2007

TEST STAND FOR **GEAR**

COLLEGE TECHNOLOGY

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TEST STAND FOR **GEAR**

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SUMMARY OF RECORD

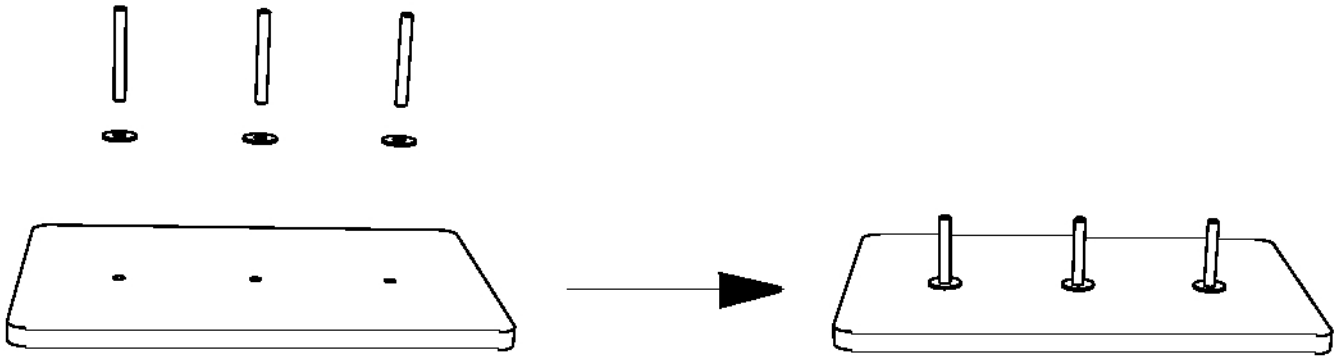
CDROM

This project's CDRom is available in the A4 Company catalogue (ref "CD-BE1").
It contains :
- The FreeHand version record (modifiable with this software - Evaluation version included).
- The PDF version record (readable and printable with Acrobat Reader software).
- **The full** product **3D modelling** in its various configurations with SolidWorks, Parasolid and eDrawings **3D files** format.

