

Week in Review # 7

MATH 365

Chapter 3 - 4.3

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1. Change 111011_{two} to base six.

2. Prove why the product of two negative integers is a positive integer.

3. Use any two models discussed to explain $-6 \cdot 2$ to a child.

4. $63T_{twelve} - 5EE_{twelve} =$

5. Order $-5 \cdot 25^{39}$, $-4 \cdot 5^{79}$, and $-2 \cdot 125^{27}$ from smallest to largest.

6. How many hours, minutes, and seconds are there in 7415 seconds? Explain how this problem relates to a base numeration system.

7. Use divisibility rules to determine whether the number 12,789 is divisible by 2, 3, 4, 5, 6, 8, 9, or 10.

8. Indicate by circling the appropriate letter whether the following properties apply to Addition, Subtraction, Multiplication, and Division over the set of integers.

Closed	A	S	M	D
Commutative	A	S	M	D
Identity Element	A	S	M	D

9. Use any two models discussed to explain 3^{-2} to a child.

Chip model

Charged field model

Patterns model

Number line model

10. Find the first two terms of an arithmetic sequence in which the fifth term is -13 and the 100^{th} term is -488 .

11. Write the first 15 counting numbers in base three.

12. Fill in the blanks with the appropriate word (factor, multiple, or divisor).

Given $18|54$. Eighteen is a _____ or _____ of 54.

Fifty four is a _____ of 18.

13. Define place value.

14. The first movie to gross over \$100,000,000 was released in MCMXXXIX, which is what year?

Do you know which movie it was?

15. Use mental math to calculate

a. $540 \div 4$

b. $74 - 38$

c. $69 + 26$

d. $47 \cdot 3$

16. $462_{seven} + 555_{seven} =$

17. Prove $(x + y)(x + y) = x^2 + 2xy + y^2$. Show all steps.

18. Use an algorithm to find $47 + 25$.

19. If $2021_{three} = 75_b$, then what does b equal?

20. Without performing the division, determine the following and explain your reasoning.

a. Is 185,074 divisible by 37?

b. Is 4,500,076 divisible by 19?

c. Is $(5)(11)(19)+3$ divisible by 5? Explain.

21. What is the counting number immediately before EEO_{twelve} ?

22. Find all integers x , if there are any, such that the following are true.

a. $-x$ is nonnegative

b. $-x - 5$ is negative

c. $|x| = 8$

d. $|x|$ is negative

$$23. 11540_{\text{eight}} \div 76_{\text{eight}} =$$

24. Of the four basic operations on integers, which have the associative property? If the operation on integers has the associative property, write, **yes** and give an example. If the associative property does not hold, write **no** and give a counterexample.

25. Write 142_{ten} in each of the following numeration systems:

a. Egyptian numeration

b. Babylonian numeration

c. Mayan numeration

d. Roman numeration

26. Use an algorithm to find $53 - 27$.

27. Compare and contrast the Egyptian, Babylonian, Mayan, Roman and Hindu-Arabic numeration systems.

	Egyptian	Babylonian	Mayan	Roman	Hindu-Arabic
place value					
# of digits/place value					
additive property					
subtractive property					
multiplicative property					
symbol for zero					

28. Using the definition of a^n , where n is any natural number, show the intermediate step.

$$3^7 = \underline{\hspace{4cm}} = 2184$$

29. Prove or disprove: If x is an integer, then $-x^2 < 0$.

30. $11|44$ if, and only if there is a unique integer k such that

$$\underline{\hspace{4cm}}. \text{ In this case, } k = \underline{\hspace{4cm}}.$$

31. Bananas normally sell for 13 cents each. They go on sale for 3 for 36 cents. How many cents are saved if you purchase three dozen bananas while they are on sale. Write an expression that describes this problem (before any simplification) and then simplify it to find the answer.

32. Using the definition of less than, show $-8 < -5$.

33. Use an algorithm to compute $762 \div 6$.

34. Factor completely $81x^2 - (x - 4y)^2$.

35. Model $-5 + 6$

36. In the 2000 Olympics, the gold medal women's long jumper jumped 7 yards, 2 feet, 1 inch. The gold medal men's long jumper jumped 9 yards, 1 foot, 1 inch. How far did the two gold medalists jump combined? (Do not simply convert to inches).

37. Prove or disprove: If a number is divisible by 12, then it is divisible by 6 and 2.

$$38. -|-6| - 5^2 + (-1)^{37} \cdot 48 \div (-4) \cdot 3 + (-4)^3 - (4 + 18) + 0 \cdot 9 =$$

$$39. \text{ Model } (-3)(-2) .$$

40. What is the additive inverse of $6x - 4y$? Use the definition of additive inverse, show all steps, and then simplify your answer.

41. Is 42,885 divisible by 2, 3, 4, 5, 6, 8, or 9?

42. Justify each step.

$$29 - 7 = (2 \cdot 10 + 9 \cdot 1) - 7 \cdot 1$$

$$= (2 \cdot 10 + 9 \cdot 1) +^{-} 7 \cdot 1$$

$$= 2 \cdot 10 + (9 \cdot 1 +^{-} 7 \cdot 1)$$

$$= 2 \cdot 10 + (9 +^{-} 7) \cdot 1$$

$$= 2 \cdot 10 + 2 \cdot 1$$

$$= 22$$

43. Why is $\frac{-9}{0}$ undefined?

$$44. 438_{\text{nine}} \cdot 75_{\text{nine}} =$$

45. Justify this alternative proof that demonstrates a negative times a negative is a positive number. Let $a, b, \in R$.

a. $(-a) * 0 = 0$

b. $(-a) * [b + (-b)] = 0$

c. $(-a)b + (-a)(-b) = 0$

d. $-(ab) + (-a)(-b) = 0$

e. $(-a)(-b) = ab$

46. Let $x, y,$ and z be integers.

a. True or False: If $x \mid 24$, then $x \mid (5 \cdot 24)$

b. True or False: If $7 \mid y$ and $7 \mid z$, then $7 \mid (z - y)$.

c. True or False: $13 \mid 1$

d. True or False: If $y \mid (x + z)$ then $y \mid (y + z)$

e. True or False: $9 \mid 0$

47. If you buy a DVD player for \$285, surround sound for \$158, two boxes of RW DVDs for \$29 per box, and 3 DVD movies for \$24 each, estimate your monthly payment if you will pay off your purchase in one year? Show all mental steps.

48. Prove or disprove: If a divides b , and a divides c , then a divides $b + c$.

49. Use an algorithm to compute $58 \cdot 67$.

50. Explain all steps when performing the standard algorithm on $103 - 67$.

51. Prove any six digit palindrome is divisible by 11, using

a. expanded notation

b. the rule for divisibility by 11.