Computing Horsepower (HP)

Lesson 8

Remember:
Pretty **P**lease **M**y **D**ear **A**unt **S**ally
(From left to right; **P**arentheses; **P**ower; **M**ultiply; **D**ivide; **A**dd, **S**ubtract)

Today, we're going to find how to compute the one thing we're all interested in when talking about a car: its horsepower.

Abbreviated "hp", an engine's ability to do work is called horsepower, 1hp.= 33,000 ft-lb. of work/minute or 550 lb. lifted 1 foot in 1 sec. In order to determine engine horsepower we need to use another equation (like we did in computing c.i.d.) by multiplying two terms and dividing by a constant.

Some of the math and math terms we'll be using to today are:

Horsepower (hp) – a measure of an engine's ability to perform work.

Variable expression – an equation with an unknown quantity represented by a letter
You can multiply 550 x 60 = 33,000 that is how the constant is generated.

Power is the rate or speed at which work is done.

What can you tell me about engine horsepower?

Why is it important to be able to calculate horsepower?

Start with the formula for calculating horsepower:

$$hp = \frac{d(ft.) \times w(lbs.)}{33,000\, ft - lbs.}$$

Enter the distance (d) the object is moved and its weight (w) into the formula.
Multiply the distance by the weight.
Divide this product by 33,000.
The result is the horsepower produced.

Usually in a drag race, the car that has more horsepower will "pull" harder and have a higher mile per hour run than a car with lower horsepower.

If your interested…Here is the equation that calculates engine torque: HP=RPM x Torque/5252

Example 1: For a small engine to lift 500 lb. a distance of 700 ft. in one minute, about how much horsepower would be needed?

$$hp = \frac{d \times w}{33,000}$$ becomes $$hp = \frac{500lb \times 700\,ft}{33,000} = 10.6hp$$

A variable expression is an equation with an unknown quantity represented by a letter. In this case, the equation for horsepower is the variable expression where "hp" varies depending on the weight of an object and how far it is moved. A constant is a fixed quantity in an equation…that is it never changes. In this case, the constant, which is 33,000 ft-lbs., is divided into the product of weight and distance. In the hp formula, there is a direct variation between weight, distance, and horsepower. That is, when weight or distance is increased, the horsepower expended is also increased.

Example 2: For a small engine to lift 487 lb. a distance of 659 ft. in one minute, about how much horsepower would be needed?

 hp = [487 lb. x 659 ft.] / 33,000 = 9.725 hp

1. How heavy of an object could be moved 20 ft. in one minute using a 20 hp engine?

2. How far can a 1000 lb. object be moved in one minute using a 50 hp engine?

3. Using the same math, find the circumference of a wheel with a 15-inch diameter. We can use a formula to find the circumference (c) of a wheel or circle by multiplying the diameter (d) – the distance across the center of the wheel or circle - by a constant called pi or (π) or $C = \pi d$.

4. Evaluate:

$$y = \frac{2(x+1)}{4}$$
x = {2, 3, -7,8}

5. Just as we used the hp formula to find weight and distance by solving it for "d" or "w", we can solve any algebraic equation in two variables for either variable.
Let's solve $y = \frac{2(x+1)}{4}$ for x.

Lesson 8 Worksheet - Computing Horsepower

Name: _____ AM-1: _____ PM _____ Date: _____

1. About how much horsepower would be needed for an engine to lift 650 lb. a distance of 500 feet in one minute?

2. How heavy of an object could be moved 100 ft. in one minute using a 25 hp engine?

3. How heavy of an object could be moved 100 ft. in one minute using a 50 hp engine?

4. How far can a 1500 lb. object be moved in one minute using a 100 hp engine?

5. What is the circumference of a 20inch rear wheel on a 2004 Viper?

Lesson 8 Homework - Computing Horsepower

Name: _____ AM-1: _____   PM _____ Date: _____

1. How far can a 1000 lb. object be moved in one minute using a 100 hp engine?

2. How much horsepower is needed to move 2850 lbs. in 7 minutes?

3. Evaluate y = 2(x + 4)/2 for x = {2, 5, 8, 10}

4. Solve y = 4x/5 in terms of 'x'

5. Solve y = 4(x + 2)/2 in terms of 'x'

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Lesson 8 Computing Horsepower

Name: _____ AM-1: _____   PM _____ Date: _____

In the space to left of each statement, place a check mark (√) if you agree or think the statement is true.

1. _____   Horsepower is a measure of an engine's ability to perform work.

2. _____   You can tell how much horsepower a vehicle has by the seat of the pants.

3. _____   The constant in the horsepower formula is needed to solve for the answer.

4. _____   A variable expression is an unknown quantity that you are solving for in the horsepower formula which is hp.

5. _____   Generally when you raise hp the distance you move the load increases or the weight you move increases.

6. _____   Change the value of the constant changes the horsepower.

7. _____   The horsepower formula is an accurate way to describe an engines ability to do work.

8. _____   An engine dynamometer is the best method to measure horsepower.