Overview - Preparation of the test stand delivered as a kit

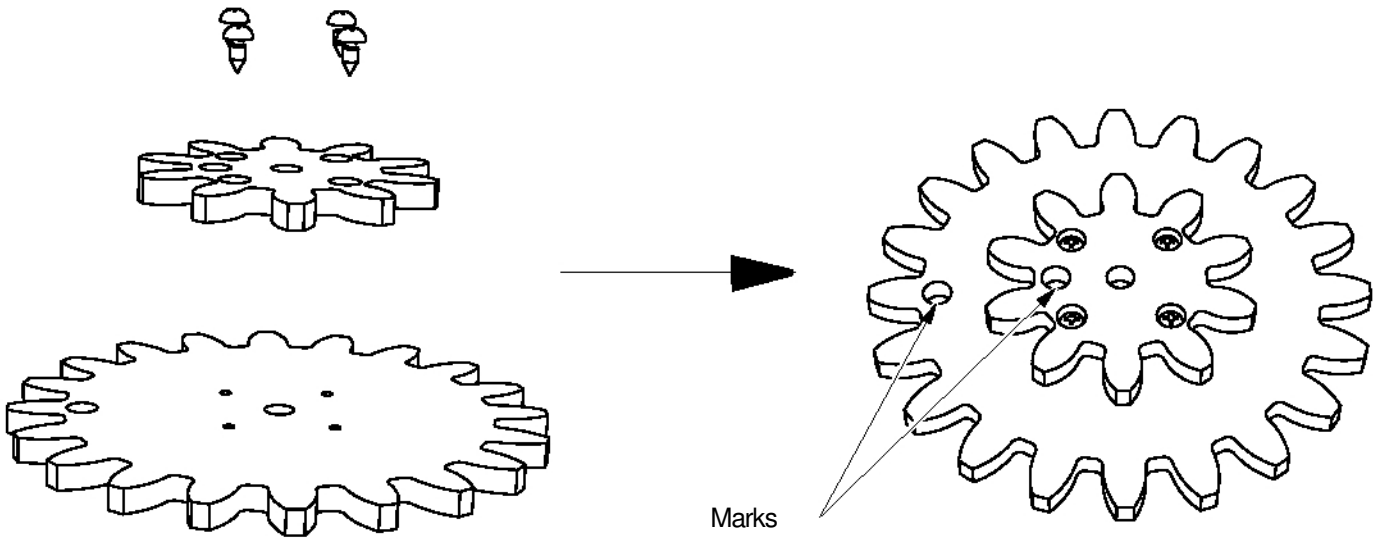
1- Plate Mounting

Stick the 3 rods on the base
Stick the 3 washers on the base



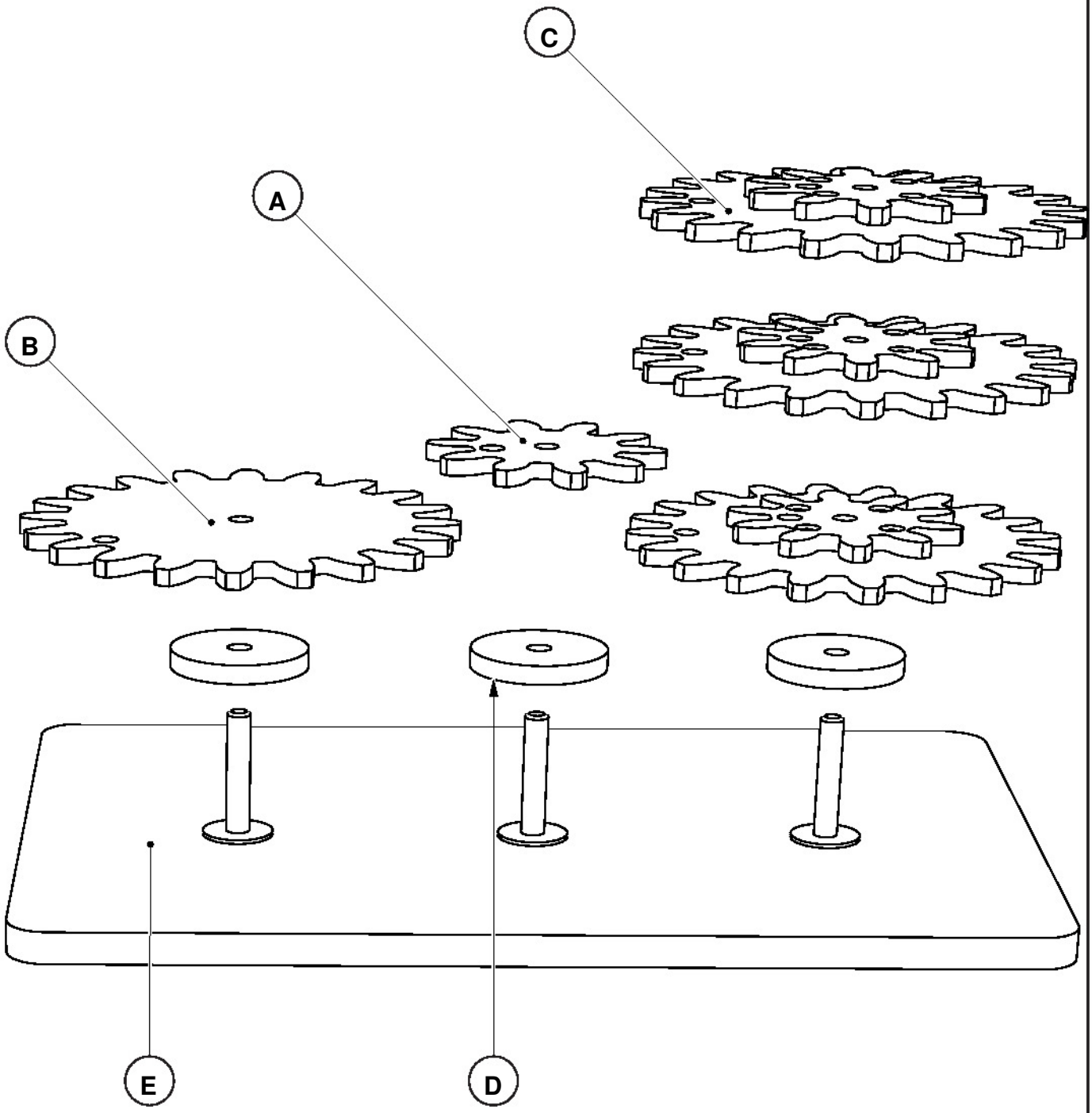
2 – Double cogwheels assembly

Assemble the 2 cogwheels with the 4 screws 3 x 6.5
Align marks



3 – Using the test stand

This equipment allows to easily testing different gears configurations.
We propose the following pages some exercises to realize various ratio movement multipliers or reducers.



MARK	NUMBER	DESIGNATION	CHARACTERISTICS
E	01	Plate equipped (3 axis + 3 washers)	240 x 160 x 6 mm thick expanded PVC
D	03	Spacer washer	Ø 35 mm x 6 mm thick expanded PVC
C	03	10/20 cogs double cogwheel	Ø 60 / 110 mm x 6 mm thick expanded PVC
B	01	20 cogs simple cogwheel	Ø 110 mm x 6 mm thick expanded PVC
A	01	10 cogs simple cogwheel	Ø 60 mm x 6 mm thick expanded PVC

