 bottles. If each bottle contains 330 milliliters, how many liters of spring water are in a case?
- A. 0.792 liters
 B. 7.92 liters
 C. 79.2 liters
 D. 7920 liters

22. As part of her pay, a real estate agent is given a commission which is a percentage of the sale price. What is her total commission on a farm which sold for \$1,750,000? The rates are as follows:

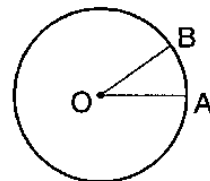
Sale Price	Commission
First \$500,000	8%
Any portion over \$500,000	5%

- A. \$ 87,500
 B. \$100,000
 C. \$102,500
 D. \$140,000

23. The inside rail of a running track consists of a rectangle with a semicircle at each end as shown in the figure below. Find the approximate area surrounded by the track rail.



- A. 1200 m²
 B. 2456 m²
 C. 1514 m²
 D. 160 m²
24. The population of a town is currently 35,000 people. If the population of the town increases at a rate of 5% per year, what will be the approximate population of the town in 15 years?
- A. 40,000 people
 B. 50,000 people
 C. 75,000 people
 D. 175,000 people
25. The circle below has a diameter of 98 units. \widehat{AB} on the circle has a length of 38.5 units. What is the measure of $\angle AOB$?



- A. 45°
 B. 50°
 C. 55°
 D. 60°

26. What is the next term in the sequence below?

1, 8, 27, 64, . . .

- A. 5
B. 25
C. 96
D. 125
27. In a high school, there are 210 sophomores, 200 juniors and 190 seniors. A survey was taken to determine the various activities in which the students were interested. A chart was prepared to show the results of the survey. A student from the high school is chosen at random. What is the probability that the student would prefer basketball over the other five sports listed?

Preferences			
Sport	So	Jr	Sr
Football	12	15	10
Basketball	8	10	12
Baseball	8	4	6
Swimming	4	3	4
Track	6	5	4
Hockey	4	3	2
Totals	42	40	38

- A. 0.300
B. 0.250
C. 0.083
D. 0.050

28. Peg always complains that she has a million things to do. If she would take just 2 minutes to do each thing, approximately how long would it take her to do the million things?

- A. 140 days
B. 55 months
C. 30 hours
D. 4 years

29. Given the following statements:

1. Judy Smith is a student at Deerfield High.
2. All students at Deerfield High are between 13 and 19 years of age.
3. Judy Smith is between 13 and 19 years of age.

Arrange the three statements into a logical sequence. Determine which statement(s) could be your conclusion.

- A. only statement number 1
B. only statement number 2
C. only statement number 3
D. statement numbers 2 or 3

Figure 3
Mathematics General Problem Solving Rubric

5 - Advanced Understanding, Excellent

- Correct answer with correct procedures/correct calculations shown or described and a written explanation that supports the work shown. The explanation tells what was done in the solution process and explains **why** the steps were done (or the reason(s) for the steps to be taken). No blemishes, that is, everything is correct. May have a minor omission in calculation or explanation where the omitted step or explanation may be of the level of $2 + 2 = 4$ (something that is usually done mentally and considered trivial and understood).

4 - Satisfactory Understanding

- Correct answer with correct procedures/correct calculations shown or described and a written explanation which supports some of the work shown. May have minor omission in calculation or explanation (such as $2 + 2 = 4$).

3 - Almost Satisfactory Understanding

- Correct answer with most correct procedures/calculations shown or described and no explanation. Some steps are missing, but you can follow what is being done.
- Correct answer with few correct procedures/calculations shown or described and some explanation. Some steps are missing, but you can follow what is being done.
- Incorrect answer with correct procedures shown or described and some explanation, but with one calculation or copying error carried through.

