1. B

$$m = \frac{67 + 75 \times 3 + 87 \times 2 + 91 \times 2}{8} = 81$$

To find the median of the test scores, put all the test scores in order, from least to greatest.

67, 75, 75, 75, 87, 87, 91, 91
There are two middle values, 75 and 87.
The median is the mean of these two values.

$$M = \frac{75 + 87}{2} = 81$$
$$M - m = 81 - 81 = 0$$

2. B

$$\text{Average} = \frac{n + n - 3 + 2n + 1 + 3n - 4 + 5n + 10}{5}$$
$$= \frac{12n + 4}{5}$$

Since the average of five numbers is 8,

$\frac{12n+4}{5}=8$.

Solving the equation for n yields $n=3$.
Therefore, the five numbers are 3, 0, 7, 5, and 25.
Arranging the five numbers in order, we get
0, 3, 5, 7, and 25.

The median of this set of numbers is 5, and the range of this set of numbers is $25-0$, or 25.

3. D

Let the other number $= y$.

$\frac{x+y}{2}=\frac{1}{2}x+1$	Avg. of two numbers is $\frac{1}{2}x+1$.
$2(\frac{x+y}{2})=2(\frac{1}{2}x+1)$	Multiply each side by 2.
$x+y=x+2$	Distributive property
$y=2$	Subtract each side by x.

The other number is 2.

4. C

If the average of a set of n numbers is 19, then the sum of n numbers is $19n$.
If the average of the 6 greatest numbers in the set is 29, the sum of those 6 numbers is 6×29, or 174. There are $n-6$ remaining numbers, with sum $19n-174$ and average is 7.

Therefore, $\frac{19n-174}{n-6}=7$.

$19n-174=7(n-6)$

$19n-174=7n-42$

$12n=132$

$n=11$

5. 1

The average of m, n, and -1 is 0.

$\frac{m+n+(-1)}{3}=0$

$m+n+(-1)=0$

$m+n=1$

6. $\frac{3}{5}$

Weighted average of the two groups

$$=\frac{\begin{Bmatrix}\text{sum of the values}\\ \text{of group 1}\end{Bmatrix}+\begin{Bmatrix}\text{sum of the values}\\ \text{of group 2}\end{Bmatrix}}{\text{total number of values}}$$

$84=\frac{79m+87n}{m+n} \Rightarrow 84(m+n)=79m+87n$

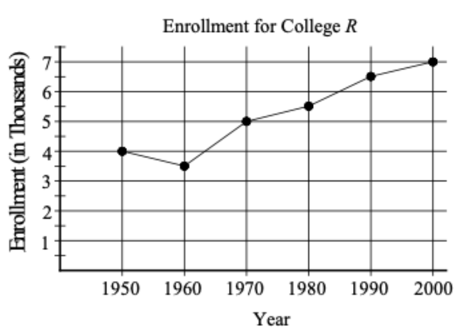
$\Rightarrow 84m+84n=79m+87n \Rightarrow 5m=3n$

$\Rightarrow m=\frac{3}{5}n \Rightarrow \frac{m}{n}=\frac{3}{5}$

7. 196

The student's total score for his 4 tests is 86×4, or 344. In order to have an average of 90 for all 6 tests, the student needs 90×6, or 540, points total. So the total score needed on the next two tests is $540-344$, or 196.

1. B



Year	Changes in enrollment	
1950 – 1960	500	decrease
1960 – 1970	1,500	increase
1970 – 1980	500	increase
1980 – 1990	1,000	increase

The greatest change in enrollment occurred between 1960 and 1970.

2. B

Average rate of increase in enrollment

$= \frac{\text{number increased}}{\text{change in decades}} = \frac{7000-4000}{5}$

$= \frac{3000}{5} = 600$

3. D

Percent of decrease in enrollment between 1950 and 1960 $= \frac{\text{number decreased}}{\text{original number}} = \frac{500}{4000} = 0.125$

The percent decrease was 12.5%, so the expected increase is 12.5%.