COLLEGE TECHNOLOGY

A4

College *Class*

Name *Date*

PROJECT
GEAR

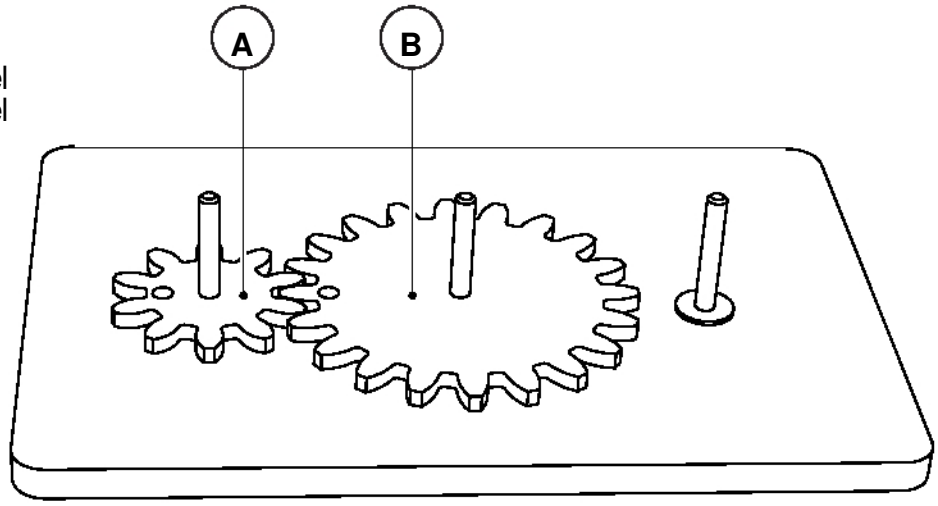
PART
ASSEMBLY

DOCUMENT TITLE
Perspective Assembly Drawing
General classification

Exercises on the gear test stand

ASSEMBLY # 1

Parts needed :
1: 10 cogs **A** simple cogwheel
1: 20 cogs **B** simple cogwheel



Turn the **A** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **A, B** cogwheels, with an arrow.

A 1 turn = **B** ..... turns
A 2 turns = **B**..... turns

Conclusion : .....

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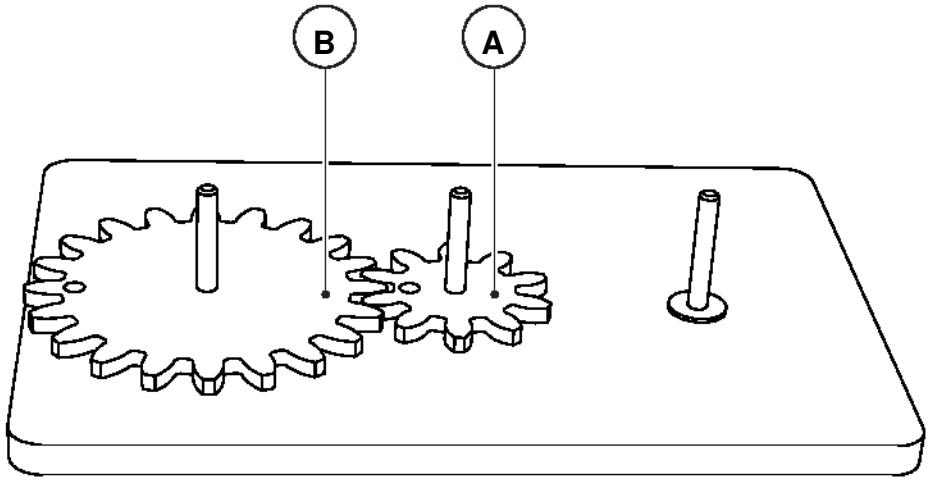
ASSEMBLY # 2

Parts needed:
1: 10 cogs simple **A** cogwheel
1: 20 cogs simple **B** cogwheel



Turn the **B** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **B, A** cogwheels, with an arrow.

B 1 turn = **A**..... turns

Conclusion : .....

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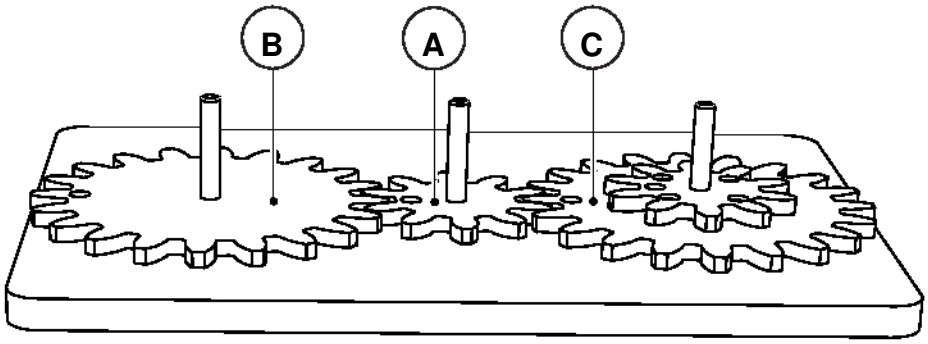
Exercises on the gear test stand

ASSEMBLY # 3

Parts needed:
1: 10 cogs simple **A** cogwheel
1: 20 cogs simple **B** cogwheel
1: 10/20 cogs double **C** cogwheel



Turn the **B** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **B, A, C** cogwheels, with an arrow.

