

Math 70

Third Test

Fall 2011

Closed book, closed notes. No calculator.

This test has 6 questions and is worth 100 points. You may have fifty minutes to do this test.

Read the instructions carefully. Show all your work, including algebraic steps to the solution for equations. A naked answer, even if correct, may not earn you full credit. If you need more room, you may use scratch paper.

1. (6 points) Write 1.6×10^{-5} in decimal form.

0.000016

3 for < 1
3 for right

2. (20 points) Use an equation to solve the following problem. Remember to define your variable, write your equation, solve your equation, and write your answer in an English sentence.

There are several actors who have played James Bond in the movies, including Sean Connery, Roger Moore, and Timothy Dalton. Sean has starred in 3 times as many James Bond movies as Timothy. Roger has starred in 5 more James Bond movies than Timothy. Combined, they have starred in 15 James Bond movies. How many movies has each of the actors starred in?

Let $T = \#$ of James Bond movies for Timothy (3)

Sean Connery: $3T$ (2)
Roger Moore: $T+5$ (2)

(3) $\rightarrow T + 3T + T + 5 = 15$
 $5T + 5 = 15$
 $5T = 10$
(3) $\rightarrow T = 2$

Tim: 2
Sean: 6 (4)
Roger: 7

15 ✓

Timothy Dalton starred in 2 movies,
Sean Connery starred in 6 movies,
and Roger Moore starred in 7 movies (3) sentence

3. (24 points) Use the rules of exponents to simplify the following. Write your answer using only positive exponents. Assume all variables represent non-zero numbers.

6

$$a. \frac{4y^3}{12y^7} = \frac{1}{3y^4}$$

2 #s
2 come out ans
(+ 2 pos exp)

10

$$b. (2xy^{-3}z^0)^3 = (2xy^{-3})^3 = 2^3 x^3 (y^{-3})^3 \leftarrow \textcircled{2} \text{ for distributing}$$

$$= 8x^3 y^{-9} = \frac{8x^3}{y^9} \textcircled{2}$$

↑ = 1
②

① ① ②

8

$$c. \left(\frac{x^{-2}}{y^{-3}}\right)^2 = \left(\frac{y^3}{x^2}\right)^2 = \frac{(y^3)^2}{(x^2)^2} = \frac{y^6}{x^4} \leftarrow \textcircled{2}$$

↑

④ for correctly translating neg. exponents

For your reference, here are some rules of exponents:

$$x^a \cdot x^b = x^{a+b}$$

$$\frac{x^a}{x^b} = x^{a-b}$$

$$\frac{x^a}{x^b} = \frac{1}{x^{b-a}} \text{ (handy if } b > a)$$

$$(x^a)^b = x^{ab}$$

$$(xy)^a = x^a y^a$$

$$\left(\frac{x}{y}\right)^b = \frac{x^b}{y^b}$$

$$x^0 = 1, \text{ provided } x \neq 0$$

$$x^{-n} = \frac{1}{x^n}, \text{ provided } x \neq 0$$

4. (6 points) Write ~~9,300,000,000~~ using scientific notation.

$$9.3 \times 10^9$$

2 for correct decimal part
2 for positive exponent
2 for correct

5. (24 points) Perform the indicated operations and simplify your answer completely.

a. $(x^3 - 12x - 5) - (2x^2 - 7x - 4)$ \leftarrow ③ for distributing minus sign

$$= x^3 - 12x - 5 - 2x^2 + 7x + 4$$

$$= x^3 - 2x^2 - 5x - 1$$

③ for combining like terms

-③ for combining unlike terms

b. $(3x - 5)(x + 4) = (3x)(x) + (3x)(4) + (-5)(x) + (-5)(4)$

$$= 3x^2 + 12x - 5x - 20 \leftarrow$$

$$= 3x^2 + 7x - 20$$

③ for combining like terms

15 ⑧ for correct 4 products

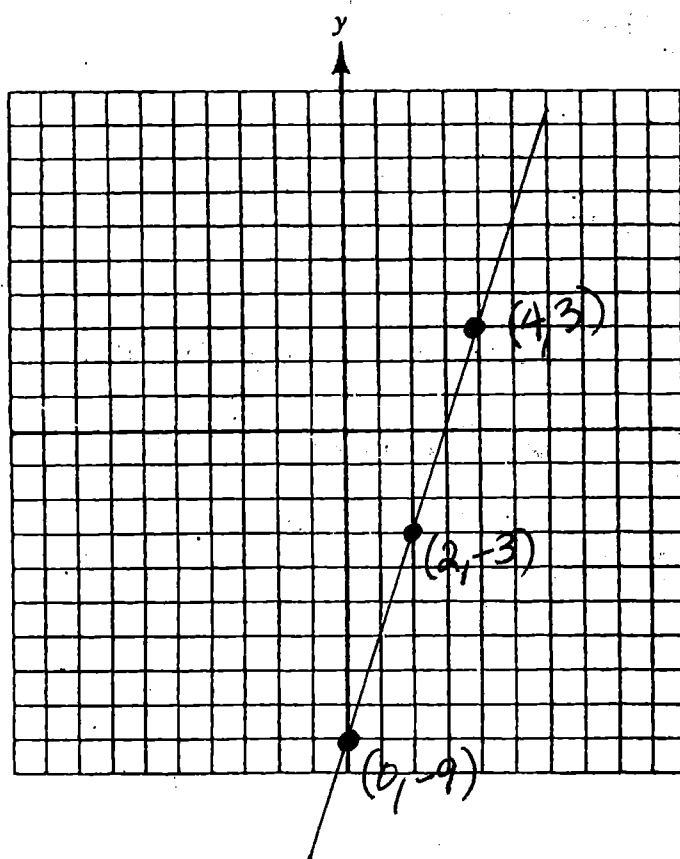
④ more for correctly multiplying

6. (20 points) Complete the three ordered pairs so that each is a solution of $3x - y = 9$. Then plot each solution and graph the equation on the grid provided by connecting the points by a straight line. Be sure to label your points.

$$\begin{aligned} (0,) \quad x=0 & \textcircled{1} \\ 3(0) - y = 9 & \textcircled{1} \\ -y = 9 & \textcircled{2} \\ \boxed{y = -9} & \textcircled{2} \\ (0, -9) & \textcircled{1} \\ \textcircled{5} & \end{aligned}$$

$$\begin{aligned} (, 3) \quad y=3 & \textcircled{1} \\ 3x - 3 = 9 & \textcircled{1} \\ 3x = 12 & \textcircled{2} \\ \boxed{x = 4} & \textcircled{2} \\ (4, 3) & \textcircled{1} \\ \textcircled{5} & \end{aligned}$$

$$\begin{aligned} (2,) \quad x=2 & \textcircled{1} \\ 3(2) - y = 9 & \textcircled{1} \\ 6 - y = 9 & \textcircled{2} \\ -y = 3 & \textcircled{2} \\ \boxed{y = -3} & \textcircled{2} \\ (2, -3) & \textcircled{1} \\ \textcircled{5} & \end{aligned}$$



③ for plotting the points

② for the line