



IGNITE!

Spark curiosity in your students.

Activities written by Dr. Raj Shah
engage students in math discovery.

**Reveal the Full Potential
in Every Student.**





IGNITE!

Ignite! activities launch every unit of *Reveal Math* K–5, a core mathematics program. Use these third-grade activities in your classroom today, which cover multiplication, division, and place value.

“Let’s bring curiosity, wonder, and joy back into the classroom and make math irresistible for kids.”

**- Raj Shah,
Contributing Author**

Ignite! Activities help students:

Cultivate Curiosity — Mathematics is as much about asking questions as it is about finding solutions. Start wondering!

Accept the Challenge — Attitude is everything. Take on new challenges and see how far you can go. Don’t give up!

Engage Trial and Error — You can’t learn by watching. To make sense of math, you have to try things and see what happens.

Embrace “Failure” — Learning new things is hard. Mistakes will happen. Allow yourself the freedom to make mistakes and learn from them.

Work Together — There is power in a community of learners working together to discover new things. Math doesn’t have to be done alone.

Just Play — Explore, discover, conjecture... Solving problems is fun!

Name _____

Broken Calculators

Part A: Your calculator can only add 2s and 5s.

How can you make numbers less than 100 with this calculator?



Part B: Your calculator can only add 3s and 7s.

What whole numbers less than 12 *cannot* be made with this calculator?

How can you make each of the whole numbers 12 through 16 with this calculator?



What is the quickest way to make 30 with this calculator? Explain.

Is there a number greater than 11 that *cannot* be made with this calculator? Explain.

Unit Opener



Name _____

Broken Calculators

Part A: Your calculator can only add 2s and 5s.

How can you make numbers less than 100 with this calculator?

Sample answers: I can make numbers by adding 2s: 2, 4, 6, and so on. I can make numbers by adding 5s: 5, 10, 15, and so on.

I can also make numbers by adding 2s and 5s.



Part B: Your calculator can only add 3s and 7s.

What whole numbers less than 12 *cannot* be made with this calculator?

1, 2, 4, 5, 8, 11

How can you make each of the whole numbers 12 through 16 with this calculator?

Sample answers: $3 + 3 + 3 + 3 = 12$;

$7 + 3 + 3 = 13$; $7 + 7 = 14$;

$3 + 3 + 3 + 3 + 3 = 15$; $3 + 3 + 3 + 7 = 16$



What is the quickest way to make 30 with this calculator? Explain.

Sample answer: 3 groups of 10 makes 30 and

$3 + 7 = 10$. Add $3 + 7 + 3 + 7 + 3 + 7$.

Is there a number greater than 11 that *cannot* be made with this calculator? Explain.

No. 3 and 7 can be used to make all numbers greater than 11.

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Ignite!

Broken Calculators

Students think about adding combinations of 2s and 5s in a unique way to obtain a particular number.

- Have students imagine they have a broken calculator. All it can do is add 2s and 5s. The calculator always starts at 0. In Part A, have students show how they can make sums less than 100 by adding only 2s and 5s.
 - What are some whole numbers sums less than 100 that you can make using this calculator?
 - What do you notice about the sums that you can make on this calculator?
 - How can you get the sum of 92 with this calculator?
 - How could you make 75 with this calculator?
 - Describe two different ways to get a sum of 10 with this calculator.
 - Describe different ways to get a sum of 14 with this calculator.
 - When adding 5 and 2, does the order in which you enter the numbers into a calculator matter? Explain.
- Have students think about sums that *cannot* be made with this calculator.
 - What number sums less than 10 cannot be made using this calculator?
 - What number sums greater than 10 cannot be made with this calculator? Explain.

Extension

- Have students think about a calculator that can only add 3 and 7. Have students use Part B when they do the following problems:
 - List the whole number sums less than 12 that cannot be made using this calculator.
 - Show how you can make each of the whole number sums 12 through 16 using this calculator.
 - Try to find a number greater than 11 that cannot be made with this calculator. Can you find one?

Name _____

Penny Estimation

Listen to your teacher. Estimate the number of pennies that will fit in each rectangle.



A

B

C

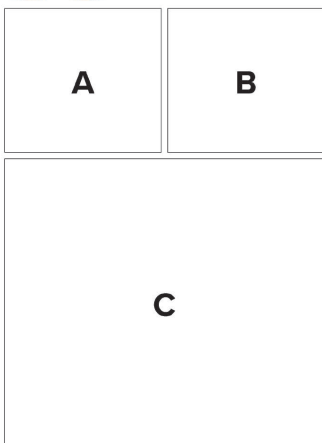
Unit Opener



Name _____

Penny Estimation

Listen to your teacher. Estimate the number of pennies that will fit in each rectangle.



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Ignite!

Penny Estimation

Students estimate the number of pennies that will fit in various regions. Their strategies may include repeated addition and rounding.

Materials: 15–20 pennies for each small group

1. Have students refer to Rectangle A.
 - How many pennies do you think will fit within Rectangle A without gaps or overlaps? Explain.
2. Place students into small groups and give each group 15–20 pennies. Have them try to fit as many pennies as they can within Rectangle A without gaps or overlaps.
 - How many pennies were you able to fit within Rectangle A? Explain.

Allow students time to share their results so they can see how they may best fit the pennies within Rectangle A.

3. Now have students consider Rectangles A and B.
 - How many pennies could fit within Rectangles A and B all together? Explain.
4. Now have students consider Rectangle C.
 - How many pennies would fit within Rectangle C? Explain.
5. Now have students consider the entire Student Edition page, from border to border.
 - How many pennies do you think would fit onto this entire page? Explain.

As the various strategies are discussed, write the estimates on the board. Then have the class choose the estimates they think are best. Finally, combine pennies from the groups to have students find out how many pennies actually fit on the page.

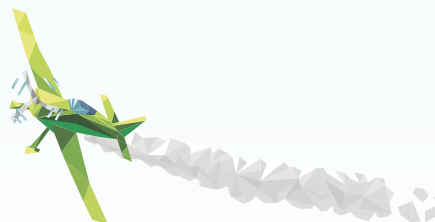
Extensions

6. Have students use similar strategies to determine the total value of coins that fit on the page.
 - What is the total value of the pennies that fit on this page? Explain.
 - Do you think the page would be worth more if it were covered with nickels rather than with pennies? Explain.

Reveal Math K–5 Contributing Author



Dr. Raj Shah has always had an affinity for math. Powered by his love of math, he earned a Ph.D. in Physics in 1999, which led to a career in R&D at Intel. In 2008, he left his job and founded Math Plus Academy, an after-school STEM enrichment program for students ages 5–14. His mission is to introduce students and adults to the wonders of mathematics. Dr. Shah also contributes his time to Math Teacher Circles, the Julia Robinson Math Festival, and is a founding member of The Global Math Project. He believes that everyone can enjoy math, develop strong number sense, and become a perseverant problem solver.



RevealMATH[®]

Reveal the Full Potential in Every Student

In order to uncover the full potential in every student, *Reveal Math* champions a positive classroom environment, explores mathematics through a flexible lesson design, and tailors classroom activities to students' needs.

Learn more at revealmath.com/k5

