MATH 53 **Name** ______________________________

FINAL EXAM REVIEW

Final Exam Study Suggestions

The 50 question, multiple-choice final exam consists of two parts: no calculator and calculator. To help you thoroughly study for the final exam, the mathematics department has prepared this review packet. The review contains 50 open-response questions (A) and 50 multiple-choice questions (B). After working all the open-response questions, use the multiple-choice questions as a practice test. Set aside a 2 hour block of time and complete the multiple-choice questions without using your notes, text, or a tutor. Use the answer key to check your work and pay close attention to the questions you get wrong. Additional practice on the concepts giving you difficulty is suggested. Refer to your notes or text for additional practice problems. Seek help from your instructor or a tutor.

Additional study tips are:

Be sure to: factor, simplify, reduce — *COMPLETELY!*

- Watch for sign errors!
- Check your answer in the problem.
- Final Exam problems combine ideas—think through the steps necessary to get the correct answer.
- Be sure to study ideas that look similar, but are very different:

$$\frac{6}{0} \; vs. \; \frac{0}{6}$$

$$-(-3) \; vs. \; -|-3|$$

$$-3^2 \; vs. \; (-3)^2$$

area vs. perimeter

different forms of linear equations

- Use the distinguishing characteristics of equations (linear vs. quadratic vs. rational) to guide you in selecting an appropriate method for solving.
- Complete the Math 53 Review in time to get help from the LAC and/or your instructor. Do not wait until the day before the Final Exam.
- Know when your final is scheduled:

  Day and Date ______________________________

  Time ______________________________

  Room ______________________________

  Bring sharpened N$^{o.}$ 2 pencils with erasers, a calculator, your Schoolcraft ID number and
  - Scantron® N$^{o.}$ F-1712-PAR-L
- Review questions 1-8, and 36-39 reflect the type of skills tested on the <u>no</u> calculator part of the test.

Directions: Complete these problems in the space provided. Write neatly and show work.

	Answer Column

I. Notation, Terminology and Order of Operations

Simplify the following:

1A. $5[-1+(2-4)]$

1A. ____________________

1B. $-7[4-(3-6)]$

1B.
a. 0
b. 49
c. –49
d. –7

2A. $\left[3-5\left|-1-4\right|\right]+6$

2A. ____________________

2B. $12-\left[4+3\left|-5-2\right|\right]$

2B.
a. 37
b. 61
c. –5
d. –13

3A. $\dfrac{-3-5}{-8(2)-4(-4)}$

3A. ____________________

3B. $\dfrac{-6(4)-8(-3)}{-8+2}$

3B.
a. 0
b. undefined
c. –6
d. –16

4A. $-2^2 - (-2)^2 + 10$

4A. ____________________

4B. $-5^2 + (-5)^2 + 4$

4B.
a. 54
b. 4
c. –46
d. 0

5A. If $x = -5$ and $y = -2$ then $x^2 - y^3 =$

5A. ____________________

5B. Let $x = -2$ and $y = -8$.

Evaluate $\frac{xy}{(y-x)^2}$

5B.
a. $\frac{4}{9}$
b. $-\frac{1}{10}$
c. $\frac{4}{25}$
d. $\frac{4}{15}$

6A. Fill in the blank with <, > or = to make each statement true.

I. $8-(-8)$ _______ $(8)(0)(-8)$

II. $\sqrt{13}$ _______ 6

III. $\frac{2}{3}$ _______ 0.6

IV. $\frac{-12}{2}$ _______ $\frac{12}{-2}$

6A.
I. ________________
II. ________________
III. ________________
IV. ________________

6B. Identify the false statement(s) from the list below.

I. $\frac{1}{3} = 0.3$

II. $-\left|-4\right| > -(-4)$

III. $-5+5 = (-5)(0)(5)$

IV. $\sqrt{3} < \frac{9}{4}$

6B.
a. III
b. IV
c. I & IV
d. I & II

7A. Determine which of the following statements are true.

