Du Bois Fractions on the Run
Instructions for Coaches
This may be obsolete

April 2013 - This is slightly out-of-date

Fractions on the Run makes math fun by integrating running and giving them challenges that are at their level. It helps students learn different fraction representations and improves their number sense.

1. Mathletes run to place three fraction challenge cards (shown on the right) on the fraction number line which runs from -1 to 2.
2. Coaches check to make sure that the challenge cards are correctly placed
3. When a mathlete has placed three challenge cards correctly they get a success sticker to place under their name.

The fraction challenge card shown above represents negative ½ because stripes represent negatives. It would be given to a mathlete on the yellow team who has earned the right to a level 13 set of cards. There are four set of level 13 cards for each color: 13A, 13B, 13C and 13D so that up to four mathletes on the yellow team can play at level 13 at any given time.

Running is the key to making *Fractions on the Run* fun

Running makes it fun, but most mathletes will need some prompting before they run. Running and being enthusiastic is the first step. Chasing after them yelling "I'm a gonna get you." works. Sometimes "Go. Go. Go." is enough, especially if at least a few other mathletes are already running. Not all mathletes will run. Use your judgement.

Offering challenges to mathletes

Mathletes can be offered challenges either directly, or by giving placing challenge envelopes in their challenge pocket.

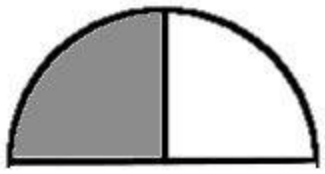
Keeping track of which mathlete placed the 13C challenge cards: the Batter's Box

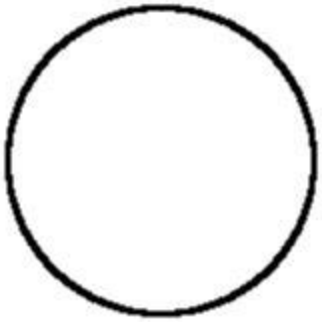
Each set of challenge cards comes in a small envelope with the same label as the challenge cards themselves. Mathletes place this envelope above their name in their batter's box. In the example on the right, Jamar has placed the envelope marked 13C above his name in the Yellow Team Batter's Box indicating that he has been given a set of challenge cards marked 13C to place on the number line. MarKhila has placed an envelope marked 1B indicating that she has been given a set of 1B challenge cards to place.

Helping mathletes who have placed a challenge card in the wrong envelope

This is your chance to help them learn, but remember that the less you say the more that they will learn.
Ignore the fact that it was misplaced and focus on getting it placed correctly.
"Dahlo could you help me figure out where this card goes?" "Dahlo where does this card belong?" "Dahlo, what fraction does this represent?"

Common challenges:

Challenge card	value	notes
	½	This could easily be seen as ¼, but it is ½ in this game.

	- ½	Stripes mean negative
1 ½	1 ½	Mixed numbers are hard
	1 ½	Mixed numbers are hard even when shown pictorially.
	0	This is a whole circle, but we are interested in the shaded art, hence this is zero here.

Don't feel that you have to explain. They learn by doing not by listening. When talking about 1 ½, I cover up the ½ and ask them what they see, then I cover

up the 1 and ask them what they see. This takes time because they have to get past whatever misconception they might have. But, eventually they will say “one” for the former and “one half” for the latter. Then I say, that 1 ½ is “one and a half” and ask them again what 1 ½ is. After all that I ask them whether they think 1 ½ will be between 0 and 1 or between 1 and 2. If they say that it will be between 0 and 1, I ask them again and continue asking them until they get it right. Then I praise them for being right and perhaps add that 1 ½ is more than 1 and less than 2.

Name tags and their starting challenge level

The number shown immediately after NL on their name tags indicates the level that they have earned the right to start with. For example, Jamar’s name tag, shown to the right here, shows that he has earned the right to start on at any level from 1 to 12.

