# recalculating



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Video Page

# *Recalculating*
# Teacher's Guide

*This Teacher's Guide includes the following:*

- Suggested Lesson Plan

- Preview Questions

- Key Terms

- Viewing Guide

- Discussion Questions

- Activity: Who Chooses

- Quiz

- Enrichment and Integration Activities

- Answer Key

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# Suggested Lesson Plan

*These materials may be used in a variety of ways. For maximum benefit, we suggest the following lesson plan:*

- As a class, discuss the Preview Questions and Key Terms.

- Distribute copies of the Viewing Guide for students to use as a note-taking tool during the video.

- Play the video, pausing if needed to facilitate understanding and note-taking. (Note: You may want to turn on subtitles and/or provide students with a copy of the transcript, available on the izzit.org website.)

- Review and discuss answers to the Viewing Guide using Answer Key as a guide.

- Use Discussion Questions to spark class discussion, or assign these questions as homework.

- As a class or in small groups, complete the Who Chooses Activity.

- Replay the video as preparation for the Quiz.

- Administer and grade the Quiz using Answer Key as a guide.

- Optional: Assign one or more Enrichment Activities as homework.

# *Recalculating*
# Preview Questions
*(These are meant to be read aloud by the teacher.)*

1. What do you know about India?

2. What are some modern technologies you take for granted?

3. What do you think a poor person in India would do with modern technology?

4. Can technology be a force for good in the world? Why or why not?

# *Recalculating*
# Key Terms and Definitions

Archival – from historical records or internet data that has been saved

Cultivation – preparation and use of land for growing crops

Encroach – v., to gradually take or begin to use or affect something that belongs to someone else

Encroacher – n, a person who takes or uses something that belongs to someone else

Evict – to expel someone from property with the support of the law

Livelihood – means of acquiring the basic necessities of life such as food, shelter, and clothing

Property rights – the rights to use, control, dispose of, and obtain the benefits from something

Title – a formal document, such as a deed, that serves as evidence of ownership

# *Recalculating*
# **Viewing Guide, page 1**

1. India … has the second largest population in the world, _____ people.

2. GPS, which stands for global _____ system, is a satellite-based navigation system.

3. Trilateration determines locations by measuring distances and using the _____ of circles, spheres or triangles.

4. Remote Indian villages…are using GPS technology to fight for their land _____ rights.

5. India gained independence from the British in 1947, but the _____ were simply taken over by the new government.

6. Local villagers … began to farm the land _____, growing food for their families.

7. Villagers were fearful to _____ their land.

8. In 1991, as economic reforms were erupting across the country, tribal communities … began to … speak out about _____.

9. In 2006, the national government passed the _____ Act, creating a provision for tribal peoples to gain legal rights to their traditional lands.

10. In order to gain ownership of their land, villagers had to prove that they were _____ a specific piece of land prior to December 31$^{st}$, 2005.

11. The government insisted on an official paper trail with a history of government-issued _____ proving ownership.

# *Recalculating*
# **Viewing Guide, page 2**

12. After a long review, the government only approved _____ of the applications.

13. What if they could use _____ satellite maps to prove that the villagers were farming specific plots of land prior to 2006?

14. The next critical step was to create accurate _____maps…GPS units made that possible.

15. Now, thanks to the GPS maps, nearly 90% of their _____were approved.

16. "This is now my _____ and I'm feeling very happy. I'll plow the land and cultivate it myself. I'll labor hard, and never sell it."

17. Forests that were entirely cut down under the Forest Department are now being _____, thanks to the tribal villagers.

18. After 10 years … most of the parents now seek to send their children to _____.

19. The greatest thing which they feel is that now we can live with _____.

20. People who have been landless and _____ for generations can now shape their own future. The key is ownership.

# *Recalculating*
# Discussion Questions, page 1

1. How is GPS technology transforming the lives of tribal communities in remote India?

2. How does GPS work?

3. Who owned all forest lands in India until 2006?

4. Why were the tribal people in India's forests considered to be encroachers, or criminals?

5. Why did the tribal people farm the land illegally? Why were they afraid to make improvements such as wells?

6. What happened in India in 1991 that encouraged tribal communities and their advocates to try to claim the lands on which they were living?

7. What was the Forest Rights Act?

8. Under the Forest Rights Act, what did tribal villagers have to do in order to gain ownership of their land? Why was this very difficult to do?

9. What new idea did advocates and tribal villagers come up with for proving they had been farming their land before 2006?

10. How do you think people who had no electricity or running water were able to understand and use a technology like GPS?

