

OPERATION CENTRAL

An Original Play Teaching Mathematical Order of Operations

FOR TOO LONG, OUR THINKING HAS BEEN that certain subjects belong together and that others are unrelated. We often pass this idea on to students by characterizing them as either mathematics and science or language and history learners. As a teacher, I dread the comment “I’m no good in mathematics. I’m more of an arts person.” I am frustrated when I see students pigeon-hole mathematics as an independent subject when it offers so much room for interdisciplinary study.

To reach my students who consider themselves more the “artsy” types, I decided to write a play to teach order of operations. A play would give the performers a chance to integrate their mathematics and drama skills, and it would convey the material to other students in a way that was more beneficial to verbal learners. The drama teacher and I worked together to cast and direct the play. The result was a performance of *Operation Central* for our middle school. The play focuses on doctors who must operate on a boy who has come down with a “big confusing math problem.” Fifth- and sixth-grade students were introduced to the order of operations while seventh and eighth graders received a fun review of this concept. The character descriptions and script are reproduced here for classroom use.

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Operation Central

Cast of Characters:

- *Boy*—All-American kid who is stricken with a terrible illness known as the “big confusing math problem.” His symptoms include watery eyes and a splitting headache.
- *Aunt Sally*—Very overprotective great aunt who thinks she knows how to get rid of the “big confusing math problem,” but she keeps making it worse. She is very dramatic and has a tendency to wail.
- *Dr. Pear-in-the-Seas*—Lead doctor on the case. He is enthusiastic and, sometimes, overly dramatic as he directs the other doctors in their tasks. He is identified by his large ears.
- *Dr. X. Ponet*—A bodybuilder doctor who speaks with a German accent.
- *Dr. Mul T. Ply*—A doctor obsessed with time. Repeats himself often. Very fidgety and constantly nervous. Wears multiple watches.
- *Dr. D. Vision*—A surgeon who wears thick glasses, similar to magnifying lenses. Precise and droll. The foil to Dr. Mul T. Ply.
- *Dr. A. Dishon*—The “cheerleader” of the group. Extremely perky and positive. Carries pom-poms.
- *Dr. Sub Tract*—Always grumpy and negative. Constantly rolling eyes and acting bored.
- *Narrator*—Cheesy announcer who resembles a game-show host.

All doctors can be cast as male or female.



The scene is a hospital. On the left, Boy and Aunt Sally wait expectantly for the doctors to come into the operating room. Boy wears a large sign around his neck showing the big confusing math problem, $3 + (5 - 2 \times 3^2 \div 6) \times 2$. On the right, the doctors gather around a table in the lounge. Music from the television show E.R. plays in the background. The narrator may introduce the cast of characters, as might be done at the beginning of a television show.

Narrator. Welcome to another episode of the dramatic *Operation Central*. Join us as our team of doctors tackles the toughest diseases in the world.

Boy. Oh, Aunt Sally, I feel so sick. This big confusing math problem has my eyes watering and my head throbbing. I just don't know what I'll do if I can't get this problem solved!

Aunt Sally [doting on the boy]. I keep telling you that all you have to do is add the 3 and the 5, then subtract the 2, then . . . Well, maybe you should do that little 2 that is on top of the 3 first . . . or . . . Oh, I just don't know what to do . . . *[begins wailing].*

[Doctor Pear-in-the-Seas enters from the doctors' lounge.]

Dr. P. I heard some commotion *[motioning to his large ears]*. Is something wrong in here?

Boy. Please excuse my dear Aunt Sally. She tends to get a little carried away. You see, Doctor, I've come down with a big confusing math problem, and I just cannot make it go away. Can you help?

Dr. P. Of course, but I must assemble the top-rated doctors in the hospital. We will have to follow a specific order of operation. Without a firm plan, we may never get rid of the big confusing math problem!

[All other characters freeze.]

All [imitating dramatic musical theme]. DUN DUN DUN!

[Dr. P. exits to the doctors' lounge.]

Narrator. Meanwhile in the doctors' lounge. . .

[Dr. D. Vision is sitting at a table dividing an M&M into smaller and smaller pieces. Dr. Mult T. Ply is pacing back and forth in the background looking at his watch and periodically stopping to check a giant clock. Dr. X. Ponet is lifting some hand weights. Dr.

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Add and Dr. Sub Tract stand listening to some dark, heavy classical music. Dr. Sub Tract is entranced while Dr. Add is perplexed.]

Dr. A. Dishon. Dr. Sub Tract, you should listen to more positive music! You think that this is classical music? You are so silly. How about we all sing that true classic *[singing and dancing]*: “Accentuate the positive, eliminate the negative. . . .”



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Dr. Mul T. Ply [interrupting]. Don't you think it is time to see another patient? I really think the *time* is now to see more patients. I mean, *time* is running out to get in to see more patients.

Dr. D. Vision. Times, times, times! Is that all you ever talk about Dr. Mul T. Ply?

[Dr. Mul T. Ply sulks.]

Dr. X. Ponet. Are you almost done splitting up that M&M, Dr. D. Vision? I really need to eat something to keep up my strength.

