MTHT 467 Problem Set #6 SPRING 2011

1. The Book store marked down some notepads from $2.00 but still kept the price over $1.00. It sold all of them. the total amount of money from the sale of the pads was $31.45. How many notepads were sold? 1 pt

Answer: 17 notebooks

2. The radio station gave away a discount coupon to every fifth caller and a CD to every sixth caller. Every twentieth caller received free concert tickets. Which caller was frist to get both a discount coupon and a CD? Which caller was first to get all three prizes? If there were 150 callers, how many of each prize did they give away? 1 pt

Answer: 1st caller to get both = 30th caller
1st caller to get all 3 prizes = 60th caller
30 discount count coupons
25 CD's and 7 concert tickets = 62 prizes

3. Larry and Mary bought a special 360-day joint membership to a tennis club, Larry will use the club every other day, and Mary will use the club every third day. The both use the club on the first day. How many days will neither person use the club in the 360-days? 3pt

Answer: Neither person will be in the gym 120 days

4. On a string of Christmas tree lights, the red ones blink every 3 seconds, the blue ones blink every 4 seconds and the white blinks every 4.5 seconds. What is the maximum number of times they all blink together in a one-hour interval? 3pt

Answer: 100 times

5. Three runners are running on a circular track. The first completes one lap every 4 minutes. The second completes one lap every 6 minutes, the third every 8 minutes. If they start together, when is the first time they get to the starting line at the same time? At that time, how many laps has each completed? 1pt

Answer: 24 mins
1st runner: 6 laps
2nd runner: 4 laps
3rd runner: 3 laps

6. You have a square pattern with which you would like to tile a room that is 203 feet by 77 feet. You want the square design to be as big as possible and you do not want any gaps or borders, the squares must exactly tessellate the area. What is the largest square pattern you can do? 1pt

Answer: 7x7 ft square

1. The Book store marked down some notepads from $2.00 but still kept the price over $1.00. It sold all of them. the total amount of money from the sale of the pads was $31.45. How many notepads were sold?

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10/10

No name?
- pretty handwriting & thoughts

Include in your discussion of these problems, connections to the concepts of factors, multiples, lcm and/or gcd.

1. The bookstore marked down some notepads from $2.00 but still kept the price over $1.00. It sold all of them. The total amount of money from the sale of the pads was $31.45. How many notepads were sold?

guess & check.

has to be in between $1 & $2.

* 17 notepads were sold at $1.85. +1

31.45/1.5 = 20.97 31.45/1.7 = 18.50 31.45/1.8 = 17.47

31.45/1.6 = 19.07 31.45/1.75 = 17.97 31.45/1.85 = 17.

#1
- guess & check
- why did you start w/ 1.5 and not 1.01, 1.02, ...etc?
- why did you go up by incriments of .05, .10, or .15 and not incriments of 1 cent?

PROBLEM SET #6

1. BOOKSTORE MARKED DOWN NOTEPADS FROM $2.00 BUT STILL KEPT THE PRICE OVER $1.00. SO

$1.00 < NOTEPADS < $2.00

THE TOTAL SALE OF NOTEPADS = $31.45

HOW MANY WERE SOLD?

THE NEW PRICE COULD BE $1.01, $1.02, ..., $1.99

SO THERE ARE 99 POSSIBLE PRICES, BUT THE PRICE HAS TO EVENLY DIVIDE THE TOTAL SALE $31.45

SINCE FINDING THE FACTORS OF $31.45 WOULD BE TOO TIME CONSUMING, WE CAN MOVE THE DECIMAL 2 PLACES OVER AND FIND THE FACTORS OF 3145

good!

good way of problem solving and avoiding extra work

3145

5 · 629

17 · 37

Very good way of finding solution

629	185	85
5 | 3145	17 | 3145	37 | 3145
- 30	- 17	- 296
14	144	185
- 10	- 136	- 185
45	85	0
- 45	- 85	
0	0	
$6.29	$1.85	.85 ¢

✓

17 NOTEPADS WERE SOLD AT $1.85 EACH

+10

Problem set #6

① Notepads $1.00 - $2.00

The total amount of money from the sale of pads = $31.45

+1

- I made $31.45 to 3145 by moving the decimals two places right
- The prime factorization of 3145 → 5 × 17 × 37
- Then, I divided 5, 17, and 37 from $31.45 and saw if the amount came out to be between $1.00 - $2.00
  - → 5 pads = $6.29 each
  - * → 17 pads = $1.85 each *
  - → 37 pads = $0.85 each

great job of using prime factorization to solve the problem!