B 1 turn = **A**..... turns = **C**..... turns

Conclusion : .....

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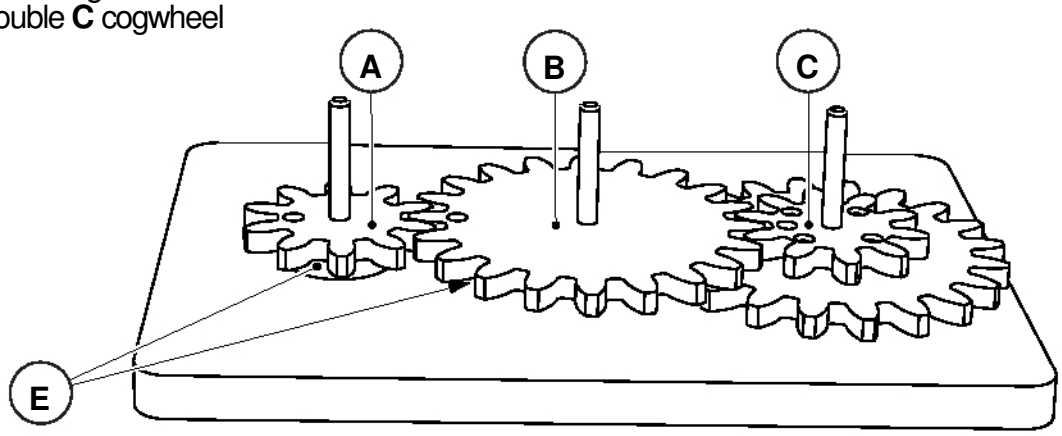
ASSEMBLY # 4

Parts needed :
1: 10 cogs simple **A** cogwheel
1: 20 cogs simple **B** cogwheel
1: 10/20 cogs double **C** cogwheel
2: **E** spacers



Turn the **A** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **A, B, C** cogwheels, with an arrow.

A 1 turn = **B**..... turns = **C**..... turns

Conclusion: .....

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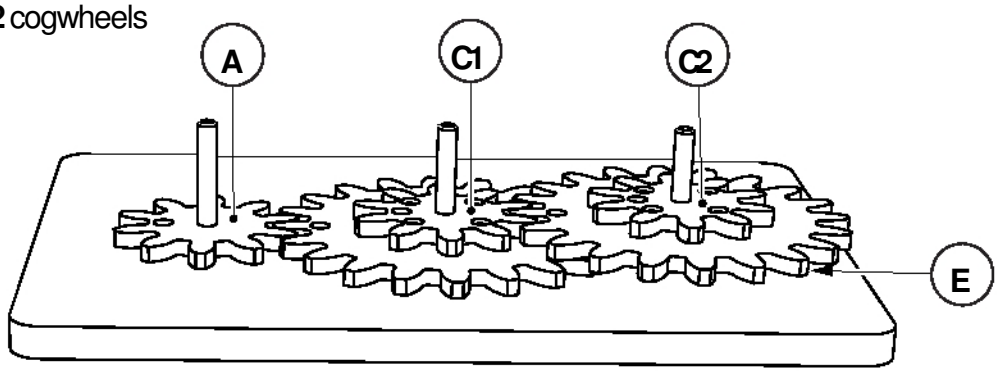
Exercises on the gear test stand

ASSEMBLY # 5

Parts needed:
1: 10 cogs simple **A** cogwheel
2: 10/20 cogs double **C1 C2** cogwheels
1: **E** spacer



Turn the **A** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **A, C1, C2** cogwheels, with an arrow.

A 1 turn = **C1**..... turns = **C2**..... turns

Conclusion : .....

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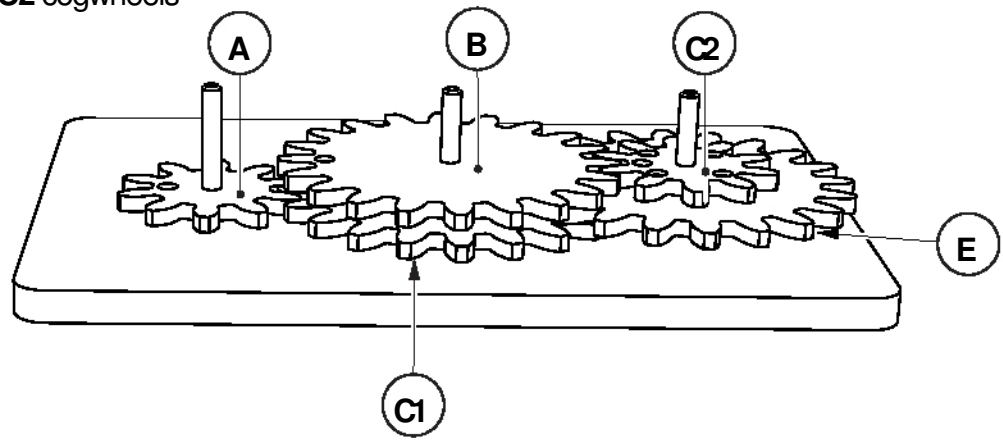
ASSEMBLY # 6

Parts needed:
1: 10 cogs simple **A** cogwheel
1: 20 cogs simple **B** cogwheel
2: 10/20 cogs double **C1 C2** cogwheels
1 **E** spacer



Turn the **A** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **A, C1, C2, B** cogwheels, with an arrow.

