

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ name the four types of motion and give examples
- ☐ calculate velocity ratio and output speed in gear trains
- ☐ describe the effect of an idler gear
- ☐ design a compound gear train to give a required speed
- ☐ describe ways to reduce friction and wear

I DO**Worked example**

Read how a full-mark answer is built

*An idler gear B is placed between gears A and C.***1 State the effect on the output speed if the number of teeth on idler B is reduced.** (1 mark)**Full-mark answer** each ✓ is one mark

There is no effect on the output speed; an idler only changes the direction of rotation ✓.

Why marks are not awarded*"It reverses the direction of gear C."*

0 marks: the question asks about speed.

WE DO**Guided practice**

Use the starters and word bank to help you

*Moving parts in a drive system wear quickly.***2 Describe one way to reduce wear.** (1 mark)**Sentence starters**

One ... is ..., which means ...

Another ... is ..., so ...

Word bank

self-lubricating · materials · friction · grease ·

reduce · lubricate · harder · bearings

Tip: 1 marks = 1 separate, developed points.

YOU DO

On your own No notes. Check your answers afterwards.

3 Quick check: tick one box for each.

- a) A pneumatic piston moving in and out shows...
☐ Rotary motion ☐ Reciprocating motion ☐ Oscillating motion ☐ Linear only
- b) A 20-tooth driver turns a 60-tooth gear. The VR is...
☐ 1:3 ☐ 20:1 ☐ 3:1 ☐ 60:1
- c) A 1500 revs min⁻¹, 52-tooth gear drives a 12-tooth gear. Output speed is about...
☐ 6500 revs min⁻¹ ☐ 346 revs min⁻¹ ☐ 1500 revs min⁻¹ ☐ 780 revs min⁻¹
- d) Reducing the teeth on an idler gear makes the output...
☐ Faster ☐ Slower ☐ Turn the other way ☐ No different

4 Key terms: write the letter of the matching description next to each term.

1. Reciprocating motion	_____	A Backwards and forwards in a straight line.
2. Oscillating motion	_____	B Two gears on one shaft; total VR = VR1 × VR2.
3. Velocity ratio	_____	C Speed of input ÷ speed of output = driven teeth ÷ driver teeth.
4. Gear speed method	_____	D Swinging backwards and forwards in an arc.
5. Idler gear	_____	E Input speed × input teeth = output speed × output teeth.
6. Compound gear train	_____	F Makes driver and driven turn the same way; doesn't change the VR.

A motorised winch is driven by a motor at 1200 revs min⁻¹. The drum must turn at 25 revs min⁻¹.

5 Calculate the velocity ratio required. (2 marks)

A 20-tooth driver gear meshes with a 60-tooth driven gear. The motor turns at $1500 \text{ revs min}^{-1}$.

6 Calculate the velocity ratio and the output speed. (3 marks)

A compound gear train: A (15 teeth) drives B (45 teeth); C (10 teeth, on the same shaft as B) drives D (50 teeth).
Input $3000 \text{ revs min}^{-1}$.

7 Calculate the output speed. (3 marks)

Check and reflect

Mark your answers with the answer sheet. Go back to the checklist on the site and re-rate each “I can” statement above.
Which one still needs work?