2 - Partial Understanding

- Correct answer with few procedures/calculations shown or described or some explanation. Too many steps are missing to follow what is being done.
- Incorrect answer with half or more correct procedures shown or described and some or no explanation. The student either did not proceed far enough or proceeded incorrectly.
- Incorrect answer with correct procedures shown or described and no explanation. May have no more than 2 calculation or copying errors.

1 - Minimal Understanding

- Correct answer with calculations, procedures or explanation that are either not legible or not understandable or missing or the procedure is incorrect. Less than a "2" score.
- No answer or an incorrect answer, but the student has provided some of the information critical to the solution. There is some indication that the student has read the item.

0 - Incorrect

- Incorrect answer in which the student attempts the task incorrectly or gives an incorrect or incomplete answer with an incorrect explanation or no explanation of the procedure or logic used in the solution. Nothing is correct.
 - Blank responses and Off-Task responses (profanity, refusal to perform, unrelated drawings or comments such as "doodles") are scored as "Incorrect responses."
 - Question marks and "I don't know" are scored as "Incorrect responses." The student has read the task and responded to it.
 - No answer is treated as an incorrect answer.
-

30. The Student Store sells physical education uniforms, **one style for boys** and **one style for girls**. The uniforms come in **4 different sizes**: small, medium, large and extra large.

All of the 850 incoming ninth-grade students, 450 of whom are girls, will need to buy these uniforms. The students, who run the school store, decide to conduct a survey with the incoming ninth-grade students to find out what sizes of each style to order.

The results of the survey are shown in the table. They plan to use this information to determine the specifics of the order for the uniforms. Use the results of the survey to find the **minimum** number of each size for girls **and** for boys that should be ordered for the incoming ninth-grade students.

	EXTRA LARGE	LARGE	MEDIUM	SMALL	TOTAL
GIRLS	2	10	36	12	60
BOYS	9	25	10	6	50

In the shaded area below, show your work and explain the steps you used to justify your answer. Numerical answers must always be labeled.

For full credit, you **must** do the following:

1. Show all the steps you used to solve the problem. If you used a calculator or did some of the work in your head, you must write a description of the steps that you followed.

