

Allowed Materials: F.E. approved calculator(s) see syllabus; pencils and/or pens.

ExamForm := 1

Honor Statement: On my honor, I promise that I have not received any unauthorized assistance on this exam (I didn't look at another student's paper, I didn't view any unauthorized written materials, I didn't talk or listen to another student, I didn't use an unauthorized calculator, I didn't use any electronic device, any visual or auditory signals, or any other techniques of exchanging information with others.) I have maintained the highest standards of academic integrity while completing this exam.

Signed: _____



1. (2 point deduction for failure to complete this problem!)

- Write in all of the indicated information in the boxes of your response form.
- Darken the appropriate circles to encode the corresponding information.
- Write your name on this exam and sign the Honor Statement.

Notes:

- If your last name is too long, just write the first 10 letters.
- "F.I." and "M.I." are your first and middle initials, respectively
- Your "Username" is the first part of your LATech email address
- For "Section" use the guide provided to the right
- Your "Exam Form" is printed on the upper right corner of this page.
- Indicate "ENGR" as the "Program"

Exam Form		Program	
<input type="radio"/>		<input type="radio"/>	BIEN
<input type="radio"/>		<input type="radio"/>	CMEN
<input type="radio"/>		<input type="radio"/>	CVEN
<input type="radio"/>		<input type="radio"/>	CVTE
<input type="radio"/>		<input type="radio"/>	CYEN
<input type="radio"/>		<input type="radio"/>	FIEN

Bubble:	For Course	Section:
91	H01 - Crittenden	TR 10-12:50
92	H02 - Easley	TR 2-3:50
93	H03 - Swanbom	TR 12-1:50
94	H04 - Reeves	TR 8-9:50
95	H05 - Scoggin	MW 8-9:50
96	H06 - Moller	MW 10-11:50
01	001 - Swanbom	MW 2-3:50
02	002 - Scoggin	TR 12-1:50
03	003 - Swanbom	TR 8-9:50
04	004 - Corbett	TR 4-5:50

Last Name	F.I.	M.I.	LA Tech Username	Course #	Section (last 2 digits)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Choices = ("A" "I properly completed all required items in problem 1, so I will not lose these points")
("B" "I did not properly complete problem 1 because I am fine with losing these points.")



2. (3 points) The direction of a force vector is typically indicated by the following:

Choices = ("A" "the x and y coordinates of the arrowhead"
"B" "how hard the implied force is pulling or pushing in the x or y direction"
"C" "the point of application"
"D" "the length of the arrow"
"E" "an angle or slope measured relative to a coordinate system"
"F" "cardinal points on a compass"
"G" "the x and y coordinates of the point of application")



3. (3 points) Choose the most accurate description of non-concurrent force systems in equilibrium.

Choices = ("A" "they do not have to have a zero overall resultant force applied"
"B" "they can exhibit angular (i.e. rotational) acceleration"
"C" "they seldom occur in practice"
"D" "the lines of action of all applied forces do not intersect at a common point"
"E" "they can exhibit translational acceleration"
"F" "the lines of action of all applied forces intersect at a common point")



4. (3 points) How does the Ping))) sensor work?

- Choices =
- "A" "It emits short bursts of infrared light and watches for its reflection off nearby objects"
 - "B" "It emits short bursts of ultraviolet light and watches for its reflection off nearby objects"
 - "C" "It creates an audible noise with a pitch that is inversely proportional to its range away from nearby objects"
 - "D" "It emits long bursts of ultrasonic sound waves and listens for the echo off nearby objects"
 - "E" "It emits long bursts of radio waves and listens for the echo off nearby objects"
 - "F" "It emits short bursts of ultrasonic sound waves and listens for the echo off nearby objects"
 - "G" "It creates an audible noise with a pitch that is proportional to its range away from nearby objects"
 - "H" "It emits long bursts of ultraviolet light and watches for its reflection off nearby objects"
 - "I" "It emits short bursts of radio waves and listens for the echo off nearby objects"
 - "J" "It emits long bursts of infrared light and watches for its reflection off nearby objects"



5. (3 points) Three categories of personas were presented in the 10 faces of innovation. These three categories are:

- Choices =
- "A" "organizing, storytelling, and building"
 - "B" "learning, organizing, and experimenting"
 - "C" "directing, organizing, and building"
 - "D" "learning, organizing, and building"
 - "E" "experience architects, hurdlers, and anthropologists"
 - "F" "caregivers, organizers, and learners"
 - "G" "learning, experimenting, directing"
 - "H" "hurdling, directing, and cross-pollinating"

