PE Civil Construction
Practice questions

Solve each problem before turning to the worked solutions.

01 Earthwork quantities

A rectangular excavation measures 90 ft by 45 ft and is 6 ft deep. Excavated material swells 20% when loaded into trucks. What loose volume should be hauled?

02 Compaction control

A soil sample has a moist unit weight of 125 pcf and a gravimetric water content of 10%. The laboratory maximum dry unit weight is 120 pcf. What is the relative compaction?

03 Construction scheduling

Activity A takes 3 days. After A, activities B and C run in parallel. B takes 5 days and C takes 7 days. Activity D takes 2 days and starts only after both B and C finish. What is the project duration and total float for B?

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04 Beam reactions

A simply supported 20 ft beam carries a 12 kip point load 5 ft from the left support. Ignore the beam’s self-weight. Find the vertical reactions at the left and right supports.

05 Concrete quantity

A 48 ft by 30 ft slab is 5 in. thick. Add a 7% allowance to the geometric volume, then round the order up to the next half cubic yard. What volume should be ordered?

06 Equipment productivity

A loader moves 2.4 loose cubic yards per completed cycle. Each cycle takes 45 seconds. The loader operates productively for 50 minutes per clock hour. What is the estimated average hourly production?

PE Civil Construction
Worked solutions

Review the setup, calculation, and common mistake.

01 Earthwork quantities

Calculate the bank volume. 90 × 45 × 6 ÷ 27 = 900 BCY.

Apply swell to the bank volume. 900 × 1.20 = 1,080 LCY.

Answer / 1,080 loose cubic yards

Divide cubic feet by 27 before reporting cubic yards. Swell increases the volume but does not add material.

02 Compaction control

Convert moist to dry unit weight. 125 ÷ (1 + 0.10) = 113.64 pcf.

Compare dry unit weights. 113.64 ÷ 120 × 100 = 94.7%.

Answer / 94.7%

Use dry unit weight in both the numerator and denominator.

03 Construction scheduling

Compare the two paths. A–B–D takes 3 + 5 + 2 = 10 days. A–C–D takes 3 + 7 + 2 = 12 days.

Find the float for B. B can finish 2 days later without delaying D, assuming finish-to-start logic with zero lag and no other constraints.

Answer / 12 days; 2 days of float for B

At a merge, the latest predecessor finish determines the successor’s earliest start.

PE Civil Construction
Worked solutions

Review the setup, calculation, and common mistake.

04 Beam reactions

Take moments about the left support. R(right) × 20 = 12 × 5, so R(right) = 3 kip.

Balance vertical forces. R(left) + 3 = 12, so R(left) = 9 kip.

Answer / 9 kip left; 3 kip right, both upward

The support closer to the load carries the larger reaction in this example.

05 Concrete quantity

Convert thickness and find the geometric volume. 48 × 30 × (5 ÷ 12) ÷ 27 = 22.22 yd³.

Apply the allowance, then round up. 22.22 × 1.07 ≈ 23.78 yd³. The next half-yard increment is 24.0 yd³.

Answer / 24.0 cubic yards

Apply the allowance before rounding to the supplier’s order increment.

06 Equipment productivity

Find average cycles per clock hour. 50 × 60 ÷ 45 = 66.67 cycles per hour.

Multiply by volume per cycle. 66.67 × 2.4 = 160 LCY/h.

Answer / 160 loose cubic yards per hour

Use productive minutes for the cycle count. Fractional cycles are appropriate for a long-run average.