

3 pts 1. Terry had an average score of 85 on her first eight quizzes. She had an average of 83 after the next quiz she took. What did she get for a grade on this last quiz?

Ans. _____

4 pts 2. Using the data displayed in the frequency table, find the sum of the mean, median and mode of the incomes to the nearest whole number.

| Income | Frequency |
|-----------|-----------|
| 1,400,000 | 2 |
| 520,000 | 6 |
| 125,000 | 12 |
| 85,000 | 13 |
| 45,000 | 7 |

Ans. _____

5 pts 3. The difference of two positive numbers is 1. The product of these same two numbers is 1. What is the positive difference of the cubes of these two numbers?

Ans. _____

Arithmetic with Statistics

1. $9(83) = 747$. $8(85) = 680$. The difference is 67. Ans. 67
2. $2(1,400,000) + 6(520,000) + 12(125,000) + 13(85,000) + 7(45,000) = 8,840,000$. This divided by 40 = 221,000, the mean. The median = $\frac{125,000 + 85,000}{2} = 105,000$. Mode = 85,000. The sum of these = 411,000. Ans. 411,000
3. $x - y = 1$, so $(x - y)^3 = 1^3 \rightarrow x^3 - 3x^2y + 3xy^2 - y^3 = 1$, so $x^3 - y^3 = 1 + 3x^2y - 3xy^2 = 1 + 3xy(x - y)$. Since $xy = 1$ and $x - y = 1$, then $x^3 - y^3 = 1 + 3(1)(1) = 4$. Ans. 4

5 Arithmetic with Statistics Mar 2016 – 17 (You may use calculators)

3 pts 1. The mean of a set of whole numbers is 84. The maximum and minimum values of 72 and 94 are taken out. What is the mean of the 10 numbers that are left?

Ans. _____

4 pts 2. The mean of the elements in data set A is 453. The mean of the elements in data set B is 480. If the mean of the elements in the union of sets A and B is 468, where B has 85 elements, how many elements does set A have?

Ans. _____

5 pts 3. The mean, median, mode and range for 7 natural numbers is 6. Find the sum of the number of sixes that cannot be used in the set of the 7 numbers.

Ans. _____

Arithmetic with Statistics

1. Sum of data: $12(84) = 1008$. $1008 - 72 - 94 = 842$. $842 \div 10 = 84.2$.

Ans. 84.2

2. $453N + 480(85) = 468(N + 85) \rightarrow 453N + 480(85) = 468N + 468(85) \rightarrow$
 $480(85) - 468(85) = 468N - 453N \rightarrow 12(85) = 15N$, so $68 = N$.

Ans. 68

3. Cannot be 7 – range wrong. Cannot be 6 – the other # can only be 6. If 5 6's makes 30, 12 left: $3 + 9 = 12$, ok. 4 6's: $4(6) = 24$, leaves 18. 4,4,10: ok. 3 6's = 18, 24 left: 3,3,9,9: ok. 2 6's = 12, 30 left: If the two 6's are the 4th and 5th terms, then the lower 3 have to be 3,4,5, this sum is 12, so the upper sum is 18, one has to be 9, cannot be done. If the 6's are the 3rd and 4th terms, then the upper 3 will be 7,8,9. Which totals 24, leaving a sum of 6 for lower two one of which has to be 3, cannot be done. There cannot be one 6. $7 + 6 + 2 + 1 = 16$.

Ans. 16

3 pts 1. Find the absolute value of the difference between the median and the mean of the following data set: {4, 0, -1, 7, 6, 3}

Ans. _____

4 pts 2. Find the sum of the mean, median, mode and range of the following data.

| | | | | | |
|-----------|---|----|---|----|---|
| size | 1 | 2 | 3 | 4 | 5 |
| frequency | 5 | 15 | 5 | 10 | 5 |

Ans. _____

5 pts 3. Seven data points are each one-digit numbers. Range of the data points is 5. There are two modes which have a difference of 2 and each mode occurs twice. The median is one of the modes. Six of the seven data points are prime numbers. Find the sum of all possible data points that satisfy these conditions.