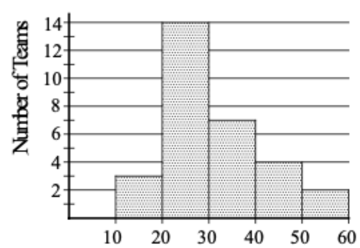
Let x = expected number of increase.
Expected percent increase

$= \frac{\text{number of increase}}{\text{original number}} = \frac{x}{7000} = 0.125$

$x = 7000 \times 0.125 = 875$

Therefore, the expected enrollment in 2010 is $7,000 + 875$, or 7,875.

4. B

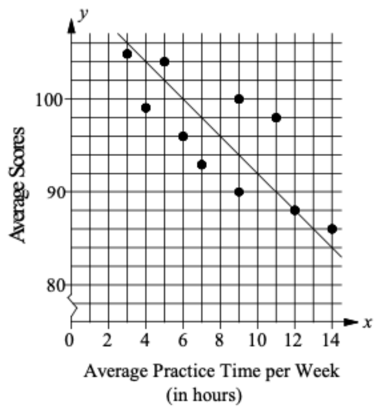


Number of Triples Hit by Mjor League Teams

The median of a data set is the middle value when the data are arranged in order. Since there are 30 teams the middle value is the average of 15th and 16th value. Since there are 3 teams who hit less than 20 triples and 13 teams who hit more than 30 triples, the median number should be between 20 and 30. Therefore, of the choices given, only 27 could be the median number of triples hit by 30 teams.

Choice B is correct.

1. C



The average score of the golfer that is farthest from the line of best fit is located at $(11,98)$. The golfer's average score is 98.

Choice C is correct.

2. D

There are two golfers whose average practice time is 9. The difference between their average scores is $100-90$, or 10.

Choice D is correct.

3. B

The list of the 10 golfers' average scores listed from highest to lowest is 105, 104, 100, 99, 98, 96, 93, 90, 88, and 86.
There are two middle values, 98 and 96.
The median is the average of these two numbers.

$$\text{Median} = \frac{98+96}{2} = 97$$

4. A

According to the graph, the horizontal line that represents 4,500 cars repaired by Jay's Motor intersects the line of best fit at a point where the horizontal coordinate is between 1995 and 2000, and closer to 1995 than 2000. Therefore, of the choices given, 1996 best approximates the year in which the number of cars repaired by Jay's Motor was estimated to be 4,500.

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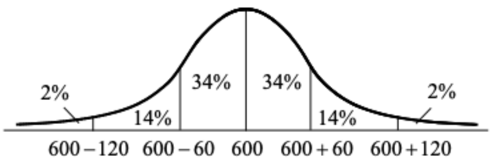
1. 168



Fourteen percent of the students have SAT scores between 660 and 720.
14% of 1,200 is 1200×0.14, or 168.

2. 192

Sixteen percent of the students have SAT scores less than 540.
16% of 1,200 is 1200×0.16, or 192.

3. 24

Two percent of the students have SAT scores greater than 720.
2% of 1,200 is 1200×0.02, or 24.

4. 1.75

First, put all the data in order.
0, 1, 1, 2, 2, 2, 2, 4

$$m = \frac{0+1+1+2+2+2+2+4}{8} = \frac{14}{8} = 1.75$$

5. 1.09

$$\begin{aligned} d^2 = [&(0-1.75)^2 + (1-1.75)^2 + (1-1.75)^2 \\ &+ (2-1.75)^2 + (2-1.75)^2 + (2-1.75)^2 \\ &+ (2-1.75)^2 + (4-1.75)^2] \div 8 = 1.1875 \end{aligned}$$

$$d = \sqrt{1.1875} \approx 1.09$$

6. C

Add 2 to each entry on the original list. The new list is 2, 3, 3, 4, 4, 4, 4, 6.

$$m_a = \frac{2+3+3+4+4+4+4+6}{8} = \frac{30}{8} = 3.75$$

$$\begin{aligned} d^2 = [&(2-3.75)^2 + (3-3.75)^2 + (3-3.75)^2 \\ &+ (4-3.75)^2 + (4-3.75)^2 + (4-3.75)^2 \\ &+ (4-3.75)^2 + (6-3.75)^2] \div 8 = 1.1875 \end{aligned}$$

$$d = \sqrt{1.1875} \approx 1.09$$

The mean is increased by 2, but the standard deviation is unchanged.

