

## CHAPTER 17

## MATH

For a foreman, there are numerous occasions when a quick calculation is needed to perform his job. The questions below are typical of some of these.

Some conversions and formulas that will be helpful.

Area of a circle =  $(\pi) 3.14 \times (\text{Radius})^2$   
= Multiply the square of the diameter by .7854

1 Cubic yard = 27 cubic feet

1 Cubic foot = 7.5 gallons

1 Mile = 5280 feet

Volume = length x width x height

Area of a Trapezoid =  $\frac{(\text{top length} + \text{bottom length}) \times \text{height}}{2}$

## CHAPTER 17

## MATH QUESTIONS

1. A box cut has been made in a strip pit which is one thousand two hundred fifty (1,250) feet long, sixty-two (62) feet deep and six hundred thirty (630) feet wide across the top, and four hundred fifteen (415) feet wide at the bottom. How many cubic yards of spoil have been removed?
2. The coal seam in question No. 1 is twelve and five tenths (12.5) feet thick. How many tons of coal is exposed, assuming twenty-four (24) cubic feet per ton?
3. A coal storage silo is circular and is twenty (20) feet in diameter and one hundred and fifty (150) feet deep. How many tons can be stored if loose coal runs thirty-seven (37) cubic feet to the ton?
4. A concrete slab in a repair shop is being poured which is one hundred twenty (120) feet long by forty-two (42) feet wide and six (6) inches thick. How many cubic yards of cement will be needed?
5. At an average speed of thirty-five (35) miles per hour, how much time is required for a haul trip (back and forth) to a preparation plant located three (3) miles away, excluding the dumping time?
6. A map on a scale of one (1) inch equals five hundred (500) feet shows twenty-seven and four tenths (27.4) inches from the preparation plant to the load-out facility. What is the haul distance in miles?
7. In a four hundred eighty (480) volt system with sixty (60) amps of current servicing a electric motor, what is the resistance?
8. A triangular piece of overburden has been removed, having a length of one hundred eighty (180) feet and a width of seventy (70) feet to a depth of forty (40) feet. what is the total tonnage removed assuming one (1) ton equals twenty-two (22) cubic feet?
9. A pump is capable of pumping 500 gallons per minute. How long will it take to pump a water tank with the following dimensions: twenty (20) feet in diameter and forty (40) feet high, assuming each cubic foot contains seven and five tenths (7.5) gallons?

10. What is the voltage in a circuit that has twelve (12) amps of current using five hundred seventy-six (576) watts of power?
11. A box cut has been made which is eight hundred seventy (870) feet long, eighty (80) feet deep and three hundred (300) feet across the top and two hundred fifty (250) feet across the bottom. How many cubic yards of spoil have been removed?
12. A box cut has been made which is one thousand fifty (1,050) feet long, sixty-eight (68) feet deep and four hundred eighty (480) feet across the bottom and top. How many cubic yards of spoil have been removed?
13. A box cut has been made which is nine hundred thirty-five (935) feet long, one hundred five (105) feet deep, five hundred twenty (520) feet across the top, and four hundred (400) feet across the bottom. How many cubic yards of spoil have been removed?
14. A box cut is being considered which will be one thousand three hundred (1300) feet long, seventy-four (74) feet deep, and six hundred eighty (680) feet across the top and bottom. How many cubic yards of overburden will be removed?
15. In question No. 11, how many tons of overburden will be removed assuming the spoil weighs two thousand seven hundred fifty (2750) pounds per cubic yard?
16. In problem No. 12, how many tons of spoil have been removed assuming a cubic yard of spoil weighs two thousand five hundred (2500) pounds?
17. The coal seam in problem No. 13, is eight and five tenths (8.5) feet thick. How many tons of coal will be removed upon completing this pit assuming the coal is twenty-five (25) cubic feet per ton?
18. In problem No. 14, the coal seam is ten and twenty-five hundredths (10.25) feet thick. How many tons of coal is exposed, assuming the coal is twenty-three (23) cubic feet per ton?
19. A coal storage silo is twenty-eight (28) feet in diameter and two hundred eighty (280) feet high, how many tons of coal can be stored if the coal runs twenty-six (26) cubic feet per ton?

20. A circular coal storage silo is fifty (50) feet in diameter and two hundred ninety (290) feet high. How many tons of coal can be stored if the coal runs twenty-seven (27) feet per ton?
21. A square coal storage silo is fourteen (14) feet by fourteen (14) feet and is two hundred thirty (230) feet high. How many tons of coal can be stored if the coal runs twenty-eight (28) cubic feet per ton?
22. A concrete slab at a load-out facility is being poured which is one hundred twenty-five feet (125) long by fifty-six (56) feet wide and six (6) inches thick. How many cubic yards of concrete will be needed?
23. A circular slab at the bottom of a silo is being poured which has a radius of twenty (20) feet and is four (4) inches thick. How many cubic yards of concrete will be needed?
24. A water tank with dimensions of thirty (30) feet in diameter and seventy (70) feet high is being filled by a pump with a capacity of five hundred (500) gallons per minute. How long will it take to fill this tank assuming each cubic foot contains seven and five tenths (7.5) gallons?
25. A haul road starts at an elevation of three thousand four hundred twenty-eight (3,428) feet and ends at an elevation of six thousand two hundred (6,200). What is the percent of grade if the road is fifty-thousand (50,000) feet long?