

Math 1030 Final Study Guide:

Name: Key

Compound Interest Formula:

$$A = P \times \left(1 + \frac{\text{APR}}{n}\right)^{(nY)}$$

Savings Plan Formula:
(Regular Payments)

$$A = \text{PMT} \times \frac{\left[\left(1 + \frac{\text{APR}}{n}\right)^{(nY)} - 1\right]}{\left(\frac{\text{APR}}{n}\right)}$$

Loan Payment Formula:

$$\text{PMT} = \frac{P \times \frac{\text{APR}}{n}}{\left[1 - \left(1 + \frac{\text{APR}}{n}\right)^{(-nY)}\right]}$$

$$\text{standard deviation} = \sqrt{\frac{\text{sum of (deviations from the mean)}^2}{\text{total number of data values} - 1}}$$

Expected Value:

expected value = (value of event 1) × (probability of event 1) + (value of event 2) × (probability of event 2)

Calculations with the Doubling Time:

$$\text{new value} = \text{initial value} \times 2^{\frac{t}{T_{\text{double}}}}$$

Approximate Doubling Time Formula (Rule of 70):

$$T_{\text{double}} \approx \frac{70}{P}$$

Calculations with the Half-Life:

$$\text{new value} = \text{initial value} \times \left(\frac{1}{2}\right)^{\frac{t}{T_{\text{half}}}}$$

Approximate Half-Life Formula:

$$T_{\text{half}} \approx \frac{70}{P}$$

The Earthquake Magnitude Scale:

$$E = (2.5 \times 10^4) \times 10^{1.5M}$$

The energy is measured in joules; magnitudes have no units.

Exponential Functions:

$$Q = Q_0 \times (1 + r)^t$$

Forms of the Exponential Function:

$$Q = Q_0 \times (2)^{\frac{t}{T_{\text{double}}}}$$

$$Q = Q_0 \times \left(\frac{1}{2}\right)^{\frac{t}{T_{\text{half}}}}$$

Math 1030 Final Review B:

Your Name: Key

1. An experiment consists of rolling a fair six-sided die twice. What is the probability that an experiment results in a sum = 10? (5,5) (6,4) (4,6)

$$\frac{P(10)}{P(T)} = \frac{3}{36} = \frac{1}{12} \text{ or } \approx 8.3\%$$

2. Brandon's hourly wage increased from \$14 to \$17 over a three-year period. Lisa's hourly wage increased from \$21 to \$25 over the same period. Whose salary increased more in relative terms (percentage changes)?

Brandon $\frac{17-14}{14} \approx 21.4\%$ Lisa $\frac{25-21}{21} \approx 19\%$

Brandon's

3. In each case, decide which of the two given prices is the better deal.

Case 1: Lotion in a 5-fluid ounce bottle for \$2.35.
Case 2: Lotion in a 9-fluid ounce bottle for \$4.14.

Case 1 $\frac{2.35}{5} = 47¢$

Case 2 $\frac{4.14}{9} = 46¢$

Case 2 is better deal

4. Given 1.5% annual increase of salary regarding the starting annual salary \$30,000, what will the salary be after 3 years?

$$Q = Q_0 \times (1+r)^t$$

$$30,000 (1+0.015)^3 = \boxed{\$31,370.35}$$

5. Two people will be selected from 8 students to be the teacher assistants in a class. In how many ways can the two people be selected?

$$8^C_2 = \boxed{28}$$

6. Convert 40 meters to inches, using the facts: 1 in = 2.54 cm, 1 m = 100 cm.

$$40 \text{ m} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} = \boxed{1574.8 \text{ inches}}$$

7. The scores of a test in a science class are normally distributed, with a mean weight of 82 grams and standard deviation of 4. What is the percentage of scores between 70 and 82?

$$\begin{array}{c|c|c|c} 2.3\sigma & 1\sigma & 3\sigma & \\ \hline 70 & 74 & 78 & 82 \end{array}$$

49.85%

8. You are looking on a map with a scale of 2 in. = 100 miles. If two towns are separated on the map by 12 in., the actual distance between them is:

$$\frac{12 \text{ in}}{2 \text{ in}} = 6 (100) \text{ miles} = 600 \text{ miles}$$

9. \$29,000 car is depreciated for tax purposes at a rate of \$800 per year. When does the depreciated value reach \$6,000?

$$f(x) = 29,000 - 800(x)$$

$$6,000 = 29,000 - 800x$$

28.75 29 years

10. \$50,000 is invested at an APR of 2.6 % for 5 years. If interest is compounded quarterly, what is the amount of money after 20 years?

