



### Lesson #1: Floor Framing (20 class periods)

#### Objectives

##### Students will be able to...

- Use decimals in the accurate keeping of an accounting ledger
- Calculate area
- Use the Pythagorean theorem to establish/check layout and framing a square
- Develop a bill of materials using linear measurement, perimeter, and area to estimate material quantities
- Calculate material takeoffs for floor frames.
- Layout and construct a scale model floor frame using blueprints.
- Identify and describe the components of a residential floor frame.
- Describe the layout and installation procedures for floor frame systems.
- Assemble a floor frame using the correct materials in the correct order.
- Describe joist restraints and subfloor sheathing installation.
- Assess floor framing adherence to code, cleanliness, and accuracy (compared to the prints and to scale).

#### Standards

LS 11-12.6  
RSIT 11-12.2  
RLST 11-12.2  
Writing 9-10.5  
Geometry 5 & 8  
Residential and Commercial Construction pathway D2.1, D2.2, D2.3, D3.1, D3.3, D3.5, D3.7, D4.4, D6.2, D6.3, D6.4  
Problem Solving and Critical Thinking 5.1, 5.2, 5.3  
Health and Safety 6.2, 6.6, 6.7, 6.8, 6.10, 6.12  
Responsibility and Leadership 7.3, 7.4, 7.5, 7.6, 7.7, 9.2, 9.3, 9.6, 9.7

#### Materials

PowerPoint Presentation

<https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Af95960f7-5f00-458d-8f09-da46d8d792b6>

Math Review Worksheets: Measuring, Area, & Square

Floor Framing Vocabulary worksheet

Floor Framing-Using the Code Book Worksheet

How keep a construction Ledger Handout and Ledger Worksheet

Application for Building Permit

Floor Framing Order of Construction

Floor Framing Bill of Materials

PowerPoint Bill of Materials-calculating carpentry materials

<https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Adf65a719-b116-485f-9e35-4ad17bb3ca75>

Floor Framing Skills Rubric

Floor Framing inspection Guidelines/Grading Sheet

Floor Framing Performance Evaluation

Floor Framing Unit Final Test

### Lesson Sequence

- Pass out the ***Math Review Worksheets: Measuring, Area, & Square***.
- Have students work on these math problems together and then review as a class (50 minutes). It is important to reiterate that measuring is critical in construction. It is important to have accurate measurements because if not it may lead to wasted time, materials, and money.
- Use the ***PowerPoint Presentation*** <https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Af95960f7-5f00-458d-8f09-da46d8d792b6> to introduce the floor framing vocabulary. Have students take notes on their ***Floor Framing Vocabulary Worksheet***. Answer any questions as needed.
- Pass out the ***How to use a Ledger Handout and Ledger Worksheet*** and review these with the students. Show students how to use the ledger and explain their task of using this while floor framing.
- Have students get in teams. This will be their "construction company" that they will build their shed with.
- Have teams choose a floor plan that they will use.
- Pass out the ***Bill of Materials***. Use the ***PowerPoint Bill of Materials-calculating carpentry materials***. <https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Adf65a719-b116-485f-9e35-4ad17bb3ca75>

- While reviewing the PowerPoint have students fill in their bill of materials.
- Hand out the ***Floor Framing Order of Construction*** and review with the students. Answer any questions.
- Review the ***Floor Framing Skills Rubric*** with students. This will support students with understanding what their expectations are.
- Begin creating Lot size. Have construction teams sit together and pass out their particle board for their lot size. Have students label the bottom.
- Demonstrate how to layout their house by showing them how to center their house on the lot and layout the sill plates.
- Explain that their houses are to be built in one-inch scales-every foot of the full-sized structure is going to equal one inch on their models.
- Cut pieces of mudsill to length, and color them with green keel before gluing them down not the lot. While doing this, explain that as they plate, they need to take the measurements for their pieces directly from the structure.
- Once all the sill-plate is down, take a felt tip marker, and place anchor blots (represented by a dot) according to code (within 1 foot of the ends, every 6 feet on center over the length) on the mudsill.
- Next, cut and set your rim-joists. Refer your students to their prints so they know why you are placing them where you are placing them. When this is complete, cut and set your beam.
- Remind students to fill in the ***Ledger Entries and Building Permits***.
- Model Floor Construction-model how the floor is constructed. Show students how to layout for the floor joists pulling 1 ¼ inches on center on the rim joists. Tell your students to make sure they pull their layout measurements from the same direction on each pair of parallel rims joists-be sure to demonstrate this.
- Measure, cut, and install the floor joists. Demonstrate how to cut and install the mid-span blocking.
- Pass out each team's floor framing materials and the ***Floor Framing Grade Sheet***. Review this with the students.
- Allow students 10+ days to work on their floor framing. Support construction companies as needed.
- Pass out the ***Floor Framing-using the code book worksheet***. Have students take out their floor framing prints. Discuss the code requirements for installing subflooring and have students fill in their worksheet.
- Installing Sub-flooring. Use the ***Floor Sheeting Inspection Guidelines***.

- When teams have finished have, they look over the inspection grade sheet and their work.
- Use the ***Construction Report*** and have each student write out a report and project ***Self-Evaluation Form***.
- Review floor framing unit (terms, math concepts, etc.) and then pass out the ***Floor Framing Unit Final Test***.

