PRACTICE FINAL – MATH 099

#1. By paying $50 cash up front and the balance at $35 a week, how long will it take to pay for a computer costing $960?

960
- 50
910

26
35 | 910
70
210
-210
0

26 weeks

#2. A bus operates between Miami International Airport and Miami Beach, 10 miles away. It makes 20 round trips per day, carrying 32 passengers per trip. If the fare eachway is $11.00, how much money is taken in from one day's operation?

$20 \times 2 \times 32 \times \$11 =$

$40 \times 32 \times 11 =$

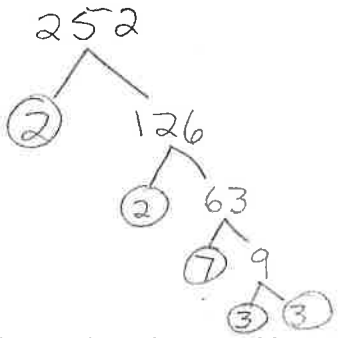
$1280 \times 11 =$

32
×40
1280

1280
× 11
1280
12800
14080

$14,080

#3. Find the prime factorization of 252.



$252 = 2^2 \times 3^2 \times 7$

126
2 | 252
-2
05
-4
12

63
2 | 126
-12
06
-6

#4. The product of 5 and a number decreased by 9 is 310. What is the number?

$5(n-9) = 310$

$5n - 45 = 310$

$+45 \quad +45$

$\frac{5n}{5} = \frac{355}{5}$

$n = 71$

71
5 | 355
-35
05
-5
0

#5. A long distance telephone plan has a monthly fee of $15.00 and a rate of $0.05 per minute. How many minutes can you chat long distance in a month for a total cost, including the $15.00, of $45.00?

n = number of minutes

$45 = 15 + 0.05n$

$-15 \quad -15$

$\frac{30}{0.05} = \frac{0.05n}{0.05}$

$600 = n$

600.
0.05 | 30.00
-30
0

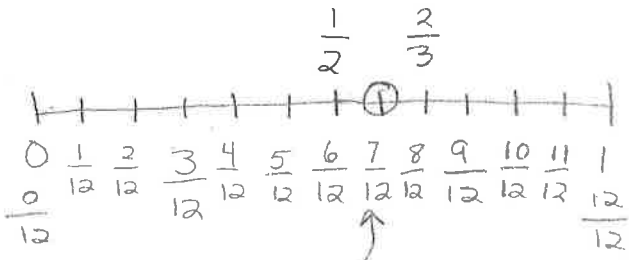
600 minutes

#6. Find a rational number halfway between 1/2 and 2/3.

$$\left(\frac{1}{2}+\frac{2}{3}\right)\div 2$$

$$\frac{1\times3}{2\times3}=\frac{3}{6}$$
$$+\ \frac{2\times2}{3\times2}=\frac{4}{6}$$
$$\frac{7}{6}$$

$$\frac{7}{6}\div\frac{2}{1}$$
$$\frac{7}{6}\times\frac{1}{2}=\frac{7}{12}$$

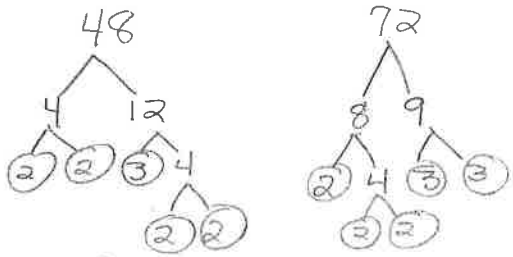


#7. Find the greatest common divisor of 48 and 72.

2	48	72
2	24	36
2	12	18
3	6	9
	2	3

Greatest common divisor
$2\times2\times2\times3=24$

or



$48=2\times2\times2\times2\times3$
$72=2\times2\times2\times3\times3$
Greatest common divisor
$2\times2\times2\times3=24$

#8. Find an estimate of 0.48992 x 120. DO NOT USE A CALCULATOR.

$\approx .5\times120$
or
$\frac{1}{2}$ of 120 = 60

#9. Estimate the answer. DO NOT USE A CALCULATOR. The cost for opening a restaurant is $485,000. If 19 people decide to share equally in the business, estimate the amount each must contribute.

This is about $500,000 and 20 people sharing the cost,
or
$50,000 and 2 sharing the cost

If 2 people share, each pays half of the cost, so about $25,000 per person

1/2 of 50,000 is 25,000

#10. Evaluate 5x - 7x - 2 when x = -5.

