Set 2

1.

Country	Consumption (in millions of kilograms)
J	1,080
K	600
L	360
M	330
N	310

The table above gives the coffee consumption in 1994 for five countries. If the total coffee consumption of these countries was 40 percent of the world's coffee consumption, what was the world's coffee consumption, in millions of kilograms, in 1994?

A. 4,320
B. 4,470
C. 5,400
D. 6,480
E. 6,700

---

2. When positive integer x is divided by the positive integer y, the remainder is 9. If $\frac{x}{y}$=96.12 what is the value of y?

A. 96
B. 75
C. 48
D. 25
E. 12

---

3. Is the standard deviation of the salaries of Company Y's employees greater than the standard deviation of the salaries of Company Z's employees?

(1) The average (arithmetic mean) salary of Company Y's employees is greater than the average salary of Company Z's employees.

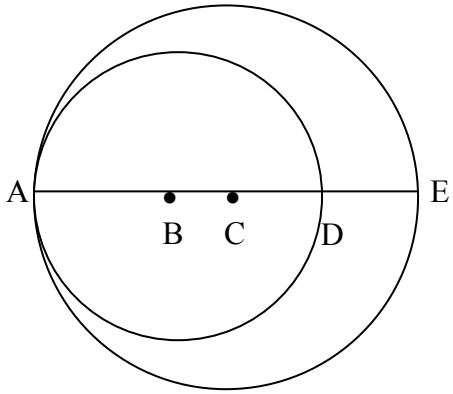
(2) The median salary of Company Y's employees is greater than the median salary of Company Z's employees.

4. What is the value of $v^3 - k^3$?

(1) $v\,k > 0$

(2) $v - k = 6$

5.

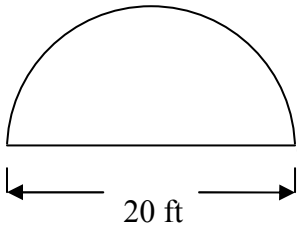


In the figure, points A, B, C, D, and E lie on a line. A is on both circles, B is the center of the smaller circle, C is the center of the larger circle, D is on the smaller circle, and E is on the larger circle. What is the area of the region inside the larger circle and outside the smaller circle?

(1) AB = 3 and BC =2

(2) CD =1 and DE = 4

6.



The figure above shows the dimensions of a semicircular cross section of a one-way tunnel. The single traffic lane is 12 feet wide and is equidistant from the sides of the tunnel. If vehicles must clear the top of the tunnel by at least ½ foot when they are inside the traffic lane, what should be the limit on the height of vehicles that are allowed to use the tunnel?

A. 5½ ft B. 7½ ft C. 8 ½ ft D. 9½ ft E. 10 ft

7. Square S is inscribed in circle T. If the perimeter of S is 24, what is the circumference of circle T?

A. 6π
B. 12π
C. $3\sqrt{2}\pi$
D. $6\sqrt{2}\pi$
E. $12\sqrt{2}\pi$

---

8. The operation $\otimes$ is defined for all nonzero numbers a and b by $a \otimes b = \frac{a}{b} - \frac{b}{a}$. If x and y are nonzero numbers, which of the following statements must be true?

I. $x \otimes xy = x(1 \otimes y)$

II. $x \otimes y = -(y \otimes x)$

III. $\frac{1}{x} \otimes \frac{1}{y} = y \otimes x$

A. I only
B. II only
C. III only
D. I and II
E. II and III

---

9. What was the price at which a merchant sold a certain appliance?

(1) The merchant's gross profit on the appliance was 20 percent of the price at which the merchant sold the appliance.

(2) The price at which the merchant sold the appliance was $50 more than the merchant's cost of the appliance.

---

10. An attorney charged a fee for estate planning services for a certain estate. The attorney's fee was what percent of the accessed value of the estate?

(1) The accessed value of the estate was $1.2 million.

(2) The attorney charged $2,400 for the estate planning services.

