

QR 101 Proficiency Exam: Formulas and Conversions

<p>Simple Interest</p> $I = Prt$ $A = P + I$ $A = P(1 + rt)$	<p><u>Conversion Factors for Length and Area</u></p> <p>12 inches (in) = 1 foot (ft) 3 feet = 1 yard (yd) 5,280 feet = 1 mile (mi) 1 in = 2.54 cm 1 mi \approx 1.61 km 1 acre = 43,560 ft² 1 mi² = 640 acres</p>
<p>Compound Interest</p> $A = P \left(1 + \frac{r}{n}\right)^{nt}$ $A = Pe^{rt}$	<p><u>Metric Prefixes</u></p> <p>Kilo (k) = 1,000 units Hecto (h) = 100 units Deka (da) = 10 units Base unit: - meter (length), -liter (volume), -gram (weight) Deci (d) = 1/10 of a unit Centi (c) = 1/100 of a unit Milli (m) = 1/1000 of a unit</p>
<p>Payment on a Loan</p> $R = \frac{P \left(\frac{r}{n}\right)}{\left(1 - \left(1 + \frac{r}{n}\right)^{-nt}\right)}$ <p>If R = monthly, then $n = 12$ and t = number of years Student Loan Monthly Payment over 10 years</p>	<p><u>Conversion Factors for Capacity</u></p> <p>1 pint (pt) = 16 fluid ounces (oz) 1 quart (qt) = 2 pints (pt) 1 gallon (gal) = 4 quarts (qt) 1 cubic foot \approx 7.48 gal 1 ft³ freshwater \approx 62.5 lb 1 ft³ seawater \approx 64 lb 1 cm³ = 1 mL 1 L \approx 1.06 quarts</p>
<p>Effective yield: $E = \left(1 + \frac{r}{n}\right)^n - 1$</p>	<p><u>Units of Weight</u></p> <p>16 ounces (oz) = 1 pound (lb) 2,000 lb = 1 ton (T) 1,000 kg = 1 metric ton (t) 1 oz \approx 28 g</p>
<p>Unearned Interest</p> $U = \frac{kRh}{100+h} \text{ or } A = \frac{R \left(1 - \left(1 + \frac{r}{n}\right)^{-h}\right)}{\left(\frac{r}{n}\right)}$	<p><u>Fahrenheit-Celsius Conversions</u></p> $F = \frac{9}{5}C + 32$
<p>Periodic Payment for Annuity</p> $R = \frac{A \left(\frac{r}{n}\right)}{\left(\left(1 + \frac{r}{n}\right)^{nt} - 1\right)}$ <p>If R = monthly, then $n = 12$ and t = number of years</p>	<p><u>Formulas for Circles</u></p> $A_{circle} = \pi r^2 \quad C_{circle} = 2\pi r$
<p>Future Value of an Annuity</p> $A = \frac{R \left(\left(1 + \frac{r}{n}\right)^{nt} - 1\right)}{\left(\frac{r}{n}\right)}$ <p>If R = monthly, then $n = 12$ and t = number of years</p>	<p><u>Volume Formulas</u></p> $V_{cylinder} = \pi r^2 h \quad V_{sphere} = \frac{4}{3}\pi r^3$
<p>Student Loan Interest</p> <p>Daily = $\frac{\text{principal balance} * \text{interest rate}}{365.25}$</p> <p>Monthly = daily interest \times days in month</p>	

QR 101 Proficiency Test Review

This is to help prepare you for the Proficiency Test.

It is not intended to be all inclusive of the material covered in the course.

Therefore items not on this review may appear on the exam.

The only electronic device allowed is a basic scientific calculator.

Remember to insert units when writing your answer.

1) Convert the following using dimensional analysis.
160 feet to yards

2) Convert the following using dimensional analysis.
69 inches to feet

3) Convert the following using dimensional analysis.
27 yards to feet

4) Convert the following using dimensional analysis. Round to 2 decimal places, if necessary.
13,980 feet to miles

5) Convert the following measurement to the specified measurement.
64 oz to pounds

6) Convert the following measurement to the specified measurement.
1,200 cm = _____ m

7) Convert the following metric weight to the specified unit.
295 dg = _____ mg

8) Convert the following measurement to the specified measurement. Round to the nearest hundredth.
51.2 millimeters = _____ inches

9) Convert the following measurement to the specified measurement. Round to the nearest tenth.
27.22 kilometers = _____ miles

10) Ann used a tape measure to section off areas for her vegetable garden. She measured the section for onions to be 396 inches long. How many feet long is the section for Ann's onions?

11) Convert the following measurement to the specified measurement. Round to the nearest hundredth, if necessary.
7,288 gallons = _____ kL

12) Convert the following unit to the specified equivalent unit. Round to the nearest hundredth, if necessary.
7,629 kilograms = _____ pounds

- 13) Doll houses provide an excellent example of scale modeling. The 1/2-inch scale is very common for doll houses; this means that 1/2 inch on the doll house corresponds to 1 foot for life-sized objects. The width of one doll house is 32 in. Assuming that it uses the 1/2-inch scale, what's the width of the full-sized house that it's modeled after?
- 14) Doll houses provide an excellent example of scale modeling. The 1/2-inch scale is very common for doll houses; this means that 1/2 inch on the doll house corresponds to 1 foot for life-sized objects. If you're building a model stove for the doll house how tall should it be if the standard height for a full-sized stove is 36 inches?
- 15) Ruth wants to paint the walls in her bedroom. A gallon of paint will cover 400ft^2 . She measures the surface to be painted and it is $514,979\text{ in}^2$. How many whole gallons of paint will she need? (Remember: we can not buy a fractional gallon)
- 16) After moving into a new house, a couple wants to have a concrete patio poured to support a hot tub. The plans call for a 14-ft by 14-ft slab of concrete 3 inches thick. How many cubic yard of concrete will be needed? (Hint: A cube that is one yard on each side is also 3 feet on each side. You can use that to find a conversion factor from cubic feet to cubic yards.) Round any calculations to two decimal places if you need to.
- 17) A Jacuzzi was filled with 200 gallons of water. The Jacuzzi itself weighs 50 lb. If a person who weighs 190 lb and a person who weighs 130 lb get into the Jacuzzi, how much is the total weight including the two people, the tub, and the water? Round to the nearest pound.
- 18) Convert the following measurement to the specified measurement. Round to the nearest hundredth, if necessary.
 $8,759\text{ L} = \underline{\hspace{2cm}}$ quarts
- 19) On average, 2,186,000 cubic centimeters of a popular soda pop are consumed worldwide every second. How many kiloliters is that? How many gallons?
- 20) Convert the following measurement to the specified measurement.
 40 oz to pounds
- 21) Convert the following metric weight to the specified unit.
 $1,734\text{ cg} = \underline{\hspace{2cm}}$ g
- 22) Convert the following unit to the specified equivalent unit. Round to the nearest hundredth, if necessary.
 429 hectograms = $\underline{\hspace{2cm}}$ ounces

- 23) Convert the following unit to the specified equivalent unit. Round to the nearest hundredth, if necessary.
3,420 kilograms = _____ pounds
- 24) Convert the following Celsius temperature to an equivalent Fahrenheit temperature.
9°C
- 25) Convert the following Celsius temperature to an equivalent Fahrenheit temperature.
-135°C
- 26) A chemistry teacher has 1,765 grams of a substance and he wants to separate the substance into 4-oz jars. How many 4-oz jars can he fill?
- 27) A chemical company needs to paint forty-five chemical tanks including the top and the bottom of the tanks. Each tank has a height of 9 ft and a diameter of 7 ft. Paint can be purchased in 1-gallon cans or in 5-gallon cans that cost the same as 4 1-gallon cans. Each gallon of paint will cover 350 square feet. How many of each should be purchased to keep the cost of painting the tanks as low as possible? Use 3.14 for π .
- 28) Find the volume, surface area, and ratio of volume to surface area for a container that measures 8 ft by 6 ft by 14 ft.
- 29) Find the volume, surface area, and volume to surface area ratio of a can that is 4.85 in. high with a radius of 1.2 in.