A 1 turn = **C1**..... turns = **C2**..... turns = **B**..... turns

Conclusion : .....

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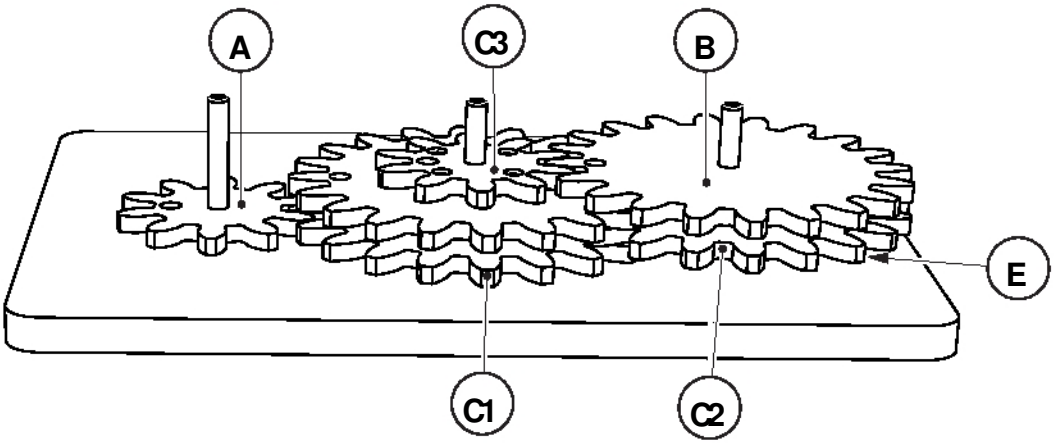
Exercises on the gear test stand

ASSEMBLY # 7

Parts needed:
- 1: 10 cogs simple **A** cogwheel
- 1: 20 cogs simple **B** cogwheel
- 3: 10/20 cogs double **C1, C2, C3** cogwheels
- 1: **E** spacer



Turn the **A** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **A, C1, C2, C3, B** cogwheels, with an arrow.

A 1 turn = **C1**..... turns = **C2**..... turns = **C3**..... turns = **B**..... turns

Conclusion : .....

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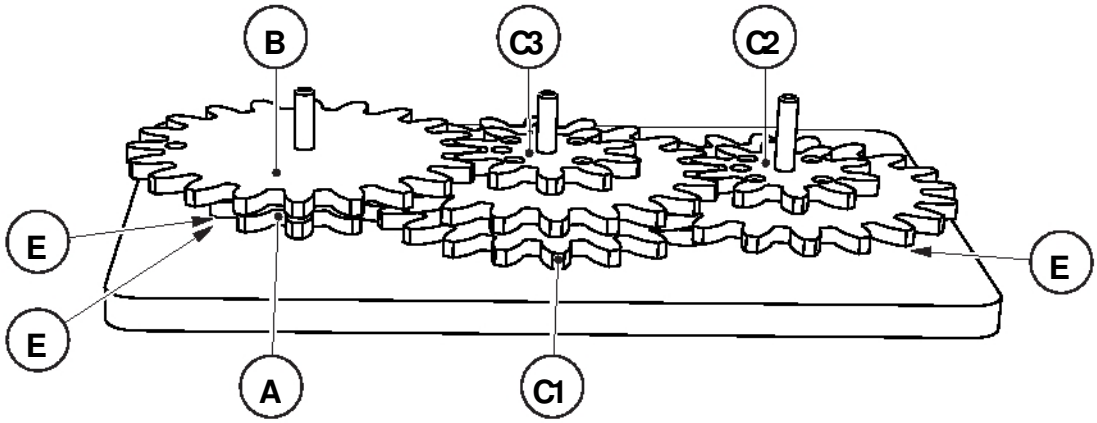
ASSEMBLY # 7 a

Parts needed:
- 1: 10 cogs simple **A** cogwheel
- 1: 20 cogs simple **B** cogwheel
- 3: 10/20 cogs double **C1, C2, C3** cogwheels
- 3: **E** spacers



Conclusion : .....

