

Test 3A - MTH 2010

9.99

Dr. Graham-Squire, Fall 2014

Name: Key

I pledge that I have neither given nor received any unauthorized assistance on this exam.

(signature)

DIRECTIONS

1. Show all of your work, even on the multiple choice questions. A correct answer with insufficient work or incorrect notation will lose points.
2. Clearly indicate your answer by putting a box around it.
3. Calculators, cell phones and computers are not allowed on this test.
4. Make sure you sign the pledge.
5. Number of questions = ~~18~~₁₂. Total Points = ~~63~~₆₀.

3. Calculators, cell phones and computers are not allowed on this test.

1. (3 points)

(a) Calculate and reduce your answer to lowest terms: $\frac{4}{6} \div \frac{7}{9}$

$$\frac{2\cancel{4}}{\cancel{3}6} \cdot \frac{9^{\cancel{3}}}{7} = \boxed{\frac{6}{7}}$$

(b) Bob mops floors. If Bob can mop $\frac{5}{9}$ of a room in an hour, how long does it take him to mop 3 rooms (assume all rooms are the same size).

$$3 \div \frac{5}{9} = 3 \cdot \frac{9}{5} = \frac{27}{5} = 5 \frac{2}{5} \text{ hours.}$$

$$\begin{array}{r} 9:49 \\ 9:50 \\ \hline 1 \end{array}$$

(c) Calculate $7.578 \div 0.9$.

time to mop 3 rooms

$$0.9 \overline{) 7.578} \Rightarrow 9 \overline{) 75.78}$$
$$\begin{array}{r} 842 \\ 9 \overline{) 75.78} \\ \underline{72} \\ 37 \\ \underline{36} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

$$\boxed{8.42}$$

9:58

2. (4 points)

(a) (2 points) Fill in the blank spots in the ratio table to figure out how many cups of red and blue paints should be mixed to give purple paint:

Cups of blue	5	10	$5\frac{1}{2}$	$\frac{25}{12}$
Cups of red	7	14	$7\frac{1}{2}$	$3\frac{5}{12}$
Cups of purple	12	24	1	5

(b) The price of a pair of pants decreased from \$80 to \$76. What was the percent decrease?

$$\$80 - 76 = \$4$$

$$\frac{\$4}{\$80} = \frac{1}{20} \cdot \frac{5}{5} = \frac{5}{100} \Rightarrow$$

5% decrease

(c) List all the factors of 48.

$$\begin{array}{r} 3 \\ 2 \overline{) 6} \\ 2 \overline{) 12} \\ 2 \overline{) 24} \\ 2 \overline{) 48} \end{array}$$

$$48 = 2^4 \cdot 3$$

\Rightarrow factors

- 1×48
- 2×24
- 3×16
- 4×12
- 6×8

{1, 2, 3, 4, 6, 8, 12, 16, 24, 48}

3. (3 points)

(a) Which of the following numbers are divisible by 6?

14 36 456 3 333 $1,375,636$ $78,246$

\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow

No Yes Yes No No b/c it is odd \rightarrow even
 $\hookrightarrow 7+8+2+4+6=27$
 is divisible by 3
 \Rightarrow Yes

even $\frac{4+5+6}{1} = 15 \Rightarrow$ divisible by 3
 $1+3+7+5+6+3+6 = 31$, not divisible by 3

$\begin{array}{r} 9:51 \\ 9:53 \\ \hline 4 \end{array}$

(b) Find the prime factorization of 540.

$$\begin{array}{r}
 3 \overline{) 9} \\
 3 \overline{) 27} \\
 5 \overline{) 135} \\
 2 \overline{) 270} \\
 2 \overline{) 540}
 \end{array}$$

$$540 = 2^2 \cdot 3^3 \cdot 5$$

(c) Is 161 prime? Explain your reasoning

Not divisible by 2, 3, or 5 early check

$$\begin{array}{r}
 23 \\
 7 \overline{) 161} \\
 \underline{14} \\
 21
 \end{array}$$

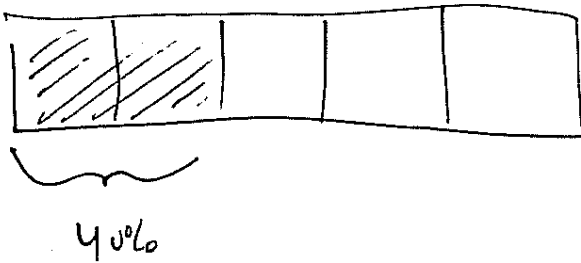
Not prime b/c

$$161 = 7 \cdot 23$$

+1 min

6 minutes so

4. (5 points) In a box of chocolate candies, 40% of the candies are dark chocolate, and the rest are milk chocolate. There are 8 more milk chocolate candies than dark chocolate candies. In all, how many chocolate candies are in the box?