11. Is the sum of the integers x and y a prime number?

(1) x is an even prime number.

(2) y is a prime number between 10 and 20.

---

12. There are 11 women and 9 men in a certain club. If the club is to select a committee of 2 women and 2 men, how many different such committees are possible?

A. 120
B. 720
C. 1,060
D. 1,520
E. 1,980

---

13. An integer greater than 1 that is not prime is called composite. If the two-digit integer n is greater than 20, is n composite?

(1) The tens digit of n is a factor of the units digit of n.

(2) The tens digit of n is 2.

---

14. $C_{(m, n)}=\frac{m!}{(m-n)!\,n!}$ for non-negative integers m and n, where $m \geq n$. If $C_{(5, 3)}=C_{(5, x)}$ and $x \neq 3$, what is the value of x?

A. 0
B. 1
C. 2
D. 4
E. 5

---

15. If w, x, y, and z are integers such that $1 < w < x < y < z$ and $wxyz = 462$, then $z =$?

A. 7
B. 11
C. 14
D. 21
E. 42

16. The sum of three integers is 40. The largest integer is 3 times the middle integer, and the smallest integer is 23 less than the largest integer. What is the product of the three integers?

A. 1,104
B. 972
C. 672
D. 294
E. 192

---

17. If a and b are positive, is $(a^{-1} + b^{-1})^{-1}$ less than $(a^{-1}*b^{-1})^{-1}$?

(1) $a = 2b$

(2) $a + b > 1$

---

18. On a certain transatlantic crossing, 20 percent of a ship's passengers held round-trip tickets and also took their cars abroad the ship. If 60 percent of the passengers with round-trip tickets did <u>not</u> take their cars abroad the ship, what percent of the ship's passengers held round-trip tickets?

A. 33 1/3%
B. 40%
C. 50%
D. 60%
E. 66 2/3%

---

19. If x is an integer, which of the following must be an odd integer?

A. 2x + 2
B. 4x + 3
C. 12x - 6
D. 13x
E. 14x

20. A collection of 36 cards consists of 4 sets of 9 cards each. The 9 cards in each set are numbered 1 through 9. If one card has been removed from the collection, what is the number on that card?

(1) The units digit of the sum of the numbers on the remaining 35 cards is 6.

(2) The sum of the numbers on the remaining 35 cards is 176.

---

21. If $xy \neq 0$, is $\frac{x}{y} = 1$?

(1) $x^2 = y^2$

(2) $xy > 0$

---

22. A construction company was paid a total of $500,000 for a construction project. The company's only costs for the project were for labor and materials. Was the company's profit for the project greater than $150,000?

(1) The company's total cost was three times its cost for materials.

(2) The company's profit was greater than its cost for labor.

23.

AMOUNT OF BACTERIA PRESENT

Time	Amount
1:00 P.M.	10.0 grams
4:00 P.M.	x grams
7:00 P.M.	14.4 grams

Data for a certain biology experiment are given in the table above. If the amount of bacteria present increased by the same fraction during each of the two 3-hour periods shown, how many grams of bacteria were present at 4:00 P.M.?

A. 12.0
B. 12.1
C. 12.2
D. 12.3
E. 12.4

24. The value of $(9\times10^7)(9\times10^8)$ is closest to which of the following?

A. 10^{16}
B. 10^{17}
C. 10^{56}
D. 10^{57}
E. 10^{58}

---

25. Of the goose eggs laid at a certain pond, 2/3 hatched, and 3/4 of the geese that hatched from those eggs survived the first month. Of the geese that survived the first month, 3/5 did not survive the first year. If 120 geese survived the first year and if no more than one goose hatched from each egg, how many goose eggs were laid at the pond?

A. 280
B. 400
C. 540
D. 600
E. 840

---

26. A researcher plans to identify each participant in a certain medical experiment with a code consisting of either a single letter or a pair of distinct letters written in alphabetical order. What is the least number of letters that can be used if there are 12 participants, and each participant is to receive a different code?

