

Data Sufficiency

Data Sufficiency is a type of mathematics question that appears in the MBA entrance tests. As the name "Data Sufficiency" implies, the task is to determine whether or not information is sufficient to answer the question asked. The typical directions are:

The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements is sufficient for answering the question. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
- B. If Statement II alone is sufficient but Statement I alone is not sufficient.
- C. If both statements I and II together are sufficient but neither statement alone is sufficient.
- D. If each statement alone is sufficient.
- E. If Statement I and II together are not sufficient.

Choice A :

The correct answer is A when Statement I alone is sufficient but Statement II alone is not sufficient.

For Example :

Is Shankar older than Ganesh ?

- I Kartik is four years younger than Shankar and two years younger than Ganesh.
- II The average of Shankar's age in years and Ganesh's age in years is 17.

In this example Statement I by itself is sufficient to answer the question asked. If Kartik is four years younger than Shankar and two years younger than Ganesh, then Shankar must be two years older than Ganesh. From the second statement about the average of their ages no conclusion can be drawn about their respective ages. Thus as Statement I by itself is sufficient the answer is A.

Choice B :

The correct answer is B when Statement II alone is sufficient but Statement I alone is not sufficient.

For Example :

If p , q and r are consecutive integers, is q even ?

- I $p < q < r$
- II pr is an odd integer.

Statement I alone is not sufficient to answer the questions asked. Statement II is, however, by itself sufficient to find out whether q is even or not. If pr is odd then p & r must be odd integers. In the series of three consecutive integers at least one must be even. Therefore if p & r are odd, then q must be even. As Statement II alone is sufficient to answer the question but Statement I is not the answer is B.

Choice C :

The answer is C when both the statements together are sufficient to answer the given question.

For Example :

How many students are there in the class ?

- I If three more students are there and none drop out, there will be more than 35 students in the class.
- II If four students drop out of the class and no more are admitted then there will be fewer than 30 students in the class.

Statement I alone is not sufficient to answer the question, but one can infer from the first statement that at least 33 students are there in the class. Statement II alone is also not sufficient to answer the question, but one can infer from this statement that there are no more than 33 students in the class. Thus neither of the statements alone is sufficient to answer the question, but we can infer from both of them that the number of students in the class must be 33. Therefore the answer choice is C.

Choice D :

The answer is D if each statement by itself is sufficient to answer the given question.

For Example :

What is the area of a square ABCD ?

- I The perimeter of the square is 20.
- II The length of the diagonal is $5\sqrt{2}$.

The perimeter of the square is 20. Therefore the length of each side is 5. Therefore the area is 25 sq. units. Thus Statement I alone is sufficient to answer the question. From Statement II we can find out the length of the side of the square by using the theorem of Pythagoras. thus we can find out the area based on the information given in Statement II alone. As each statement alone is sufficient, the answer is D.

Choice E :

The answer is E if both the statements together cannot answer the question.

For Example :

Is $a < b$?

- I $-0.30 < a < 0.30$
- II $0.25 < b < 0.50$

Statements II and I define ranges for a and b respectively but do not give any relation between a and b . Thus Statement I alone is not sufficient to answer the question asked. Statement II alone is also not sufficient to answer the question asked. Even if the statements are taken together one cannot answer the question because a can be larger than b over the range of 0.25 to 0.3 . Thus, the two statements even when taken together do not provide information to answer the question asked. Therefore the answer is E.

One must always understand the significance of each clue. The Data Sufficiency section tests the analytical ability. The task is to determine the sufficiency of the given statements, not simply to answer the question. It is also possible that one may be well versed with the mathematical formulae needed to answer a particular question, but may assess the adequacy of the statements incorrectly. "Clear thinking" is what is required to tackle questions of this type. One must read each statement in isolation of the other.

A useful way of tackling the questions is to cover up the other statement so that the judgment about the statement you are studying is not influenced by the other statement.

Data Sufficiency

Exercise 1(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
- B. If Statement II alone is sufficient but Statement I alone is not sufficient.
- C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
- D. If each statement alone is sufficient.
- E. If Statement I and II together are not sufficient.

1. Is the radius of circle with centre O a whole number?
 - I The circumference of the circle is 12π
 - II The ratio of the circumference of the circle to the area of this circle is $1/4$
2. Is the line AB tangent to the circle with center C?
 - I One of the Radii of the circle is perpendicular to AB
 - II B is a point on the circumference, and CB is perpendicular to AB
3. Is the sum of 2 real numbers a and b even?
 - I a and b are positive
 - II a and b are negative
4. Is the positive integer N a perfect square?
 - I $N + 5$ is a perfect square
 - II $N - 3$ is a perfect square
5. What will be the age of Ram 5 years from now?
 - I Ram is 25 years younger than his father now.
 - II His father was 45 years old 5 years ago.
6. Are the integers A,B,C,D, E which have been written in the ascending order consecutive?
 - I c is the average of the five integers
 - II $E = B + 3$
7. What is the value of r? p,q,r are real numbers.
 - I $q - r = r - p$
 - II $p + q = 10$
8. If a, b, c are integers (positive or negative), is $(a + b + c)$ even?
 - I $(a - b + c) = 0$
 - II abc is even and positive
9. What is the area of the triangle PQR?
 - I P,Q,R are the midpoints of triangle ABC
 - II Triangle ABC is an equilateral of side 10 cms.
10. Is $M > N$
 - I $-5M + 5N$ is positive
 - II $5M + 5N$ is positive
11. How many girls passed IIM entrance exam this year?
 - I Last year 560 girls passed
 - II This year there was a 10% decrease over last year in the number of failures.

12. What is the value of natural number x ?
- I $(x^4)^2 = x^8$
 - II $(x^3)^2 = (2^2)^3$
13. What is the value of a ? a, b are real numbers.
- I $3a + 2b = 9$
 - II $a = (27 - 6b)/9$
14. What is the total salary of A, B and C ?
- I A and B draw equal salaries, which is twice the salary of C .
 - II C 's salary is Rs.400 less than B 's.
15. What is the fourth even number in a given series of even real numbers?
- I The sum of the first two numbers is 18.
 - II The sum of last two numbers is 26
16. Is the angle at the vertex B of triangle ABC more than a right angle?
- I $AB = AC/3$
 - II $AC^2 > AB^2 + BC^2$
17. Which of the integers a, b, c, d, e are odd numbers?
- I a, b, c, d, e are consecutive integers
 - II c is an even integer
18. How many marbles are there totally with A and B ?
- I If A gives 5 marbles to B , they will have an equal number.
 - II If B had 10 marbles less, he will have half the number as with A .
19. What is the value of b ? a, b, c are real numbers
- I a, b, c are such that $b^2 = ac$
 - II $a = c$ and both are positive.
20. What is the area of the rectangle X ?
- I Square Y whose side is equal to the longer side of X has perimeter 24.
 - II A parallelogram Z whose one side is equal to the shorter side of X has perimeter 24.

EXERCISE 1(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I and II. The questions are to be answered with the help of these two statements. As your answer, Mark (a), if the question cannot be answered even with the help of both statements together, Mark (b), if the question can be answered with the help of both statements together, Mark (c), if the question can be answered with the help of Statement II alone, Mark (d), if the question can be answered with the help of Statement I alone.

1. How long will A, B and C individually take to complete the work?
 - I. A and B together can complete the work in 10 days.
 - II. B and C take 2 days more than A and C take to complete the work.

 2. A cistern contains 20 litres of water. If an inlet A and an outlet B are opened at the same time, the cistern is completely filled in 3 hours. How many litres does the cistern hold?
 - I. Pipe A alone takes 2 hours to fill the empty cistern.
 - II. If the cistern is completely filled, Pipe B alone takes 4 hours to empty it.

 3. What is the value of $X + Y$?
 - I. $X = 75\%$ of Y .
 - II. $4X + 4Y = 70$.

 4. $X + Y = 0$. Is $X > Y$?
 - I. $Y^2 = Y$.
 - II. $X^2 = 1$.

 5. What is the wholeseller's gain/loss?
 - I. He mixes two types of tea in the ratio 3:4.
 - II. The cheaper tea cost him Rs. 10.50 and the value of the mixture is Rs. 12.50.

 6. In $\square ABCD$ is $A(\triangle AEC) > A(\triangle BEC)$ given that E is a point in between A and D?
 - I. $\square ABCD$ is a rectangle
 - II. $I(AC) > I(AE)$
-
7. What is the ratio of the rates of interest for the two schemes?
 - I. Rs. 4000 invested in the first scheme amounts to Rs. 8000 in 4 years.
 - II. Rs. 8000 invested in the second scheme amounts to Rs. 12000 in $1\frac{1}{2}$ years.

 8. The pie chart gives the distribution of the monthly rent of an apartment, paid by Arun and Shirish. How much does Arun pay per month?
 - I. $Y = 30$.
 - II. Shirish pays Rs. 2000 per month more than Arun.
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9. A regiment of soldiers is arranged in the form of a solid rectangle. If the number of soldiers in a row is greater than the number of soldiers in a column, how many soldiers are standing in the first row and the first column of the formation?
 - I. If the regiment is arranged in the form of a hollow rectangle 4 deep, there are 3 more soldiers each in the first row and the first column.
 - II. The number of soldiers in the regiment is 247.

 10. How fast does the man run?
 - I. The man takes 20 seconds to run up an escalator 140 metres long.
 - II. He takes 35 seconds to run down the escalator.

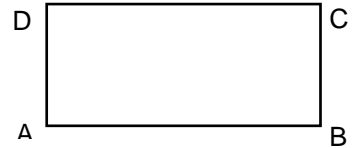
Exercise 2(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
 - B. If Statement II alone is sufficient but Statement I alone is not sufficient.
 - C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
 - D. If each statement alone is sufficient.
 - E. If Statement I and II together are not sufficient.
1. There are four plateaus on a mountain labelled M,N,O and P. M is 2200 metres above the ground. N is 600 metres higher than M. P is 1000 metres higher than O. Is N higher than O?
 - I P is 2600 m above the ground.
 - II P is 400 m higher than M.
 2. At what time would train X reach station B?
 - I It X left station A at 10 AM and runs at an average speed of 40 kmph.
 - II Train Y, which left station B at 11 AM, and runs at the same speed as X towards A crossed it at 12.30 P.M on the same day.
 3. Is P-5 even? P is real number.
 - I P-15 is an integer.
 - II P-10 is an odd integer.
 4. What is the depreciated value on 1st Jan 87 of a car which was bought on 1st Jan 83?
 - I The purchase value was Rs.60,000.
 - II Each year, it depreciates at the rate of 15% of its value on 1st Jan in that year.
 5. What is the total cost of tiles needed for a room 9 feet by 12 feet?
 - I Tiles are 6" square each.
 - II Tiles cost Rs.10 per sq. ft.
 6. Is point P in the first quadrant?
 - I P lies within the circle with centre at the origin and radius 3.
 - II P lies on the straight line $x + 2y = 4$.
 7. Is z less than w? z and w are real numbers.
 - I $z^2 = 25$
 - II $w = 9$
 8. What is the curved surface area of a cylinder C?
 - I The base area is 66.
 - II The volume is 264.
 9. What is the distance from City A to City C in kms?
 - I City A is 90 kms from City B.
 - II City B is 30 kms from City C.
 10. What is the rate of simple interest?
 - I The principle doubles itself in 8 years.
 - II The principle is Rs.1000.

11. In the rectangle ABCD, what is the length?

- I Area of rectangle is 55 sq. units.
- II $AC = 30$ units.

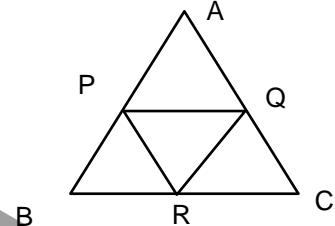


12. What is the base radius of the right circular cone?

- I A right circular cylinder with the same radius and height as the cone with volume 616 cc.
- II If the height of the cylinder had been one cm more, its volume would be more by 154 cc.

13. In the figure, what is the area of triangle PQR where P,Q,R are midpoints of side AB, BC, CA?

- I Area of triangle ABC = 48 sq. inches
- II $AB = 4''$ $BC = 5''$ $CA = 7''$

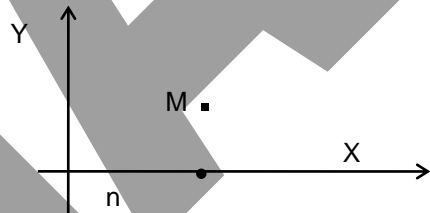


14. What is the profit when two varieties of tea priced at Rs.6 and Rs.8 per kg respectively are mixed and sold at Rs.9 per kg?

- I The total quantity sold was 10 kgs.
- II The total cost of the mixture was Rs.68.

15. Is the straight line MN perpendicular to the x - axis?

- I Co-ordinates of M are (3,4)
- II $OM = 5$

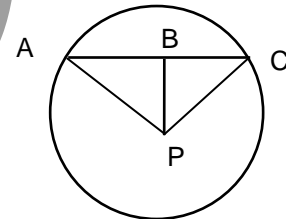


16. Is n an odd number?

- I $m + 5n$ is an odd number
- II $2m + 9n$ is an odd number

17. Are the triangles ABP and CBP congruent if P is the centre of the circle?

- I PB is perpendicular to AC
- II $AB = CB$

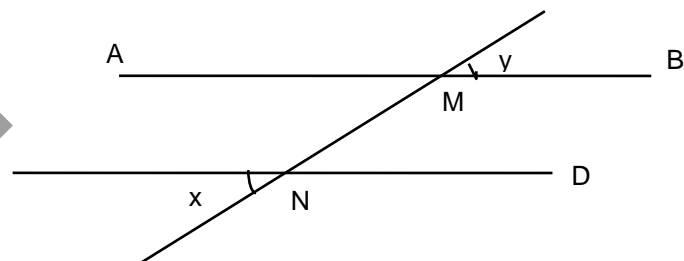


18. $(x+y)$ is positive. Is $(x+y+z)$ positive

- I $z < x$
- II $z < y$

19. Is AB parallel to CD?

- I $CN = MB$
- II $\angle x = \angle y$



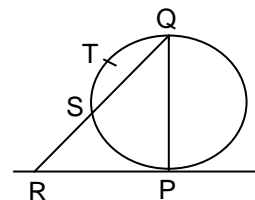
20. Is the number N divisible by 17?

- I $(N + 1)$ is an odd number
- II N is not divisible by 19.

EXERCISE 2(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I and II. The questions are to be answered with the help of these two statements. As your answer, Mark (a), if the question cannot be answered even with the help of both statements together, Mark (b), if the question can be answered with the help of Statement II alone, Mark (c), if the question can be answered with the help of Statement I alone, Mark (d), if the question can be answered with the help of both statements together.

- An industrial plant manufactures certain commodities. In 1995, the number of commodities manufactured by the plant was twice the number of commodities manufactured in 1994. What was the total number of commodities manufactured in the years 1994, 1995 and 1996?
 - In 1996, the number of commodities manufactured was thrice the number of commodities manufactured in 1994.
 - In 1997, the number of commodities manufactured was $\frac{1}{2}$ the total number of commodities manufactured in the years 1994, 1995 and 1996.
- In a 100m race, B takes $\frac{1}{2}$ a minute more than A to complete the race. How much can A give B in a 1400m race?
 - A runs 100m in 3 minutes.
 - A is faster than B.
- Students in a school can choose one or more foreign languages from among German, French and Russian. In a class of 250 students, 98 study French and German only. No student studies only one language. How many students study all three languages?
 - All students in the class study German.
 - 102 students study only Russian and German.
- A man bought a horse and carriage in town A on Sunday. The following week, he sold both, the horse and the carriage to a merchant in town B. On one, he gained 30% and on the other he incurred a loss of 30%. If the man's total investment was Rs. 2800, what is the amount he gained or lost in the transaction?
 - The cost price of the horse was more than the cost price of the carriage.
 - The merchant paid equal amounts for the horse and the carriage.
- Is $\square ABCD$ a rectangle?
 - $l(AB) = l(BC) + 2$.
 - $P(\square ABCD) = 4 \times l(AB)$.
- In the adjoining figure, PQ is the diameter of a circle with radius 3cm. If RP is tangent to the circle, what is $l(QR)$?
 - $l(\text{arc } STQ) = 2\pi$
 - The measure of the inscribed angle is half the measure of the intercepted arc.
- A can do a piece of work in 18 days. If B joins A after 9 days, in how many days more will the work be completed?
 - B works faster than A.
 - The ratio of the amount of work done by A and B in one day is 2 : 3.
- What is the value of X?
 - $X^4 = 2401$.
 - $X^2 + 3X - 24 = \frac{1}{2}(6X + 50)$.
- A, B and C are participating in a 200 yard race. How much can A give B in the race?
 - B can give C 24 metres in a km race.
 - A completes the race 4.50 minutes before B.
- What are the co-ordinates of the centroid of $\triangle XYZ$?
 - The co-ordinates of points X and Y are (1, 2) and (-3, 4) respectively.
 - The centroid of a triangle divides the medians of the triangle in the ratio 2:1.

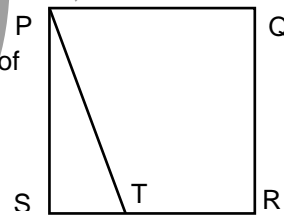
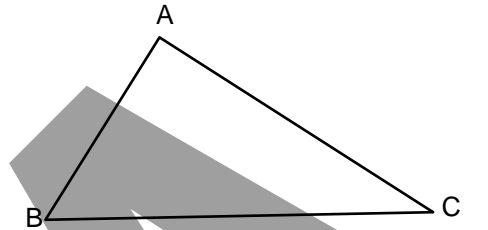


Exercise 3(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

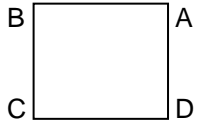
- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
B. If Statement II alone is sufficient but Statement I alone is not sufficient.
C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
D. If each statement alone is sufficient.
E. If Statement I and II together are not sufficient.
- Is $x = y$? x and y are real numbers
I $x = (a+b)/(b-a)$, a and b are real numbers
II $y + 7 = 0$
 - For being promoted to the next higher class, a student has to pass in both English and Mathematics. How many of the 32 students in the class were promoted, if nobody had failed in both subjects?
I 22 passed in English
II 26 passed in Mathematics
 - Is $x > 5$?
I $x^2 - 6x + 5 > 0$
II $x^2 - 11x + 24 < 0$
 - What is the distance between A and B both of which lie along a straight line?
I The distance between A and C is 5 cms.
II The distance between B and C is 4 cms.
 - a, b, c, d are integers, is $b < c$?
I $a + b = c + d$
II $2(b-a) = d - c$
 - Is Raju over 40 years of age?
I The average age of 20 employees in his office is 48.
II Raju is among the oldest 3 employees in his office in which the retirement age is 60.
 - Is $a < b < c$? a, b, c are real numbers
I $2a = c$
II $b + a > c$
 - What is the area of square ABCD?
I The length of the diagonal is 10.
II The perimeter of the square is more than 18.
 - Is Jyoti's height greater than 160 cms?
I If Jyoti grows 6 cm, her height will be more than 160 cms.
II If she grows 3 cm, her height will be less than 160 cms.
 - Does the straight line MN pass through the origin?
I Its equation is $3x + 4y = 0$
II Its slope is $-3/4$
 - What was the percentage increase per month in the pay of Mr. Naik?
I His pay was raised by Rs.1,600.
II He receives Rs.8,600 per month after the raise.

12. Are the four numbers A,B,C,D in arithmetic progression?
 I $B - A = D - C$
 II The average of A,B,C,D, is equal to the average of B and C.
13. Are there exactly 3 distinct symbols used to create the code words in language Q?
 I The set of all code words in language Q is the set of all possible distinct horizontal arrangements of one or more symbols with no repetition.
 II There are exactly 15 code words in language Q.
14. x and y are integers. Is x an odd integer?
 I xy is an odd integer.
 II y is an odd integer.
15. In triangle ABC, what is the measure of $\angle B$?
 I $AB = 8$; $AC = 6$
 II $\angle BCA = 60$ degrees
16. Is the five digit number P divisible by 8?
 I The number P is divisible by 4.
 II The number P is not divisible by 16.
17. What is the value of x? x,y are positive numbers.
 I $\log_y y^x = x$
 II $\log_y x = 0$
18. If M, N and P are integers, is (M+N+P) even?
 I MNP is even
 II $M + N = P$
19. In square PQRS what is the ratio of area of PTS to the area of square PQRS.
 I $RT = 2$ "
 II $RT/TS = 1/3$
20. Is y an integer
 I $x + y$ is an integer
 II y is equal to x.