### Assessment

Informal assessment throughout the whole floor framing project  
Use rubrics and project guidelines to grade student's final projects  
Use Floor Framing Unit Final to assess student learning of floor framing concepts

### Accommodations/Modifications

Strategic Partner Pairing  
One on One Support  
Calculators  
Extra Time If Needed  
Additional Visuals  
Check for Understanding

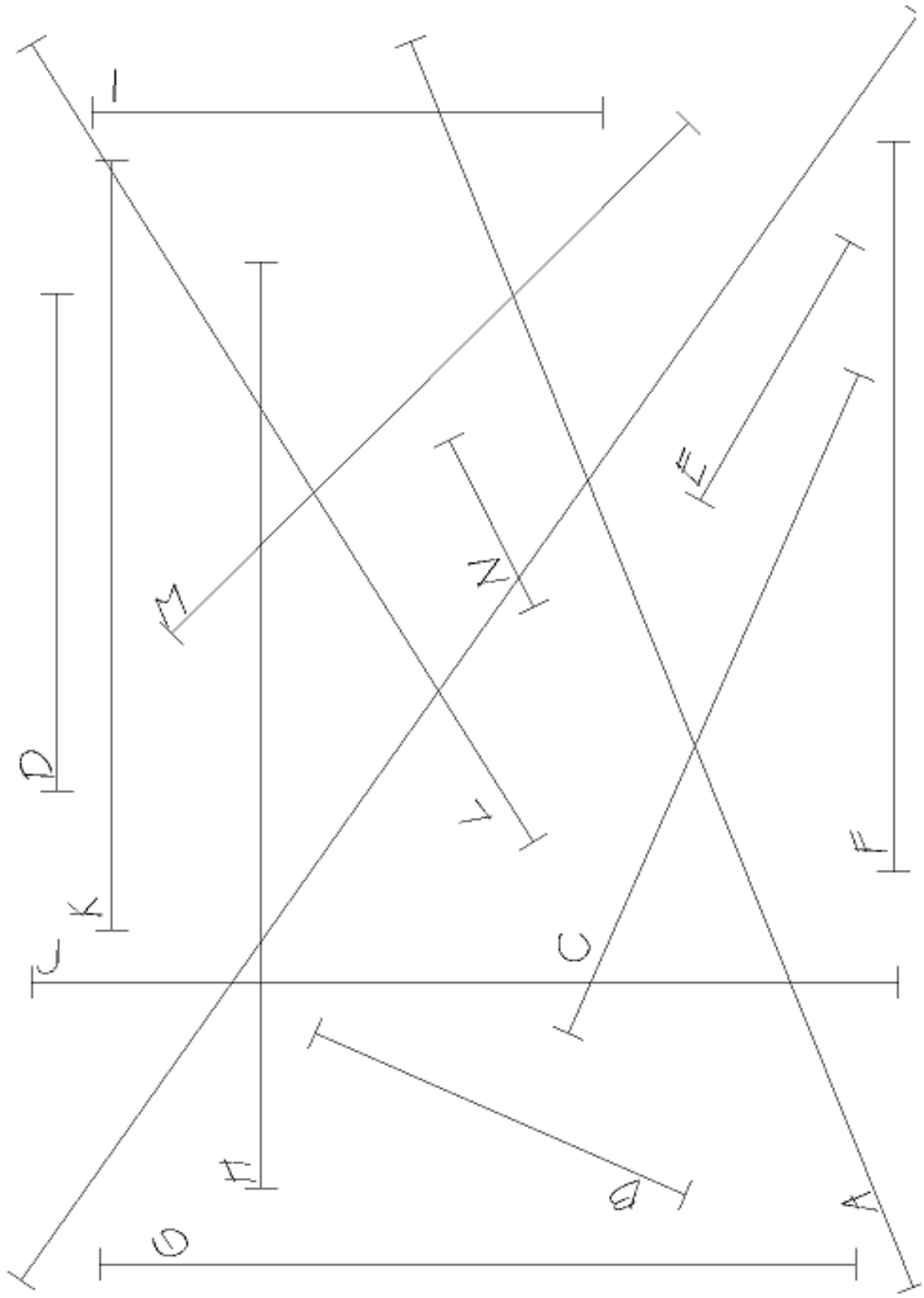
**Math Review Worksheet: Measuring**

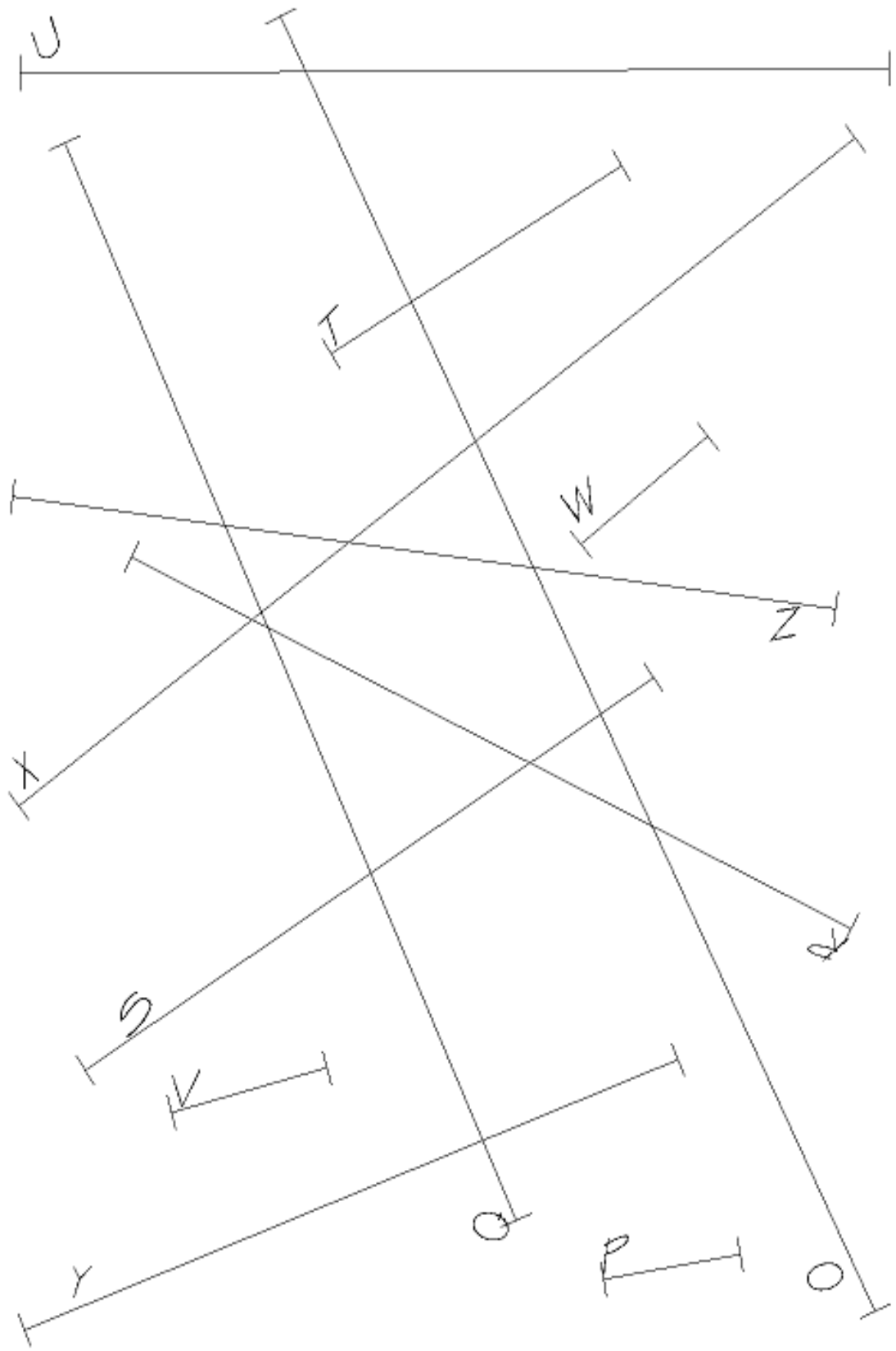
**Directions:** Measure the lines on the following pages. Enter the measurement in the corresponding box below.