I. Every whole number is an integer.

II. $\frac{1}{4}$ is an integer.

III. 0 is a rational number.

IV. $\sqrt{25}$ is a irrational number.

V. Every natural number is a rational.

7A. ____________________

7B. Given the set $\left\{-3, -1\frac{1}{2}, 0, \pi, \sqrt{17}, \frac{22}{3}, 8.5\right\}$, list all the rational numbers.

7B.
a. $-3, -1\frac{1}{2}, 0, \frac{22}{3}, 8.5$

b. $-3, -1\frac{1}{2}, \frac{22}{3}, 8.5$

c. $\pi, \sqrt{17}$

d. $-1\frac{1}{2}, \frac{22}{3}$

II. Linear Equations in Two Variables

8A. Verify that (–2, 6) satisfies $y = -x + 4$.

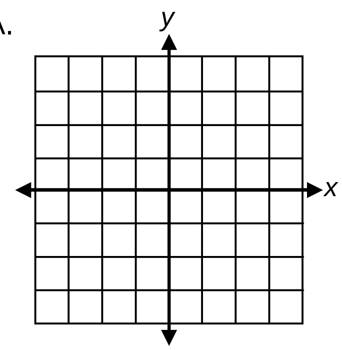
8A. ____________________

8B. Which ordered pair is a solution of $2x + 3y = -8$?

8B.
a. (4, 0)
b. (–4, 2)
c. (2, –4)
d. (–2, 4)

9A. Graph the equation $y = \frac{5}{3}x - 2$.

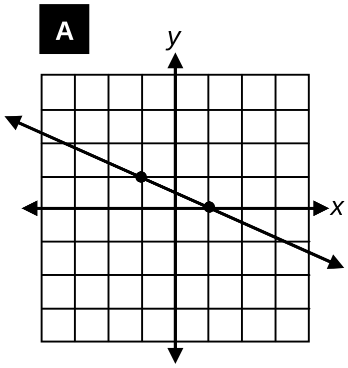
9A.



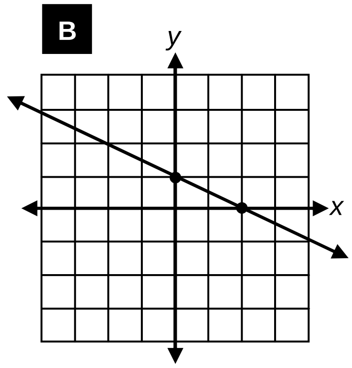
9B. Which of the choices below is the graph of the equation $y = \frac{-1}{2}x + 1$?

