Real World Problem-Based Learning

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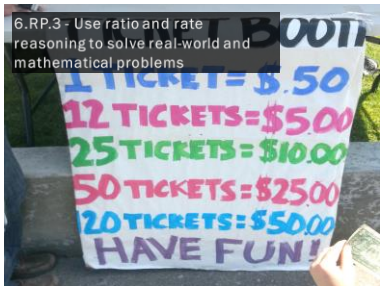
August 1, 2013

The Challenge

- Which ticket option is the best deal?
- Which ticket option is the worst deal?
- Which ticket options are the same deal?
- How would you suggest they change their prices?



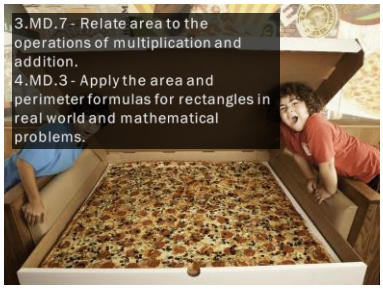
The Reality

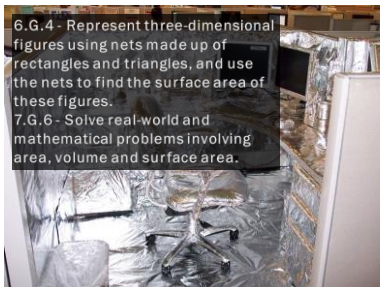
- What does "best" mean?
  - 120 tickets for $50 is "best" because you get the most tickets
  - 1 ticket for $0.50 is "best" because you spend the least amount of money
- "What do you need to know to solve the problem?"
  - How many tickets will we use?
  - How long will we be staying there?
  - How many people are we going with?
  - How many tickets do the rides cost?
- Once they started working, they had no idea what to do.
  - They didn't realize that they could buy multiple sets of tickets.

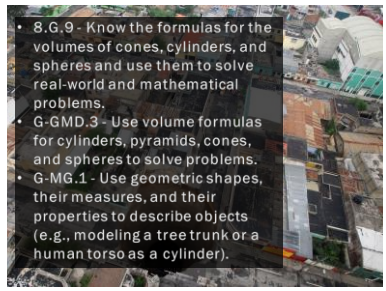
Student Work Samples

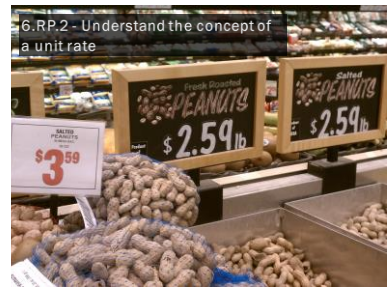
The Four C's

- Communication
- Curiosity



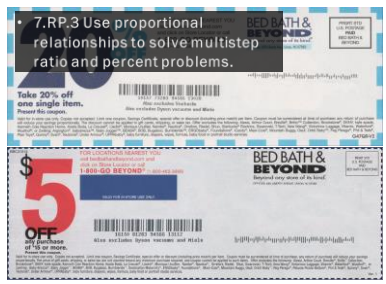






The Four C's

- Communication
- Curiosity
- Critical Thinking
- Content Knowledge



Standards for Mathematical Practice

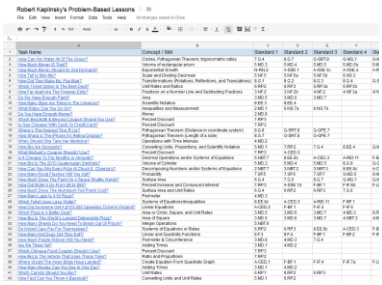
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

PROBLEM-BASED LEARNING FAQ

- *How often do teachers do problem-based learning?*
- *How long do problem based lessons take?*
- *Do teachers use problem-based lessons to introduce a topic or after you've already taught it?*
- *How is problem-based learning assessed?*
- *How much time does it take to create a problem-based lesson?*

Problem-Based Lesson Resources

- My lessons: http://www.robertkaplinsky.com/lessons
- Dan Meyer: http://threeacts.mrmeyer.com
- Andrew Stadel: http://tinyurl.com/mrstadel
- Geoff Krall: http://tinyurl.com/Pr&Lmaps
- Nathan Kraft: http://tinyurl.com/mrkraft
- Sam J Shah: http://samjshah.com/worksheets-projects
- Yummy Math: http://www.yummymath.com
- Mathalicious: http://www.mathalicious.com
- Dan Meyer's TED talk: http://tinyurl.com/meyer-TED



