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Applied Math for Tire Pressure

This lesson requires students to apply math skills to calculate tire pressure and the effect on tire life.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

Understanding and Goals

Unit Understandings, Themes, and Concepts:

Enduring Understandings:

Students will learn how to use math skills to figure out tire pressure. They will also grasp how temperature and weather can have an effect on tire pressure

Primary Learning Goals:

Essential questions:

- How does temperature effect tire pressure?
- How much pressure do tires lose each month and why?
- What math skills are needed to figure out the tire problem?

Students with disabilities:

For students with disabilities, each instructor should refer to the student's IEP to be sure that the accommodations specified in the IEP are being provided within the classroom setting. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation within any given instructional activity or requirement.

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Technology

CD No.:1
Lesson No.:24

Hot Wheels

As an automobile service technician, you know that customers sometimes think their cars are in need of repair when they don't handle well on the road. However, attention to simple preventive maintenance is often the answer to their problem. You know that a car will handle better and tires last longer if tire pressure is monitored and adjusted as needed. In fact, if the air pressure in a car's tires is not correct, a dangerous situation could result.

Time and the Life of a Tire

Last week when Jane Hurley brought her car in for a tune up, you noticed that her tires were seriously underinflated. Jane couldn't remember the last time she checked her tire pressure. You explained that tires lose pressure over time.

- A. On an average, tires lose one pound of pressure per month. The manufacturer of Jane's tires recommends that the tires be inflated to 32 pounds of pressure per square inch (PSI). When you measured the pressure of the tires, one tire was dangerously low at 26 PSI. Determine the pounds of pressure lost and estimate how much time had passed since Jane had her tire pressure checked last.

1. $\frac{\text{Recommended PSI}}{\text{Recommended PSI}} - \frac{\text{Measured PSI}}{\text{Measured PSI}} = \frac{\text{No. of PSI lost}}{\text{No. of PSI lost}}$

2. Estimated number of months since Jane's last tire check _____

- B. You explained to Jane that she can expect her tires to last for 30,000 miles if she keeps them properly inflated. Tires lose 10 percent of their expected life for every 10 percent they are under inflated. How much life had Jane's tire lost?

1. What percent of the recommended PSI is Jane's low tire currently inflated?

$\frac{\text{Measured PSI}}{\text{Measured PSI}} / \frac{\text{Recommended PSI}}{\text{Recommended PSI}} = \frac{\text{Decimal}}{\text{Decimal}} = \frac{\text{Percentage inflated}}{\text{Percentage inflated}}$
(Round to two places)

2. What percent is Jane's low tire currently under inflated?

$\frac{100\%}{\text{Full inflation}} - \frac{\text{Current \% inflated}}{\text{Current \% inflated}} = \frac{\text{Percent under inflated}}{\text{Percent under inflated}}$

3. Calculate how many miles of the expected life of the tire will be lost due to the percent of under inflation.

$$\frac{\text{Expected life of tire (mi.)}}{\text{Percent under inflated}} \times \frac{\text{Percent under inflated}}{\text{Percent under inflated}} = \frac{\text{Miles of tire life lost}}{\text{Percent under inflated}}$$

Time and Temperature

Bob Dolan spent last summer in Florida and drove home to New York the first week of September. It's now the end of December, and he brought his car in for a check up because it pulls to the left when he brakes.

Because Bob has radial tires, it's hard for him to judge the tires' inflation by looking. Bob says he was careful to adjust his tire pressure to the manufacturer's recommended 34 PSI before he left Florida. You ask what the temperature was when he left Florida. He remembers it being a balmy 85 degrees; it's now 45 degrees in New York.

Tires lose about one PSI for every 10-degree temperature drop; in addition to the PSI they lose over time. What total PSI loss do you discover when you measure Bob's tire pressure?

- A. It's now December and Bob last adjusted his tire pressure in September. Approximately how much PSI has each tire lost to time?

$$\frac{\text{Avg. PSI loss per month}}{\text{Avg. PSI loss per month}} \times \frac{\text{Months since adjustment}}{\text{Months since adjustment}} = \frac{\text{PSI loss to time}}{\text{PSI loss to time}}$$

(Part I A)

- B. How many PSI were lost due to the temperature differences in Florida and New York.

- $$\frac{\text{Fl Temp.}}{\text{Fl Temp.}} - \frac{\text{NY Temp.}}{\text{NY Temp.}} = \frac{\text{Temp. difference}}{\text{Temp. difference}}$$
- $$\frac{\text{Temp. difference}}{\text{Temp. difference}} / 10 = \frac{\text{PSI loss to temp. difference}}{\text{PSI loss to temp. difference}}$$

- C. Calculate the current PSI of Bob's tires.

$$\frac{\text{Recommended PSI}}{\text{Recommended PSI}} - \frac{\text{PSI lost to time}}{\text{PSI lost to time}} - \frac{\text{PSI lost to temp. change}}{\text{PSI lost to temp. change}} = \frac{\text{Current PSI}}{\text{Current PSI}}$$





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