9B. ____________________

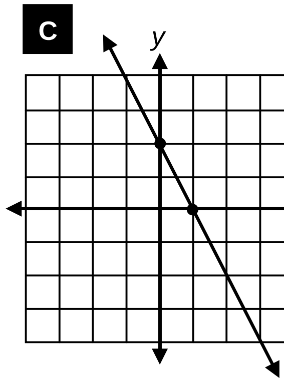
A



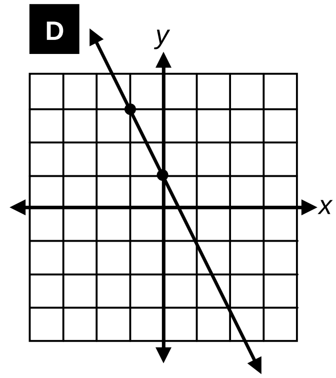
B



C

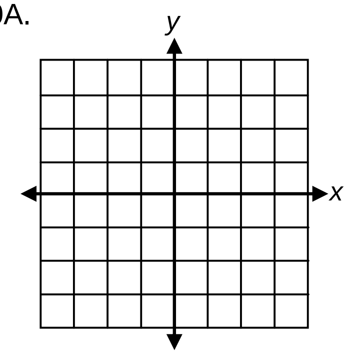


D



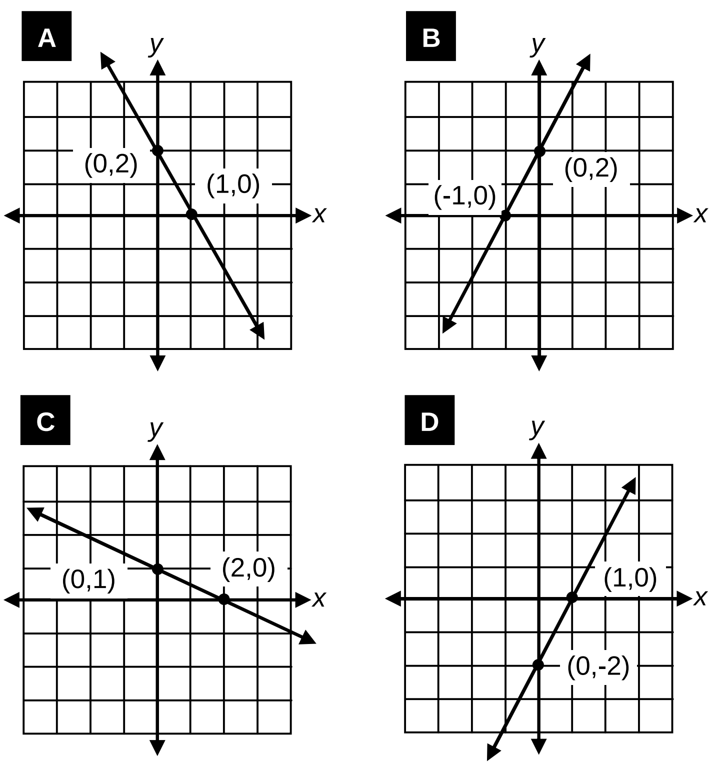
10A. Graph $-2x+3y=6$ by finding the x- and y-intercepts.

10A.

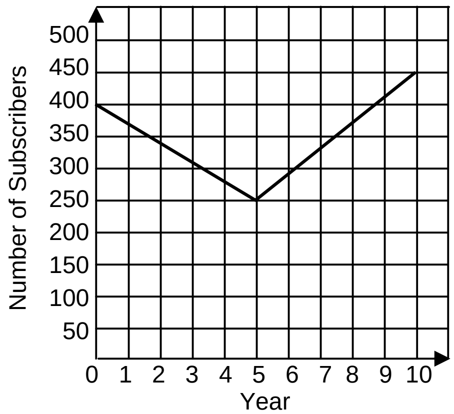


10B. Which of the choices below is the graph of $x+2y=2$?

10B. ____________________



11A. The graph shows the number of subscribers to a newspaper over a ten-year period.



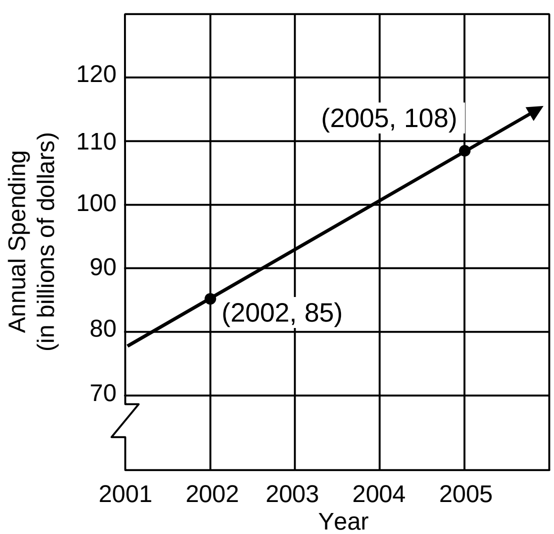
1. Find the rate of change over the first five year period.

2. Find the rate of change between year five and year ten.

11A. 1.________________

2.________________

11B. The graph shows the U.S. government's projected spending (in billions of dollars) on technology. Find the slope of the line and write the slope as a rate of change. Don't forget to attach the proper units.



11B. a. $m = \frac{3}{23}$
increase of approximately \$0.13 billion/year

b. $m = \frac{23}{3}$
increase of approximately \$7.67 billion /year

c. $m = -\frac{23}{3}$
decrease of approximately \$0.13/year

d. $m = \frac{23}{3}$
increase of approximately \$7.67/year

12A. Determine the x- and y-intercepts of $x - 2y = -8$.

12A. x-intercept is ______.

y-intercept is ______.

12B. Determine the x- and y-intercepts of $-2x + 5y = 10$.

