

"In The Name of God"

Second Trimester Exam

8th Grade

Mathematics

February, 2007

Read every question carefully and answer the questions based on what you are asked.

Do not leave any question blank and show your work.

You may not leave the exam early; even if you are finished, review the test until the end of the designated time.

Show your work on the paper and make sure you write units.

Please do not ask any unnecessary questions during the test.

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Part (I): Solve for x in the following equations

$$1) 64^{(1-x)} = \frac{1}{16^{(2x)}}$$

$$2) (5 - x)(3x - 2) + x^2 - 2x - 15 = 0$$

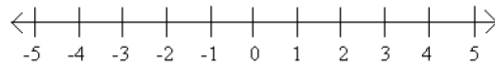
$$3) \sqrt[4]{3x - 1} = 2 \times \sqrt[4]{\frac{x}{16}}$$

$$4) \frac{5xy - 2x + 2y}{(x-1)} = y$$

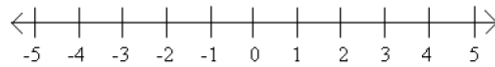
Part(II): Solve and graph each of the following inequalities

1) Graph the system $\begin{cases} y > 3x - 4 \\ x + 2y \leq 6 \end{cases}$

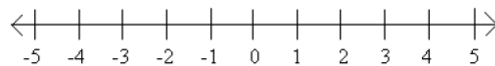
2) Solve and graph $\{x|3(x - 2) \leq 6\} \cap \{x|-2(x - 3) < 5\}$



3) Solve and graph $\{x|-(x - 4) > 5\} \cup \{x|3x - 7 > 3\}$



4) Solve and graph $\left\{\left|\frac{5-2x}{5}\right| \leq 3\right\} \cap \{-x + 12 < 3\}$



Part(III): Simplify the following expressions

$$1) \left(\frac{x^{-2}y^3z^{-4}}{x^3y^{-5}z^0} \right)^{-1} =$$

$$2) \frac{\sqrt[3]{x^2y} x^{\left(\frac{1}{3}\right)}}{\sqrt[6]{x^3y} y^{\left(\frac{1}{6}\right)}} =$$

$$3) \frac{x^2-25}{x-5} + \frac{x^2-6x-16}{x+2} =$$

$$4) (-2) \left(\begin{bmatrix} 0 & -1 \\ -3 & -3 \end{bmatrix} - \begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix} \right) =$$

5) Find the point of intersection between lines in questions 2 and 3 and graph the two lines to show the point at which they intersect.

6) If 1 and -2 are both solutions of the equation $ax^2 + bx - 12 = 0$, then find the coefficients a and b :

7) Solve the following system of linear equations:
$$\begin{cases} x + \frac{y}{2} - \frac{3z}{2} = -\frac{7}{2} \\ 3x - y + 2z = 0 \\ 2x + 2y - z = -2 \end{cases}$$

- 5) Suppose a car travels at 100 kph for 4 hours and then at 120 kph for 6 hours and finally for 60 kph for 2 hour. What is the average speed of the car?
- 6) Suppose we have \$2.72 in coins. If the number of dimes is 3 times as many as nickels and the number of quarters is 4 more than 2 times as many as nickels, and there are as many nickels as pennies, how many of each coin do we have?
- 7) Suppose 5 pens an 2 pencils cost \$16 and 4 pens and 5 pencils cost \$23. What is the cost of 3 pens and 10 pencils?

Part(VII): Graphing functions

For each of the following functions, graph and determine the domain and range

1) $y = -3 \times 2^x - 4$

2) $y = |2x - 2| + 2$

3) $y = 2 \times 3^x + 2$

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

5) $y = -|x| - 1$

Part(VIII): Factoring/Multiplying polynomials

1) $(3x^3 - 2x^2 + x - 1)(-x^2 - x + 3) =$

2) $(x - y)^5 =$

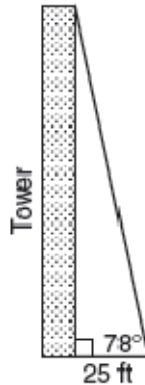
3) Factor completely: $2b^3 + 3b^2 - 8b - 12$

4) Solve for the variable in: $a^2 - 11a + 24 = 0$

5) Factor: $2x^3 + 2x^2 - 60x$

Part(IX): Solve the following problems

- 1) From a point on level ground 25 feet from the base of a tower, the angle of elevation to the top of the tower is 78° , as shown in the accompanying diagram. First find hypotenuse as you see in the picture. Then use the Pythagorean Theorem to find the height of the tower, to the nearest tenth of a foot.

