I BIKE

BIKE MATHS

DURATION: 30MINS

MATERIALS REQUIRED: NOTEPAD AND PEN, CALCULATOR OR PHONE

Power

Aim:

To understand what is meant by power, and to use a formula to investigate the relationship between power and speed of a cyclist.

Power is way of quantifying the amount of work done over a period of time. This could be jumping up and downing during a Joe Wicks workout, running up a hill or even pedalling a bike! The unit of power is the Watt (work done per second).

A bike rider uses their leg muscles to push the pedals and make the bike moves. Energy is converted from chemical energy in the muscles into kinetic energy of the bike moving along.

The power (P, in Watts) required for a cyclist to maintain a speed (v, in mph) on level ground using an average adult and bike weight of 90kg is give by the following formula:
$P= 0.0165v^3 + 2.09v$

Example: How much power would you need to produce to travel at 15mph?

Answer:
v= 15, so: $0.0165x\ 15^3 + 2.09x15 = 87W$

Questions:

1) 2012 Olympic Champion Bradley Wiggins averaged 32mph during the time trial, what was his average power output?

2) Use the formula to find the power needed to maintain a speed of: (a) 5mph (b) 15mph (c) 9.6mph (average cycling speed in Copenhagen, The Netherlands).

3) A cyclist has a maximum power output of 600W. To the nearest mph, what speed can they achieve when using maximum power?

4) Tour de France cyclist Mark Cavendish can sprint at 48.5mph, how much power does it take to cycle at that speed?

Brain teaser:

What are the limits to how fast you can travel on a bike? Think of what forces are involved...

Research:

What's the land speed record on a push bike?

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