

1.1 Inductive Reasoning

In this section we will consider two types of reasoning

1. Inductive Reasoning
2. Deductive Reasoning



Inductive reasoning is the process of reasoning to a general conclusion through observations of specific cases.

Induction involves looking for a pattern and then predicting a conclusion.

Example #10

Use inductive reasoning to predict the next line in the pattern.

$$\begin{aligned}1 \times 9 &= 9 \\2 \times 9 &= 18 \\3 \times 9 &= 27 \\4 \times 9 &= 36\end{aligned}$$



Example #24

Use inductive reasoning to predict the next three number in the pattern.

$$0, 3, 8, 15, 24, 35, \dots$$

Example #38 Pick any number and multiply the number by 6. Add 3 to the product. Divide the sum by 3 and subtract 1 from the quotient.

- (A) What is the relationship between the number you started with and the final answer?
- (B) Arbitrarily select some different numbers and repeat the process, record the original number and results.
- (C) Can you make a conjecture about the relationship between the original number and the final number?



The result reached by inductive reasoning may be correct for the specific cases studied but not correct for all cases. For this reason, mathematicians use deductive reasoning to prove conjectures.

Deductive reasoning is the process of reasoning to a specific conclusion from a general statement.

Example (continued)

(D) Try to prove, using deductive reasoning, the conjecture you made in part (C).



1.2 Estimation

The ability to estimate results from data given in everyday situations is important. By using estimation we can get a quick approximation of the correct answer. Even when using a calculator, we can make sure the result makes sense by estimating the answer.

Example #18 Estimate the amount of a 7% sales tax on a refrigerator that costs \$789.



Example #24 Estimate the weight of 18 shovels of dirt if one shovel of dirt weighs 3.92 pounds.



Example #30 The Elways are planning a vacation to Yosemite National Park. Their round-trip airfare from Louisville, KY, to Santa Barbara, CA., totals \$892. Car rental is \$42 per day, lodging is a total of \$97 per day, and they estimate a total of \$90 per day for food, gas and other miscellaneous items. If they are planning to stay for six full days and nights, estimate their total expenses.



When you estimate an answer, the amount that your approximation differs from the actual answer will depend on how you round the numbers.

1.3 Problem Solving

Guidelines for Problem Solving (See page 20)

1. Understand the problem.
2. Devise a plan to solve the problem.
3. Carry out the plan.
4. Check the results.

Example #4

A 40 lb bag of insecticide covers an area of 6,000 ft² of lawn. How much insecticide is needed to cover 22,000 ft² of lawn?



Example #10

The Main Street Garage charges \$2.50 for the first hour of parking and \$1.00 for each additional hour or part thereof. Denise Tomey parks her car in the garage from 9 a.m. to 5 p.m., 5 days a week. How much money does she save by paying a weekly parking rate of \$35.00?



Example #20

- (A) Quinton works 20 hours per week and makes \$5.40 per hour. How much money can he expect to earn in 1 year (52 weeks)?
- (B) If he saves all the money that he earns, how long will he have to work to save for a boat that costs \$750?