A.		N.	
B.		O.	
C.		P.	
D.		Q.	
E.		R.	
F.		S.	
G.		T.	
H.		U.	
I.		V.	
J.		W.	
K.		X.	
L.		Y.	
M.		Z.	

**Directions:** After you have completed the measuring exercise above, add the following dimensions.

1. S	2. W	3. B	
+ U	+ A	+ M	
_____	_____	_____	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
4. K	5. E	6. P	7. F
L	K	T	Z
+ O	+ B	+ Y	V
_____	_____	_____	N
<input type="text"/>	<input type="text"/>	<input type="text"/>	+ G
			_____





**Math Review Worksheet: Measuring – Answer Key**

A.	$8\frac{3}{4}$	N.	$1\frac{1}{2}$
B.	$2\frac{5}{8}$	O.	<b>9</b>
C.	$4\frac{7}{16}$	P.	$\frac{7}{8}$
D.	$3\frac{1}{2}$	Q.	$7\frac{3}{8}$
E.	$1\frac{15}{16}$	R.	$5\frac{1}{4}$
F.	$4\frac{3}{4}$	S.	$4\frac{3}{8}$
G.	$4\frac{15}{16}$	T.	$2\frac{3}{16}$
H.	<b>6</b>	U.	$5\frac{1}{2}$
I.	$3\frac{9}{16}$	V.	<b>1</b>
J.	$5\frac{5}{8}$	W.	$1\frac{1}{16}$
K.	<b>5</b>	X.	$6\frac{13}{16}$
L.	$6\frac{1}{4}$	Y.	$4\frac{1}{2}$
M.	$4\frac{3}{4}$	Z.	$5\frac{1}{4}$

1.  $9\frac{7}{8}$

2.  $9\frac{13}{16}$

3.  $7\frac{3}{8}$

4.  $20\frac{1}{4}$

5.  $9\frac{9}{16}$

6.  $7\frac{9}{16}$



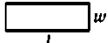

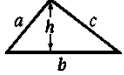


**Math Review Worksheet: Area**

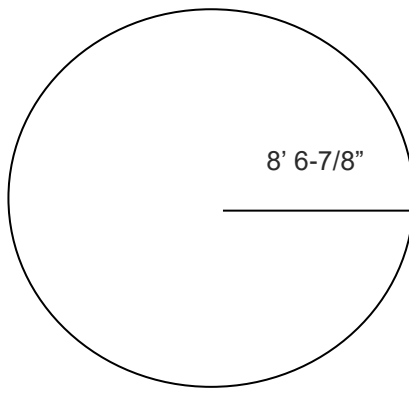
Directions: Find the area of each drawing and enter your answers below.

1.	6.
2.	7.
3.	8.
4.	9.
5.	

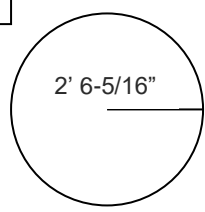
**TABLE 10.2** Perimeter and Area Formulas for Familiar Two-Dimensional Objects

OBJECT	PICTURE	PERIMETER	AREA
Circle		$2\pi r = \pi d$	$\pi r^2$
Square		$4l$	$l^2$
Rectangle		$2l + 2w$	$lw$
Parallelogram		$2l + 2w$	$lh$
Triangle		$a + b + c$	$\frac{1}{2}bh$

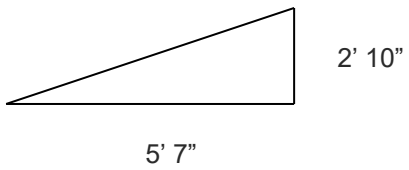
1.



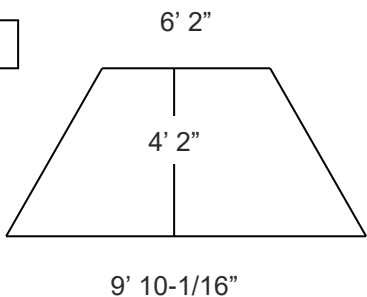
2.