A. 4
B. 5
C. 6
D. 7
E. 8

---

27. Max has \$125 consisting of bills each worth either \$5 or \$20. How many bills worth \$5 does Max have?

(1) Max has fewer than 5 bills worth \$5 each.

(2) Max has more than 5 bills worth \$20 each.

28. At a sale all books were priced equally and all magazines were priced equally. What was the price of 3 books and 4 magazines at the sale?

(1) At the sale the price of a book was $1.45 more than the price of a magazine.

(2) At the sale the price of 6 books and 8 magazines was $43.70.

---

29. How many different 6-letter sequences are there that consist of one "A", two "B", and three "C" ?

A. 6
B. 60
C. 120
D. 360
E. 720

---

30. A pharmaceutical company received $3 million in royalties on the first $20 million in sales of the generic equivalent of one of its products and then $9 million in royalties on the next $108 million in sales. By approximately what percent did the ratio of royalties to sales decrease from the first $20 million in sales to the next $108 million in sales?

A. 8%
B. 15%
C. 45%
D. 52%
E. 56%

---

31. If n is a positive integer, what is the remainder when $7^{4n+3}\ 6^{n}$ is divided by 10?

A. 1
B. 2
C. 4
D. 6
E. 8

32. A certain fruit stand sold apples for $0.70 each and bananas for $0.50 each. If a customer purchased both apples and bananas from the stand for a total of $6.30, what total number of apples and bananas did the customer purchase?

A. 10
B. 11
C. 12
D. 13
E. 14

---

33. A certain list consists of 3 different numbers. Does the median of the 3 numbers equal the average (arithmetic mean) of the 3 numbers?

(1) The range of the 3 numbers is equal to twice the difference between the greatest number and the median.

(2) The sum of the 3 numbers is equal to 3 times one of the numbers.

---

34. Working simultaneously and independently at an identical constant rate, 4 machines of a certain type can produce a total of x units of product P in 6 days. How many of these machines, working simultaneously and independently at this constant rate, can produce a total of 3x units of product P in 4 days?

A. 24
B. 18
C. 16
D. 12
E. 8

---

35. The weights of all dishes of type X are exactly the same, and the weights of all dishes of type Y are exactly the same. Is the weight of 1 dish of type X less than the weight of 1 dish of type Y?

(1) The total weight of 3 dishes of type X and 2 dishes of type Y is less than the total weight of 2 dishes of type X and 4 dishes of type Y.

(2) The total weight of 4 dishes of type X and 3 dishes of type Y is less than the total weight of 3 dishes of type X and 4 dishes of type Y.

36. If x, y, and z are positive integers, is xz even?

(1) xy is even.

(2) yz is even.

---

37. A club with a total membership of 30 has formed 3 committees, M, S, and R, which have 8, 12, and 5 members, respectively. If no member of committee M is on either of the other 2 committees, what is the greatest possible number of members in the club who are on none of the committees?

A. 5
B. 7
C. 8
D. 10
E. 12

Answers for set 2

1. The best answer is E.

   Let X be the world's total coffee consumption. The consumption of the five countries is: 1,080+600+360+330+310=2,680 ➔ $\frac{40x}{100} = 2{,}680$ ➔ x = 6,700

2. The best answer is B.

   $\frac{x}{y} = 96.12 \Rightarrow \frac{x}{y} = 96\frac{12}{100}$. It is given that the remainder of $\frac{x}{y}$ is 9, so: $\frac{x}{y} = 96\frac{9}{y}$

   and now we can build the equation: $\frac{12}{100} = \frac{9}{y} \Rightarrow y = 75$

3. The best answer is E.

   (1) Insufficient. The average salary of Y and of Z does not give us the Standard Deviation.

   (2) Insufficient. The median salary does not give us the Standard Deviation.