Choice C is correct.

7. A

Multiply each entry by 2 on the original list.
New list is 0, 2, 2, 4, 4, 4, 4, 8.

$$m_p = \frac{0+2+2+4+4+4+4+8}{8} = \frac{28}{8} = 3.5$$

$$\begin{aligned} d^2 = [&(0-3.5)^2 + (2-3.5)^2 + (2-3.5)^2 \\ &+ (4-3.5)^2 + (4-3.5)^2 + (4-3.5)^2 \\ &+ (4-3.5)^2 + (8-3.5)^2] \div 8 = 4.75 \end{aligned}$$

$$d = \sqrt{4.75} \approx 2.18$$

The mean and standard deviation are multiplied by 2.

Choice A is correct.

1. B

The total number of people who are between age 31 and 60 is 210. From that age group, 90 people voted for candidate B. Thus the percent of those who voted for candidate B is $\frac{90}{210} \approx 0.428 \approx 43\%$.

Choice B is correct.

2. C

The best estimate of the total number of votes can be obtained by multiplying the fraction of people who voted for candidate B and the total population of voters. $\frac{212}{500} \times 450,000 = 190,800$.

Therefore, of the choices given, 190,000 is the best estimation.

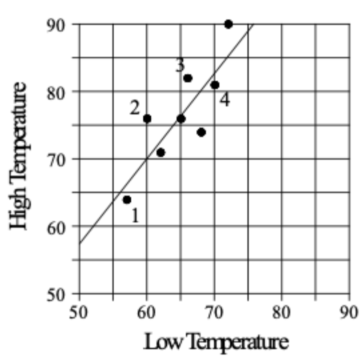
3. A

According to the data, 84 out of 160 people whose ages are between 18 and 30 voted for candidate A and 31 out of 130 people who are 55 years or older, voted for candidate A.

The ratio is $(\frac{84}{160}) \div (\frac{31}{130}) \approx 2.2$.

2.2 times more likely.

1. B



The slope of the line of best fit is the value of the average increase in high temperature when the low temperature increases by one degree.
Using approximate values found along the line of best fit $(60,70)$ and $(76,90)$, the approximate slope can be calculated as $\frac{90-70}{76-60}=1.25$.

Of the choices given, 1.3 is the best estimation. Therefore, the high temperature increases 1.3 degrees when the low temperature increases by one degree.

2. B

When the low temperature is 58, the graph shows that the high temperature is between 65 and 70, but closer to 70. Of the choices given, 68 is the best estimation.

3. A

In Day 1, the approximate high temperature is 64 and the approximate low temperature is 57. The difference is $64-57$, or 7 degrees.

In Day 2, the approximate high temperature is 76 and the approximate low temperature is 60. The difference is $76-60$, or 16 degrees.

In Day 3, the approximate high temperature is 82 and the approximate low temperature is 67. The difference is $82-67$, or 15 degrees.

In Day 4, the approximate high temperature is 81 and the approximate low temperature is 70. The difference is $81-70$, or 11 degrees.

The difference between the high and the low temperature was minimum on Day 1.

4. C

3 people worked for 30 hours.
5 people worked for 34 hours.
9 people worked for 40 hours.
2 people worked for 45 hours.
1 person worked for 50 hours.

Average number of hours worked

$=\frac{\text{total number of hours}}{\text{total number of people}}$

$=\frac{3\cdot 30+5\cdot 34+9\cdot 40+2\cdot 45+1\cdot 50}{20}$

$=\frac{760}{20}=38$

5. B

Frequency Distribution for List *A*

Number	0	4	5	6
Frequency	8	10	12	10

Frequency Distribution for List *B*

Number	7	10	11	15
Frequency	10	8	10	12

Average of the numbers in List B

$= \frac{10\times7+8\times10+10\times11+12\times15}{40} = \frac{440}{40} = 11$

Average of the numbers in List A

$= \frac{8\times0+10\times4+12\times5+10\times6}{40} = \frac{160}{40} = 4$

Therefore, the difference between the average of the two lists is $11-4$, or 7.