Robert Kaplinsky's Problem-Based Lessons

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	A	B	C	D	E	F	G
1	Task Name	Concept / Skill	Standard 1	Standard 2	Standard 3	Standard 4	Sta
2	How Can We Make All Of The Grass?	Circles, Pythagorean Theorem, trigonometric ratios	7.G.4	8.G.7	G-GPE.6	G-MG.1	G-M
3	How Much Water Should Be Poured?	Cylinders, cones, and sphere; prism	8.MG.1	8.MG.4	G-MG.3	G-MG.1b	G-M
4	How Much Money Should Dad Demand?	Exponential Growth	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4	A-R
5	How Tall Is Mt. Hood?	Scale and Dividing Decimals	5.NF.3	5.NF.5a	5.NF.7b	6.NS.3	
6	How Far Does Light Go, Practice?	Rotations, Reflections, (Rotations, Reflections, and Translations)	8.G.3	8.G.2	8.G.4	8.G.1	G-S
7	How Is Time Made At The Mint Desk?	Unit Rates and Ratios	6.RP.3	6.RP.3	6.RP.3a	6.RP.3b	
8	How Far Apart Are The Forever Exits?	Fractions on a Number Line and Subtracting Fractions	3.NF.2	3.NF.2b	4.NF.2	4.NF.3a	4.N
9	Do We Have Enough Paint?	Area	3.MD.5	3.MD.6	3.MD.7		
10	How Many Stars Are Rising In The Universe?	Scientific Notation	8.EE.4	8.EE.4			
11	How Much Water Is Left?	Capacities and Measurement	5.MD.1	5.NS.1b	5.NS.3b		
12	Do We Have Enough Mints?	Mints	2.MD.4				
13	Which Bed Bath & Beyond Coupon Should You Use?	Percent Discount	7.RP.3				
14	Is Gas Cheaper With Cash Or Credit Card?	Percent Discount	7.RP.3				
15	Where Is The Nearest Sno Kids?	Pythagorean Theorem (Distance in coordinate system)	8.G.8	G-SRT.8	G-GPE.7		
16	How Much Does Our Pool Need Of A Solar Blanket?	Surface Area and Volume of a solid	8.G.9	G-MG.3	G-GMD.1		
17	When Should Dirty Tires Be Replaced?	Operations with Time Intervals	4.MD.2				
18	How Big Are Dumpsters?	Converting Units, Proportions, and Scientific Notation	5.MD.1	7.RP.2	7.G.4	8.EE.4	G-M
19	What Michael's Coupon Should I Use?	Percent Discount	7.RP.3	A-CED.3			
20	Is It Cheaper To Fly Monthly or Annually?	Decimal Operations and/or Systems of Equations	5.NBT.7	8.EE.8c	A-CED.3	A-REI.11	F-IF
21	How Much Does Our Pool Need Of Chlorine?	Percent Discount	7.RP.3	8.EE.4	A-CED.3	A-REI.11	F-IF
22	How Can We Mix Exactly Pints Of Chuck A Gallon?	Decomposing Numbers and/or Systems of Equations	3.NBT.2	3.NBT.2	3.NBT.3	4.NF.3b	A-C
23	How Many Good Catches Will You Get?	Probability	7.SP.5	7.SP.6	7.SP.7	8.MD.5	S-M
24	How Much Does The Paint In A Name Shuffle Weigh?	Surface Area	7.G.4	7.G.6	8.G.7	G-MG.1	G-M
25	How Long Will It Go Form Bit By Bit?	Multiplication and Compound Interest	7.NS.3	8.NS.1b	F-IF.7	F-IF.8b	F-LE
26	How Much Water Is Left In The Paint Can?	Surface Area and Unit Rates	6.G.4	6.RP.2	6.RP.3	7.G.6	
27	How Many Jars In A Pallet?	Polynomial	A-MD.3				
28	Which Tetra Uses Less Water?	Systems of Equations/Inequalities	8.EE.8c	A-CED.3	A-REI.11	F-BF.1	
29	How Did Increase And Fund Mini Speeding Ticket In Florida?	Percent Increase	7.RP.3	8.EE.4	F-IF.7	F-BF.3	
30	How Much Water Is Left In The Tank?	Area of Circle, Square, and Unit Rates	3.MD.5	3.MD.6	3.MD.7	4.MD.3	G-N
31	How Big Is The World's Largest Deliverable Pizza?	Area of Square	3.MD.5	3.MD.6	3.MD.7	4.NBT.3	4.N
32	How Many Weeks Do You Need To Break Out Of Prison?	Integer Operations	5.NBT.8				
33	Do Hybrid Cars Pay For Themselves?	Systems of Equations or Rates	6.RP.2	6.RP.3	8.EE.8c	A-CED.3	F-B
34	How Much Does A Bin Bag Fall?	Quadratic or Absolute Functions	F-IF.7b	F-BF.1	F-BF.3	F-BF.2	F-B
35	How Much Fence Material Will You Need?	Perimeter & Circumference	3.MD.8	4.MD.3	7.G.4		
36	Are We There Yet?	Adding Times	3.MD.1	4.MD.2			
37	Which Chinese Food Coupon Should I Use?	Percent Discount	7.RP.3				
38	How Big Is The Miracle That Uses Three Tires?	Ratio and Proportions	7.RP.2				
39	How Much Does Our Pool Need To Be Leveled?	Slope-Intercept Form Quadratic Graph	F-BF.1	F-BF.1	F-IF.4	F-IF.7a	F-LE
40	How Many Weeks Can You Stay In Jail Free?	Adding Times	3.MD.1	4.MD.2			
41	Which Carpet Should You Buy?	Unit Rates	6.RP.1	6.RP.2	6.RP.3		
42	How Fast Can You Throw A Baseball?	Converting Units and Unit Rates	5.MD.1	6.RP.2			

NEXT STEPS

- *Find lessons for your grade level*
- *Set a realistic implantation goal.*
- *These lessons will uncover other issues.*
- *Join Twitter or create a blog to get feedback from others.*