(1+2) The median and the mean do not give us any information about the Standard Deviation of the company.

4. The best answer is E.

   (1) Insufficient.

   (2) Insufficient.

(1+2) Insufficient. The easiest way is to plug in two different sets of numbers: v=10, k=4➔ 10^3-4^3 OR v=1000, k=994➔ 1000^3-994^3.

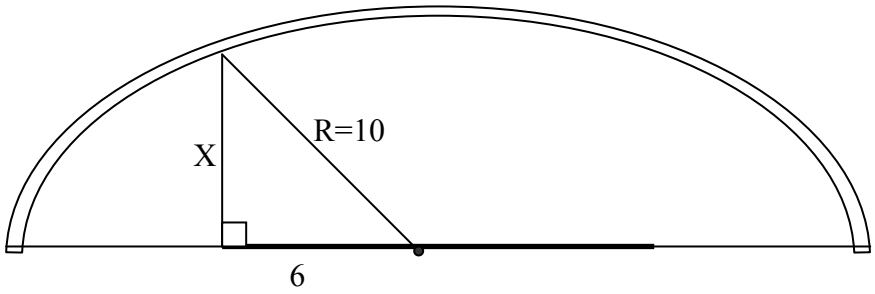
5. The best answer is D.

Let r and R be the radiuses of the smaller circle and the larger circle, respectively.
The area we were asked to find is the difference between the two circles, which can be found by using r and R.

(1) Sufficient. AB = 3, BC =2 ➔ AB=r=3 and AB+BC=R=3+2=5.

(2) Sufficient. CD=1, DE=4 ➔ CD+DE=R=5. AD (The diameter of the small circle)= AE (the diameter of the large circle) – DE ➔ AD= (5*2)-4= 6 ➔ $r=\frac{6}{2}=3$.

6. The best answer is B.



Let X be the height of the tunnel at the edge of the lane. The radius of this semicircle is 10 ft and the 12ft lane is centered ➔ 6ft of lane from each side of the center of the semicircle. We have a right triangle with legs of 6 and x, and hypotenuse of 10 (the radius of the circle). Using the Pythagorean Theorem: $6^2+X^2=10^2$ ➔ X=8 (it is recommended to remember the Pythagorean triplet 3:4:5). Since the vehicles must clear the top of the tunnel by at least 0.5 foot, the limit on the height of the vehicles should be: $8-\frac{1}{2}=7\frac{1}{2}$

7. The best answer is D.

Let d be the diagonal of the square. The perimeter of S is 24 ➔ each side is $\frac{24}{4}=6$. The diagonal of the square is the diameter of the circle. Using the Pythagorean Theorem we can find the diagonal (a faster way is to remember that the ratio between the sides of a right angle isosceles: X:X: $X\sqrt{2}$) ➔ Diagonal=Diameter= $6\sqrt{2}$ ➔ The circumference of the circle equals $2\pi R = 2\pi \bullet \frac{6\sqrt{2}}{2} = 6\sqrt{2}\pi$.

8. The best answer is E.

(I) $x \otimes xy = \frac{x}{xy} - \frac{xy}{x} = \left(\frac{1}{y} - y\right)$ and $x(1 \otimes y) = x\left(\frac{1}{y} - y\right)$ ➔ not true

(II) $x \otimes y = \frac{x}{y} - \frac{y}{x}$ and $-(y \otimes x) = -\left(\frac{y}{x} - \frac{x}{y}\right) = \frac{x}{y} - \frac{y}{x}$ ➔ true

(III) $\frac{1}{x} \otimes \frac{1}{y} = \frac{1/x}{1/y} - \frac{1/y}{1/x} = \frac{y}{x} - \frac{x}{y}$ and $y \otimes x = \frac{y}{x} - \frac{x}{y}$ ➔ true

9. The best answer is C.

Let S, P and C be the selling price, the profit and the cost price, respectively. We know that P=S-C

(1) Insufficient. $P = \frac{20}{100}S$. Since P is unknown, we can't find S.