Solve. Remember to insert units in your answer.

- 30) A bottle weighs 84 grams. Determine the weight in kilograms of 35 bottles.
- 31) Six milligrams of preservatives are added to a 0.4-kg box of dried fruit. How many milligrams of preservatives are in 9 cartons of dried fruit if each carton contains 20 boxes?
- 32) One box of cookie mix weighs 2.325 kilograms, but 87 grams of this weight is the packaging. Determine the actual weight (excluding packaging) of the cookie mix in 5 boxes.
- 33) A painting in a museum is 140 centimeters wide. Convert this width to inches. Round answer to the nearest hundredth, if necessary.
- 34) The speed limit is 50 miles per hour. Convert this to kilometers per hour. Round answer to the nearest hundredth, if necessary.
- 35) The distance between two cities is 392 kilometers. Convert this to miles. Round answer to the nearest hundredth, if necessary.

36) A doctor orders a dosage of 12 mL of medicine every 8 hours for 2 weeks. How many fluid ounces of medicine should be purchased? Round up to the next whole fluid ounce.

Fill in the blank "More Than" or "Less Than".

37) A gallon is _____ a liter.

38) A liter is _____ a quart.

39) A foot is _____ a meter.

40) A yard is _____ a meter.

41) A kilogram weighs _____ a pound.

42) An ounce weighs _____ a gram.

43) A centimeter is _____ an inch.

44) Which would be the most appropriate unit of weight for a professional athlete?

A) kilogram

B) liter

C) metric ton

D) gram

Without actually converting, choose the most reasonable answer.

45) A dinner plate has a diameter of about _____.

A) 26 m

B) 26 km

C) 26 g

D) 26 cm

46) A two-car garage is about _____ wide.

A) 8 m

B) 800 m

C) 80 m

D) 8000 m

47) A baby bottle has a capacity of about _____.

A) 25 L

B) 2.5 L

C) 250 mL

D) 25 mL

48) The weight of an average teenager is about _____.

A) 0.6 kg

B) 6 kg

C) 600 kg

D) 60 kg

49) Sam aims to drink about 50 fluid ounces of water per day which is about _____.

A) 15 L

B) 150 mL

C) 150 L

D) 1.5 L

50) A plant is 19 inches tall which is about _____.

A) 500 cm

B) 5 m

C) 5 cm

D) 0.5 m

Solve. Remember to insert units when writing your answer.

51) The standard dose of medicine for a dog is 10 grams for every 15 pounds of body weight. What is the standard dose for a dog that weighs 115 pounds?

- 52) The tree in the Robertsons' back yard is 12.4 m tall. Because it blocks too much light, they ask a tree trimmer to remove the top $\frac{1}{4}$ of the tree. How tall will the tree be after being shortened?
- 53) If 2 ft 9 in. of material is used to manufacture one scarf, how much material is needed for 7 scarves?
- 54) A 7-m rope is attached to a 4.6-m rope. However, when the ropes are tied, 4 cm of length is lost to form the knot. What is the length of the tied ropes?
- 55) The sediment on the bottom of a creek is normally 22 cm thick, but a recent flood washed away 5 mm of sediment. How thick is it now?
- 56) The two sticks used to make a kite have lengths of 1.1 m and 54 cm. What total length of wood must be ordered for the sticks if 15 kites are to be built?
- 57) A rectangular fence is to be installed around a garden 12 ft 6 in. long by 15 ft 8 in. wide. What is the total length of fencing needed to enclose the garden?
- 58) Daniel is tiling a floor in a new building. He uses rectangular tiles which have a length of 25.6 cm. Along one wall he uses 128 tiles placed end to end. What is the length of the wall in meters?
- 59) Tina is preparing to run a marathon. Today, as part of her training, she will run 20 kilometers. How many miles is this?
- 60) The ratio of a basketball player's completed free throws to attempted free throws is 5 to 7. If she completed 10 free throws, determine how many free throws she attempted. Round to the nearest whole number if necessary.
- 61) It is recommended that there be at least 10.7 square feet of floor space in a classroom for every student in the class. Determine the minimum floor space that 30 students require. Round to the nearest tenth if necessary.
- 62) A bag of fertilizer covers 2000 square feet of lawn. Determine how many bags of fertilizer should be purchased to cover a rectangular lawn 130 feet by 80 feet.
- 63) On an architect's blueprint, 1 inch corresponds to 9 feet. If an exterior wall is 12 feet long, determine how long the blueprint measurement should be. Write answer as a mixed number if necessary.
- 64) The scale on a map states that 1 centimeter corresponds to 40 kilometers. On the map, two cities are 1.3 cm apart. Determine the actual distance.

- 65) A punch recipe calls for mixing 5 parts of cranberry juice with 2 parts of apple juice. Determine how much cranberry juice should be mixed with 40 ounces of apple juice.
- 66) The gasoline/oil ratio for a certain snow mobile is 20 to 1. If 1 gallon equals 128 fluid ounces, how many fluid ounces of oil should be mixed with 4 gallons of gasoline? Round the answer to the nearest whole ounce.
- 67) The adult daily dosage for a certain medicine is 100 mg (milligrams) for every 20 pounds of body weight. If the patient weighs 240 pounds and he is to receive a dose of this medicine every 3 hours, determine the amount of medicine he should receive in each dose.
- 68) A solution strength of 5 mg of medicine in 1 mL of solution is available. If a patient needs 8 mg, how many mL do you administer?

Determine the unit price.

- 69) Determine which is the better buy (lower cost per ounce) by finding each unit price rounded to three decimal places if necessary. Assume that different sizes of the same brand are being compared.

Popcorn:

\$1.07 for 16 ounces

\$1.49 for 21 ounces

Fill in the blank with one of the words or phrases listed below.

not equal	equal	cross products	rate	mass
unit rate	ratio	unit price	proportion	meter
unit fractions	liter	calorie	weight	

70) To convert from one unit of length to another, _____ may be used.

71) The basic unit of length in the metric system is the _____.

72) The _____ is the basic unit of capacity in the metric system.

73) Express 0.34 as a percent.

74) Express $\frac{3}{8}$ as a percent.

75) Express 93% as a decimal.

