

Appendix A. QL assessment items and item analysis

Contents:

Table A1: Assessment items, sources, and percentages correct

Table A2: Item analysis

Table A1		
Assessment Items		
Question	Response Options	Source (Percent correct)
1– If 1 gallon of paint covers 250–400 square feet, how much paint do you need to for a room that is 20×15 feet? There are 3 windows which are 30×60 inches. The room has a door which is 38×82.75 inches and has 8 foot ceilings.	1. 1 gallon 2. 2 gallons 3. 15 gallons 4. 17 gallons	Authors 48/9% (<i>n</i> =92)
2– You are at a restaurant and receive good service. On a bill totaling \$40.31, what is a 15% tip?	1. \$6.05 2. \$2.69 3. \$8.62 4. \$4.31	Authors 91.0% (<i>n</i> =171)
3 – You are at a restaurant. There are three options from which you would like to choose. Which option gives you the fewest calories for the cost?	1. Southwestern Cobb Salad (1080 calories, \$8.99) 2. Honey BBQ ribs (1120, \$16.79) 3. Country Fried Chicken Crispers (1490 calories, \$9.89) 4. All are equal	Authors 58.0% (<i>n</i> =109)
4 – Most automobiles get about 28% more miles per gallon of fuel at 50 miles per hour than at 70 miles per hour. How much more gas will you use in a trip of 350 miles going 70 miles per hour than 50 miles per hour?	1. 28% more 2. 35% more 3. 20% more 4, 22% more	Authors 66.5% (<i>n</i> =125)
5 – How much more time will it take you to complete the trip mentioned in the previous question if you are traveling 50 miles per hour (versus 70 miles per hour)?	1. 1 hour 2. 2 hours 3. 3 hours 4. 4 hours	Authors 75.0% (<i>n</i> =141)
6– You want to make a small cake. You plan on using ½ of a cake mix. If the box tells you to use 1/3 cup of oil, how much do you need to make your small cake?	1. 2/6 2. 2/3 3. ¼ 4. 1/6	Authors 80.9% (<i>n</i> =152)
7 – If it takes you 22 minutes to get to Hamilton, what time should you leave Oxford to get there at 9 am?	1. 8:32 2. 8:38 3. 8.42 4. 8.44	Authors 89.9% (<i>n</i> =169)

8 – What is $\frac{1}{2}$ of $\frac{3}{4}$?	1. $\frac{2}{3}$ 2. $\frac{5}{8}$ 3. $\frac{1}{3}$ 4. $\frac{3}{8}$	Authors 79.8% (n=150)
9 – If 80% of the population is exposed to the swine flu, but only 20% of those exposed actually contract it, what is the percent of the population that actually get it?	1. 42% 2. 60% 3. 16% 4. 20%	Authors 71.8% (n=135)
10 – You are working at a restaurant and one customer's bill comes to \$10.76. They give you \$20.01. How much change should you give them?	1. 9.25 2. 10.25 3. 9.23 4. 10.99	Authors 81.9% (n=154)
11 – You are asked to do an analysis of students currently attending Miami University classes online. One of the areas being assessed is the number of students in the military compared to civilians. In the survey you plan on sending out, one question asks the respondent to check one of the following: ___ I am in the military ___ I am not in the military. What level of data is this question?	1. nominal 2. ordinal 3. interval 4. ratio	http://www.brainmass.com/homework-help/math/other/37420 42.0% (n=79)
12 – You started your own business last year and financially it has done quite well. You want to ascertain customer satisfaction, so you send a survey out to everyone on your mailing list. There are 10 questions on the survey, and customers are asked to rate a variety of areas: 1 (very unsatisfied), 2 (unsatisfied), 3 (neutral), 4 (satisfied), 5 (very satisfied). What level of data are the survey questions?	1. nominal 2. ordinal 3. interval 4. ratio	http://www.brainmass.com/homework-help/math/other/37420 37.8% (n=71)
13 – Halley's comet passes by the Earth every 76 years. The last time it came was 1985. When is the next time that it will pass by the Earth?	1. 2051 2. 2076 3. 1985 4. 2061	Authors 85.6% (n=161)
14 – To convert Fahrenheit to Celsius, you subtract 32 from the temperature and multiply the number by $\frac{5}{9}$. The normal human body temperature is 98.6 degrees Fahrenheit. What is it in Celsius?	1. 6.8 2. 37 3. 64.6 4. 209.48	Authors 84.6% (n=159)
15 – The highest point on the Earth is the top of Mt. Everest (29,028 feet above sea level). The lowest point on land is the Dead Sea (1,312 feet below sea level). What is the distance between the highest and lowest land locations on the Earth?	1. 27,716 ft 2. 28,312 ft 3. 30,340 ft 4. 30,430 ft	Authors 61.2% (n=115)
16 – Temperature can be determined by the frequency of cricket chirps using the following equation, temperature = $50 + (C - 50)/4$. "C" in this equation represents the number of cricket chirps in one minute. If you hear 70 chirps in a minute, what is the temperature?	1. 36 2. 55 3. 74 4. 80	Authors 82.4% (n=155)