Notepads sold: 17 for $1.85 each

② 5th caller: Discount coupon

6th caller: CD

20th caller: Free concert tickets

- Which caller was first to get both discount coupon and CD?

5, 10, 15, 20, 25, (30)] LCM

6, 12, 18, 24, (30)

= The 30th caller

+1

used LCM to solve problem, excellent!

- Which caller was first to get all three prizes?

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, (60)] LCM

6, 12, 18, 24, 30, 36, 42, 48, 54, (60)

20, 40, (60)

= The 60th caller

- 150 callers, then 62 prizes given away

Disc. coupon: 150/5 = 30

CD: 150/6 = 25 } add to be 62

Free concert tickets: 150/20 = 7.5 = 7

2. The radio station gave away a discount coupon to every fifth caller and a CD to every sixth caller. Every twentieth caller received free concert tickets. Which caller was frist to get both a discount coupon and a CD? Which caller was first to get all three prizes? If there were 150 callers, how many of each prize did they give away?

#2
- good use of table
- showed multiples of each give away
- circled common multiples
- showed good understanding of problem

1.85 to gain $31.45"

2)

discount coupon	5	10	15	20	25	(30)	35	40	45	50	55	(60)
CD	6	12	18	24	(30)	36	42	48	54	(60)	66	72
free concert tickets	20	40	(60)	80	100	120	140	160	180	200	220	240

f)
- From the chart above, the person who first received a discount coupon and a CD will be the least common multiple of 5 and 6 which is 30. Thirtieth caller is the first one to get both prizes.
- A person who can get all three prizes will be the least common multiples of 5, 6, and 20 which is 60. Sixtieth caller can received all three prizes.
- If they were 150 callers.

  150 ÷ 5 = 30 discount coupons

  150 ÷ 6 = 25 CDs

  150 ÷ 20 = 7.5 which means they gave away 7 concert tickets

62 prizes

Make sure to write the total amount

3. Larry and Mary bought a special 360-day joint membership to a tennis club, Larry will use the club every other day, and Mary will use the club every third day. The both use the club on the first day. How many days will neither person use the club in the 360-days?

150/20 = 7.5

20 + 25 + 7.5 = 52.5 total

#3

- good job of restating the problem to fully understand what it was asking
- good use of list to recognize a pattern.
- nice recognition of LCM

of 5, 6, 62

3 x 5 = 60

60, 65

66

150/30 = 5

150/25 = 6

3. Larry: every other day (LCM 2)
Mary: every third day (LCM 3)
Both starts on the first day (+1)
For Larry I need to find LCM of 2 +1
For Mary I need to find LCM of 3 +1
You can use equation:

$L = 2x + 1$
$M = 3x + 1$

] x = the # of day.

using calculator $Y_1 = 2x+1$
$Y_2 = 3x+1$

Looking at the table I noticed that $2x+1=L$ covers all the odd days so 1, 3, 5, 7, 9 etc.
Looking at the table I noticed that $3x+1=M$ covers both even & odd days but not all even days so I need to look for even numbers that are not shown in the table. this number will be the days that none of two will use the club.

days not been used by both Larry & Mary

Guess use chart

2.	42	80.	120	158	196	236	276	314
6.	44	84	122	162	200	240	278	318
8.	48	86	126	164	204	242	282	320
12.	50	90	128	168	206	246	284	324
14.	54	92	132	170	210	248	288	326
18	56	96	134	174	212	252	290	330
20	60	98	138	176	216	254	294	332
24	62	102	140	180	218	258	296	336
26	66	104	144	182	222	260	300	338
30	68	108	146	186	224	264	302	342
32	72	110	150	188	228	266	306	344
36	74	114	152	192	230	270	308	348
38	78	116	156	194	234	272	312	350

354, 356, 360

120 days that they are not going to use club.

$= 2^2 \times 3$

no

$= 3^2$ qcd

$= 2^3$

so 100 times

#3.) 360 day membership:
Larry = every other day (3)
Mary = every third day (2)

used chart to figure out 36 days and then multiplied by ten to get 360 days. Great job!