76) Express 38% as a fraction or improper fraction.

- 77) A coat was reduced from \$250 to \$200. Find the percent decrease.
- 78) The average teachers' and superintendents' salaries for a school district was \$43,640. Eight years later, the new average was \$55,176. Find the percent increase to the nearest tenth of a percent.
- 79) According to a government researcher, the average cost of tuition, room and board, and fees at public 4-year universities was \$8,553 in the 2000–2001 academic year, \$12,997 for 2006–7, and \$15,514 for 2009–10. Find the percent increase from 2001 to 2007 and from 2007 to 2010.
- 80) According to a government agency, there were 103,600 chefs/head cooks employed in the United States in 2010 and 319,600 food service managers. Those numbers were projected to decrease to 102,400 and 302,600 by 2020. Which job was facing the larger percent decrease? By how much?
- 81) Find the sales tax and total cost of an item that costs \$49.95 if the tax rate is 6.5%.
- 82) The sales tax in Pennsylvania is 5%. If the tax on an item is \$99, find the cost of the item.
- 83) A desk with an original price of \$229.99 is on sale for 20% off. Find the sale price.
- 84) A real estate agent received a 6% commission on the sale of a home. If his commission was \$22,620, how much did the home sell for?
- 85) You buy \$120 in clothes at a department store. You can choose between coupons that offer \$17 off your entire purchase or 25% off. Which will save you more money? By how much?
- 86) Marlene works full-time as an executive assistant, and she has a check for \$1,702.11 direct-deposited into her checking account every other Friday. How much money does Marlene make per year? There are different approaches to calculating this amount, so make sure that you describe how you arrived at your answer.
- 87) If a worker is paid a salary of \$45,400 per year and is in a tax bracket that results in 26% deductions, what is her monthly take-home pay?
- 88) My friend Charles noticed that one of his students came to class every day with two cups of coffee from a well-known coffee chain that isn't exactly famous for their low prices. He asked her if she'd ever thought about how much she spent on that coffee over the course of a year; not surprisingly, she had not. If she paid \$2.95 per cup for that coffee every day, how much would she spend on coffee in a year?

89) Leslie shares an apartment with two friends, and the rent and utilities are split equally by all three tenants. Find the amount left for variable expenses and luxuries if her monthly income is \$1,720.18 and fixed expenses are shown below.

Total rent:	\$1,601	Total utilities	\$277
Public transportation:	\$89	Cell Phone:	\$88.50
Insurance:	\$48.60	Gym membership	\$38.95

90) Leslie's monthly income is \$1,590.10 and has fixed expenses of \$847.05. Leslie treats her roommates to salads and pizzas from Papa Antonio's every Monday and Thursday, at a cost of \$27, including delivery and tip. What percentage of her budget after fixed expenses goes toward these semiweekly gatherings on average?

91) Jin pays \$320.29 every six months for car insurance. He also pays \$2,702 for tuition at the beginning of both fall and spring semesters, and budgets \$700 for books and supplies for each semester. If he wants to plan ahead, how much money should he put into savings every month? Explain how you decided on that amount.

92) In many cases, property taxes when you own a home are paid every six months, homeowner's insurance is paid once per year, and car insurance is paid every six months. One homeowner pays \$1,450 in property taxes twice a year, \$946 in homeowner's insurance annually, and makes car insurance payments of \$294.32 and \$335.40 every six months. If this homeowner wants to spread these expenses out by putting some money each month into a savings account, how much should she put aside per month?

93) 1. Simple interest = _____ × _____ × _____

2. Future value = _____ + _____

94) Using simple interest, determine the missing value.

Principal	Rate	Time	Simple Interest
\$16,200	3.5%	30 months	

95) Using simple interest, determine the missing value.

Principal	Rate	Time	Simple Interest
\$5,900	11%		\$2,920.50

96) Using simple interest, determine the missing value.

Principal	Rate	Time	Simple Interest
\$14,200		5.5 years	\$11,715.00

97) Using simple interest, determine the missing value.

Principal	Rate	Time	Simple Interest
	17%	4 years	\$1,496.00

98) Find the future value of a loan if \$3,500 is borrowed for 4 years at a simple interest rate of 9% per year.

99) Suppose that you take out a loan to buy new furniture, borrowing \$1,500. If the interest charge will be 7.2% of the borrowed amount per year, how much interest will you pay each year?

100) Dr. Phillips borrowed some money to buy new furniture for her office. She paid \$225.00 simple interest on a 5-year loan at 6%. Determine the principal.

101) Marta needs some cash for books at the beginning of spring semester, so she borrows \$600 at 11% simple interest for 4 months. How much interest will she pay, and what is the future value of the loan?

102) \$23,700 is invested for 30 months in a savings account with a rate of 5.5% simple interest per year. determine the interest.

103) A Motel is converting its rooms into privately owned condominiums. The interest on a \$600,000, 20-year construction loan is \$80,000. What is the rate of interest? Does the rate seem unreasonable?

104) The Elk Restaurant took out a loan for \$9,000. The simple interest rate was 6.9%, and the term of the loan was 3 years. Determine the interest, future value, and monthly payment.

105) If you invest \$6,000 for 42 months and receive \$840 in simple interest, what was the rate?

106) A pawn shop offers to finance a guitar costing \$800 at 4% simple interest. The total interest charged will be \$160. What is the term of the loan and the monthly payment?

107) For an investment of \$100,000 at 5% interest for 7 years, determine (a) the simple interest, and (b) the compound interest if interest is calculated once per year.

108) The general formula for compound interest is $A =$ _____

109) Using compound interest, determine the future value.

Principal	Rate	Compounded	Time
\$2,200	4.5%	Semiannually	6.5 years

110) Using compound interest, determine the amount of interest earned.

Principal	Rate	Compounded	Time
\$3,450	9%	Quarterly	4 years

111) In order to help pay for college, the grandparents of a child invest \$3,100 in a bond that pays 15% interest compounded quarterly. How much money will there be in 7.5 years?

112) Determine the interest on an investment of \$75,000 that pays 8.3% compounded weekly for 6 years.

113) Jenny Sherrer has \$19,000 to invest and believes that she will earn 8% compounded semiannually. Find the compound amounts if she invests for 3 years and for 8 years. Then find the additional amount earned due to the longer period.

114) Amy had an unpaid balance of \$2,296.42 on her credit card statement at the beginning of July. She made a payment of \$340.00 during the month, and made purchases of \$307.24. If the interest rate on Amy's credit card was 6.5% per month on the unpaid balance, find her finance charge and the new balance on August 1.

115) Raoul's credit card statement showed these transactions during May.

May 1	Previous balance	\$304.29
May 6	Payment	\$100.00
May 10	Purchases	\$58.10
May 15	Payment	\$100.00
May 26	Purchases	\$114.73

The interest rate is 18% per month on the average daily balance. Find the average daily balance, the finance charge for the month, and the new balance on June 1. [Hint: Remember that May has 31 days.]

116) A graphic design pro buys a new iMac for \$1,499 with a \$310 down payment, and gets manufacturer financing for 5 years at 15% APR. Find (a) the amount financed; (b) the monthly payment; (c) the total installment price; and (d) the finance charge.