Success stickers and earning the right to greater challenges

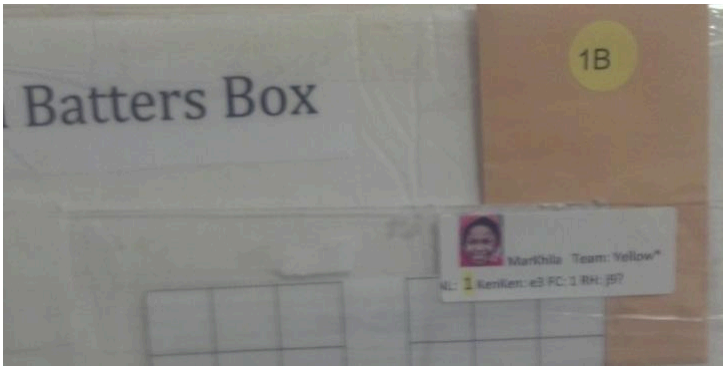
One of the three Du Bos Principles is that mathletes must earn the right to greater challenges. Hence in order to move up to a level 13, Jamar must convince you, the coach, that he can handle a level 12. In an ideal world, you would know immediately whether he place all of his challenge cards in the right position. In practice, you will have to use your judgement. If you have time, you could give him a level 13 packet, ask him to shake out the challenge cards and show them to you. Ask him about one or two of them (what fraction do they represent? where will he put them on the number line?) to gauge his understanding. Unless he is completely lost, I would not take the envelope away from him, but if he struggles, I would keep him on a 13 until he has demonstrated competence at that level. On the other hand, if he explains each fraction and where it belongs easily, I would praise him and ask him if he would rather try a 14 instead.

Using the sorting line to find completed challenge card sets

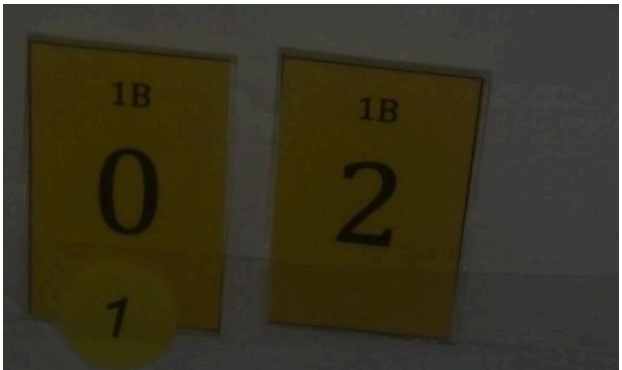
Just below the batter’s box there is a sorting line. The picture shown below shows a bit over half of the yellow team sorting line which contains stickers

numbered

from 1 to 33. Zooming in first on the Batter's box we see that MarKhila was given a 1B challenge.



We now switch to the sorting line to see that two of her challenge cards have been placed on the sorting line near the yellow 1 sticker. Placement on the sorting line



indicates that they were correctly placed on the number line (and then brought back by a coach). Hence, if
MarKhila also places the third yellow 1B challenge card correctly she will have earned a success sticker.

Success stickers act as a reward and as a record of their achievement

Under Jamar's name tag, we see a success sticker with the number 12 written on it. This sticker has been given to Jamar by his coach in recognition of his successful placement of three level 12 challenge cards.

This allows us to update our database so that 13 (or higher) will appear on Jamar's name tag the next time he plays "Fractions on the Run" allowing him to start with a level 13.

Team coaches:

Team coaches work only with the mathletes from a given team (typically: Yellow, Blue, Red or Green). They make sure that each mathlete's name is on the batter's box (name tags, if available, are ideal). They ask each mathlete what level challenge they would like to start at (up to, but not exceeding, the number on their name tag) and give basic instructions:

1. Place their envelope in their batter's box
2. Place their challenge cards on the number line
3. Run, run, run

Inspector coaches:

Inspector coaches run along the number line looking for challenge cards, collecting correctly placed challenge cards until they find an incorrectly placed challenge card. As soon as they find an incorrectly place challenge card, they run it back to the correct team (yellow cards are from the yellow team) and give it to a team coach who then offers tha mathlete who placed this challenge card a second chance to place it.