12B.
a. x-intercept: (–2,0)
   y-intercept: (0,5)

b. x-intercept: (0, –5)
   y-intercept: (2,0)

c. x-intercept: (2,0)
   y-intercept: (0, –5)

d. x-intercept: (–5,0)
   y-intercept: (0,2)

13A. Fill in the blanks:

I. The graph of $x = c$ is a __________ line with intercept __________.

II. The graph of $y = c$ is a __________ line with intercept __________.

13A. I.________________

II.________________

13B. The graph of $x = 5$ is a:

13B.
a. vertical line passing through (0,5).

b. horizontal line passing through (5,0).

c. vertical line passing through (5,0).

d. horizontal line passing through (0,5).

14A. Write the point-slope form of the equation for the line that contains the points (5, –3) and (2, 1).

14A. ____________________

14B. Select a point-slope form of the line that contains the points (6, 7) and (4, –3).

14B.
a. $y-3=5(x+4)$
b. $y-4=5(x+3)$
c. $y+3=5(x-4)$
d. $y-4=\frac{1}{5}(x+3)$

III. Functions

15A. Find $f\left(\frac{-4}{5}\right)$ for $f(x)=1-5x$.

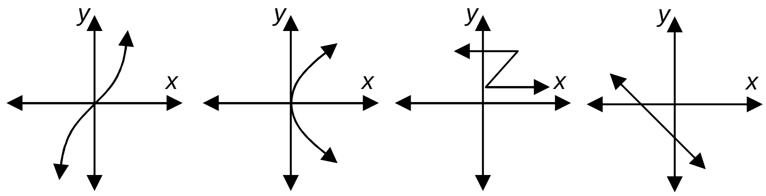
15A. ____________________

15B. Given $g(x)=x^3-x$ find $g(-3)$.

15B.
a. –30
b. 30
c. –24
d. 24

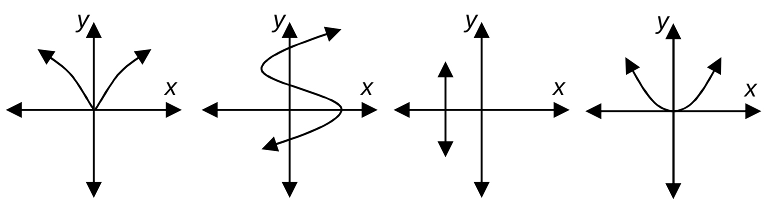
16A. Identify the graphs that are functions. 16A. ________________

I. II. III. IV.



16B. Identify the graphs that are functions.

I. II. III. IV.



16B.
a. III only
b. I and IV
c. I, III and IV
d. all are functions

17A. Find the domain: 17A. ________________

$$f(x) = \frac{4}{x+3}$$

17B. Find the domain:

$$g(x) = \frac{x+1}{x-2}$$

17B.
a. $\{x \mid x$ is a real number and $x \neq -1\}$

b. $\{x \mid x$ is a real number and $x \neq 2\}$

c. $\{x \mid x$ is a real number and $x \neq 0\}$

d. $\{x \mid x$ is a real number and $x \neq -1$ and $x \neq 2\}$

IV. Properties of Exponents

18A. $(2xy)^0 + 3^0 - 5x^0$

18A. ____________________

18B. Simplify: $(-4a)^0 - 4^0 + 2a^0$

18B.
a. 3
b. 1
c. –6
d. 2

19A. Simplify: $\dfrac{(5xy^{-3})^{-2}}{xy^{-2}}$

19A. ____________________

19B. Simplify: $\left(\dfrac{a^4b^{-2}}{a^{-3}b}\right)^{-3}$

19B.
a. $\dfrac{a}{b^2}$
b. $\dfrac{b^5}{a^9}$
c. $\dfrac{b^9}{a^{21}}$
d. $\dfrac{b^3}{a^3}$