EXERCISE 3(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I and II. The questions are to be answered with the help of these two statements. As your answer, Mark (a), if the question can be answered with the help of both statements together, Mark (b), if the question can be answered with the help of Statement I alone, Mark (c), if the question can be answered with the help of Statement II alone, Mark (d), if the question cannot be answered even with the help of both statements together.

1. Four cities A, B, C and D form a square, 200 km long. An aeroplane travels the route A-B-C-D-A. The plane's speed doubles after each city. What is the aeroplane's average speed for the journey?
- 
- I. The aeroplane travelled at 400 kmph between cities C and D.
 - II. The aeroplane maintained a constant speed between any two cities.

2. What was the price of a dozen bananas during the 23rd week of 1997?
- I. During the 1st week of 1997, the price of a dozen bananas was Rs. 12.
 - II. The price of a dozen bananas increased @ 10 paise a week during the 1st five months of 1997.

3. What percent of the total population are women voters?
- I. 40% of all women is voters.
 - II. 48% of the total population are women.

4. If X is a nonzero positive integer, is $(X^2 + 3X + 20) / 2$ an even integer?
- I. X is a multiple of 2.
 - II. X is a multiple of 4.

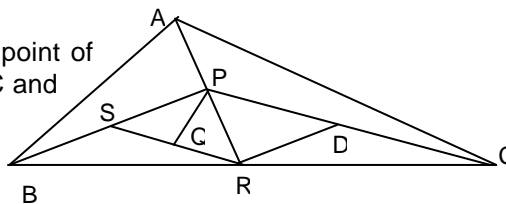
5. What is the equation of the line PQ?
- I. The line PQ passes through the origin.
 - II. The line PQ passes through the point of intersection of the lines $2X+3Y = 2$ & $4X+3Y = 6$.

6. A man rows downstream and back, a total distance of 50 km in 2 hours. If the speed of the current increases by 4 kmph, how long will the man take to complete the journey?
- I. The ratio of times taken by the man to travel down stream and to travel upstream is 5:7 at the current's original speed.
 - II. The current helps the man to travel faster when going downstream.

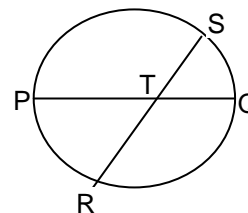
7. Samar and Narayan bought two wrist-watches for Rs. 750. They sold both watches for the same price. Who gained in the transaction?
- I. Had Samar sold his watch for Rs. 125 more, he would have made a gain of 7.50%.
 - II. Had Narayan sold his watch for Rs. 35 less than Samar's selling price, he would have made a loss of 10%.

8. In the figure, R is the midpoint of BC, P is the midpoint of AR, S is the midpoint of PB, D is the midpoint of PC and Q is the midpoint of RS. What is $A(\Delta PQR)$?

- I. If two triangles are similar, their corresponding angles are congruent.
- II. $A(\Delta APC) = 48 \text{ cm}^2$.



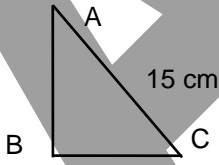
9. What is the area of the circle with PQ as a diameter?
- I. $ST = 6 \text{ cm}$ and $RT = 4 \text{ cm}$.
 - II. $PT = 3 \text{ cm}$.



10. Which of the four numbers a, b, c, and d is the largest?
- I. The average of a, b, c, and d is 78.
 - II. The numbers c, d, and e are each less than 78.

Exercise 4(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
B. If Statement II alone is sufficient but Statement I alone is not sufficient.
C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
D. If each statement alone is sufficient.
E. If Statement I and II together are not sufficient.
- What is the volume of a cubical box in cubic centimetres?
I One face of the box has area of 49 sq. cms.
II The longest diagonal of the box is 20 cms.
 - What was this year's profit in the business
I The profit is 10% of the capital
II The capital is 10 times the profit.
 - What is the area of the triangle below?
I The perimeter of the triangle is $25 + 5\sqrt{5}$ cms.
II The triangle is right angled at B.

 - One and only one of the three numbers a,b,c is zero. Which one is it?
I $a(a-b) = 0$
II $a(a+b) = b(a+c)$
 - Is $A = C$? A,B,C are real numbers
I $A - B = B - C$
II $A - 2C = C - 2B$
 - x and y are two trains which started at the same time from A and B respectively and running at uniform speed in opposite direction. Which train runs faster?
I When they met, x was nearer to B than y was to A.
II y has less number of bogies than x.
 - What is the slope of the line in x - y plane?
I Line passes through origin
II Line passes through (8, 10)
 - What is the minimum number of days in which 100 pieces of a part can be made by X and Y together?
I X can make a minimum of 20 pieces and Y can make a maximum of 30 pieces per day.
II Together X and Y can make 40 pieces maximum per day.
 - In the expression $5x + 2y < z$, is y positive? x,y,z are real numbers
I $z = 21$
II $x = 15$
 - A rectangular paper is rolled into a tube and placed vertically on a table. What is the volume of this tube?
I The lengths and width of the paper are 10 cms and 7 cms respectively.
II The height of the tube is 10 cms.
 - What is the annual interest in Rs. which a bank will pay on a principal of Rs.10,000?
I The interest is to be paid every 6 months.
II The rate of interest is 4%

12. What is the value of $3X + Y$?

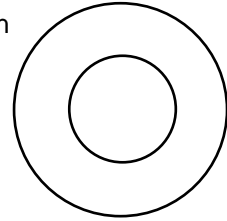
I $2X + Y = 20$

II X is three times Y .

13. Is the area of the outer circle 9 times the area of the inner circle in given figure?

I The circumference of outer circle is 3 times that of the inner circle.

II The two circles are concentric.



14. Is N the square of positive integer ?

I $N = 4k^2$ where K is positive integer.

II $N^2 = A^2 + B^2$ where A and B are positive integers.

15. Is $p = m$? p and m are real numbers.

I $p^2 = m^2$

II $p^3 = m^3$

16. What is the length of AB in a triangle ABC ?

I AC is 5, and is perpendicular to CB

II CB is 12

17. When will the Indian population exceed Chinese population?

I population of China grows at the rate of 10% per decade and of India at the rate of 15% per decade.

II In 1975, Chinese population was 20 crores more than the Indian population.

18. Is x divisible by 3?

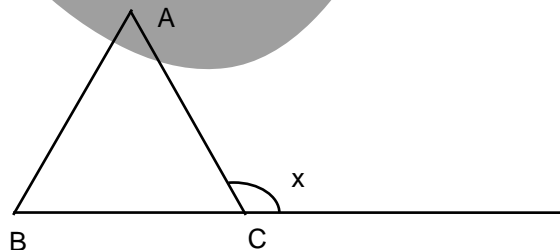
I x is divisible by m , Which is divisible by 3

II x is divisible by n , which is divisible by 3

19. In the figure, what is $\angle A$?

I $\angle B = 70$ degrees

II $\angle x = 130$ degrees



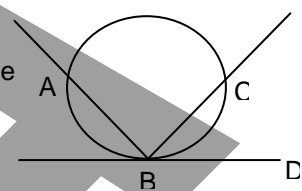
20. What is the value of y^2/x^2 ?

I $2x + 3y = 26$

II $2y + 3z = 18$

EXERCISE 4(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I and II. The questions are to be answered with the help of these two statements. As your answer, Mark (a), if the question can be answered with the help of Statement II alone, Mark (b), if the question cannot be answered even with the help of both statements together, Mark (c), if the question can be answered with the help of both statements together, Mark (d), if the question can be answered with the help of Statement I alone.

- Sanjeev earned Rs. 500 as interest on his deposit for one year. What is the rate of interest?
 - Sanjeev had deposited the amount in a nationalised bank.
 - The face value of his investment was Rs. 5000.
- What is the value of X?
 - $\log(X^2 + 10X + 25) = 2$.
 - $\log(X^3 - X^2) = 2$.
- In the adjoining figure, the radius of the circle is 10 cm. What is the area of $\triangle ABC$?
 - Seg BC is the bisector of $\angle ABD$.
 - The perpendicular bisector of seg BC bisects $\angle CAB$.
- What is the cost of white washing the walls of a room 20 metres high @ Rs. 9 per square metre?
 - The perimeter of the room is 100 metres.
 - The area of the room is 600 square metres.
- The density of a planet varies directly as its weight and inversely as the square of its distance from the Sun. How far is Neptune from the Sun?
 - The Earth, which is 4.28×10^6 km from the Sun, weighs 2.719×10^6 tons and has density 3.12×10^6 .
 - Neptune is $\frac{1}{4}$ times as heavy as the Earth and twice as dense.
- What are the lengths of the two trains?
 - The two trains cross each other in 32 seconds.
 - The faster train crosses a telegraph pole in 12 seconds.
- A piece of wood 30cm long is cut into three smaller pieces. How long is the longest of the three pieces?
 - One piece is 10cm long.
 - One piece is 5cm longer than another piece and the remaining piece is 5cm long.
- What is the area of $\triangle PQR$?
 - The measures of $\angle P$, $\angle Q$ and $\angle R$ are in arithmetic progression.
 - $I(PQ) = 20$ cm.
- Is $XY > 0$?
 - (X, Y) is a point in the third quadrant of the Cartesian plane.
 - $X + Y = -5$.
- Five numbers are in continued proportion. What are the numbers?
 - The product of the 2nd and the 4th numbers is 400.
 - The sum of the first and the last numbers is 85.

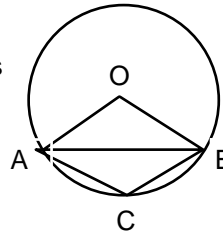
Exercise 5(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
 - B. If Statement II alone is sufficient but Statement I alone is not sufficient.
 - C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
 - D. If each statement alone is sufficient.
 - E. If Statement I and II together are not sufficient.
1. What time will a slow clock show at mid-night on Wednesday?
 - I It was set right at 12 noon on Monday.
 - II It loses 8 minutes everyday.
 2. How long will it take for the share value of Company X to triple itself?
 - I The present value of the share is triple its value three years back
 - II Its present value is Rs.30 and its value next year will be Rs.40.
 3. If the present age of my father is 39 years and my present age is x years, what is x ?
 - I Next year my mother will be 4 times as old as I would be.
 - II My brother is 2 years older than I & my father is 4 years older than my mother.
 4. How much is Kumar's salary?
 - I Kumar's salary at present is double Arvind's salary last year
 - II Arvind's salary at present is Rs.850.
 5. What is the digit in the unit place of a number of 2 digits?
 - I The sum of the digits of the number is 18
 - II If digits are interchanged the number remains same
 6. How many boxes can be made by workers in factory A on the average in a day?
 - I In another factory, twice the number make 300 boxes in a day.
 - II The workers in a factory A made 10000 boxes in 25 working days last month.
 7. The first term in a k - sequence is 8. What is the tenth term?
 - I The third term of k -sequence is 512.
 - II The 11th term is 256.
 8. What is the altitude of the triangle?
 - I The area in sq. cms. is the same as the length of the base in cms.
 - II The angles are 100,50 and 30 degrees respectively.
 9. What is the ratio of the sides of the triangle?
 - I The triangle is acute angled.
 - II The angles of the triangle are in the ratio of 7:8:9.
 10. What is the price of apple?
 - I 10 apples and 6 eggs cost Rs.13.
 - II 18 eggs cost Rs.9.
 11. The aggregate score of three cricketers A,B,C was 149. What was the score of each cricketer?
 - I B and C together made 76 runs
 - II A and C together made 103 runs

12. Is N , a number greater than 2, a prime number or not?
I $N + 1$ is a prime number
II $2N$ is not a prime number

13. In the given circle with centre O , how many degrees is angle ACB ?
I Angle $OAB = 45$ degrees
II Angle $AOB = 100$ degrees

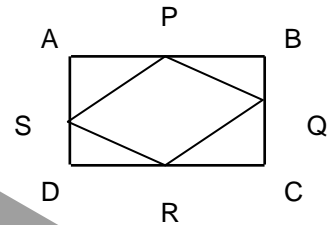


14. How many lottery tickets were sold, if the receipt was Rs.21,000?
I 100 books were sold
II Each book contained 50% one rupee tickets and 50% two rupees tickets.
15. The value of an estate in January 1905 started gradually declining in such a way that at the end of each year it was worth only $\frac{5}{6}$ th of its value at the beginning of the year. What was its worth in end Dec. 1910?
I It was worth Rs.12,000 in beginning January 1905.
II It was worth Rs.10,000 in end Dec.1906
16. Do a rectangle and a square have equal area?
I Their diagonals are equal.
II One side of the rectangle is equal to the side of the square.
17. What is the perimeter of rhombus ABCD?
I Area of ABCD is 140 m^2 .
II diagonal BD is 48 metres.
18. How many books are there in the bookshelf?
I The average weight of the books is 0.7 kg
II The weight of the books and bookshelf is 85 kgs.
19. If the population of a certain country is 10% more than it was 10 years ago and 5% more than it was 4 years ago, what is the increase in population in the last 10 years?
I Population 4 years ago was 22 million.
II Population 10 years ago was 18 million.
20. Can I reach from A to B before 11 a.m.
I The distance between A and B is 45 kms.
II A bus takes 90 minutes to go from A to B, and the time now is 8.30 a.m.

EXERCISE 5(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I and II. The questions are to be answered with the help of these two statements. As your answer, Mark (a), if the question can be answered with the help of Statement II alone, Mark (b), if the question cannot be answered even with the help of both statements together, Mark (c), if the question can be answered with the help of both statements together, Mark (d), if the question can be answered with the help of Statement I alone.

1. P, Q, R and S are midpoints of the sides of $\square ABCD$. Is the area of the four triangles at the corners more than the area of $\square PQRS$?



- I. $\square ABCD$ is a rectangle.
 II. $\square ABCD$ is a parallelogram.

2. Is the total quantity in all the cisterns more than 2 litres?

- I. The total number of litres in x cisterns, each containing $1/y$ litres and in y cisterns, each containing $1/x$ litres.
 II. $x - y > 0$

3. A got a bonus of Rs. 6000 plus a 5% increase in annual salary while B got a bonus of Rs. 8000 plus a 7.5% increase in annual salary. Who was benefited more between A and B in a year?

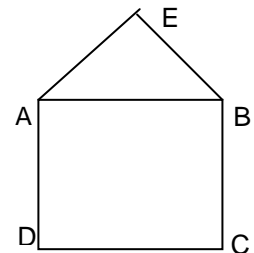
- I. A earns Rs. 1 lakh more than B every year.
 II. The annual salaries of A and B are in the ratio 3:2.

4. What is the harmonic mean of X and Y?

- I. $2 \times 4 \times 8 \times 16 \times 32 \times 64 = 2^{X+Y}$.
 II. $X \cdot Y = 90$

5. If $\square ABCD$ is a square of side 10 cm, what is the ratio of area of $\triangle AEB$ to that of the isosceles $\triangle DEC$?

- I. $\triangle AEB$ is an isosceles triangle.
 II. The heights of the two triangles is in the ratio 3:4.



6. Is the number of males attending the party more than that of females?

- I. If 12 males leave the party, there are twice as many females as there are males.
 II. If 16 males leave the party, there are thrice as many males as there are females.

7. In a 100 question multiple test, 1 mark was awarded for each question answered correctly and $\frac{1}{4}$ mark was deducted for each question answered incorrectly. Will a student get an integral score?

- I. The ratio of number of total questions to correct answers is 15:7.
 II. The number of incorrect answers is a multiple of 4.

8. What is the remainder from $(n-1)^x/n$ where $n, x \in \mathbb{N}$?

- I. x is an even number.
 II. n is an even number.

9. $X^2 - 35X + 216 = 0$. What is the value of X?

- I. X is a perfect cube.
 II. X^2 is a perfect cube.

10. What is the number of real roots of a given cubic equation?

- I. It has minimum 1 real root.
 II. It has minimum 2 real roots.

Exercise 6(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
- B. If Statement II alone is sufficient but Statement I alone is not sufficient.
- C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
- D. If each statement alone is sufficient.
- E. If Statement I and II together are not sufficient.

1. Is the product of two real numbers x & $y > 20$?

- I $6 < x < 9$
- II $3y > 8$

2. Are x, y, z all positive?

- I $x + y + z$ is positive
- II xyz is positive

3. How much did Usha earn in December?

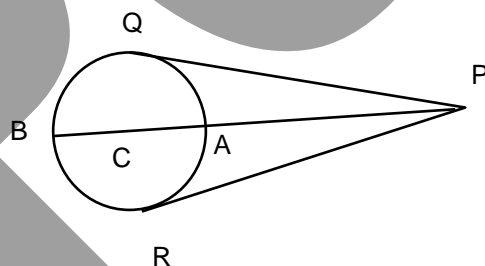
- I She earned Rs.500 on an average per month during the years.
- II Her earning in the month of December was double of the average earning of remaining 11 months.

4. How long will it take for the tank to get filled when taps A and B are opened simultaneously? Assume that initially tank is completely empty.

- I A can fill it in 2 hours
- II B can drain it in 3 hours

5. Given that PQ & PR are tangents in figure with centre C lying on line PB. What is the radius of the circle?

- I $PQ = 10$
- II $PB = 18$

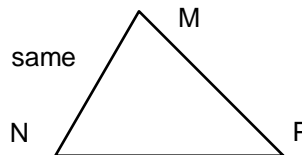


6. Two trains A and B start simultaneously from places 250 kms apart and run towards each other on parallel tracks. Which train travels faster?

- I The place where they meet is nearer to starting point of train B than starting point of train A.
- II It takes 5 hours for train B to reach its destination.

7. Is triangle MNP an isosceles triangle

- I Exactly two of the angles $\angle M$ & $\angle N$ have the same measure
- II $\angle N$ & $\angle P$ are not equal.



8. A piece of wood is cut into three pieces A, B and C. Are they of equal lengths?

- I The sum of the lengths of A and B is $\frac{2}{3}$ of the original piece.
- II B and C are of the same length.

9. Is $x > y$? x, y are real numbers

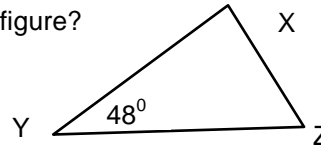
- I $8x = 6y$
- II $x = y + 4$

10. Which is greater, the area of the circle or the area of the triangle?

- I The circle touches the three sides of the triangle.
- II The diameter of the circle is smaller than one of the sides of the triangle.

11. What is the area of the triangle XYZ in the given figure?

- I $XY = 5, XZ = 9$
- II $\angle XZY = 72^\circ$



12. What is the rate of compound interest given by a Bank?

- I A deposit of Rs.300 becomes Rs.330 in 3 years.
- II The Bank compounds the interest every six months.

13. What is the radius of circumscribed circle of the triangle XYZ?

- I Triangle XYZ is equilateral
- II The sides of triangle are 6,8 and 10

14. What is angle B in triangle ABC?

- I The triangle is an isosceles triangle.
- II The triangle is an equilateral triangle

15. Is $x = 2$?

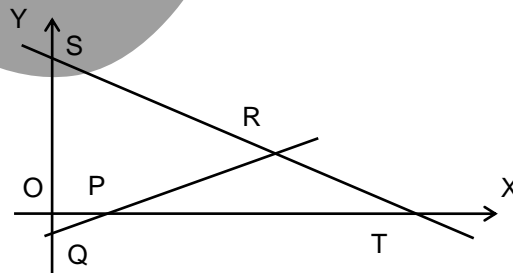
- I $\log_{10}x = \log_{10}1000 - \log_{10}10$
- II $\log_{10}x^2 = 2 \log_{10}x$

16. Which has the greater perimeter, the circle or the rectangle?

- I The area of the circle is greater than the area of a rectangle.
- II The rectangle is a square.