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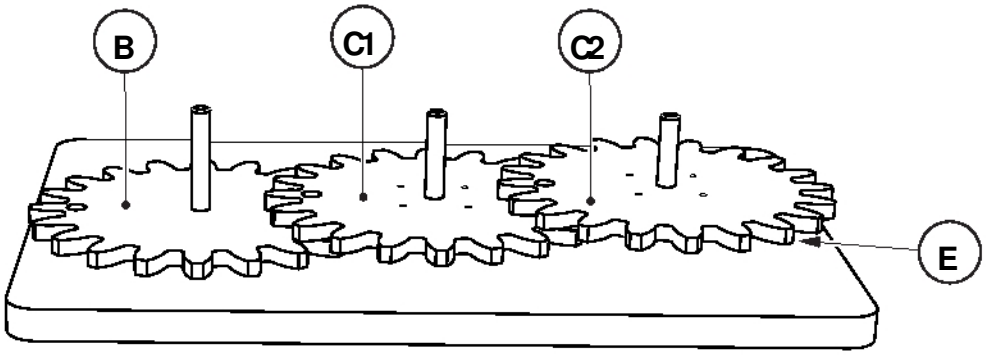
Exercises on the gear test stand

ASSEMBLY # 8

Parts needed:
1: 20 cogs simple **B** cogwheel
2: 10/20 cogs double **C1 C2** cogwheels
1: **E** spacer



Turn the **B** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **B, C1, C2** cogwheels, with an arrow.

B 1 turn = **C1**..... turns = **C2**..... turns

Conclusion : .....

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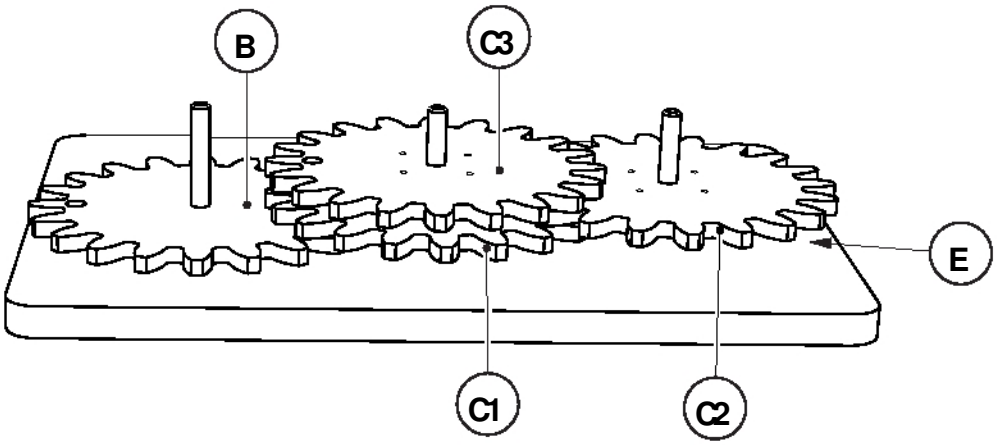
ASSEMBLY # 9

Parts needed:
1: 20 cogs simple **B** cogwheel
3: 10/ 20 cogs double **C1 C2 C3** cogwheels
1: **E** spacer



Turn the **B** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **B, C1, C2, C3** cogwheels, with an arrow.
B 1 turn = **C1**..... turns = **C2**..... turns = **C3**..... turns

Conclusion : .....

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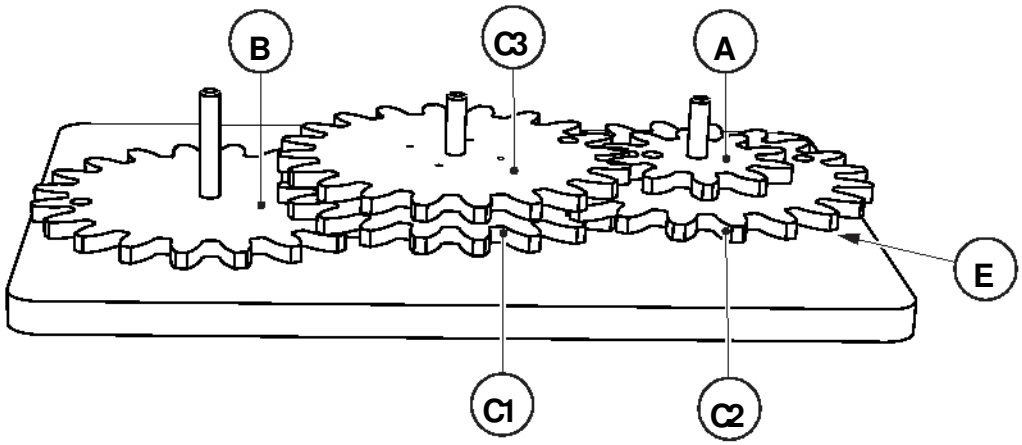
Exercises on the gear test stand

ASSEMBLY # 10

Parts needed:
- 1: 10 cogs simple **A** cogwheel
- 1: 20 cogs simple **B** cogwheel
- 3: 10/20 cogs double **C1, C2, C3** cogwheels
- 1 **E** spacer



Turn the **B** cogwheel one direction of rotation and note on the drawing the direction of rotation of the **C1, C2, C3, A** cogwheels, with an arrow.