3)

X		X	O	X	
OX		X	O	X	
OX		X	O	X	
OX		X	O	X	
OX		X	O	X	
OX		X	O	X	

6 x 6 = 36 days
chart)

Larry = X
Mary = O

There are 12 shaded/unused days
36 x 10 = 360
12 x 10 = 120
120 days unused

#4.) red lights = every 3 seconds
blue lights = every 4 seconds
White lights = every 4.5 seconds
how many secs in 1 hour?

$$(1\text{ hr})\left(\frac{60\text{ min}}{1\text{ hr}}\right)\left(\frac{60\text{ sec}}{1\text{ min}}\right) = \underline{3600}\text{ sec. in 1 hour}$$

3600 ÷ 3 = 1200
3600 ÷ 4 = 900
3600 ÷ 4.5 = 800

prime factorization!

(+3)

1200
120 · 10
20 · (2) (5) · (2)
10
(5) (2)
2 · 2 (2) (2) · 3 · (5) (5)

900
90 · 10
9 · 10 (5) (2)
(3) (3) (5) (2)
(2) (2) · 3 · 3 · (5) (5)

800
80 · 10
8 · 10 (5) (2)
4 · 2 (5) (2)
(2) (2)
(2) (2) · 2 · 2 · (5) (5)

$= 2 \cdot 2 \cdot 5 \cdot 5 =$ **100** = max. # of times lights blink together in 1 hr intv.

4. On a string of Christmas tree lights, the red ones blink every 3 seconds, the blue ones blink every 4 seconds and the white blinks every 4.5 seconds. What is the maximum number of times they all blink together in a one-hour interval?

④ Red → 3sec
Blue → 4sec
White → 4.5sec

$1\text{hr} \times \frac{60\text{min}}{1\text{hr}} \times \frac{60\text{sec}}{1\text{min}} = 3600\text{sec in 1hr}$

3600 ÷ 3 = 1200
3600 ÷ 4 = 900
3600 ÷ 4.5 = 800
} max # of times they can all possibly blink together is 800 times

4.5 multiples (that are also multiples of 3 and 4) → 36, 72, 108, 144, 180, 216, 252, 288, 324, 360

10 multiples from 0–360sec

3600 ÷ 360 = 10
↓
10 sets of ~~4 more~~ 10 multiples

10 × 10 = 100
↓ ↓
sets of multiples | # of multiples in each set

Max # of times they all blink together in a one hour interval is 100

#4
- ~~discussed~~
- showed common multiples of 4.5, 3, 4
- chose LCM ~~discussed~~
- good use of conversion from hr to sec.

#4

- Thought 3 · 4 · 4.5 would give LCM
- Thought 66 was LCM
  ↳ 36 is the LCM
- Seems like student rushed this problem.

4. On a string of Christmas tree lights, the red ones blink every 3 seconds, the blue ones blink every 4 seconds and the white blinks every 4.5 seconds. What is the maximum number of times they all blink together in a one-hour interval?

3 · 4 · 4.5 = 54sec when they blink together

$\frac{3600sec}{54sec}$: 66 blink together in 1hr.

2

+1

$\frac{1\text{hr}}{1} \times \frac{60\text{min}}{1\text{hr}} \times \frac{60\text{sec}}{1\text{min}} = 3{,}600$

(4) Red lights

$\frac{3{,}600\text{ sec}}{1\text{ hr}} \times \frac{3\text{ sec}}{1\text{ blink}} = 1{,}200$ blinks in 1hr

+3

used prime factorization. Excellent!

Blue lights

$\frac{3{,}600\text{ sec}}{1\text{ hr}} \times \frac{4\text{ sec}}{1\text{ blink}} = 900$ blinks in 1hr

100 times

White lights

$\frac{3{,}600\text{ sec}}{1\text{ hr}} \times \frac{4.5\text{ sec}}{1\text{ blink}} = 800$ blinks in 1hr

I found out how many times each light blinks in 1hr. To find out the maximum number the lights would blink together, I found the GCD of 1,200, 900, and 800. I found the GCD to be 100. With that I know that the max. number the lights would blink together would be 100.

