

QUIZ INFORMATION

Mechanism Basics Important Facts

1. What is the difference between the two alan keys?

Large → screws, Small → collars

2. What is the importance of the bearing flat?

To make rotating rods sturdy

3. When using collars, what must we be very careful of?

Do not loosen the screw all the way out.

4. Should we tighten screws as tight as we possibly can? What happens if we do this?

No, they should be snug.

→ they will strip on-

5. What direction do the teeth of the lock nuts face?

They face the metal.
or
hug

Name: _____

Date: _____

First Build – Gear Trains!

Per: _____

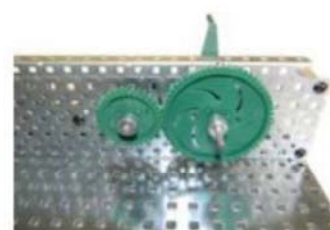
Directions: Using the pictures below and the VEX pieces we talked about at the beginning of class, build Gear Train A and Gear Train B and answer the questions that follow.



Gear Train A



Gear Train A



Gear Train B

1. What is the relationship of the input compared to the output in both gear trains?

2. Identify the drive and the driven gears for Gear Train B.

Drive: _____

Driven Gear: _____

3. In Gear Train A, is the speed increased, decreased, or constant?

4. In Gear Train B, is the speed increased, decreased, or constant?

5. What is the gear ratio of Gear Train A? Remember, count the teeth!

_____ : _____

6. What is the gear ratio of Gear Train B? Remember, count the teeth!

_____ : _____

7. Is the flow of power reversible? _____

8. Do the gears move in the same or opposite direction?
opposite

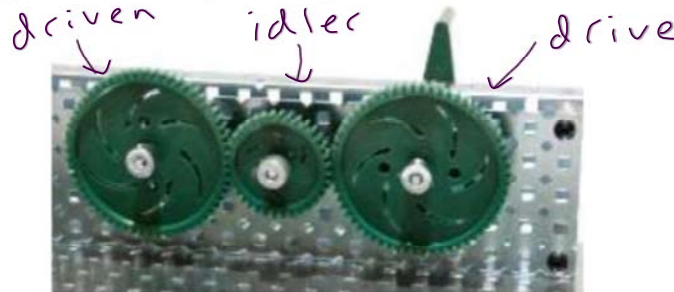
9. List an example of where this mechanism might be used:



Name: _____
 Build Day #2!

Date: _____
 Per: _____

Directions: It's time for our second build! Using the picture below and what you learned last class about gear trains, build a gear train with an **idler**. That's the fancy small gear between the two larger gears! **CHALLENGE:** You must build this gear train on a piece of metal that is **NOT** your base plate. Attach this piece of metal to your base plate.



1. What is the relationship of the input shaft compared to the output shaft?

2. Label the drive, driven, and **idler gear**.

3. Is the speed increased, decreased, or constant?

4. What is the gear ratio?

5. Is the flow of power reversible e.g. can you make the input shaft turn by turning the output shaft?

6. What is the direction of travel between the input and output gears?

Same direction

7. Predict what the direction of travel would be between the input and output gears if the idler gear was eliminated from the mechanism.

Name: _____

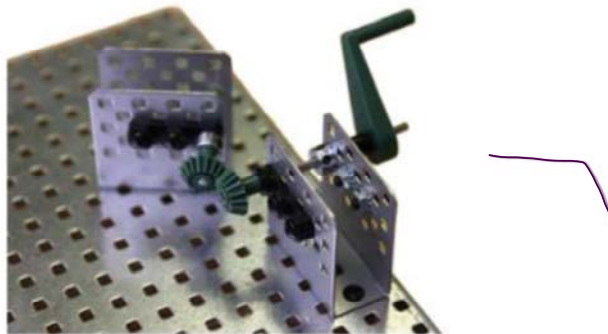
Date: _____

Build #3: Bevel Gears!

Per: _____

Directions: Using the image below and your knowledge of VEX materials to this point, construct a bevel gear with your groupmates. Make sure you have Mr. Valentino check off your build before you move on to answer the questions.

Mr. Valentino initials _____



Questions:

