

CAREERS IN CONSTRUCTION MATH CHALLENGE!

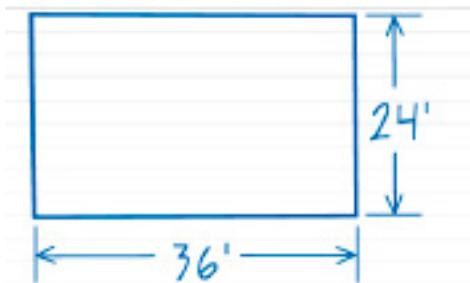
Instructions:

Work with your class to complete each of the following tasks. You can assign each task to smaller teams or “crews” or work together to solve each one.

Each crew’s work represents a construction craft that contributes to the success of the final construction project. Submit completed answers to all questions by Wednesday, October 23rd for a chance to win a pizza party for your entire team!

1 Carpentry Task

- a. Find the perimeter of the building below:

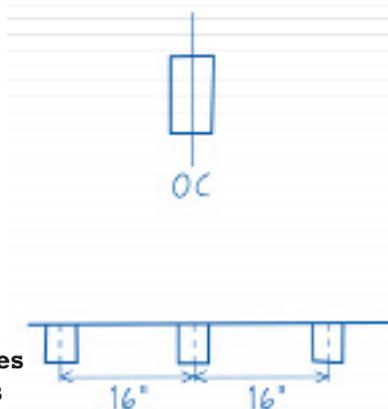


- b. Assume your team is buying **12ft 2x6s** for the sill plates. Determine **the number of 2x6s** your team will need to frame the above building.

- c. If your team uses one 2x4 stud per foot of perimeter, calculate **the number of studs** you will need if each is placed 16 inches apart from the center of each stud.

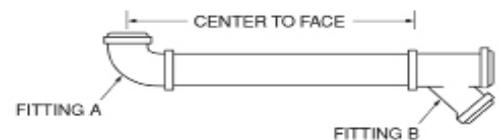
TRICK OF THE TRADE

Construction estimators will assume the use of one 2 X 4 stud per foot of perimeter. Since each corner needs at least 3 studs, and each opening needs two studs on each side, using the one-stud-per-foot trick compensates for these additional studs without guesswork.

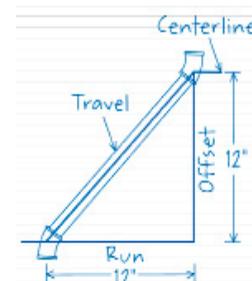


2 Plumbing Task

- a. Your team needs to fabricate the pipe joints shown in the diagram below. The center to face measurement of the entire pipe joint is 18 inches. Fitting A has a $1\frac{3}{4}$ inch fitting allowance. Fitting B has a $1\frac{7}{8}$ inch fitting allowance. Calculate the length of the pipe between the fittings.



- b. Your team wants to move the sink to the right by one foot. This will require moving the hot and cold water lines to the right. When you change the direction of a pipe it is referred to as “offsetting.” Calculate the length of the pipe you will need if the offset is 12 inches. (Hint use Pythagorean Theorem)



CAREERS IN

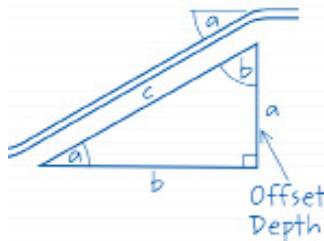
CONSTRUCTION

MATH CHALLENGE!

3 Electrical Task

a. A circle has a radius of $1 \frac{1}{4}$ inches. What is the diameter? What is the circumference?

b. Determine the length of the wire (travel) your electrical team will need to bend to get to the junction box if the offset depth is $1 \frac{1}{2}$ inches and the base is $1 \frac{1}{4}$ inches. Use the Pythagorean theorem and the figure below.



DID YOU KNOW

When you talk about a heating system, you are talking about adding heat to the air in a house. For an air conditioning system, you are removing heat from the house.

4 HVAC Task

a. To calculate the airflow in a duct in cubic feet per minute (cfm), the area of the duct and the duct and the velocity of the air flowing in the duct must be known.

$$\text{Airflow (cfm)} = \text{Area} \times \text{Velocity}$$

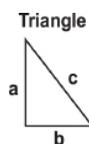
A duct has been installed that is 12" X 15" inside. Using a velometer inserted in the duct, the velocity is measured at 740 feet per minute. Find the **area of the duct** in square feet.

b. Calculate the airflow in the duct in cfm if velocity is equal to 740 ft per minute.

c. A crate containing a condensing unit is marked as weighing 175 pounds. What does it weigh in kilograms?

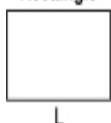
Handy Construction Formulas

Perimeter



$$\text{Perimeter} = a + b + c$$

Rectangle

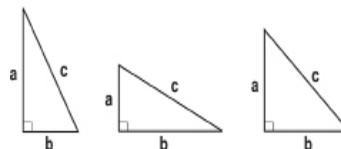


$$\text{Perimeter} = L + L + W + W \text{ or } 2L + 2W$$

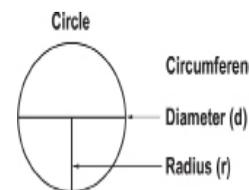
Pythagorean theorem

$$a^2 + b^2 = c^2$$

Side a is the rising side. Remember it with the word altitude. Side b is the base. Side c is always the long side of the triangle.



Circumference



$$\text{Circumference} = \pi d \text{ or } 2\pi r$$

$$\text{Area} = \text{Length} \times \text{Width}$$

Team Name: _____

Grade: _____

Number of Team Members: _____

Question Number	Section	Answer	Section Value	Exceptions	Score
1.	a	120 feet	2 points	To receive full credit answer must include: 1. correct perimeter 2. correct number of sill plates	/2
	b	10 sill plates	2 points	To receive full credit, answer must include: 1. use of perimeter from part a. 2. correct number of sill plates	/2
	c	90 studs	3 points	To receive full credit, answer must include: 1. use of perimeter from part a. 2. convert feet to inches 3. correct number of studs per foot of perimeter	/3
2.	a	16 1/4 inches	2 points	To receive full credit, answer must include: 1. correct length 2. correct unit of measurement	/2
	b	16.97 inches	2 points	To receive full credit, answer must include: 1. correct length of unknown side 2. correct unit of measurement	/2
3.	a	Diameter = 2.5 inches Circumference = 7.85 inches	3 points	To receive full credit, answer must include: 1. correct diameter 2. correct circumference 3. correct units of measurement	/3

	b.	1.9525 inches	2 points	To receive full credit, answer must include: 1. correct length 2. correct unit of measurement	/2
4.	a	1.25 square ft	2 points	To receive full credit answer must include: 1. correct length 2. correct unit of measurement	/2
	b	925 cfm	1 points	To receive full credit, answer must include: 1. use area formula 2. convert inches to feet	/1
	c	70.37 kg	1 points	To receive full credit, answer must include: 1. correct conversion from pounds to kilograms	/1
					Total Score
					/20

Judge: _____