

Pondering the Possibilities! *Numbers at the Inclined Plane*

Teacher Directions: Provided below are 34 math problems of varying degrees of difficulty. Choose those that suit your particular students' ability levels the best. These can be used as a math extension lesson, or they could be used as examples to help students develop their own Inclined Plane related math problems.

1. Construction of the Inclined Plane started on May 1, 1890. It opened on June 1, 1891. How many months did it take to build the Inclined Plane? Weeks? Days?
2. Originally, each car could hold 12 passengers. Making a trip every 5 minutes, how long would it take to transport 600 people to the top of the Inclined Plane? How many trips would it take?
3. The 3-ton gear wheel has a radius of 8 feet. What is the diameter? What is the circumference?
4. The Inclined Plane rises at a 35 degree angle. Forming a right triangle at the base, solve for the remaining angle. Using trig functions, completely solve the triangle.
5. Until 1920, the Inclined Plane operated 24 hours a day. If it made a trip every 5 minutes, how many trips did it make each day?
6. The original cars were 12 feet wide and 24 feet long. The replacement cars installed in 1921 are 15 feet wide and 34 feet long. How much larger is the area of the replacement cars?
7. The original cars could carry 12 passengers and the replacement cars can carry 50. What is the percent of increase in the number of possible passengers?
8. When the Inclined Plane opened in 1891, a monthly book (which provided 122 trips) cost \$1. How much did each trip cost?
9. In 1926, a book of 150 trips cost \$3. This was twice the rate of 1915. What was the 1915 rate?
10. After 1926, the schedule for trips was changed. The Inclined Plane opened at 6 a.m. and closed at midnight. The trips ran every 10 minutes. How many trips ran each day? How many fewer trips was this than when it operated 24 hours a day at 5 minute intervals?
11. From 1926 to 1933, the annual ridership dropped from 1,015,657 to 351,802. How many less people rode the Inclined Plane in 1933?
12. In 1937, repairs were completed on the Inclined Plane at the cost of \$20,702. If Westmont Borough paid \$2890, how much federal money was used?

13. The Inclined Plane closed on January 31, 1962 and did not reopen until July 4, 1962. How many days was it closed?
14. At the end of 1943, ridership was up to 711,494. In 1933, the ridership was 351,802. How many more people rode in 1943?
15. On Labor Day weekend in 1970, the ridership was 1,484. This was 323 people less than the previous year. How many people rode the Inclined Plane on Labor Day weekend, 1969?
16. During the 1984 renovations, 720 railroad ties were replaced. How many ties are on each side of the tracks?
17. Each car has 55 sodium lights and each track has 57 sodium lights. How many lights are there total?
18. The Inclined Plane uses 3,586 feet of rails that weigh a total of 120,553 pounds. How much does 1 foot of rail weigh?
19. During the month of September, the Inclined Plane opens at 11 a.m. and closes at 11 p.m., making a trip every 15 minutes. In May, it opens at 9 a.m. How many more trips a day are made during the month of May?
20. Friends of the Incline receive a 10% discount on commuter passes. If a commuter pass for 22 trips costs \$20, how much money would you save?
21. Calculate the round-trip cost and the one-way cost for the following groups based on current trip prices:
 - a. 2 adults, 3 children (ages 8, 4, and 1)
 - b. 1 car with 2 adults
22. If the top of the Inclined Plane is 1,693.5 feet above sea level, and the Inclined Plane has a vertical rise of 502.5 feet, how far above sea level is the bottom of the Inclined Plane?
23. If the Inclined Plane travels 867.1 feet up the slope and rises 502.5 feet vertically, how far does the Inclined Plane travel horizontally?
24. In what year did the Inclined Plane celebrate its centennial? In what year will it celebrate its bicentennial?
25. How many years were the original cars in use before being replaced in 1921?
26. Estimate the total number of passengers that could ride the Inclined Plane during its first year of operation.

27. If there are 8,000 bolts used in the Inclined Plane construction, how many bolts are used per foot of travel?
28. What is the total length of all three cables used to raise and lower the cars?
29. What is the maximum number of people that could ride the Inclined Plane in one hour today?
30. How much time does it take for one car to go from the bottom of the Inclined Plane to the top?
31. Thinking of the gear wheel as a large circle, what would be its area for one side?
32. What is the area of the car floor? The volume of the car?
33. Calculate the speed of the car.
34. What is the volume of the two cars combined?