117) If you buy a used car for \$8,200 with a down payment of \$1,300 and 36 monthly payments of \$250, find the amount financed, the total installment price, and the finance charge.

118) A student loan is taken out for \$9,100 at 6.2%. Find the interest that accrues in a 30-day month.

119) A student loan is taken out for \$8,400 at 7.4%. The student graduates 3 years and 9 months after the loan is acquired. Payments are deferred for 3 months after graduation. Find the total amount of interest that will accrue before regular payments begin, using 30-day months.

- 120) Max borrows \$18,500 for her last 2 years of college, acquiring a federal student loan at 7.3% interest. For a 10 year loan, find the following if she acquires the loan in August, graduates 2 years later, and payments begin 3 months later:
- Find the monthly payment after graduation if interest is not capitalized.
 - Find the full monthly payment after graduation if interest is capitalized.
 - How much money would be saved by not capitalizing interest.
- 121) A house sells for \$376,500 and a 35% down payment is made. A 30-year mortgage at 7.5% was obtained.
- Find the down payment.
 - Find the amount of the mortgage.
 - Find the monthly payment.
 - Find the total interest paid.
- 122) The Trissel family agreed on a price of \$222,700 for a home. Their company credit union offers a 6.4% 20-year loan with 15% down, resulting in a monthly payment of \$1,400.21. Find the monthly payment for the Trissels if they choose a 15-year loan instead of 20. How much money would they save overall?
- 123) A house has a \$297,500.00 mortgage at 7%. The monthly payments are \$2,674.53. Compute an amortization schedule for the first three months.
- 124) Twenty-five people responded to a questionnaire about what types of pets they had. Construct a frequency distribution for the data (D = dogs only, C = cats only, B = both, N = neither).

N	B	D	B	D
B	B	B	B	C
C	B	D	B	C
B	D	B	B	B
D	B	B	C	N

- 125) The ages of 40 community college students were gathered. Construct a frequency distribution for the data using five classes.

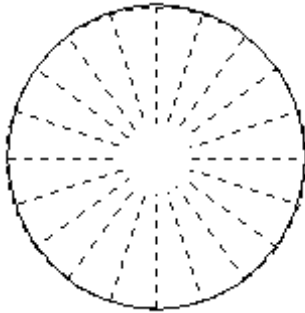
46	17	34	19	42	19	20	48
34	51	31	21	43	32	39	17
21	21	40	38	42	17	21	45
19	39	48	19	17	42	32	19
49	19	26	38	43	46	51	39

126) The GPAs of 20 students are given below. Construct a stem and leaf plot for the data using whole numbers as stems and the decimals as leaves.

1.6	2.0	2.6	2.9	2.3
3.9	4.0	2.5	3.5	3.8
3.5	2.2	0.6	1.6	4.0
1.8	3.0	2.3	3.1	2.1

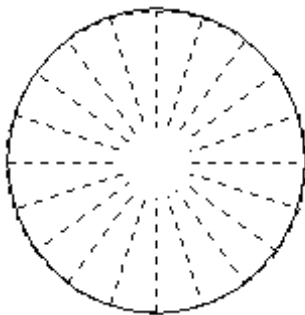
127) Construct a pie chart representing the given data set.

Favorite Pizza Topping	Number of Responses
Black olives	162
Mushrooms	135
Onions	63
Pepperoni	351



128) Construct a pie chart representing the given data set.

Favorite Food	Number of Responses
Chinese	115
Indian	75
Mexican	120
Thai	90



129) A population consists of _____.

130) A sample is a _____.

131) A researcher is studying possible grade inflation at colleges. The population is _____.

132) A researcher is studying possible grade inflation at colleges. The sample is _____.

- 133) In order to obtain a _____ sample, every subject of the population has to have an equal chance of being selected.
- 134) A _____ sample is taken by numbering each member of the population and then selecting every k th member, where k is some natural number.
- 135) When a population is divided into groups where the members of each group have similar characteristics and a certain number of members from each group are chosen at random, the result is called a _____ sample.
- 136) When an existing group of subjects that represent the population is used for a sample, it is called a _____ sample.
- 137) A researcher randomly selected three states and then gathered information from all colleges willing to release grade information in those states. Identify the sampling method used.
A) Stratified B) Cluster C) Systematic D) Random
- 138) A researcher numbered all of the colleges willing to release grade information and chose every tenth one. Identify the sampling method used.
A) Cluster B) Random C) Stratified D) Systematic
- 139) A researcher numbered all of the colleges willing to release grade information and chose several of them using a random number generator. Identify the sampling method used.
A) Cluster B) Systematic C) Stratified D) Random
- 140) A researcher grouped the schools by two-year state schools, four-year state schools, two-year private schools, and four-year private schools. The researcher then decided to choose five schools from each of those groups. Identify the sampling method used.
A) Systematic B) Stratified C) Random D) Cluster
- 141) To study the number of credit hours taken by a typical student, Shawna asks the registrar to provide e-mail addresses for 10 freshmen, 10 sophomores, 10 juniors, and 10 seniors. From each group, she asks for one whose student ID ends in 0, one whose ends in 1, and so forth. a. What method of sampling did she use?
A) Cluster B) Random C) Systematic D) Stratified

142) A bookstore recorded the type of books 30 customers purchased during a weekend sale (R = romance novel, S = science fiction, N = nonfiction, C = children's fiction). Construct a frequency distribution for the data.

N R R C R S
 R C C S R R
 C N N R C S
 S S R R N C
 S R R C C N

143) The ages of 40 community college students were gathered. Construct a frequency distribution for the data using five classes.

22 41 19 15 21 32 17 25
 20 27 18 44 21 17 24 40
 33 45 21 21 24 31 42 21
 15 25 26 15 29 16 15 35
 31 41 17 18 16 22 27 23

144) As an experiment in a botany class, plants are placed in a greenhouse, and their growth in centimeters after 25 days is recorded, with the results shown below in a stem and leaf plot.

Stems	Leaves
1	8
2	0 7
3	3 3 6 6 7
4	1 8 8 9
5	0 1 3 4 4 5 9 9

- How many plants grew to 207 cm?
- How many plants grew to 36 cm?
- How many plants had their growth measured and recorded?
- What was the largest growth recorded for any plant?

145) The grades on a college math exam are shown below. Construct a stem and leaf plot for the data.

79 77 50 83 71 65
 50 70 71 84 79 99
 87 89 92 73 95 76
 90 80 76 95 88 83
 75 68 78 53 73 57

146) Construct a stem and leaf plot for the following data using whole numbers as stems and the decimals as leaves.

5.3 2.4 7.1 4.8 6.2
3.1 7.8 6.4 2.7 2.5
7.1 3.6 5.9 5.4 3.2
4.4 7.6 2.5

147) Construct a bar graph for the following information.

Eye color	Number
Blue	513
Brown	892
Green	106
Hazel	327

148) The following frequency distribution shows for a certain high school the number of freshmen, sophomores, juniors, and seniors who smoke. Construct a bar graph for the data.

