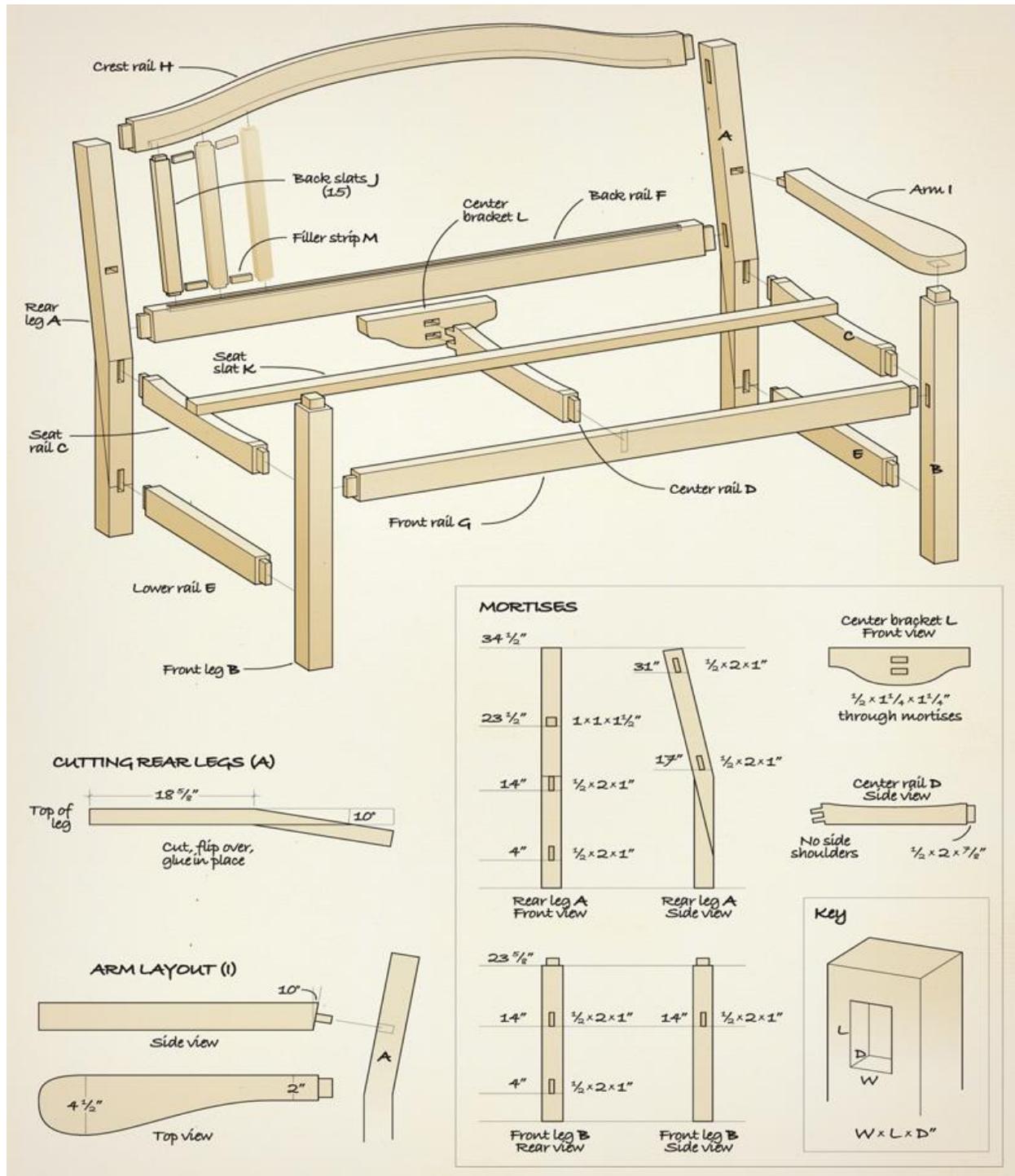


**QUANTITATIVE TECHNIQUES QUESTIONS – SAMPLE SET FOR MAY 27, 2020**

- The diagram and table below represent the design and materials needed to construct a garden bench. Use the information provided to answer the questions that follow. Any additional information you need to answer a question will be provided along with that question.



[Source (with edits and revisions): <https://www.canadianwoodworking.com/plans-projects/english-garden-bench>]

**NOTES:**

<sup>1</sup> A 'mortise' is a hole or recess cut into a part, designed to receive a corresponding projection (a tenon) on another part so as to join or lock the parts together.

<sup>2</sup> A 'tenon' is a projecting piece of wood made for insertion into a mortise in another piece.

<sup>3</sup> The slats for the seat and back are fixed in single grooves, and not mortises.

The table below displays the quantity and dimensions of the pieces of wood from which the parts of the garden bench were shaped.

In the table below:

'Qty' = 'Quantity'; 'T' = 'Thickness'; 'W' = 'Width'; 'L' = 'Length'

<b>MATERIALS LIST</b> (All measurements in inches)					
Part		Qty	T	W	L
A	Legs, rear	2	2	2	34 ½
B	Legs, front	2	2	2	24 ½ <sup>1</sup>
C	Rails, seat	2	1¼	2½	16 ¾ <sup>2</sup>
D	Rail, center	1	1¼	2½	17 <sup>3</sup>
E	Rails, lower	2	1¼	2½	16 ¾ <sup>2</sup>
F	Rail, back	1	1¼	2½	48 ½ <sup>2</sup>
G	Rail, front	1	1¼	2½	48 ½ <sup>2</sup>
H	Rail, crest	1	1¼	3	48 ½ <sup>2</sup>
I	Arms	2	1¼	4 ¾	21 <sup>1</sup>
J	Slats, back	15	5/8	1¼	14 ½ <sup>4</sup>
K	Slats, seat	9	7/8	1¾	50 ½ <sup>5</sup>
L	Center bracket	1	1¼	3¼	10
M	Filler strips	28	5/8	5/8	cut to suit spacing

<sup>1</sup> Includes 1" extra for one 7/8" tenon

<sup>2</sup> Includes 2" extra for two 7/8" tenons

<sup>3</sup> Includes 2 5/8" extra for one 7/8" tenon and one 1 1/4" tenon

<sup>4</sup> Includes 1" extra for two 5/8" tenons

<sup>5</sup> The slat that butts against the front legs will be trimmed to fit

1.1 How many mortises have to be cut to assemble the garden bench in the manner shown in the diagram?

- (a) 21
- (b) 51
- (c) 41
- (d) 31

1.2 For which part of the bench is the ratio of mortises to tenons 1:1?

- (a) Front Leg
- (b) Arm
- (c) Front Rail
- (d) Centre Rail

1.3 What is the length of each filler strip (filler strips are only filled between two back slats (and not between a back slat and a rear leg)? Assume that the gap between each rear leg and the adjoining back slat is the same length as a filler strip.

- (a) Between 2.5" and 3"
- (b) Between 1" and 1.5"
- (c) Between 1.5" and 2"
- (d) Between 2" and 2.5"

1.4 What is the volume of wood required for all the filler strips?

- (a) Greater than 11 inches<sup>3</sup>
- (b) Between 10 inches<sup>3</sup> and 10.5 inches<sup>3</sup>
- (c) Between 10.5 inches<sup>3</sup> and 11 inches<sup>3</sup>
- (d) Less than 10 inches<sup>3</sup>

1.5 Before the Centre Bracket was shaped, the mortises were cut out. What percentage of the volume of the wood for the Centre Bracket remained after the mortises were cut out?

- (a) Greater than 97%
- (b) Between 95% and 96%
- (c) Between 96% and 97%
- (d) Less than 95%