(5) Runner 1: 4, 8, 12, 16, 20, (24), 28, 32, 36 | lap 6
Runner 2: 6, 12, 18, (24), 30, 36, 42 | lap 4
Runner 3: 8, 16, (24), 32, 40, 48 | lap 3

24 mins
1: lap 6
2: lap 4
3: lap 3

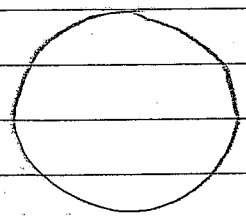
What I did was find the multiples of Runner 1: (4) Runner 2: (6) & Runner 3: (8). When I found the multiples I found the Least Common Multiple (LCM) which is 24. That means at 24 mins they will start at the starting line together. The first runner would be on lap 6 ($24 \div 4 = 6$) The second runner would be on lap 4 ($24 \div 6 = 4$) The third runner would be on lap 3 ($24 \div 8 = 3$).

LCM!
+1

5. Three runners are running on a circular track. The first completes one lap every 4 minutes. The second completes one lap every 6 minutes, the third every 8 minutes. If they start together, when is the first time they get to the starting line at the same time? At that time, how many laps has each completed?

6. You have a square pattern with which you would like to tile a room that is 203 feet by 77 feet. You want the square design to be as big as possible and you do not want any gaps or borders, the squares must exactly tessellate the area. What is the largest square pattern you can do?

5.



1st runner = $\frac{1 \text{ lap}}{4 \text{ min}}$ 3rd runner = $\frac{1 \text{ lap}}{8 \text{ min}}$

2nd runner = $\frac{1 \text{ lap}}{6 \text{ min}}$

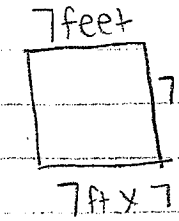
1st 4 min, 8, 12, 16, 20, (24), 28,

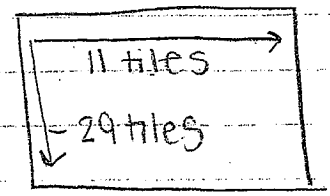
2nd 6 min, 12, 18, (24), 30, 36, 42

3rd 8 min, 16, (24), 32, 40, 48

At 24 min, they are all at the starting line. Runner 1 completed 6 laps, Runner 2 completed 4 laps and Runner 3 completed 3 laps.

⑥ Tile size



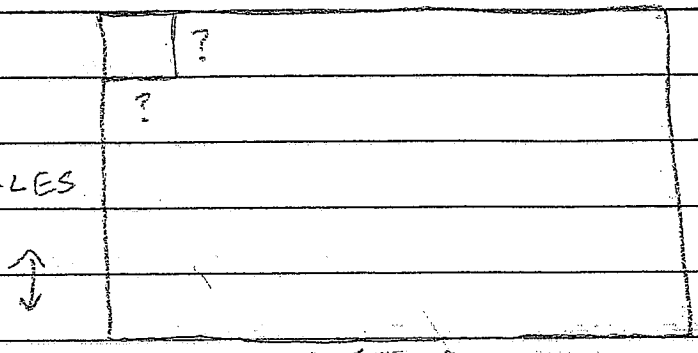


What I did for this problem was I found the greatest common divisor (GCD) of 77 & 203. I found the GCD to be 7 because 77 is divisible by 7 & 203 is also divisible by 7. The tile size must be 7feet x 7feet. Since the room is 203feet x 77feet That would mean that there need to 11 tiles of the 7x7 going one way (7x11=77) and there needs to be 29 tiles of 7x7 going the other way (7x29=203). This would be the largest square pattern you can do.

+1

great use of GCD to solve the problem

6.



77 FT

WHAT IS THE LARGEST SQUARE PATTERN YOU CAN DO?

WE CAN FIND THE DIMENSIONS OF THE LARGEST POSSIBLE SQUARES BY FINDING THE COMMON FACTORS OF 203 AND 77.

203	77
/ \	/ \
(7) 29	(7) 11

A 7 x 7 SQUARE IS THE LARGEST POSSIBLE DIMENSIONS FOR THE PATTERN.

A 7x7 SQUARE YIELDS A 49 ft^2 AREA.

AND THE ROOM HAS AN AREA OF 15,631 ft^2 SO THE ROOM WILL NEED

319 TILES

$$
\begin{array}{r}
319 \\
49 \overline{)\,15631} \\
-\,147 \\
\hline
93 \\
-\,49 \\
\hline
441 \\
-\,441 \\
\hline
0
\end{array}
$$

4/4 ✓
- great explanation
- good use of drawing to understand the problem