(2) Insufficient. S = C+50. Since C is unknown, we can't find S.

(1+2) Sufficient. From (2) we know that P=50. From (1) we know that $P = \frac{20}{100}S$ ➔

we receive: $50 = \frac{20}{100}S \Rightarrow S = 250$

10. The best answer is C.

Let F and V be the attorney's fee and the accessed value of the estate, respectively. We are looking for $\frac{F}{V}*100$

(1) Insufficient. V=1.2 million, there is no way to find F➔ there is no way to find the value of $\frac{F}{V}*100$

(2) Insufficient. F=2,400, but there is no way to find V, so there is no way to find the value of $\frac{F}{V}*100$

(1+2) Sufficient. V=1.2 million, F=2,400 ➔ $\frac{F}{V}*100=\frac{2,400}{1,200,000}*100=\frac{1}{5}$

11. The best answer is E.

(1).Insufficient. Only even prime number is 2, so X=2, but we do not know Y.

(2) Insufficient. Tells us Y=11,13,17,19 and we do not know the value of X.

(1+2) Insufficient. We have, for example, these two possibilities for X+Y:

$X=2,Y=11\Rightarrow X+Y=13$
$X=2,Y=13\Rightarrow X+Y=15$. 13 is prime whereas 15 is not, so we can't determine.

12. The best answer is E.

We have to choose 2 women out of 11 women when order is not important, so the number of possibilities to do that is: $\frac{11!}{2!\bullet 9!}=\frac{10\bullet 11}{2}=55$. We also have to choose 2 men out of 9 men when order is not important, so the number of possibilities to do that is: $\frac{9!}{2!\bullet 7!}=\frac{8\bullet 9}{2}=36$. Since we have to choose 2 women and 2 men, we have to multiply: 55*36 = 1,980.

13. The best answer is A.

Let X be the tens digit of n. n>20 ➔ X>2.

(1) Sufficient. X is a factor of the unit's digit ➔ the units digit is XY, where Y is an integer ➔ the value of n is: 10X+XY = X (10+Y) ➔ X is a factor of n ➔ Since X>2, n has a factor which is <u>not</u> 1 or itself, so it's not a prime (It's composite).

(2) Insufficient. n can be 21, for example, which is composite, or 23 which is prime (non-composite).

14. The best answer is C.

$C_{(5,3)} = \frac{5!}{3!2!}$. $C_{(5,x)} = \frac{5!}{x!(5-x)!}$. $C_{(5,3)} = C_{(5,x)}$ ➔

$\frac{5!}{3!2!} = \frac{5!}{x!(5-x)!} \Rightarrow 3!\bullet 2! = x!(5-x)!$ ➔ there are two possibilities: X=3 or X=2.

It is given that x≠3 ➔ X=2

15. The best answer is B.

The prime factors of 462 are: 2,3,7 and 11 ➔ 462= 2*3*7*11. 1 < w < x < y < z ➔ w=2, x=3, y=7 and z=11.

16. The best answer is B.

Let X be the middle integer ➔ The largest is 3X ➔ The smallest is 3X-23. Their sum equals 40 ➔ X+3X+3X-23=40 ➔ $7X - 23 = 40$ ➔ $X = 9$. The largest integer equals 3X=3*9=27, and the smallest integer equals 3X-23 =4➔ their product=9*27*4=972.

17. The best answer is B.

We are asked to compare between $\left(\frac{1}{a}+\frac{1}{b}\right)^{-1} = \frac{ab}{a+b}$ and $\left(\frac{1}{ab}\right)^{-1} = \frac{ab}{1}$. Since a and b are both positive, the expressions above are also positive. We need to know whether a+b>1.

(1) Insufficient. For example a=0.2 and b=0.1, OR a=20 and b=10.