17. What are the co-ordinates of point of intersection of lines ST and QR

- I The equation of line ST is $y = 17 - 6x$
- II The equation of line PQ is $y = 3x - 4$



18. What is the average weight of the students in a class?

- I Their average weight eight months back was 52 kgs.
- II Three students have additionally joined the class last month.

19. What is the 30th term of a given series?

- I The first two terms of the sequence are 1, $1/2$
- II The third term and 4th term of the sequence are 0, $-1/2$

20. What is the value of $|x - y|$?

- I $x + y = 4$
- II $x = 1/y$

EXERCISE 6(B)

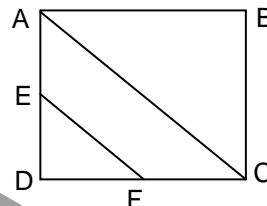
DIRECTIONS: Each of the following questions has two statements marked I and II. As your answer, Mark (a), if both statements I and II together are sufficient but neither of statement alone is sufficient.

Mark (b), if statement I alone is sufficient but statement II alone is not sufficient.

Mark (c), if statement II alone is sufficient but statement I alone is not sufficient..

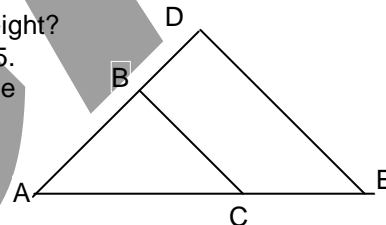
Mark (d), if both statements together are not sufficient.

1. □ABCD is a square. What is the area of □ABCD?
 I. Point E and F are mid points of AD and DC
 II. $l(EF) = \sqrt{8}$ cm.



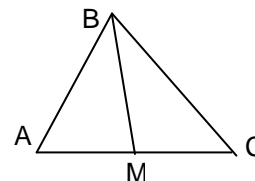
2. Three friends Amita, Babita and Chandni have different age. What is the age of Chandni?
 I Babita's age is two years more than that of Amita.
 II Product of the ages(in years) of the Chandini and Babita is 6.
 The addition of Chandini and Babita's age is 7.
3. A printer numbered consecutively the pages of a book, beginning with 1 on the first page. What is the number of pages?
 I. The total number of digits printed is 396.
 II. The number of pages is more than 50.
4. There is a team of 20 people. What is the average of their weight?
 I. The weight of each team member is between 60 and 65.
 II. After adding three new people the average weight of the team becomes 63.

5. What is $l(DE)$?
 I. $l(AC) = 3$, $l(BC) = 4$, $l(AE) = 6$
 II. C and B are the midpoints of AE and AD.



6. A man spends a certain amount on rice every month. What is the rate of rice?
 I. When price drops by Rs. 4 / kg, he is able to buy 16 kg more.
 II. When price increases by Rs. 9 / kg, he is able to buy 18 kg less.
7. In a particular library, what is the average number of visitors per day in the given month of February?
 I. First day of February is Monday.
 II. The library had an average of 513 visitors on Sunday and 240 on other days of month
 No of visitors on the last day of that month of February is 513.

8. Three friends have some peculiarities about their ages, what are their ages?
 I. Product of their ages is 96.
 II. Their ages are even integers.



9. What is $l(BM)$?
 I. In $\triangle ABC$, $m\angle ABC = m\angle ACB = 75^\circ$.
 II. $l(AB) = 4$ cm. M is the midpoint of AC.
10. The cost of carpeting a room is Rs 72 and papering the walls at 8 paise per square ft is Rs. 81.60. What is the height of the room?
 I. The length of the room is 18 ft.
 II. If width had been 4ft less the cost of the carpet would have been Rs. 18 less.

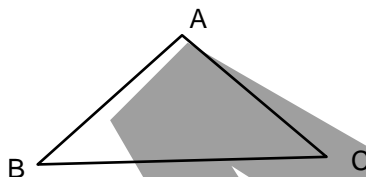
Exercise 7(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
 B. If Statement II alone is sufficient but Statement I alone is not sufficient.
 C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
 D. If each statement alone is sufficient.
 E. If Statement I and II together are not sufficient.

1. What is the area of $\triangle ABC$ in the figure?

- I $AC = 10$; $AB = 7$
 II $\angle BAC = 80^\circ$



2. Is the quadrilateral ABDC a square?

- I AB and CD are parallel and equal
 II AC and BD are parallel and equal

3. If each of the 20 bolts of fabric on the shelf is either 100% cotton, 100% wool or a mixture of cotton & wool, find the number of bolts only with a mixture of cotton and wool?

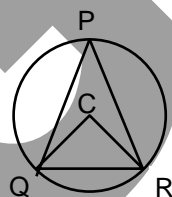
- I Of the 20 bolts, 18 contain wool and 14 contain cotton.
 II Of the 20 bolts, 6 are 100% wool.

4. Is xy greater than 1?

- I x is greater than $1/y$
 II y is positive

5. Is C the centre of circle in the figure?

- I $\angle QPR = 70^\circ$ & $\angle QCR = 140^\circ$
 II $\angle CQR = \angle CRQ = 30^\circ$



6. I had money in the form of one rupee coins and 50 paise coins. What was the total sum that I had?

- I If 5 of the one rupee coins had been 50 paise coins, I would have had Rs.2.50 less
 II The number of one rupee coins was twice the number of 50 paise coins.

7. What is the volume of a conical vessel?

- I The perimeter of the base of vessel is 64 inches.
 II The vol. of the vessel is $1/3$ the vol. of a cylinder of the same base and height.

8. What is the ratio of the ages of the father and his son?

- I Two years ago the ratio was 3:1.
 II Two years hence, the ratio will be 2.5 : 1.

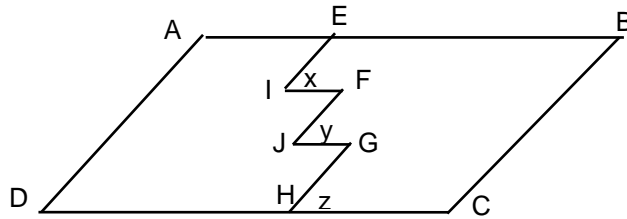
9. Is $x > 1$?

- I $x^2 > 1$
 II $\sqrt{x} > x$

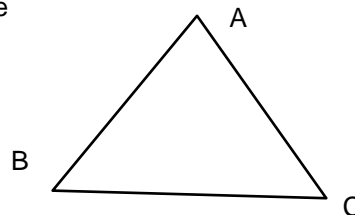
10. How many sides does regular polygon A have?

- I From one vertex we can draw seven lines connecting in the other vertices
 II The sum of the angles of the polygon A is more than 10 right angles.

11. Does $AD+CD = AE + EI + IF + FJ + JG + GH + HC$?



- I ABCD is a parallelogram
 II angles x, y & $z = \angle D$
12. How many right circular cylinders of equal size can be made from a metal of volume 200 cm^3 .
 I The height of each cylinder is equal to its diameter.
 II The slant surface area of each cylinder is 45 sq.cm .
13. Is $x = 0$?
 I $x^3 + 27 = 0$
 II $x^4 - 81 = 0$
14. What is the angle between the hands of a wall clock now?
 I The time now is between 3 and 4.
 II Fifteen minutes back the angle was 90 degree.
15. The Motwane Corporation has 1000 employees. What is the average yearly wages of its executives?
 I The total wages of all employees is Rs.5,00,000 per year.
 II The company has 150 executives
16. If $x, 5, y$ are in arithmetical progression, what is the value of y ?
 I. $y = 2x$
 II. The progression is an increasing one
17. Is equation of given straight line is $y = \sqrt{3}x - 5\sqrt{3}$?
 I The straight line cuts equal intercepts on the axes.
 II The straight line cuts off x-axis at distance 5 units from the origin & makes an angle 60° with the x-axis
18. Is $x + y + z$ a positive number?
 I At least two of the three numbers are negative
 II xyz is negative.
19. What is the length of BC in the given figure?
 I. $AB = AC$
 II. $\angle BAC = 60$ degrees.
20. What is the radius of the wheel of a train?
 I The number of revolutions made by it while traveling from A to B is 1500.
 II If it had traveled one more kilometer, it would have revolved 760 more times.



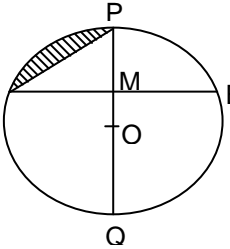
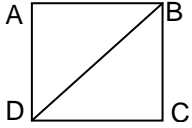
EXERCISE 7(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I, II and III. The questions are to be answered with the help of these statements. As your answer, Mark (a), if the question cannot be answered even with the help of both statements together, Mark (b), if the question can be answered with the help of Statement I alone, Mark (c), if the question can be answered with the help of both statements together, Mark (d), if the question can be answered with the help of statement II alone, Mark (e), if the question can be answered with the help of each of the two statements alone.

1. A cistern has an inlet A and an outlet B. The area of cross-section of the outlet B is half the area of cross-section of the inlet A. The cistern being initially empty, both the pipes A and B are opened at the same time. How long will the empty cistern take to fill?
 - I. The inlet A, by itself, can fill the cistern in 42 minutes.
 - II. The outlet B, by itself, can empty the cistern in 84 minutes.

 2. A person, 5 feet tall, is standing near a streetlight. What is the length of the shadow cast by the person?
 - I. The street light is at the top of the pole 15 ft high.
 - II. The person is 10 ft from the pole.

 3. Is $X > Y$?
 - I. $X / Y = 8 / 7$
 - II. $X^2 > Y^2$

 4. In the adjoining figure, PQ is a chord of the circle with centre O. Chord $AB \perp$ chord PQ. If the radius of the circle is 28", what is the area of the shaded region?
 - I. $P(\Delta APO) = 84$ ".
 - II. $m\angle AQP = 30^\circ$.
- 
5. $\square ABCD$ is a rectangle. In $\square ABCD$, the lengths of the sides are integers. Is $\square ABCD$ a square?
 - I. $A(\square ABCD) = P(\square ABCD) = 16$.
 - II. Diagonal BD is $4\sqrt{2}$.
- 
6. There are 15 students in the Oonche Log High School. The average height of these 15 students is 164 cm. What is the height of the new student?
 - I. The school admits only those students who are at least 150 cm. tall.
 - II. After the new student joins the school, the total height of the students is 26.50 m.

 7. Two trains are travelling between Agra and Delhi. Train A, which is 180 m long, leaves Agra at 6:45 a.m. at the speed of 90 kmph. Train B, which is 315 m long, leaves Agra after some time, at a speed greater than that of train A. What is the speed of train B?
 - I. Train B overtakes train A in 45 seconds, at a point 30 km away from Delhi.
 - II. Train B crosses a man standing on a platform in 12 seconds.

 8. What is the value of $\log_{10} 40$?
 - I. $\log_{10} 2 = 0.3010$.
 - II. $\log_{10} 7 = 0.8451$.

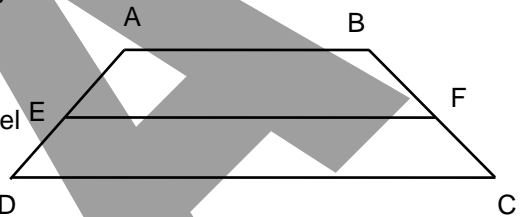
 9. What is the value of C in the equation $X^2 + X + C = 0$?
 - I. The equation has two roots.
 - II. The sum of the two roots is -1.

 10. Is $\square ABCD$ a square?
 - I. $m\angle A = m\angle B = m\angle C = m\angle D$.
 - II. AC is perpendicular to BD.

Exercise 8(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
B. If Statement II alone is sufficient but Statement I alone is not sufficient.
C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
D. If each statement alone is sufficient.
E. If Statement I and II together are not sufficient.
- Is the side of the square expressed in inches a rational number?
I The diagonal of the square is 16".
II The area of the square is side multiplied by itself.
 - Is AD the bisector of angle A in triangle ABC?
I Triangle ABD and triangle ACD have equal areas
II AD is not perpendicular to BC
 - What is the area of the trapezium ABCD in the figure?
I The line joining the mid-points of non-parallel sides is 13".
II $AE = ED = 3"$.
 - How long would it take for A and B to complete a job together?
I Working alone, A can complete it in twice as many days as B would take.
II If C, Who is as efficient as A also joins A and B in the beginning, the work can be completed four days earlier.
 - What are the speeds of two trains 80 yards and 85 yards long respectively? Assume that former is faster than later.
I They take 7.5 seconds to pass each other when running in the opposite direction.
II They take 37.5 seconds to pass each other when running in the same direction.
 - A box contains one rupee coins and fifty paise coins. What is the total amount in the box?
I The total number of coins is 120.
II If ten 50 ps. coins replaced by equal number of one rupee coins, the amount will increase by Rs.5.
 - Who receives minimum if Rs.385 are divided among John, Peter and George?
I John receives $\frac{2}{9}$ of what Peter and George receive together.
II Peter receives $\frac{3}{11}$ th of what John and George receive together.
 - Is $x = 2$?
I x is a number such that $x^2 - 3x + 2 = 0$
II x is a number such that $x^2 - x - 2 = 0$
 - What is the total investment of a merchant on 200 eggs in Rs?
I Out of 200 eggs, 38 were broken and he sold the remaining at Rs.4.80 per dozen.
II He gained 8% on his investment
 - Is the profit on item A more than the profit on item B?
I 100 units of item A are sold, and 150 units of item B are sold.
II The cost price of item A is less than the cost price of item B.
 - When one ball is drawn at random from an urn containing 25 balls. What is the chance that it is red?
I The urn contains 10 yellow and 8 green balls
II The urn contains all coloured balls.



12. If n is positive integer, is n a prime number?
I n lies between 10 and 20.
II n is odd number, not divisible by 3.
13. How long did the secretary's speech last?
I He spoke at an average of 50 words per minute.
II He would have spoken for 10 minutes extra, had his speech rate been 4 words less per minute.
14. Which is the smallest angle of triangle ABC?
I AB^2 is greater than $BC^2 + AC^2$
II BC^2 is less than $AB^2 + AC^2$
15. Asha and Munni share a room on rent in proportion to their stay period. How much would each pay for September 1982?
I Asha had gone out for the first 10 days and Munni stayed alone till she returned and then both stayed for the remaining part of the month.
II Munni paid Rs.15 for her stay.
16. What percent of the employees of the company are graduates?
I The ratio of the graduates to the non-graduates is 9 to 11.
II The number of non-graduates in the company are 88.
17. In how many ways can a group photo of Lisa and Anand be taken with their 3 friends?
I Lisa and Anand sit together.
II Lisa and Anand occupy extreme positions.
18. What is the volume of rectangular box?
I The total surface area of the box is 24 sq. meters.
II The total length of the edges of the box is 24 meters.
19. Is x a real number?
I $\sqrt{x} \cdot \sqrt{x} = -x$
II $x^2 = -x$
20. If Rs.100 is divided between A and B, how much does B get?
I If B has been given Rs.10 more, he and A would have equal amounts.
II B got Rs.20 less than what he wanted.

EXERCISE 8(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I, II and III. The questions are to be answered with the help of these three statements. As your answer, Mark (a), if the question can be answered with the help of each statement alone, Mark (b), if the question can be answered with the help of statement I alone, Mark (c), if the question cannot be answered even with the help of both statements together, Mark (d), if the question can be answered with the help of both statements together, Mark (e), if the question can be answered with the help of Statement II alone.

1. What is the cost of 30 mangoes and 24 oranges?
 - I. Cost of 10 mangoes and 8 oranges is Rs. 28.
 - II. Cost of 5 mangoes and 4 oranges is Rs. 14.

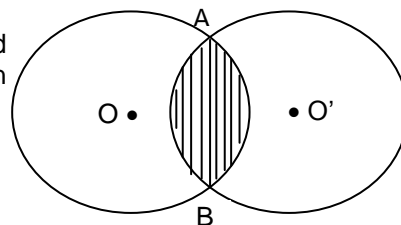
2. A reservoir has two inlets, A and B, and an outlet C. All three pipes are opened at the same time. How long will the reservoir take to fill?
 - I. A and B together can fill the reservoir in 48 hours.
 - II. The area of cross-section of the outlet C is $\frac{1}{7}$ th the area of cross-section of inlet A.

3. A survey of a group reveals 38 read only one newspaper. How many read exactly two newspapers.
 - I. 12 persons read all the three newspapers.
 - II. The group contains 60 persons.

4. How much cardboard will be required to make an open cubical box with no top?
 - I. The area of the bottom of the box is 25 cm^2 .
 - II. Volume of the box is 100 cm^3 .

5. A, B, C, D and E are all distinct non-zero integers. If $AB \times C = DE$, what is the value of D?
 - I. $A = 4$.
 - II. D is an odd integer.

6. The figure shows two circles with centres O and O' and diameters 10 cm. each. The two circles intersect each other in the points A and B. What is the area of the shaded region?
 - I. The two circles enclose an area of 45π .
 - II. $\text{seg } OO' \perp \text{seg } AB$.



7. Is ΔPQR an isosceles triangle?
 - I. $\angle(QR) = \angle(PQ) + 2$.
 - II. $m\angle R = 70^\circ$.

8. The total expenses of Sohanlal and Mohanlal are Rs. 630 and Rs. X respectively. These expenses are represented with the help of pie charts. How much does Mohanlal spend?
 - I. The radius of the circle representing Sohanlal's total expenditure is 3.9" and that of the circle representing Mohanlal's total expenditure is 1.3".
 - II. The ratio of the radii of the two pie charts is 3:1.

9. What time will a clock show at 1:47 p.m. on Monday, if it loses 3 seconds every minute?
 - I. It was set right at 7:23 the previous evening.
 - II. The ratio of the number of minute spaces covered by the hour hand and the minute hand is 1:12.

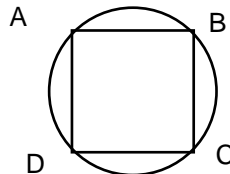
10. Is the average of the three positive numbers, A, B and C, greater than B?
 - I. $A > B > C$.
 - II. $B - C > B - A$.

Exercise 9(A)


Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
- B. If Statement II alone is sufficient but Statement I alone is not sufficient.
- C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
- D. If each statement alone is sufficient.
- E. If Statement I and II together are not sufficient.

1. Is $x > y$? x, y are real numbers
I $(x+y)/2 > 0$
II $y^2 > x^2$
2. N is a member of the set $(4, 9, 16, 27, 36)$, What is N ?
I N is divisible by 8
II N is divisible by 4
3. Assuming that 50% is the passing grade, how many students in a class of 31 have passed?
I The average grade was 50%
II The median grade was 51%
4. A radio is priced at Rs.250. What percent discount does the shop allow on this price?
I The shop still has 5 sets to be sold.
II If all remaining sets are sold, the shop will get Rs.1150.
5. If n and k are even integers, is $n/3 + k/2$ an integer?
I n is a multiple of 3
II k is a multiple of 4.
6. What was the average mark in the class?
I Raju's score was 17 above the average marks.
II If Raju got 35 less, he would have got 18 less than the average marks.
7. Is $n > p$? n and p are real numbers
I $m/n = n+p$
II $n > m$
8. How many people in town A have both a radio and a bicycle?
I 150 have radios and 840 have bicycles.
II The total population of the town is 2000.
9. What fraction part of the total surface area of a cube is red?
I Each of the 3 faces is exactly $1/2$ red.
II Each of the 3 faces is entirely white.
10. Which is the longest side of triangle ABC?
I Angle A is 95 degrees.
II Angle B is 20 degrees.

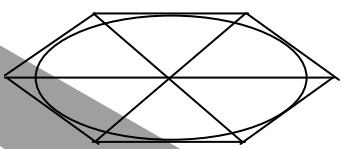


11. The square ABCD is circumscribed by a circle? What is the radius of the circle?
I The area of the square is 25 sq.cms.
II Area of the circle is 40 sq cms.