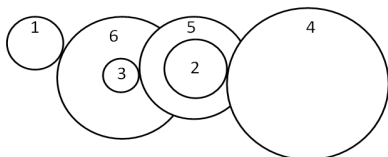


6. (3 points) In the IR object detection setup that you built, the reason you were supposed to program the IR LED to flash rapidly (~38,000 times per second) was:

- Ch =
- "A" "it's just tradition, we've always done it that way"
 - "B" "by looking only for IR light flashing at this frequency, the detector is built to ignore other ambient sources of light"
 - "C" "IR LEDs consume a significant amount of power, and the power demand is considerably reduced in this way"
 - "D" "if the IR LED is left on constantly, there is a risk of burning it out"
 - "E" "the only way the LED produces IR light is if it is switched on and off"
 - "F" "the short, fast bursts of light make them invisible to human observers, but detectable by the IR detector"



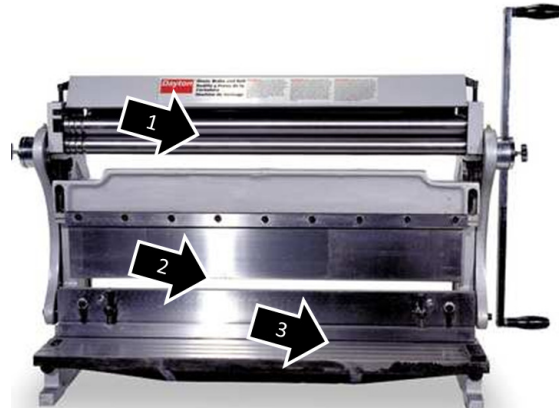
7. (3 points) In the gear train diagram shown, which pairs of gears must have compatible teeth to mesh properly?



- Ch =
- "A" "1&6; 6&3; 3&5; 5&2; 2&4"
 - "B" "the teeth on all gears must be compatible with the teeth on all other gears"
 - "C" "there are no compatibility requirements for gear teeth in this geartrain"
 - "D" "1&2; 3&4; 5&6"
 - "E" "1&6; 3&5; 2&4"
 - "F" "1&3; 3&2; 2&4"
 - "G" "3&6; 2&5"



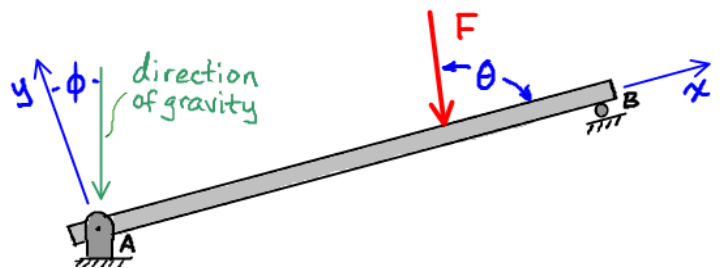
8. (3 points) On the figure shown, consider the labeled parts of the sheet metal working tool we used in class. Choose the correct terminology and purpose from the following options:



- Choices =
- "A" "part 1 is called a roll, it is used to bend metal; part 2 is called a shear, it is used to cut metal"
 - "B" "part 2 is called a brake, it is used to bend metal; part 3 is called a shear, it is used to cut metal"
 - "C" "part 2 is called a shear, it is used to cut metal; part 3 is called a brake, it is used to cut metal"
 - "D" "part 2 is called a brake, it is used to cut metal; part 3 is called a shear, it is used to bend metal"
 - "E" "part 1 is called a brake, it is used to bend metal; part 3 is called a shear, it is used to cut metal"
 - "F" "part 1 is called a shear, it is used to cut metal; part 2 is called a brake, it is used to bend metal"
 - "G" "part 1 is called a shear, it is used to bend metal; part 3 is called a brake, it is used to cut metal"
 - "H" "part 1 is called a brake, it is used to bend metal; part 2 is called a roll, it is used to cut metal"
 - "I" "part 1 is called a roll, it is used to bend metal; part 3 is called a brake, it is used to cut metal"
 - "J" "part 2 is called a shear, it is used to bend metal; part 3 is called a brake, it is used to cut metal"



9. (3 points) The beam shown is sloped by an angle of ϕ relative to horizontal, and the force F is oriented at an angle of θ relative to the beam as shown. The beam's center of gravity is located halfway between supports A and B. Choose a sufficient set of conditions that will cause a zero reaction to be found at A in the x direction (**as oriented on the figure**).

