### Friday 9<sup>th</sup> February 2024

Period 4: 8A4 Physics

**Title**: Work, energy and machines.

Complete on paper or in your books – you will need to hand in this work after half term.

- 1. Using the text book page 94 & 95 (copy on next page) Write out what work in physics means.
- 2. Write out the formula for work done.
- 3. Make notes on simple machines and gears.
- 4. Answer summary questions 1-4.

# ork, energy, and

### Learning objectives

After this topic you will be able to:

- calculate work done
- energy to simple machines. apply the conservation of



 Riding downhill is much easier than riding uphill

makes it easier to go up hills. gear that you use to ride downhill? Choosing a lower gear Have you ever tried to ride your bike uphill in the same

### Working out work

transfer energy by doing work. Not all energy transfers are to do with heating and cooling. You can

in physics the word 'work' has a special meaning

- When you lift a book you do work against gravity.
- When you slide the book you do work against friction.

work done = force x distance 2





▲ Lifting a book work done = force  $\times$  distance =2N×1m

> work done = force xdistance Sliding a book.

 $=1N\times0.2 m$ =0.2J

# A State the equation for calculating work

### Making life easier

things. It reduces the force that you need to do a job, or increases the distance that something moves when you apply a force. A simple machine makes it easier to lift things, move things, or turn

Using different size cogs on the front and

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back wheels of a bicycle can give you up

Fantastic Fact

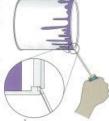
Climb a mountain! TIE OF The force applied to the lid by the lever is bigger than the force that

Most people use a lever to open a tin of paint. If you put a the tin with a much smaller force, screwdriver between the lid and the rim of the tin, you can open

you apply with just your hand. A lever is a force multiplier

Your hand moves down and the other end of the lever moves up. Your hand moves much further than the other end of the lever.





 A screwdriver applies a bigger with just your hand. force than you could apply

▲ The force may be bigger but the distance is smaller.

### Gears

the force, change direction, or go faster like levers that are rotating. You can use a gear system to increase The **gear** system on a bicycle is a simple machine. Gears are a bit





 You can select big bicycle gears or small cogs in

A When the cog at the back is smaller, it takes less force to turn it. It is a force multiplier.

# Name two types of simple machine

# Getting something for nothing?

something for nothing. The big force can only move a small distance. You cannot get A small force acting over a big distance produces a big force.

than you put in. You cannot get out more than you put in. distance as well as the force then you would get more energy out The reason is the law of conservation of energy, If you increased the

### **Key Words**

work, simple machine, lever, gear

## Summary Questions

& Copy and complete the of energy. You cannot get more machines obey the law of \_ easier to cycle uphill. All simple be used to open a paint tin A simple You need to know the \_ because it is a \_\_ sentences below. out than you put in. on a bicycle can make i to calculate work done like a \_multiplier.

(8 marks

- 2 A You can use a stone under a plank of wood to lift a heavy rock
- a State the type of machine that equipment you can make with this (1 mark

b Calculate the work done by

a distance of 0.25 m. (2 marks lifting a rock of weight 200 N

- 3 A A person with a weight of 600 N climbs Mount Everest, a the work done climbing Mount vertical height of 10 km. Compare
- (4 marks

Everest and climbing 2.5 m

upstairs to bed.

4 4 Look at the diagram of the force on the pedals, but you still obey the law of conservation of Explain in detail why you exert a bicycle chain and cogs above.

(6 marks QWC)