Math 200 - Test 3

April 20, 2011

Name _____

Score _____

Show all work. Supply explanations where necessary.

1. (1 point) Which one of the following is the additive inverse of the expression $3-4x+7y$?

   (a) 1

   (b) $-3+4x-7y$

   (c) $3+4x-7y$

   (d) $\dfrac{1}{3-4x+7y}$

2. (1 point) Suppose x is negative integer. Which one of the following is true of $-x$?

   (a) $-x$ is less than zero

   (b) $-x$ is a negative integer

   (c) $-x$ is a positive integer

   (d) $-x$ may be either positive or negative

3. (1 point) Choose the division model that best fits the following problem situation: *Sabrina can send a total of 250 text messages. If she sends 25 each day, for how many days can she send messages?*

   (a) missing factor model

   (b) charged field model

   (c) set partition model

   (d) repeated subtraction model

4. (1 point) Suppose p and q are integers. Which one of the following is equal to $-p \times (-q)$?

   (a) $p \times q$

   (b) $-(p \times q)$

   (c) $-p \times q$

   (d) $p \times (-q)$

5. (1 point) Consider the following conjecture:

   If $x \mid (y+7)$, then $x \mid y$.

   Which one of the following is a counterexample?

   (a) $7 \mid (14+7)$ and $7 \mid 14$

   (b) $5 \nmid (10+7)$ and $5 \mid 10$

   (c) $3 \mid (5+7)$ and $3 \nmid 5$.

   (d) The conjecture is true.

6. (3 points) Use a multiplication model to illustrate the following fact.

$$3 \cdot (2 + y) = 3 \cdot 2 + 3 \cdot y$$

7. (3 points) Suppose n is a positive number. Give a brief but thorough explanation for why $n \div 0$ is not defined.

8. (6 points) Use a different model to illustrate each product.

   (a) $-3 \times (-2)$

   (b) $4 \times (-5)$

   (c) -2×8

9. (1 point) Which one of the following is a valid test for divisibility by 8?

   (a) An integer is divisible by 8 if and only if the sum of its digits is divisible by 8.

   (b) An integer is divisible by 8 if and only if its ones digit is divisible by 8.

   (c) An integer is divisible by 8 if and only if its last digit is an 8.

   (d) An integer is divisible by 8 if and only if the integer formed by the last three digits is divisible by 8.

10. (1 point) Choose the division model that best fits the following problem situation: *Tara has 24 stickers to share evenly among her 4 friends. How many stickers does each friend get?*

    (a) set partition model

    (b) charged field model

    (c) repeated subtraction model

    (d) missing factor model

11. (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 $a \div b = k$.

12. (3 points) Use any multiplication algorithm to compute $547_{\text{eight}} \times 36_{\text{eight}}$.

    (a) $25\,022_{\text{eight}}$

    (b) $19\,692_{\text{eight}}$

    (c) $24\,102_{\text{eight}}$

    (d) $22\,602_{\text{eight}}$

13. (3 points) Zasha used the number line to model $-5-2$. Here is what she said:

> "Start at zero facing right. Turn around, go five. Back-up two. You end up at negative three. Therefore, $-5-2=-3$."

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

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

(c) What fact would Zasha be modeling if she said,

> "Start at zero facing right. Back-up five. Then back-up two. You end up at negative seven."

14. (3 points) Clearly state the rule for adding two integers with opposite signs. Give an example that illustrates your rule.

15. (1 point) Suppose x and y are integers.
Which one of the following is equal to $-x - (-y)$?

(a) $-x + y$

(b) $x - y$

(c) $-x - y$

(d) $x + y$

16. (1 point) The number 1 is also know as

(a) the multiplicative identity.

(b) the additive identity.

(c) the multiplicative inverse.

(d) the additive inverse.

17. (1 point) Which one of the following is a true statement?

(a) $0 \mid 13$

(b) $3 \mid 6321$

(c) $32 \mid 8 = 4$

(d) 25 divides 5

18. (1 point) Suppose $d \mid a$ and $d \mid b$. Which one of the following is NOT necessarily true?

(a) $d \mid (5a + 6b)$

(b) $a \mid d$

(c) $d \mid 7ab$

(d) $a \mid ad$ if $a \neq 0$

19. (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) $x \div 2$

20. (3 points) Explain why the algorithm illustrated below works.
Then use it to compute 37×56.

$$\begin{array}{r} 14 \\ \times\ 23 \\ \hline 12 \\ 30 \\ 80 \\ 200 \\ \hline 322 \end{array}$$

21. (3 points) Use base-10 blocks to illustrate the multiplication fact $14 \times 23 = 322$.

22. (2 points) State the test for divisibility by 9 and illustrate your test with a 4-digit example.

23. (3 points) It is common for students to make mistakes when computing differences such as $3 - (-3)$ and $-3 - (-3)$. Use the charged-field model to compute each difference. Be sure to label which is which.

24. (3 points) Test the following number for divisibility by 2, 3, 4, 5, 8, 9, and 10. Explain your reasoning.

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25. (2 points) Use short division to compute $-34368 \div (-6)$. Make sure to mention how you deal with the signs.

26. (2 pts ex cred) See problem #8 on page 172. Use the Russian peasant algorithm to compute 98×73.