12. Is X a prime number?
 I X is an odd number between 10 and 20.
 II X is divisible by 5.
13. Is $y = z$? where x, y, z are non zero numbers and x is not equal to 1.
 I $(x)^y = (y)^z$
 II $(x)^{y-z} = 1$
14. Is the average age in a class of 30 students more than 16?
 I 29 students in the class are 16 years old.
 II The average of four of the students is less than 16
15. Given $x+y = a+b$; is $x>y$? x, y, a, b being real numbers
 I $x > a$
 II $y < b$
16. How much area can a cow tied to a pole in the middle of a ground graze?
 I The area of the ground is 1200 sq.ft.
 II If the length of the rope is increased by 6 ft, it can graze 132 sq.ft. more.
17. Is the parallelogram ABCD a rectangle?
 I $\frac{\angle A}{\angle B} + \frac{\angle C}{\angle D} = 180^\circ$
 II $\frac{\angle A}{\angle B} + \frac{\angle C}{\angle D} = 180^\circ$
- 
18. Who had greater profit, A or B?
 I A had a higher turnover than B by Rs.40,000
 II B's rate of profit is 1% lower than A's.
19. Is $(a+b)^2 = a^2+b^2$? a, b are real numbers
 I $a > 0$
 II $b < 0$
20. Is xyz greater than yz ?
 I $x - 1 = 0.6$
 II y and z are both negative.

EXERCISE 9(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I, II and III. The questions are to be answered with the help of these three statements. As your answer, Mark (a), if the question can be answered with the help of both statements together, Mark (b), if the question can be answered with the help of Statement II alone, Mark (c), if the question cannot be answered with the help of each statement alone, Mark (d), if the question cannot be answered even with the help of both statements together, Mark (e), if the question can be answered with the help of statement I alone.

- If a sequence of numbers is given by $a_n = a_{n-1} + 3$. Is a_{12} an odd number?
I. a_1 is an odd integer. II. a_{11} is an odd integer.
- An oval is inscribed in a hexagon, 3 lines are drawn to join the exactly opposite vertices of the hexagon. What is the ratio of the areas of the sectors of the ovals?
I. The area of the oval is 3.75 times that of a circle of radius 14cm.
II. The hexagon is regular.

- Who stood first in the class?
I. Ram scored more than Vijay who has not scored more than Ramesh, who has scored 2 marks more than Amit.
II. Had Amit scored 6 marks more, he would have scored 2 marks more than Vijay.
- Is $x^3 + y^3 + z^3 = 3xyz$?
I. $x + y + z = 0$. II. $x^2 + y^2 + z^2 = xy + yz + zx$.
- Two trains 180m and 150m long are travelling between Pune and Bombay. If the speed of the longer train is 60 kmph, what is the speed of the other train?
I. The trains cross each other in 14 seconds.
II. Bombay is 192 km from Pune.
- Is cone A similar to cone B?
I. The volumes of the two cones are equal.
II. The ratio of the curved surface area of cone A to that of cone B is $\sqrt{10}$.
- A merchant mixes two types of sugar, A and B. The sugar of type A costs Rs. 5.45/kg, and that of type B costs Rs. 6.75/kg. At what price should the merchant sell the mixture, if he wants to gain 23% on the transaction?
I. The mixture weighs 140 kgs.
II. The merchant mixes the sugars of type A and B in the ratio 9:5.
- A circus tent is in the form of a right circular cylinder with a right circular cone placed exactly on the top. The ratio of the diameter of the base and the height of the tent is 10:12. What is the area of the canvas required to erect the tent?
I. The radius of the base of the tent is 5 feet.
II. The volume of the conical part of the tent is $\frac{1}{3}$ rd the volume of the cylindrical part.
- ΔPQR is an equilateral triangle. A line passes through the vertices P and Q of the triangle. What is the equation of the line?
I. The co-ordinates of P and R are (-3, -1) and (1, -3) respectively.
II. Point Q lies in the third quadrant of the Cartesian plane.
- Two inlets, A and B and an outlet C are connected to a cistern. The pipes A, B and C are opened alternately in that order. In how much time will the cistern be filled?
I. C can empty the cistern in 12 hours.
II. A and B together can fill the cistern in 7 hours.

Exercise 10(A)

Directions : The problems below contain a question and two statements giving certain data. You have to decide whether the data given in the statements are sufficient for answering the questions. The correct answer is

- A. If Statement I alone is sufficient but Statement II alone is not sufficient.
- B. If Statement II alone is sufficient but Statement I alone is not sufficient.
- C. If both statements I and II together are sufficient but neither of statements alone is sufficient.
- D. If each statement alone is sufficient.
- E. If Statement I and II together are not sufficient.

1. If 'x' is an integer, is $x/2$ an even integer?

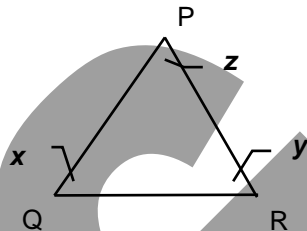
- I x is multiple of 2
- II x is multiple of 4

2. Is pq a prime number?

- I p is a prime number
- II q is a fraction

3. Is $PQ > RP$?

- I $x = y$
- II $y = z$



4. a, b, c are in geometric progression. Is the common ratio negative?

- I b is less than a
- II abc is greater than ac

5. If 5 is added to the numerator and denominator each of the fraction a/b , will the new fraction be less than the original one?

- I $a = 101, b = 161$
- II $a > b, a$ and b are real numbers.

6. What is the area of right angled triangle ABC?

- I The hypotenuse $BC = 8$
- II $AC = 4$

7. When a body falls from rest its distance from the starting point varies as the square of the time it has fallen. How far does it fall in 10th second?

- I it falls through 122.6 m in 5 seconds.
- II it falls through 490.4 m in 10 seconds.

8. How many revolutions does a cycle wheel make in traveling one km?

- I It is pedalled at the speed of 3 kms an hour
- II The height of the topmost point of the wheel from the ground is 1.3 meters.

9. What will be the first arithmetic mean between $1/4$ and $-9^{3/4}$ if certain arithmetic means are inserted between these?

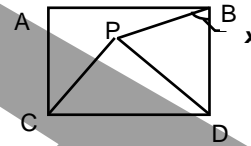
- I If 19 arithmetic means are inserted.
- II If 3 arithmetic means are inserted.

10. Is b negative?

- I ab^3 is negative
- II a^3b is negative

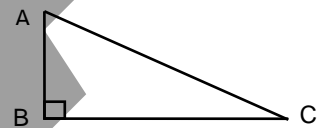
11. How long would it take Julie to complete the work?
 I Julie & Jean complete the work in 10 days
 II Julie takes 5 days more than Jean to complete the work.
12. If a, b, c are integers, is bc even?
 I a and b are consecutive integers
 II b and c differ by 1
13. What is the value of a ? a is a real number.
 I $a^2 - a - 6 = 0$
 II $2a^2 - a - 15 = 0$
14. If a and b are not equal to zero, is $3/a$ greater than $3/b$?
 I a is larger than b
 II a is negative

15. In the figure given alongside, what is angle x equal to?
 I ABCD is a square
 II PDC is an equilateral triangle



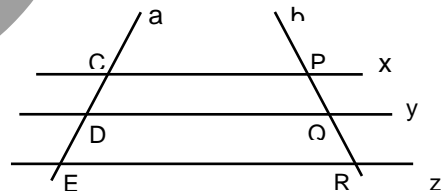
16. Which is the smallest angle of triangle ABC?
 I Angle A is 10 degrees
 II Side AC is greater than side AB

17. What are the sides of triangle ABC?
 I Perimeter of the triangle is 132 cms.
 II Sum of squares of sides is 6050 sq. cms



18. If a is a negative number, is abc less than 0?
 I At least one of b and c negative.
 II The sum of b and c is positive.

19. In the figure, is $x/y/z$? x, y, z, a, b are straight lines.
 I $CD = DE$
 II $PQ = DE$



20. Is the number N divisible by 12?
 I $2N$ is divisible 84
 II N^2 is divisible by 144

EXERCISE 10(B)

DIRECTIONS: Each of the following questions is followed by two statements marked I, II and III. The questions are to be answered with the help of these three statements. As your answer, Mark (a), if the question cannot be answered even with the help of both statements together, Mark (b), if the question can be answered with the help of each statement alone, Mark (c), if the question can be answered with the help of both statements together, Mark (d), if the question can be answered with the help of Statement II alone, Mark (e), if the question can be answered with the help of Statement I alone.

- What are the lengths of the two trains?
 - When crossing each other, the trains move at 80 kmph and 110 kmph.
 - The trains cross each other in 35 seconds and the faster train crosses a telegraph pole in 14 seconds.
- A solid is in the form of a cylinder with the base and top as trapezium. The ratio of the height of the figure and the median of the base is 5 : 2. What is the volume of the solid?
 - The parallel sides of the base are 140cm and 60cm.
 - The nonparallel sides of the base are 74cm and 26cm.
- What is the % decrease in the revenue?
 - The tax on a commodity is reduced by 37.5% and the sales increase by 11.11%.
 - The tax on a commodity is increased in the ratio 8:9 and the sales decrease in the ratio 81:50.
- X and Y are integers. Is $X + Y = 101$?
 - $\sqrt{XY} = 10$.
 - $X + Y \neq 25$.
- X, K, M and N are distinct real numbers. Is $X^M > X^N$?
 - $KM > KN$.
 - $M > N$.
- What is the slope of the line AB?
 - AB is perpendicular to the line $7X + 8Y = 56$.
 - Parallel lines have the same slope.
- What is the ratio of speeds of X and Y?
 - X beats Y by $\frac{1}{2}$ a second in a 100 m race.
 - X beats Y by $\frac{1}{2}$ a metre in a 100 m race.
- 12 men, 8 women and 6 boys are assigned to do a piece of work. In how many days can they complete the work?
 - 2 men, 3 women and 5 boys can complete the work in 67 days.
 - 18 men, 12 women and 9 boys can complete the work in 24 days.
- What is the cost price of the transistor?
 - A shopkeeper gives a discount of 10% on the marked price of Rs. 330, but still makes a profit of 10% on the transaction.
 - On the list price of Rs. 375, the shopkeeper gives successive discounts of 20% and 10% to reduce his inventory, on a no profit - no loss basis.
- The average weight of three men, A, B and C, is 84 kgs. Another man, D, joins the group and the average weight of the group becomes 80 kgs. How much does A weigh?
 - Another man, E, weighs 3 kgs more than D, replaces A and the average weight of B, C, D and E becomes 79 kgs.
 - Had A weighed 7 kgs less, the average weight of A, B, C would be the same as that of B, C and D.

ANSWERS

Ex. 1(A)	1 - d	2 - b	3 - e	4 - c	5 - c	6 - c	7 - c	8 - a	9 - c	10 - a
	11 - e	12 - b	13 - e	14 - c	15 - e	16 - b	17 - c	18 - c	19 - e	20 - e
1(B)	1 - a	2 - b	3 - c	4 - d	5 - a	6 - d	7 - a	8 - b	9 - c	10 - b
Ex. 2(A)	1 - d	2 - b	3 - b	4 - c	5 - b	6 - e	7 - c	8 - c	9 - e	10 - a
	11 - c	12 - c	13 - d	14 - c	15 - e	16 - b	17 - d	18 - e	19 - b	20 - e
2(B)	1 - a	2 - c	3 - d	4 - b	5 - d	6 - c	7 - b	8 - a	9 - a	10 - a
Ex. 3(A)	1 - e	2 - c	3 - c	4 - e	5 - e	6 - c	7 - e	8 - a	9 - b	10 - a
	11 - e	12 - e	13 - c	14 - a	15 - c	16 - e	17 - b	18 - b	19 - b	20 - e
3(B)	1 - b	2 - d	3 - a	4 - c	5 - a	6 - b	7 - a	8 - c	9 - a	10 - d
Ex. 4(A)	1 - d	2 - e	3 - c	4 - e	5 - a	6 - a	7 - c	8 - b	9 - c	10 - c
	11 - e	12 - c	13 - a	14 - a	15 - b	16 - c	17 - e	18 - d	19 - c	20 - e
4(B)	1 - a	2 - c	3 - c	4 - d	5 - c	6 - b	7 - a	8 - b	9 - d	10 - c
Ex. 5(A)	1 - e	2 - e	3 - c	4 - e	5 - a	6 - b	7 - e	8 - a	9 - b	10 - c
	11 - c	12 - a	13 - d	14 - c	15 - d	16 - c	17 - c	18 - e	19 - d	20 - e
5(B)	1 - d	2 - c	3 - c	4 - c	5 - a	6 - a	7 - a	8 - c	9 - b	10 - a
Ex. 6(A)	1 - e	2 - e	3 - c	4 - c	5 - c	6 - a	7 - a	8 - c	9 - b	10 - a
	11 - a	12 - c	13 - b	14 - b	15 - a	16 - e	17 - c	18 - e	19 - c	20 - c
6(B)	1 - a	2 - a	3 - b	4 - d	5 - d	6 - a	7 - a	8 - d	9 - a	10 - a
Ex. 7(A)	1 - c	2 - e	3 - a	4 - c	5 - a	6 - e	7 - e	8 - c	9 - b	10 - a
	11 - c	12 - c	13 - d	14 - e	15 - e	16 - a	17 - d	18 - c	19 - e	20 - b
7(B)	1 - e	2 - c	3 - a	4 - e	5 - b	6 - d	7 - e	8 - b	9 - a	10 - c
Ex. 8(A)	1 - a	2 - c	3 - e	4 - c	5 - c	6 - e	7 - c	8 - c	9 - c	10 - e
	11 - e	12 - c	13 - c	14 - e	15 - c	16 - a	17 - d	18 - e	19 - d	20 - a
8(B)	1 - a	2 - c	3 - c	4 - a	5 - d	6 - b	7 - d	8 - a	9 - b	10 - c
Ex. 9(A)	1 - c	2 - a	3 - e	4 - e	5 - a	6 - e	7 - e	8 - e	9 - c	10 - a
	11 - d	12 - c	13 - b	14 - c	15 - e	16 - b	17 - a	18 - c	19 - c	20 - c
9(B)	1 - c	2 - b	3 - d	4 - c	5 - e	6 - a	7 - b	8 - a	9 - a	10 - d
Ex. 10(A)	1 - b	2 - e	3 - a	4 - e	5 - a	6 - c	7 - d	8 - b	9 - d	10 - e
	11 - c	12 - b	13 - c	14 - a	15 - c	16 - e	17 - c	18 - c	19 - e	20 - b
10(B)	1 - c	2 - c	3 - b	4 - a	5 - a	6 - e	7 - d	8 - d	9 - b	10 - b

SOLUTIONS

EXERCISE 1(A)

- Statement I: We have, Circumference = $2\pi r = 12\pi$. Therefore $r = 6$, which is a whole number so Statement I alone is sufficient. From Statement II, we have $(2\pi r)/(\pi r^2) = \frac{1}{4}$. Therefore $r = 8$, which is a whole number so Statement II alone is sufficient. Hence answer is (d).
- Since AB can be a chord or a secant of the circle, Statement I alone is not sufficient. Statement II alone is sufficient, as the tangent AB is perpendicular to radius CB. Hence answer is (b).
- Statement I: Take two positive numbers a and b as 2 and 3 respectively, then their sum = $2 + 3 = 5$, which is an odd number. Take two positive numbers a and b as 2 and 4 respectively, then their sum = $2 + 4 = 6$, which is an even number. Therefore Statement I alone is not sufficient.
Statement II: Take two negative numbers a and b as -2 and -3 respectively, then their sum = $(-2) + (-3) = -5$, which is an odd number. Take two negative numbers a and b as -2 and -4 respectively, then their sum = $(-2) + (-4) = -6$, which is an even number. Therefore Statement II alone is not sufficient. Since each Statement I and (2) are contradictory to each other, both together are not sufficient. Hence answer is (e).
- Statement I: We can have $N + 5 = (3)^2$, which gives $N = 4$, which is a perfect square. We can also have $N + 5 = (5)^2$, which gives $N = 20$, which is not a perfect square. Therefore, statement I alone is not sufficient to answer the question.
Statement II: We can have $N - 3 = (1)^2$, which gives $N = 4$, which is a perfect square. We can also have $N - 3 = (2)^2$, which gives $N = 7$, which is not a perfect square. Therefore Statement II alone is not sufficient. Now we have $N + 5 = k_1^2$ and $N - 3 = k_2^2$ where k_1 and k_2 are integers. Therefore $N + 5 - (N - 3) = 8 = k_1^2 - k_2^2$. Therefore $(k_1 + k_2)(k_1 - k_2) = 4 \times 2$. Since k_1 and k_2 are integers, only possible values of k_1 and k_2 are 3 and 1 respectively or 3 and -1. Therefore only possible value of N is 4, which is a perfect square.
Alternate solution:
Since by substituting 3 and adding 5 to an integer, we get a perfect square, the two perfect squares have to have a difference of 8 between them. Only possibility left is that the perfect squares are 1 and 9. Therefore $N=4$. Since we require both the statements to reach this conclusion, the answer is (c).
- Since Ram's father's age is not known, Statement I alone is not sufficient.
Statement II: Ram's father is 50 year old today. From this we can not find Ram's age. Therefore Statement II alone is not sufficient. Both the statements together we have Ram is $50 - 25$ i.e. 25 years old today. So Ram will be 30 years old 5 years from now. Hence answer is (c)
- Statement I: We can have A, B, C, D, E as 10, 20, 40, 60, 70 respectively or 2, 3, 4, 5, 6 respectively. Therefore Statement I alone is not sufficient.
Statement II: We have $E = B + 3$. Also the numbers A, B, C, D, E are integers written in ascending order. So we can conclude that $C = B + 1$, $D = C + 1$ and $E = D + 1$. But A need not be $B - 1$. Therefore Statement II alone is not sufficient. Both statements (1) and (2) together we have $A = B - 1$, then A, B, C, D, E becomes consecutive integers. Hence answer is (c).
- Statement I: We have $q - r = r - p$, giving us $r = (p + q)/2$. Therefore Statement I alone is not sufficient.
Statement II: From the equation, $p + q = 10$, we can't determine the value of r. Therefore the Statement II alone is not sufficient.
Now by combining both the statements, $p + q = 10$ and $r = (p + q)/2$. Therefore both the statements together give $r = 5$. Hence answer is (c).