20A. Express in standard notation: 9.02×10^{-6}

20A. ________________

20B. Express in scientific notation: 70,400,000

20B.
a. 70.4×10^{-6}
b. 7.04×10^{-7}
c. 70.4×10^{6}
d. 7.04×10^{7}

V. Polynomials

21A. Find the sum: $(11x^2 - 5x - 9) + (4x^3 - 6x + 3)$

21A. ________________

21B. Find the difference:
$(4y^3 - 5y^2 - 8y + 1) - (9y^3 + 4y^2 - 2y - 8)$

21B.
a. $-5y^3 - y^2 - 10y - 7$
b. $-5y^3 - 9y^2 - 6y - 7$
c. $-5y^3 - 9y^2 - 6y + 9$
d. $5y^3 - y^2 - 10y - 7$

22A. Find the product: $(x-3)(x^2+3x+9)$

22A. ________________

22B. Find the product: $(2x-4)(3x^2-7x+8)$

22B.
a. $6x^3-2x^2+12x-32$
b. $6x^3-26x^2+44x-32$
c. $6x^3-26x^2-12x-32$
d. $6x^2-26x^2-12x-32$

23A. Find the product: $2(3x-2)(3x+2)$

23A. ________________

23B. Find the product: $3(2x-5)^2$

23B.
a. $12x^2-60x+75$
b. $36x^2-180x+225$
c. $12x^2+60x+75$
d. $36x^2+180x+225$

24A. Perform the division: $\dfrac{4a^3 - 8ab^3 + 3b}{48a^2b}$

24A. ____________________

24B. Perform the division: $\dfrac{15a^4 - 6a^2 + 12}{3a}$

24B.
a. $5a^3 + 2a$

b. $5a^3 - 2a + \dfrac{4}{a}$

c. $5a^3 - 6a^2 + 12$

d. $15a^4 - 2a + 12$

25A. Perform the division: $\dfrac{8x^2 - 20x + 12}{2x - 3}$

25A. ____________________

25B. Perform the division: $\dfrac{9x^2 + 21x + 5}{3x + 5}$

25B.
a. $3x + 21x$

b. $3x + 2 + \dfrac{5}{3x + 5}$

c. $3x + 8$

d. $3x + 2 - \dfrac{5}{3x + 5}$

VI. Factoring

26A. Find the greatest common factor:
$20x^2y^3 - 30x^3y^4 + 45xy^3$

26A. ____________________

26B. Find the greatest common factor:
$18a^2b^5 - 36ab^3 - 27ab^2$

26B.
a. $3a^2b^2$
b. $9a^2b^3$
c. $9ab^2$
d. $3ab^2$

27A. Factor completely: $x^2 + 5x - 24$

27A. ____________________

27B. Factor completely: $x^2 - 9x + 20$

27B.
a. $(x-10)(x-2)$
b. $(x+10)(x+2)$
c. $(x+5)(x-4)$
d. $(x-5)(x-4)$

28A. Factor completely by grouping: $4ax - 8bx - 3a + 6b$

28A. ____________________

28B. When $ab - 2b + 3a - 6$ is factored completely by grouping, one of the factors is:

28B.
a. $a - 2$
b. $a + 2$
c. $b - 3$
d. $a + 3$

29A. Factor completely: $2y^2 - 5y - 3$

29A. ____________________

29B. When $6x^2 - x - 2$ is factored completely, one of the factors is:

29B.
a. $(2x - 2)$
b. $(2x - 1)$
c. $(3x - 2)$
d. $(3x - 1)$

30A. Factor completely: $8b^3 - 1$

30A. ______________

30B. When $64x^3 + y^3$ is factored completely, one of the factors is:

30B.
a. $4x^2 - 2xy + y^2$
b. $16x^2 + 4xy + y^2$
c. $4x^2 + 2xy + y^2$
d. $16x^2 - 4xy + y^2$