$$\Rightarrow \text{each block} = 20\% = \frac{40\%}{2}$$

One block more of milk chocolate and 8 more milk choc candies

$$\Rightarrow \text{One block} = 8 \text{ candies.}$$

$$\text{Total of } 5 \cdot 8 = \boxed{40 \text{ candies}}$$

5. (5 points) If you multiply an odd number by 3 and then add 1, what kind of number (odd or even) do you get? Explain *why* your answer is always correct.

You get an even #. Why?

$$\text{odd}^\# \cdot 3 + 1$$

$$= \text{odd}^\# + \text{odd}^\# + \text{odd}^\# + 1$$

↓
Can pair these
up to get an
even #

↓
This is
an even #

plus 1 extra. Pair that
1 extra with this 1

and it is even, ~~even~~

b/c everything is ~~even~~
paired up.

6. (5 points) If Q and R are integers, which of the following expressions could be irrational?

- (I) $\frac{Q}{R}$ \rightarrow Rational
(II) $Q - R$ \rightarrow Integer
(III) $\sqrt{Q \times R}$ \rightarrow could be irrational, like $\sqrt{1 \times 2} = \sqrt{2}$
(IV) $R \times Q^2$ \rightarrow Integer
(V) $0.00\overline{RQR}$
 \hookrightarrow Repeating decimal \Rightarrow Rational

(A) I, III, IV

(B) V only

(C) III only

(D) II, III, V

(E) None could be irrational

7. (5 points) It takes hose A 5 minutes to fill the kiddie pool, and hose B takes 7.5 minutes to fill the kiddie pool. How long would it take for the two hoses to fill up the kiddie pool together?

x = # of minutes. Then

Hose A does $\frac{x}{5}$ of the pool

" B " $\frac{x}{7.5}$ " " "

together they do $\frac{x}{5} + \frac{x}{7.5}$, set = 1 and solve!

$$\frac{3}{3} \cdot \frac{x}{5} + \frac{x \cdot 2}{7.5 \cdot 2} = 1$$

$$\frac{3x}{15} + \frac{2x}{15} = 1$$

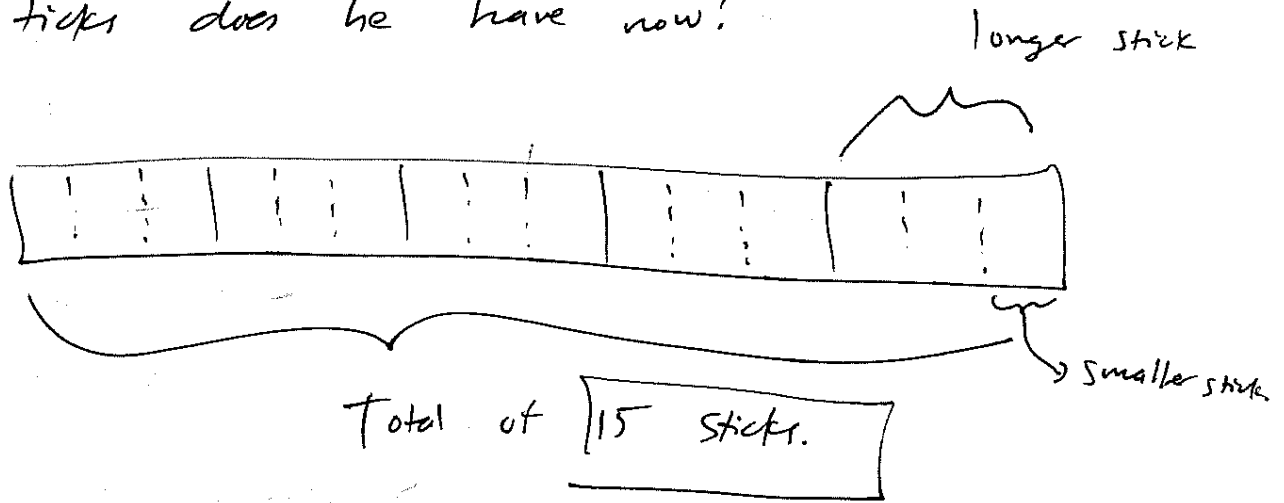
$$15 \cdot \frac{5x}{15} = 1 \cdot 15$$

$$\frac{5x}{5} = \frac{15}{5}$$

$$x = 3$$

8. (5 points) Write a word problem for $5 \div \frac{1}{3}$, then solve the problem with the aid of a math drawing, a table, or a double number line. Explain your reasoning.

