# Contemporary Math Review Guide

1. $|-p| = p$, therefore $|-97| = 97$ is an example of inductive or deductive reasoning?

2. Practice makes perfect. Therefore, if I practice, I'll be perfect. Inductive or deductive reasoning?

3. Fresh fruit costs more in winter. This is January. These fresh strawberries cost more. Inductive or deductive reasoning?

4. Use inductive reasoning to predict the next term in the sequence of numbers. 2, 5, 4, 10, 8, 20,?

5. How many different squares are there in an 8 by 8 square? Use inductive reasoning to answer.

6. Continue the pattern for five more items in the list. 180, 169, 158, 147, …

7. Continue the pattern for five more items in the list. aaa, aab, aba, …

**Determine whether the statement is true of false. If it is true, give two examples to illustrate it. If it is false, give a single counterexample.**

8. If you make the sides of as square 6 times longer, the area of the square is 36 times larger.

9. If Alex got a higher grade than Ethan, and Harrison got a lower grade than Ethan, then Harrison got a lower grade than Alex.

**In a school survey, students showed these preferences for instructional materials.**
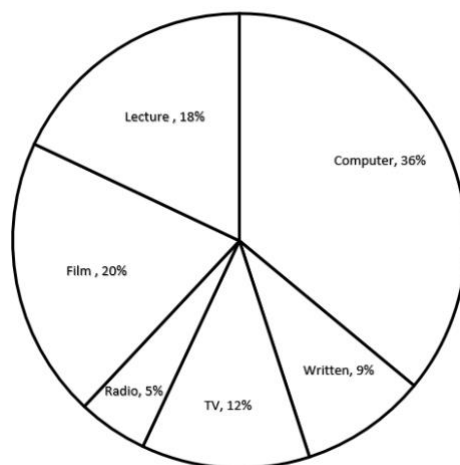


10. About how many students would you expect to prefer lectures in a school of 950 students?

**11.** Refer to the double bar graph below which shows the number of male (M) and female (F) athletes at a university over a four-year period. In which year was the number of male athletes equal to 375?
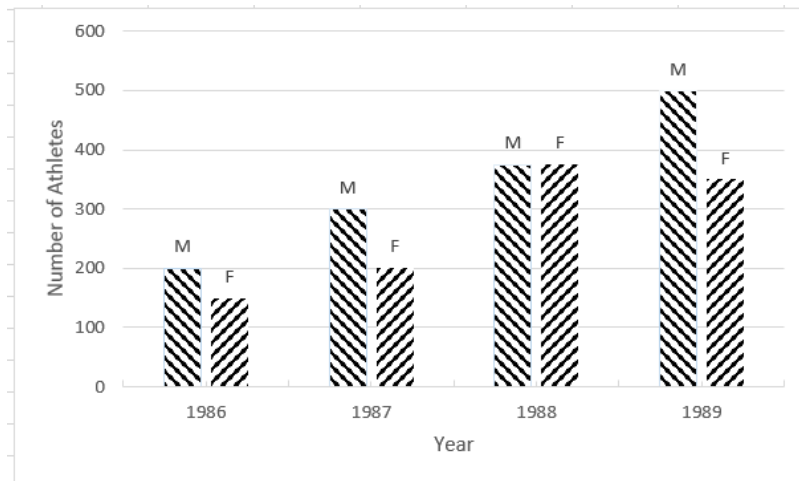


**12.** Solve the equation : $1-3x=8x+3$

**13.** Solve the equation $A=P(1+nr)$ for $r$

**14.** Find the slope of the line passing through the points (-6, -7) and (-2,8).

**15.** What is the slope and y-intercept of the graph of the equation $y=-5x+9$

**16.** The cost of a tourist package depends on the number of sightseeing stops that you have. The ordered pair (2, 170) means that 2 stops cost $170, and the ordered pair (6, 310) means that 6 stops cost $310.

Write a linear equation giving the cost, y, in terms of the number of stops x.

Using the equation found in part a, find how much it costs for 3 stops.

How many stops would there be if the cost is $415?

**17.** College students can purchase points for use in the food service areas instead of cash. If you initially pay the basic food service fee of $45, then points can be purchased for 30 cents each; otherwise, points cost 60 cents each. How many points must you use in order for it to be cheaper to pay the basic food service fee?

**18.** Find the slope intercept equation of the line that has slope 5 and passes through the point (-3, 7)

**19.** Find the slope intercept equation of the line that passes through the points (-8, 0) and (9, -6).

**20.** Suppose that a sales person observes that if an item is priced at $7 per item then 5 items are sold. If 3 items are sold for $9 per item then find an equation to model the number y of items sold for x dollars per item.

**21.** If a county has a population of 988 million in 2000 and a constant growth rate of 1.5 percent per year, then what will the population of that county be in 2012?

**22.** John Lee's savings account has a balance of $ 1509. After 9 years, what will the amount of interest be at 6% compounded annually? Round to the nearest dollar.