B 1 turn = **C1**..... turns = **C2**..... turns = **C3**..... turns = **A**..... turns

Conclusion : .....

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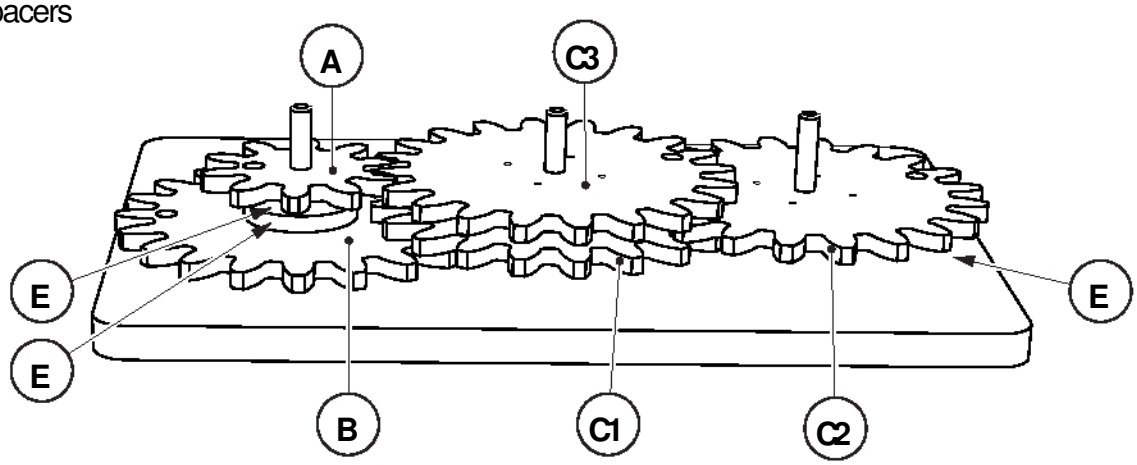
ASSEMBLY # 10 a

Parts needed:
- 1: 10 cogs simple **A** cogwheel
- 1: 20 cogs simple **B** cogwheel
- 3: 10/20 cogs double **C1, C2, C3** cogwheels
- 3: **E** spacers



Conclusion : .....

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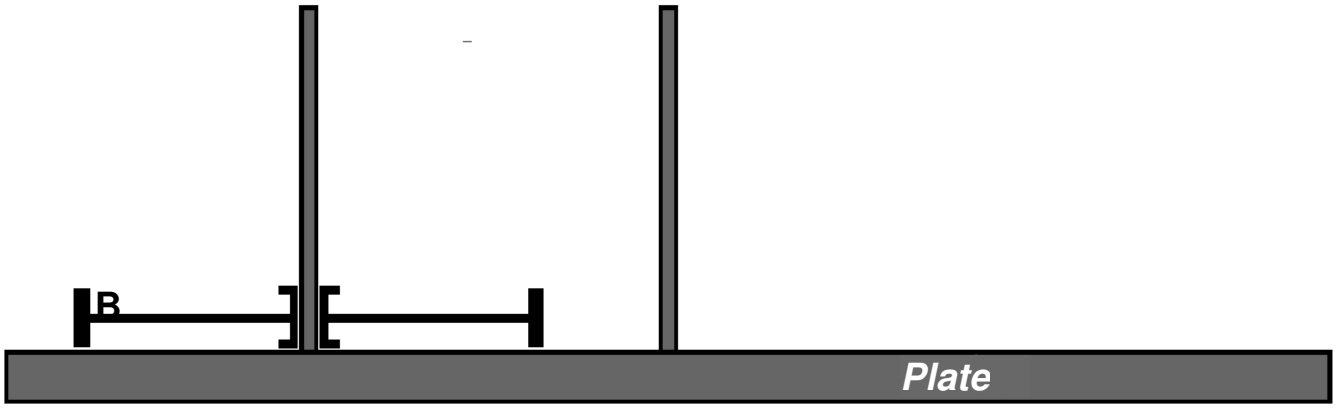
Exercises on the gear test stand

ASSEMBLY # 11

Using all cogwheels, make a 16 times multiplier with only two axis of the plate.

Complete the gear diagram.



QUESTIONS

- Write a gear definition: .....

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- Write some technical objects including a gear: .....

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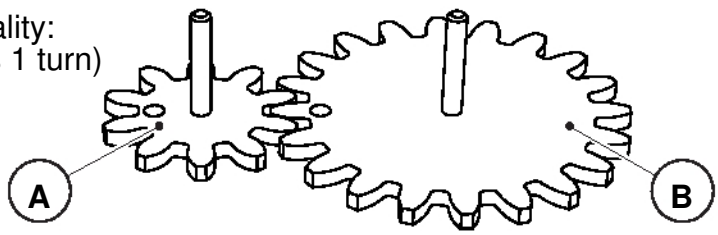
- Complete equality:
(B wheel makes 1 turn)



A cogs number **x A** turns number = **B** cogs number **x B** turns number

..... x ..... = ... x .....

