

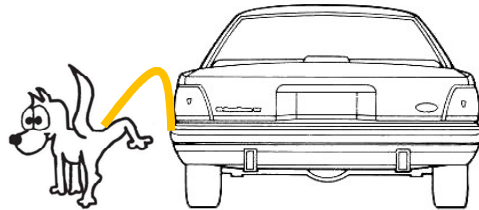
Diesel's Tie Breaker Questions

No Search Engines!

Driver / Navigator Jeanne Kerr / Diesel Kerr Time: _____

You have 30 minutes to complete the tie breaker questions

1. From Diesel the Tour Hound: Ya so, I had to go outside and there was an old Ford in the parking lot so I left my mark, so to speak. And it was spot on, I mean dead center of the wheel kinda spot on. My expert trajectory is shown below and is modeled by the quadratic equation:



$$Y = -3x^2 + 15x + 18$$

Where x is the distance (in inches) between me and the center of the Ford's wheel. Assume the height of the center of the wheel and the height of my pee-pee are the same.

- 1(a). Since I hit spot on, how close was I to the Ford's wheel when I cut loose (in inches)? State your answer to 1 decimal place. 7 inches (5 points)

Since the height of Diesel's pee pee and the center of the Ford's wheel are the same, use the formula to find the roots of the quadratic equation given in Diesel's List of Useless Information. The roots are $x = -1$ and $x = 6$. Therefore, the distance between Diesel and the Ford is 7 inches

- 1(b). What was the highest my stream reached before hitting the Ford's wheel (in inches)? State your answer to 1 decimal place. 36.8 inches (5 points)

Looking at the example graph of a quadratic equation on Diesel's list of Useless Information, you can see that the maximum height is halfway between the roots of the equation, in this case at $X = 2.5$ inches. Plugging in $X = 2.5$ and find that $y = 36.8$ inches (you were told to round to one decimal place)

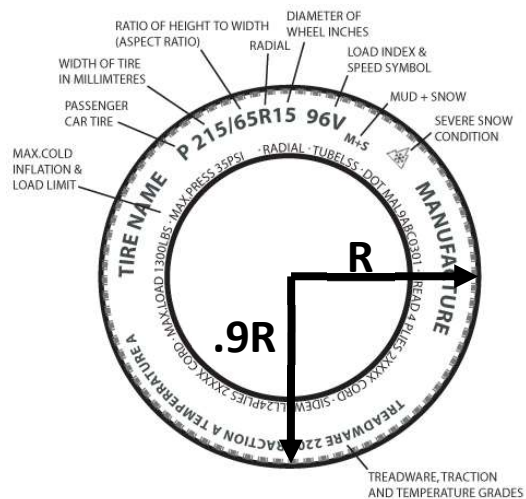
Diesel's note: Ya so, I really had to go!

2. What egregious grammatical error did Diesel make in his biography? (1 point)

Diesel said his pronoun is "Boss". That's a noun.

No Search Engines!

- $$25 \text{ mi} * 5280 \frac{\text{ft}}{\text{mi}} * 12 \frac{\text{in}}{\text{ft}} * 1 \frac{\text{rev}}{68.4} = 23,158 \text{ revolutions}$$



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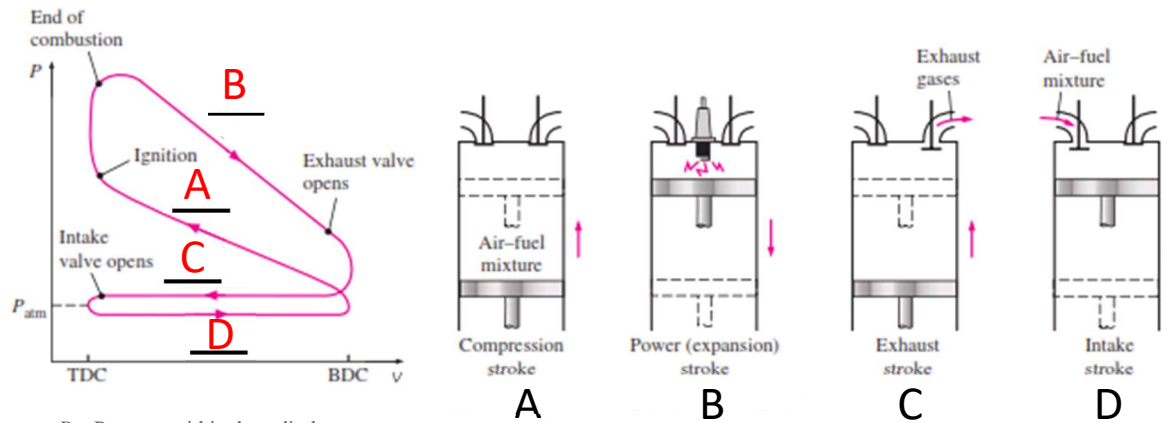
3(d). Now assume you're joining Elon Musk's Starman on a trip to the moon in your MGB. How many revolutions of the wheel will it take to drive to the moon? Round to the nearest whole number. Pick the most correct answer. (1 point)

- (a) 221,296,842
- (b) 199,167,158
- (c) 172,008,000
- (d) I hate math

*Since you're traveling in space, there is no load on the tyre so you'll use the full diameter of the wheel, or 24.2 inches, giving the effective circumference of one revolution as $\pi * 24.2 = 76$ inches*

From Diesel's List of Useless Information, the distance to the moon is 238,900 miles.

$$238,900 \text{ mi} * 5280 \frac{\text{ft}}{\text{mi}} * 12 \frac{\text{in}}{\text{ft}} * 1 \frac{\text{rev}}{76 \text{ in}} = 199,167,158 \text{ revolutions}$$



P = Pressure within the cylinder

v = Volume within the cylinder as the piston moves up and down

4. An actual four-stroke spark-ignition cycle curve ($P-v$ curve) and description of the four strokes is shown above. For each arrow shown on the $P-v$ curve, fill in the corresponding letter of the stroke.

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5. I am a healthy, happy hound, but if I was ill my people would take me to a vet. On the tour you passed at least 4 of these horrible places. Which ones did you NOT pass? Mark an "X" in front of those you did not pass on the tour route. (1 point)

- ☒ "Deer Creek Animal Hospital"
- ☐ "Lone Rock Veterinary Hospital"
- ☐ "Big Horn Veterinary"
- ☐ "Veterinary Hospital"
- ☒ "Green Valley Ranch Pet Center"
- ☐ "Farmers Corner" Vet Hospital
- ☐ "Aspen Park Vet Hospital"

6. During the tour, I was happy to see several Fire Stations where I can sing with the trucks! Please match the name of these stations with the roads they are located on by drawing a line from the station to the road. (1 point)

Inter-Canyon Fire Department	Highway 9
Inter-Canyon Fire/Rescue No. 3	South Turkey Creek Road
Northwest Fire Station No. II	Highway 285