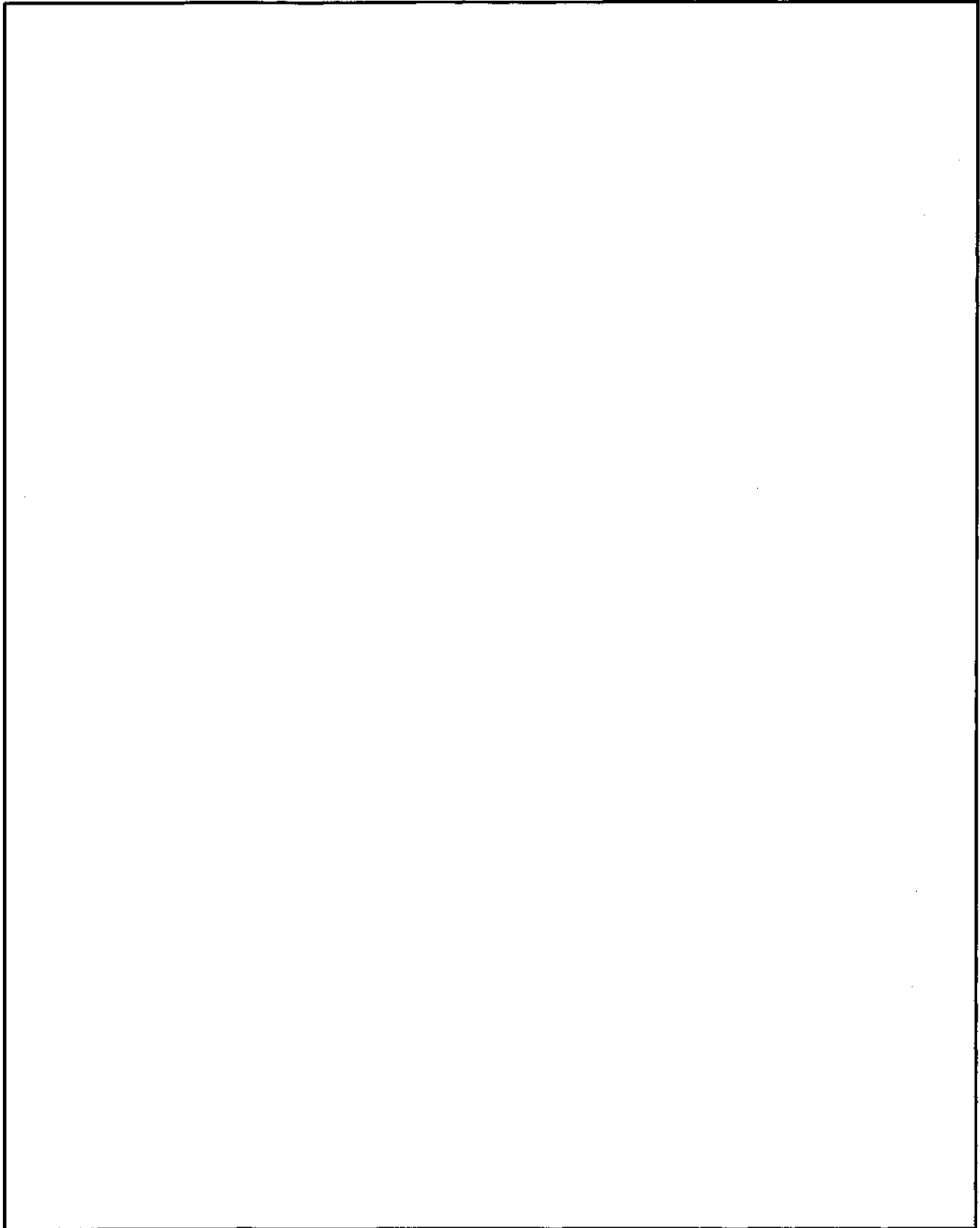
AND

2. Write an explanation stating the mathematical reason(s) **why** you chose each of your steps.

IF YOU NEED MORE SPACE, PLEASE USE NEXT PAGE.

GO ON 

30. *Continued.* If you need more space, use this page. Please refer to previous page for task explanation.



IF YOU NEED MORE SPACE, PLEASE USE NEXT PAGE.

GO ON 

Grade 11 Sample Response for Category 5

64. Dwyane and Jonra decided that they are going to make and sell pine cone wreaths to make some extra money. Their parents agree to let them use the garage to make the wreaths if they pay \$50 per month for electricity and heat. They estimate that they can make and sell 40 wreaths per month in the evenings and on weekends. They determine that the materials will cost about \$3.50 per wreath. Each one of them wants to make at least \$100 per month profit. What is the least amount Dwayne and Jonra must charge for each wreath?

For full credit, you must do the following:

1. Show all the steps you used to solve the problem. If you used a calculator or did some of the work in your head, you must write a description of the steps that you followed.

AND

2. Write an explanation stating the mathematical reason(s) why you chose each of your steps.

First we need to see how much they need to spend each month.

$$40 \text{ wreaths} \times 3.50 \text{ and } +50 \text{ for heat \& elec.}$$
$$140 + 50 = 190 \text{ dollars per month}$$

then to determine price we need to make an equation. if x is the price, then:

$$40x - \overset{+190}{\text{their expenses}} \geq \overset{+100}{\text{their added desired profit}}$$

$$40x \geq 390$$

$$x \geq 9.75$$

at least \$9.75 they must charge for each wreath

5 - Response uses algebraic method by first calculating total production costs. An equation relating the income, less costs, to profits is constructed. The variable (x) is defined and the correct answer (\$9.75) is found. All work is shown and clearly explained. The use of labeling is acceptable for the algebraic method when all parts of the equation are clearly defined.