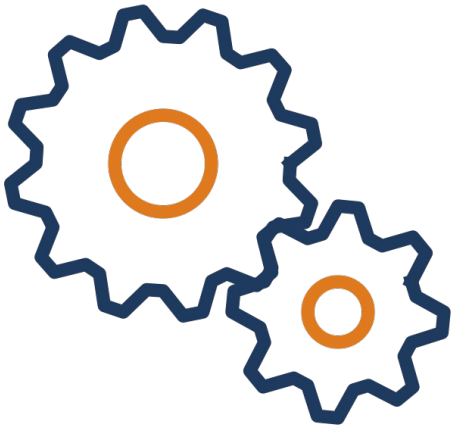
Lesson D5 Review Questions

Friction and Efficiency in Drive Systems



Answer every question in your jotter. Show your working. Tap a question below to go to it. Tap **Show answer** under a question to mark it.

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Questions

2023 Section 1 Question 6 (b)

1. Grease is used to lubricate the gear system within the drill.

Describe a reason for lubricating the gear system. **1**

Show answer ›

2024 Section 1 Question 7

2. Friction can cause the moving parts of a drive system to wear out.

(a) Describe how to reduce the wear on the moving parts of a drive system. **1**

(b) State a form of energy lost due to friction in a drive system. **1**

Show answer ›

2014 Section 2 Question 16 (e)

3. Describe how friction in a mechanical system could be reduced. **1**

Show answer ›

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4. A lifeboat winching system on a cruise ship is shown below.



A lifeboat of mass 7750 kg is lowered into the water.

The lifeboat is winched back up to its starting position 15 m above the water level.

(a) Calculate, showing all working and final unit:

(i) the potential energy of the lifeboat; **2**

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(ii) the efficiency of the system when the input energy to the winch is 2·50 MJ. **2**

(b) Explain why the winching system is not 100% efficient. **2**

Show answer ›

2021 Section 2 Question 14 (c)

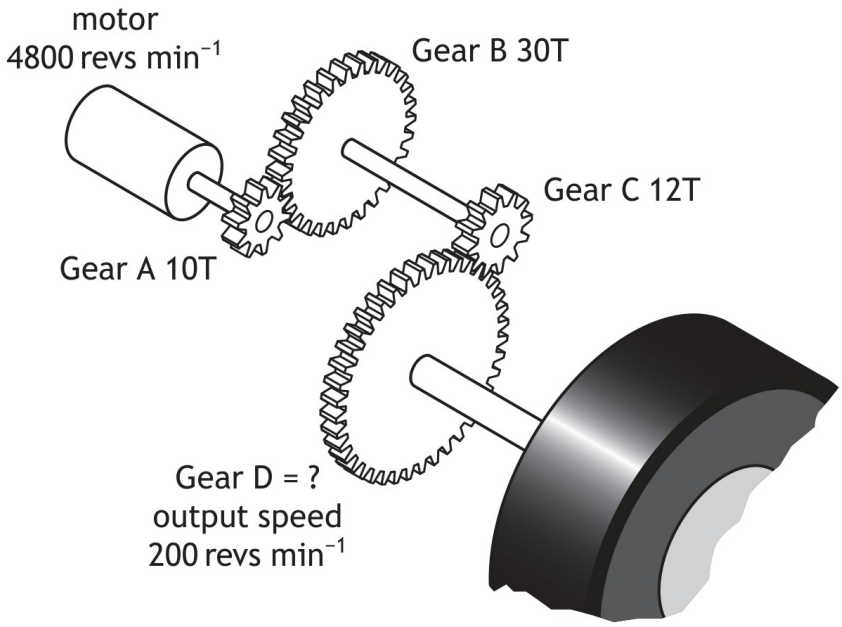
5. Explain how the efficiency of a compound gear train can be increased. **2**

Show answer ›

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2017 Section 2 Question 12 (d)

6.



Explain how this mechanical system could be made more efficient.

_____

_____

_____

Show answer ›

2024 Section 2 Question 9 (c)

7. Explain how the efficiency of the gear train could be improved. **2**

_____

_____

_____

Show answer ›

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Answers

Check your understanding (booklet)

1 Any two: energy is lost as heat (and sound); the moving parts wear; the efficiency is lower.

2 Any two: lubricate the gears (oil or grease); fit bearings; use a smoother ("slippier") material.

3 efficiency = energy out ÷ energy in = 400 ÷ 500 = 0.8 (80%)

4 Lubricating reduces friction (cause), so less energy is lost as heat and the battery lasts longer (effect).

Answer to question 1

2023 Section 1 Question 6 (b)

Marking instructions

Question			Expected response	Max mark	Additional guidance
	(b)		Reduce wear (on the gear system). Gears run smoother/quieter. Improve efficiency/battery life. Less heat/sound/energy losses.	1	Descriptive response. Accept reduces friction (stated or implied). Accept stops the gears rusting/ prevents losing torque.

‹ Back to question 1

Answer to question 2

2024 Section 1 Question 7

Marking instructions

Question			Expected response	Max mark	Additional guidance
7.	(a)		Regular maintenance. Avoid overloading/revving. Lubricate/oil/grease the parts.	1	Descriptive answer. Do not accept single words. Accept use of bearings/use a slippery material.
	(b)		Heat/sound (energy)	1	

‹ Back to question 2

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Answer to question 3

2014 Section 2 Question 16 (e)

Marking instructions

Question			Expected Answer(s)	Max Mark	Additional Guidance
	(e)		Lubricate moving parts. Smoother materials could be used where mechanisms interact. Add bearings to the shaft	1	1 mark for any suitable descriptive response (what **and** where). No single word answers.

‹ Back to question 3

Answer to question 4

2015 Section 2 Question 11 (b)(i), (b)(ii), (c)

Marking instructions

Question			Expected Answer(s)	Max Mark	Additional Guidance
	(b)	**(i)**	E_p = mgh = 7750 x 9·8 x 15 (1 mark for substitution) = 1139250J (1 mark for correct answer from given working with unit)	**2**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
	(b)	**(ii)**	Efficiency = $\frac{\text{Eout}}{\text{Ein}}$ = $\frac{1{\cdot}14}{2{\cdot}50}$ (1mark for substitution) = 0·456 (0.46) Or 45·6% (46%) (1 mark for correct answer from given working)	**2**	Allow FTE from (b) (i)
	(c)		Loss of energy/heat/sound 1 mark due to friction 1 mark	**2**	Explanation Cause – 1 mark effect – 1 mark

‹ Back to question 4

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Answer to question 5

2021 Section 2 Question 14 (c)

Marking instructions

Question			Expected response	Max mark	Additional guidance
	(c)		Lubricate/bearings/'slippier' material used. To reduce friction/energy loss(to heat/sound).	2	Explanation response. 1 mark for cause (lubrication). 1 mark for effect (reason).

‹ Back to question 5

Answer to question 6

2017 Section 2 Question 12 (d)

Marking instructions

Question			Expected answer(s)	Max mark	Additional guidance
	(d)		Lubricate/bearings/'slippier' material used to reduce friction/energy loss(to heat/sound); or location for change gears/shafts/moving parts etc	2	1 mark lubrication (cause) 1 mark for location / reason (effect)

‹ Back to question 6

Answer to question 7

2024 Section 2 Question 9 (c)

Marking instructions

Question			Expected response	Max mark	Additional guidance
	(c)		Lubricate/oil the gears ...to reduce friction/energy loss.	2	Descriptive answer. 1 mark for cause with reference to the gear train. 1 mark for effect.

‹ Back to question 7

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