Inspector coaches return the correctly place challenge cards to the teams which placed them (again color coded). Ideally they sort them directly into the sorting line.

On the importance of running

Running serves three purposes: 1) It models the activity that we hope to see in the mathletes. 2) It demonstrates a sense of urgency. 3) It gets the job done quicker. Catching mistakes quickly keeps mathletes from making the same error over and over again. Identifying correctly place challenge cards quickly allows us to praise mathletes and offer them success stickers. It also keeps the sorting line and batters box from getting overloaded. Prompt feedback helps the team coaches decide whether to promote mathletes to the next level.

So many ways to praise a mathlete

Praise is the reward that we want mathletes to work for. Here are a few of the many ways to praise a mathlete:

- "You placed all 3 challenges correctly on your first try. Were any of them hard for you?"
- Blow a whistle. "Good job placing all three challenges correctly."
- Bring another coach over: "Hey, Coach Katherine, check this out, Samantha has earned five success stickers and moved up three levels. She is really working hard, you should see her fly."

Other issues to consider as you praise a mathlete

As you praise Sarah, consider the impact on Sam. Praising Samantha for success at level 29 may discourage Sam, who is struggling at level 3. I prefer to praise for successes that anyone could hope to achieve: earning four success stickers; moving up two levels; good focus and effort.

Praise effort over intelligence. Children tend to see intelligence as genetic and see

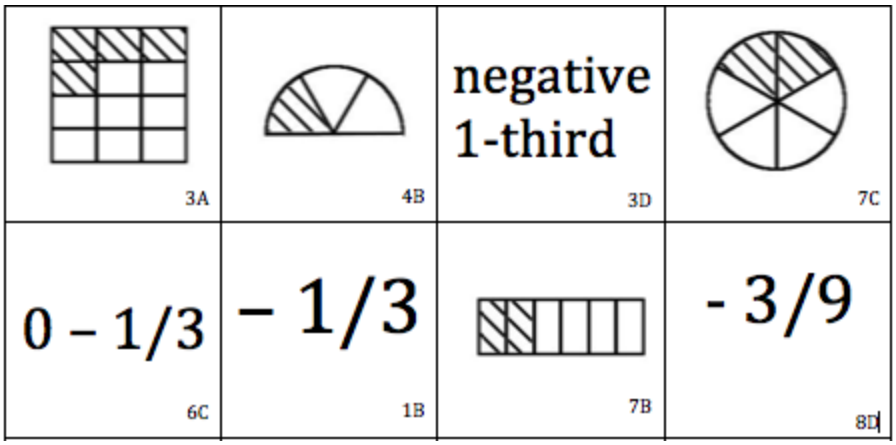
no reason to work hard. Einstein said that intelligence is 99% effort.

Experienced mathletes may want to act as inspectors

For now you can just tell them that we aren't doing that right now. Perhaps offering that they can be an inspector as soon as we start allowing mathletes to be inspectors. When we do allow mathletes to be inspectors, we will have an inspector trainer and the inspector's will go out in pairs, one from each of two teams, say yellow and blue. The yellow team inspector will collect correctly placed yellow challenge cards. The blue team inspector will collect correctly placed blue challenge cards. Both should run together to return incorrectly placed cards to the appropriate team.

Envelopes:

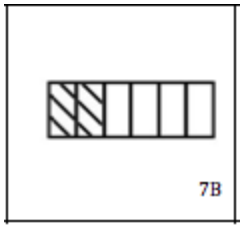
The envelopes on the number line have most of the representations on the challenge cards. Hence, mathletes can check their own work, greatly reducing the number of mistakes. Here is a sample envelope for - ⅓:



Secret challenges:. Everyone loves a secret. Our secret challenges are fraction representations that are not visible on the envelopes. Instead they printed in "Red Reveal" and hence are only visible with a "Secret Decoder Card" (i.e. a specially marked card with a red filter.) We use the secret challenges as a reward for demonstrating success with the regular challenge cards and as an assessment device. If they can correctly place a secret challenge at a given level, they are ready to move on higher levels.