17 – In 1960, the average person generated 2.66 pounds of garbage per day. In 1988, the estimate was 4.00 pounds of garbage per person per day. What is the percent increase of pounds of garbage per day?	<ol style="list-style-type: none"> 1. 50.4% 2. 54.7% 3. 66.5% 4. 150.4% 	<p>Authors</p> <p>45.7% (n=86)</p>
18 – Which of the following is the longest lived tree species?	<ol style="list-style-type: none"> 1. Douglas fir (750 years) 2. Bristlecone pine (3000–4700 years) 3. Giant sequoia (2500 years) 4. Redwood (1000–3500 years) 	<p>Authors</p> <p>79.8% (n=150)</p>
19 – Which animal lives the longest?	<ol style="list-style-type: none"> 1. Bobcat (32.3 years) 2. Giant Panda (9490 days) 3. Queen Ant (10 years) 4. Bedbug (182 days) 	<p>Authors</p> <p>77.7% (n=146)</p>
20 – If 2 pints equal a quart and 4 quarts equal a gallon, how many pints are in 5 gallons?	<ol style="list-style-type: none"> 1. 10 2. 5 3. 60 4. 40 	<p>Authors</p> <p>79.8% (n=150)</p>
21 – The exact length of the year is 365 days, 5 hours, 48 minutes, and 46 seconds. How much error do we have when using the leap year system?	<ol style="list-style-type: none"> 1. 44 minutes, 56 seconds 2. 65 minutes 3. 5 hours, 48 minutes, 46 seconds 4. 6 hours, 11 minutes, 14 seconds 	<p>Authors</p> <p>30.3% (n=57)</p>
22 – Which number reflects a trillion?	<ol style="list-style-type: none"> 1. 1,000,000 2. 1,000,000,000 3. 1,000,000,000,000 4. 1,000,000,000,000,000 	<p>Authors</p> <p>74.5% (n=140)</p>
23–24 not available		
The next couple questions are about the following advertisement for an imaginary drug called Gritagrel. “Gritagrel–50% reduction in strokes. Gritagrel is a new pill to prevent strokes. People taking Gritagrel had half as many strokes as people taking a placebo (i.e., sugar pill). Like any medicine, Gritagrel can have side effects. The most common side effects are: headache (5%) and stomach ache (1%).”		<p>Schwartz et al 2005 (Gritagrel Items)</p>
25 – Which would best help you to determine how much a person could benefit from Gritagrel?	<ol style="list-style-type: none"> 1. how often people experience side effects 2. how many people take Gritagrel 3. the chance of stroke for people who do NOT take Gritagrel 4. how recently Gritagrel was developed 	<p>Schwartz et al 2005 (Gritagrel Items)</p> <p>67.6% (n=127)</p>