Ans. _____

Statistics

- Median = 3.5. Mean = $19/6 = 3\frac{1}{6}$. Median - Mean: $3\frac{1}{2} - 3\frac{1}{6} = \frac{1}{3}$. **Ans. 1/3**
- Mode is 2. Range is 4. Median = 2.5. Mean = $115/40 = 2\frac{7}{8}$. Sum = $11\frac{3}{8}$. **Ans. 11 3/8**
- Possibilities for modes are either 3 and 5 or 5 and 7. Primes are 2, 3, 5, 7. Non-primes are 0, 1, 4, 6, 8, and 9. Only one non-prime can be used. Possibilities: 0, 2, 3, 3, 5, 5, 7, out of range; 0, 2, 3, 5, 5, 7, 7, out of range; 1, 2, 3, 3, 5, 5, 7, out of range; 1, 2, 3, 5, 5, 7, 7, out of range; 2, 3, 3, 4, 5, 5, 7, median not mode. 2, 3, 3, 5, 5, 6, 7, works (1); 2, 3, 3, 5, 5, 8, out of range; 2, 3, 4, 5, 5, 7, 7, works (2); 2, 3, 5, 5, 6, 7, 7, works (3); 2, 3, 5, 5, 7, 7, 8, out of range. (1) + (2) + (3) = 31 + 33 + 35 = 99. **Ans. 99**

5 Arithmetic with Statistics Mar 2015 (You may use calculators)

3 pts 1. Find a set of five positive integers with a mean of 4, a range of 6, a mode of 1 and a median of 5. List your numbers in increasing order.

Ans. _____

4 pts 2. Find all the distinct real numbers x , such that the median of the five numbers $x, 4, 6, 1, 9$ is equal to the mean of the same 5 numbers.

Ans. _____

5 pts 3. In a group of five people, the sums of the ages of each group of four of them are 124, 128, 130, 136, and 142. What is the age of the youngest?

Ans. _____

Arithmetic with Statistics

1. 1, 1, 5, x , 7; mean 4 implies $x + 14 = 20$, so $x = 6$. **Ans. 1, 1, 5, 6, 7**
2. Since the order of the known numbers is 1, 4, 6, 9 the median must be 4, 6, or the only number in between, 5. If 4, then x is 0. If 5, then $x = 5$. If 6, then $x = 10$. **Ans. 0, 5, 10**
3. Let a, b, c, d, e be the ages of the people from youngest to oldest. Then $a+b+c+d = 124$, $a+b+c+e = 128$, $a+b+d+e = 130$, $a+c+d+e = 136$, and $b+c+d+e = 142$. Adding all 5 equations: $4(a+b+c+d+e) = 660$ or $a+b+c+d+e = 165 \rightarrow a + 142 = 165$, $a = 23$. **Ans. 23**

5 Arithmetic with Statistics Mar 2014 (Calculators allowed)

3 pts 1. N is the least common multiple of 5, 6, and 7. Find the exact mean of the numbers one gets when dividing N by 5, then 6, then 7.

Ans. _____

4 pts 2. Convert $344_5 + 233_4 + 122_3$ to Base 6.

Ans. _____

5 pts 3. The mean, median and mode of a group of 8 positive integers are 8, 9, and 10 respectively. M is the largest of these integers. Find the sum of the largest and smallest possible values for M for all such groups.