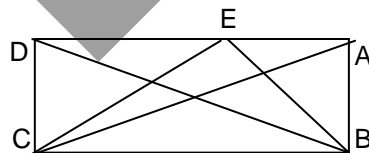
8. Statement I: We have $a - b + c = 0$. Therefore $a + c = b$. Therefore $a + b + c = b + (a + c) = 2b$ which is an even number. Therefore the Statement I alone is sufficient.
Statement II: The product $a b c$ is even then atleast one number must be even. But we have even + even + even = even and even + odd + even = odd. Therefore Statement II alone is not sufficient. Hence answer is (a).
9. Statement I alone is not sufficient as we don't know the length of the sides of the triangle. Since we do not know the relation between area of triangle ABC and area of the triangle PQR, statement II alone is not sufficient since we have no relation between ΔPQR and ΔABC . Combining both the statements together, we have 4 equilateral triangles. Therefore $A(\Delta PQR) = \frac{1}{4} \times 10 = 2.5$ sq. cm. Hence answer is (c).
10. Statement I: We have $-5M + 5N > 0$. Therefore $N > M$. So Statement I alone is sufficient.
Statement II: We have $5M + 5N > 0$. Now we can have two cases as follow.
Case1: $M < N$. If we take $M = 2$ and $N = 5$
Case2: $M > N$. If we take $M = 7$ and $N = 2$.
Therefore Statement II alone is not sufficient to get unique solution. Hence answer is (a).
11. Statement I alone is not sufficient. Since we don't know the number of girls failed this year, Statement II alone is not sufficient since we do not know anything about the number of girls failed last year. Both the statements together are not sufficient since the number of girls appeared in the exam may also change. Hence answer is (e).
12. Statement I: $(x^4)^2 = x^8$. Therefore $(x)^8 = x^8$. Therefore Statement I alone is not sufficient.
Statement II: $(x^3)^2 = (2^2)^3$. Therefore $x^6 = 2^6$. Therefore $x = 2$ or $x = -2$. But from the given question, x is a natural number. So, $x = 2$. So Statement II alone is sufficient. Hence answer is (b).
13. Statement I: We have $3a + 2b = 9$. Therefore $a = (9 - 2b)/3$. Since we don't know the value of b , Statement I alone is not sufficient.
Statement II: $a = (27 - 6b)/9$. Since we don't know the value of b , Statement II alone is not sufficient. It is obvious that both statements are same. Hence answer is (e).
14. Suppose salaries of A, B, C are S_a, S_b, S_c respectively.
Statement I: $S_a = S_b = 2S_c$. Therefore Statement I alone is not sufficient
Statement II: $S_c = S_b - 400$. Statement(2) alone is not sufficient. Both statements together we get $S_a = S_b = 800$ and $S_c = 400$. Therefore $S_a + S_b + S_c = 2000$. Hence answer is (c).
15. Statement I: We have $18 = 2 + 16 = 4 + 14 = 6 + 12 = 8 + 10$. On the basis of this four answers are possible. Therefore Statement I alone is not sufficient.
Statement II: $26 = 2 + 24 = 14 + 12 = \dots$ etc. Therefore Statement II alone is not sufficient.
Since we don't know the series of even real numbers given, we can't determine the fourth even number even with both statements together. Hence answer is (e).
16. Statement I: We can draw two triangles such that $AB = AC/3$. One triangle will have $\angle B$ as acute angle, while the other triangle will have $\angle B$ as obtuse angle. Therefore Statement I alone is not sufficient.
Statement II: We have if $m\angle B = 90^\circ$, then $AC^2 = AB^2 + BC^2$. Now if $AC^2 > AB^2 + BC^2$, we can conclude that $\angle B > 90^\circ$. Therefore Statement II alone is sufficient. Hence answer is (b).
17. Statement I alone is not sufficient since we do not know the value of any of the integer. Statement II alone is not sufficient since we do not know any thing about the other 4 integers. Both the statements together give a, c and e are even number and b & d are odd numbers. Therefore answer is (c).
18. Let there be N_a and N_b marbles with A and B.
Statement I: $N_a - 5 = N_b + 5$. Therefore Statement I alone is not sufficient.
Statement II: $N_b - 10 = N_a / 2$. Therefore Statement II alone is not sufficient. Both the statements (1) and (2) together give $N_b = 30$ and $N_a = 40$. Hence answer is (c).

19. Statement I alone is not sufficient as it does not give any value of B. Statement II alone is not sufficient since it can't give any relation between a, b and c. Both the statements together give $b^2 = ac = a^2 = c^2$. Still we can't determine the value of b. Hence answer is (e).
20. Statement I alone is not sufficient as we don't know the breadth of the rectangle. Since we can't find the shorter side of the rectangle, Statement II alone is not sufficient. We don't know the breadth of the rectangle. Therefore both the statements (1) and (2) are not sufficient. Hence answer is (e).

EXERCISE 1(B)

1. Neither of the two statements alone is sufficient to answer the question. If we combine the two statements, we can obtain two equations containing three variables. This system of equations will have infinitely many solutions. Since it is not possible to uniquely determine the rates at which A, B and C work, even the two statements together are not sufficient to answer the question. Hence answer is (a).
2. Statement I alone is not sufficient as we don't know the rate at which pipe B empties the cistern. Statement II alone is not sufficient as we don't know the rate at which pipe A fills the cistern. Suppose V is the volume of the cistern. Combining both statements, we get $3(V/2 - V/4) + 20 = V$. We can now calculate the volume of the cistern. Therefore, both statements together are required to answer the question. Hence answer is (b).
3. From statement I, we get $x = 3y / 4$. We have one equation and two unknowns. So statement I alone is not sufficient to answer the question. From statement II, we get $x + y = 70 / 4$. Therefore statement II alone is sufficient. Hence answer is (e).
4. From statement I, $Y^2 - Y = 0$. So, Y could be either 0 or 1. We know that $X + Y = 0$. So, depending on the value of Y, X will be either 0 or -1. In any case, X is not greater than Y. Therefore, statement I alone is sufficient to answer the question. Statement II alone is not sufficient since X can be 1 or -1 consecutively Y will be -1 or 1. Now, as we are getting different relation between X and Y. So statement I alone is sufficient. Hence answer is (d).
5. Neither of the two statements alone is sufficient to answer the question since they do not tell anything about the selling price. If we combine both statements, we can obtain the cost of the second type of tea. We know the cost of the mixture. As we do not know the selling price of the mixture, it is not possible to determine the whole seller's gain/loss. So, the given data is not sufficient to answer the question. Hence answer is (a).

6.



Statement I says that quadrilateral ABCD is a rectangle. \therefore the height of $\triangle AEC$ and the height of $\triangle BEC$ are equal. Further, AE (base of $\triangle AEC$) is less than BC (base of $\triangle BEC$). So we can definitely say that $A(\triangle AEC) < A(\triangle BEC)$.

Statement II is impossible as $(AC) > I(AE)$ will not lead to the formation of a quadrilateral. Therefore, statement I alone is sufficient to answer the question. Hence answer is (d).

7. It can easily be seen that data from both questions will be required to compare the interest rates. However, since it is not known whether the interests are compounded as S. I. or C. I., even the two statements together are not sufficient to answer the question. Hence answer option is (a).
8. Statement I alone is not sufficient to answer the question as we don't know the total expenses of Arun and Shirish. Statement II alone is not sufficient to answer the question as we need the value of x or y . Combining both statements, we get $[30 / (70 - 30)] 2000$ as the amount Arun pays each month for the apartment. . Hence answer is (b).
9. Let the number of soldiers in the first row and the first column of a solid rectangle be X and Y respectively. ($X > Y$). From statement I, we can obtain an equation of the form $XY = (X + 3)(Y + 3) - (X - 5)(Y - 5)$. We obtain an equation containing two variables. So, statement I alone is not sufficient to answer the question. From statement II, we know that the total number of soldiers is $247 = XY$. 247 can only be expressed as the product of two prime numbers, 13 and 19. So, X and Y are 19 and 13 respectively. Therefore, statement II alone is sufficient to answer the question. . Hence answer is (c).
10. As an escalator moves upwards, the man's speed when running up will be greater than his speed when running down. Neither of the two statements alone is sufficient to answer the question. If we combine both statements, we can obtain the man's speeds when running up and when running down. We can now use $S_u = X + Y$ and $S_d = X - Y$, where X is the speed at which the man runs and Y is the speed of the escalator, S_u is the upward speed and S_d is the downward speed. So, both statements together are needed to answer the question. Hence answer is (b).

EXERCISE 2(A)

1. Statement I: From the given information we have N is higher than O by $2800 - 1600$ i.e. 1200m. Therefore Statement I alone is sufficient.
Statement II: From the given information N is higher than O by 1200 m. So Statement II alone is sufficient. Hence answer is (d).
2. Statement I alone is not sufficient as we don't know the distance AB . Statement II: Since speed of train Y is equal to speed of train X , later will take $1 \frac{1}{2}$ hour. So train X will reach station B at 2 p.m. on the same day. So Statement II alone is sufficient. Hence answer is (b).
3. Statement I: Since $P - 15$ is an integer, P is an integer. Therefore Statement I alone is not sufficient.
Statement II: $P - 10$ is an odd integer. Therefore P is an odd integer. So $P - 5$ is an even number. Therefore Statement II alone is sufficient. Hence answer is (b).
4. Statement I alone is not sufficient as we don't know the depreciation rate. Since we don't know the purchase value, Statement II alone is not sufficient. Both the statements (1) and (2) together we have the depreciated value = $60000 (1 - 15/100)^4$. Hence answer is (c).
5. Statement I alone is not sufficient as we don't know the cost of one tile.
Statement II: Total cost = $9 \times 12 \times 10 = \text{Rs.}1080$. Therefore Statement II alone is sufficient. Hence answer is (b).
6. Statement I alone is not sufficient as P can be in any quadrant. Statement II alone is not sufficient as P can be in first or second or fourth quadrant. Both the statements together gives point P to be in the first or second quadrant. Hence answer is (e).
7. Statement I: We have, $z = \pm 5$. Therefore the Statement I alone is not sufficient as we don't know the value of w . Statement II alone is not sufficient as we don't know the value of z . Both statements together give $w > z$. Hence answer is (c).

8. Statement I alone is not sufficient as we don't know the height of the cylinder. Statement II alone is not sufficient as we can't find the value of $2\pi rh$ from the given value of $\pi r^2 h$. But from statements (1) and (2) together we can find the values of r and h . Therefore we can find the curved surface area of the cylinder. Hence answer is (c).
9. Statement I alone is not sufficient as we do not know data regarding city C. Statement II alone is not sufficient we do not know data regarding city A. Even after combining both statements Point C can be anywhere on the circumference of radius 30 km from city B. So we can't determine the exact position of point C. Hence answer is (e).
10. Statement I: $P = P \times R \times 8 / 100$, which gives $R = 100 / 8 = 12.5\%$. Therefore Statement I alone is sufficient to answer the question.
Statement II alone is not sufficient as only principal value can't determine the rate of simple interest. Hence answer is (a).
11. Let l and b are the length and breadth of the rectangle. Then Statement I gives $lb = 55$. Now Statement I alone is not sufficient as we don't know the breadth of the rectangle. Statement II gives $l^2 + b^2 = 900$, so Statement II alone is not sufficient. Both the statements together can give the value of length of the rectangle. Hence answer is (c).
12. Statement I alone is not sufficient as we can't determine the base radius from the given information $\pi r^2 h = 616$. Statement II alone is not sufficient as we don't know the height of the cylinder. But both statements together give radius and height equal to 7cm and 4 cm respectively. Therefore volume of the cone = $1/3 \pi r^2 h = 1/3 \pi (7)^2 \times 4$. Hence answer is (c).
13. From Statement I, we get 4 equal triangles. So $A(\Delta PQR) = A(\Delta ABC) / 4 = 12$. Therefore Statement I alone is sufficient. By Hero's formula, we have $A(\Delta ABC) = \sqrt{s(s-a)(s-b)(s-c)}$. Therefore Statement II alone is sufficient. Hence answer is (d).
14. Statement I alone is not sufficient as we don't know the proportion in which two varieties of tea are mixed. Statement II alone is not sufficient as we don't know the quantity of mixture sold. Both the statements together give profit = $9 \times 10 - 68 = \text{Rs. } 22$. Hence answer is (c).
15. Statement I alone is not sufficient as we don't know the coordinates of N. Statement II alone is not sufficient as we can't find the coordinates of N on the given information. Both the statements together can't determine the position of N. Hence answer is (e).
16. Statement I alone is not sufficient as we don't know whether m is even or odd.
Statement II: We have $2m$ as an even number. Therefore $9n$ is an odd number. So n is an odd number. Therefore Statement II alone is sufficient.
17. Statement I: We have $AB = BC$. Therefore by SAS property $\Delta ABP \cong \Delta CBP$. Therefore the Statement I alone is sufficient. Similarly from the Statement II alone we can show that $\Delta ABP \cong \Delta CBP$. Therefore Statement II alone is sufficient. Hence answer is (d).
18. Statement I alone is not sufficient as z can take any negative value. Statement II alone is not sufficient as z can take any negative value. Both the statements together give $z < (x + y) / 2$. But z can take any negative value. Therefore, even the two statements together are not sufficient to answer the question. Hence answer is (e).
19. Statement I alone is not sufficient. Statement II gives $\angle x$ and $\angle MND$ are opposite angles. Therefore $\angle x = \angle MND$. Therefore $\angle MND = \angle y$. Therefore $\angle MND = \angle y$. Therefore $AB \parallel CD$. So Statement II alone is sufficient. Hence answer is (b).
20. Statement I alone is not sufficient. Statement II alone is not sufficient. Both statements together are not sufficient. E.g. N can be 34, which is divisible by 17. N can be 36, which is not divisible by 17. Hence answer is (e).

EXERCISE 2(B)

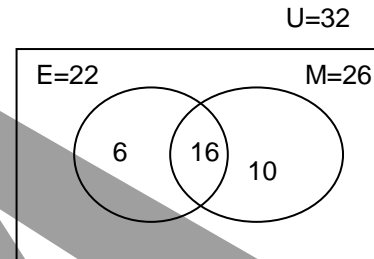
1. Neither statement I alone nor statement II alone is sufficient as we don't know the number of commodities manufactured in 1994. If N is the number of commodities manufactured in 1994, then combining both statements the number of commodities is equal to $2N$, $3N$ and $3N$ respectively. Since we don't know the value of N , both statements are not sufficient to answer the question. Hence answer is (a).
2. From statement I, we can find A's speed. We also know that B takes $3\frac{1}{2}$ minutes to run 100 m. We can therefore, find B's speed. We now know the ratio of speeds. This ratio is also the ratio of distances covered by A and B in constant time. This ratio can be used to calculate the distance A can give B in a 1400 m race. Therefore, statement I alone is sufficient to answer the question. Hence answer is (c).
3. Statement I alone is not sufficient as we don't know how many students learn all three languages and also the number of students learning German and Russian only. Statement II alone is not sufficient as we don't know how many students learning German. If we combine both statements, we can draw a Venn diagram to represent the given data and get the number of students learning all the three languages as 50. Hence answer is (d).
4. Statement I alone is not sufficient to answer the question. Using statement II, we can calculate the percent loss as $(30 \times 30)/100 = 9\%$. As we know the man's investment, we can calculate his loss in the transaction. Therefore, statement II alone is sufficient to answer the question. Hence answer is (b).
5. Neither of the two statements alone is sufficient to answer the question. In a rectangle, the opposite sides are congruent. From statement (II), we can conclude that $\square ABCD$ could be rhombus or a square. By combining the two statements, we can conclude that the opposite sides need not be congruent. We can therefore, conclude that $\square ABCD$ is not a rectangle. So, both statements together are required to answer the question. Hence answer is (d).
6. From statement I, we know that $m\angle SPQ = 60^\circ$. Using this, we can calculate the radius of the circle as 3. Now, using the properties of a 30° - 60° - 90° triangle, we can find $l(QR)$. Therefore, statement I alone is sufficient to answer the question. Hence answer is (c).
7. Statement I alone cannot answer the question as we cannot determine B's rate of work. From statement II, we can conclude that B, by himself, can complete the work in 12 days. As we know the rates at which A and B work, the question can be answered with the help of statement II alone. Hence answer is (b).
8. From statement I, we obtain $X = \pm 7$. As we cannot uniquely determine the value of X , statement I alone is not sufficient to answer the question. From statement II, we obtain $X = \pm 7$. As we cannot uniquely determine the value of X , statement II alone is not sufficient to answer the question. Combining the two statements will not help in uniquely determining the value of X . So, even the two statements together are not sufficient to answer the question. Hence answer is (a).
9. Neither of the two statements alone is sufficient to answer the question. Even if we combine the two statements, we cannot obtain a relation between A, B and C. Therefore, even the two statements together are not sufficient to answer the question. Hence answer is (a).
10. From the data in statement I, we can use the slope–point form of the equation of a line and obtain two different positions for point C. As we cannot determine the position of point C uniquely, statement I alone is not sufficient to answer the question. The data given in statement II is a known fact about the centroid of a triangle. The data in this statement is thus redundant.

As it is not possible to uniquely determine the position for the third vertex of the triangle even on combining both the given statements, the given data is not sufficient to determine the coordinates of the centroid of the triangle. Hence answer is (a).

EXERCISE 3(A)

1. Since we do not know the relation between x and y , Statement I alone is not sufficient. Since we don't know the value of x , Statement II alone is not sufficient. Both the statements together are not sufficient as we can not calculate the value of x . Hence answer is (e).

2. Statement I alone is not sufficient as we don't know the number of students passed in Mathematics. Statement II alone is not sufficient as we don't know the number of students passed in English. Both the statements together give number of students failed in English and Mathematics are 10 and 6 respectively. Since nobody failed in both the subjects, we have number of students promoted = $32 - 16 = 16$. Hence answer is (c).



3. Statement I alone is not sufficient as we get $x > 5$ or $x < 1$. Statement II alone is not sufficient as we get $3 < x < 8$. Both the statements together give $5 < x < 8$. Hence answer is (c).
4. Statement I alone is not sufficient as position of B is not defined. Statement II alone is not sufficient as position of A is not known. Both the statements together are not sufficient since the point C can be anywhere on the circumference of circle, 5 cm from A and 4 cm from B. Or C is lying on the straight line from A to B. Hence answer is (e).
5. Statement I alone or (2) alone is not sufficient as we don't know a and d . Both the statements together are not sufficient as there are 4 unknowns and only two equations. Hence answer is (e).
6. Raju can be greater than or equal to or less than 40 years so each Statement I alone or (2) alone is not sufficient. Both the statements together give sum of all employees is equal to 960. Suppose the oldest two employees are of age 60 each then even if first 17 employees are 40 years each then Raju's age = $960 - 120 - 17 \times 40 = 160 > 40$. Therefore Raju is over 40 years of age. Hence answer is (c).
7. Statement I alone is not sufficient as we don't know the value of b . Statement II alone is not sufficient as three variables and one equation can't give us the required value. Both the statements together are not sufficient as relation between b and c is not known. Thus b can be greater or less than c . Hence answer is (e).
8. Area of the square = $(10 / \sqrt{2})^2 = 50$. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as we can't determine the area of the square on the information that side of the square is greater than $18 / 4$. Hence answer is (a).
9. Let Jyoti's height be h . Then Statement I gives $h > 154$ which is not sufficient. Statement II gives $h < 157$, which is sufficient. Hence answer is (b).
10. Point $(0, 0)$ satisfies the equation $3x + 4y = 0$. Therefore the Statement I alone is sufficient. Statement II: We can have a line $3x + 4y = a$, where a is any real number. When a is equal to 0, then the MN passes through the origin. When a is not equal to zero then MN does not pass through the origin. So Statement II alone is not sufficient. Hence answer is (a).
11. Statement I alone is not sufficient as we don't know Mr. Naik's pay. Statement II alone is not sufficient as we don't know the increment in Mr. Naik's pay. Both the statements together are

not sufficient as we don't know the period for which an increment of Rs. 1600 was given. Hence answer is (e).

12. Statement I: A, B, C, D need not be in A.P. e.g. We can have $B = 12, C = 15, A = -100, D = 127$. Therefore the Statement I alone is not sufficient.
Statement II: We have $A + D = B + C$. Therefore the Statement II alone is not sufficient. Since both statements are same, the given data is not sufficient to answer the question. Hence answer is (e).
13. Statement I alone is not sufficient as we don't know, the number of codes. Statement II alone is not sufficient, as we don't know, how the words are formed. If there are exactly 3 distinct symbols are used, then there will $3 \times 2 \times 1$ i.e 6 different code words. Therefore both statements together are sufficient to answer the given question as 'No'. Hence answer is (c).
14. Statement I alone is sufficient as it gives both x and y as odd numbers. Statement II alone is not sufficient, as we don't know x . Hence answer is (a).
15. We require at least 3 parameters including one side to calculate any other parameter in a triangle. So Statement I alone is not sufficient. Similarly, Statement II alone is not sufficient. By Sine rule in $\triangle ABC$, $\sin B / 6 = \sin 60^\circ / 8$. Therefore both statements together are sufficient. Hence answer is (c).
16. Statement I alone is not sufficient as P can be even or odd multiple of 4. Statement II alone is not sufficient as P can be even or odd multiple of 8. Both the statements together are not sufficient, as P can be odd multiple of 4 or any multiple of 8. Hence answer is (e).
17. Statement I gives $y^x = y^x$, which is not sufficient to find the value of x . Statement II alone is sufficient as we get $x = y^0 = 1$. Hence answer is (b).
18. Statement I: At least one from M, N, P is even. But still $M + N + P$ can be even or odd. Therefore the Statement I alone is not sufficient.
Statement II: $M + N + P = P + P = 2P$ which is even. Therefore the Statement II alone is sufficient. Hence answer is (b).
19. Statement I alone is not sufficient as we don't know ST .
Statement II: $A (\triangle PTS) / A (\square PQRS) = \frac{1}{2} ST / PS = 1 / [2(1 + RT / ST)] = 1 / [2(1 + 1/3)] = 3/8$. Therefore the Statement II alone is sufficient. Hence answer is (b).
20. Statement I alone is not sufficient. Statement II alone is not sufficient. Both the statements together are not sufficient because if $2y$ is an integer then y need not be an integer. Therefore, the question cannot be answered even with the help of both statements together. Hence answer is (e).