Rank	Frequency
Freshmen	14
Sophomores	20
Juniors	31
Seniors	35

149) The following frequency distribution shows for a certain high school the number of freshmen, sophomores, juniors, and seniors who smoke. Construct a pie chart for the data.

Rank	Frequency
Freshmen	14
Sophomores	20
Juniors	31
Seniors	35

150) Construct a pie chart for the following information.

Eye color	Number
Blue	513
Brown	890
Green	108
Hazel	327

151) The exam grades of 31 students were used to obtain the frequency distribution below. Construct a histogram for the data.

Class	Frequency
40-49	1
50-59	2
60-69	5
70-79	12
80-89	7
90-99	4

152) Fifty ten-year-olds were monitored to determine the number of hours per week they spent watching television, surfing the net, and playing video games. The results were used to obtain the frequency distribution below. Construct a histogram for the data.

Class	Frequency
0-4	2
5-9	7
10-14	7
15-19	15
20-24	10
25-29	5
30-34	3
35-39	1

153) These data represent the number of stray cats in a small town for the years listed. Draw a time series graph for the data.

Year	1998	1999	2000	2001	2002	2003
Number	29	38	51	42	45	56

154) These data represent the number of trees in a certain seaside town. Draw a time series graph for the data.

Year	1990	1991	1992	1993	1994	1995
Number	200	192	183	197	206	203

155) Last year, nine employees of an electronics company retired. Their ages at retirement are listed below. Find the mean retirement age.

50 65 64
 54 63 58
 60 50 52

156) A store manager kept track of the number of newspapers sold each day over a seven-day period. The results are shown below.

Sunday Monday Tuesday Wednesday Thursday Friday Saturday
 72, 10, 201, 133, 284, 231, 230

Find the median number of newspapers sold.

157) Find the mean, median, mode, and midrange for the data provided. The data shows hours spent at work for a group of men.

Name	Hours
Alvin	63.1
Juan	58.9
Sean	56.7
Victor	48.5
Chan	43.7
Jacques	39.7
Philip	32.9
Roberto	29.9

158) Provided below are the sizes of 15 farms, in acres, randomly selected from the state of Oregon. Find the mean area for these 15 farms.

1,920 289 451 263 485 307 347 265
 239 308 522 231 209 451 223

159) Provided below are the sizes of 15 farms, in acres, randomly selected from the state of Oregon. Find the midrange of the sample below.

3,200 473 213 341 480 535 503 181
 457 82 92 498 462 213 250

160) Provided below are the sizes of 15 farms, in acres, randomly selected from the state of Oregon. The mean of this sample is 530 acres.

3,200 95 474 309 190 279 188 446
 499 204 103 536 542 474 411

- Find the median of the sample and compare it to the mean and discuss the difference.
- Find the mean and the median if you throw out the 3,200 acre farm which has the largest area by far. What does this tell you?

161) Consider the grading structure for a course:

- Homework average: 50 points
- Four tests: 30 points each
- Final exam: 50 points
- Group project: 25 points
- Attendance/Participation: 10 points

Sue had an 87% homework average, got 91%, 80%, 85%, and 96% on the four tests, 86% on the final exam, 92% on the group project, and 100% of attendance/participation points. Use the mean for grouped data formula to find Sue's average for the course.

State which type of average, the mean, median, or mode, would be most appropriate in the situation described. Explain your thinking.

162) Suppose that a state introduces a state income tax which will be at a flat rate of 3%. The state legislature wishes to estimate how much money they will receive in taxes, and to do this they need to know the average income of residents of the state. Which information would be most useful, the mean income, the median income, or the mode of the incomes? Why?

163) Dave is a college student contemplating a possible career option. One factor that will influence his decision is the amount of money he is likely to make. He decides to look up the average starting salary of graduates in that profession. Which information would be most useful to him, the mean starting salary, the median starting salary, or the mode of the starting salaries. Why?

164) The table below lists the average high temperature in degrees Fahrenheit for each month of the year on a particular island. Find the mode and the median.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	82	83	83	84	86	85	87	87	87	84	86	83

165) The monthly high temperatures from January to December in Aruba and St. Louis are shown below. Find the median and range for each city.

Aruba: 85° 83° 84° 86° 87° 88° 88° 90° 88° 90° 87° 86°

St. Louis: 37° 46° 57° 62° 80° 82° 91° 86° 78° 68° 55° 38°

166) Find the mean, median, mode, and midrange for the data provided. The data shows hours spent at work.

Name	Hours
Annette	63.1
Juan	58.9
Sue	56.7
Victor	48.5
Chan	43.7
Jacques	39.7
Philip	32.9
Roberta	29.9

167) Find the range.

9 15 41 12 8 25 35 5

168) If a student's rank in a class of 500 students is 35, find the student's percentile rank.

169) For the 20 test scores shown, find the percentile rank for a score of 86.

75 63 92 74 86 50 77 82 98 65 71 89 75 66 87 59 70 83 91 73

170) Howard scored in the 65th percentile rank on an exam. If 400 students took the exam, how many students scored lower than Howard?

171) Find Q_1 , Q_2 , and Q_3 for the ages of nine students.

18 20 21 19 17 36 22 19 24

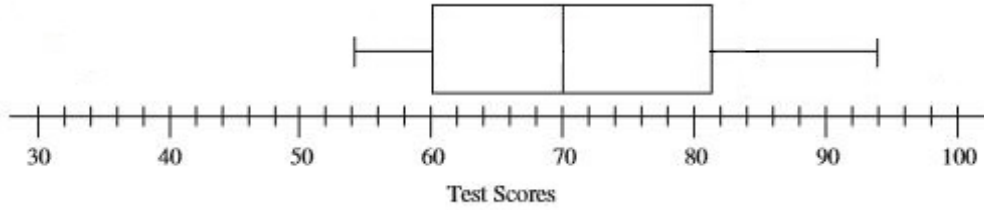
172) Find Q_1 , Q_2 , and Q_3 for the data set below.

5.4 2.0 6.8 3.1 2.9 4.7 2.1 5.0 1.9 3.4

173) Provide the five-number summary for the test scores of 15 students listed below.

42 46 48 53 59
63 66 68 74 77
85 87 90 94 95

174) Use the box plot to fill in all of the requested information for the test scores it illustrates.



Lowest Score _____ Third Quartile _____
 First Quartile _____ Highest Score _____
 Median _____ Interquartile Range _____

175) The data below are the number of cattle on farms in the United States (in millions) for each year that begins a decade from 1910 to 2010. Draw a box plot for the data below. Are there any outliers? If so, what are they?

58.0 71.4 64.9 70.0 74.5 98.9 114.4 112.3 95.4 99.8 91.9

176) Draw a scatter plot for the data shown.

x	2	7	3	4	5	1	6
y	6	1	5	3	6	12	2

177) Draw a scatter plot and describe the relationship.

x	3	6	7	5	1	4	2
y	10	1	2	10	5	6	3

178) Use a scatter plot to determine the relationship between the x values and the y values.