..... = ...

- What means the gear reducer ratio (or multiplier ratio) ? .....

.....

.....

Exercises on the gear test stand - *CORRECTING*

Page 03

- ASSEMBLY # 1

A 1 turn = **B** 1/2 turn

A 2 turns = **B** 1 turn

Conclusion: this gear allows dividing by 2 the rotation frequency.

- ASSEMBLY # 2

B 1 turn = **A** 2 turns.

Conclusion : this gear allows multiplying by 2 the rotation frequency.

Page 04

- ASSEMBLY # 3

B 1 turn = **A** 2 turns = **C** 1 turn.

Conclusion : this gear doesn't reduce or increase the rotation frequency.

B and C rotation direction are identical. This gear allows motion transmission without any speed and rotation sens modification.

- ASSEMBLY # 4

A 1 turn = **B** 1/2 turn = **C** 1 turn.

Conclusion : this gear doesn't reduce or increase the rotation frequency.

A and C rotation direction are identical. This gear allows motion transmission without any speed and rotation direction modification.

Page 05

- ASSEMBLY # 5

A 1 turn = C1 1/2 turn = C2 1/4 turn.

Conclusion : this gear is dividing by 4 the rotation frequency.

- ASSEMBLY # 6

A 1 turn = C1 1/2 turn = C2 1/4 turn = B 1/8 turn.

Conclusion : this gear is dividing by 8 the rotation frequency.

Page 06

- ASSEMBLY # 7

A 1 turn = C1 1/2 turn = C2 1/4 turn. = C3 1/8 turn = B 1/16 turn

Conclusion : this gear is dividing by 16 the rotation frequency.

ASSEMBLY # 7a

Conclusion : this gear is dividing by 16 the rotation frequency.

B wheel is no longer on the same axis as in assembly # 7 but is still driven by the same C3 small wheel.

Page 07

- ASSEMBLY # 8

B 1 turn = C1 2 turns = C2 4 turns.

Conclusion : this gear is multiplying by 4 the rotation frequency.

- ASSEMBLY # 9

B 1 turn = C1 2 turns = C2 4 turns = C3 8 turns.

Conclusion : this gear is multiplying by 8 the rotation frequency.

Page 08

- ASSEMBLY # 10

B 1 turn = C1 2 turns = C2 4 turns = C3 8 turns = A 16 turns.

Conclusion : this gear is multiplying by 16 the rotation frequency.

- ASSEMBLY # 10 a

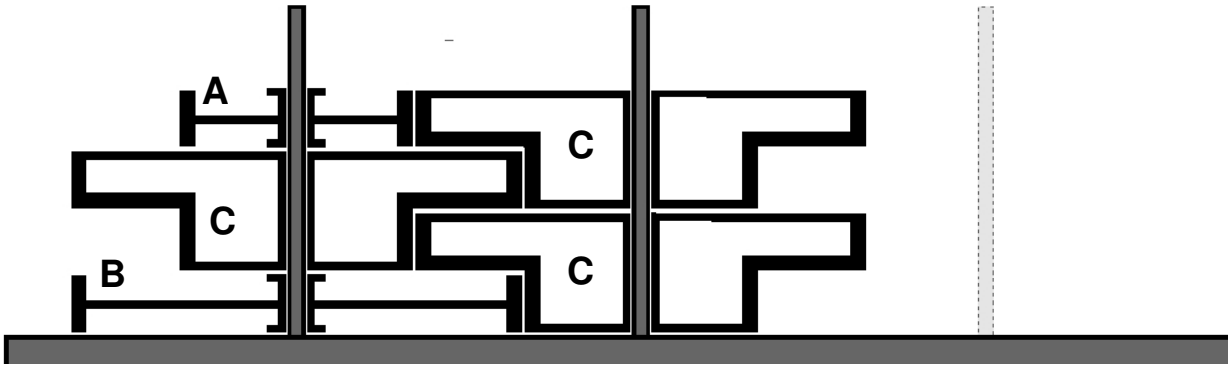
B 1 turn = C1 2 turns = C2 4 turns = C3 8 turns = A 16 turns.

Conclusion : this gear is multiplying by 16 the rotation frequency.

A wheel is no longer on the same axis as in assembly #10 but is still driven by the same C3 big wheel.

Page 9

- ASSEMBLY # 11



- Definition of a gear:

Set of cogwheels that engage with each other to transmit motion.

- Articles with a gear :

Photocopiers, vehicle gearboxes, mechanical toys and models of vehicle, salad spinner, power tools, clock movements, crank flashlight, …

- **Equality** : 10 x 2 = 20 x 1

- Reduction ratio: it's the relationship between the leader wheel turns number and the driven wheel turns number (between the first and the last cogwheels of the gear).