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5th Grade
Learning Scale Without Fail
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Problem Context :

- Can students plan a vacation somewhere in the United States using scale to tell the distance (in miles) it would take to drive to their destination and the cost of the drive by car?

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Math/Science/Technology Concepts :

Math

- addition, subtraction, multiplication, division
- scale
- understanding the formula to figure miles per hour
- understanding the formula to figure miles per gallon
- understanding the formula to figure price per gallon of gas

Science

- data collection and analysis

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Math/Science/Technology Standards :

Math

- Organize and consolidate mathematical thinking through communication

- Apply appropriate techniques, tools, and formulas to determine measurements

Technology

- Students use technology tools to enhance learning, increase productivity, and promote creativity

Science

- Understand science and technology

Learning Activity Context :

X Moving Tekbot _ Building Tekbot _ Programming a Tekbot

Description of Activity :

The students will plan a trip of their choice to somewhere in the United States that they can "drive to". The students job will be to find the distance it takes to get to their destination using scale and the time and price it would cost to drive to their destination using the assumption that they can drive 60 miles per hour the whole way to their vacation spot, that the gas costs $3.25 a gallon, that their car holds 15 gallons of gas, and that you can drive 30 miles on each gallon of gas.

The Tekbot will be used to help understand the scale part of the lesson. We will begin the lesson by understanding how far a mile is. We will take our Tekbot for a mile long class walk. When the walk is complete we will discuss how far a mile was and how scale comes into play on maps to help simplify mileage on maps. The students job will be to figure out the total miles it takes to get to their destination and the price it will cost to drive there. After finding all the information they need they will then be expected to make a scale using materials of their choice and the Tekbot to show how far it is (in miles) to their destination and share that information

with the class. It can be as simple as "every time the Tekbot wheels turns 4 times that equals 100 miles on my scale. It took me 400 miles to get to my destination of _(city)__ so the wheels would need to turn 16 times for my scale to be accurate. It would take me ___(time)__ to get there and it would cost __(price)___ to fill up my gas tank and the total price to drive both ways to and from my vacation spot would cost ___(total price)___.

Teacher and Student Suggestions/Tips :

Preteaching :

- Before starting the lesson with the Tekbot discuss with the children what engineers do, things that engineers are involved in making, how to become and engineer, and engineering as a profession as a whole.
- Discuss with the students the different things that you have to be able to do to make the Tekbot. Show them the Time magazine for kids on soldering and give them a lesson on how to solder.
- Get the children interested in by having them make a battery tester and test a 9-volt battery.
- Talk to the student about how the Tekbot was made. Show them video clips of how the Tekbot was put together in a real setting. If possible give them an opportunity to watch an engineering major put together certain parts of the Tekbot and be involved in a minor way.

Anticipatory Sets :

- Get to know our Tekbot, understand the basics of moving it and what it can do so
  - that we can understand how the students can use it to make a scale of their own.
- Show different ways of using the Tekbot to show scale (examples : x feet = y miles,
  - x wheel revolutions = y miles, x seconds of driving = y miles)
- For fun and student interest you may want to dress up your Tekbot to look like a

modern day car.

Teacher Questions :

- Does it matter if one persons scale doesn't match anyone else's scale in the classroom?
    - No
- Why?
    - If the scale is done correctly it will tell us the correct mileage no matter whose scale we use.
- Are all of our answers going to be the same?
    - No
- Why?
    - We are going to different destinations.
- Which answer should be the same from everyone in the class?
    - How much it would cost to fill up our gas tank because our gas price is the same and our cars all hold 15 gallons of gas.
- Does it matter if our scale is 2 inches to a mile or 2 yards to a mile or if you don't use measurement to show your scale?
    - No, it is the students decision what their scale looks like.

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Student Data Recording :

- I will provide a worksheet with spaces for the students to write down their answers to the questions asked of them. I will also provide the key formulas for the students to figure out their answers until they get the hang of the formulas relating to the road.

Materials Needed :

- Tekbots
- Maps
- Worksheets with formulas and spots for the students answers
- Pen / Pencil
- Measuring devices (meter stick, yard stick, rulers, etc...)
- Stopwatches
- Calculator
- Masking tape

Student Worksheets :

- See student data recording

URL's or Internet Links:

http://www.vacationidea.com

http://www.mapquest.com

Student Data Worksheet

Name: _____

Grade:_____

Teacher:_____

Show your work on all problems that involve math calculation

What is your destination?

How many miles does it take to get to your destination from the starting point (Omaha, NE)?

How big is the scale you will be using? How many miles does your scale equal?

How long will it take to get to your destination?

How much will it cost to get to your destination?

What will be the cost to get to your destination and back to the starting point?