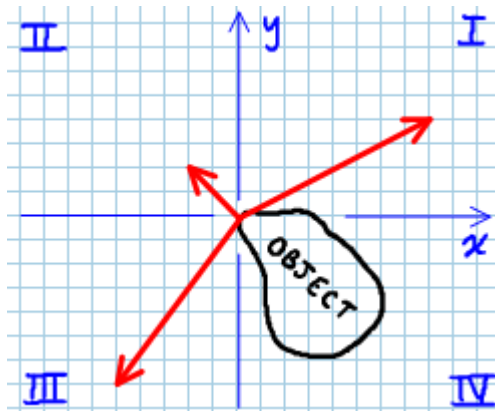


- i. the self-weight of the beam must be neglected
- ii. θ must equal ϕ
- iii. θ must be 0 degrees
- iv. θ must be 90 degrees
- v. ϕ must be 0 degrees
- vi. ϕ must be 90 degrees
- vii. the line of action of F must be parallel with the direction of gravity

- Choices =
- "A" "iv. only"
 - "B" "v. only"
 - "C" "i. and either iv. or v."
 - "D" "iv. and either i. or v."
 - "E" "i., ii., and vii."
 - "F" "ii. and v."
 - "G" "vii. only"
 - "H" "iii., vi. and vii."
 - "I" "iii. and vi."
 - "J" "i. and v."



10. (3 points) The diagram shows three force vectors acting on an object. Assuming the force vectors are drawn to scale according to their respective magnitudes and directions, the direction of the resultant force vector from these three forces will lie:



- Choices =
- "A" "in quadrant II"
 - "B" "on the negative x axis"
 - "C" "in quadrant IV"
 - "D" "on the negative y axis"
 - "E" "the resultant force is zero"
 - "F" "in quadrant III"
 - "G" "on the positive x axis"
 - "H" "in quadrant I"
 - "I" "on the positive y axis"



11. (3 points) Which **one** of the following was **not** recommended in the presentation given in class focused on working on brainstorming as a group:

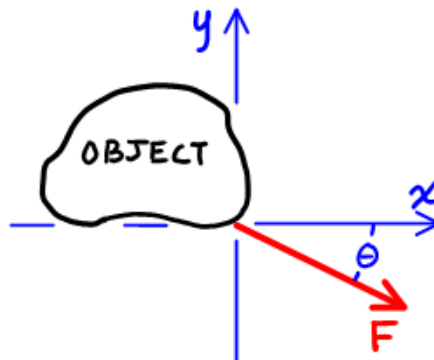
- Choices =
- "A" "use color and illustrations"
 - "B" "don't get bogged down"
 - "C" "avoid judgement"
 - "D" "use a mind map to help your group document and visualize collective ideas, and see connections"
 - "E" "use a concept map to evaluate merits of ideas and narrow in on choosing a plan"
 - "F" "keep the main idea at the center"
 - "G" "keep ideas flowing"
 - "H" "relate concepts to main idea with connection lines"



12. (5 points) The x-component of the force shown is closest to:

$$F = 300 \cdot \text{N}$$

$$\theta = 52 \cdot \text{deg}$$



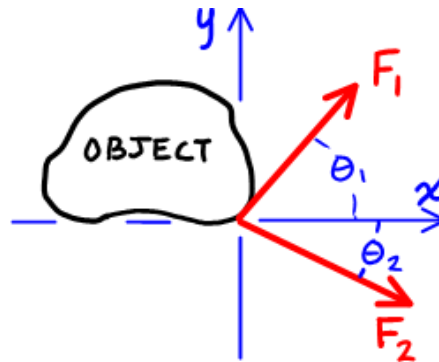
- Choices =
- "A" -139.67
 - "B" -151.04
 - "C" -162.29
 - "D" -173.48
 - "E" -184.70
 - "F" 139.67
 - "G" 151.04
 - "H" 162.29
 - "I" 173.48
 - "J" 184.70
- N



13. (5 points) Given the two forces and angles depicted below, the angle the resultant force makes with the x-axis is closest to:

$$F_1 = 200 \text{ N} \quad F_2 = 850 \text{ N}$$

$$\theta_1 = 28 \cdot \text{deg} \quad \theta_2 = 18 \cdot \text{deg}$$



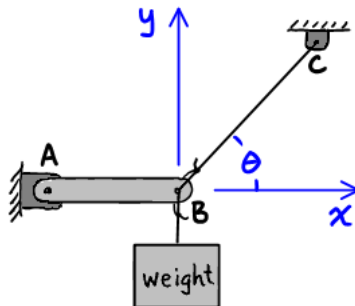
- Choices =
- | | |
|-----|--------|
| "A" | -7.37 |
| "B" | -8.15 |
| "C" | -8.94 |
| "D" | -9.72 |
| "E" | -10.51 |
| "F" | 7.37 |
| "G" | 8.15 |
| "H" | 8.94 |
| "I" | 9.72 |
| "J" | 10.51 |
- deg