EXERCISE 3(B)

1. From statement I, we can calculate the speeds over the distances A-B, B-C, C-D and D-A as 100 kmph, 200 kmph, 400 kmph and 800 kmph respectively. As the distances are equal, we can use the harmonic mean of these speeds to calculate the average speed of the aeroplane over the entire journey. Therefore, statement I alone is sufficient to answer the question. Hence answer is (b).
2. Neither of the two statements alone is sufficient to answer the question as from statement I we can't calculate the value in 23rd week and from statement II we don't know the initial value of bananas. From the two statements, we can find the price of bananas during the first five months of the year. However, as the 23rd week comes after the first five months, we cannot determine the price of bananas during the 23rd week. Therefore, even the two statements together are not sufficient to answer the question. . Hence answer is (d).

3. Statement I alone is not sufficient, as we don't know how much of the total population is formed by women. Statement II alone is not sufficient, as we don't know what percent of women vote. Combining both statements, women voters are 48×0.4 i.e. 19.2% of the total population. Therefore, both statements together are required to answer the question. . Hence answer is (a).
4. From statement I, as X is a multiple of 2, $(X^2 + 20)/2$ will yield an even integer. But, $3X/2$ could be either an even or an odd integer. Depending on this value, $(X^2 + 3X + 20)/2$ could be an odd or an even integer. So, statement I alone is not sufficient to answer the question. From statement II, as X is a multiple of 4, $(X^2 + 20)/2$ will yield an even integer and $3X/2$ will also yield an even integer. So, $(X^2 + 3X + 20)/2$ will be an even integer. Therefore, the question can be answered with the help of statement II alone. . Hence answer is (c).
5. Neither of the two statements alone is sufficient to answer the question. As from statement I we cannot say anything about slope or co-ordinate of the point lying on the line and from statement II we cannot say anything about slope of that line or any other point on that line to know the equation. From statement II, we can obtain the point of intersection of the lines $2X + 3Y = 12$ and $4X + 3Y = 6$. If we combine the two statements, we know the co-ordinates of two points on the required line. The equation of the line can now be determined by using the two-points form of the equation of a line. Therefore, both statements together are required to answer the question. Hence answer is (a).
6. From statement I, we know that the man required 50 minutes to row downstream and 70 minutes to row upstream. We also know that the distance he travelled either way was 25 km. Using this, we can calculate the man's speeds when rowing downstream and when rowing upstream. Consequently, the speed of the current and the man's speed in still water can be calculated. We, can then calculate the time the man would require to complete the same journey if the speed of the current increases by 4 kmph. Therefore, statement I alone is sufficient to answer the question. . Hence answer is (b).
7. Suppose Rs. X and Rs. $750 - X$ are the cost prices and Rs. Y each are the selling prices of the wristwatches by Samar and Narayan respectively. From statement I, we have $Y + 125 = 107.5X$. As we get one equation containing two variables, statement I alone is not sufficient to answer the question. From statement II, we have $Y - 35 = 0.9(750 - X)$. So, statement II alone is not sufficient to answer the question. Combining both we can find the values of X and Y . Therefore, both statements together are required to answer the question. Hence answer is (a).
8. Statement I alone is not sufficient to answer the question. We know that the median of a triangle divides the triangle into two equal areas. As all the lines drawn are medians of triangles, $A(\triangle ABR) = A(\triangle ARC)$, $A(\triangle APB) = A(\triangle APC) = A(\triangle BPR) = A(\triangle PRC)$, $A(\triangle PRD) = A(\triangle DRC)$, $A(\triangle BRS) = A(\triangle SRP)$ and $A(\triangle SPQ) = A(\triangle PQR)$. Using this and the information from statement II, we can calculate the $A(\triangle PQR) = \frac{1}{4}A(\triangle APC)$. Therefore, statement II alone is sufficient to answer the question. . Hence answer is (c).
9. Statement I alone is not sufficient as we don't know the dimensions of circle and we don't know either SR is the diameter of circle or not. Statement II alone is not sufficient, as we do not know any other dimension. Combining both statements we get $TQ \times 3 = 6 \times 4$ using the theorem of two intersecting chords inside a circle. So $TQ = 8$. Therefore the area of the circle is $\pi(11/2)^2$. Therefore both statements are required to answer the question. Hence answer is (a).
10. Statement I alone is not sufficient as the relation between all 4 variables is not known. Statement II alone is not sufficient as relation between a and b is not given. Both statements will give the value of a and b , but we cannot say whether either of them is the largest. Hence answer is (d).

EXERCISE 4(A)

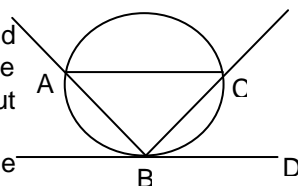
1. Let x is the side of the cube. Statement I: area of one face = $x^2 = 49$ thus $x = 7$. Therefore volume = 343. Therefore the Statement I alone is sufficient. Statement II gives the longest diagonal = $x\sqrt{3} = 20$. So $x = 20/\sqrt{3}$ Therefore volume = $(20/\sqrt{3})^3$. Therefore the Statement II alone is also sufficient. Hence answer is (d).
2. Statement I and II imply the same information so both will not serve the purpose. Hence answer is (e).
3. Statement I alone is not sufficient as we don't know the other two sides. Statement II alone is not sufficient as we don't know the other two sides. Let x and y be the arms of the triangle. Then both the statements together, we have $x + y = 25 + 5\sqrt{5} - 15 = 10 + 5\sqrt{5}$. We also have $x^2 + y^2 = (15)^2$. On solving we get $x = 10$ and $y = 5\sqrt{5}$. So $A(\Delta ABC) = \frac{1}{2} \times 10 \times 5\sqrt{5}$. Hence answer is (c).
4. Statement I alone is not sufficient, as it concludes either $a = 0$ or $c = 0$. Statement II alone gives $a^2 = b c$. If any one number is zero, then there has to be one more number equal to zero. Since one and only one number is zero, Statement II alone is not sufficient. For the same reason both the statements together are not sufficient. Hence answer is (e).
5. From statement I alone $A - B = B - C$ which means A, B and C are three distinct digits and even if B is 0, then $A = -C$, so statement I alone is sufficient to give the answer. Statement II alone is not sufficient as it gives $A + 2B = 3C$. Hence answer is (a).
6. Statement I: If time is constant, speed \propto distance travelled. Therefore train x is faster than train B . Therefore Statement I alone is sufficient. Statement II alone is not sufficient as can't compare the speed of the train on the basis of number of bogies only. Hence answer is (a).
7. Statement I alone is not sufficient as there can be any number of lines passing through the origin. Statement II alone is not sufficient as there can be any number of lines passing through the point $(8, 10)$. Both the statements together (1) and (2) give slope of the line = $(10 - 0) / (8 - 0) = 5 / 4$. Hence answer is (c).
8. Statement I alone is not sufficient as we don't know the maximum number of pieces X can make. Statement II alone is sufficient as we know the maximum number of pieces X and Y together can make is 40 per day. So minimum 3 days are required to make 100 pieces. Hence answer is (b).
9. From Statement I we have $5x + 2y < 21$. Value of y depends on the value of x . Since we don't know the value of x , Statement I alone is not sufficient. From Statement II, we have $75 + 2y < z$. Value of y is dependent on the value of z . Therefore Statement II alone is not sufficient. Both the statements give $y < -27$. Therefore y is negative. Hence answer is (c).
10. Statement I alone is not sufficient as we don't know whether the rolling is along the length or along the width. Statement II alone is not sufficient as we don't know the radius of the tube. Both statements together, we have $2\pi r = 7$. So volume of the tube = $\pi (49 / 44)^2 \times 10$. Hence answer is (c).
11. Statement I alone is not sufficient as we don't know the rate of interest. Since we don't know the time period of the given 4% interest, Statement II alone is not sufficient. For the same reason both statements together are not sufficient to answer the question. Hence answer is (e).
12. Statement I alone is not sufficient. Statement II alone is not sufficient. Both statements together give $X = 60 / 7$. Therefore $3X + Y = 200 / 7$. Hence answer is (c).
13. Statement 1: $2\pi r_2 / 2\pi r_1 = 3$. Therefore $\pi r_2^2 / \pi r_1^2 = 9$. So Statement I alone is sufficient. Statement II alone is not sufficient. Hence answer is (a).

14. We have $N = (2k)^2$. So Statement I alone is sufficient. Since $\sqrt{A^2 + B^2}$ need not be an integer, Statement II alone is not sufficient. Hence answer is (a).
15. Statement I alone is not sufficient as it gives $p = \pm m$. Statement II alone is sufficient as it gives $p = m$. Hence answer is (b).
16. Statement I alone is not sufficient as we don't know CB. Statement II alone is not sufficient. Both statements together give $AB^2 = 5^2 + 12^2$. Therefore $AB = 13$. Hence answer is (c).
17. Statement I alone is not sufficient as we don't know the population of China and India. Statement II alone is not sufficient as we don't know the rate of population increase. Suppose in 1975, population of India and China be P crores and P + 20 crores. Then $(P + 20)(1 + 10/100)^t = P(1 + 15/100)^t$. Since there are two unknowns and only one equation, both the statements together are not sufficient. Hence answer is (e).
18. Statement I alone is sufficient as x is divisible by a number which is a multiple of 3. Statement II alone is sufficient as x is divisible by a number which is a multiple of 3. Hence answer is (d).
19. Statement I alone is not sufficient as it does not give the value of $\angle A$. Statement II alone is not sufficient for the similar reason. Using both the statements and applying exterior angle theorem we get $\angle x = \angle A + \angle B \Rightarrow 130 = 70 + \angle A$. here we can calculate the value of $\angle A$. Hence answer is (c).
20. Statement I alone does not give the value of y^2/x^2 so it is not sufficient. Statement II alone is not sufficient. Both the statements together are not sufficient. Hence answer is (e).

EXERCISE 4(B)

1. The data in statement I is redundant. From statement II, we know the principal invested for the period of one year is 5000 rupees. It is now possible to calculate the rate of interest. So, statement II alone is sufficient to answer the question. In this example, the question of the interest being S. I. or C. I. does not arise, as the period of investment is only one year. Hence answer is (a).
2. From statement I, we get $(X^2 + 10X + 25) = 100$. We can solve this quadratic equation to obtain $X = 5$ or $X = -15$. As we get two values of X, we cannot determine X uniquely and hence statement I alone is not sufficient to answer the question. From statement II, we get $(X^3 - X^2) = 100$. We can solve this equation to obtain $X = 5$ or $X = 7/2$. So, it is not possible to determine the value of X uniquely from statement II alone. But if we combine both statements, we can determine that the unique value for X is 5. Therefore, we can answer the question with the help of both statements. Hence answer is (c).

3. Suppose we join the points A and C.
 From statement I, we know that $m\angle ABC = m\angle CBD$. As $\angle CBD$ and $\angle CAB$ are inscribed in the same arc of the circle, their measures are equal. We now know that two angles of $\triangle ABC$ are congruent. But this does not help in answering the question.
 From statement II, we know that the perpendicular bisector of side BC is also a median, angle bisector and altitude of the triangle.
 Combining the two statements, we can conclude that $\triangle ABC$ is an equilateral triangle. As we know the circumradius, we can find the side of the triangle and determine its area. Hence answer is (c).



4. To calculate the cost of white washing the walls of the room, we need to calculate the area of the walls. The area of the walls is given as $2(lh + bh) = 2h(l + b)$.
From statement I, we know the value of $2(l + b)$. So, statement I alone is sufficient to answer the question.
The data in statement II is not sufficient to answer the question by itself. If we combining the two statements, we can obtain the values for the length and the breadth of the room. However, these values are not required to calculate the area of the walls of the room. Hence answer is (d).
5. Neither of the two statements alone is sufficient to answer the question. From the question, we can obtain the relation as $DL^2 = KW$, where, D: Density of the planet, L: Distance of the planet from the Sun, W: Weight of the planet and K: Constant of proportion. From statement I, we can calculate the value of K. From statement II, we can calculate the density and the weight of Neptune. If we combine the two statements, we know K, D and W. We can now calculate L^2 and hence the distance of Neptune from the Sun. Therefore, both statements together are required to answer the question. Hence answer is (c).
6. It can be seen that neither of the two statements alone is sufficient to answer the question as we cannot get any idea about speed of any of the trains also statement I does not say any thing about the relative direction of the trains. Thus two statements together are not sufficient to answer the question. Hence answer is (b).
7. Statement I alone is not sufficient to answer the question as we don't know the length of other two sides. If l_1, l_2 and l_3 are sides of the three pieces, then from statement II, we have $l_3 = 5$ and $l_1 + l_2 = 25$ and $l_1 - l_2 = 5$. So statement II alone is sufficient to answer the question. Hence answer is (a).
8. From statement I, we can obtain the measure of $\angle Q = 60^\circ$. If we know the measures of the angles of the triangle and any one side, we can use the sine - rule to obtain the other two sides. The area of the triangle can be calculated.
If we combine the two given statements, the above condition is satisfied. However, the three angles in A.P. could be $30^\circ - 60^\circ - 90^\circ$ or $20^\circ - 60^\circ - 100^\circ$ or $10^\circ - 60^\circ - 110^\circ$, etc. As the values of the angles cannot be determined uniquely, the data given in the two statements is not sufficient to answer the question. Hence answer is (b).
9. In the third quadrant both X - coordinate and Y - coordinate are negative. So, the product $XY > 0$. Therefore statement I alone is sufficient. Hence answer is (d).
10. Let the numbers be a, b, c, d and e. As these numbers are in continued proportion, we have $a/b = b/c = c/d = d/e$. From statements I and II, we get $bd = 400$ and $(a + e) = 85$. Neither of the two statements alone is sufficient to answer the question. However, we can use the constant of proportion 'K' and write the five numbers in terms of e. We can then solve the two equations obtained from the two statements as a pair of simultaneous equations and obtain the five numbers as 5, 10, 20, 40 and 80. Therefore, the two statements together are required to answer the question. Hence answer is (c).

EXERCISE 5(A)

1. Statement I alone is not sufficient as we don't know the rate at which clock is loosing. Statement II alone is not sufficient as we don't know the time at which the clock was set right. Since we don't know which Monday and which Wednesday is referred, both the statements are not sufficient. Hence answer is (e).
2. Since we don't know whether the trend of share prices will repeat or not, Statement I alone is not sufficient. Since we don't know when the value will become Rs. 60, Statement II alone is not sufficient. Therefore, both the statements together are not sufficient to answer the question. Hence answer is (e).

3. Statement I alone is not sufficient as we don't know the age of mother. Statement II alone is not sufficient as we don't know the age of mother. Both the statements together give present age of mother is $39 - 4$ i.e 35 years old. Therefore $x = 36 / 4 - 1 = 8$ years. Hence answer is (c).
4. Statement I alone is not sufficient as we don't know Arvind's salary last year. Statement II alone is not sufficient. Both the statements together are not sufficient. Hence answer is (e).
5. Statement I alone is sufficient as the only possible number is 99. Statement II alone is not sufficient as number can be 22, 33, 44,, 99. Hence answer is (a).
6. Statement I alone is not sufficient as two factories can have different style of working. According to Statement II, $10000 / 25$ i. e. 400 boxes can be made by workers in factory A on the average in a day. Therefore Statement II alone is sufficient. Hence answer is (b).
7. Statement I alone is not sufficient as we don't know the type of the sequence. Since we don't know the relationship between tenth term and the 11th term. Since we don't know the type of the sequence both the statements together are not sufficient. Hence answer is (e).
8. Statement I: We have $\frac{1}{2} \times b \times h = b$. Therefore $h = 2$ cm. Therefore Statement I alone is sufficient. Since we can draw any number of similar triangles with angles 100° , 50° , 30° respectively, Statement II alone is not sufficient. Hence answer is (a).
9. Statement I alone is not sufficient. From the Statement II alone let the angles be $7x$, $8x$, $9x$. Then $7x + 8x + 9x = 180^\circ$. So angles are $(7 \times 45 / 6)$, $(8 \times 45 / 6)$, $(9 \times 45 / 6)$. According to Sine rule, in any $\triangle ABC$, $a : b : c$ is equal to $\sin A : \sin B : \sin C$. Therefore the Statement II alone is sufficient. Hence answer is (b).
10. Suppose the price of one apple and one egg is Rs. a and Rs. b respectively. From Statement I, we have $10a + 6b = 13$. Therefore the Statement I alone is not sufficient as there is only one equation and two unknowns. From Statement II alone we have $b = \frac{1}{2}$. Therefore Statement II alone is not sufficient. Both statements together give $a = 1$. Hence answer is (c).
11. Suppose the score of A, B, C was a , b , c respectively. Now $a + b + c = 149$. From Statement I we have $a = 149 - 76 = 73$. But we can't find b and c so Statement I alone is not sufficient. From Statement II we have $b = 149 - 103 = 46$. But we can't find a and c so Statement II alone is not sufficient. Both statements together give $a = 73$, $b = 46$, $c = 30$. Hence answer is (c).
12. Statement I: If $N + 1$ is a prime number then it must be odd number. So N is an even number. Therefore N is not a prime number. So Statement I alone is sufficient. Statement II alone is not sufficient as N need not be a prime number. Hence answer is (a).
13. Statement I: We have $m\angle OAB = 45^\circ = m\angle OBA$. Therefore $m\angle AOB = 90^\circ = m(\text{arc } ACB)$. Therefore $m\angle ACB = (360 - 90) / 2 = 135^\circ$. Therefore the Statement I alone is sufficient. Statement II: We have $m(\text{arc } ACB) = 100^\circ$. Therefore $m\angle ACB = (360 - 100) / 2 = 130^\circ$. Therefore the Statement II alone is sufficient. Hence answer is (d).
14. Statement I alone is not sufficient as we don't know how many lottery tickets one book contain and the price of one lottery. Statement II alone is not sufficient as we don't know number of books sold and number of tickets each book contain. Suppose each book contains x pages. Then with both statements together we have $100[x / 2 + 2(x / 2)] = 21000$. On solving we get $x = 140$. Therefore 14000 tickets were sold. Hence answer is (c).
15. Statement I alone is sufficient as it gives the value of the estate = $12000 (5 / 6)^6$. Statement II alone is sufficient as it gives the value of the estate = $10000 (5 / 6)^6$. Hence answer is (d).

16. Suppose l and b is the length and breadth of the rectangle respectively. If x is the side of the square, then Statement I gives $l^2 + b^2 = 2x^2$. From this we can't determine whether lb is equal to x^2 . Therefore Statement I alone is not sufficient. Since second side of the rectangle need not be equal to the side of the square, Statement II alone is not sufficient. Both statements together give each side of the rectangle is equal to the side of the square. So a rectangle and a square have equal area. Hence answer is (c).
17. Statement I alone is not sufficient as we can't find the side of the rhombus ABCD from A (\square ABCD). Statement II alone is not sufficient as from length of one diagonal we can't find the side of the rhombus. Both statements together give $(\frac{1}{2})(AC) \times 48 = 140$. Therefore $AC = 35 / 6$. Diagonals of the rhombus are perpendicular bisectors of each other. Therefore side of \square ABCD = $\sqrt{[(35/12)^2 + 24^2]}$. Hence answer is (c).
18. Statement I alone is not sufficient as we can't determine the number of books from the average weight of the books. Statement II alone is not sufficient. Both statements together are not sufficient. Hence answer is (e).
19. Statement I: Current population = 1.05×22 . Population 10 years back = $1.05 \times 22 / 1.1$. Therefore increase in population in the last 10 years = $1.05 \times 22 - 1.05 \times 22 / 1.1$. Therefore the Statement I alone is sufficient. Statement II alone is sufficient as the increase in population in the last 10 years = $10 \times 18 / 100$ million. Hence answer is (d).
20. Statement I alone is not sufficient as we don't know the speed. Since we don't know the time at which the bus is starts the journey, Statement II alone is not sufficient. Also it is not known what the mode of travel is. Therefore both statements together are not sufficient. Hence answer is (e).