$5(-5)-7(-5)-2=$
$-25-(-35)-2=$
$-25+35-2=$
$10-2=8$

#11. Solve the inequality and graph the solution: $6 - 9x > 33$

$-6 \quad -9x > 27$

$\frac{-9x}{-9} > \frac{27}{-9}$

$x < -3$

#12. Express 7/12 as a decimal.

$12 \overline{)7.000}$ $.5833$

-60

100

-96

40

-36

4

$0.58\overline{3}$

#13. Find the least common multiple of 48 and 72.

	48	72
2	24	36
2	12	18
3	6	9
2	2	3
3	1	3
	1	1

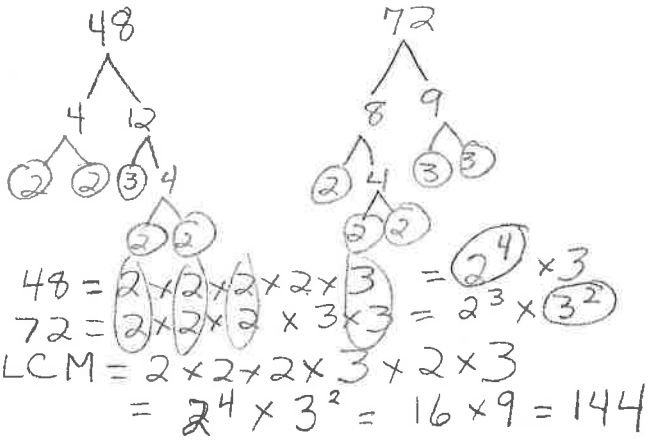
LCM = $2^4 \times 3^2$

16×9

16

$\times 9$

144



#14. Perform the indicated operation: $-6 - (5 - 12)$

$-6 - (5 - 12)$

$-6 - (-7)$

$-6 + 7 = 1$

#15. Find a counterexample to show that the following statement is false: If a two-digit number is multiplied by a one-digit number, the answer is a two-digit number.

$72 \times 5 = 360$ ← this is not a 2-digit number so the statement is false

#16. In a class, there are 15 men and 10 women. Find the ratio of the number of women to the number of students in the class. First express the ratio as a fraction reduced to lowest terms. Then rewrite the ratio using a second method.

$\frac{10}{15+10} = \frac{10}{25} = \frac{2}{5}$ $\quad 2:5$

$y_1 x_1 = y_2 x_2$ $\quad 42 \times 5 = y\,4$ $\quad \frac{210}{4} = \frac{4}{4}y$ $\quad y = 52.5$

#17. The amount of current flowing in an electrical circuit varies inversely as the resistance in the circuit. When the resistance in a particular circuit is 5 ohms, the current is 42 amperes. What is the current when the resistance is 4 ohms?

$x = 5$, $y = 42$, $y = \frac{k}{x}$, $42 = \frac{k}{5}$, $210 = k$

$x = 4$, $y = ?$

So, $y = \frac{210}{x}$, $y = \frac{210}{4}$

$4\overline{)210.0}$ $\quad 52.5$, -20, 10, 8, 20

52.5 amperes

#18. At the time they took office, Ronald Reagan and James Buchanan were among the oldest U.S. Presidents. Reagan was 4 years older than Buchanan. The sum of their ages was 134. Determine Reagan's age and Buchanan's age at the time each man took office.

b = Buchanan's age

$b + 4$ = Reagan's age

Buchanan + Reagan = 134

$b + b + 4 = 134$

$2b + 4 = 134$, -4

$\frac{2b}{2} = \frac{130}{2}$

$b = 65$

Buchanan was 65
Reagan was 69

#19. Identify a pattern in the list of numbers and use the pattern to find the next number.

0, 5, 10, 15, 20 (+5, +5, +5, +5)

#20. Perform the indicated operations: (-3)(-4) ÷ (7-10)

$(-3)(-4) \div (-3)$

$12 \div -3$

$= -4$

#21. A human brain contains 3×10^{10} neurons and a gorilla brain contains 7.5×10^{9} neurons. How many times as many neurons are in the brain of a human as in the brain of a gorilla?

$\frac{3 \times 10^{10}}{7.5 \times 10^{9}} = .4 \times 10 = 4$

$7.5\overline{)30.0}$ $\quad 4$, 300, 0

#22. Rationalize the denominator: $\sqrt{\frac{5}{6}} = \frac{\sqrt{5}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{5 \cdot 6}}{6} = \frac{\sqrt{30}}{6}$

#23. Perform the indicated operation. Where possible, reduce the answer to lowest terms.