Joe has 5 equal sized sticks. He breaks each stick into thirds. How many (smaller) sticks does he have now?



$$5 \div \frac{1}{3} = 5 \cdot \frac{3}{1} = \boxed{15}$$

9. (5 points) The letters L , M , and N represent digits (possibly equal) in the twelve digit number $x = 111,111,111,LMN$. For which values of L , M , and N is x divisible by 40?

X (A) $L=4, M=2, N=0$ 111,111,111,420

X (B) $L=1, M=0, N=0$

X (C) $L=0, M=0, N=4$

(D) $L=3, M=2, N=0$

Yes, 40 divides 320!

40 divides into 1000;
so only need to look
at last 3 digits.

40 does not
divide into 420
(has remainder of 20)

40 does not divide
100 (rem. of 20)

won't work b/c last digit
is not 0; so 40 won't
divide

10. (5 points) The chairs in a large room can be arranged in rows of 18, 25, or 40 with no chairs left over. If C is the smallest possible number of chairs in the room, which of the following inequalities does C satisfy?

(A) $C \leq 300$

(B) $300 < C \leq 600$

(C) $600 < C \leq 1000$

(D) $C > 1000$

Need LCM of 18, 25, 40

$$18 = 2 \cdot 3^2$$

$$25 = 5^2$$

$$40 = 2^3 \cdot 5$$

$$\Rightarrow \text{LCM} = 2^3 \cdot 3^2 \cdot 5^2$$

$$= 8 \cdot 9 \cdot 25$$

$$= 200 \cdot 9$$

$$= 1800$$

11. (5 points) Write the repeating decimal $0.07\overline{35}$ as a fraction. Your answer should be a fraction with no decimals in it, written in its most reduced form.

$$0.07\overline{35} = N$$

$$7.35\overline{35} = 100N$$

$$- 0.07\overline{35} = -N$$

$$7.28 = 99N$$

$$N = \frac{7.28 \cdot 100}{99 \cdot 100}$$

$$N = \frac{\cancel{7}28}{9900} \quad \text{Now simplify!}$$

$$= \frac{\cancel{7}28 \overset{369}{182}}{9900}$$

~~4950~~ 2475

$$= \boxed{\frac{182}{2475}}$$

12. (5 points) If $2\frac{1}{2}$ pounds of water fills $3\frac{1}{2}$ buckets, how many buckets will 12 pounds of water fill? If the last bucket is not full, state what *fraction* of the bucket will be full.

lbs : buckets

$$2\frac{1}{2} : 3\frac{1}{2} \Rightarrow \frac{5}{2} : \frac{7}{2}$$

$$12 : x$$

$$\frac{\left(\frac{5}{2}\right)}{\left(\frac{7}{2}\right)} = \frac{12}{x}$$

$$\Rightarrow \frac{5}{2}x = \frac{7}{2} \cdot 12$$

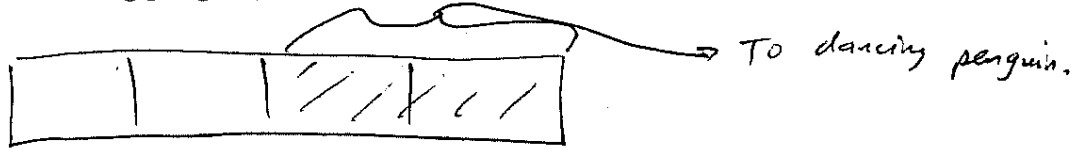
$$\frac{2}{5} \cdot \frac{5}{2}x = 42 \cdot \frac{2}{5}$$

$$x = \frac{84}{5} = 16\frac{4}{5}$$

\Rightarrow 16 full buckets + $\frac{4}{5}$ of a bucket

13. (5 points) The ratio of Dominic's legos to Eva's legos is 4 to 3. After Dominic gives half of his legos to a dancing penguin, he has 11 fewer legos than Eva. How many legos does Eva have?

• Dom



• Eva



So Eva has one more block = 11 legos

$$\Rightarrow \text{Eva has } 11 \cdot 3 = \boxed{33 \text{ Legos}}$$

Extra Credit(up to 3 points) In the space below, write either the number 1 or the number 3. If you write 1, you are guaranteed to get 1 point extra credit. If you write 3, you will get 3 points, UNLESS 5 or more students in the class total write 3, in which case everyone who writes 3 will get no extra credit.