EXERCISE 5(B)

1. Using statement I, if L and B are the length and breadth of the rectangle ABCD, then area of the shaded region is $4[(\frac{1}{2})(L/2)(B/2)]$, i.e., $LB/2$. Now $A(\triangle PQR) = \frac{1}{2}A(\square ABPR) = \frac{1}{2}(LB/2)$. Similarly $A(\triangle PRS) = \frac{1}{2}(LB/2)$. Adding these we get $A(\square PQRS) = LB/2$. Using statement II alone, a parallelogram need not be always a rectangle. So, II alone is not sufficient. Hence the answer is (d).
2. Using statement I alone, the total number of litres = $x(1/y) + y(1/x)$, i.e. $(x/y + y/x)$. Now we know that $(x/y).(y/x)$ is minimum when $(x/y) = (y/x)$, or when $x^2 = y^2$, or when $x = y$. Therefore we get the total quantity L to be 2 litres. So, the minimum value of L is 2 litres. But when $x \neq y$, we get $L > 2$. So, Statement I alone is not sufficient. From statement II, we just know that $x > y$ and there is no way to relate x and/or y to the total quantity L . Using both the statements, we get $x \neq y$. So $L > 2$. Hence the answer is (c).
3. The profits of A and B cannot be found unless we know the actual annual salaries of A & B. From Statement I alone, we get only one relationship between the annual salaries of A and B. So statement I alone will not be sufficient to answer the given question. Again from statement II alone, we get a single relationship between the two salaries. So, even statement II alone will not be sufficient to deduce the values of annual salaries of A and B. However, by using both the statements together, we can find out the actual annual salaries of A and B and hence answer the question. So the answer is (c).
4. Harmonic Mean (H.M) = $(X+Y)/2XY$. Using both the statements together, we can find the value of H.M.. So the answer is (c).
5. For both $\triangle AEB$ and $\triangle DEC$, the base is same. To find out the ratio of areas, we need to find out the ratio of heights. Using statement I alone, the ratio of heights cannot be determined. But statement II alone is sufficient to answer the question. Hence the answer is (a).
6. Using statement II alone, we get $(M-16) = 3F$. So, $M > F$. Hence, the answer is (a).

7. Using statement II alone, as the number of incorrect answers is a multiple of 4, the marks deducted will be a natural number. So the marks gained will be an integral value. Hence, the answer is (a).
8. From statement I, as the power is even, the last term of $(n-1)^x$ will be 1. Hence the remainder will be 1 when divided by 1. But for $n = 1$, remainder will be 0. So, statement I alone will be insufficient. Using Statement II alone, we get $n \neq 1$. So, the remainder will be 1 for all possible values of x and a . So, the answer is (c).
9. From statement I, $(x - 27)(x - 8) = 0$. So we get $x = 27$ or $x = 8$. Therefore we cannot determine the unique value of x as both 27 and 8 are perfect cubes. If x is a perfect cube, then x^2 also has to be a perfect cube. So, statement II alone is also insufficient. Even on using both the statements together, we cannot find the value of x . Hence the answer is (b).
10. For any cubic equation, there will be in all 3 roots. From statement I alone, there can be either 1 or 3 real root. Hence, statement I alone is not sufficient to answer the question. From statement II, there can be either 2 or three real roots. If there are 2 real roots, then the third root has to be real as imaginary roots always occur in pairs. So, statement II alone is sufficient to answer the given question. Hence, the answer is (a).

EXERCISE 6(A)

1. Statement I alone is not sufficient as we don't know anything about y . Statement II alone is not sufficient as we don't know anything about x . Both statements together are not sufficient. E.g. If we take $x = 6\frac{1}{4}$, $y = 3$, then $xy = 75/4 < 20$. If we take $x = 7$, $y = 3$, then $xy = 21 > 20$. Hence answer is (e).
2. Statement I alone is not sufficient. E. g. If $x = 2$, $y = 3$, $z = 4$, then $x + y + z = 9 > 0$. If $x = 2$, $y = -20$, $z = 20$, then $x + y + z = 2 > 0$. Statement II gives all x , y , z should be positive or any two numbers should be negative and the remaining number should be positive. Therefore Statement II alone is not sufficient. Both statements together are not sufficient. E. g. We can take $x = 2$, $y = 3$, $z = 5$ or $x = -20$, $y = -30$, $z = 60$. Hence answer is (e).
3. Statement I alone is not sufficient as earning in December could be less than, equal to or greater than Rs. 500. Statement II alone is not sufficient as we don't know the average earning of remaining 11 months. Suppose the earning in December be d , then the average earning from January to November be $d/2$. Now we have $d + 11 \times d/2 = 500 \times 12$. On solving $d = 12000/13$. Hence answer is (c).
4. Statement I alone is not sufficient as we don't know the rate of work done by pipe B. Statement II alone is not sufficient as we don't know the rate of work done by pipe A. Combining both statements, we have the rate of filling = $(1/2) - (1/3) = 1/6$. Therefore 6 hours are required to fill the tank. Hence answer is (c).
5. Statement I alone is not sufficient as we don't know the length AP. For the same reason, Statement II alone is not sufficient. Both statements together give $(10)^2 = (18 - 2r)(18)$. On solving we get $r = 56/9$. Hence answer is (c).
6. Statement I: Time is constant. So, distance travelled \propto speed. Therefore train A travels faster. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as we don't know the speed of train A. Hence answer is (a).
7. Statement I alone is sufficient as two angles are equal so it becomes isosceles triangle. Statement II alone is not sufficient, as we don't know anything about $\angle M$. Hence answer is (a).

8. Statement I alone is not sufficient as length of A and B need not be equal. Statement II alone is not sufficient as we don't know about the length of A. If l_a, l_b, l_c be the length of pieces A, B, C respectively. Then both statements together give $l_a + l_b = 2/3 (l_a + l_b + l_c)$ and $l_b = l_c$. On solving these two equations we get $l_a = l_b = l_c$. Hence answer is (c).
9. Statement I: We have $x = 3y/4$. Now if $x = -3, y = -4$, then $x > y$. If $x = 3, y = 4$, then $x < y$. Therefore the Statement I alone is not sufficient. Statement II alone is sufficient as we have $x - y = 4 > 0$. Hence answer is (b).
10. Statement I: To touch all the three sides of the triangle, the circle has to be incircle of the given triangle. So area of the triangle is greater. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as other two sides of the triangle can be of any length. Hence answer is (a).
11. Statement I: By Sine rule, $\sin 48^\circ / 9 = (\sin \angle XZY) / 5$. Therefore $m\angle YXZ = 180 - 48 - m\angle XZY$. Now $A(\Delta XYZ) = \frac{1}{2} \times (XY)(XZ) \sin \angle YXZ$. Therefore Statement I alone is sufficient. Statement II alone is not sufficient. Hence answer is (a).
12. Statement I alone is not sufficient as we don't know how the bank is calculating the interest i.e. whether quarterly or six monthly or annually. Statement II alone is not sufficient. Now combining both the statements, if r is the half-yearly rate of interest, then $330 = 300(1 + r/100)^6$. Hence answer is (c).
13. Circum radius = $abc / 4\Delta$, where a, b, c are the sides and Δ is the area of the triangle. Since we don't know the side of the triangle XYZ, Statement I alone is not sufficient. From Statement II, circum radius = $6 \times 8 \times 10 / [4 \times (1/2) \times 6 \times 8] = 5$. Therefore Statement II alone is sufficient. Hence answer is (b).
14. Statement I alone is not sufficient. Since ΔABC is an equilateral triangle, $m\angle B = 60^\circ$. So Statement II alone is sufficient. Hence answer is (b).
15. Statement I gives $\log_{10} x = 3 - 1 = 2$. Therefore $x = 10^2 = 100$. Statement II alone is not sufficient. Hence answer is (a).
16. Statement I: We have $\pi r^2 > lb$. Therefore, $r > \sqrt{(lb/\pi)}$. We have $2\pi r > 2\sqrt{(\pi lb)}$. We have the perimeter of the rectangle = $2l + 2b > 4\sqrt{(lb)}$. If $2\sqrt{(\pi lb)} < 2\pi r < 4\sqrt{(lb)}$, then perimeter of the rectangle is greater than perimeter of the circle. If $4\sqrt{(lb)} < 2\pi r$, then perimeter of the rectangle can be greater than or less than the perimeter of the circle. Therefore Statement I alone is not sufficient. Statement II alone is not sufficient as we don't know the side and the radius of the square and the circle respectively. If x is the side of the square, both statements together give $2\pi r > 2x\sqrt{\pi}$. But perimeter of the square = $4x > 2x\sqrt{\pi}$. Therefore both statements together are not sufficient. Hence answer is (e).
17. Statement I alone is not sufficient as we don't know the equation of the line QR. Statement II alone is not sufficient as we don't know the equation of the line ST. Both statements together give $y = 17 - 6x = 3x - 4$. On solving we get $x = 7/3$ and $y = 3$. Hence answer is (c).
18. Statement I alone is not sufficient as we want current average weight. Statement II alone is not sufficient. Both statements together are not sufficient as we do not have information about weight of three students. Hence answer is (e).
19. Since we don't know the type of the series Statement I alone is not sufficient. For the same reason, Statement II alone is not sufficient. Both statements together, we have the given series to be in Arithmetic Progression with the first term equal to 1 and the common difference equal to $-\frac{1}{2}$. So the 30th term is $1 + 29(-\frac{1}{2})$. Hence answer is (c).
20. Statement I alone is not sufficient. Statement II alone is not sufficient. Both statements together give $x = 2 + \sqrt{3}$ and $y = 2 - \sqrt{3}$ or $x = 2 - \sqrt{3}$ and $y = 2 + \sqrt{3}$. So we get value of $|x - y| = |\pm 2\sqrt{3}| = 2\sqrt{3}$. Therefore both statements together are sufficient. Hence answer is (c).

EXERCISE 6(B)

1. Statement I alone is not sufficient because we do not know the length of side or diagonal. Statement II alone is not sufficient because we do not know about the position of E and F. Combining both the statements, we can get the length of diagonal using mid-point theorem i.e., $I(AC) = 2\sqrt{8}$. So $\text{area}(\square ABCD) = \frac{1}{2}(I(AC))^2 = \frac{1}{2}(4\sqrt{8})^2 = 16 \text{ cm}^2$. Hence answer is (a).
2. Let the ages of Amita, Babita and Chandini be a, b and c respectively. Statement I alone is not sufficient because we don't know any relation about Chandini's age. Statement II alone is not sufficient because from this statement we get, $cb = 6$ and $c + b = 7$. In turn which gives us two possible values of c. Combining both the statements, $c(7-c) = 6$ thus $c = 1$ or 6 . But from statement I, $b = a + 2$ so c can't take value of 6. Hence answer is (a).
3. Statement I alone is sufficient as we can calculate the number of pages. Here we have 1 to 9 i.e., 9 single digit numbers. We also have 10 to 99 i.e., 90 two digit numbers, thus total of 180 digits. Now we will have $[396 - (9 + 180)]/3$ i.e., 69 three digit numbers. So total number of pages is 168. Hence answer is (b)
4. Statement I alone is not sufficient as we don't know exact age of members. Statement II alone is not sufficient, as we don't know about age of 20 members. Even after combining both we can't get answer as we don't know exact age of members. Hence answer is (d).
5. Statement I alone is not sufficient because we don't know about points C and B. Statement II alone is not sufficient because we don't know any side's length. Combining both the statements, we can't calculate $I(DE)$. Hence answer is (d).
6. Statement I alone is not sufficient because it gives one equation with two variables. For the similar reason statement II alone is not sufficient. Combining both the statements, we can get answer as we have two different equations having two variables. Hence answer is (a).
7. Statement I alone is not sufficient. Statement II alone is not sufficient because we don't know whether it is a leap year. Combining both the statements, we know that it is not a leap year because the last day is Sunday and starting day is Monday. So average is $(4 \times 513 + 24 \times 240)/28$. Hence answer is (a).
8. Statement I alone is not sufficient because $96 = 2 \times 6 \times 8 = 2 \times 4 \times 12$. Statement II alone is also not sufficient. Combining both the statements, we still get two different combinations as shown above. So we can't get unique answer. Hence answer is (d).
9. Statement I alone is not sufficient because we don't know length of any side. Statement II alone is also not sufficient. Combining both the statements, we know the angles of the triangle viz. 75, 75 and 30. Also we know one of the sides, so we can calculate the $I(BM)$. Hence answer is (a).
10. Statement I alone is not sufficient. Statement II alone is not sufficient because we don't know the length. Combining both the statements, we can get the answer. $b/(b - 4) = 72/54 \Rightarrow b = 16$. Area of walls is $(18 + 16) \times 2 \times h$. Therefore we get $(18 + 16) \times 2 \times h \times 8 = 8160$. Thus $h = 15$ ft. Hence answer is (a).

EXERCISE 7(A)

1. Statement I alone is not sufficient as we should know at least one more parameter of the triangle. Statement II alone is not sufficient. Both statements together give $A(\Delta ABC) = \frac{1}{2} \times (AB)(AC) \sin \angle BAC = \frac{1}{2} \times 7 \times 10 \times \sin 80^\circ$. Hence answer is (c).
2. Statement I alone is not sufficient as parallelogram need not be a square. For the same reason Statement II alone is not sufficient. Both statements together give $\square ABCD$ is a parallelogram. Hence answer is (e).
3. Statement I: If we draw a Venn diagram, we get 6 bolts containing wool only, 2 bolts containing cotton only and 12 bolts with a mixture of cotton and wool. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as we don't know about remaining 14 bolts. Hence answer is (a).
4. Statement I alone is not sufficient because if $y < 0$, $xy < 1$ and if $y > 0$, $xy > 1$. Statement II alone is not sufficient as we don't know x . Both statements together give $xy > 1$. Hence answer is (c).
5. Statement I: $m\angle QPR = 70^\circ = \frac{1}{2} m\angle QCR = 140/2$. So C is the centre of the circle. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as C can be any point on the perpendicular bisector of QR. Hence answer is (a).
6. From Statement I alone we can not find the total sum. Therefore Statement I alone is not sufficient. There can be any number of one rupee coins so Statement II alone is not sufficient. Both statements together are not sufficient. Hence answer is (e).
7. Statement I alone is not sufficient as we don't know the height of the vessel. Statement II alone is not sufficient as we don't know the volume of the cylinder. Both statements together are not sufficient. Hence answer is (e).
8. Statement I: Two years ago the ages of a father and his son be $3x$ and x . Now the ratio of ages is $(3x + 2) : (x + 2)$. Since we don't know x , Statement I alone is not sufficient. Statement II: After two years ages of a father and his son be $2.5y$ and y respectively. Now their ages are $2.5y - 2$ and $y - 2$ respectively. Since we don't know y , Statement I alone is not sufficient. Both statements together we have $3x + 2 = 2.5y - 2$ and $x + 2 = y - 2$. On solving we get $y = 16$. Therefore the required ratio = 19: 7. Hence answer is (c).
9. Statement I: $x^2 - 1 > 0$, then $x > 1$ or $x < -1$. Therefore Statement I alone is not sufficient. Statement II: $x - \sqrt{x} < 0$, On solving this we get $0 < x < 1$. Therefore Statement II alone is sufficient. Hence answer is (b).
10. Statement I alone is sufficient as number of sides is equal to 8. From Statement II alone we have $(2n - 4) 90 > 10 \times 90$. Therefore $n > 7$. So Statement II alone is not sufficient. Hence answer is (a).
11. Statement I alone is not sufficient as we don't know about points E, I, F, J, G, H. Statement II alone is not sufficient. Both statements together we have $AD \parallel EI \parallel FJ \parallel GH$ and $DH \parallel JG \parallel IF$. Since opposite sides of a parallelogram are equal. Hence answer is (c).
12. Statement I: $h = d = 2r$. Volume of each cylinder = $\pi r^2 h = 2\pi r^3$. Since we don't know r , Statement I alone is not sufficient. Statement II gives $2\pi r h = 45$. Since we have one equation and two unknowns, Statement II alone is not sufficient. Both statements together give $r = \sqrt[3]{45 / (4\pi)}$. We have volume of each cylinder = $2\pi [45 / (4\pi)]^{3/2}$. Therefore the number of cylinders = $200 / \{2\pi [45 / (4\pi)]^{3/2}\}$. Hence answer is (c).
13. Statement I alone is sufficient as $x = -3$. Statement II alone is sufficient as it gives $x = \pm 3$. Hence answer is (d).

14. Statement I alone is not sufficient as we don't know the position of the minute hand. Statement II alone is not sufficient as the two hands are twice at right angles in every hour. Both statements together are not sufficient as there is no unique answer. E.g. at 3 O'clock and 32 8/11 minutes past 3 O'clock hands of the clock are at right angles. Hence answer is (e).
15. Statement I alone is not sufficient as we have to find average yearly wages of only executives. Statement II alone is not sufficient as we don't know the total wages of all executives. For the same reason, both statements together are not sufficient. Hence answer is (e).
16. Statement I alone is sufficient as we get $y = 20/3$, on solving the equations $(x + y) / 2 = 5$ and $y = 2x$. Statement II alone is not sufficient as we don't know the common difference of the A.P. Hence answer is (a).
17. Statement I: The equation $y = \sqrt{3}x - 5\sqrt{3}$ can not be written in the form of $x/a + y/a = 1$. So the equation of the given straight line is not $y = \sqrt{3}x - 5\sqrt{3}$. Therefore Statement I alone is sufficient. Statement II: $y = 0 = \sqrt{3}x - 5\sqrt{3}$. So we get $x = 5$. Also slope of the line $= \sqrt{3} = \tan 60^\circ$. So the answer to the given question is, 'YES'. Therefore Statement II alone is sufficient. Hence answer is (d).
18. Statement I: If we take $x = -1, y = -2, z = 4$, then $x + y + z = 1 > 0$. If we take $x = -1, y = -2, z = -3$, then $x + y + z = -6 < 0$. Therefore Statement I alone is not sufficient. Statement II: If we take $x = -1, y = -2, z = -3$, then $xyz = x + y + z = -6 < 0$. If we take $x = -1, y = 2, z = 3$, then $xyz = -6 < 0$ but $x + y + z = 4 > 0$. Therefore Statement II alone is not sufficient. Both statements together give each of x, y and z to be negative. So $x + y + z$ is negative. Hence answer is (e).
19. Statement I alone is not sufficient as one can draw any number of isosceles or equilateral triangles. Statement II alone is not sufficient as one can draw any number of triangles having one angle equal to 60° . Both statements are not sufficient as one can draw any number of equilateral triangles of any side. Hence answer is (e).
20. Statement I alone is not sufficient. Statement II gives $760 \times 2\pi r = 1000$. So Statement II alone is sufficient. Hence answer is (b).

EXERCISE 7(B)

1. From the question, we know that the ratio of the work done by A to that done by B is 2:1. If we know the rate of work of either the inlet or the outlet, we can find the answer. Statement I and statement II give the rates at which the inlet A and the outlet B work, respectively. Therefore, each statement alone is sufficient to answer the question. Hence answer is (e).
2. Statement I alone is not sufficient to answer the question, as we do not know the distance of the person from the streetlight. Statement II alone is not sufficient, as we don't know the height of the streetlight. If L is the length of the shadow, then by combining both statements and using similarity of triangles, we get, $15/5 = (10 + l)/L$. Therefore, both statements together are required to answer the question. Hence answer is (c).
3. Statement I alone is not sufficient because if $X = 8$ and $Y = 7$, then $X > Y$ and if $X = -8$ and $Y = -7$, then $X < Y$. Statement II alone is not sufficient as X can be greater than or less than Y depending on the values of X and Y as positive or negative. Therefore, even the two statements together are not sufficient to answer the question. Hence answer is (a).
4. From statement I, we know that $\triangle APO$ is an equilateral triangle of side 28". We can use this information to find the area of the sector and the area of the triangle. So, the question can be answered with the help of statement I alone.