[Dr. P. finally catches their attention.]

Dr. P. Hey! Come on, doctors, we've got a tough case waiting for us. It is going to take teamwork on all our parts to cure this one. Let's go in for a pre-operation consultation. Ready?

[All come together and clasp hands as a sports team might.]

All. Let's go team!

[They enter the operating room.]

Dr. P. Boy, I would like to introduce you to the finest team of doctors this side of Albuquerque. First, I am Dr. Pear-in-the-Seas. It is a Dutch name that means “fruit on the ocean.” I'm the lead doctor because I direct the other doctors when to start operating. I signal to them which parts of the surgery to do first, next, and so on. I'll have the other doctors introduce themselves. Note the order; the order of operation is critical to curing the *[slowly and dramatically]* big confusing math problem.

All [again imitating musical theme]. DUN DUN DUN!

Dr. P. Without the order of operations, we would have confusion . . . chaos *[building]* . . . the end of civilization as we know it!

Dr. A. And it would be really yucky!

Dr. X [with German accent]. I am Dr. X. Ponet, and I am here to pump *[clap]* you up!

Aunt Sally. You are going to blow up my baby with a bicycle pump? Can you do that? Is that legal? Oh . . . *[wails]*.

Boy. Please excuse my dear Aunt Sally. She seems to take things a little too literally. But now that I think about it, though, what do you mean?

Dr. X. I take care of powers. I look for whatever numbers have exponents, and I simplify them *eins* . . . that is . . . ah . . . first.

Boy. Oh, I see. For my big confusing math problem, then, you would square the 3 and get 9?

Dr. X. Yes! Yes!

Dr. M. I'm Dr. Mul T. Ply. You can call me Dr. Ply, or Mul T. Ply, or Doc, or . . .

Dr. D. [interrupting]. And I'm Dr. D. Vision.

Dr. M. We work as a team. I take care of times. That is, I do this number times that number. In other words, I take a number, then I times it by . . .

Dr. D. [again cutting Dr. M. short]. I think he gets the picture. He multiplies; I slice numbers up, or divide, as some people call it.

Dr. M. The most important thing to remember is that we always tackle problems from left to right. Whichever one of us comes first in the problem

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does the operation first. That is, if the times is first, I get to go. If division comes first, Dr. D. goes.

Boy. Oh, I think I get it. In my big confusing math problem, Dr. Mul T. Ply would multiply the 2 by the 9 first because multiplication comes first in the parentheses.

Dr. M. Precisely. Precisely. Precisely!

Boy. Then, Dr. D. Vision would divide that 18 by 6, leaving a 3 behind.

Dr. D. By George, I think he's got it.

Boy. Then who are these guys [*motioning to Dr. Add and Dr. Sub Tract*]?

Dr. A. I'm Dr. A. Dishon! This is my very bestest friend in the whole wide universe, Dr. Sub Tract. Don't mind his attitude. He's always negative.

Dr. S. [*sarcastically*]. Well, somebody has to make up for you being so positive all the time.

Dr. P. Now, you two, just let the boy know what you do around here.

Dr. A. We work as a team because teamwork is great! Whichever one of us comes first in the big confusing math problem extends the courtesy to the other.

Boy. Huh?

Dr. S. What Dr. A. means is that if addition comes first in the problem, then he [*or she*] goes. If subtraction comes first, then I go. Just remember, the order must be from left to right.

Dr. A. Exactly!

Boy. In my big confusing math problem, Dr. A. Dishon would go first because he [*or she*] is on the left?

Dr. P. Close. The only thing you have to remember is that I said to work inside the parentheses first. You can remember that because parentheses look like my ears!

Aunt Sally. Oh, so Dr. Sub Tract would go before Dr. A. Dishon because subtraction is in the parentheses. Terrific!

Dr. P. Boy, now that you understand the operations

that are about to take place, go to sleep, and we will solve your problem.

Dr. M. Don't worry! You'll be awake in no time, no time at all.

[Boy sleeps. The doctors remove the sign from around his neck and place it on an easel where it can be seen by the audience.]

Dr. P. [*directing the operation*]. Dr. X. Ponet, you are up first.

Dr. A. Go, Dr. X. Ponet! [*Like a cheerleader, he forms a ^ sign with his arms.*]

Dr. X. [*strutting up to the sign and writing on a new line*]. I will keep everything the same except that I will square the 3 and make it 9. Yes, that is good! [*Shows the audience and the other doctors what he has done.*]

Dr. P. Now, Dr. Mul T. Ply, you go.

Dr. A. Go, Dr. Ply! [*Holds up arms in an X like a multiplication sign.*]



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Dr. M. Oh, it is my time to shine. Time is of the essence, but I will take my time and rewrite everything the same except where I multiply 2 times 9 and get 18. [*Shows everyone the work.*]

Dr. P. Your turn, Dr. D. Vision.