$5 + (8 - 3)^2 - 16 \div 4 - 2$

$5 + 5^2 - 16 \div 4 - 2$

$5 + 25 - 16 \div 4 - 2$

$5 + 25 - 4 - 2$

$30 - 4 - 2$

$26 - 2 = 24$

#24. The pressure of water on an object below the surface varies directly as its distance below the surface. If a submarine experiences a pressure of 25 pounds per square inch 60 feet below the surface, how much pressure will it experience 330 feet below the surface?

$$\frac{25}{60} = \frac{x}{330}$$

330 × 25 = 1650 + 6600 = 8250

137.5
60 | 8250.0
60
225
180
450
420
300
-300
0

137.5 pounds per square inch

#25. Park rangers catch, tag and release 200 tule elk back into a wildlife refuge. Two weeks later, they observe a sample of 150 elk, of which 5 are tagged. Assuming that the ratio of tagged elk in the sample holds for all elk in the refuge, how many elk are there in the park?

$\frac{\text{All elk}}{\text{Tagged elk}}$ $\frac{150}{5} = \frac{x}{200}$

150 × 200 = 30,000

6,000
5 | 30,000
-30
0

6000 elk

#26. Simplify: $5(3x - 2) + 7x$

$15x - 10 + 7x$

$22x - 10$

#27. Estimate the answer. DO NOT USE A CALCULATOR. For a spring break vacation, a student needs to spend $47.00 for gas, $311.00 for food, and $405.00 for a hotel room. If the student takes $681.79 from savings, estimate how much more money is needed for the vacation.

Gas 50
Food 300
Hotel 400
$750

$700

700 − 750 = −50

needs about $50 more

#28. Identify a pattern in the list of numbers and then use the pattern to find the next number:

40, -20, -80, -140, ___ −200

(−60 −60 −60 −60)

#29. The cost of renting a boat from Estes Rental is $9 per 15 minutes. The cost from Ship and Shore Rental is $20 per half-hour. If you plan to rent the boat for three hours, which business offers the better deal and by how much?

3 hours

Estes Rental
There are 4 blocks of 15 minutes in 1 hour
3 × 4 = 12 15-minute blocks
12 × 9 = $108

Ship & Shore
There are 2 blocks of half-hours in 1 hour
3 × 2 = 6 half hour blocks
20 × 6 = $120

120 − 108 = 12

Estes Rental is $12 less expensive.

#30. Express 0.64 as a quotient of integers in lowest terms.

$\frac{64}{100} = \frac{32}{50} = \frac{16}{25}$

#31. Add -50 + 32

$\begin{array}{r} {}^{4}\cancel{5}{}^{1}0 \\ -32 \\ \hline 18 \end{array}$

−18

#32. Solve and check the following equation: 8x - 5(x - 2) = x + 26

$8x - 5x + 10 = x + 26$
$3x + 10 = x + 26$
$-10 \quad -10$
$3x = x + 16$
$-x \quad -x$
$\frac{2x}{2} = \frac{16}{2}$

x = 8

$8(8) - 5(8-2) = 8 + 26$
$64 - 5(6) = 34$
$64 - 30 = 34$
$34 = 34$ ✓

#33. The formula N = 3.5 x + 58 models the average mortgage loan, N, in thousands of dollars, x years after 1980. How many years after 1980 will the average mortgage loan be $142 thousand? In which year will that be?

$142 = 3.5x + 58$
$-58 \quad -58$
$\frac{84}{3.5} = \frac{3.5x}{3.5}$

$\begin{array}{r} 1980 \\ +\ 24 \\ \hline 2004 \end{array}$

$\begin{array}{r} 24 \\ 3.5\overline{)84.0} \\ -70 \\ \hline 140 \\ -140 \\ \hline 0 \end{array}$

24 years after 1980 so 2004

#34. Solve for y: $2x + 4y = 8$.