14. & 15. (5 points total) The weight shown is suspended by link AB and cable BC. The force carried in link AB is closest to:

$$\text{weight} = 200 \text{ lbf}$$

$$\theta = 42 \text{ deg}$$



Problem 14: force value (4pts)

Problem 15: force direction (1pt)

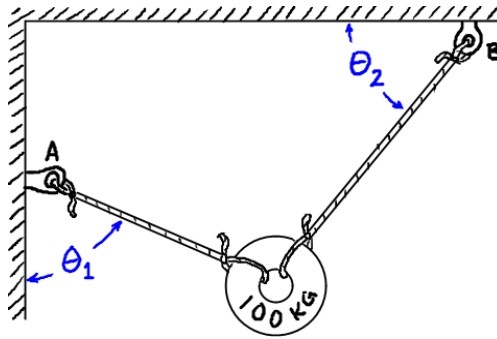
- Choices =
- | | |
|-----|--------|
| "A" | 0.00 |
| "B" | 131.68 |
| "C" | 143.30 |
| "D" | 154.70 |
| "E" | 165.81 |
| "F" | 177.24 |
| "G" | 188.35 |
| "H" | 199.52 |
| "I" | 210.87 |
| "J" | 222.12 |
- lbf

- Choices =
- | | |
|-----|---------------|
| "A" | "tension" |
| "B" | "compression" |
| "C" | "no force" |



16. (5 points) Two ropes are used to suspend a 100kg weight as shown. The tension in the rope attached at A is closest to:

$$\theta_1 = 17 \cdot \text{deg} \quad \theta_2 = 5 \cdot \text{deg}$$



- Choices =
- | | |
|-----|--------|
| "A" | 999.1 |
| "B" | 2504.3 |
| "C" | 959.1 |
| "D" | 293.2 |
| "E" | 101.8 |
| "F" | 87.4 |
| "G" | 2608.8 |
| "H" | 29.9 |
- N



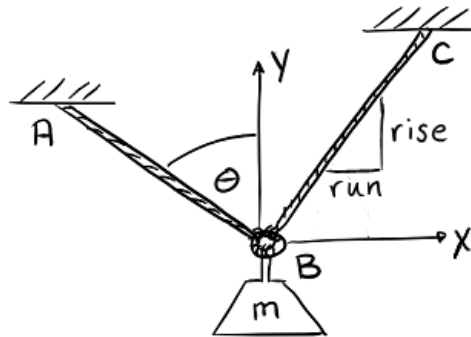
17. (5 points) A mass is supported by two ropes as shown below. The force in rope BC is closest to:

$$\theta = 25 \cdot \text{deg}$$

$$\text{mass} = 15 \text{ kg}$$

$$\text{rise} = 2$$

$$\text{run} = 1$$



- Choices =
- | | |
|-----|------|
| "A" | 60.0 |
| "B" | 63.2 |
| "C" | 66.5 |
| "D" | 69.7 |
| "E" | 72.9 |
| "F" | 76.1 |
| "G" | 79.4 |
| "H" | 82.6 |
| "I" | 85.9 |
| "J" | 89.1 |
- .N

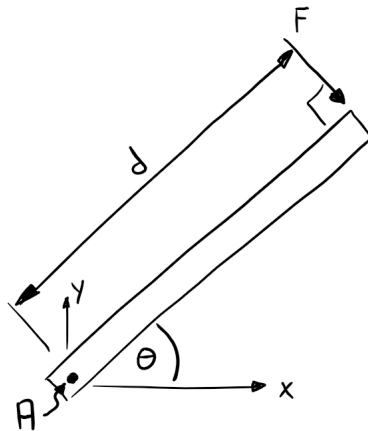


18. (5 points) The moment of the force, F , about point A is closest to:

$$F = 11 \text{ N}$$

$$d = 3.1 \text{ m}$$

$$\theta = 30\text{-deg}$$



- Choices = $\left(\begin{array}{l} \text{"A"} \quad 31.0 \\ \text{"B"} \quad 37.6 \\ \text{"C"} \quad 18.8 \\ \text{"D"} \quad 17.9 \\ \text{"E"} \quad 29.5 \\ \text{"F"} \quad 32.5 \\ \text{"G"} \quad 34.1 \\ \text{"H"} \quad 39.3 \\ \text{"I"} \quad 35.8 \\ \text{"J"} \quad 17.0 \end{array} \right) \cdot \text{N}\cdot\text{m}$