VII. Rational Expressions

31A. Simplify the rational expression: $\dfrac{x^2 - 2x}{x^3 + 2x^2 - 8x}$

31A. ______________

31B. Simplify the rational expression: $\dfrac{x^2 - 1}{x - 1}$

31B.
a. x
b. $x + 1$
c. $x - 1$
d. $\dfrac{1}{x + 1}$

32A. Divide: $\dfrac{x^2+3x+2}{x^2+2x+1} \div \dfrac{x^2-4}{x+1}$

32A. ____________________

32B. Divide: $\dfrac{x^2-16}{4x-12} \div \dfrac{x^2-2x-8}{x^2-x-6}$

32B. a. $\dfrac{x+4}{4}$

b. $\dfrac{x^2-16}{4x-16}$

c. $\dfrac{x}{4}$

d. $\dfrac{4}{x+4}$

33A. Add: $\dfrac{1}{x+6} + \dfrac{2}{x^2+11x+30}$

33A. ____________________

33B. Add: $\dfrac{-5}{x-3} + \dfrac{9x+3}{x^2-9}$

33B. a. $\dfrac{9x-2}{x^2+x-12}$

b. $\dfrac{4}{x+3}$

c. $\dfrac{-5}{x^2}$

d. $\dfrac{9x-2}{(x-3)(x+3)}$

34A. Subtract: $\dfrac{x^2 - x}{x - 3} - \dfrac{6x - 12}{x - 3}$

34A. ____________________

34B. Subtract: $\dfrac{10x + 3}{x + 3} - \dfrac{7x + 3}{x + 3}$

34B.
a. 1

b. $\dfrac{x}{x + 1}$

c. $\dfrac{x + 3}{3x}$

d. $\dfrac{3x}{x + 3}$

35A. Simplify:

$$\dfrac{\dfrac{16}{d^2} - 1}{\dfrac{4}{d} - 1}$$

35A. ____________________

35B. Simplify:

$$\dfrac{\dfrac{x}{8} - \dfrac{8}{x}}{1 - \dfrac{8}{x}}$$

35B.
a. $x + 8$

b. $\dfrac{x}{8}$

c. $\dfrac{x^2 - 64}{8x - 64}$

d. $\dfrac{x + 8}{8}$

VIII. Solving Equations (linear in one variable, formulas, quadratic and rational)

36A. Solve for x: $x - 6(x + 2) = -7(x - 3) + 10$

36A. ____________________

36B. Solve for x: $2(x + 3) - 5 = 7x - 3(x - 2)$

36B.
a. $x = 0$
b. $x = \frac{7}{2}$
c. $x = 1$
d. $x = -\frac{5}{2}$

37A. Solve for w: $P = 2\ell + 2w$

37A. ____________________

37B. Solve for x: $B = \frac{1}{3}xy$

37B.
a. $x = B - \frac{1}{3}y$
b. $x = 3B - y$
c. $x = \frac{3B}{y}$
d. $x = \frac{B}{3y}$

38A. Solve for x: $\frac{3x}{4} - 5 = \frac{x}{3} + 10$

38A. ____________________

38B. Solve for x: $\frac{x}{2} - 5 = \frac{2x}{5} - 2$

38B.
a. $x = 3$
b. $x = 0$
c. $x = 30$
d. $x = -70$

39A. Solve for x: $x^2 + x - 20 = 0$

39A. ____________________

39B. Solve for x: $x^2 - 3x - 10 = 0$

39B.
a. $x = 0, x = 3$
b. $x = 5, x = -2$
c. $x = -5, x = -2$
d. $x = -5, x = 2$

40A. Solve for x: $2x^2 = 8x$

40A. ____________________

40B. Solve for x: $x(3x+7) = 6$

40B.
a. $x = \frac{2}{3}, x = -3$
b. $x = -\frac{2}{3}, x = 3$
c. $x = -\frac{1}{3}, x = 6$
d. $x = -\frac{1}{3}, x = -6$

41A. Solve for x:

$$\frac{5}{3x-8} = \frac{x}{x-2}$$

41A. ____________________

41B. Solve for x:

$$\frac{7}{x+2} - \frac{3x+35}{x^2+7x+10} = \frac{3}{x+5}$$

41B.
a. no solution
b. $x = -64$
c. $x = 13$
d. $x = 6$

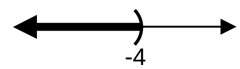
IX. Solving Inequalities

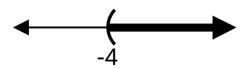
42A. Solve and graph the solution: $5x + 2 \le x - 6$

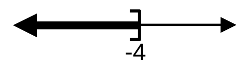
42A. ____________________

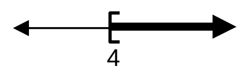
42B. Solve and graph the solution: $5x - 7 > 8x + 5$

42B.

a. 

b. 

c. 

d. 