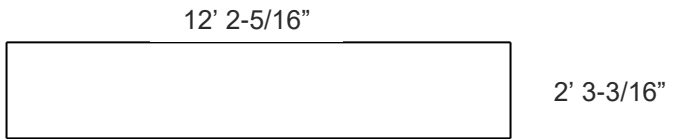
3.



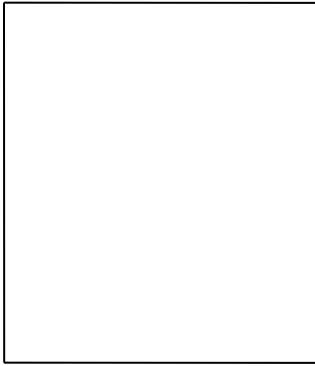
4.



5.



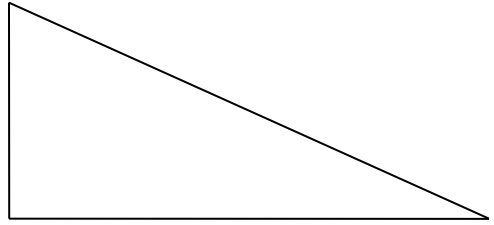
6.



10' 8-11/16"

7' 8-1/4"

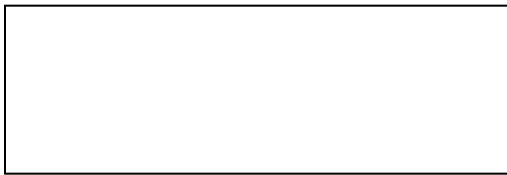
7.



5'

10'

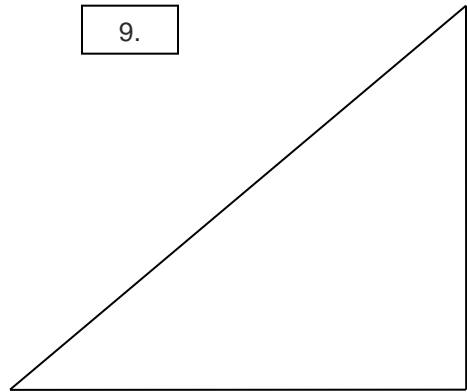
8.



4' 10"

11' 11-3/16"

9.



11' 4"

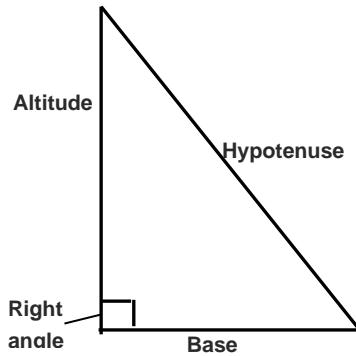
7' 8"

**Math Review Worksheet: Area – *Answer Key***

1. <b>2,769.29 ft</b>	6. <b>989.29 ft</b>
2. <b>240.43 ft</b>	7. <b>30 ft</b>
3. <b>94.91 ft</b>	8. <b>687.24 ft</b>
4. <b>491.93 ft</b>	9. <b>521.33 ft</b>
5. <b>331.49 ft</b>	

**Math Review Worksheet: Square**

The Pythagorean Theorem formula is  $a^2 + b^2 = c^2$ , where 'a' is the altitude, 'b' is the base, and 'c' is the hypotenuse.



Directions: Solve these math problems using the 3-4-5 method of making a square corner.

1. If you have a room that is 9 ft. x 12 ft., what is the hypotenuse?

\_\_\_\_\_

2. You walk onto a slab to layout the walls and the plans call for the structure to be 35'6" x 42'8" If you used the longest measurements you can to apply the Pythagorean Theorem, what 3 measurements would you use?

1.

\_\_\_\_\_

2.

\_\_\_\_\_

3.

\_\_\_\_\_

3. The slab next to it is 47'2" x 75'0". If you used the longest measurements you can to apply the Pythagorean Theorem, what 3 measurements would you use?

1.

\_\_\_\_\_

2.

\_\_\_\_\_

3.

\_\_\_\_\_

4. The slab on the corner lot is "L" shaped. The back of the house is the longest at 65'6" and the kitchen/family room side is 44'7" with the 22' deep garage in front of the kitchen. What measurements would you use to get square?

1.

\_\_\_\_\_

2.

\_\_\_\_\_

3.

\_\_\_\_\_

**Floor Framing Vocabulary Worksheet**

1. Scale:

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2. Foundation:

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3. Footing/stem wall:

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4. Subfloor:

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5. Anchor bolts/hold downs:

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6. Sill plate:

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7. Joist:

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8. Rim joist:

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9. Girder/beam:

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10. Blocking/bridging:

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11. Subfloor adhesive:

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12. Sheeting:

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13. Nail/screw schedule:

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*Extra credit:*

What does OSB stand for?

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What is OSB used for?

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**Floor Framing-Using the Code Book Worksheet**

Directions: Using the IRC for One- and Two-Family Dwellings, find the answers to the following questions.

- 1. What chapter and section numbers do you find the codes governing floor framing?

Chapter

Section

\_\_\_\_\_

- 2. What table shall be used to find the allowable floor joist spans for standard lumber species?

\_\_\_\_\_

- 3. Floor cantilevers shall not exceed what length?

\_\_\_\_\_

- 4. According to Figure R502.2, what must be done to header joists if the span is 5' 6"?

\_\_\_\_\_  
\_\_\_\_\_

- 5. According to Table R502.3.1(1), what size Douglas Fir #2 placed at 16" o.c. would be required for a 17'6" span?

\_\_\_\_\_

- 6. According to Table R502.3.1(1), for a 20 psf dead load using Douglas Fir, list at least four size, spacing and grade options to span 18'0"?