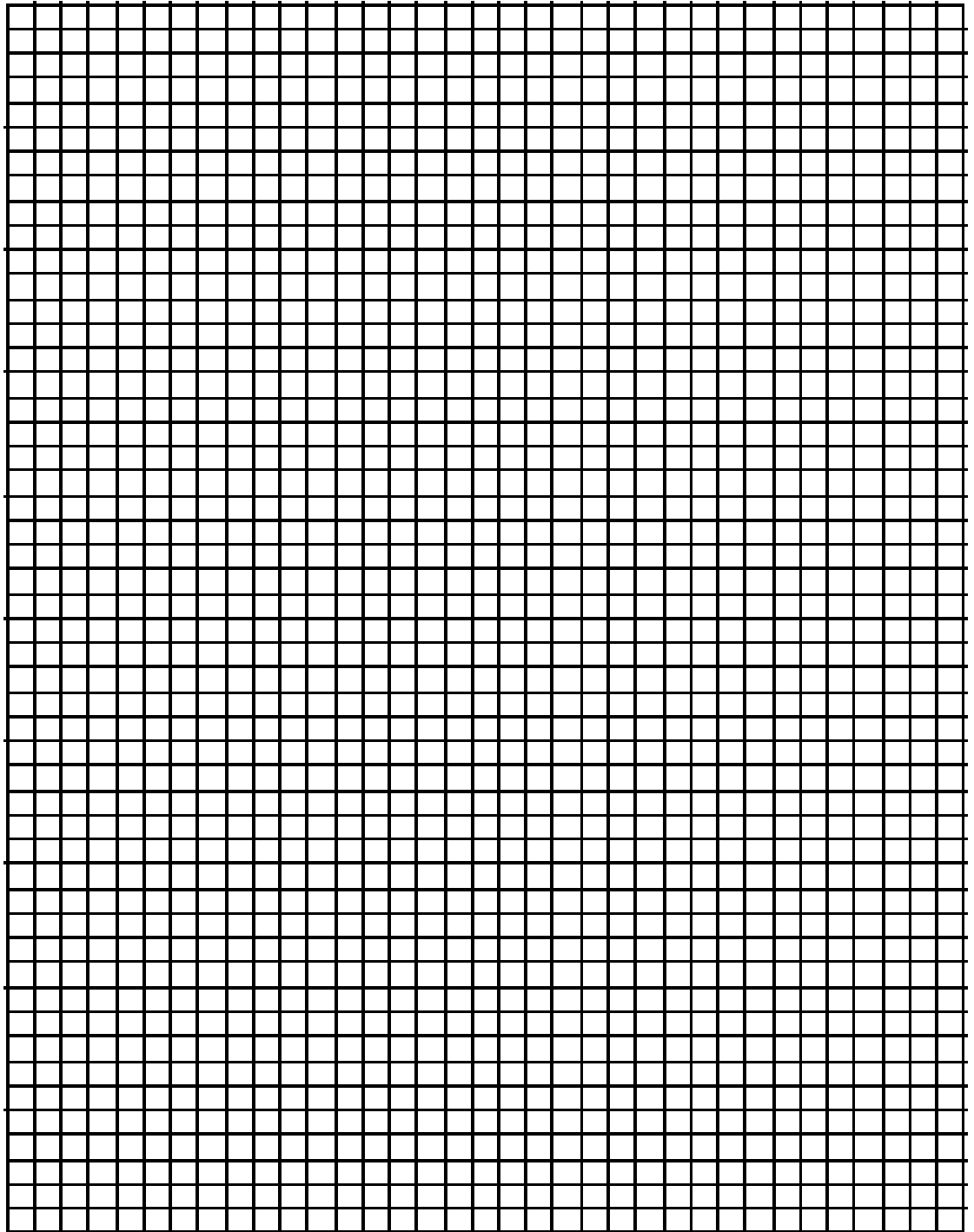


- 2) Suppose the price of an item has been reduced by 20% and then by 10%. By what percent must we increase the price in order for the price to be 5% less than the original price?
- 3) Suppose the price of an item has been increased by 60%. By what percent must we reduce it to get back to the original price?

Scrap Graph Paper — This sheet will not be scored.

Top line

Bottom line



Extra Credit:

- 1) Suppose there is a bicycle with wheels of different sizes such that one wheel has a *radius* of 4 meters and the other has a *diameter* of 4 meters; if someone rides this bicycle around a circular land and the smaller wheel turns 400t times, then find the area of the circular land (hint: you first have to find the circumference, then the radius, then the area)
- 2) A man can pour a cement slab in 2 hours less than his friend. If they work together, they could do it in $2\frac{2}{5}$ hour. How long does it take each to pour the slab alone?
- 3) Two consecutive even integers have a product of 634. What are the numbers?