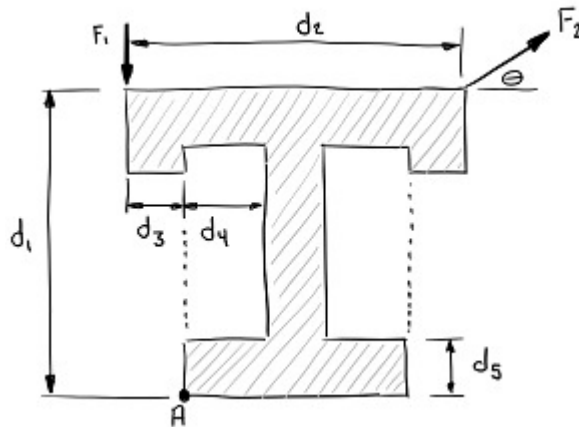
19. & 20. (5 points total) A T-shape is shown below with two forces applied, F_1 and F_2 . The net moment created by these two forces about point A is closest to:

$$d_1 = 11 \text{ in} \quad d_2 = 12 \text{ in}$$

$$d_3 = 2 \text{ in} \quad d_4 = 3 \text{ in}$$

$$d_5 = 2 \text{ in} \quad \theta = 20 \text{ deg}$$

$$F_1 = 10 \text{ lbf} \quad F_2 = 5 \text{ lbf}$$



Problem 19: magnitude (4pts)

- Choices = $\left(\begin{array}{l} \text{"A"} \quad 0.00 \\ \text{"B"} \quad 13.55 \\ \text{"C"} \quad 14.58 \\ \text{"D"} \quad 15.61 \\ \text{"E"} \quad 16.64 \\ \text{"F"} \quad 17.68 \\ \text{"G"} \quad 18.70 \\ \text{"H"} \quad 19.72 \\ \text{"I"} \quad 20.78 \\ \text{"J"} \quad 21.81 \end{array} \right) \cdot \text{in}\cdot\text{lbf}$

Problem 20: direction (1pt)

- Choices = $\left(\begin{array}{l} \text{"A"} \quad \text{"counter-clockwise"} \\ \text{"B"} \quad \text{"clockwise"} \\ \text{"C"} \quad \text{"zero net moment"} \end{array} \right)$

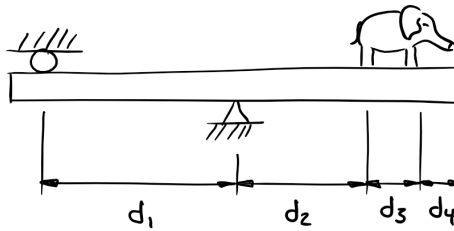


21. (5 points) A pachyderm stands near the end of a beam contemplating the nuances of the plotline of the last movie he saw. The reaction at the roller is closest to:

$$d_1 = 10 \cdot \text{ft} \quad d_3 = 5 \cdot \text{ft}$$

$$d_2 = 9 \cdot \text{ft} \quad d_4 = 4 \cdot \text{ft}$$

$$\text{weight}_{\text{pachyderm}} = 6000 \cdot \text{lb}$$



Assume that the elephant's weight can be evenly divided between his front pair of legs and his rear pair of legs, and neglect self-weight of the beam.

- Choices =
- "A" 4456
 - "B" 4950
 - "C" 5440
 - "D" 5924
 - "E" 6413
 - "F" 6900
 - "G" 7388
 - "H" 7879
 - "I" 8363
 - "J" 8852
- lb



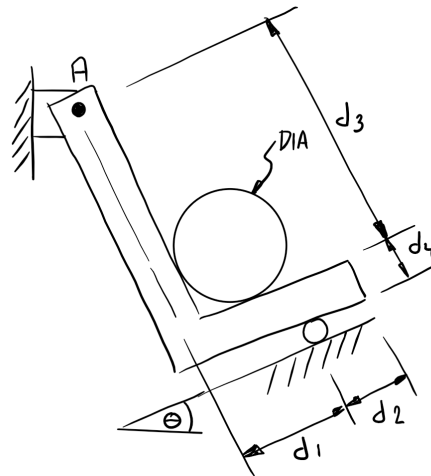
22. (5 points) An L-shaped piece holds a 25 pound cylinder in its 90-degree bend. The resultant of the reactions at the pin at A is closest to (both "legs" of the L are the same width, d_4):