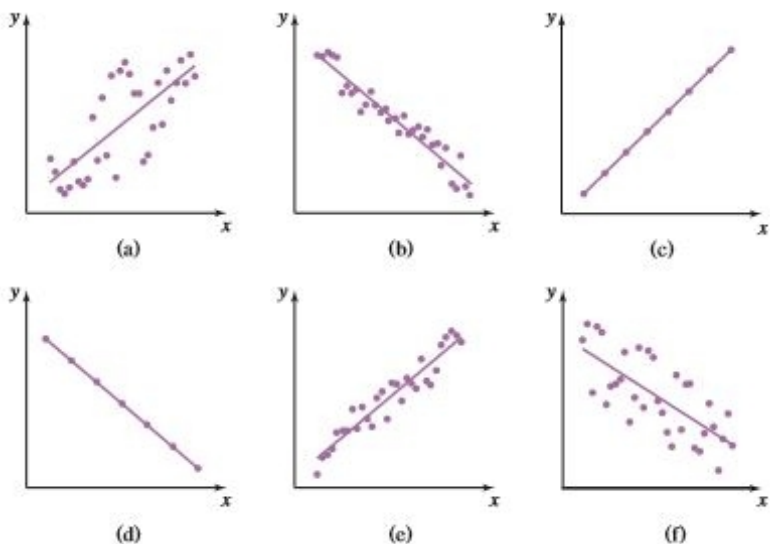
x	4	2	7	5	3	6	1
y	20	12	26	22	18	26	9

179) Use a scatter plot to determine the relationship between the x values and the y values.

x	7	2	4	5	1	6	3
y	4	25	19	14	29	11	24

180) Match each value of r with the appropriate graph.

$r = -1$	
$r = -0.9$	
$r = -0.5$	
$r = 0.5$	
$r = 0.9$	
$r = 1$	



181) Evaluate this claim by an advertiser: 63% of people surveyed prefer our brand of Cola over the leading national brand.

182) An upcoming school levy in my town would raise the property taxes on a \$170,000 home from \$248 per month to \$280 per month. Calculate the annual increase and the percent increase, then pick which one of these numbers would most likely be publicized by an advocacy group that opposes the tax increase.

183) A statistics instructor has recorded the scores of a recent quiz worth 20 possible points below.

19 17 17 15 15 0 15 16 18 18 18 20 15 19 17 0 15 17 20 18

- a. If he wanted to tell his students the scores on the quiz were terrible, which measure is he likely to use? (Determine Mean, Median, Midrange, and Mode; Give that value in your explanation.)
- b. If he wanted to tell them the scores on the quiz were fantastic, which measure is he likely to use? Give that value in your explanation

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

- 1) $53\frac{1}{3}$ yd
- 2) $5\frac{3}{4}$ ft
- 3) 81 ft
- 4) 2.65 mi
- 5) 4 pounds
- 6) 12 m
- 7) 29,500 mg
- 8) 2.02 inches
- 9) 16.9 miles
- 10) 33 feet
- 11) 27.5 kL
- 12) 16,783.8 pounds
- 13) 64 feet
- 14) 1.5 inches
- 15) 9 gallons
- 16) 1.81 cu yd
- 17) 2,041 lb
- 18) 9,284.54 quarts
- 19) 2.186 kL, 577.48 gal
- 20) 2.5 pounds
- 21) 17.34 g
- 22) 1,513.25 ounces
- 23) 7,524 pounds
- 24) 48.2°F
- 25) -211°F
- 26) He can fill 15 jars (almost 16).
- 27) 7 5-gallon cans and 1 1-gallon can
- 28) Volume: 672 ft³; Surface area: 488 ft²; ratio: 1.38
- 29) Volume: 21.94 in.³; Surface area: 45.62 in.²; ratio: 0.48
- 30) 2.94 kg
- 31) 1080 mg
- 32) 11.19 kg
- 33) 55.12 in.
- 34) 80.5 km per hr
- 35) 243.04 mi
- 36) 18 fl oz
- 37) greater capacity than
- 38) greater capacity than
- 39) shorter than
- 40) shorter than
- 41) greater than
- 42) greater than

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

- 43) shorter than
- 44) A
- 45) D
- 46) A
- 47) C
- 48) D
- 49) D
- 50) D
- 51) $76\frac{2}{3}$ g
- 52) 9.3 m
- 53) 19 ft 3 in.
- 54) 11.56 m
- 55) 21.5 cm
- 56) 24.6 m
- 57) 56 ft 4 in.
- 58) 32.768 m
- 59) 12.4 mi
- 60) 14 free throws
- 61) 321 sq ft
- 62) 6 bags
- 63) $1\frac{1}{3}$ in.
- 64) 52 km
- 65) 100 oz
- 66) 26 fl oz
- 67) 150 mg
- 68) 1.6 mL
- 69) \$1.07 for 16 ounces
- 70) unit fractions
- 71) meter
- 72) liter
- 73) 34%
- 74) 37.5%
- 75) 0.93
- 76) $\frac{19}{50}$
- 77) 20%
- 78) 26.4%
- 79) 2001 to 2007: 51.96%, 2007 to 2010: 19.37%
- 80) Food Service Managers; 5.32%
- 81) sales tax = \$3.25, total cost = \$53.20
- 82) \$1,980.00
- 83) \$183.99
- 84) \$377,000
- 85) 25% off coupon, \$13.00

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

86) Two possible answers:

1) Estimate a year at 52 weeks, then multiply \$1,702.11 by 26 to get \$44,254.86.

2) Divide \$1,702.11 by 14 to get a daily average, then multiply that by 365 days to get \$44,376.44.

87) \$2,799.67

88) \$2,153.50

89) \$829.13

90) 29.1%

91) \$620.38

92) \$425.45

93) 1. principal; rate; time

2. principal; interest

94) \$1,417.50

95) 4.5 years

96) 15%

97) \$2,200

98) \$4,760

99) \$108.00

100) \$750

101) \$22.00; \$622.00

102) \$3,258.75

103) 0.67%; unreasonable

104) \$1,863; \$10,863; \$301.75

105) 4%

106) 5 years; \$16.00

107) **a.** \$35,000; **b.** \$40,710.04

108) $P \left(1 + \frac{r}{n} \right)^{nt}$

109) \$2,937.96

110) \$1,475.29

111) \$9,354.16

112) \$48,358.05

113) \$11,545.54

114) Finance charge = \$149.27; new balance = \$2,412.93

115) Average daily balance = \$229.02; finance charge = \$41.22; new balance = \$318.34

116) **a.** \$1,189; **b.** \$28.29; **c.** \$2,007.40; **d.** \$508.40

117) Amount financed = \$6,900; total installment price = \$10,300;
finance charge = \$2,100

118) \$46.34

119) \$2,448.00

120) **a.** \$217.67; **b.** \$253.41; **c.** \$1,251.33

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

121)

- (i) Down payment = \$131,775.00
- (ii) Amount of mortgage = \$244,725.00
- (iii) Monthly payment = \$1,710.63
- (iv) Total interest paid = \$371,101.80

122) Monthly payment = \$1,638.57; Money saved = \$41,107.80

123)