26 – Which would best help you to decide whether <i>you</i> will benefit from Gritagrel?	1. how many people were in the study 2. age and sex of the people in the study 3. whether a doctor confirmed that people had strokes 4. who paid for the study	Schwartz et al 2005 (Gritagrel Items) 63.8% (n=120)
27 – Which additional piece of information would be the best evidence that Gritagrel helped people?	1. Gritagrel lowered antioxidant levels 2. fewer people died for any reason in the Gritagrel group than in the placebo group 3. many doctors prescribe it 4. fewer people died from strokes in the Gritagrel group than the placebo group	Schwartz et al 2005 (Gritagrel Items) 66.0% (n=124)
28 – A new study finds that there were 30 deaths among people who eat broccoli regularly compared to 100 deaths among people who don't eat broccoli at all. According to this study, which statement best describes how eating broccoli relates to death?	1. lowers the risk of death 2. doesn't change the risk of death 3. raises the risk of death 4. can't tell from this information	Schwartz et al 2005 (Gritagrel Items) 36.7% (n=69)
29– not available		
30 – If person A's risk of getting a disease is 1% in 10 years, and person B's risk is double that of A's, what is B's risk?	Open ended 2% in 10 years	Lipkus et al. 2001 71.3% (n=134)
31 – The chance of getting a viral infection is 0.0005. Out of 10,000 people, about how many of them are expected to get infected?	Open ended 5	Lipkus et al. 2001 64.4% (n=121)
32 – You have a fair coin, which means the chance of getting a head on a single toss is 1/2. Suppose you toss the coin 10 times and get 10 tails in a row. Is the probability of getting a head on your next toss more than, less than, or equal to 1/2? Explain.	Open ended 1/2	http://math.ucdenver.edu/~wbriggs/qr/QL_prof_test.html 75.0% (n=141)
33 – A high school tests all athletes for drug use, using a drug test that is 98% accurate. That is, it correctly gives a positive result for 98% of the drug users who are tested, and it correctly gives a negative result for 98% of the nonusers who are tested. Suppose that 1,000 athletes take the test, and 50 of these athletes are actually using drugs. What percentage of the positive tests are false positives (nonusers who test positive)?	Open ended 28%	http://math.ucdenver.edu/~wbriggs/qr/QL_prof_test.html 33.0% (n=62)

34 – A farmer has a rectangular garden with a perimeter of 72 feet. If one side is 4 feet longer than the other, then what is the area of the garden?	<p>1. 320 square feet</p> <p>2. 1476 square feet</p> <p>3. 1280 square feet</p> <p>4. 324 square feet</p> <p>5. 672 square feet</p>	<p>http://www.acethe-dat.com</p> <p>examplequantitative.html</p> <p>53.2%</p> <p>(n=100)</p>
According to the Census Bureau figures, solo drivers (no passengers) accounted from 73% of all driving commuters in 1990 and 76% of all driving commuters in 2000. The average commute time also increased from 22.4 minutes to 25.5 minutes between 1990 and 2000.		
35 – Estimate the increase in the number of solo drivers between 1990 and 2000.	<p>Open ended</p> <p>18%</p>	<p>http://www-math.cudenver.edu/~wbriggs/qr/news_problems.html#anchor285920</p> <p>3.2%</p> <p>(n=6)</p>
36 – What is the percent increase in commute time between 1990 and 2000?	<p>Open ended</p> <p>14%</p>	<p>http://www-math.cudenver.edu/~wbriggs/qr/news_problems.html#anchor285920</p> <p>17.6%</p> <p>(n=33)</p>
37 – Over the course of a year, how much more time does one person spend commuting in 2000 than in 1990?	<p>Open ended</p> <p>12.4 hours</p>	<p>http://www-math.cudenver.edu/~wbriggs/qr/news_problems.html#anchor285920</p> <p>5.3%</p> <p>(n=10)</p>
38–44 not available		

