Newton Chinese Language School
Math 7 Fall Final Exam   1/29/2012   Name: _____

**Multiple Choice Questions (4 points each, 72 points total)**

1. If $2x + 3y = 18$ and $x - 2y = -5$, then $xy = ?$

   A. 12   B. -12   C. -15   D. 15   E. 34

2. Your teacher is giving a test worth 120 points. There are a total of 30 five-point and two-point questions. How many two-point questions are on the test?

   A. 18   B. 20   C. 10   D. 12   E. 15

3. Simplify $\dfrac{4x^3y^2}{4xy} * \dfrac{8xy^3}{4y^2}$:

   A. $2x^2y^3$ B. $4x^2y$ C. $2x^3y^2$ D. $2x^2y^4$ E. $2xy^3$

4. Rewrite $4.8 * 10^{-6}$ in decimal form.

   A. 0.000048   B. 4,800,000   C. 0.00000048   D. 48,000,000   E. 0.0000048

5. Evaluate the product $(2.4 * 10^4) * (7.2 * 10^5)$. Write the result in scientific notation

   A. $1.728 * 10^8$ B. $1.728 * 10^{10}$ C. $17.28 * 10^1$ D. $17.28 * 10^9$ E. $17.28 * 10^{20}$

6. In 1992 you bought a rare stamp for $400 that you expect to increase in value 8% each year for the next 15 years. Write an exponential growth model and estimate the value of the stamp in 2002.

   A. $881.17   B. $799.60   C. $863.57   D. $932.66   E. $1268.87

7. Evaluate $(5^{-3})^2$

   A. -3125 B. $-\dfrac{1}{15,625}$ C. $\dfrac{1}{3125}$ D. $\dfrac{1}{15,625}$ E. $15,625$

8. A business had a profit of $142,000 in 1994. Then its profit decreases by 8% each year for the next 6 years. Which model would you use to find how much the business earned in the year 2000. Let E represent the earnings and let t represent the year.

   A. $E = 142,000(0.08)^t$ B. $E = 142,000(0.96)^t$ C. $E = 142,000(0.92)^t$

   D. $t = 142,000(0.08)^E$ E. $E = 0.92(142,000)^t$

9. Which one of the following is a solution of the equation $\frac{2}{3}t^2 - 7 = 17$?

   A) -6   B) -4   C) 4   D) $\sqrt{5}$ E) $\sqrt{24}$

10. You drop a rock from a bridge 320 feet above a river. How long will the rock take to hit the river?

    A) 2.5 secs   B) 3.5 secs   C) 3.8 secs   D) 4.5 secs   E) 5.5 secs

11. An object is launched directly upward at 64 ft/s from a platform 80 feet high. What will be the object's maximum height?

    A) 120 ft   B) 144 ft   C) 160 ft   D) 98 ft   E) 88 ft

12. The surface area S of a cube is 150 square feet. What is the length (in feet) of each edge of the cube?

    A) ±5 B) $5\sqrt{6}$ C) 5   D) 25   E) None of these

13. Find the area of a rectangle of one side $\sqrt{12}$ and another side $\sqrt{20}$.

    A) $20\sqrt{3}$ B) 240   C) 60   D) $12\sqrt{5}$ E) $4\sqrt{15}$

14. Suppose that one leg of a right triangle is 12 inches while the hypotenuse is $4\sqrt{10}$ inches. What is the length of the other leg?

    A) 4 inches   B) 6 inches   C) 3 inches   D) 8 inches   E) 10 inches

15. A garden measuring 12 meters by 16 meters is to have a pedestrian pathway installed all around it, increasing the total area to 285 square meters. What will be the width of the pathway?

   A) 1.2 meters   B) 1.3 meters   C) 1.4 meters   D) 1.5 meters   E) 1.6 meters

16. What is the x-coordinate of the vertex for the graph of $y = -\frac{1}{2}x^2 - x + 8$?

   A) -2   B) -1   C) $\frac{1}{2}$ D) $\frac{1}{2}$ E) 1

17. What are the x-intercepts of the graph of $y = -x^2 - 6x + 40$?

   A)   4 and 10   B) -7 and 1   C) -10 and 4   D) -8 and 2   E) -11 and 5

18. The width of a rectangle is 16 feet less than 3 times the length. If the area is 35 square feet, what are the dimensions of the rectangle?

   A)   5 ft and 6 ft   B) 6 ft and 7 ft   C) 5 ft and 7 ft   D) 4 ft and 6 ft   E) 4 ft and 5 ft

Graph Inequalities (10 point)

19. $-x^2 - 2x + 3 \geq y$ and $y > x + 1$ (pick your x axis and y axis wisely so the solution area is in the grid)
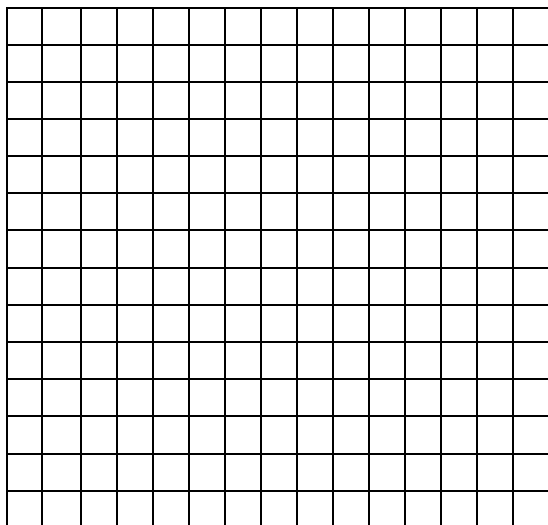
Solve Problems below. Show steps.

20. Solve $x^2 - 2bx - a^2 + b^2 = 0$ (8 points)

21. An object is launched from ground level directly upward at 64 ft/s. For how long is the object at or above a height of 48 feet?   (10 points)

Bonus Problems (use the back side if you need more space)

Prove that any two mirroring points on a parabola ($y = ax^2 + bx + c$), its mid point is always $x = -\frac{b}{2a}$. (for two points (x_1, y_1), (x_2, y_2), its mid point is ($\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$)) (20 points)