

## Math 205 Final Exam Review

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1) Alice counted 7 cycle riders and 19 cycle wheels going past her house. How many unicycles, bicycles, or tricycles were there?

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2) Jake is helping his father build a rectangular pen to keep their horses from getting lost. The pen will be 24 meters long, 20 meters wide, and have fence posts 4 meters apart. How many fence posts do they need?

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3) In a game of chips, Pauli lost half her chips in the first round, won 50 chips, then lost half her total and finally won 80 chips. She finished with 170 chips. How many chips did she have at the beginning of the game?

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4) There are 78 people around a table. Each person shakes hands with the people to his or her immediate right and left. How many handshakes take place?

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5) Find a pattern in the following sequences, and write the next term.

A) 1, 3, 9, 27, 81      B) 3, 6, 9, 12, 15      C) 0, 6, 12, 18, 24      D) 1, 4, 9, 16, 25      E) 3, 5, 11, 21, 35

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6) Use the method of finite differences to find the next three terms in each sequence.      A) 1, 5, 14, 30, 55      B) 2, 9, 20, 35

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7) Given the universal set  $U = \{0, 1, 2, 3, 4, 5, 6\}$  and the sets  $A = \{2, 4, 6\}$ ,  $B = \{1, 2, 3, 4\}$  and  $C = \{0, 2, 3, 5\}$ , determine the following sets:

A)  $A \cap B$       B)  $A \cup B$       C)  $A' \cap B$       D)  $A \cup (B' \cap C)$       E)  $(A \cap C) \cup B$

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8) A travel company charges \$120 for insurance and \$55 a day to rent a trailer. Let  $x$  represent the number of days and  $y$  the total cost of renting a trailer.

A) Write an equation for the total coast of renting a trailer.

B) What is the total coast of renting the trailer for 10 days?

C) If the travel budget allows \$850 for trailer rental and a trailer can only be rented for a whole number of days, for how many days could you afford to rent the trailer?

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9) In a certain town there live 150 men: 85 are married, 70 have a cell phone, 75 own a car, 55 are married and have a cell phone, 35 have a cell phone and a car, 40 are married and have a car, and 30 are married, have a car, and have a cell phone.

A) How many men are single and have neither a car nor a cell phone?

B) How many married men have neither a cell phone nor a car?

C) How many married men own a cell phone but no car?

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10) Write the converse, inverse, and contrapositive of the following statement: *If Mary goes fishing, then her husband goes with her.*

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11) Use the premises to draw a logical conclusion.

A) **Premises:** If anemia occurs, then something has interfered with the production of red blood cells. The production of red blood cells in this patient is normal.

B) **Premises:** If poison is present in the bone marrow, then production of red blood cells will be slowed down. This patient has poison in her bone marrow.

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12) Determine whether each conclusion is valid or invalid. Justify your answer.

A) **Premises:** All mallards are aggressive birds. Some black ducks are aggressive birds. **Conclusion:** Some black ducks are mallards.

B) **Premises:** If people are happy, then they have enough to eat. All rich people have enough to eat. **Conclusion:** Some rich people are happy.

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13) Sketch/describe the minimum number of base-five pieces to represent the following number of units.

- A) 39 units                      B) 115 units                      C) 327 units
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14) Determine the total number of units to which the base pieces are equivalent for the given base.

- A) Base five: 3 flats, 4 longs, 3 units                      B) Base eight: 6 flats, 0 longs, 5 units
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15) Determine the minimum number of pieces for the bases if the pieces in set A are combined with the pieces in set B. Then write numbers in positional numeration for sets A and B and the number for their sum in the given base.

- A) Base five  
A: 2 flats, 3 longs, 2 units                      B: 1 flat, 2 longs, 3 units
- B) Base twelve  
A: 8 flats, 5 longs, 2 units                      B: 2 flats, 9 longs, 5 units
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16) Add or subtract vertically (without the use of unit-conversion/pieces):

- A)  $312_{four}$                       B)  $34412_{five}$                       C)  $4T32_{twelve}$                       D)  $6543_{seven}$   
 $+233_{four}$                        $+ 4211_{five}$                        $- 2ET1_{twelve}$                        $- 2566_{seven}$
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17) Determine whether the following statements are true or false. Justify your answers.

- A)  $3 \mid 48,025$                       B)  $2 \mid 3776$                       C)  $6 \nmid 7966$                       D)  $9 \mid 4576$
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18) Use the Prime Number Test to determine whether each number is prime or composite.

- A) 331                      B) 251                      C) 494
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19) Find each GCF or LCM.

- A) GCF(18, 28, 36)                      B) LCM(6, 15, 65)                      C) GCF(280, 165)                      D) LCM(14, 22)
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20) One lighthouse flashes every 12 seconds, a second flashes every 15 seconds, and a third every 40 seconds. If they flash at the same moment, how many seconds will it be until they flash together again?

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21) List all the factors of 273.

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22) Use Red and Black Chip Models to illustrate each operation. Explain your reasoning and complete the equation.

