

Construction Workers

You will need to calculate the cost for each route 3 ways (calculations rounded to the nearest .5). Labeled solutions will be provided for Route A and calculations only for the others. Refer to route A for questions about labeling the other routes, as the labels are the same for all routes. This is a longer task, so for shorter classes it can be modified by having the students choose 2 of the four routes to evaluate. Additionally, it can be divided into segments that are less intimidating for students if needed.

- 1. Using only slave labor**
- 2. Using no slave labor**
- 3. Using a mixture of slaves and freedmen for labor**

Labor rates: You will need to complete this project within 30 days. Each group of 1000 workers can build 1 mile of road per day.

Freedmen-25 cents per day

Slaves-10 cents per day.

Architect-\$500 to plan each bridge

Extra cost- \$250 per mile to build while traveling over a mountain.

Foremen-\$1.00 per day (you need 1 foreman for every 50 freedmen or every 25 slaves).

Step 1- For each route you will need to figure out how many workers you will need to build the road within the 30 day time period.

Step 2-For each route you will need to figure out how much it will cost to pay for freedmen laborers.

Step 3-For each route you will need to calculate how much it will cost to pay for slave laborers.

Step 4-For each route you will need to calculate how much it will cost to pay for a mix of slave and freedmen laborers (equal amounts of each were used in this solution, your student's answers may vary).

Step 5-For every 25 slaves and every 50 freedmen, you will need to add the cost of a foreman to each route.

Step 6-For every bridge you will need to add \$500 to your cost.

Step 7-For every mile of mountain you will need to add \$250 to your cost.

Step 8-Add up all of the individual costs for each route for a route total.

Route A: This route is 150 miles long and will need 2 bridges.

Step1: 150 mi. / 30 days = 5 mi. per day; 5 mi. x 1000 workers per

mile=5000 workers.

Step2: 5000 workers x 25 cents (freedmen) = \$1250 per day x 30 days =

\$37,500 for freedmen labor.

Step3: 5000 workers x 10 cents (slaves) = \$500 per day x 30 days =

\$15,000 for slave labor.

Step4: \$37,500 for freedmen labor + \$15,000 for slave labor = \$52,500

for both / 2 = \$26,250 for a labor mix.

Step5:

Freedmen = 5000 workers / 50 (1 foreman for every 50 freedmen) = 100

foremen x \$1 x 30days =\$3000 for foremen.

Slaves= 5000 workers / 25 (1 foremen for every 25 slaves) = 200 foremen

x \$1 x 30 days = \$6000 for foremen.

Labor mix = \$3000 for freedmen + \$6000 for slaves = \$9000 for both / 2

= \$4500 for foremen.

Step 6: \$500 (bridge cost) x 2 (number of bridges) = \$1000 for bridges.

Step 7: No mountains, but calculation is cost per mile of mountains x

miles of mountains = cost of building over mountains.

Step 8: (cost of workers + foremen + bridges + mountains = total cost)

**Freedmen = \$37,500 (freedmen) + \$3,000 (foremen) + \$1000 (bridges) =
\$41,500 total cost with freedmen only.**

**Slaves = \$15,000 (slaves) + \$ 6,000 (foremen) + \$1000 (bridges) =
\$22,000 total cost with slaves only.**

**Labor Mix = \$26,250 (freedmen and slaves) + \$4500 (foremen) + \$1000
(bridges) = \$31,750 total cost with labor mix.**

**Route B: This route is 100 miles long; will need 3 bridges, 20 miles of
mountains, and 30 miles of desert.**

Step1: $100 / 30 = 3.5 \times 1000 = 3500$.

Step2: $3500 \times \$0.25 = \875 ; $\$875 \times 30 = \$26,250$.

Step3: $3500 \times \$0.10 = \350 ; $\$350 \times 30 = \$10,500$.

Step4: $\$26,250 + \$10,500 = \$36,750 / 2 = \$18,375$.

Step5:

Freedmen = $3500 / 50 = 70$; $70 \times \$1 \times 30 = \2100 .

Slaves = $3500 / 25 = 140$; $140 \times \$1 \times 30 = \4200 .

Labor Mix = $\$2100 + \$4200 = \$6300 / 2 = \3150 .

Step 6: $\$500 \times 3 = \1500 .

Step 7: $\$250 \times 20 = \5000 .

Step 8:

Freedmen = $\$26,250 + \$2100 + \$1500 + \$5000 = \$34,850$.

Slaves = $\$10,500 + \$4200 + \$1500 + \$5000 = \$21,200$.

Labor Mix = \$18,375 + \$3150 + \$1500 + \$5000 = \$28, 025.

Route C: This route is 125 miles long; will need 10 miles of mountains, and 5 bridges.

Step1: $125 / 30 = 4$; $4 \times 1000 = 4000$.

Step2: $4000 \times \$0.25 = \1000 ; $\$1000 \times 30 = \$30,000$.

Step3: $4000 \times \$0.10 = \400 ; $\$400 \times 30 = \$12,000$.

Step4: $\$30,000 + \$12,000 = \$42,000 / 2 = \$21,000$.

Step5:

Freedmen = $4000 / 50 = 80$; $80 \times \$1 \times 30 = \2400 .

Slaves = $4000 / 25 = 160$; $160 \times \$1 \times 30 = \4800 .

Labor Mix = $\$2400 + 4800 = \$7200 / 2 = \$3600$.

Step 6: $\$500 \times 5 = \2500 .

Step 7: $\$250 \times 10 = \2500 .

Step 8:

Freedmen= $\$30,000 + \$2400 + \$2500 + \$2500 = \$37,400$.

Slaves = $\$12,000 + \$4800 + \$2500 + \$2500 = \$21,800$.

Labor Mix = $\$21,000 + \$3600 + \$2500 + \$2500 = \$29,600$.

Route D: This route is 175 miles long and will need 1 bridge.

Step1: $175 / 30 = 6$; $6 \times 1000 = 6000$.

Step2: $6000 \times \$0.25 = \1500 ; $\$1500 \times 30 = \$45,000$.

Step3: $6000 \times \$0.10 = \600 ; $\$600 \times 30 = \$18,000$.

Step4: $\$45,000 + \$18,000 = \$63,000 / 2 = \$31,500$.

Step5:

Freedmen = $6000 / 50 = 120$; $120 \times \$1 \times 30 = \3600 .

Slaves = $6000 / 25 = 240$; $240 \times \$1 \times 30 = \7200 .

Labor Mix = $\$3600 + \$7200 = \$10,800 / 2 = \5400 .

Step 6: $\$500 \times 1 = \500 .

Step 7: No mountains.

Step 8:

Freedmen = $\$45,000 + \$3600 + \$500 = \$49,100$.

Slaves = $\$18,000 + \$7200 + \$500 = \$25,700$.

Labor Mix = $\$31,500 + \$5400 + \$500 = \$37,400$.