11. How did the villagers create accurate boundary maps?

12. How has ownership of their land changed the lives of the tribal people?

13. What is dignity? Why do the tribal people feel that now they can live with dignity? Why couldn't they do so before?

# *Recalculating*
# Discussion Questions, page 2

14. "People who have been landless and powerless for generations can now shape their own future." What is the key to this change?

15. Why did the narrator's family emigrate from India to the U.S.? If you lived in India, would you stay there, or try to leave? Explain.

16. In the video, one advocate says the lives of the tribal people of Sagai village have changed dramatically, and another says the change has not been dramatic. Which of them is right? Or can both be right? Explain.

17. Do you think advocates were right to introduce modern technology to tribal people outside the mainstream of Indian society? Do you think the villagers would like to have modern conveniences like electricity, cars, and smartphones, or do you think they would prefer to continue their traditional ways? Explain.

18. What gives someone a legitimate claim to a piece of land?

19. How do you think people came to recognize each other's ownership of land?

20. How is the law related to property ownership?

21. How did private ownership benefit not just the people, but the land itself?

# *Recalculating*
# Activity:
# Who chooses? Who benefits? Who pays? What's fair?

[These four questions can be a useful tool for evaluating any policy or system. Posing the questions is a great way to stimulate critical thinking.]

As a class, or in small groups, discuss the following:

*(For each question, think broadly about all the possible people or groups of people who may be affected, and remember there may be non-monetary costs and benefits.)*

- Who benefits when the law protects property ownership?

- Who benefited under the previous system in India (before the Forest Rights Act)?

- What choices would we have if we could not own land or property at all?

- What choices does a system of property ownership allow us to make?

- Who benefits from improvements farmers make on the land? Who pays?

- Before the Forest Rights Act, who benefited from improvements farmers made on the land? Who paid?

# *Recalculating*
# Quiz, page 1

1. What is the population of India?

   A) 1.2 million
   B) 12 million
   C) 1.2 billion
   D) 12 billion

2. Remote Indian villages are using GPS technology to fight for _____.

   A) modern infrastructure
   B) access to technology
   C) access to education
   D) land ownership rights

3. GPS technology uses the _____ of circles, spheres or triangles.

   A) algebra
   B) geometry
   C) geography
   D) statistics

4. In 1947, India gained independence from _____.

   A) Britain
   B) the Soviet Union
   C) China
   D) Pakistan

5. Ownership of their traditional land has given tribal villagers _____.

   A) a high standard of living
   B) dignity
   C) a lot of problems
   D) less incentive to work hard

# *Recalculating*
# Quiz, page 2

6. In 2006, the Indian government passed the _____ Act.

    A) Civil Rights
    B) Indigenous Peoples
    C) Forest Rights
    D) Farm Rights

7. Villagers were afraid to improve their land because _____.

    A) wild animals might eat their crops
    B) they did not know how
    C) natural disasters might destroy what they built
    D) they had no legal rights of ownership

8. Initially, the government only approved _____ of the applications for land ownership.

    A) 1%
    B) 10%
    C) 20%
    D) 50%

9. Who owned all forest lands in India before 2006?

    A) The government
    B) Rich people
    C) Tribal villagers
    D) Foreigners

10. Which technology allowed tribal villagers to prove they had been farming certain plots of land prior to 2006?

    A) Google Circles
    B) Google Documents
    C) Google search engine
    D) Google Earth archival images

11. How has technology transformed the lives of the people of Sagai village?

# *Recalculating*
# Enrichment and Integration Activities, page 1

I.     Class Research Project: India. Divide the class into small groups, with each group focusing on a different aspect of India—history, geography, religion and culture, government, economy. Each group should present a report to the class, complete with visual aids such as pictures, drawings, maps, and charts. As a reward for all your hard work, have a class luncheon featuring Indian food.

II.     Research Project: Bangalore. Bangalore is known as the Silicon Valley of India. Working individually or in small groups, find out more about this Indian city and how technology has affected life there. Present your findings in a written or oral report, or use another format such as Powerpoint/Google Presentation.

III.     Writing: Write an essay describing how you might feel being a child growing up in a remote village without basic modern conveniences such as electricity or running water. What would your life be like? Would you feel deprived? Would life be hard? What kinds of things would make you happy? Would you dream of leaving the village when you grow up, or would you want to stay?

IV.     Writing: Imagine you are living in India at a time before the Forest Rights Act. Write a letter to an Indian government officials explaining why the tribal people of Sagai and other remote villages should be given legal ownership rights to the land they farm. OR, write a letter explaining why the land should remain as national forest land, to be owned and enjoyed by all the people of India.