Table A2					
Assessment Items					
Question	Gender	Year in School	Total Score	Correlation with Total	Time
1– If 1 gallon of paint covers 250–400 square feet, how much paint do you need	$\chi^2(3)=5.12$, p=.16	$\chi^2(5)=5.99$, p=.31	t(176)=4.02, p<.001	r(178)=.29, p<.001	t(176)=.32, p=.75
2– You are at a restaurant and receive good service. On a bill totaling \$40.31, what is a 15% tip?	$\chi^2(3)=1.4$, p=.99	$\chi^2(5)=1.28$, p=.94	t(178)=4.55, p<.001	r(180)=.32, p<.001	t(178)=3.12, p=.002
3 – You are at a restaurant.... Which option gives you the fewest calories for the cost?	$\chi^2(3)=1.24$, p=.74	$\chi^2(5)=7.23$, p=.20	t(172)=4.03, p<.001	r(174)=.29, p<.001	t(172)=.26, p=.79
4 – ... How much more gas will you use in a trip of 350 miles	$\chi^2(2)=4.0$, p=.82	$\chi^2(5)=2.67$, p=.75	t(173)=7.00, p<.001	r(175)=.47, p<.001	t(173)=.64, p=.75
5 – How much more time will it take you to complete the trip	$\chi^2(2)=4.72$, p=.09	$\chi^2(5)=8.15$, p=.15	t(173)=6.55, p<.001	r(175)=.45, p<.001	t(173)=1.20, p=.23
6– You want to make a small cake. You plan on using ½ of a cake mix.....	$\chi^2(2)=8.20$, p=.02	$\chi^2(5)=7.5$, p=.98	t(172)=8.09, p<.001	r(174)=.53, p<.001	t(172)=.07, p=.94
7 – If it takes you 22 minutes to get to Hamilton, what time should you leave Oxford	$\chi^2(3)=1.7$, p=.98	$\chi^2(5)=4.11$, p=.53	t(181)=7.64, p<.001	r(183)=.49, p<.001	t(181)=.66, p=.51
8 – What is ½ of ¾?	$\chi^2(2)=8.99$, p=.01	$\chi^2(5)=1.45$, p=.92	t(173)=7.03, p<.001	r(175)=.47, p<.001	t(173)=.05, p=.96
9 – If 80% of the population is exposed to the swine flu, but only 20% of those exposed	$\chi^2(2)=3.65$, p=.16	$\chi^2(5)=1.27$, p=.94	t(173)=5.28, p<.001	r(175)=.37, p<.001	t(173)=1.42, p=.16
10 – You are working at a restaurant and one customer's bill comes to \$10.76.....	$\chi^2(2)=5.2$, p=.77	$\chi^2(5)=1.77$, p=.88	t(173)=5.40, p<.001	r(175)=.38, p<.001	t(173)=1.5, p=.13
11 – You are asked to do an analysis of students currently attending Miami University....	$\chi^2(2)=2.38$, p=.30	$\chi^2(5)=5.96$, p=.31	t(173)=3.05, p=.003	r(175)=.23, p<.001	t(173)=.55, p=.59
12 – You started your own business last year and financially it has done quite well....	$\chi^2(2)=1.15$, p=.56	$\chi^2(5)=9.37$, p=.10	t(173)=2.16, p=.03	r(175)=.16, p=.03	t(173)=2.50, p=.01
13 – Halley's comet passes by the Earth every 76 years. The last time it came was 1985....	$\chi^2(2)=4.55$, p=.10	$\chi^2(5)=2.96$, p=.71	t(171)=3.89, p<.001	r(173)=.29, p<.001	t(171)=.74, p=.46
14 – To convert Fahrenheit to Celsius, you subtract 32 from the temperature	$\chi^2(2)=1.15$, p=.56	$\chi^2(5)=1.12$, p=.95	t(170)=5.86, p<.001	r(172)=.41, p<.001	t(170)=.63, p=.53
15 – The highest point on the Earth is the top of Mt. Everest (29,028 feet above sea level)....	$\chi^2(2)=2.78$, p=.25	$\chi^2(5)=5.53$, p=.36	t(172)=6.00, p<.001	r(174)=.42, p<.001	t(172)=1.47, p=.14
16 – Temperature can be determined by the frequency of cricket chirps using	$\chi^2(2)=1.92$, p=.38	$\chi^2(5)=1.91$, p=.86	t(168)=6.05, p<.001	r(170)=.42, p<.001	t(168)=.62, p=.54
17 – In 1960, the average person generated 2.66 pounds of garbage per day	$\chi^2(2)=2.37$, p=.31	$\chi^2(5)=3.01$, p=.70	t(170)=4.11, p<.001	r(172)=.30, p<.001	t(170)=.83, p=.41
18 – Which of the following is the longest lived tree species?	$\chi^2(2)=4.2$, p=.81	$\chi^2(5)=4.58$, p=.47	t(170)=5.44, p<.001	r(172)=.39, p<.001	t(170)=.94, p=.35

