Math 141, section _____ _____ NAME: Answers

Test 3, version A, Spring 2012 100

Chapters 6, 7 & 8 **Do NOT use a calculator on this test!!** Seat: _____

Full credit is based on work shown!

9pts

1. a. Compare the size of $\frac{4}{7}$ *and* $\frac{5}{9}$, using **two different methods** that we discussed in class. 1pt

4pts Use common denominator $\frac{9}{9}\cdot\frac{4}{7} ? \frac{5}{9}\cdot\frac{7}{7}$ $\frac{36}{63} > \frac{35}{63}$ or Cross Mult. $4\cdot 9 \quad 7\cdot 5$ $36 > 35$ or Change to decimals $\frac{4}{7} = .571428$ $\frac{5}{9} = .5555\ldots$

Which is bigger? 4/7

$7\overline{)4.000000}$ → .571428; 35, 50, 49, 10, 7, 30, 28, 20, 14, 60, 56, 4

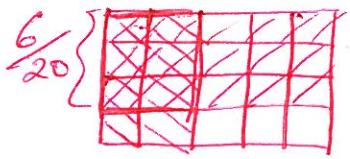
4pts b. Find **two** fractions **between** $\frac{4}{7}$ *and* $\frac{5}{9}$, showing your work.

(∞ answers) $\frac{360}{630}$ $\frac{355}{630}, \frac{357}{630}$ $\frac{350}{630}$ or $\frac{4+5}{7+9} = \frac{9}{16}$ or $.56 = \frac{56}{100}$ $.562 = \frac{562}{1000}$

6pts

2. **Show** how to illustrate $\frac{2}{5}$ *of* $\frac{3}{4}$, using a rectangular diagram. Clearly label the diagram to indicate each fraction and the answer. 3pts

$\frac{2}{5}\times\frac{3}{4} = \frac{6}{20}$ 3pts



5pts

3. When you multiply whole numbers the product is larger than the factors (except for 0 and 1). Is this also true for **improper fractions**? Yes 1pt **Explain** and give an example:

2pts When you multiply improper fractions, the product is greater than the original numbers because an improper fraction is greater than one.

2pts Example; $\frac{5}{2}\times\frac{7}{3} = \frac{35}{6}$ compare size; $2\frac{1}{2}\times 2\frac{1}{3} = 5\frac{5}{6}$ $\frac{5}{2}\times\frac{7}{3} = \frac{35}{6}$

4pts

4. Is the set of **positive fractions** closed for **division**? Yes 1pt (Note, this excludes division by zero.)

Explain: 3pts When you divide any two positive fractions, the result is always a positive fraction. $\frac{a}{b}\div\frac{c}{d} = \frac{a}{b}\times\frac{d}{c} = \frac{ad}{bc}$

where $a,b,c,d \in \{0,1,2,3,\ldots,\}$ & $b,c,d \neq 0$

4pts

5. Write a brief description of the article with video clips, in module 6, including the main topic discussed and the conclusion of the article.

2pts Main topic: Learning math using procedures and/or concepts. (Example was converting a mixed number to an improper fraction.)

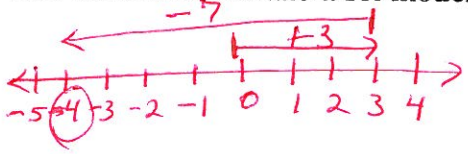
2pts Conclusion; Students received conceptual instruction & then procedural instruction learned the ideas better and remembered them longer.

10pts

6. We studied four different ways to illustrate **integer arithmetic**.

a. $(+3)-(+7) =$ -4 1pt

b. Use a **number line** and **a set model** to illustrate your answer to part a.



2pts

Add the inverse

(or) $(+3)+(-7)=-4$

Begin with +3, then take away +7. Leaves -4.

c. Building from the fact that (2)(2) = 4, finish this **number pattern** to illustrate why (-2)(2) = -4.

(2) (2) = 4

(1) (2) = 2

(0) (2) = 0

(-1)(2) = -2

(-2)(2) = -4

2pts Also explain the pattern that each column demonstrates.

The 1st column is decreasing by one each step.

2nd column stays the same. Thus there is one less 2 each step, so the third column decreases by 2 each step.