$$d_1 = 10 \cdot \text{in} \quad d_2 = 5 \cdot \text{in}$$

$$d_3 = 17 \cdot \text{in} \quad d_4 = 4 \cdot \text{in}$$

$$\text{Dia} = 6 \cdot \text{in} \quad \theta = 20 \cdot \text{deg}$$

$$W = 25 \cdot \text{lb}$$



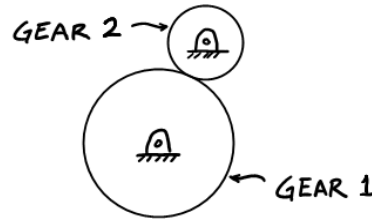
- Choices =
- "A" 6.48
 - "B" 7.17
 - "C" 7.86
 - "D" 8.55
 - "E" 9.25
 - "F" 9.94
 - "G" 10.62
 - "H" 11.32
 - "I" 12.00
 - "J" 12.69
- lb

Neglect self-weight of the L-shaped piece.



23. (5 points) Two gears are designed to mesh as shown. Gear 1 has = 28 teeth, and gear 2 has = 10 teeth with a pitch diameter = 15 in. The pitch diameter of Gear 1 is closest to:

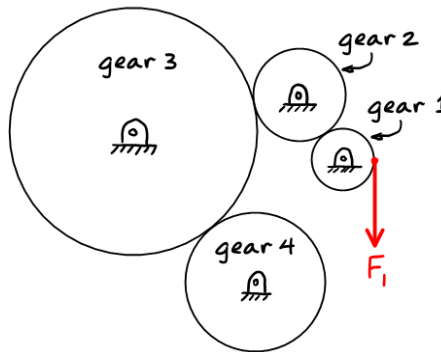
Note: the relative sizes of the gears shown may not be accurate. Use the data given in the problem statement!



- Choices =
- "A" 30
 - "B" 2.8
 - "C" 0.67
 - "D" 5.36
 - "E" 42
 - "F" 0.36
 - "G" 15
 - "H" 1.87
- in



24. & 25. (5 points total) Suppose you design a gear train that meshes as shown. Each gear has the number of teeth given below. Gear 4 has a pitch diameter = 17.21 cm. Gear 1 has a constant force of F_1 (given below) applied in a tangential direction. If the gear train loses no energy, then the torque that must be applied to gear 4 to hold the gear train at a constant speed is closest to:



Problem 24: torque (4pts)

- Choices =
- "A" 0.00
 - "B" 5.60
 - "C" 6.13
 - "D" 6.69
 - "E" 7.22
 - "F" 7.75
 - "G" 8.29
 - "H" 8.82
 - "I" 9.36
 - "J" 9.90
- N·m

Problem 25: direction (1pt)

- Choices =
- "A" "clockwise"
 - "B" "counter-clockwise"
 - "C" "no torque must be applied"

$$F_1 = 102.53 \text{ N}$$

$$N_{\text{gear1}} = 13 \text{ teeth} \quad N_{\text{gear2}} = 27 \text{ teeth}$$

$$N_{\text{gear3}} = 159 \text{ teeth} \quad N_{\text{gear4}} = 82 \text{ teeth}$$



26. (5 points) An engineering student has found that her servo's efficiency = 57.% when operating at full speed. If she designs a custom wheel with the proper diameter, the servo will take a Time = 26 s to lift a dumbbell = 20·kg so that the dumbbell's change in height = 5·cm. Since the servo is powered by 5VDC from the Arduino, the electrical current draw should be closest to:

- Choices =
- "A" 60
 - "B" 68
 - "C" 76
 - "D" 84
 - "E" 92
 - "F" 100
 - "G" 108
 - "H" 116
 - "I" 124
 - "J" 132
- mA



27. & 28. (5 points total) Given the set of gears and the information given below, determine the torque that must applied to the shaft attached to Gear 3 if the gear train is to run at a constant speed.

$$\text{diameter}_{\text{gear1}} = 10 \cdot \text{in}$$

$$\text{diameter}_{\text{gear4}} = 7 \cdot \text{in}$$

$$\text{diameter}_{\text{gear6}} = 0.4 \cdot \text{in}$$

$$N_{\text{gear1}} = 50 \cdot \text{teeth}$$

$$N_{\text{gear2}} = 40 \cdot \text{teeth}$$

$$N_{\text{gear5}} = 40 \cdot \text{teeth}$$

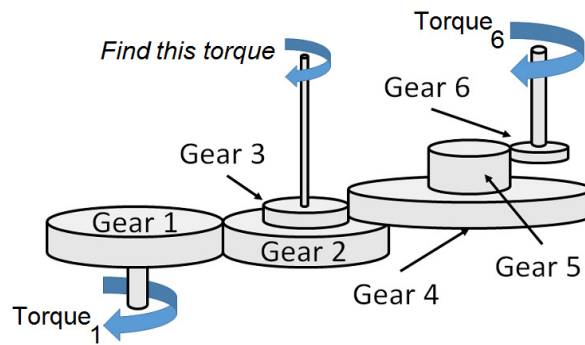
$$N_{\text{gear6}} = 8 \cdot \text{teeth}$$