V.     Writing: Write an essay about how technology affects your life. How much do you rely on technology? How much do you use GPS? How would your life be different without smartphones and the Internet? What are the costs and benefits of constant instant communication? Can you imagine life without those things?

# *Recalculating*
# Enrichment and Integration Activities, page 2

## Physical Science - Simple Machines

1. Review/discuss the 6 types of simple machines (lever, wheel and axle, pulley, inclined plane, wedge and screw).

2. Have students look around the classroom for examples of each of the simple machines.

3. Have students watch the video again. Have them record the simple machines they see in the video and how/where each was being used. Example- wheel and axle- on the tractor plowing the field.

4. After the video, have a class discussion on what students recorded. This could be done by naming each type of simple machine and where students saw them.

5. Extending- have students make a presentation of the 6 types of simple machines. Have them include a picture (or model) of each, research mechanical advantage of each, list several uses for each type of simple machine. Students could differentiate by using PowerPoint, Google Presentation, paper and pencil, or poster board as a presentation method.

# *Recalculating*
# Enrichment and Integration Activities, page 3

## Latitude and Longitude

1.  Discuss with students reading latitude and longitude using a map or globe.

2.  Latitude - read in degrees, minutes and seconds XX.XX.XX. Either North (above the equator) or South (below the equator). Lines are equal distance apart and read 0-90 degrees north or south. Demonstrate using a map, globe or drawing lines on the board.

3.  Longitude- read in degrees, minutes and seconds XXX.XX.XX. Either East or West (of the Prime Meridian). Read 0-180 degrees. Unequal distance apart, closer together at the north and south poles.

4.  Start by giving students a latitude and longitude using only degrees and have them determine location. This can be done using atlases, globes or printed maps.

5.  Next, use both degrees and minutes and when students are comfortable include seconds. As students become familiar with reading locations, have students choose latitude and longitude or cities and have the class find the answer.

6.  Have students watch the video again. Direct students to record places mentioned in the video. Afterwards, using globes or atlases find these locations and determine latitude and longitude.

7.  Extending - have students conduct research on when the system of using latitude and longitude became universally accepted. How was location determined before this system? How was land ownership determined? How could you prove land ownership without this system in place?

# *Recalculating*
# Enrichment and Integration Activities, page 4a

## Physical Science – research

1.  Have students watch the video again. When complete, have a discussion with students about how GPS works and how it was applied in the video.

2.  Discuss other ways GPS is used or could be used. How have students used GPS?

3.  Have students research how GPS is being used today. Have students go to http://www.GPS.gov/applications and explore how GPS is being used.

4.  Divide students into small groups and assign a research application to each group. Groups could be agriculture, aviation, environment, marine, public safety and disaster relief, rail, recreation, roads and highways, space, surveying and mapping and timing. Have students prepare a short presentation on each of the examples listed. Have students describe how GPS is being used, the benefits of using GPS as opposed to not having it and explore related websites to add interesting facts. Have each group present to the class.

5.  Differentiate presentations by allowing students to use PowerPoint, Google Presentation, pen and paper or a poster board.

# *Recalculating*
# Enrichment and Integration Activities, page 4b

## All Who Wander Aren't Lost:
### A lesson about GPS technology

GPS (Global Positioning Satellite) technology is based on a trilateration. Trilateration is a way to find the location of an object given its distance from **at least** 3 other objects.

In this activity, you will simulate GPS positioning to determine the location of a missing child.

*Materials:*

- Map of Nutsville County (follow the teacher notes)
- ruler
- compass – the kinds that draws circles, or string cut to scale

*Group size:*

This activity will work best with groups of 3.

*Directions:*

1.  Tape your map of Nutsville down onto a table.

2.  A child is lost in the area shown on the map. You know this child is:

    a.  185 km from Coconut Town
    b.  50 km from Peanut Town
    c.  60 km from Walnut Grove

3.  If the students want to more closely pinpoint the location of the missing child, having the distance from a 4th location is helpful.  This is why GPS uses 4 satellites when it could locate something with three.

    a.  45 km from Cashew City

4.  Where is the missing child?

*Teacher Notes:*

- A more complete explanation of GPS can be found at <u>www.howstuffworks.com/gps1.htm</u>.  This activity could be done with a regional location as well.

# *Recalculating*
# Enrichment and Integration Activities, page 4c

Teacher Notes

There are two ways to use trilateration to complete this learning opportunity.