Size	Spacing	Grade
1.		
2.		
3.		
4.		
5.		
6.		

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7. What table would you refer to in order to find the maximum allowable span for floor joists that are supporting an exterior balcony? \_\_\_\_\_

8. What section would you find regulations for drilling and notching floor joists?  
\_\_\_\_\_

9. What is the process you would have to go through in order to alter a floor truss?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. When using 16" o.c. floor joist spacing, what is the *minimum* thickness of floor sheathing to be used and what table would you find the information on?

Floor sheathing thickness	Table



**Floor Framing-Using the Code Book Worksheet – *Answer Key***

1. Chapter 5 Section R502
2. Table R502.3.1
3. The depth of the wood floor joist
4. Doubt it
5. 2x12
6. Answers will vary depending on sizes student's pick
7. Table R502.3.3
8. R502.8
9. Get approval from registered design professional, alterations resulting in addition of load that exceeds the design load for truss-R.502.11.3

## How to keep a Construction Ledger Handout

### *History Behind the Ledger*

**Bookkeepers** most likely emerged while society was still in the barter and trade system (pre-2000 B.C.) rather than a cash and commerce economy. Ledgers (a book that a company uses to record information about the money it has paid and received) from these times read like narratives with dates and descriptions of trades made or terms for services rendered.

### **Example - Barter and Trade Bookkeeping**

- Monday, May 12 - In exchange for three chickens, which I provided today, William Smallwood (laborer) promised a satchel of seed when the harvest is completed in the fall.
- Wednesday, May 14 - Samuel Thomson (craftsman) agreed to make one chest of drawers in exchange for a year\'s worth of eggs. The eggs are to be delivered daily once the chest is finished.

All these transactions were kept in individual ledgers, and if a dispute arose, they provided proof when matters were brought before magistrates. Although tiresome, this system of detailing every agreement was ideal because long periods of time could pass before transactions were completed.

**The New and Improved Ledger - Now with Numbers** As currencies became available and tradesmen and merchants began to build material wealth, bookkeeping also evolved. Then, as now, business sense and ability with numbers were not always found in one person, so math-phobic merchants would employ bookkeepers to keep a record of what they owed and who owed them. Up until the late 1400s, this information was still arranged in a narrative style with all the numbers in a single column whether an amount paid, owed or otherwise. This is called single-entry bookkeeping and is like what many of us do to keep track of our checkbooks.

### **Example - Single-Entry Bookkeeping**

Date	Item Details	Amount
Monday, May 12	Bought one sack of seeds	-\$48.00
Monday, May 12	Sold three chickens	+\$48.00
Wednesday, May 14	Bought a chest of drawers	-\$900.00
Wednesday, May 14	Sold one year\'s worth of eggs	+\$900.00

It was necessary for the bookkeeper to read the description of each entry to decide whether to deduct or add it when calculating something as simple as monthly profit or loss.

**The Mathematical Monk**

Continuing in the tradition of monks doing high-level scientific and philosophical research, in the 15th century, Italian monk Luca Pacioli revamped the common bookkeeping structure and laid the groundwork for modern accounting. Pacioli published a textbook in 1494 that showed the benefits of a double-entry system for bookkeeping. The idea was to list an entity's resources separately from any claims upon those resources by other entities. In the simplest form, this meant creating a balance sheet with debits and credits separated. This innovation made bookkeeping more efficient and provided a clearer picture of a company's overall strength. This picture, however, was for the owner who hired the bookkeeper only.

**Example - Basic Double-Entry Bookkeeping**

		Debit	Credit
Sold chickens	Debit cash	\$48.00	-
	Credit chickens	-	\$48.00
Bought seeds	Debit seeds	\$48.00	-
	Credit cash	-	\$48.00
Sold eggs (daily delivery, for 1 year)	Debit cash	\$900.00	-
	Credit eggs	-	\$900.00
Bought chest of drawers	Debit furniture	\$900.00	-
	Credit cash	-	\$900.00

## **Model Home Construction Project**

Each of you is going to get a ledger to use during your model home construction project. I will give you all a substantial amount of money to place into your 'construction accounts.' You and your construction company are going to build me a 'spec.' home. 'Spec.' is short for speculation. This term is used in the business world to describe taking a financial risk in the hope of financial gain. A spec. home then is one that is built as an investment; to sell, not to live in. The money I give you is the deposit (my investment) that will allow you to begin construction.

1. From these funds you must purchase your building permit, materials, and the tools you will need to complete the floor framing. All deposits and purchases must be recorded on your ledger.
2. When you have **successfully** completed the first phase of the project, (the floor framing) you can then bill me/submit for your first 'draw.' A draw is the construction term for payment.
3. I will then 'pay' you for the floor framing.
4. Then, again using the money you have in your construction account, you will purchase the materials and tools you will need for the second phase of the project (wall framing).
5. When you have successfully completed the wall framing, you can bill me/submit for that draw.
6. This process repeats one more time, when your part of the house construction is complete.
7. When the roof is finished, you will submit for your final draw. Any monies that you have left at the end are yours to keep; these are known as your profit. If you do not have any money left, or are even in debt, then your company will go bankrupt.

### **How can your company lose money?**

One of the ways your company can lose money is by someone on your crew breaking any safety rules; glasses off in the shop, pointing the micro-pinner at someone, 'chopping' your framing materials with the saw, etc., etc., your company will be fined by "OSHA."

**OSHA** stands for the *Occupational Safety and Health Administration*. OSHA is **THE** authority when it comes to jobsite safety. They make the safety rules we have to adhere to in the work world. If you are caught in violation of OSHA rules, they have several methods at their disposal of ensuring that you will be complying the next time they visit.