- A)  $-15 \div 5 =$                       B)  $-12 \div (-4) =$                       C)  $3 \times (-5) =$   
D)  $3 + (-7) =$                       E)  $-8 - (-3) =$                       F)  $-3 \times 2 =$
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23) Convert to base ten: (A)  $102_{three}$                       (B)  $13425_{seven}$

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24) (A) Convert 413 to base three.                      (B) Convert 357 to base seven.

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25) The temperature on January 22 was  $-17$  degrees. This was four degrees warmer than the record for that date. What was the record temperature?

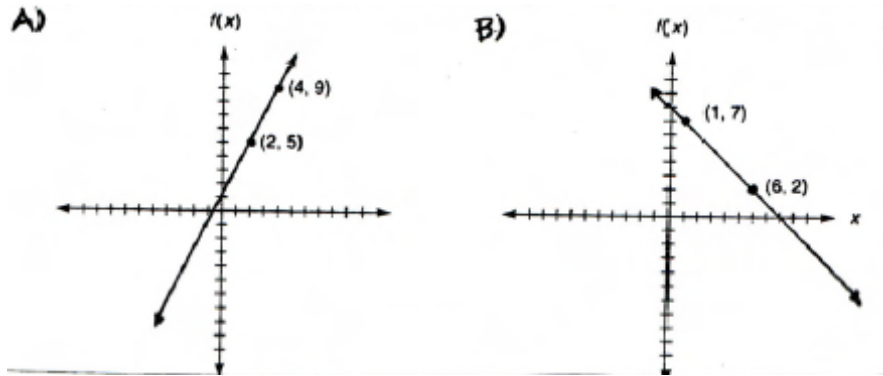
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26) Draw sketches using Fraction Bars or sets of dots to illustrate:  $\frac{2}{5} = \frac{4}{10}$

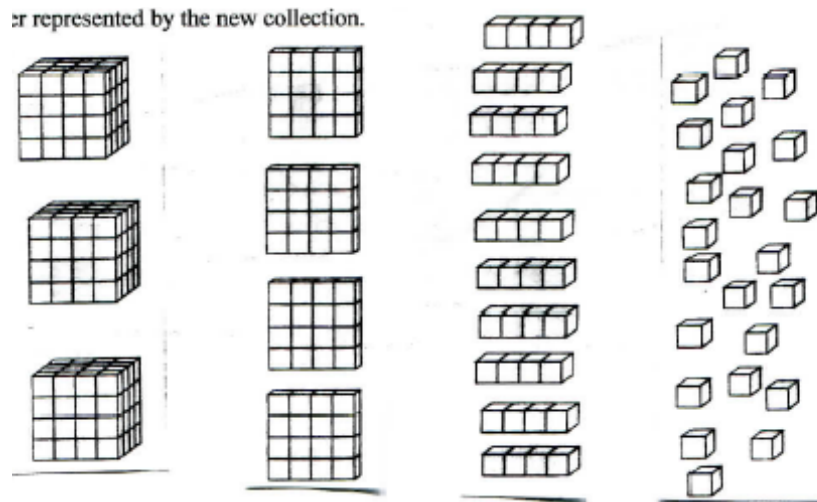
27) Find a fraction that is between the two given fractions:  $\frac{1}{3}$  and  $\frac{1}{4}$

28) Divide the interval from  $(-2.5, 2)$  into fifths.

29) Find the rise and run for each pair of points, determine the slope of the line, and the y-intercept. Then write the equation of the line in slope-intercept form.



30) Sketch/Describe the minimum number of base-four pieces needed to replace the collection below. Then determine the base-four number represented by the new collection.



31) Write an algebraic rule for each of the following functions, where the domain is all whole numbers and  $x$  represents an element of the domain.

- A)  $f(x)$  is an element in the range, and each element in the domain is assigned to three more than twice its value.
- B)  $g(x)$  is an element in the range, and each element in the domain is assigned to one more than four times its value.
- C)  $h(x)$  is an element in the range, and each element in the domain is assigned to ten times its value.
- D) Evaluate  $f(45)$ ,  $g(56)$ , and  $h(84)$ .

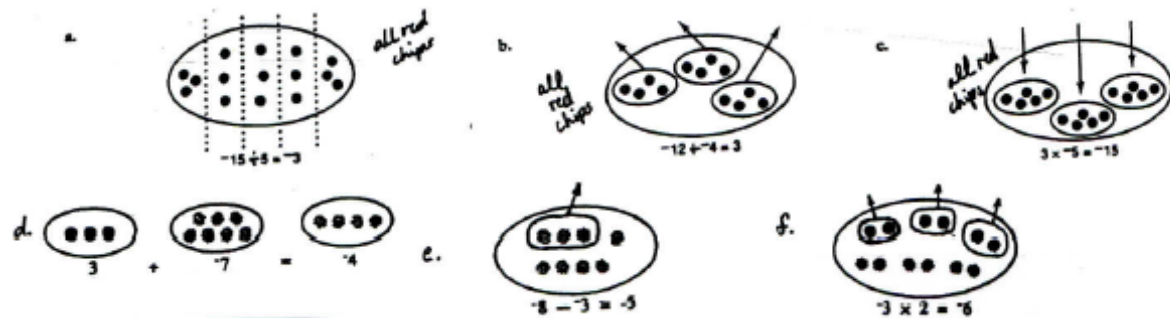
32) During the recent BrainBashers school sports day, four girls were competing in the 400 metres hurdles. Official figures mysteriously went missing just after the event, however, various spectators could remember the following information. Determine the positions the girls finished in, along with the numbers and colours they wore?