1.  Compass (the kind that draws circles)

    a.  Using the scale on the map (1cm = 20 km) open the compass to the appropriate radius. For example, the distance between the child and Walnut Grove is 60 km. Since 20 km = 1 cm, 60 km = 3 cm. (A review of proportions and ratios may be helpful.) Draw a circle with a radius of 3 cm that is centered on Walnut Grove. Repeat this for the other 2 towns.

    b.  The area with an overlap of the three circles is where the child is located. By adding the information for a 4th location, the child's location is easier to pinpoint.

2.  String

    a.  Using the scale on the map (1cm = 20 km) cut a length of string to the appropriate radius. For example, the distance between the child and Walnut Grove is 60 km. Since 20 km = 1 cm, 60 km = 3 cm; a string with a length of 3 cm is needed. Hold one end of the string in place on Walnut Grove, and draw a circle with a radius of 3 cm. Repeat this for the other 2 towns.

    b.  The area with an overlap of the three circles is where the child is located. By adding the information for a 4th location, the child's location is easier to pinpoint.

# Map of Nutsville County

**N**

- Pistachioville
- Peanut Town
- Cashew City
- Filbert
- Walnut Grove
- Coconut Town
- Chestnut
- Macadamia City

**1 cm = 20 km**

# Map of Nutsville County Answer Key

Pistachioville

Peanut Town

Cashew City

Filbert

location of
missing child

Coconut Town

Walnut Grove

Chestnut

Macadamia City

**N**

**1 cm = 20 km**

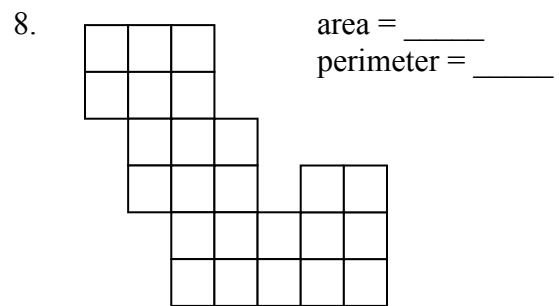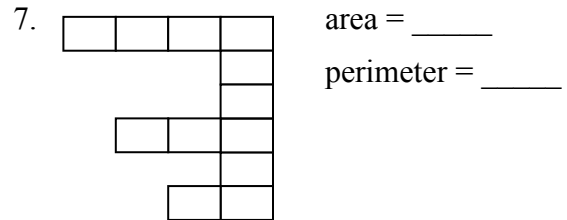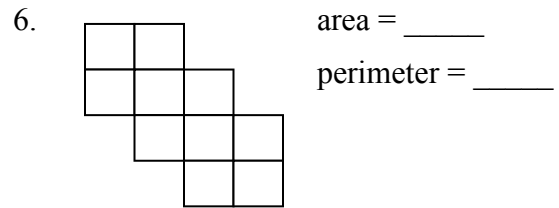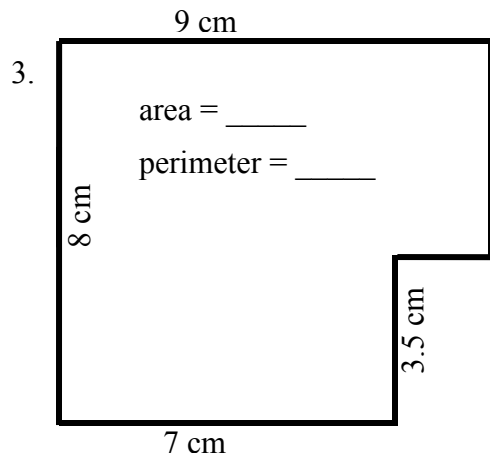# Recalculating
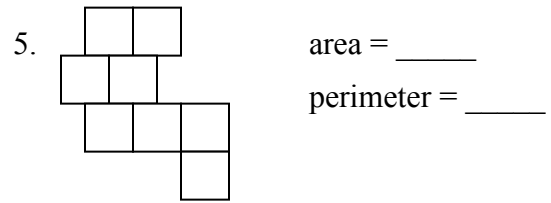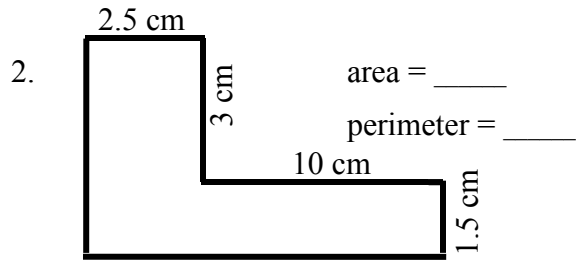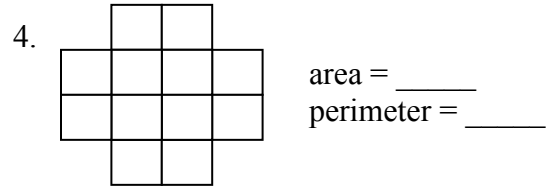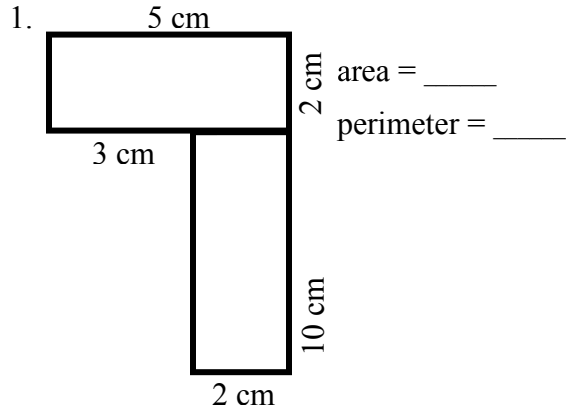## Enrichment and Integration Activities, page 5a