4pts

7. Simplify each of the following using rules of exponents. Show your work to illustrate the rule used.

a. $\frac{6^{-5}}{6^{+7}} = 6^{-5-7} = 6^{-12}$ or $\frac{1}{6^{12}}$

b. $5^{9}\cdot 5^{-3} = 5^{9+(-3)} = 5^{6}$

6pts

8. Show your steps to illustrate an easy way to divide these numbers; write your answer in scientific notation.

$$\frac{1.2 \times 10^{3}}{6.0 \times 10^{-5}} = \frac{1.2}{6.0} \times \frac{10^{3}}{10^{-5}} = \frac{1}{5} \times 10^{3-(-5)} = .2 \times 10^{8} = 2 \times 10^{7}$$

9pts

9. Write each decimal as an equivalent fraction. Simplify, if possible.

a. 0.36 $\frac{36}{100} = \frac{9}{25}$ 1pt 1pt

b. 0.363636... $\frac{36}{99} = \frac{4}{11}$ 1pt 1pt

5pts c. 0.41383838....

$100n = 41.38383838...$

$1n = .41383838...$

$99n = 40.97000000...$

$n = \frac{40.97}{99} = \frac{4097}{9900}$

12pts

10 a. **Explain** an easy method to **mentally calculate** 25 % of any number. Also give an example. 2pts

2pts $25\% = \frac{25}{100} = \frac{1}{4}$ so multiply by $\frac{1}{4}$ or divide by 4

Example: 25% of $36 = 9$

$\frac{1}{4} \times 36 = 9$

b. **Explain** an easy method to **mentally calculate** 40 % of any number. Also give an example.

$40\% = 4 \times 10\%$ or $4 \times \frac{1}{10} = \frac{4}{10}$ or $\frac{2}{5}$

So Divide # by 10 then multiply by 4 or mult # by $\frac{2}{5}$

Ex: $40\% \times 120$

$\frac{4}{10} \times 120 = 4(12) = 48$ or

c. **Explain** an easy method to **mentally calculate** $33\frac{1}{3}$ % of any number. Also give an example.

$33\frac{1}{3}\% = \frac{1}{3}$

So Divide # by 3 or multiply by $\frac{1}{3}$

Ex!

$33\frac{1}{3}\%$ of 120

$\frac{1}{3} \times 120 = 40$

6pts (3 each)

11a. Show an easy way to **mentally calculate** this product using a fractional equivalent.

150 % of 30 = $\frac{1}{2} \times 30 = 1(30) + \frac{1}{2}(30)$

$= 30 + 15 = 45$

or $150\% = \frac{150}{100} \Rightarrow \left(\frac{3}{2} \times \frac{15}{30}\right) = 3 \times 15 = 45$

b. **Estimate** using compatible numbers:

$\left(47\frac{1}{3}\right) \div \left(5\frac{2}{3}\right) \approx 48 \div 6 = 8$

6pts

12. **Solve using a proportion, showing your work.**

If a product costs 58 cents for 24 ounces, what should it cost for 36 ounces?

2pts $\frac{58\text{¢}}{24\text{oz}} = \frac{x}{36\text{oz}}$

$24x = 58(36)$

$x = \frac{2088}{24}$ (easier if simp. here)

$x = \frac{58(\cancel{36}^{3})}{\cancel{24}_{2}} = \frac{\overset{29}{\cancel{58}}(3)}{\underset{1}{\cancel{2}}} =$ work 2pts

$x = 87\text{¢}$ 2pts

(-1 if $50 \div 5 = 10$ ok if $45 \div 5 = 9$)

9 pts

13a. 78 is 40 % of what number?

Solve using a simple algebraic equation that is not a proportion. Show your work.

(-1 if used proportion)

5pts

$78 = 40\% \text{ of } x$

$78 = .40x$

$\frac{78}{.40} = x$

$x = 195$

$40\overline{)7800}$ → 195

40

380

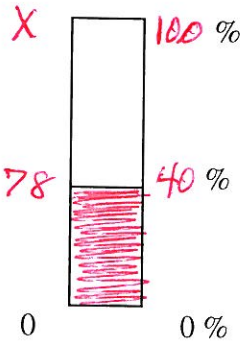
360

200

200

b. Illustrate this problem by shading and putting appropriate numbers on this diagram.

4pts



10pts

14a. State the theorems from sections 7.1 & 7.2 that let you decide whether a fraction will have a terminating decimal representation.

4pts

* Simplify the fraction completely.
* Find the prime factors of the simplified denominator.
* * If the prime factors of the simplified denominator are only 2 and/or 5 then the decimal # will terminate. Any other factors will make the decimal be infinite repeating.

b. Using the theorem from part a, determine whether each of the following fractions will be a terminating decimal. [Do not divide to convert the fraction to a decimal.]

3pts

$\frac{5}{300} = \frac{1}{60}$ not terminating

Explain:

60

5 · 12

1

5 · 3 · 2 · 2

The factor of 3 in the simplified denominator means the decimal will be ∞ repeating.

$\frac{45}{300} = \frac{3}{20}$ terminating

Explain:

20

4 · 5

1

2 · 2 · 5

Prime factors of 20 are only 2s and 5,