- These include but are not limited to fining you and your company, having criminal charges brought against you and/or your company, they can even shut your project and your company down. In other words, you either make sure you adhere to proper safety practices, or risk major problems with OSHA.
- For the course of your scale model construction project, I will be acting (among other things) as OSHA. If I catch you or anyone in your construction company breaking any of our shop safety rules, you risk serious financial penalties; i.e. fines. If you get fined, where is the money going to come from to pay the fine? (Construction Accounts) How are you going to pay me? (with a check)

If a company runs out of money before the project is complete, we have a special term for that, – **bankruptcy**. Bankruptcy means you are done, kaput, everyone losses their jobs and goes home.

**Filling in Your Ledger**

**General Ledger**

Company: \_\_\_\_\_

Account: \_\_\_\_\_

Account Number \_\_\_\_\_

Date	Description	Investment	Checking	Lumber	Permits

There will be four accounts that we are going to use during this project.

- The first we will title "Investment"
- The second account we will title "Checking;"
- The third will be titled "Lumber,"
- The fourth will be "Permits."

Record a \$20,000 debit in your account titled "checking," and a \$20,000 credit in their account titled "investment."

The California State Contractor Law only allows a deposit/down payment of \$1,000.00, or 10% of the total cost of the job; whichever is *less*. This means that technically, the \$20,000 deposit I just gave you would be illegal if we were building a real house. Since your companies have no money to begin with, we are going to overlook it.

Keep your ledgers in a safe place. You will be using them in a few days when we start construction of the model floors. Your ledger sheets will be turned in at the end of the project. They will be included in your final individual grades for the project.



# **BUILDING INDUSTRY TECHNOLOGY ACADEMY: YEAR TWO CURRICULUM**

## **APPLICATION FOR BUILDING PERMIT**

Building Industry Technology Academy

Please **TYPE** or **PRINT** clearly in ink.

Date:		
Project Address:		
Description of Work:		
Total Square Feet:	Cost of Construction: \$	
Property Owner Name:	Telephone Number:	
Property Owner Address:		
Contractor Name:	Telephone Number:	
Contractor Address:		
Contractor e-Mail Address:		
Contact Person:	Telephone Number:	
Contact Person E-Mail address:		
Architect:	Telephone Number:	
I hereby certify that the information contained in the application and accompanying drawings or plans is correct, and that I will conform with all applicable laws of the Building Industry Technology Academy.		
Signature of Applicant:		Date:
<b>FOR OFFICE USE ONLY</b>		
<b>APPROVALS</b>		
Permit #		Bin Number:
Zoning Site Plan Review:	Date:	Building Plan Review: Date:
Conditional Use: ____ Yes ____ No	Site Plan Approved: ____ Yes ____ No	Authorization Form Received: ____ Yes ____ No
Notes:		
Plans: ____ Attached ____ Rolled ____ None	COP: ____ NOT Required ____ Required ____ In-house ____ Attached	
Minimum Fee: \$	Credit Card Receipt #:	A/P Receipt #:
Total Fee: \$	Credit Card Receipt #:	A/P Receipt #:

## **Floor Framing Order of Construction**

Check off each step when it has been completed.

\_\_\_\_\_ **1. Create Bill of Materials for floor**

- Before you can build a house, you must know what and how much of the different materials you are going to need to complete the project.
- We 'take' the material types and quantities 'off' of the prints.
- Once we take off all the materials information we need, we can make an estimation of how much it will cost (materials wise) to build the structure.
- These materials cost then becomes part of our 'bid' (how much money we will charge to do the work) on the project.
- Like everything else, it is important to be precise in your take-offs and materials estimation.

\_\_\_\_\_ **2. Land for house - Lot Size**

- Label the bottom of the lot with both the company name as well as all the employees' names.
- Center your house (floor print) on the lot, and layout for the sill-plates. Remember it is 1-inch scale. 1 ft. = 1 in. meaning that for every foot of the full-sized structure is going to equal one inch on their models.

\_\_\_\_\_ **3. Mud sill/Sill plate**

- Cut pieces of mudsill to length, and color them with a green keel before gluing them down to the lot. While doing this, explain that as they plate, they need to take the measurements for their pieces directly from the structure.

\_\_\_\_\_ **4. Anchor Bolts**

- Once all the sill-plate is down, take a felt tip marker, and 'place' anchor bolts (represented by a dot) according to code (within 1 foot [1'] of the ends, every 6 feet [6'] on center over the length) on the mudsill.

\_\_\_\_\_ **5. Rim Joists**

- Next, cut and set your rim-joists. Use your prints so you know where you are placing them. When this is complete, cut and set your beam.

\_\_\_\_\_ **6. Joists**

- layout for the floor joists pulling 1 ¼ inches on center on the rim joists. make sure that you pull the layout measurements from the same direction on each 'pair' of parallel rim joists
- Next, measure, cut, and install the floor joists. You don't have to roll them all, just enough in the back and front sections to get the idea. Remember you are taking your measurements from the building itself.

\_\_\_\_\_ **6. Mid-span Blocking**

- Cut and install the mid-span blocking.



## **7. Receive Floor Framing Materials**

- Your company will receive your floor framing materials, (minus the plywood; it will be issued to your team when you pass your floor framing inspection)

## **8. Building to Code**

- **The first** code states that the 'face grain' of the sheeting must be installed perpendicular to the direction of the joists. If it is installed parallel, you will fail inspection and have to re-sheet your floor.
- **The second** code states that the vertical seams between successive 'courses' of the subflooring must be staggered by at least two bays. (the spaces between the joists)
- **The third** code states, we must use the right nails placed at the right spacing when we fasten the sheeting down to the floor framing.
- The nail schedule for the subflooring (6 and 12)
  - **Nailing Schedule** - the first number is the 'edge nailing' number, and it means that wherever we have material (joists, beams, etc.,) directly under the ends and edges of our sheeting, we need to have nails placed every six inches on center there.
  - The second number is the 'field nailing' number, and it tells us how far apart the nails can be spaced in the 'field' (face) of the sheet into the joists below.