1. Jane won and wore red.
2. The girl wearing number 1 came third.
3. Julie beat the girl in yellow, but wasn't wearing number 2.
4. Only one girl finished in the same position as the number she wore, but she didn't wear red.
5. Jackie beat the girl wearing number 3 and Josie wore yellow.
6. The girl in green wore number 2.
7. A spectator remembered one girl wore blue, but couldn't remember anything else about her.

- 33) Determine which of the following rules for the given sets are functions. If the rule is not a function, explain why.
- A) Each person is assigned to his or her social security number.
  - B) Each amount of money is assigned to the object it will buy.
  - C) Each person is assigned to a person who is older.
  - D) Each person is assigned to its length.

## Answers:

- 1) 5 tricycles and 2 bicycles or 1 unicycle and 6 tricycles
- 2) 22 fence posts
- 3) 260 chips
- 4) 78 handshakes
- 5) A) 243      B) 18      C) 30      D) 36      E) 53
- 6) A) 91, 140, 204      B) 54, 77, 104
- 7) A) {2, 4}      B) {1, 2, 3, 4, 6}      C) {1, 3}      D) {0, 2, 4, 5, 6}      E) {1, 2, 3, 4}
- 8) A)  $y = 55x + 120$       B) \$670      C) 13 days
- 9) A) 20      B) 20      C) 25
- 10) **Converse:** If Mary's husband goes with her, then she goes fishing.  
**Inverse:** If Mary does not go fishing, then her husband does not go with her.  
**Contrapositive:** If Mary's husband does not go with her, then she does not go fishing.
- 11) A) The patient does not have anemia.  
B) The patient's production of red blood cells will be slowed down.
- 12) A) Invalid      B) Invalid
- 13) A) A collection with 1 flat, 2 longs, and 4 units  
B) A collection with 4 flats, 3 longs, and 0 units  
C) A collection with 2 long-flats, 3 flats, 0 longs, and 2 units
- 14) A) 98 units      B) 389 units
- 15) A) 4 flats, 1 long, 0 units;  $232_{five} + 123_{five} = 410_{five}$   
B) eleven flats, 2 longs, 7 units;  $852_{twelve} + 295_{twelve} = E27_{twelve}$
- 16) A)  $1211_{four}$       B)  $44123_{five}$       C)  $1751_{twelve}$       D)  $3644_{seven}$
- 17) A) False      B) True      C) True      D) False
- 18) A) prime      B) prime      C) composite
- 19) A) 2      B) 390      C) 5      D) 154
- 20) 120 seconds
- 21) 1, 3, 7, 13, 21, 39, 91, 273



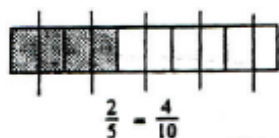
22)

23) (A) 11 (B) 3645

24) (A) 120022<sub>three</sub> (B) 1020<sub>seven</sub>

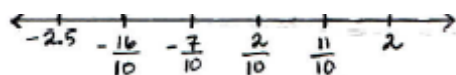
25) -21 degrees

26)



27) Answers may vary.

28)



29) A) rise: 4; run: 2; slope = 2; y-intercept: (0, 1);  $y = 2x + 1$

B) rise: -5; run: 5; slope = -1; y-intercept: (0, 8);  $y = -x + 8$

30) 1-4<sup>4</sup> piece; 0 LF; 3 F; 3 L; 3 U

31) A)  $f(x) = 2x + 3$  B)  $g(x) = 4x + 1$  C)  $h(x) = 10x$  D)  $f(45) = 93; g(56) = 225; h(84) = 840$

Number	Name	Wore	Color
1	Jane	4	red
2	Jackie	2	green
3	Julie	1	blue
4	Josie	3	yellow

Explanation: Julie wasn't wearing 2 (clue 3) so wasn't wearing green (clue 6), Jane was wearing red (clue 1) and Josie wore yellow (clue 5), hence Julie wore blue, leaving Jackie wearing green wearing 2 (clue 6). As Jackie wore 2, she didn't come 3rd (clue 2), and Jane came first (clue 1), which means that Jackie must have come 2nd in order to beat the girl wearing 3 (clue 5). We now know Jane won and Jackie was 2nd, therefore Julie must have come 3rd in order to beat the girl in yellow (clue 3), leaving Josie in last place. As Jackie came second and she beat the girl wearing 3 (clue 5), the girl wearing 3 must have come 4th (therefore Josie) as the girl wearing 1 came 3rd (clue 2). Julie (who is 3rd) wore 1 (clue 2), leaving Jane wearing 4.

33) A) Function

B) Not a function because two or more objects may cost the same amount

C) Not a function because many people are older than a given person

D) Function