43A. Solve and write the solution using interval notation:
$-11 \le 3 - 2x < 5$

43A. ____________________

43B. Solve and write the solution using interval notation:
$-4 \le 2x - 4 < 8$

43B.
a. $(-\infty, 6)$
b. $(0, 6]$
c. $(6, \infty)$
d. $[0, 6)$

X. Applications

44A. A gardener uses 76 ft. of fencing to enclose a rectangular shaped garden. The width of the garden is 2 ft. shorter than three times its length. Let x represent the length and write an equation to find the dimensions of the garden. What is the width?

44A. ________________

44B. A 21-foot beam is to be divided so that the longer piece is 1 foot more than four times the shorter piece. Write an equation to find the length of each piece, if x represents the length of the shorter piece.

44B.
a. $x(1+4x)=21$
b. $x+(1+4x)=21$
c. $x+4x=21$
d. $1+4x=21$

45A. Part of a $3,600 bonus was invested at 9% annual simple interest. The rest was invested at 8% annual simple interest. The total interest at the end of one year was $312. How much was invested in the 9% account?

45A. ________________

45B. Part of a $16,000 inheritance was invested at 13% annual simple interest and the rest was invested at 7% annual simple interest. At the end of one year the interest earned by the two investments was equal. How much was invested at 7%?

45B.
a. $5,600
b. $8,000
c. $10,400
d. $1,120

46A. A family drove to an amusement park at 50 miles per hour and returned on the same route at 40 mph. Find the distance to the amusement park if the total driving time was 7.2 hours.

46A. ________________

46B. While traveling to a meeting 295 miles from home, a salesman traveled for 2 hours at an average speed of 10 miles per hour more than the posted speed limit. After being stopped for speeding and issued a ticket, he finished the trip in 3 hours driving at the posted speed limit. Find the posted speed limit.

46B. a. 55 mph
b. 60 mph
c. 65 mph
d. 70 mpn

47A. The height of a triangle is 2 inches less than the base. If the area is 60 square inches, find the base.

47A. ________________

47B. A rectangle has a length which is five more than three times the width. Write an equation to find the dimensions of the rectangle if x represents the width and the area is 42 square feet.

47B. a. $42 = 2x + 2(3x + 5)$
b. $42 = x(3x + 5)$
c. $42 = x(3x - 5)$
d. $42 = 2x(3x + 5)$

48A. Find the length of the shorter leg of a right triangle if the longer leg is 3 cm more than the shorter leg and the hypotenuse is 6 cm more than the shorter leg.

48A. ____________________

48B. An object is dropped from the top of a building that is 784 ft. tall. The height of the object, after *t* seconds is given by the equation $h = -16t^2 + 784$. How many seconds pass before the object reaches the ground?

48B.
a. 7 sec.
b. 784 sec.
c. 49 sec.
d. 16 sec.

49A. Two inches on a map corresponds to an actual distance of 210 miles. Two cities are 4.5 inches apart on the map. What is the actual distance between the two cities?

49A. ____________________

49B. Select the proportion that you would use to correctly answer the following question. If 100 grams of ice cream contains 13 grams of fat, how much fat is in 250 grams of ice cream?

49B.
a. $\frac{100}{250} = \frac{x}{13}$

b. $\frac{13}{x} = \frac{250}{100}$

c. $\frac{100}{13} = \frac{250}{x}$

d. $\frac{100}{13} = \frac{x}{250}$

50A. Two fire hoses are being used to flood the skating rink at the park. The larger hose working alone can flood the park in 50 minutes. The smaller hose working alone can flood the park in 1 hour and 15 minutes. If both hoses run at the same time, how long will it take to flood the park?

50A. ____________________

50B. A manufacturing plant can complete a job order in six hours if two assembly lines work together. The new line working alone can complete the job in nine hours. How long would it take to complete the job if the old line works alone?