## **9. Building Permit**

- **One** permit to the president of each company. It is their responsibility to take care of the permit, as it will need to be signed off at the proper points during the project.

## **10. Sub-floor/sheeting Laying** (remember it should be staggered and look like laying bricks)

- Sheeting must be installed perpendicular to the direction of the joists. A good way to ensure this happens is to start the **first course** with a full sheet of plywood.
- The **second course** then starts with a half sheet of plywood.
- Then the **third course** starts with a full sheet again, while
- The **fourth course** starts with a half sheet. And so on, and so on. You need to also make sure that you cut the ends of your plywood, so they land half on a floor joist. If you don't, and the plywood ends 'float' between joists, you will fail your inspection and must sheet the floor all over again.

## **11. Finished hand in lot**

- Turn-in your model floors and building permit for final grading.

**Floor Framing Skills Rubric**

A qualified carpenter...

- Performs all tasks efficiently, with a high level of accuracy
- Understands the application of theoretical principles in the workplace
- Demonstrates sophisticated problem-solving skills when various problems are encountered
- Can teach their peers
- Maintains a safe and clean working environment

Element	4 – Advanced	3 – Proficient	2 – Basic	1 – Below Basic
<b>Floor Framing</b>	<p>The student demonstrates a qualified knowledge of required technical skills through the following behaviors:</p> <ul style="list-style-type: none"> <li>• Identifies all major components involved in the framing of a floor on a raised foundation.</li> <li>• Accurately estimates all materials needed for the construction of a given floor</li> <li>• Constructs floor from sill plating through sub-flooring while maintaining industry standards</li> <li>• Locates and constructs head-outs</li> <li>• Identifies and implements nail schedule</li> <li>• Identifies applicable codes and locates them in code book.</li> <li>• Adheres to all safety rules, and wears appropriate safety gear</li> <li>• Correctly operates and maintains all equipment</li> </ul>	<p>The student exhibits a working knowledge of required technical skills through the following behaviors:</p> <ul style="list-style-type: none"> <li>• Identifies most components involved in the framing of a floor on a raised foundation</li> <li>• Applies appropriate methods of materials estimation</li> <li>• Constructs floor from sill plating through sub-flooring with minimal assistance</li> <li>• Identifies nail schedule</li> <li>• Identifies applicable codes</li> <li>• Adheres to all safety rules, and wears appropriate safety gear</li> <li>• Correctly operates and maintains all equipment</li> </ul>	<p>The student exhibits limited knowledge of required technical skills through the following behaviors:</p> <ul style="list-style-type: none"> <li>• Identifies some of the components involved in the framing of a floor on a raised foundation</li> <li>• Assists in the construction of a floor from sill plating through sub-flooring</li> <li>• Aware of nail schedule</li> <li>• Aware of applicable codes</li> <li>• Does not adhere to all safety rules, and/or does not wear all appropriate safety gear</li> <li>• Lacks knowledge of the proper care and operation of some equipment</li> </ul>	<p>The student exhibits little or no knowledge of required technical skills involved in the estimation and construction of a floor frame.</p>

## Floor Framing Inspection Guidelines

When inspecting, or being inspected, two criteria must be met.

1. Is the structure built to code?
2. Does the structure build to the prints?

If either of these criteria are not met at any time during the construction of any structure, then that structure will fail inspection. Failed inspections can hurt your production schedule, budget, and ultimately your company.

1. Does the model scale-out to be 20' x 20'? \_\_\_\_\_
2. Is the sill plate pressure treated? \_\_\_\_\_
3. Are the anchor bolts spaced according to code? \_\_\_\_\_
4. Are the floor joists placed at a scale of 16" on-center? \_\_\_\_\_
5. Do the floor joists run the right direction when compared to the prints?  
\_\_\_\_\_
6. Are the mid-span blocks installed at mid-span? \_\_\_\_\_

To successfully pass inspection, the model of the construction company you are inspecting must meet **all** the above codes and specifications (specs). Even if only one code or spec is not met, the model (and the company that built it) will fail the inspection.

If you pass a model's floor framing, you must justify your decision in writing. You must explain how/why the model floor framing passed inspection as opposed to failed. Your report must be at least one half of a page long, and spelling and grammar count. If these writing requirements are not met, then all the employees of your company will be penalized by a loss of points on the assignment.

If you fail a company for a violation of any of the codes/specs listed above, you must record why they failed, and what they must do to correct the problem(s). You must fill out a "Correction Notice" and leave it with the company president of the model floor you are inspecting. Your construction team will inspect the floor as a group, but writing the report is done by only one member of the company.

There will be five inspections: Two for floor framing, two for wall framing, and one for roof framing. Every member of your company must take a turn writing at least one report during the construction phase of this project.

Failed Inspection writing sample:

*Platinum Construction Company's edge nailing for their floor sheeting is scale 12" OC.*

*The floor sheeting nail schedule calls for no more than 6" OC edge nailing. Inspection failed.*

*To pass inspection, the company needs to increase nailing to match schedule.*

### Floor Framing Inspection Grade Sheet

When you have completed framing your model floor, you must have it inspected/graded before you can move on to the installation of the sub-floor/sheeting. The following are the criteria by which your floor frame will be graded, including the points available for each area.

1. Does the model scale-out to be 20'x20'? This maybe different according to the plan chosen.	30 points	_____
2. Is the sill plate pressure treated?	5 points	_____
3. Are the anchor bolts spaced according to code?	15 points	_____
4. Are the floor joists place at a scale of 16" on-center?	25 points	_____
5. Do the floor joists run the right direction when compared to the prints?	30 points	_____
6. Are the mid-span blocks installed at mid-span?	<u>20 points</u>	_____
<b>Total points for floor framing</b>	<b>125 points</b>	_____

### Floor Sheeting Inspection Grade Sheet

When you have successfully passed inspection, and received a grade for your floor frame, you will be approved to begin installing the sub-flooring/sheeting. The following are the criteria by which your sub-flooring will be graded, including the points available for each area.