$$50,000 \left(1 + \frac{.026}{4} \right)^{4(20)} \approx \$83,959.98$$

11. Your goal is to create a college fund for your child. Suppose you find a fund that offers an APR of 6.5%. How much should you deposit monthly to accumulate \$100,000 in 10 years?

$$A = 100,000 = \text{PMT} \times \frac{\left[\left(1 + \frac{.065}{12} \right)^{12(10)} - 1 \right]}{\left(\frac{.065}{12} \right)} = \$593.81$$

12. Consider a home mortgage of \$250,000 at a fixed APR of 3.5 % for 20 years. Calculate the monthly payment.

$$\text{PMT} = \frac{250,000 \times \frac{.035}{12}}{\left[1 - \left(1 + \frac{.035}{12} \right)^{-12(20)} \right]} = \$1,449.90$$

13. What is the most likely relation between the following two variables:
(Negative causality, Negative correlation, Positive causality, Positive correlation, No relation)
The years a person smokes and the likelihood of them getting cancer:

↑ longer smoke ↑ risk of cancer

very Positive Causality.

14. What is the probability of drawing three aces in a row from a standard deck of cards when the drawn card is not returned to the deck each time?

$$\frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} = \frac{24}{132600} = .018\%$$

15. A regular deposit of \$200 per month is paid into an account that pays an APR of 3%. What is the balance after 5 years?

$$200 \times \frac{\left[\left(1 + \frac{.03}{12} \right)^{12(5)} - 1 \right]}{\left(\frac{.03}{12} \right)} \approx \$12,929.34$$

16. An insurance policy sells for \$1000. Based on past data, an average of 1 in 10 policyholders will file a \$5,000 claim, an average of 1 in 200 policyholders will file a \$10,000 claim, and an average of 1 in 500 policyholders will file a \$100,000 claim. What is the expected value to the company per policy sold?

$$+1,000 + \left(-5,000 \times \frac{1}{10} \right) + \left(-10,000 \times \frac{1}{200} \right) + \left(-100,000 \times \frac{1}{500} \right)$$

$$1,000 - 500 + -50 - 200 = \$250$$

17. How much do you have to **deposit each month**, over 30 years, in order to have \$300,000 saved for retirement, assuming an interest rate of 5% compounded monthly?

$$300,000 = PMT \cdot \frac{\left[\left(1 + \frac{.05}{12} \right)^{12(30)} - 1 \right]}{\frac{.05}{12}} \approx \$729.87$$

18. You are driving across Utah from Provo to Ogden. You will drive for about 80 miles on I-15. The speed limit on this stretch of freeway is 75 mph. For this freeway portion of the trip, **how much time would you lose** going 65 mph versus going the speed limit of 75 mph? Give your answer to the **nearest minute**. Show your work!

$$\frac{80 \text{ miles}}{75 \text{ mph}} \approx 1.07 \text{ hrs.}$$

$$\frac{80 \text{ miles}}{65 \text{ mph}} \approx 1.23 \text{ hrs}$$

$$1.23 - 1.07 \approx 0.16 \text{ hrs} \approx 9.6 \text{ minutes} \approx 10 \text{ minutes}$$

19. As I was travelling on the freeway and I noticed that my car was moving a tenth of a mile (or 528 feet) every 6 seconds. Convert that to miles per hour. How fast was I going? Round to nearest whole number.

$$\frac{528 \text{ ft}}{6 \text{ sec.}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} \times \frac{3600 \text{ sec}}{1 \text{ hr}} = 60 \text{ mph}$$

20. The statements contain examples of a fallacy named in parentheses. Explain how the fallacy occurs in the argument.

- a. (Appeal to Popularity) Ford makes the best pickup in the world. More people drive Ford pickups than any other light truck.

"Best pickup in the World" is the conclusion not the premise. No evidence more people drive them

- b. (Limited Choice) You don't support the president, so you are not a patriotic American.

only two types of Americans
there are other possibilities

21. Using the approximate rule for doubling and calculations with doubling formula, compare the expected amount after 20 years in an account with an initial deposit of \$40,000 given:

- a. 7% growth per year

$$T_D = \frac{70}{7} = 10 \quad Q = Q_0 \times 2^{\frac{t}{T_D}}$$

$$= 40,000 (2)^{\frac{20}{10}} = \$160,000$$

- b. 5% growth per year

$$T_D = \frac{70}{5} = 14 \quad Q = 40,000 (2)^{\frac{20}{14}} \approx \$107,672.02$$

22. The high temperatures (in Fahrenheit) for Provo, UT over the last ten days:

43, 45, 45, 33, 38, 39, 41, 41, 42, 37. SHOW ALL WORK on the problems below!