19 – Which animal lives the longest?	$\chi^2(2)=18$, p=.92	$\chi^2(5)=59$, p=.99	t(169)=7.86, p<.001	r(171)=.52, p<.001	t(169)=.07, p=.94
20 – If 2 pints equal a quart and 4 quarts equal a gallon, how many pints are in 5 gallons?	$\chi^2(2)=16$, p=.92	$\chi^2(5)=83$, p=.32	t(168)=5.10, p<.001	r(170)=.37, p<.001	t(168)=.89, p=.37
21 – The exact length of the year is 365 days, 5 hours, 48 minutes, and 46 seconds....	$\chi^2(2)=637$, p=.04	$\chi^2(5)=330$, p=.65	t(166)=3.65, p<.001	r(171)=.27, p<.001	t(166)=.77, p=.44
22 – Which number reflects a trillion?	$\chi^2(2)=504$, p=.08	$\chi^2(5)=112$, p=.95	t(169)=4.41, p<.001	r(171)=.32, p<.001	t(169)=.39, p=.70
23–24 not available					
The next couple questions are about the following advertisement for an imaginary drug					
25 – Which would best help you to determine how much a person could benefit from Gritagrel?	$\chi^2(2)=151$, p=.47	$\chi^2(5)=283$, p=.73	t(163)=5.56, p<.001	r(165)=.40, p<.001	t(163)=.43, p=.67
26 – Which would best help you to decide whether <i>you</i> will benefit from Gritagrel?	$\chi^2(2)=105$, p=.59	$\chi^2(5)=840$, p=.14	t(163)=4.12, p<.001	r(165)=.31, p<.001	t(163)=1.32, p=.19
27 – Which additional piece of information would be the best evidence that Gritagrel helped people?	$\chi^2(2)=392$, p=.14	$\chi^2(5)=583$, p=.32	t(162)=4.00, p<.001	r(164)=.30, p<.001	t(162)=1.41, p=.16
28 – A new study finds that there were 30 deaths among people who eat broccoli	$\chi^2(2)=141$, p=.50	$\chi^2(5)=529$, p=.38	t(162)=2.04, p<.001	r(164)=.16, p=.04	t(162)=.54, p=.59
29– not available					
30 – If person A’s risk of getting a disease is 1% in 10 years, and person B’s risk is....	$\chi^2(3)=316$, p=.37	$\chi^2(5)=260$, p=.76	t(180)=8.67, p<.001	r(182)=.54, p<.001	t(180)=.72, p=.47
31 – The chance of getting a viral infection is 0.0005. Out of 10,000 people	$\chi^2(2)=426$, p=.12	$\chi^2(5)=627$, p=.28	t(153)=3.66, p<.001	r(155)=.28, p<.001	t(153)=.72, p=.47
32 – You have a fair coin , Suppose you toss the coin 10 times and get 10 tails in a row....	$\chi^2(2)=328$, p=.19	$\chi^2(5)=931$, p=.10	t(152)=2.37, p=.02	r(154)=.19, p=.02	t(152)=2.26, p=.03
33 – A high school tests all athletes for drug use, using a drug test that is 98% accurate	$\chi^2(2)=79$, p=.67	$\chi^2(5)=190$, p=.86	t(153)=2.54, p=.01	r(155)=.20, p=.01	t(153)=.55, p=.58
34 – A farmer has a rectangular garden with a perimeter of 72 feet....	$\chi^2(2)=193$, p=.38	$\chi^2(5)=215$, p=.83	t(154)=9.41, p<.001	r(156)=.69, p<.001	t(154)=.18, p=.86
According to the Census Bureau figures, solo drivers (no passengers) accounted for					
35 – Estimate the increase in the number of solo drivers between 1990 and 2000.	$\chi^2(2)=10$, p=.95	$\chi^2(5)=254$, p=.77	t(129)=1.77, p=.079	r(131)=.15, p=.08	t(129)=1.44, p=.15
36 – What is the percent increase in commute time between 1990 and 2000?	$\chi^2(2)=36$, p=.84	$\chi^2(5)=83$, p=.57	t(133)=4.04, p<.001	r(135)=.33, p<.001	t(133)=.60, p=.55
37 – Over the course of a year, how much more time does one person spend commuting	$\chi^2(2)=10$, p=.95	$\chi^2(5)=142$, p=.92	t(141)=3.83, p<.001	r(133)=.32, p<.001	t(131)=.47, p=.64
38–44 not available					