**23.** Find a pair of obtuse, alternate exterior angles:
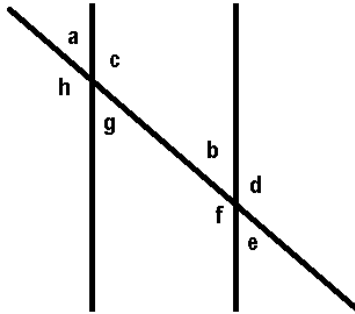
**24.** Find the area of a trapezoid with height 5ft and whose bases total 18 feet.

**25.** Find the area inside the circle but outside the square:

2 m
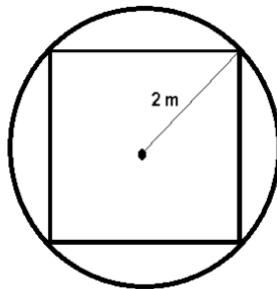
**26.** How much more liquid does a cylindrical tank with radius 3 feet and height 12 feet hold than a similar tank with radius 2 feet and height 10 feet?

**27.** A smaller than average beach ball has a volume of $36\pi$ in$^3$, what is its radius?

**28.** Find the volume of a can in m$^3$ if its diameter is 20 cm and its height is 30 cm.

**29.** Express the rate 10 ft/sec in miles/hr.

**30.** A student ID code must start with a letter that can be capital or lowercase and end in four digits that could be repeated.  How many possible ID codes are there?

**31.** Frank, Fred, Mark, and Mike are sitting together in a row.  How many fewer arrangements are there if Mark and Mike must be in the middle seats than if they can be in any order?

**32.** A model of car is available in exterior colors of indigo, midnight, titanium, slate, and frost. Interior color options are beige, granite, moonlight, and pewter. How many options of color combinations are there if slate is not available with beige?

**33.** A multiple choice test has 6 questions. How many more keys are possible if each question has five choices instead of four choices?

**34.** How many ways can the books "Algebra", "Booleans", "Contemporary", "Differentials", "Euler's Methods", "Fermat's Work", and "Great Mathematicians" be arranged on a shelf?

**35.** If the probability that an identified hurricane will make a direct hit on a certain stretch of beach is $\frac{1}{100}$, what are the odds against a direct hit?

**36.** If two fair dice are rolled, what is the probability that a total of four shows?

**37.** The odds against Carl beating his friend in a round of golf are 9:7. Find the probability that Carl will lose.

**38.** If $P(A \cup B) = 0.64, P(A) = 0.31, P(B) = 0.49$, find $P(A \cap B)$.

**39.** If $P(A \cup B) = 0.64, P(A) = 0.39, P(A \cap B) = 0.17$, find $P(B)$.

**40.** If a single card is drawn from a standard 52 card deck, what is the probability that it is neither a Jack nor a club?

**41.** For a school project, Sue interviewed a total of 100 persons with were either lawyers or salesmen. She asked them if they were happy or unhappy with their occupation. Of the 59 lawyers she interviewed, 14 were unhappy, however, only 9 of the salesmen were unhappy. Supposed that one of the persons interviewed is selected at random. Find the probability that the person selected is happy.

**42.** A box contains 24 blue marbles, 13 green marbles, and 13 red marbles. Two marbles are selected at random without replacement. Let E be the event that the first marble selected is green. Let F be the event that the second marble selected is green. Find $P(F \mid E)$.

**43.** A survey of senior citizens at a doctor's office shows that 52% of the seniors take blood pressure lowering medication and 40% take cholesterol lowering medication. 17% take both medications. What is the probability that a senior citizen takes only one of these medications given that he or she takes at least one of the medications?

**44.** A pair of fair dice are rolled. Let E be the event that the sum is less than ten. Let F be the event that at least one die shows a six. Are E and F dependent events?

**45.** A student is taking a standardized test consisting of multiple choice questions for which there are five options for each question. Seven points are awarded for each correct answer, but the student loses 2 points for an incorrect answer. Questions left blank receive zero points, but no points are deducted. Is it in the student's best interest to guess?

**46.** Keven asked some of his friends how many hours they worked during the previous week at their after-school jobs.   The results are shown below. Construct a table showing the frequency and the relative frequency of the hours worked at after-school jobs.

6 5 6 3 6 6 9 8 6 4 8 5 5 8 6 5 8 6 5 8 5 8 8 3

**47.** A major league baseball player got the following number of hits during each year of his career: 55, 112, 183, 177, 184, 188, 190, 178, 158, 167, 151, 142, 116, 40.
What is the mode of the data?

**48.** Find the mean, median, and mode for the given distribution.
11, 9, 7, 5, 12, 11, 11, 9, 5, 12, 11, 7, 15, 5, 11, 11, 7, 9, 5, 11

**49.** The test scores of 32 students are listed below. What are the minimum value, $Q_1$, median, $Q_3$, and the maximum value?   32 37 41 44 46 48 53 55 57 57 59 63 65 66 68 69 70 71 74 74 75 77 78 79 81 82 83 86 89 92 95 99

**50.** The following are the ages of 17 people at their 50-year college reunion:

| Score | 69 | 71 | 72 | 73 | 76 | 79 |
|-----------|----|----|----|----|----|----|
| Frequency | 2 | 7 | 4 | 2 | 1 | 1 |

What is the mean and standard deviation?