- a) What is the mean? (Round to nearest tenth)

33, 37, 38, 39, 41, 41, 42, 43, 45, 45

40.4

- b) What is the median?

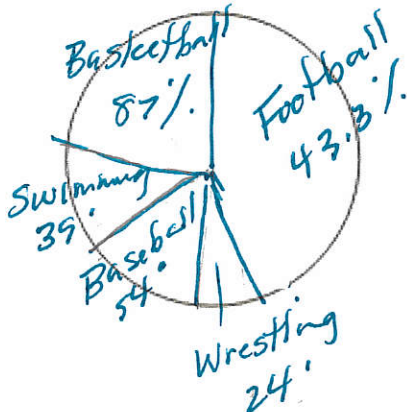
41

- c) What is the mode?

41, 45

23. Of the 120 people Ann surveyed about their favorite sport, 52 said football, 29 said basketball, 18 said baseball, 13 said swimming, and 8 said wrestling. Make a pie chart that displays the data.

Make sure you include percents on the labels in your chart.



$$\text{Football} = \frac{52}{120} \approx 43.3\% \times 360^\circ = 156^\circ$$

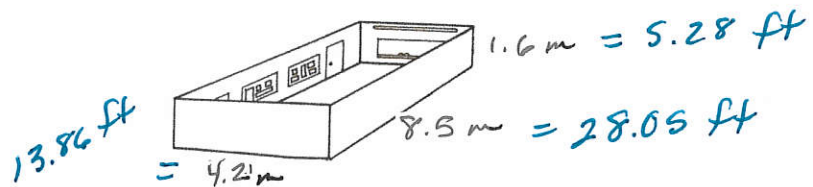
$$\text{Basketball} = \frac{29}{120} \approx 24.2\% \times 360^\circ = 87^\circ$$

$$\text{Baseball} = \frac{18}{120} = 15\% \times 360^\circ = 54^\circ$$

$$\text{Swimming} = \frac{13}{120} = 10.8\% \times 360^\circ = 39^\circ$$

$$\text{Wrestling} = \frac{8}{120} \approx 6.7\% \times 360^\circ = 24^\circ$$

24. This office needs new carpet and new paint. The dimensions are given in meters but you need to change them to feet. (1 meter = 3.3 feet)



Calculate the area (square footage) for the new carpet. Round to nearest whole number.

Area of carpet: 389 ft²

Calculate the surface area of all 4 walls and the ceiling to determine how much paint you will need. (Round to nearest whole number) Each gallon of paint will cover 400 square feet. How many gallons of paint will you need?

$$389 + 2(13.86 \times 5.28) + 2(28.05 \times 5.28)$$

Total Square feet: 831.6 ft²

Gallons of paint: 2

25. You have been following advice to stay out of debt, so you have been saving money for a new car. You now have \$6500 saved, and you can trade in your current car for \$1300.

- a. What is the highest price car you can purchase and still keep within your budget, knowing that you will have to pay 6.25% sales tax and about \$500 in registration fees? Show your work.

$$6500 + 1300 = 7800$$

$$X = \text{Price Car} \quad 7800 = X(1 + .0625) + 500$$

Car price \$6870.59

- b. As you look at cars, you stop by a dealer and the salesperson tempts you with a new car for \$28,000 (including tax and fees). You could use the \$7800 as a down payment and finance the balance for 60 months with a loan interest rate of 2.89%. What would your monthly payments be? How much money in interest would you have paid over the life of the loan? Show your work.

$$PMT = \frac{20,200 \times \frac{.0289}{12}}{1 - \left(1 + \frac{.0289}{12}\right)^{-12(5)}} = \$361.98$$

Monthly payment amount \$361.98
Total interest \$1518.86

$$(361.98 \times 60) = 21,718.86$$

$$- 20,200.00$$

- c. You resist temptation to go into debt and decide to just use the \$7800 to buy a car. You then decide to save the amount you would have paid as a loan payment (your answer from 3.b.). How much will you have saved after 60 months? Assume a savings interest rate of 3.25% compounded monthly through a savings plan. Show your work.

$$361.98 \times \left[\left(1 + \frac{.0325}{12}\right)^{12(5)} - 1 \right]$$

$$\frac{.0325}{12}$$

Savings amount \$25,920.30