



## Task Title: Working with Concrete

### OALCF Cover Sheet – Practitioner Copy

**Learner Name:** \_\_\_\_\_

**Date Started:** \_\_\_\_\_

**Date Completed:** \_\_\_\_\_

**Successful Completion:** Yes ☐ No ☐

**Goal Path:** Employment ☒ Apprenticeship ☒

Secondary School ☐ Post Secondary ☐ Independence ☐

**Task Description:** The learner will read about concrete and related materials used by carpenters to answer questions and make calculations.

#### Main Competency/Task Group/Level Indicator:

- Find and Use Information/Interpret documents/A2.2
- Understand and Use Numbers/Use measures/C3.3

#### Materials Required:

- Pen/pencil and paper and/or digital device
- Calculator or digital device with calculator function

## Learner Information

Carpenters must be knowledgeable about concrete and other construction materials. They may make calculations or interpret tables and lists in order to effectively do their work.

Read “Notes on Concrete” and “Mortar Mix Proportions”.

## Notes on Concrete

1. All foundations must be carried well below the frost line.
2. Unless a foundation is built on a firm, uniform strata such as rocks, firm gravel or hard pan, a footing is required. A footing is good at all times.
3. Footings are generally twice the thickness of the offset and not less than 8" or 10" deep.
4. A safe footing for posts 6 x 6 for most soils would be 10" deep by 18" square.
5. A good concrete should be mixed about 6 of ordinary bank run gravel to 1 cement or if clean crushed stone and good sharp sand are used, the mix could be 5 parts crushed stone, 3 parts sand and 1 part cement.
6. Concrete mix should be just wet enough to allow the cement to set as a glue covering each particle in the mix.
7. A good foundation should be well spaded and tamped to remove all air pockets.
8. Slacked lime can be added to concrete to make it waterproof. Lime to be added just before pouring.
9. Concrete should be allowed to remain with the forms on until the concrete resists indentation with the thumb.
10. Forms should be sheathed with semi-seasoned stock. Dry stock will swell, warp and distort the form and wall faces.
11. The best forms should be matched lumber and free from openings which allow the liquid to escape.
12. If concrete is being mixed and poured in freezing temperature, have all ingredients warm and keep concrete well covered to prevent freezing. Straw, earth, saw dust or covers can be used.
13. Concrete is best when it dries slowly, that is, covered to keep out direct rays of the sun rapid evaporation of its moisture.

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14. Initial setting of concrete takes place within one hour. Concrete should not be used if disturbed after its initial set.
15. The less water used the stronger the concrete, provided the mixture is plastic and workable.
16. Cement is sold by the barrel or bag; 4 bags make a barrel. Approximately 4 cubic feet to the barrel.
17. If field stones are placed in a concrete wall, they should be thoroughly washed and wet just before placing. Keep stones well apart and never place in concrete which is not on the wet side when poured.

### Mortar Mix Proportions

Mortar Class	Minimum compressive strength at 28 days, MPa		Quantity of sand per 50 kg bag of cement L		Quantities of material required per m <sup>3</sup> of mortar (not including wastage)			
	Preliminary laboratory tests	Work tests	Common cement 32.5, 42.5	Masonry cement 22.5X	Common cement, bags 32.5, 42.5	Sand m <sup>3</sup>	Masonry cement, bags, 22.5X	Sand m <sup>3</sup>
I	14.5	10	130 L	100 L	9.0	1.15	10.5	1.1
II	7	5	200 L	170 L	6.5	1.25	7.25	1.22

Sand is estimated at 5% moisture content.

**NOTE:** For 90 – 110 mm thick single sheaf walls. 1 m<sup>3</sup> of mortar will be sufficient to lay about 3700 bricks (190 x 90 x 90 mm) without wastage.