50B.
a. 18 hours
b. 15 hours
c. 7.5 hours
d. 3.6 hours

FINAL EXAM REVIEW ANSWER KEY

1A. – 15
1B. c

2A. – 16
2B. d

3A. undefined
3B. a

4A. 2
4B. b

5A. 33
5B. a

6A.
I. >
II. <
III. >
IV. =

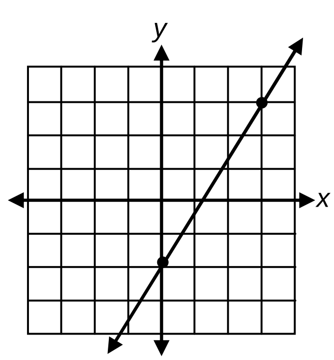
6B. d

7A. I, III, V
7B. a

8A.
$$6 \stackrel{?}{=} -(-2) + 4$$
$$6 \stackrel{?}{=} 2 + 4$$
$$6 = 6$$

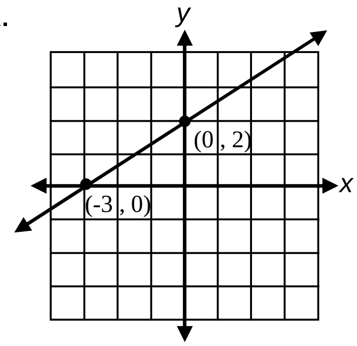
8B. c

9A.



9B. b

10A.



10B. c

11A.
1) decrease of 30 subscribers per year
2) increase of 40 subscribers per year

11B. b

12A. x-intercept (– 8 , 0)
y-intercept (0 , 4)

12B. d

13A.
I. vertical, (c , 0)
II. horizontal, (0 , c)

13B. c

14A. $y - 1 = -\frac{4}{3}(x - 2)$ or
$y + 3 = -\frac{4}{3}(x - 5)$

14B. c

15A. 5
15B. c

MATH 53 FINAL EXAM REVIEW ANSWER KEY

16A. I, IV
16B. b

17A. $\{ x \mid x$ is a real number and $x \neq -3 \}$

17B. b

18A. -3
18B. d

19A. $\dfrac{y^8}{25x^3}$
19B. c

20A. 0.00000902
20B. d

21A. $4x^3 + 11x^2 - 11x - 6$
21B. c

22A. $x^3 - 27$
22B. b

23A. $18x^2 - 8$
23B. a

24A. $\dfrac{a}{12b} - \dfrac{b^2}{6a} + \dfrac{1}{16a^2}$
24B. b

25A. $4x - 4$
25B. d

26A. $5xy^3$
26B. c

27A. $(x + 8)(x - 3)$
27B. d

28A. $(4x - 3)(a - 2b)$
28B. a

29A. $(2y + 1)(y - 3)$
29B. c

30A. $(2b - 1)\left(4b^2 + 2b + 1\right)$
30B. d

31A. $\dfrac{1}{x + 4}$
31B. b

32A. $\dfrac{1}{x - 2}$
32B. a

33A. $\dfrac{x + 7}{(x + 6)(x + 5)}$
33B. b

34A. $x - 4$
34B. d

35A. $\dfrac{4 + d}{d}$
35B. d (d and c are equal, but c is not simplified)

36A. $x = \dfrac{43}{2}$
36B. d

37A. $w = \dfrac{P - 2\ell}{2}$ or $w = \dfrac{P}{2} - \ell$

37B. c

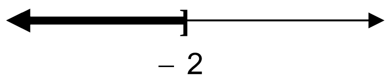
38A. $x = 36$
38B. c

39A. $x = -5$, $x = 4$
39B. b

MATH 53 FINAL EXAM REVIEW ANSWER KEY

40A. $x = 0, x = 4$
40B. a

41A. $x = 1, x = \frac{10}{3}$
41B. d

42A. 

42B. a

43A. $(-1, 7]$
43B. d

44A. $2x + 2(3x - 2) = 76$
width is 28 ft

44B. b

45A. \$2,400 is invested at 9%
45B. c

46A. 160 miles
46B. a

47A. 12 inches
47B. b

48A. shorter leg is 9 cm
48B. a

49A. 472.5 miles
49B. c

50A. 30 minutes
50B. a