



Connecting Industry to Mathematics Instruction

NSF ATE Award # 1954291

Solutions: Roof Pitch - Roofing a Barndominium Student Activity Sheet

In partnership with



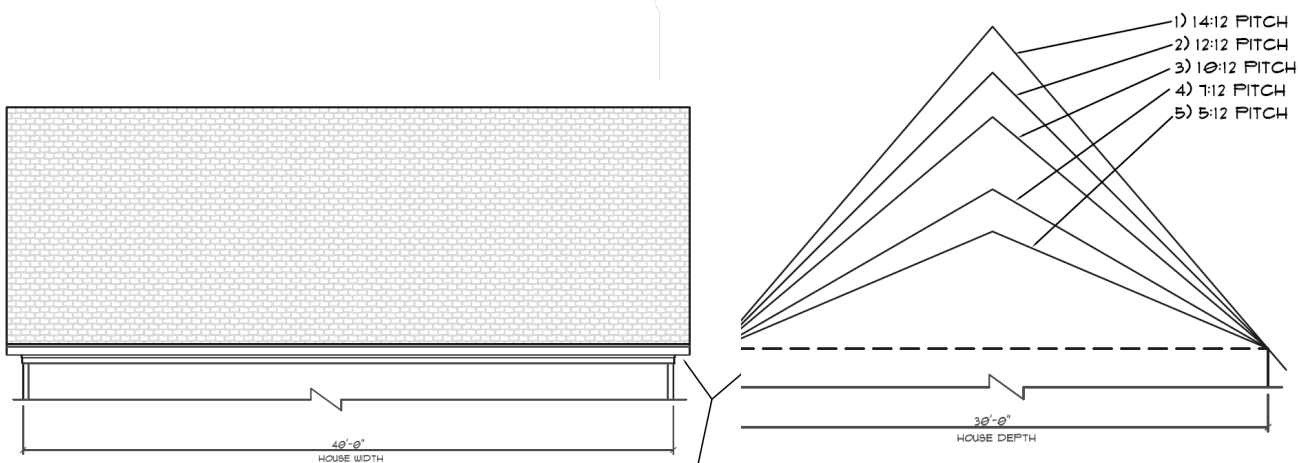
WAKE COUNTY
PUBLIC SCHOOL SYSTEM



A builder has been hired to create plans for a new barndominium home for a client. The builder will need to consider several different options for the roof's pitch. Not only should the builder consider cost, but the client also wants the option of adding a second floor heated living space in the future.



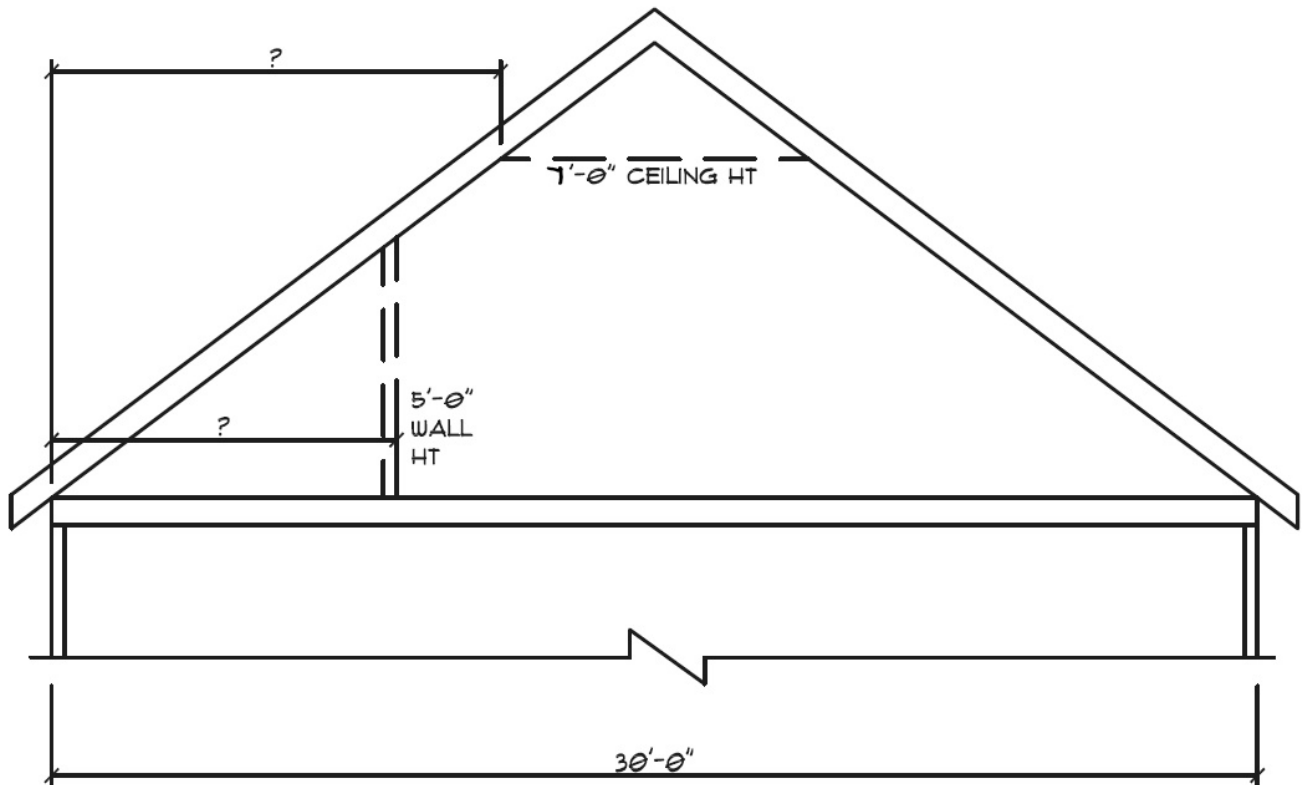
Task 1: Given several different pitch options, how many 4'x8' sheets of plywood are needed to cover the roof.



*note: this roof has a 12 in overhang on the front and sides

Part 1:	Pitch	Angle	Other angle	Side	Length of roof	Width of roof	Area of roof	Vertical boards	Horizontal boards	Number of boards
1	14:12	49.4	81.2	32	24.58610003	42	2065.232402	6.146525006	5.25	64.53851
2	12:12	45	90	32	22.627417	42	1900.703028	5.656854249	5.25	59.39696
3	10:12	40	100	32	20.88651663	42	1754.467397	5.221629157	5.25	54.82710
4	7:12	30	120	32	18.47520861	42	1551.917524	4.618802154	5.25	48.49742
5	5:12	23	134	32	17.38176604	42	1460.068347	4.34544151	5.25	45.62713

Task 2: The client has decided they would like the pitch to be steep enough to allow for an additional second floor heated living space. NC Residential Building Code section R301.1 - Minimum Height states, "habitable space shall have a ceiling height of not less than 7 feet except rooms with sloped ceilings. The required floor area of the room shall have a ceiling height of not less than 5 feet, and not less than 50% of the required floor area shall have a ceiling height of not less than 7 feet." Considering the 5 different pitches in task one, calculate the possible square footage of the entire heated living space including the first and second floors.



14:12, 12:12, and 10:12 would all meet the minimum height code with more than 50% having a ceiling height of not less than 7 feet. 7:12 only leaves 44% of the area with a ceiling height of not less than 7 feet.