(2) Sufficient. As written above, the comparison is between a+b and 1, so if we `know that a + b > 1, we know which expression is bigger $\left[\left(\frac{1}{ab}\right)^{-1}\right]$.

18. The best answer is C.

Let P be the total number of passengers. Let X be the number of passengers holding tickets but not taking their cars. It is given that $\frac{20}{100}P$ people hold the tickets and take their cars. 60 percent of the passengers with round-trip tickets did not take their cars abroad the ship➔ 40 percent of the passengers with round-trip tickets did take their cars abroad the ship➔ $\frac{40}{100}X=\frac{20}{100}P$ ➔ 2X=P ➔ The number of people holding tickets is 50% of the passengers.

19. The best answer is B.

Let's examine each of the answers:

A. 2X is even since 2 is even, so 2X+2 is even + even=even.
B. 4X is even since 4 is even, and 4X+3=even + odd=odd, so that's the answer.
C. 12X is even since 12 is even, and 12X-6 is=even – even=even.
D. 13X is either even or odd (depends on whether X is even or odd).
E. 14X is either even or odd (depends on whether X is even or odd).

20. The best answer is D.

(1) Sufficient. The unit's digit of the sum after the removal is 6. That means that only a certain number had been removed. Any other integer (between 1 and 9 inclusive) besides that integer would result in a different unit's digit.
(2) Sufficient. The sum after the removal is 176. Only the removal of one specific integer would get this specific result.

21. The best answer is C.

(1) Insufficient. $x^2 = y^2$ ➔ |x| = |y|, does not give indication on positive or negative.

So if x=y then $\frac{x}{y}=1$ and if x=-y then $\frac{x}{y}=-1$.

(2) Insufficient. x and y have the same sign (both are negative or positive).

(1+2) Sufficient. |x|=|y|, and also x and y have the same sign ➔ x=y ➔ $\frac{x}{y}=1$

22. The best answer is C.

Let C, L, M and P be the cost, the labor, material and profit, respectively. It is given that C=L+M, and we know that P=500,000-C=500,000-L-M

(1) Insufficient. C=3M➔ L=2M ➔ P=500,000-C =500,000-3M, but C and M are unknown.

(2) Insufficient. It is given that P > L, but L is unknown.

(1+2) Sufficient. P > L $\Rightarrow$ 500,000 – C > L, $\Rightarrow$ 500,000 –3M> 2M➔ 500,000> 5M, M< 100,000 ➔ C< 300,000 (C=3M)➔ P > 200,000.

23. The best answer is A.

Simple ratio: $\frac{10}{x} = \frac{x}{14.4}$ ➔ x=12.

24. The best answer is B.

We have: $10^7 * 10^8 * 9 * 9 = 10^{15} * 9 * 9 \cong 10^{15}$ x 10 x 10= 10^{17}

25. The best answer is D.

Let X be the total number of eggs. $\frac{2}{3}$ X are hatched. The number of eggs hatched that survived the first month is $\frac{3}{4} * \frac{2}{3} X = \frac{X}{2}$. $\frac{3}{5}$ Of the eggs that survived the first month did not survive the first year, so $\frac{2}{5}$ did survive the first year➔ the number of eggs who survived the first year is $\frac{2}{5} * \frac{X}{2} = \frac{X}{5}$. 120 eggs survived the first year ➔ $120 = \frac{X}{5}$ ➔ X=600.

26. The best answer is B.

The first letter is A, which creates only one code, A.
When adding the letter B, it gives us 2 more codes: B, AB.
When adding the letter C, that gives us 3 more codes: C, AC, BC
When adding the letter D, that gives us 4 more codes: D, AD,BD,CD.
Now we have only 10 different codes, so we have to add the letter E, which gives us: E, AE, BE etc. Now we have even more than 12 different codes composed of 5 different letters.