$-2x \quad -2x$

$\frac{4}{4}y = \frac{-2}{4}x + \frac{8}{4}$

$y = \frac{-2}{4}x + \frac{8}{4}$

$\boxed{y = -\frac{1}{2}x + 2}$

#35. Solve and check the following equation. $3(2x - 4) = 9 - 3(x + 1)$

$3(2x-4) = 9-3(x+1)$

$6x - 12 = 9 - 3x - 3$

$6x - 12 = 6 - 3x$

$+3x \quad +3x$

$9x + 12 = 6$

$+12$

$\frac{9x}{9} = \frac{18}{9}$

$\boxed{x = 2}$

$3(2(2)-4) = 9-3(2+1)$

$3(4-4) = 9-3(3)$

$3(0) = 9-9$

$0 = 0$ ✓

#36. Evaluate the following expression: $7x^2 + 4x - 5$; $x = -2$

$7(-2)^2 + 4(-2) - 5$

$7(4) + (-8) - 5$

$28 - 8 - 5$

$20 - 5$

$\boxed{15}$

#37. Perform the indicated operations: $\sqrt{50} + \sqrt{32}$

$\sqrt{50} = \sqrt{2 \cdot 25} = \sqrt{2} \cdot \sqrt{25} = 5\sqrt{2}$

$\sqrt{32} = \sqrt{2 \cdot 16} = \sqrt{2} \cdot \sqrt{16} = 4\sqrt{2}$

$5\sqrt{2} + 4\sqrt{2} = \boxed{9\sqrt{2}}$

#38. Consider the following procedure:

Select a number. Multiply the number by 4. Add 8 to the product. Divide the sum by 2.
Subtract 4 from the quotient.
Repeat this procedure for three numbers of your choice. Write a conjecture that relates the result of the process to the original number selected.

#	3	4	10
× 4	12	16	40
+ 8	20	24	48
÷ 2	10	12	24
− 4	6 ←	8 ←	20 ←

The end result is 2 times the original number

#39. Multiply and express the answer in decimal notation: $(3 \times 10^{8})(2.5 \times 10^{-4})$

commutative property

$(3 \times 2.5)(10^{8} \times 10^{-4})$

$2.5 \times 3 = 7.5$

$10^{8+(-4)} = 10^{4}$

7.5×10^{4}

#40. Perform the indicated operations. Where possible, reduce the answer to its lowest terms.

$\frac{1}{3} + \frac{1}{2} \times \frac{4}{5}$

$\frac{1}{3} + \frac{1}{2} \times \frac{4}{5}$

$\frac{1}{2} \times \frac{4^{2}}{5} = \frac{2}{5}$

$\frac{1}{3} + \frac{2}{5}$

LCM = 15

$\frac{1 \times 5}{3 \times 5} = \frac{5}{15}$

$+ \frac{2 \times 3}{5 \times 3} = \frac{6}{15}$

$\frac{11}{15}$

Match the following:

A. Inductive Reasoning

B. Deductive Reasoning

C. Estimation

D. Prime Number

E. Composite Number

F. Fundamental Theorem of Arithmetic

G. Greatest Common Divisor of 2 or more Natural Numbers

H. Least Common Multiple of 2 or more Natural Numbers

I. Mixed Number

J. Improper Fraction

K. Reciprocal

L. Rationalization of the Denominator

M. Commutative Property of Addition

N. Commutative Property of Multiplication

O. Associative Property of Addition

P. Associative Property of Multiplication

Q. Distributive Property

R. Algebraic Expression

S. Equation

T. Proportion

U. Absolute Value

V. Theorem

W. Difference

X. Product

Y. Simplify

K Two numbers whose product is 1

R A combination of variables and numbers using the operations of addition, subtraction, multiplication, or division, as well as powers or roots

D A natural number greater than 1 that has only itself and 1 as factors

A The process of arriving at a general conclusion based on observations of specific examples.

W The result of subtraction

G The largest number that is a divisor (or factor) of all the numbers

V A statement that can be proved using deductive reasoning

C The process of arriving at an approximate answer to a question

S Two algebraic expressions joined by an equal sign

Y To remove parenthesis and combine like terms in an algebraic expression

Q $7(5+3) = 7(5) + 7(3)$

B The process of proving a specific conclusion from one or more general statements

E A natural number greater than 1 that is divisible by a number other than itself and 1

T A statement that says two ratios are equal

M $6 + 4 = 4 + 6$

X The result of multiplication

U The distance from 0 to a number on the line number

N $6(4) = 4(6)$

F Every composite number can be expressed as a product of prime numbers in one and only one way (if the order of the factors is disregarded)

L Process of rewriting a radical expression to remove the square root from the denominator without changing the value of the expression

O $7 + (4 + 3) = (7 + 4) + 3$

I The sum of an integer and a rational number, expressed without the use of an addition sign

P $3 \times (4 \times 5) = (3 \times 4) \times 5$

J A rational number whose numerator is greater than its denominator

H The smallest natural number that is divisible by all of the numbers