1. What is the angle of the input shaft compared to the output shaft?

obtuse angle

2. Is the speed increased, decreased, or constant? _____

3. Is the torque increased, decreased, or constant? _____

4. If the input gear was larger than the output gear, how would that affect the speed and torque?

5. What is the gear ratio? _____ : _____

6. Is the flow of power reversible? (Can you make the input shaft turn by turning the output shaft?)

7. List an example where this mechanism might be used. *A helpful search term is **bevel gear**.*

•

Name: _____

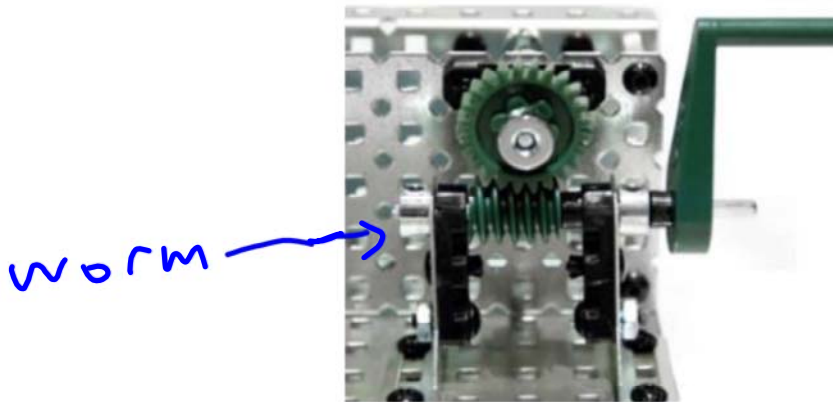
Date: _____

Build #4 – Worm and Wheel

Per: _____

Directions: Using your VEX building skills to this point, build the **worm and wheel** mechanism below. Notice, there are some new pieces in order to construct this mechanism! After building, answer the questions that follow.

Mr. Valentino initials _____



1. What is the angle of the input shaft compared to the output shaft? _____
2. Is the speed increased, decreased, or constant?

3. Label the **worm and wheel gears**.
4. What is the gear ratio?

5. Is the flow of power reversible? (Can you make the input shaft turn by turning the output shaft?)

NOT REVERSIBLE

6. Is the direction of travel reversible? (Does the mechanism still work if the input shaft is turned in the opposite direction?)

7. List an example where this mechanism might be used. A helpful online search term is *worm gear*.

•

Name: _____

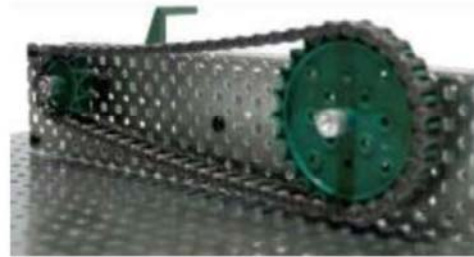
Date: _____

Build #5: Chain Drive

Per: _____



Chain Drive A.



Chain Drive B.

After building the above, answer the following questions:

1. Label the drive and driven gears.
2. What is the angle of the input shaft compared to the output shaft?
3. In gear train A, is the speed increased, decreased, or constant?
4. In gear train A, is the torque increased, decreased, or constant?
5. In gear train A, what is the input to output ratio?
6. What happens to speed, torque, and gear ratio if the smaller gear becomes the drive gear, which is shown labeled as image B?
7. Does the input shaft turn in the same or opposite direction of the output shaft, which is shown labeled as image A?
8. List an example of where this mechanism might be used. A helpful search term is *chain drive*.

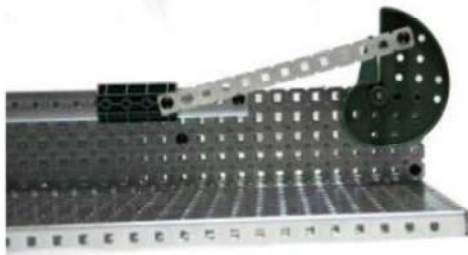
increased
decreased

Name: _____

Date: _____

Build #6: Crank and Slider

Per: _____



Crank and Slider - A pivot pin near the outside edge of a wheel or disk that changes _____ motion into _____ motion.

Questions:

1. Label the **crank and slide**.

2. The input to this system is what type of motion? (rotary, reciprocating, or linear)

rotary

3. The output of this system is what type of motion? (rotary, reciprocating, or linear)

reciprocating

4. How far does the slider move with each revolution of the crank?

5. If the diameter of the crank gear were increased, would the slider move a shorter or longer distance?

6. Is the flow of power reversible, i.e., can you make the crank gear turn by pushing the slider?

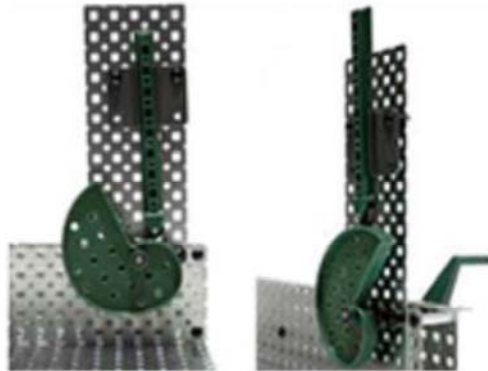
No.

Name: _____

Date: _____

Build #7: Cam and Follower

Per: _____



1. Label the **Cam and Follower**

2. What is the type of input movement? (rotary, reciprocating, or linear)

rotary

3. What is the type of output movement?

reciprocating

4. How many times does the follower move up and down with one revolution of the crank?

5. Is the flow of power reversible, i.e., can you make the crank turn by pushing the follower?

NO.

6. Is the direction of travel reversible, i.e., does the mechanism still work if the crank is turned in the opposite direction?