Envelopes with a secret sticker have 4 challenge cards: 3 regular challenge cards and a secret challenge card.

Each mathlete is given three 1” by 1” number line challenge cards in a 2” by 3” coin envelope. The challenge cards and the envelope have the same unique ID color coded by team. The mathlete places their envelope in their batter’s box. Then they place each of the challenge cards in an envelope on the number line. Coaches[1] check to make sure that the challenge cards were placed in the right envelopes on the number line, returning incorrectly placed cards to the mathlete who placed them and placing correctly placed cards on the sorting line. For example, if a coach finds that a red 3A challenge card is misplaced, she would take that card back to the red team’s staging area and look to see which batter’s box contains the envelope with a red 3A marked. That coach or perhaps a coach working with this particular mathlete can then talk to the mathlete about After all three challenge cards, having been placed correctly, are back on the sorting line the player who placed them earns a success sticker with the number of the to place by their name. Here is a typical number line challenge card representation of negative 1-third. We use stripes, or diagonal shading, to represent negative numbers. The 7B packet would include three cards, each labelled 7B, typically including at least one negative number.



We play ten minute rounds with a two minute cleanup round at the end.

Music makes Fractions on the Run more fun.

[1] Experienced mathletes may act as inspectors, in pairs, but this is out of the scope of this document.

Levels:. A major part of making Fractions on the Run fun for everyone is giving each mathlete appropriate challenges. The challenge cards are levelled from 1 to 35. Level 1 includes the numbers 0, 1 and 2. Level 35 includes ⅓ + ⅓ as a representation of ⅔. We may soon be adding higher levels. Mathletes must earn the right to be offered higher levels by proving that they can handle lower challenges with ease.

Inspectors (Optional) If mathletes are invited to be inspectors, all teams designate an initial inspector. They inspectors work in teams of two. Each inspector keeps the correctly placed challenge cards from their team and the incorrectly placed challenge cards from the other team. The inspectors then return to their teams and sort the correctly placed cards into the sorting tray. Once they have placed those cards into the sorting tray, they look to see if all three of any packets have been completed and alert their coach to any successes. Each pair of inspectors goes over the number line only once. The teams should continue to designate inspectors on a regular basis.

Every mathlete is given the opportunity to be an inspector.

Our success with using coaches as inspectors suggests that if there is an inspector from the very beginning, they will catch mistakes early, motivating the mathletes to take the time to put the challenges in the right place from the beginning.

Using Musical Fractions as a break Next time, consider using musical fractions as a break time to allow the coaches and perhaps a mathlete or two on each team to get the cards sorted, score checked and ready to go again.

This document is maintained at: http://tiny.cc/DuBoisFractionsOnTheRun

January 2012 Fraction Club

We used Fractions on the Run extensively in our January 2012 Fraction Club at Prospect Elementary in Oberlin, Ohio. Each of our seven after school sessions started with some variant of the number line game. The first session we gave only one challenge card to each mathlete, but still tried to keep track of which packet we had given to each mathlete. This was a logistic nightmare, but giving out only one card at a time is a good way to help mathletes who struggle with fractions, negative numbers and/or the number line concept enjoy success with math.

From the second session on, we gave mathletes three challenge cards and success sticker in a coin envelope. The mathletes put the success sticker on the number line success board, indicating to us which packet they had put up. We then asked the teams to go check their teams successes and finally count how many challenge cards were correctly placed. This did not work well. The coaches were not able to keep their teams together. Discipline problems ensued. And, occasionally large numbers of challenge cards were pulled out inappropriately.

The last session we tried selecting mathletes as inspectors. The inspection process was too slow. We wait too long to start sending out inspectors. Inspectors were coming back with a couple dozen challenge cards. Furthermore, by the time they came back, at least one mathlete had placed two packets completely incorrectly. The inspectors did not realize that they were only to make one pass over the number line and that they were to return to their teams after that first pass.