Dr. A. Hey, go, D. Vision! [*Holds arm out straight in a minus sign, then glares at Dr. M. and Dr. S. They grudgingly put their hands up as the dots on the top and bottom of the division sign.*]

Order of Operations Main Ideas from *Operation Central*

Please fill in the blanks with what each doctor might say or do to solve a big confusing math problem.

Dr. Pear-in-the-Seas says:

Dr. X. Ponet says:

Dr. Mul T. Ply says:

Dr. D. Vision says:

Dr. A. Dishon says:

Dr. Sub Traction says:

Fig. 1 Play recap worksheet

Dr. D. [matter-of-factly]. I will now slice the 18 into 6 parts, giving me 3. *[Shows work.]*

Dr. P. Dr. Sub Tract will now finish off the parentheses.

Dr. A. [excitedly]. Yeah! Go, Sub Tract! *[Holds up arms in a minus sign.]*

Dr. S. I cannot believe what I put up with around here. There, 5 minus 3 is 2. Am I done here? *[Shows work.]*

Dr. P. Yes, Sub Tract, you have done all you can here. Dr. Mul T. Ply needs to come back up here, though, and take care of that second multiplication sign.

Dr. M. Did you say a second time? It is my time again? I get to go multiple times?

All. Just go!

Dr. M. Fine, 2 times 2 is 4. My time here is through.

Dr. P. Finally, Dr. A. Dishon will finish us off.

[Dr. A. Dishon begins to walk over to the sign, then stops and turns back to the other doctors. He gives them an encouraging look. Grudgingly, they all cross their arms in a plus sign.]

All. [with little enthusiasm]. Let's go, A. Dishon.

Dr. A. [smiles]. That's better! Now, 3 added to 4 is 7. *[Circles the 7 and puts a smiley face next to it, then shows the work to the audience.]* Yeah! We have finished the operation. Wakey, wakey, Boy!

[Boy groggily wakes up, rubs his eyes, and looks with amazement at his sign.]

Boy. My big confusing math problem is solved! I feel so much better!

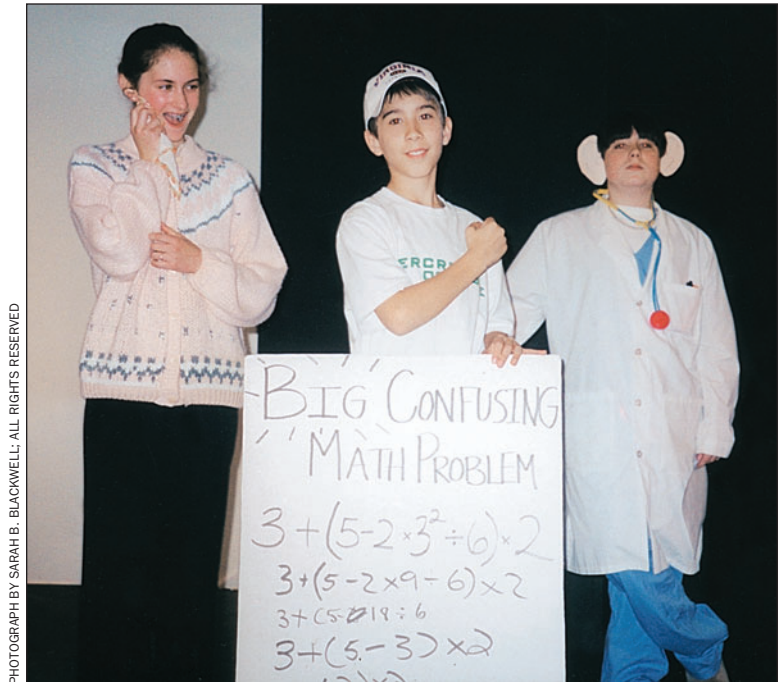
Dr. S. I'm glad somebody does. This operation has been just way too much excitement for me.

Dr. P. Now, Boy, will you remember how we cured you next time you have a big confusing math problem?

All. DUN DUN DUN!

Boy. Sure, and if I forget, I can always ask my dear Aunt Sally.

Dr. X. Solving big confusing math problem will make you a manly man!



Dr. P. [laughing]. That's right. Never underestimate the power of . . .

All doctors. The order of operations! *[They throw their fists up into the air and freeze.]*

Narrator. All you out there in TV land, if you get stuck with a big confusing math problem, remember the lessons we have learned on this episode of *Operation Central*. Join us next week when we tackle a big confusing science problem!

[Characters unfreeze.]

All: DUN DUN DUN!

After the play, I have students fill out a recap worksheet, shown in **figure 1**, to make sure that they have learned the basic concepts. We discuss how the doctors showed each step of the process, and I encourage students to use the same inverted-pyramid method. The mnemonic device "Please Excuse My Dear Aunt Sally" is discussed, with careful attention paid to the multiplication and division order and the addition and subtraction order. To continue the artistic theme of the unit, students might draw their own interpretations of the characters or design humorous cartoons about what happens when we do not follow the proper order of operations in our daily lives. When teachers look for ways to connect mathematics to every subject, we can make mathematics relevant, understandable, and fun for students who call themselves the "artsy" types. A play is an effective approach to reach out to a broad range of learners. □