$$\text{Torque}_1 = 15 \cdot \text{in} \cdot \text{lbf}$$

$$\text{Torque}_6 = 15 \cdot \text{in} \cdot \text{lbf}$$

$$\text{speed}_{\text{gear3}} = 14634 \cdot \text{rpm}$$

$$\text{speed}_{\text{gear5}} = 1800 \cdot \text{rpm}$$



Problem 27: torque (4pts)

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 24.429 \\ \text{"B"} & 0 \\ \text{"C"} & 9.225 \\ \text{"D"} & 2.775 \\ \text{"E"} & 12 \\ \text{"F"} & 21.225 \\ \text{"G"} & 18.429 \end{pmatrix} \cdot \text{in} \cdot \text{lbf}$$

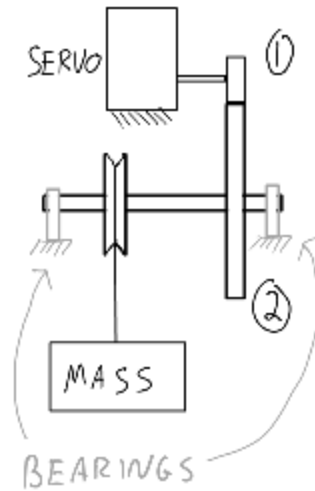
Problem 28: direction (1pt)

$$\text{Choices} = \begin{pmatrix} \text{"A"} & \text{"in the direction shown"} \\ \text{"B"} & \text{"opposite the direction shown"} \\ \text{"C"} & \text{"no torque is needed on this shaft"} \end{pmatrix}$$



29. (5 points) A student has connected his Parallax servo to an additional geartrain, consisting of Gears 1 and 2, as labeled. Gear 2 is affixed to the same shaft as a pulley, and a mass is suspended from the pulley. From the experiment that all ENGR122 students performed in class, the student knows his servo alone has an efficiency = 57%. The owner's manual of the geartrain says that the geartrain alone is = 93% efficient. At this moment, the servo and Gear 1 are operating at a rotational speed = 17 rpm and the electrical power consumed = 4 W. The diameter of the pulley is closest to:

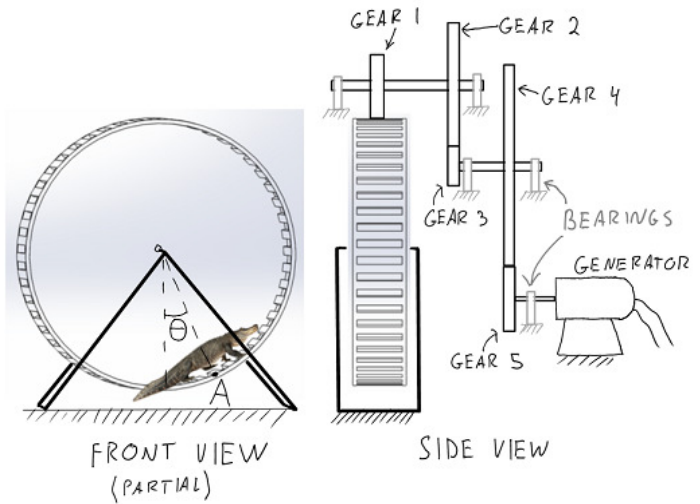
$\text{Gear}_1 = 12\text{-teeth}$ $\text{Gear}_2 = 130\text{-teeth}$ $\text{mass} = 46\text{ kg}$



- Choices =
- | | |
|-----|-------|
| "A" | 5.025 |
| "B" | 5.370 |
| "C" | 5.719 |
| "D" | 6.067 |
| "E" | 6.411 |
| "F" | 6.759 |
| "G" | 7.105 |
| "H" | 7.461 |
| "I" | 7.800 |
| "J" | 8.155 |
- cm



30. & 31. (5 points total) Dr. Swanbom wants his own private source of alligator pictures for test questions, so he has decided to help his pet get fit (lean gators are more aesthetically pleasing). Swanbom has constructed an exercise wheel (diameter = 9-ft) similar to the one used by Dr. Hall's pet rodents. In order to avoid wasting all that energy, a generator has been connected to the wheel through a geartrain, as visible in the side view below. In order to produce power at its rated specifications, the generator shaft should have a rotational speed = 1750-rpm. Given the parameters below, answer the following questions.