27. The best answer is D.

Let x be the number of bills worth $5.
Let y be the number of bills worth $20.
125=5x+20y (x, y are positive integers).
(1) Sufficient. x<5, so there are 5 possibilities for x which are: 0,1,2,3,4. But only x=1 is possible since in all the other possibilities y is not an integer.
(2) Sufficient. y>5, so the only possibility which satisfies (*) is y=6 which means that x=1.

28. The best answer is B.

Let B be the price of one book. Let M be the price of one magazine.
We are looking for the value of 3B+4M
(1) Insufficient. B=1.45+M, so 3B+4M=3(1.45+M)+4M, but we don't have the value of M.
(2) Sufficient. 6B+8M=43.7. Dividing this equation by 2, we receive:

$$3B+4M=\frac{43.7}{2}$$

29. The best answer is B.

To number of possibilities arrange 6 different letters in a code is 6! When they are not all different from each other, we have to divide it by the number of arrangements within the identical groups ➔ $\frac{6!}{2!3!}=60$

30. The best answer is C.

The ratio of royalties to sales from the first \$20 million is $\frac{3}{20}$

The ratio of royalties to sales from the next \$108 million is $\frac{9}{108}$

➔ The percent of decrease in the ratio is:

$$\frac{\frac{3}{20}-\frac{9}{108}}{\frac{3}{20}}*100=\frac{20}{3}\left(\frac{3}{20}-\frac{9}{108}\right)*100=\left(1-\frac{5}{9}\right)*100=44.44444\approx 45$$

31. The best answer is E.

In order to find the remainder, we need to know the units digit of $7^{4n+3}6^n$.
The units digit of 7^{4n+3} is the same as the units digit of 7^3 ➔ The units digit of 7^{4n+3} is 3. The units digit 6 in the power of any positive integer is 6➔ The units digit of 6^n is 6. The units digit of $7^{4n+3}6^n$ is the units digit of 3*6 ➔ the units digit of $7^{4n+3}6^n$ is the same as the units digit of 3*6, which is 8.

32. The best answer is B.

Let A be the number of apples purchased. Let B be the number of bananas purchased.
We are looking for A+B (A and B are positive integers).
0.7A+0.5B=6.3 ➔ 7A+5B=63. The only possibility is A=4, B=7 ➔ A+B=11

33. The best answer is D.

(1) Sufficient. We can conclude that the difference between the largest and the median, is equal to the difference between the smallest and the median ➔ symmetric distribution ➔ the median is equal to the average.

(2) Sufficient. We know that one of the numbers is equal to $\frac{1}{3}$ of the sum➔ this number must be the average➔ the difference between the largest and the average, is equal to the difference between the smallest and the average ➔ symmetric distribution ➔ the median is equal to the average.

34. The best answer is B.

The working rate of each machine is $\frac{x}{6*4}=\frac{x}{24}$. Let m be the number of machines required to produce 3x units in 4 days ➔ $m*\frac{x}{24}=\frac{3x}{4}\Rightarrow m=18$

35. The best answer is B.

Let X be the weight of 1 dish of type X.

Let Y be the weight of 1 dish of type Y.

The question is whether X<Y.

(1) Insufficient.3X+2Y < 2X+4Y. ➔ X<2Y So maybe X<Y and maybe X>Y.

(2) Sufficient. 4X+3Y < 3X +4Y ➔ X<Y.

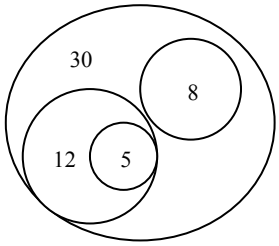
36. The best answer is E.

(1) Insufficient. X can be either even or odd (when Y is even)

(2) Insufficient. Z can be either even or odd (when Y is even)

(1+2) Insufficient. It is possible that y is even and than both x and z can be odd.

37. The best answer is D.



The situation, in which the number of members who are not in any committee will be max, is when there is max congruency between the 3 group's members. We know that that one group (the 8 members group) is not congruent with any other group, thus the solution is: 30-8-12=10.