1. Is the sheeting/sub-flooring installed on the floor joists according to code?	30 points	_____
2. Are the courses of sheeting/sub-flooring staggered according to code?	30 points	_____
3. Is the edge and field nailing according to the schedule?	15 points	_____
<b>Total points for sub-flooring</b>	<b>75 points</b>	_____
<b>Total points available for floor framing and sub-flooring installation</b>	<b>200 points</b>	_____

## Floor Framing Performance Evaluation

1. What I had learned from this project ...

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2. Parts of the project I am most proud of ...

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3. Safety practices I have been observing...

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4. What I have learned that I should be doing, from this point on, to ensure any other projects have an excellent outcome.

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## Floor Framing Unit Final Test

Directions: Circle the correct answer to each of the following questions.

1. What part of the house have you just finished building?
  - a. floor
  - b. roof
  - c. door
  - d. wall
  
2. What are the five main components of a floor frame?
  - a. sill plate, rim joists, joists, blocking, and sub-flooring/sheeting
  - b. studs, headers, trimmers, plates, and shear panel
  - c. ridge, rafters, ceiling joists, frieze blocks, fascia, and sheeting
  - d. piers, plates, posts, parapets, and purloins
  
3. What floor frame components are installed between joists to keep them from twisting as well as helping to distribute loads among neighboring joists?
  - a. sill plate
  - b. studs
  - c. blocks
  - d. joists
  
4. What size and type of nails do we typically use to fasten dimensional framing members when assembling a floor frame?
  - a. 10d galvanized
  - b. 12 and 20 penny commons
  - c. 6d ring-shanks
  - d. 8 and 16 penny GVS

5. What has more "holding" power?
  - a. an end-nail
  - b. a toenail
  - c. both have the same holding power
  - d. neither has the same holding power
  
6. What are the advantages of gluing the sub-flooring to the dimensional framing members with sub-floor adhesive?
  - a. It eliminates virtually all shrinkage in the dimensional floor framing members
  - b. It eliminates squeaks as well as the need to use mechanical fasteners
  - c. It virtually eliminates squeaks, and increases floor strength by approximately 25%
  - d. It allows for a greater number of larger mechanical fasteners to be used
  
7. What is the most common joist layout/spacing?
  - a. 12" O.C.
  - b. 16" O.C.
  - c. 19-3/8" O.C.
  - d. 24" edge-to-edge
  
8. What is the "Crown" of a joist, and how is it installed?
  - a. Splits in the end of a joist resembling a "crown", it must be cut off before installation
  - b. The concave face of a joist that must be installed facing up
  - c. A specific grain pattern in a joist that must face down when the joist is installed flat
  - d. It is the on-edge bow in a joist that must be installed with the convex edge facing up
  
9. Where in a set of plans do we find the nailing (size and spacing) requirements for the sub-floor/sheeting?
  - a. title page
  - b. elevations
  - c. nail schedule
  - d. mechanical

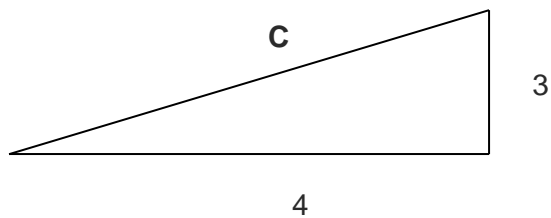
10. When is it allowable for a nail head to penetrate the surface of the sub-flooring it is being used to fasten?
- never
  - sometimes
  - always
  - it's up to the carpenter
11. When nailing down the sub-flooring, what do we call a nail that "misses" the framing and is sticking out under the floor?
- a "sinker"
  - a "shiner"
  - "miss"
  - A "bright"
12. What are the two "areas" on a sheet of sub-flooring that have specific nailing patterns assigned to them?
- face and field
  - end and perimeter
  - edge and field
  - front and back
13. What does the nailing schedule of 6 and 12 (6/12) mean?
- The edge nailing is 6 inches on center, and the field nailing is 12 inches on center
  - 6 divided by 12 is .5, so you are to install a nail every .5 of a foot, or 6 inches
  - 6 penny nails are to be used on the face, and 12 penny nails are to be used on the perimeter
  - For every 6 inches you nail horizontally, you must nail 12 inches vertically
14. Why do we use OSB in place of plywood for most residential construction applications today?
- Because it is less expensive
  - Because it requires fewer trees to produce
  - Because in certain applications, it is virtually as strong as plywood
  - All the above



15. When is it okay to leave bent-over/miss-driven nails in your work?

- a. Never
- b. Never ever
- c. Never, never ever
- d. All the above

16. Pythagorean Theorem:



Directions: Using the Pythagorean Theorem, find the value of "C".

C = \_\_\_\_\_

17. Find the area and perimeter of a rectangle with a width of 9.8 ft and a height of 2.7 ft.

Perimeter = \_\_\_\_\_ Area = \_\_\_\_\_

**Floor Framing Unit Final Test – Answer Key**

1. A
2. A
3. C
4. A
5. B
6. C
7. B
8. D
9. C
10. A
11. B
12. C
13. A
14. D
15. D
16. 25
17. Perimeter-25ft and Area- 26.26 sq. ft



**Floor Framing Bill of Materials**

Part #	Description	Material Type	Dimensions (calculate footage)		Footage (bd/ft, lin/ft, sq/ft)	Quantity Of Parts	Unit Cost	Total Cost
				=				\$-
				=				-
				=				-
				=				-
				=				-
				=				-
				=				-
				=				-
				=				-
To calculate board feet with all measurements in inches:					<u>T x W x L</u>			
					144			
							Total	
							Cost: \$-	