Math 200 - Test 3

November 17, 2010

Name _____

Score _____

Show all work. Supply explanations where necessary.

1. (1 point) Choose the division model that best fits the following problem situation: *Sabrina has 18 stickers for her sticker book. If she puts 3 stickers on each page, how many pages does she fill?*

   (a) set partition model
   (b) repeated subtraction model
   (c) missing factor model
   (d) charged field model

2. (1 point) Which one of the following is a legitimate test for divisibility by 12?

   (a) An integer is divisible by 12 if and only if it is divisible by both 2 and 6.
   (b) An integer is divisible by 12 if and only if it is divisible by both 3 and 4.
   (c) An integer is divisible by 12 if and only if the sum of its digits is divisible by 12.
   (d) All of the above or none of the above

3. (3 points) Use any multiplication algorithm to compute $435_{\text{seven}} \times 24_{\text{seven}}$. (Use the back of the last page if you need more room to work.)

   (a) $10\,440_{\text{seven}}$
   (b) $14\,106_{\text{seven}}$
   (c) $14\,136_{\text{seven}}$
   (d) $14\,436_{\text{seven}}$

4. (1 point) Consider the following conjecture:

   If $x \mid 3y$, then $x \mid y$.

   Which one of the following is a counterexample?

   (a) $2 \mid (3 \cdot 6)$ and $2 \mid 6$.
   (b) $6 \mid (3 \cdot 2)$ and $6 \nmid 2$
   (c) $5 \nmid (3 \cdot 7)$ and $5 \mid 7$
   (d) The conjecture is true.

5. (1 point) Which one of these is an example of an integer x for which $|x| = -x$?

   (a) -1.352
   (b) 5
   (c) -117
   (d) None of the above

6. (2 points) Give a brief but thorough explanation for why $0 \div 0$ is not defined.

7. (4 points) Use a different model to illustrate each product.

   (a) $-6 \times (-2)$

   (b) -4×5

   (c) Explain why the repeated addition model is not a good model for illustrating either one of the products above.

8. (4 points) Test the following number for divisibility by 2, 3, 4, 5, 6, 8, 9, 10, and 12.

$$4106427664114966998940$$

9. (1 point) Choose the division model that best fits the following problem situation: *April has 35 pieces of Halloween candy to divide evenly among 7 children. How much candy does each child get?*

   (a) charged field model

   (b) repeated subtraction model

   (c) missing factor model

   (d) set partition model

10. (1 point) Which one of the following means the same as $a \mid b$?

    (a) a divided by b

    (b) a is a multiple of b

    (c) a is a divisor of b

    (d) There exists an integer k such that $a \div b = k$.

11. (1 point) Suppose n and m are integers. Which one of the following is equal to $-n \times (-m)$?

    (a) $n \times m$

    (b) $-(n \times m)$

    (c) $-n \times m$

    (d) $n \times (-m)$

12. (1 point) Compute $-3 - (-3) - 3 + (-3) - 3 - (-3)$.

    (a) 0

    (b) -9

    (c) -6

    (d) 3

13. (1 point) Which one of the following is the additive inverse of the expression $-5x+2-y$?

    (a) $5x + 2 - y$

    (b) $5x - 2 + y$

    (c) 1

    (d) $\dfrac{1}{5x - 2 + y}$

14. (3 points) Trevor used the number line to model $-4 - 7$. Here is what he said:

> "Start at zero facing right. Turn around, go four. Back-up seven. You end up at three. Therefore, $-4 - 7 = 3$."

(a) Is Trevor correct? If not, correct his application of the number line model.

(b) Use a different model to illustrate Trevor's problem.

15. (3 points) Clearly state the rule for adding two integers with opposite signs. Give an example that illustrates your rule.

16. (2 points) Use short division to compute $-284135 \div (-5)$.

17. (1 point) Suppose a and b are integers. Which one of the following is equal to $-a-(-b)$?

(a) $-a+b$
(b) $a-b$
(c) $-a-b$
(d) $a+b$

18. (1 point) Which one of the following is a true statement?

(a) $0 \mid 7$
(b) $9 \mid 12321$
(c) $24 \mid 6 = 4$
(d) 18 divides 6

19. (1 point) What is the sign of $2 \times (-2) \times (-3) \div (-2) \times 5 \div (-1)$?

(a) positive
(b) negative

20. (1 point) Suppose $d \mid a$ and $d \mid b$. Which one of the following is NOT necessarily true?

(a) $d \mid (2a - 3b)$
(b) $d \mid ab$
(c) $a \mid ad$ if $a \neq 0$
(d) $a \mid d$

21. (1 point) Suppose x is an integer. Which one of the following is equal to $-x \div (-2)$?

(a) $-x \div 2$
(b) $-(x \div 2)$
(c) $x \div (-2)$
(d) $x \div 2$

22. (1 point) The number 1 is also know as

(a) the multiplicative identity.
(b) the additive identity.
(c) the additive inverse.
(d) the multiplicative inverse.

23. (3 points) Explain why the algorithm illustrated below works.
Then use it to compute 19×53.

$$\begin{array}{r} 24 \\ \times\, 46 \\ \hline 24 \\ 120 \\ 160 \\ 800 \\ \hline 1104 \end{array}$$

24. (2 points) Use the standard long division algorithm to compute $54192 \div 24$.

25. (2 points) Any number in which each digit except 0 appears exactly 3 times must be divisible by 3. Explain why this must be true and give an example of such a number.

26. (2 points) If 123 is divided by a number and the remainder is 13, what are the possible divisors?

27. (3 points) It is common for students to make mistakes when computing differences such as $5 - (-5)$ and $-5 - (-5)$. Use the charged-field model to compute each difference. Be sure to label which is which.

28. (2 points) Use a nonstandard multiplication algorithm to compute 567×234.

29. (2 pts ex cred) See problem #8 on page 172. Use the Russian peasant algorithm to compute 85×93.