## Work Sheet

**Task 1: Which ingredient should be reduced to strengthen concrete?**

Answer:

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**Task 2: What can be added to concrete just before pouring to make it waterproof?**

Answer:

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**Task 3: What can be done to reduce the effects of the temperature during the mixing, pouring and setting of the concrete when temperatures are freezing?**

Answer

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**Task 4: 12 cubic yards of cement is required for a project. Calculate how many barrels of cement need to be ordered. Note: 3 ft = 1 yd; 1 yd<sup>3</sup> = 27 ft<sup>3</sup>.**

Answer:

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**Task 5: Clean crushed stone and good sharp sand are used to build a wall requiring 60 cubic yards of concrete. How many cubic yards of sand are required?**

Answer:

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**Task 6: How much sand (in litres) is required for a 50 kg bag of masonry cement to make Class I Mortar?**

Answer:

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**Task 7: For Mortar class II, what is the difference in minimum compressive strength at 28 days between the laboratory and work tests?**

Answer:

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**Task 8: 1 cubic meter of Class I mortar is required for a project. If common cement is being used, how many m<sup>3</sup> of moisture is contained in the sand?**

Answer:

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## Answers

**Task 1: Which ingredient should be reduced to strengthen concrete?**

Answer: Using less water strengthens concrete.

**Task 2: What can be added to concrete just before pouring to make it waterproof?**

Answer: Slacked lime can be added to make concrete waterproof.

**Task 3: What can be done to reduce the effects of the temperature during the mixing, pouring and setting of the concrete when temperatures are freezing?**

Answer: Keep all ingredients warm and keep concrete well covered to prevent freezing.

**Task 4: 12 cubic yards of cement is required for a project. Calculate how many barrels of cement need to be ordered. Note: 3 ft = 1 yd; 1 yd<sup>3</sup> = 27 ft<sup>3</sup>.**

Answer:

$$12 \text{ cubic yards} = 12 \times 27 \text{ ft}^3 = 324 \text{ ft}^3$$

$$\text{Realize } 4 \text{ ft}^3 = 1 \text{ barrel.}$$

$$324 / 4 = 81 \text{ barrels}$$

**Task 5: Clean crushed stone and good sharp sand are used to build a wall requiring 60 cubic yards of concrete. How many cubic yards of sand are required?**

Answer: See next page

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The ratio is 5 parts crushed stone, 3 parts sand and 1 part cement. For 60 cubic yards of concrete:

$5 + 3 + 1 = 9$  (Sum of the parts). Sand is 3 parts of 9 (or  $1/3$  of the mixture).

Amount of sand required is  $1/3$  of the amount of concrete.  $60 \text{ yd}^3$  of concrete is required

$60 \text{ yd}^3 \text{ of concrete} = 60 * 1/3 \text{ sand} = 20 \text{ yd}^3 \text{ of sand}$

**Task 6: How much sand (in litres) is required for a 50 kg bag of masonry cement to make Class I Mortar?**

Answer: 100 litres

**Task 7: For Mortar class II, what is the difference in minimum compressive strength at 28 days between the laboratory and work tests?**

Answer: Laboratory test value = 7; work test value = 5

$$7 - 5 = 2$$

The difference in minimum compressive strength tests for Mortar Class II is 2.

**Task 8: 1 cubic meter of Class I mortar is required for a project. If common cement is being used, how many  $\text{m}^3$  of moisture is contained in the sand?**

Answer:

$1.15 \text{ m}^3$  of sand required for  $1 \text{ m}^3$  of mortar (using common cement).

Note that "Sand is estimated at 5% moisture content".

Calculate the amount of moisture (in  $\text{m}^3$ ) contained in  $1.15 \text{ m}^3$  of sand is

$$1.15 \times 5\% = 1.15 \times .05 = .0575 \text{ m}^3$$



## Performance Descriptors

Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
A2.2	performs limited searches using one or two search criteria			
	extracts information from tables and forms			
	uses layout to locate information			
	makes connections between parts of documents			
	makes low-level inferences			
C3.3	calculates using numbers expressed as whole numbers, fractions, decimals, percentages and integers			
	manages unfamiliar elements (e.g. context, content) to complete tasks			
	chooses and performs required operations; makes inferences to identify required operations			

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Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
	selects appropriate steps to solutions from among options			
	interprets, represents and converts measures using whole numbers, decimals, percentages, ratios and fractions			

This task: Was successfully completed ☐ Needs to be tried again ☐

Learner Comments:

Instructor (print):

Learner (print):