**51.** Find the standard deviation. Round to one more place than the data.166  111  135  130  152  274  185  290  245

**52.** A store is having a 60% off sale. The sale price of an item is $125. What is the list price?

**53.** You receive a 10% decrease in your pay. What percentage increase in pay would you have to receive in order to gain your original pay rate again? Round your answer to the nearest whole percent.

**54.** Assume you wish to borrow $500 for two weeks and the amount of interest you must pay is $20 per $100 borrowed. What is the APR at which you are borrowing money? Round your answer to the nearest percent.

**55.** If a couple deposits $25,000 into an account earning 6% annual interest compounded monthly, how much money will be in the account at the end of 25 years?

**56.** Alex wishes to save $30,000 over the next two years for a down payment on a house. If she deposits money into an account paying 8% interest, how much does she need to deposit each month to have enough save? (Round to the nearest dollar)

**57.** A university's Department of Business is electing a new chair. As part of the process, students from the school rank the candidates in order of preference. The following table shows the results of the student votes.

| Preference Table for Candidates | | | | | | |
|---|---|---|---|---|---|---|
| Rankings | | | | | | |
| 1st | B | A | C | C | D | B |
| 2nd | A | B | D | B | A | A |
| 3rd | D | C | B | D | B | C |
| 4th | C | D | A | A | C | D |
| otal Votes | 43 | 12 | 13 | 21 | 51 | 9 |

a. Determine the student preference for chair by using the pairwise method of comparison.
b. Determine the student preference for chair by using the plurality with elimination method.
c. Determine the student preference for chair by using the plurality method.
d. Determine the student preference for chair by using the Borda Count method.

**58.** Determine the percent change if the price of an item goes from $2.25 to $1.80.

**59.** Find the original weight of an object that has increased by 30% to 15.626 oz.

**60.** Determine the amount in an account after 18 months if $10000 is deposited in a savings account paying 1.6% interest compounded quarterly.

**61.** What regular payments would Sally need to make into an ordinary annuity paying 2% annual interest in order to have $5000 in two years?

**62.** Which fairness criterion is violated by using plurality to determine the winner of an election with the following preference table?        (hint: what happens if Iris drops out?)

| | Number of voters | | |
|---|---|---|---|
| | 12 | 16 | 11 |
| 1st | Iris | Bill | Fred |
| 2nd | Fred | Fred | Bill |
| 3rd | Bill | Iris | Iris |
| 4th | Gary | Gary | Gary |

**Contemporary Math Review Guide Answers**

1. Deductive
2. Deductive
3. Deductive
4. 16
5. 204
6. 136,125, 114, 103, 92
7. baa, abb, bab, bba, bbb
8. True
9. True
10. About 171 students
11. 1988
12. $x = \dfrac{-2}{11}$
13. $r = \dfrac{A - P}{Pn}$
14. $\dfrac{15}{4}$
15. slope $= -5$

    y-intercept: $(0,9)$
16. a. $y = 35x + 100$

    b.  $205

    c.  9 stops
17. 150 points
18. $y = 5x + 22$
19. $y = -\dfrac{6}{17}x - \dfrac{48}{17}$
20. $y = -x + 12$

21. 1,181.3 million
22. $2549
23. d and h
24. 45 ft
25. $\approx 4.56 \text{ m}^2$
26. $\approx 213.52 \text{ ft}^3$
27. 3 in
28. $\approx 0.00942 \text{ m}^3$
29. 6.82 mi/hr
30. 520,000
31. 20

32. 19

33. 11529

34. 5040

35. 99 to 1

36. $\dfrac{1}{12}$

37. $\dfrac{9}{16}$

38. 0.16

39. 0.42

40. $\dfrac{9}{13}$

41. 0.77

42. $\dfrac{12}{49}$

43. 0.77

44. Yes

45. No

46.

| Number of hours worked last week | Frequency | Relative frequency |
|---|---|---|
| x | f | |
| 3 | 2 | 0.0833333 |
| 4 | 1 | 0.0416667 |
| 5 | 6 | 0.25 |
| 6 | 7 | 0.2916667 |
| 7 | 0 | 0 |
| 8 | 7 | 0.2916667 |
| 9 | 1 | 0.0416667 |
| Total | 24 | 1 |

47. None

48. Median: 10

     Mean: 9.2

     Mode: 11

49. 32, 56, 69.5, 80 ,99

50. Mean: 71.9

     Standard Deviation: 2.46

51. Standard Deviation: 66.1

52. $312.50

53. 11%

54. 520%

55. $111,624.25

56. $1,180

57. a. B b. B c. B d. B

58. -20%
59. 12.2 oz
60. $10,242.41
61. $204.37
62. Independence of Irrelevant Alternatives Criterion