Activity: Introduction to Percents

FIND SOLUTIONS TO APPLICATION PROBLEMS INVOLVING PERCENTS

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Worksheet #1: Percent Thinking
A t-shirt is 90% cotton. A sale for 20% off. The weather man says “The chance of rain is 40%.” James earns an 85% on his history test. Studies show 60% of children prefer chocolate over vanilla. Chances are our students have encountered many examples of percents long before we formally introduce the topic in math class. I find it is always good to gauge students understanding at the beginning of a unit, and I use Worksheet #1 for those purposes prior to exploring percents. Working in groups of four, students are to discuss each situation and agree and record on a response. We then share as a class.

Sometimes we have student write to clarify their own thinking, and sometimes we have them write so that we, as teachers, can assess where student’s understand is at. Most of the time it is for both reasons. Worksheet #1: Percent Thinking is mainly a tool for us as teachers to assess our students understanding. Observing as groups work is important, and so is the class discussion, as well as reading the responses. This should help you in developing the rest of the unit and tailoring it to the specific needs of your students.

The questions on Worksheet #1: Percent Thinking were specifically chosen to touch on situations students are likely to have heard of or experienced, and to probe further to see the depth of their comprehension. For instance with question #1, do students intuitively understanding that if the chance of choosing a red jelly bean is 60%, then the chance of choosing a blue jelly bean is 40%, since 60% + 40% = 100%? Question #2 touches on a similar idea, that if you are winning 48% of the time, that means you are losing 52% of the time, and if you are losing more than you are winning, those aren’t good odds for the player. With question #4, we’re wondering, do students understand that 100% chance of rain means it is guaranteed to happen? Question #5 extends the situation to whether or not you can add Saturday’s chance of rain and Sunday’s chance of rain to get the entire weekend’s chance of rain (the answer is ‘No”). Question #6 begs another question “how many other choices for mascots are there?” If there is only one other choice, then the answer is “No.” However if there are two or more additional choices then “Maybe” 40% of the votes will be enough to win.

I think of Worksheet #1: Percent Thinking like a pretest. I don’t use it as a moment to teach; there will be plenty of time for that. I’m just interesting in hearing what students already know. I always encourage multiple responses as well as explanations of their thinking. I do not make corrections, though I do make mental notes of where the holes are in their understanding.

Worksheet #2: Percent Strategies
Worksheet #2: Percent Strategies is where the instruction begins. I try to start slowly with the idea that percent means “out of 100”. I begin by asking “So what does percent mean?” I write the word “percent” on the board then record students responses. I continue asking for additional thoughts until no one has anything else to share. I verbally ask questions #1 through #6 on Worksheet #2 (before I pass out the worksheet).

“What is 100% of 100? And how do you know.” is how I’d phrase it. And we’d talk about how 100% means “all of it” so 100% of 100 is 100.

Then we moved on to “What is 50% of 100? And how do you know.” Most students should know that 50% of 100 is 50, however they may think about the problem differently, and I think that it is an important difference to discuss. One student may say “50% means 50 out of 100 so the answer is 50.” Another student may say “50% means half and half of 100 is 50.”

After we’ve discussed #1-#6 on Worksheet #2, I pass out Worksheet #2 to each student (if I pass it out before the more advanced students might work ahead and disengage from our discussion.) Once each student has a worksheet we record our answers for #1-#6, and then I have them work on #7-#14 with a partner or individually. Notice that questions #15-#22 have been left intentionally blank so that students don’t work ahead. After pairs/individuals have had adequate time for #7-#14, we discuss their thinking and their answers as a class. My main
focus is on the different ways they've thought about the problem. For instance a student might have found 75% of
300 by tripling their answer to 75% of 100. Another student may have added their answers to 25% of 300 and
50% of 300 to get 75% of 300. Hearing how various students thought about the problem helps others develop their
mental mathematical map and increase the strategies that are available to them.

Next I have students work through a more challenging number for #15-#22. I may say “Fill in the blanks on
questions #15-#22 with the number 240. And then solve each one on your own.” Of course you can choose
any number for them to fill in the blank.

Finally students are to reflect on the strategies they used and record them at the bottom of Worksheet #2.
Depending on students understanding, I may have them work through this last part with a partner.

Worksheet #3 & 4
Worksheet #3: Percent Chart is a natural extension of the strategies students have begun developing from
Worksheet #2 with an added twist that in some areas answers are given and students must work backwards to
determine the starting number or percent. Each part of this introduction to percents is designed to push students
understanding a step further and have them make sense of what they already know, and what they are now asked to
do. This idea continues with Worksheet #4: What percent? Our class discussion of Worksheet #3 should help but
that doesn’t mean that students won’t find Worksheet #4 challenging. For this question I have student work in pairs.
I make all tools available to them including calculators. As always I am equally interesting in their methods as their
answers. If they used a calculator, then how? Why did it make sense to put it in their calculator that way? How
confident do they feel in their answer?

Worksheet #4: What percent? is not a quick problem and I encourage students to take their time and work through
it. Only do what makes sense to you, I often say. When students get stuck I may ask:

• How far have you gotten? Why did it make sense to begin that way?
• Is this problem similar to any others you’ve solved?
• If the numbers were easier would you know how to solve it? What would you do? Can you apply
  that same process to these harder numbers?

Journal Questions:

• In regards to percents, so far I understand . . .
• In regards to percents, I’m still confused about . . .
Percent Thinking

1. There are red and blue jelly beans in a bag. There is a 60% chance of choosing a red jelly bean. What is the chance of choosing a blue jelly bean? Why?

2. The odds of winning a casino game called the Lucky Duck is 48%. Are these good odds that you will win money? Why?

3. Cress Furniture Store is offering 0% financing for the first year on sectional sofas. Is this a good deal? Why?

4. The weather man forecasts “100% chance of rain for the weekend.” What does that mean?

5. Carter says when the weather man forecasts 100% chance of rain for the weekend, this means 50% chance for Saturday and 50% chance for Sunday. Is this reasonable? Why?

6. At school, 40% of the people voted to have a panther as the school mascot. Will this be enough votes to win over the other choices? Why?

7. Sandy’s sales went up 200% over the last year. Kate’s sales tripled over the same period of time. Who would you give the raise to? Why?

8. There are 10 more boys than girls in Ms. Gambino’s class. Alexis concludes the class must be 55% boys and 45% girls. Is she correct? Why?
Percent Strategies

1. 100% of 100 =
2. 50% of 100 =
3. 25% of 100 =
4. 10% of 100 =
5. 75% of 100 =
6. 1% of 100 =
7. 50% of 300 =
8. 100% of 300 =
9. 25% of 300 =
10. 10% of 300 =
11. 75% of 300 =
12. 1% of 300 =
13. 20% of 300 =
14. 3% of 300 =
15. 50% of _______ =
16. 100% of _______ =
17. 25% of _______ =
18. 10% of _______ =
19. 75% of _______ =
20. 1% of _______ =
21. 20% of _______ =
22. 3% of _______ =

What strategies do you have for finding . . .

100%
50%
25%
75%
10%
1%
20%

Any percent?
## Percent Chart

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<tr>
<th>Percentage</th>
<th>100%</th>
<th>50%</th>
<th>25%</th>
<th>75%</th>
<th>10%</th>
<th>1%</th>
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What Percent?

Nancy answered 269 questions correctly out of 324. What percent did she get right?