Ans. _____

Arithmetic with Statistics

1. $N = 5 \cdot 6 \cdot 7$. $\frac{5 \cdot 6 \cdot 7}{5} = 42$, $\frac{5 \cdot 6 \cdot 7}{6} = 35$, $\frac{5 \cdot 6 \cdot 7}{7} = 30$. $(42 + 35 + 30) / 3 = 35\frac{2}{3}$. Ans. $35\frac{2}{3}$

2. Converting each to base 10: $344_5 = 75 + 20 + 4 = 99$; $233_4 = 32 + 12 + 3 = 47$;
 $122_3 = 9 + 6 + 2 = 17$. The sum is 163. Converting 163 to Base 6: there are 4 36's which is 144, with 19 left over. This is 3 6's with 1 left over. 431 Base 6. Ans. 431 Base 6

3. If the mean of eight numbers is 8, then their sum is 64. Since the median is 9 and the mode is 10 then the smallest possible value for the largest term is 10, the numbers being $\underline{\quad}, \underline{\quad}, \underline{\quad}, 9, 9, 10, 10, 10$. The sum of these numbers is 48, that leaves 16 for the other 3, which could be 4, 5, 7. The value for the largest term comes when the fourth and fifth are 8 and 10, the 6th and 7th are 10 and the first three terms are as small as possible. If the first three terms are 1, 1, and 2, then the first 7 numbers are 1, 1, 2, 8, 10, 10, 10. The sum of these is 42, making the 8th term 22. $22 + 10 = 32$. Ans. 32

3 pts 1. A data set of three samples of positive integers has a sum of 93. One of the samples is the mean of the data set and the range is 8. Find the largest sample of the set.

Ans. _____

4 pts 2. The following chart shows a student's quiz grades on all math quizzes so far through his high school career. He has two quizzes left to take.

| | | | | | | | |
|--------|----|----|----|----|----|----|-----|
| Grade | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
| Number | 2 | 5 | 8 | 11 | 19 | 16 | 18 |

What must he average on the last two quizzes in order to finish high school with exactly a 90 math quiz average?

Ans. _____

5 pts 3. For a data set, define the *MS Index* ("Makes Sense") as $\frac{|Median - Mean|}{Range}$. Find the value of the smallest *MS Index* among the following data sets:

- {1, 2, 9} {1, 2, 3, 12} {1, 17, 24} {1, 19, 19, 21} {1, 2, 14, 15, 23}

Ans. _____

Arithmetic with Statistics

(1) Since mean (31) is a sample and range is 8, let x = largest sample. $x - 8 + x = 93 - 31$
 $2x = 70, x = 35.$

Ans. 35

(2) $90(81) = 2a + 2(70) + 5(75) + 8(80) + 11(85) + 19(90) + 16(95) + 18(100)$
 $7290 = 2a + 7120. 2a = 170, \text{ so } a = 85.$

Ans. 85

| | | | | | |
|----------|-----------|---------------|-------------|-----------------|--------------------|
| (3) | {1, 2, 9} | {1, 2, 3, 12} | {1, 17, 24} | {1, 19, 19, 21} | {1, 2, 14, 15, 23} |
| Median | 2 | 2.5 | 17 | 19 | 14 |
| Mean | 4 | 4.5 | 14 | 15 | 11 |
| Range | 8 | 11 | 23 | 20 | 22 |
| MS Index | 1/4 | 2/11 | 3/23 | 1/5 | 3/22 |

Ans. 3/23

5 Arithmetic with Statistics Mar 2012 (You may use calculators)

3 pts 1. The mean of the set of numbers 21, 42, 25, 55, and x is 37. Find the sum of the mean, median, mode and range of this set of numbers.

Ans. _____

4 pts 2. Five positive integers have an average of 89. The median is 103. The mode is 105. The range is 70. What is the second smallest of these five integers?

Ans. _____

5 pts 3. If the following was multiplied out, what would the unit's digit of the product be?

$$242^{81}(363)^{72}(454^{97})$$

Ans. _____

Arithmetic with Statistics

1. $21 + 42 + 25 + 55 + x = 37(5) \Rightarrow 143 + x = 185$, so $x = 42$. Thus the median and mode are each 42 and the range is $55 - 21 = 34$. $37 + 42 + 42 + 34 = 155$. **Ans. 155**

2. Let the 1st (the smallest) = x , the 2nd (the second smallest), 3rd 103 (the median), the 4th and 5th 105 (the mode). Range = $70 = 105 - x$, so $x = 35$. Mean = $89 = (y + 348)/5$. $445 = y + 34$. So $y = 97$. **Ans. 97**