<u>Payment Number</u>	<u>Interest</u>	<u>Payment on Principle</u>	<u>Balance of Loan</u>
1	\$1,735.42	\$939.11	\$296,560.89
2	\$1,729.94	\$944.59	\$295,616.30
3	\$1,724.43	\$950.10	\$294,666.20

124)

Type	Tally	Frequency
dogs		5
cats		4
both		14
neither		2

125)

Group	Tally	Frequency
17-23		15
24-30		1
31-37		5
38-44		11
45-51		8

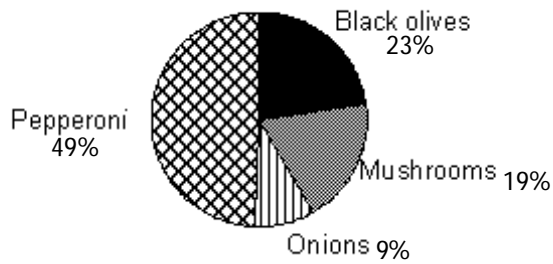
126)

Stems	Leaves
0	6
1	6 6 8
2	0 1 2 3 3 5 6 9
3	0 1 5 5 8 9
4	0 0

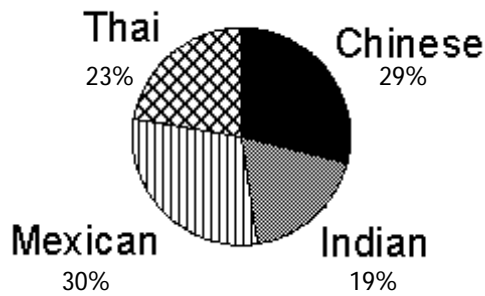
Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

127)



128)



129) all subjects under study

130) representative subgroup or subset of a population

131) all college students

132) the group of students whose GPAs were included in the averages

133) random

134) systematic

135) stratified

136) cluster

137) B

138) D

139) D

140) B

141) D

142)

Type	Tally	Frequency
R	### ###	11
S	###	6
N	###	5
C	### III	8

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

143)

Group	Tally	Frequency
15-20		13
21-26		13
27-32		6
33-38		2
39-44		6

144) a. None

b. 2

c. 20

d. 59

145)

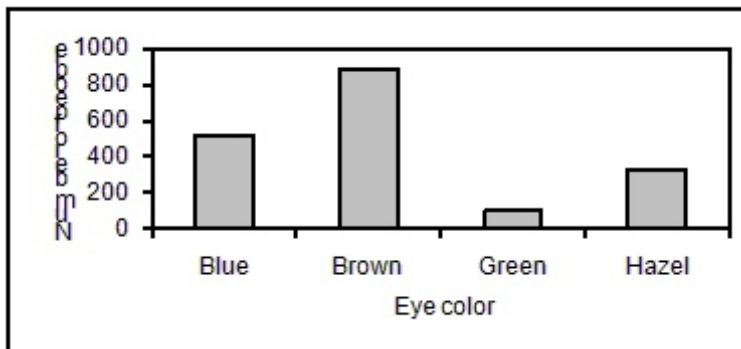
Stems	Leaves
5	0 0 3 7
6	5 8
7	0 1 1 3 3 5 6 6 7 8 9 9
8	0 3 3 4 7 8 9
9	0 2 5 5 9

146) Stems

Leaves

2	4 5 5 7
3	1 2 6
4	4 8
5	3 4 9
6	2 4
7	1 1 6 8

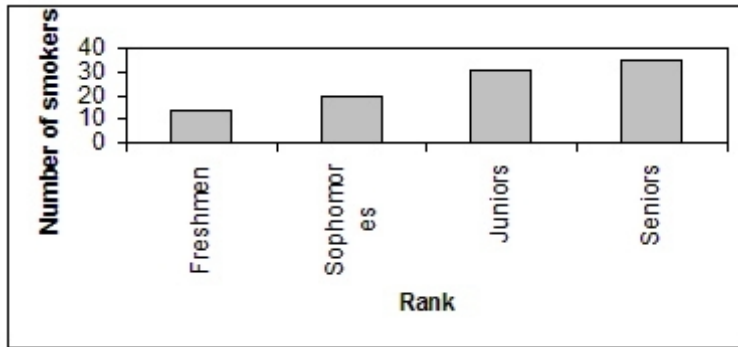
147)



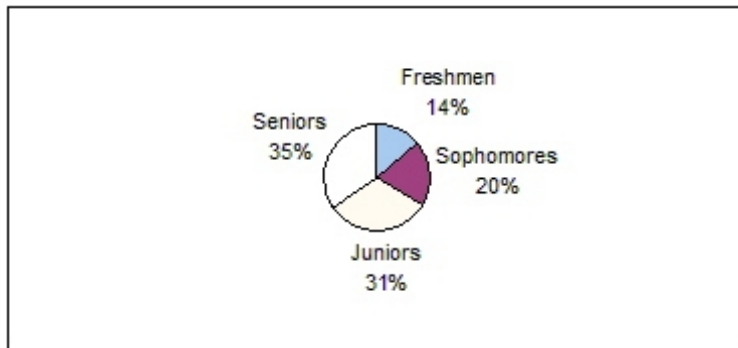
Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

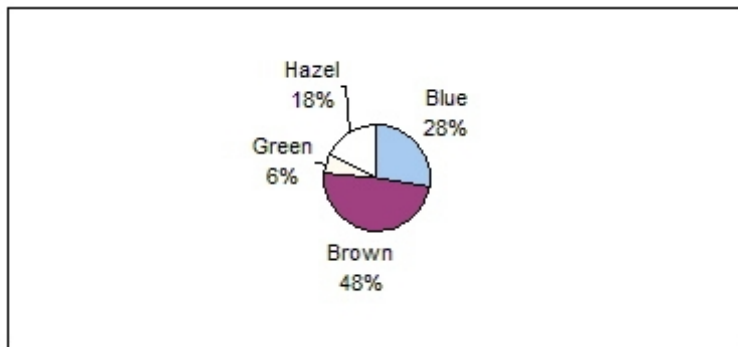
148)



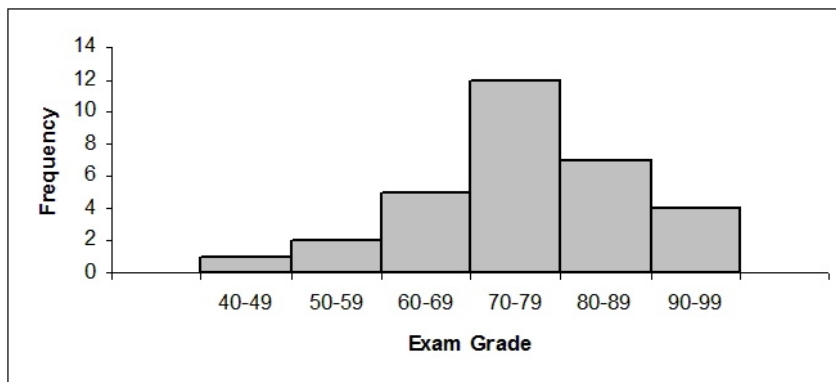
149)



150)