$$\text{diameter}_{\text{Gear1}} = 4 \cdot \text{ft} \quad \theta = 10 \cdot \text{deg}$$

$$\text{Gear}_2 = 82 \cdot \text{teeth} \quad \text{Gear}_4 = 153 \cdot \text{teeth}$$

$$\text{Gear}_3 = 14 \cdot \text{teeth} \quad \text{Gear}_5 = 12 \cdot \text{teeth}$$

30. (1 point) To turn the generator at its rated speed, the alligator must walk at a speed closest to...

- Choices =
- | | |
|-----|------|
| "A" | 2.52 |
| "B" | 2.83 |
| "C" | 3.12 |
| "D" | 3.42 |
| "E" | 3.71 |
| "F" | 4.01 |
| "G" | 4.31 |
| "H" | 4.61 |
| "I" | 4.91 |
| "J" | 5.21 |
- $\frac{\text{ft}}{\text{s}}$

31. (4 points) Assume that the line of action of the gator's weight passes through point A. If the gator's weight = 180-lbf and the overall system efficiency = 89.%, the electrical power output from the generator is closest to...

- Choices =
- | | |
|-----|-------|
| "A" | 95.5 |
| "B" | 106.2 |
| "C" | 117.9 |
| "D" | 129.0 |
| "E" | 140.2 |
| "F" | 151.5 |
| "G" | 162.6 |
| "H" | 173.8 |
| "I" | 185.1 |
| "J" | 196.3 |
- W

Note: 1N = 0.225-lbf and 1in = 2.54-cm

scratchwork page

THIS IS YOUR EXAM FORM # ---> ExamForm = 11

While you are waiting to begin your test, please complete problem 1, shown here:

1. (2 point deduction for failure to complete this problem!)

- Write in all of the indicated information in the boxes of your response form.
- Darken the appropriate circles to encode the corresponding information.
- Once the exam begins, do not forget to write your name on this exam and sign the Honor Statement.

Bubble:	For Course Section:
91	H01 - Crittenden TR 10-12:50
92	H02 - Easley TR 2-3:50
93	H03 - Swanbom TR 12-1:50
94	H04 - Reeves TR 8-9:50
95	H05 - Scoggin MW 8-9:50
96	H06 - Moller MW 10-11:50
01	001 - Swanbom MW 2-3:50
02	002 - Scoggin TR 12-1:50
03	003 - Swanbom TR 8-9:50
04	004 - Corbett TR 4-5:50

Notes:

- If your last name is too long, just write the first 10 letters.
- "F.I." and "M.I." are your first and middle initials, respectively
- Your "Username" is the first part of your LATech email address
- For "Section" use the guide provided to the right
- Your "Exam Form" is printed on the upper right corner of this page.
- Indicate "ENGR" as the "Program"

Exam Form		Program	
○	○	○	BIEN
○	○	○	CMEN
○	○	○	CVEN
○	○	○	CVTE
○	○	○	CYEN
○	○	○	FIEN

Last Name										F.I.	M.I.	LA Tech Username					Course #	Section (last 2 digits)	
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Also Note:

- Mobile phones or other electronic devices (other than FE-approved calculators and plain timepieces) are not allowed on this exam. If you have non-approved devices (phones, smartwatches, mp3 players, etc.), please deposit them at the front of the room for the duration of the exam. Don't forget to retrieve them when you prepare to depart.
- Please place any bags you might have brought under your desk for the duration of the exam.
- If you need additional scratch paper, please ask your proctor. Turn in any scratch paper with your exam, even if unused.
- If you have questions during the exam, please remain in your seat and raise your hand. A proctor will come to you.
- Please use a restroom now if you need it so as to minimize potential disruptions during the exam.
- Unless given permission beforehand, there is no food or drink allowed (with the exception of a clear water bottle).



163_ENGR122_E1

ExamForm = 11

ind = 1

Key =

	1
1	"A"
2	"E"
3	"D"
4	"F"
5	"D"
6	"B"
7	"E"
8	"B"
9	"D"
10	"C"
11	"E"
12	"J"
13	"D"
14	"J"
15	"A"
16	"A"
17	"G"
18	"G"
19	"C"
20	"B"
21	"F"
22	"D"
23	"E"
24	"H"
25	"A"
26	"J"
27	"D"
28	"A"
29	"C"
30	"I"
31	"I"