# Area and Perimeter

1. Watch the video again. Have students pay close attention to the use of GPS and how maps are superimposed showing land plots using latitude and longitude.

2. After the video, have students describe the process used to prove land ownership. Ask students "Were all of the land plots the same size and shape?" Ask students to describe some of the shapes they remember. Students could draw these on the board.

3. Discuss/review how area and perimeter are determined.

4. Perimeter- total distance around the outside of a 2D shape. Determined by adding all of the lengths of the sides together (show an example on the board).

5. Area- amount of surface the 2D shape covers. It is measured in "square units" (feet, centimeters, etc.). Rectangles- multiply length X width. Triangles- base X height divided by 2. Irregular shaped objects- break down into rectangles, triangles and determine area of each, then add these areas together.

6. Have students determine perimeter and area of examples you provide.

7. Use the worksheet on area and perimeter in this Teaching Guide.

8. Extending- have students research how to determine the area of acute triangles, obtuse triangles and trapezoids. Have selected students demonstrate for the class how to calculate area for the shapes.

# Recalculating
## Enrichment and Integration Activities, page 5b

## Area and Perimeter Practice

1. 5 cm

   2 cm

   3 cm

   10 cm

   2 cm

   area = _____

   perimeter = _____

2. 2.5 cm

   3 cm

   10 cm

   1.5 cm

   area = _____

   perimeter = _____

3. 9 cm

   8 cm

   3.5 cm

   7 cm

   area = _____

   perimeter = _____

4. area = _____

   perimeter = _____

5. area = _____

   perimeter = _____

6. area = _____

   perimeter = _____

7. area = _____

   perimeter = _____

8. area = _____

   perimeter = _____

# *Recalculating*
# Enrichment and Integration Activities, page 5c

## Area and Perimeter Practice Answer Key

1.  area = 20 cm2 + 10 cm2 = 30 cm$^2$
    perimeter = 5 + 2 + 10 + 2 + 10 + 3 + 2 = 34 cm

2.  area = (2.5 x 4.5) + (10 x 1.5) = 26.25 cm$^2$
    perimeter = 2.5 + 3 + 10 +1.5 + 12.5 + 4.5 = 34 cm

3.  area = (7 x 8) + (2 x 4.5) = 65 65 cm$^2$
    perimeter = 9 + 4.5 + 2 + 3.5 + 7 + 8 = 34 cm

4.  area = 12 squares
    perimeter = 16 squares

5.  area = 8 squares
    perimeter = 16 squares

6.  area = 10 squares
    perimeter = 16 squares

7.  area = 12 squares
    perimeter = 26 squares

8.  area = 24 squares
    perimeter = 28 squares

# Recalculating
## Viewing Guide Answer Key

1. 1.2 billion
2. positioning
3. geometry
4. ownership
5. forest lands
6. illegally
7. improve
8. property rights
9. Forest Rights
10. farming
11. documents
12. 10%
13. Google Earth
14. boundary
15. applications
16. land
17. replanted
18. good schools
19. dignity
20. powerless

# Quiz Answer Key

1. C) 1.2 billion
2. D) land ownership rights
3. B) geometry
4. A) Britain
5. B) dignity
6. C) Forest Rights
7. D) they had no legal rights of ownership
8. B) 10%
9. A) the government
10. D) Google Earth archival images

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