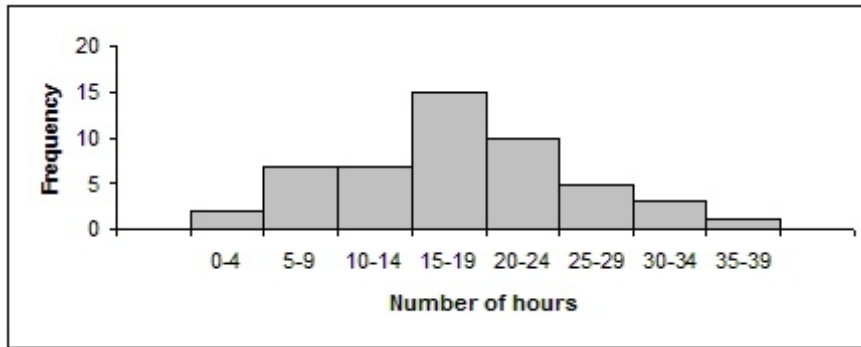
151)



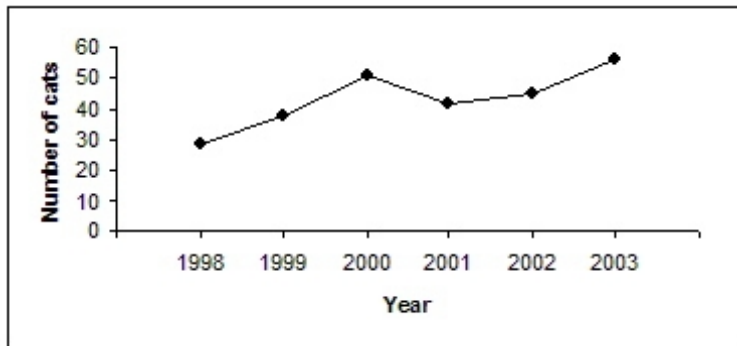
Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

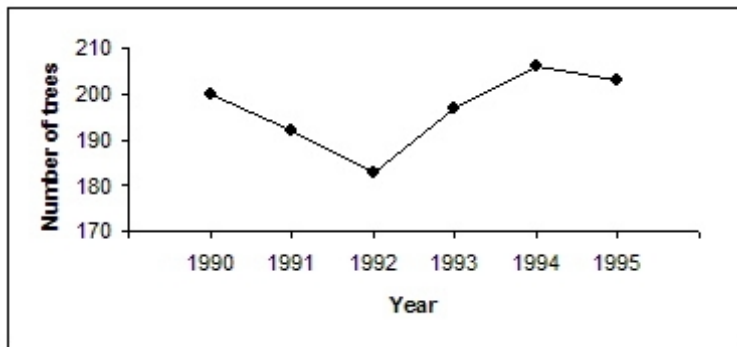
152)



153)



154)



155) 57.3

156) 201

157) mean: 46.675, median: 46.1, mode: no mode, midrange: 46.5

158) 434 acres

159) 1,641 acres

160) **a.** The median 411 acres which is much smaller than the mean. The mean is much more effected by the one value that is much larger than the others.

b. The new mean is 339.3 acres and the new median is 360 acres. That one large value did in fact skew the mean upward.

161) 88.3%

162) Answers will vary. Possible answer: The mean income would be most useful as it takes into account the numerical value of all incomes and thus best predicts how much tax will be paid.

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

163) The median salary would be most useful. Explanations will vary. Possible answer: The median gives the center of the data and is not affected by the few unusually high (or low) starting salaries. The median gives a better indication of the "typical" salary than either the mean or the mode.

164) Modes: 83° and 87° ; median: 84.5°

165) Aruba, median 87° , range 7° ; St. Louis, median 65° , range 54°

166) mean: 46.675, median: 46.1, mode: no mode, midrange: 46.5

167) 36

168) 93

169) 70th percentile

170) 260

171) $Q_1 = 18.5$, $Q_2 = 20$, $Q_3 = 23$

172) $Q_1 = 2.1$, $Q_2 = 3.25$, $Q_3 = 5.0$

173) 42, 53, 68, 87, 95

174) Lowest Score 54

First Quartile 60

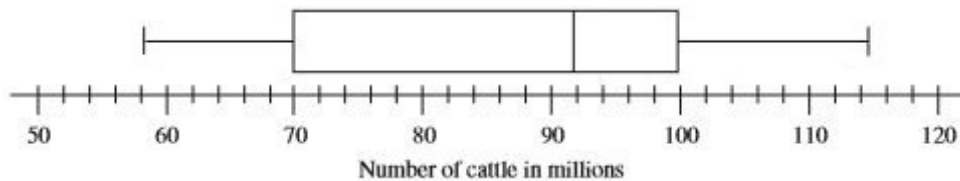
Median 70

Third Quartile 81

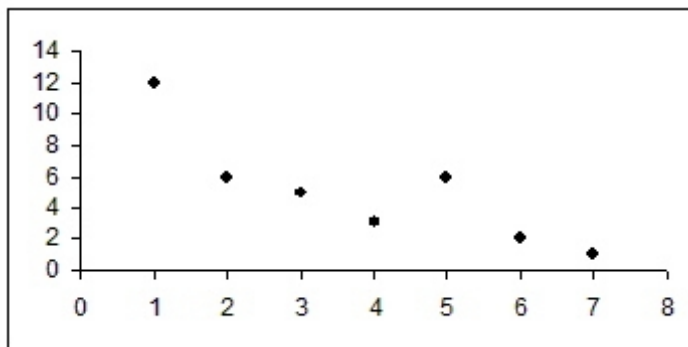
Highest Score 94

Interquartile Range 21

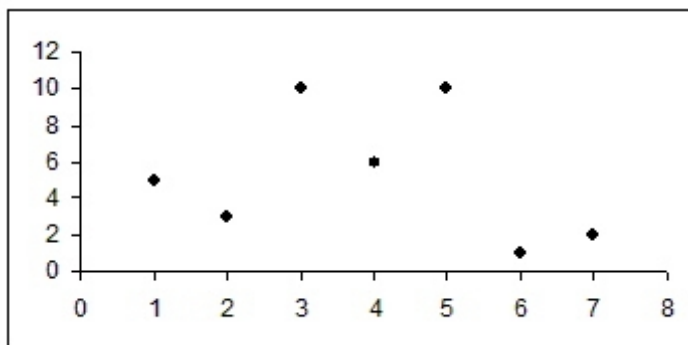
175) There are no outliers.



176)



177) No relationship exists.



178) Positive linear relationship

179) Negative linear relationship

Answer Key

Testname: 2018 PROFICIENCY REVIEW - V1

180)

$r = -1$	d
$r = -0.9$	b
$r = -0.5$	f
$r = 0.5$	a
$r = 0.9$	e
$r = 1$	c

- 181) Answers can vary. Ex: Since the sample size and selection methods are not given the result may not reflect the general population.
- 182) Increase: \$37; percent increase: 14.9% Which the advocacy group might choose is an opinion.
- 183) **a.** Because of the two zeroes, the midrange is 10, which is 50%. That makes it seem like the scores were awful.
- b.** The median was 17—great job class! Most of the scores were high, but the two zeroes lowered all other measures of average.