3. The unit's digit sequence for powers of 242 are 2, 4, 8, 6, 2, 4, ..., repeating every power of 4. 4 divides 81 with a remainder of 1. 2 is the result. Similarly 363 has a sequence 3, 9, 7, 1, 3, 9, ... repeating every power of 4 also. Dividing 72 by 4, leaves no remainder, so 1 is the result. 454 has a sequence of 4, 6, 4, 6, ..., thus repeating every power of 2. 2 divides 97 with a remainder of 1, so the result is 4. $2(1)(4) = 8$. **Ans. 8**

5 Arithmetic with Statistics Mar 2011 (You may use Calculators)

3 pts 1. Find a group of five positive integers such that the mean, median, range and only one mode are all 12.

Ans. _____

4pts 2. At Deering High the mean score of 50 students on the MEA science test was 75. At Portland High the mean score of 40 students on the same test was 80. What is the mean score of all 90 students? Round your answer to the nearest 10th.

Ans. _____

5 pts 3. If the mean of the data, $x + 5$, x , $x - 1$, $x/2$, $2x$, x^2 , and $x^2 + 1$ is $1\frac{5}{28}$, where x is a positive real number, find the numerical value of the median.

Ans. _____

Arithmetic with Statistics

1. 6, 12, 12, 12, 18 or 7, 10, 12, 12, 19 or 5, 12, 12, 14, 17 satisfies all with mean, median, mode and range 12. **Ans. 6, 12, 12, 12 18 or 7, 10, 12, 12, 19 or 5, 12, 12, 14, 17.**

2. $50(75) + 40(80) = 6950$. $6950/90 = 77.2222$. **Ans. 77.2**

3. Adding the values $x + 5$, x , $x - 1$, $x/2$, $2x$, x^2 , and $x^2 + 1$ makes $2x^2 + 5\frac{1}{2}x + 5$.

So $\frac{2x^2 + 5\frac{1}{2}x + 5}{7} = \frac{33}{28}$. Thus $8x^2 + 22x + 20 = 33 \rightarrow 8x^2 + 22x - 13 = 0$. Factoring:

$(4x + 13)(2x - 1) = 0$. So $x = \frac{1}{2}$ or $x = -3\frac{1}{4}$. But x is a positive real. So $x = \frac{1}{2}$. Plugging back into the 7 data points, $x = \frac{1}{2}$ is the median. **Ans. 1/2**

5 Arithmetic with Statistics Mar 2010 (You may use Calculators)

3 pts 1. The mean for a set of 20 basketball games is 42.3. Two of the extreme scores are 96 and 11. If these two scores are removed, by how much is the mean changed? State answer to the nearest 10th and whether it is higher or lower than the original mean.

Ans. _____

4 pts 2. Find the base four number which is the product of 321_4 and 123_4 .

Ans. _____

5 pts 3. There are three integral values of x such that the mean is equal to the median of the data set $\{x, 2, 9, -7, 1, -6\}$. Find the three values.

Ans. _____

Arithmetic with Statistics

1. Mean times 20 = total sum of numbers = 846. $846 - (96 + 11) = 739$. $739 \div 18 = 41.055$. $42.3 - 41.055 = 1.245$. **Ans. 1.2 lower**

2.

$$\begin{array}{r} 321_4 \\ 123_4 \\ \hline 2223 \\ 1302 \\ 321 \\ \hline 120,003_4 \end{array}$$

Ans. 120,003₄

3. Ordering the numbers: -7, -6, 1, 2, 9. The sum of these five is -1. Plugging in numbers from -6 to 2, -2 produces a mean and median of -.5. Otherwise the mean will have to be 5 or -2.5. So either (1) $\frac{x-1}{6} = -2.5$ or (2) $\frac{x-1}{6} = 1.5$. In (1): $x - 1 = -15$, so $x = -14$.

In (2): $x - 1 = 9$, so $x = 10$.

Ans. 10, -14 and -2