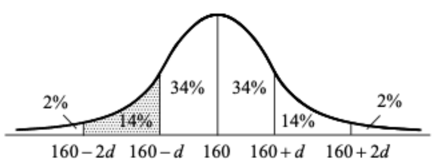
6. A

Because the lists A and B each contain 40 numbers, the average of the numbers in list C is the average of the individual averages of the numbers in lists A and B. Thus the average of the numbers in list C is $\frac{4+11}{2}$, or 7.5.

If you look at the numbers in the two lists, you will see that the 40 numbers in list A are all less than or equal to 6, and the 40 numbers in list B are all greater than or equal to 7. Thus the two middle numbers in list C are 6 and 7, and the average of these numbers is $\frac{6+7}{2}$, or 6.5.

Therefore, $m = 7.5$ and $M = 6.5$, and $m - M = 7.5 - 6.5 = 1$.

7. B



If the value 148 is at the 12th percentile of the distribution, the value must be in the shaded region which is in between $160-d$ and $160-2d$.

If $d=5$, $160-d=160-5=155$ and $160-2d=160-2\cdot5=150$, which does not include 148.

If $d=10$, $160-d=160-10=150$ and $160-2d=160-2\cdot10=140$, which includes 148.

If $d=15$, $160-d=160-15=145$ and $160-2d=160-2\cdot15=130$, which does not include 148.

If $d=20$, $160-d=160-20=140$ and $160-2d=160-2\cdot20=120$, which does not include 148.

Choice B is correct.

8. B

Ratings of Laptop A by 100 Reviewers

Ratings	5	4	3	2	1
Frequency	28	45	11	7	9

Ratings of Laptop B by 100 Reviewers

Ratings	5	4	3	2	1
Frequency	22	24	18	20	16

The standard deviation is a measure of how far the data set values are from the mean. In the data set for laptop A, the large majority of the data are in two of the five possible values, which are the two values closest to the mean. In the data set for laptop B, the data are more spread out, thus by observation, the data for laptop B have a larger standard deviation.

Choice B is correct.

1. B

$\sqrt{-1}-\sqrt{-4}+\sqrt{-9}$
$=i-i\sqrt{4}+i\sqrt{9}$ $i=\sqrt{-1}$
$=i-2i+3i$
$=2i$

2. C

$\sqrt{-2}\cdot\sqrt{-8}$
$=i\sqrt{2}\cdot i\sqrt{8}$ $\sqrt{-2}=i\sqrt{2}$, $\sqrt{-8}=i\sqrt{8}$
$=i^2\sqrt{16}$
$=-4$ $i^2=-1$

3. D

$\frac{3-i}{3+i}$

$=\frac{3-i}{3+i}\cdot\frac{3-i}{3-i}$ Rationalize the denominator.

$=\frac{9-6i+i^2}{9-i^2}$ FOIL

$=\frac{9-6i-1}{9+1}$ $i^2=-1$

$=\frac{8-6i}{10}$ Simplify.

$=\frac{4-3i}{5}$ or $\frac{4}{5}-\frac{3i}{5}$

4 . C

$\frac{1}{2}(5i-3)-\frac{1}{3}(4i+5)$

$=\frac{5}{2}i-\frac{3}{2}-\frac{4i}{3}-\frac{5}{3}$ Distributive Property

$=\frac{15}{6}i-\frac{9}{6}-\frac{8i}{6}-\frac{10}{6}$ 6 is the GCD.

$=\frac{7}{6}i-\frac{19}{6}$ Simplify.

5. 23

$(4+i)^2=a+bi$
$16+8i+i^2=a+bi$ FOIL
$16+8i-1=a+bi$ $i^2=-1$
$15+8i=a+bi$ Simplify.
$15=a$ and $8=b$ Definition of Equal Complex Numbers

Therefore, $a+b=15+8=23$.

6. 2

$\frac{3-i}{1-2i}=\frac{3-i}{1-2i}\cdot\frac{1+2i}{1+2i}=\frac{3+6i-i-2i^2}{1-4i^2}$

$=\frac{3+6i-i+2}{1+4}=\frac{5+5i}{5}=1+i=a+bi$

Therefore, $a=1$ and $b=1$, and $a+b=1+1=2$.