From statement II, we know that $m\angle AOP = 60^\circ$. So, $\triangle AOP$ is an equilateral triangle. We can use this information to find the area of the sector and the area of the triangle. So, the question can be answered with the help of statement II alone. Therefore, each statement alone can answer the question. Hence answer is (e).

5. Let L and B be the length and the breadth of the rectangle respectively. From statement I, $2(L + B) = 16$, i.e. $(L + B) = 8$ and $LB = 16$. Combining the two equations, we can obtain $L = B = 4$. So, $\square ABCD$ is a square. Therefore, statement I alone is sufficient to answer the question. Hence answer is (b).
6. The information in statement I is redundant. From statement II, we know the total height of 16 students. From the question, we know the total height of 15 students. So, using the above information, we can determine the height of the 16th student. Therefore, the question can be answered with the help of statement II alone. Hence answer is (d).
7. From statement I and the information given in the question, we can obtain a relation of the type $S_A + S_B = (l_1 + l_2)/t$, containing only one unknown. So, the question can be answered with the help of statement I alone.
From statement II and the information given in the question, we can obtain a relation of the type $S_B = l_2/t$, containing only one unknown. So, the question can be answered with the help of statement II alone. Therefore, each statement alone is sufficient to answer the question. Hence answer is (e).
8. $\log_{10}40 = 2\log_{10}2 + \log_{10}10$. Therefore, the question can be answered with the help of statement I alone. Statement II alone cannot answer the given question. Hence answer is (b).
9. From statement I, C can take any value except $1/4$. For X to be a real number, $C < 1/4$. Since we can't get unique value of C, statement I alone is sufficient. Comparing the given equation with the standard form, $X^2 - (\text{Sum of roots})X + (\text{Product of roots})$, we get sum of roots is equal to -1 . So no extra information is given. Therefore statement II alone is not sufficient to answer the question. Both statements are not sufficient to answer the question. Hence answer is (a).
10. Statement I give $\square ABCD$ is a rectangle. But a rectangle need not be a square. Therefore statement I alone is not sufficient. Statement II give $\square ABCD$ is either a rhombus or any quadrilateral whose diagonals are perpendicular to each other. But a rhombus need not be a square. Therefore statement II alone is not sufficient. Combining both statements we get $\square ABCD$ is a square. Hence answer is (c).

EXERCISE 8(A)

1. Statement I alone is sufficient as the side of the square is equal to $8\sqrt{2}$, which is not a rational number. Statement II alone is not sufficient. Hence answer is (a).
2. Statement I: $A(\triangle ABD) = A(\triangle ACD)$, then $BD = DC$. But $\angle BAD$ is need not be equal to $\angle CAD$. Therefore Statement I alone is not sufficient. Statement II alone is sufficient as we don't know whether D is a midpoint of BC. Since $BD = DC$, AD will be the bisector of $\angle A$, if and only if AD is perpendicular to BC. Hence answer is (c).
3. Statement I: We have $(AB + CD) / 2 = 13$. But we don't know the height of the trapezium so Statement I alone is not sufficient. Since we don't know the height and the length of the parallel sides, Statement II alone is not sufficient. Both statements together can't give the value of $\frac{1}{2}$ (sum of parallel sides) (Distance between the parallel sides). Hence answer is (e).
4. Statement I alone is not sufficient as we don't know the actual rate of working of A and B. For the same reason Statement II alone is not sufficient. Suppose A alone takes x days to complete the job. Then B and C takes $x/2$ and x days to complete the job independently. So A and B together take $x/3$ days while A, B and C together take $x/4$ days to complete the

- job. Therefore $x / 3 - x / 4 = 4$. On solving we get $x = 48$. So $x / 3 = 16$ days. Hence answer is (c).
5. Suppose S_1 and S_2 be the speeds of the trains of 80 yards and 85 yards long respectively. From Statement I we have $S_1 + S_2 = (80 + 85) / 7.5 = 22$. Therefore Statement I alone is not sufficient as there are two unknowns and one equation. Similarly Statement II gives $S_1 - S_2 = (80 + 85) / 375 = 4.5$. Therefore Statement II alone is not sufficient. Both statements together give $S_1 = 13.25$ and $S_2 = 8.75$. Hence answer is (c).
 6. We don't know the distribution of 120 coins. If there are x Re.1 coins and y 50p coins, then $(x+y) = 120$ and the amount $A = x + \frac{1}{2}y$. We get many combinations of x and y . So statement I alone is not sufficient. Statement II alone is not sufficient as the information tells us about something, which is very obvious (if number of coins is constant, then the worth of ten 50p coins will increase by 5 Rs. when replaced by ten Re.1 coins). Even both the statements together are not sufficient. Hence answer is (e).
 7. Statement I alone is not sufficient as we don't know respective shares of Peter and George. Statement II alone is not sufficient as we don't know respective shares of John and George. Both statements together give shares of John, Peter and George are 70, 82.5, 232.5 respectively. Therefore John receives minimum amount. Hence answer is (c).
 8. Statement I alone is not sufficient as it gives $x = 2$ or $x = 1$. Statement II alone is not sufficient as it gives $x = 2$ or $x = -1$. Both statements together give $x = 2$. Hence answer is (c).
 9. Statement I alone is not sufficient as we don't know the cost price. Statement II alone is not sufficient as we don't know the profit. Both statements together, we have total revenue = 4.8 $(200 - 38) / 12 = 64.8$. Therefore the total investment = $64.8 / 1.08$. Hence answer is (c).
 10. Statement I alone is not sufficient as we don't know the cost price and selling price of each item. Since we don't know the selling price, Statement II alone is not sufficient. Both statements together are not sufficient to answer the question. Hence answer is (e).
 11. Statement I alone is not sufficient as we don't know about the remaining 7 balls. Statement I alone is not sufficient as we don't know the number of red balls. Both statements together are not sufficient as we don't know the number of red balls. Hence answer is (e).
 12. Statement I alone is not sufficient as n can be 11, 12, 13,....., 19. From Statement II, n can be 1, 5, 7, 11, 13, etc. But 1 is neither prime nor composite. Therefore Statement II alone is not sufficient. Both statements together give n equal to 11, 13, 17, 19. Therefore n is a prime number. Hence answer is (c).
 13. Statement I alone is not sufficient as we don't know the total number of words spoken. Statement I alone is not sufficient as we don't know the speech rate. Both statements together give $50t = (50 - 4)(t + 10)$. On solving we get $t = 115$ minutes. Hence answer is (c).
 14. Statement I alone is not sufficient as the smallest angle could be $\angle A$ or $\angle B$. Statement II alone is not sufficient. Both statements together give $AB^2 > BC^2 + AC^2$ and $-BC^2 > -AB^2 - AC^2$. Adding these inequalities we get $AB > BC$. But we don't know whether AC is greater than or less than BC . Therefore both statements together are not sufficient. Hence answer is (e).
 15. Since we don't know the total rent, Statement I alone is sufficient. Statement I alone is sufficient as we don't know the duration of stay of Asha and Munni. Both statements together are sufficient as Asha and Munni would pay Rs. $20 \times 15 / 30$ and Rs. 15 as a rent respectively. Hence answer is (c).
 16. Statement I alone is sufficient as it gives % of the graduate employees of the company = $[9 / (9 + 11)] 100 = 45$. Statement II alone is not sufficient as we don't know the number of graduates in the company. Hence answer is (a).

17. Statement I: Suppose the group of Lisa and Anand as one element. There will be total 4 elements which can be arranged in $4!$ ways. Lisa and Anand can sit in $2!$ ways. So the total number of ways = $4! \times 2!$. So, statement I alone is sufficient to answer the question. Statement II: Extreme two positions can be occupied in 2 ways. Middle three positions can be occupied in $3!$ ways. By the principle of multiplication, total number of ways = $2 \times 3!$ So Statement II alone is sufficient. Hence answer is (d).
18. Statement I: $2(lb + bh + lh) = 24$. Statement I alone is not sufficient as we can't find the value of lbh . Statement II: $4(l + b + h) = 24$. Statement I alone is not sufficient as we can't find the value of lbh . Both statements together are not sufficient. Hence answer is (e).
19. Statement I gives $x = 0$, which is a real number. So Statement I alone is sufficient. Statement II alone gives $x = 0$ or $x = -1$. So x is a real number. So Statement II alone is sufficient. Hence answer is (d).
20. Suppose A gets X_a then B gets $100 - X_a$. Statement I alone gives $(100 - X_a + 10) = X_a - 10$. On solving we get $X_a = 60$ and $100 - X_a = 40$. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as we don't know the amount, B wanted. Hence answer is (a).

EXERCISE 8(B)

1. Suppose Rs. x and Rs. y are the cost price of one mango and one orange respectively. Statement I gives $10x + 8y = 28$. Therefore $3(10x + 8y) = 84$. So statement I alone is sufficient. Similarly statement II gives $5x + 4y = 14$. Therefore $6(5x + 4y) = 84$. So statement II alone is sufficient. Therefore, each statement alone is sufficient to answer the question. Hence answer is (a).
2. Neither of the two statements alone is sufficient to answer the question. Even if we combine the two statements, we cannot determine the rate at which the outlet C drains the reservoir. Therefore, even the two statements together are not sufficient to answer the question. Hence answer is (c).
3. Since we don't know number of persons who do not read a single newspaper, both statements are not sufficient. Hence answer is (c).
4. Statement I gives side of the cubical box equal to 5 cm. Therefore surface area of each face is equal to 5×5 i.e. 25 cm^2 . Therefore 25×5 i.e. 125 cm^2 a cardboard of one side area of 125 cm^2 is required. So statement I alone is sufficient. From statement II, side of the cubical box is equal to $100^{1/3}$. So cardboard of one side area equal to $5 \times 100^{1/3} \text{ cm}^2$ is required. So statement II alone is sufficient. Therefore, each statement alone is sufficient to answer the question. Hence answer is (a).
5. From statement I, we get $AB > 40$, i.e., AB could be 41, 42, ---, 49. If $C = 1$, then $DE = AB$ or $A = D = 4$. But, as all integers are different, D cannot be 4. So, statement I alone is not sufficient to answer the question. From statement II, we get that D could be 1, 3, ---, 9. As we cannot obtain a unique value for D, statement II alone is not sufficient to answer the question. If we combine both statements, we can conclude that $C = 2$. (AB is a 2-digit number and is greater than 40. The product $AB \times C$ is also a 2-digit number. So, $c = 2$.) If B takes values 1, 3 or 4, the product $AB \times C$ will be 82, 86 or 88. As statement II states that D is an odd integer, D is not equal to 8. So, B cannot take values 1, 3 or 4. If $B = 5$, then the product $AB \times C = 90$. This gives us $E = 0$. As all integers are non-zero, B is not equal to 5. So, $AB > 45$ and AB could be 46, 47, 48 or 49. Whatever the value of AB, the product $AB \times C$ will be 92, 94, 96 or 98. Thus, $D = 9$. Therefore, both statements together are required to answer the question. Hence answer is (d).

6. From the question, we know that the area of each circle is 25π . So, the two circles should cover a total area of 50π . From statement I, we know that the two circles cover an area of 45π . The area covered by the two circles is less as the shaded area is common to both circles, and is 5π . Therefore, the question can be answered with the help of statement I alone. Hence answer is (b).
7. Neither of the two statements alone is sufficient to answer the question. From statement I, we know that $\angle(QR) > \angle(PQ)$, angle $P > \text{angle } R$. Combining both statements, angle $P > 70^\circ$. So, angle $P + \text{angle } R > 140^\circ$. As the sum of all angles in a triangle = 180° , angle $Q < 40^\circ$. As all three angles of the triangle are different, the triangle is not an isosceles triangle. Therefore, both statements together are required to answer the question. Hence answer is (d).
8. Both statements tell us that the ratio of the radii of the two pie charts is 3:1. As the pie charts represent the total expenditure, the areas of the circles are equal to the respective expenditures. So, $630:X = 3^2:1^2$. Thus, $X = 70$. Therefore, the question can be answered with the help of each statement alone. Hence answer is (a).
9. From statement I, we can determine the total period of time. As the clock loses 3 seconds every minute, we can calculate the loss for the total period of time. Therefore, statement I alone is sufficient to answer the question. Hence answer is (b).
10. Statement I alone is not sufficient to answer the question as we do not know the values of A, B and C. If we consider statement II, 'B' on both sides of the equation can be cancelled, giving $A > C$, which is the same as statement I. Therefore, as both statements give the same relation between A and C, even both statements together are not sufficient to answer the questions. Hence answer is (c).

EXERCISE 9(A)

1. Statement I: If we take $x = -2$, $y = 3$, then $x + y = 1 > 0$ and $x < y$. If we take $x = 3$, $y = -2$, then $x + y = 1 > 0$ and $x > y$. Therefore Statement I alone is not sufficient. Statement II: If both x and y are positive, then $y > x$. If both x and y are negative, $y < x$. So Statement II alone is not sufficient. Statement I gives $x + y > 0$ and Statement II gives $(x + y)(y - x) > 0$. Therefore both statements together give $y - x > 0$. So $x < y$. Hence answer is (c).
2. Statement I alone is sufficient as it gives N equal to 16. Statement II alone gives values of N equal to 4, 16, 36. Since there is no unique value for N , Statement II alone is not sufficient. Hence answer is (a).
3. Statement I alone is not sufficient as the average grade can't decide the number of students with a passing grade. Average grade is the simple arithmetic mean of all the scores of the students. For example, for three numbers a , b and c , their average is $(a+b+c)/3$. But by knowing the average grade of the class, we cannot find out the number of students who have scored above 50%. Hence, statement I alone is insufficient. Statement II alone is not sufficient, as the median grade can't decide the number of students with a passing grade. Median of a set of numbers arranged in order of magnitude is the middle number in case of odd number of elements or the mean of the two middle numbers in case of even number of elements. For example, the set of numbers 1, 3, 5, 7, 10 will have a median 5. The median of the set of numbers 1, 4, 6, 10 is $(4+6)/2 = 5$. So, if the median grade of the class is 51%, then there are 15 students out of 31 who have got more than 51% and 15 students out of 31, who have got less than 51%. But, from the above information, we still cannot find the number of students who have got more than 50%. So, statement II alone is not sufficient. Both statements are not sufficient. As even on using both, we cannot find the number of students who have grades between 50% and 51%. Hence answer is (e).

4. Statement I alone is not sufficient. Since we don't know the number of the remaining sets, Statement II alone is not sufficient. Both statements together give the average selling price equal to $1150/5$ i.e. Rs. 230. For the last five radio sets we don't know the actual selling price of every piece independently, though we know the average selling price of these five, so it is not possible to find out what is the allowance made on independent pieces. Also though we know what the discount % on the last five sets is, we don't know what is the allowance made on the previous number of radios either collectively or singly. So both statements together are also not sufficient to answer the question. Hence answer is (e).
5. Statement I: We have since n is a multiple of 3, $n/3$ is an integer. Since k is even, $k/2$ is also an integer. So $n/3 + k/2$ is an integer. Therefore Statement I alone is sufficient. Statement II alone is not sufficient as we don't know whether n is divisible by 3. Hence answer is (a).
6. Statement I alone is not sufficient as we don't know Raju's score. Statement II is same as Statement I. Therefore both statements together are not sufficient. Hence answer is (e).
7. Statement I gives $n^2 + pn - m = 0$. Since we don't know m , Statement I alone is not sufficient. Statement II alone is not sufficient. Since n is real, p^2 is greater than or equal to $-4m$. We also have $-n < -m$. Both statements together can't decide whether $n > p$. Hence answer is (e).
8. Statement I alone is not sufficient as we don't know the population of town A. Statement II alone is not sufficient as we also don't know the number of radioes / bicycles each person has. Both statements together are not sufficient. Hence answer is (e).
9. Statement I alone is not sufficient as we don't know about the remaining three faces. Statement II alone is not sufficient as we don't know about the remaining three faces. Both statements together give $(\frac{1}{2} + \frac{1}{2} + \frac{1}{2})/6 = 1/4$. Hence answer is (c).
10. Statement I: We have $\angle B + \angle C = 180 - 95 = 85^\circ$. SO $\angle A$ is the biggest angle in $\triangle ABC$. Therefore BC is the longest side of $\triangle ABC$. So Statement I alone is sufficient. Statement II alone is not sufficient as we don't know whether $\angle A$ is greater than or less than $\angle C$. Hence answer is (a).
11. Statement I: Side of the square = $\sqrt{25} = 5$ cm. Diagonal of the square = $5\sqrt{2} =$ Diameter of the circle. So radius of the circle = $5 / \sqrt{2}$. Therefore Statement I alone is sufficient. Statement II: $\pi r^2 = 40$. So $r = \sqrt{(40 / \pi)}$. Therefore Statement II alone is sufficient. Hence answer is (d).
12. Statement I: We have x equal to 11, 13, 15, 17, 19. Now the numbers 11, 13, 15, 17, 19 are prime but 15 is not a prime. So Statement I alone is not sufficient. Statement II: If $x = 5$, then it is a prime. If x is any other multiple of 5, then it is not a prime. So Statement II alone is not sufficient. Both statements together give $x = 15$, which is not a prime. Hence answer is (c).
13. Statement I: If $x = 2$, $y = 4$, $z = 2$, then y is not equal to z . If $x = 2$, $y = 2$, $z = 2$, then $y = z$. Therefore Statement I alone is not sufficient. Statement II gives $y - z = 0$. So Statement II alone is sufficient. Hence answer is (b).
14. Statement I alone is not sufficient as we don't know the age of 30th student. Statement II alone is not sufficient as we don't know the average age of remaining 26 students. From both statements, age of the 30th student should be less than 16 years. So average age of the class is less than 16 years. Hence answer is (c).
15. Statement I: We have $x + y = a + b$ and $x > a$. Therefore $y < b$. Since we don't know the values of a and b , Statement I alone is not sufficient. Statement II is same as Statement I. Therefore both statements together are not sufficient. Hence answer is (e).

16. Statement I alone is not sufficient as we don't know the length of the rope. If x is the length of the rope, we have from Statement II, $\pi(x+6)^2 - \pi x^2 = 132$. On solving we get $x = 1/2$. So the area a cow can graze is $\pi(1/2)^2$. So Statement II alone is sufficient. Hence answer is (b).
17. Statement I: Since $\square ABCD$ is a parallelogram, $\angle A = \angle C$. But $\angle A + \angle C = 180^\circ$. So $\angle A = \angle C = 90^\circ$. Therefore $\square ABCD$ is a rectangle. So Statement I alone is sufficient. Statement II alone is not sufficient as for every parallelogram the adjacent angles are supplementary. Hence answer is (a).
18. Statement I alone is not sufficient as turnover alone of the company can't decide the profit. Statement II alone is not sufficient as we don't know the turnover of A and B. Both statements together we have A had a higher turnover and higher rate of profit than B. Hence answer is (c).
19. We know that $(a+b)^2 = a^2 + b^2$, then $ab = 0$. Statement I alone is not sufficient as we don't know about b . Statement II alone is not sufficient as we don't know about a . Both statements together are sufficient as we get $ab < 0$. Hence answer is (c).
20. Statement I: Here, $(x-1) = 0.6$. Hence, $x = 1.6$. If $yz > 0$, then $xyz > yz$. If $yz < 0$, then $xyz < yz$. So Statement I alone is not sufficient. Statement II: If $x > 1$, then $xyz > yz$. If $x < 1$, then $xyz < yz$. So Statement II alone is not sufficient. Both statements together give $xyz > yz$. Hence answer is (c).

EXERCISE 9(B)

1. From statement I, we have $a_2 = (\text{odd number}) + 3 = (\text{even number})$. So we have a_2, a_4, \dots, a_{12} are even numbers. So statement I alone is sufficient to answer the question. From statement II, we have $a_{12} = (\text{odd number}) + 3 = (\text{even number})$. So statement II alone is sufficient to answer the question. Therefore, each statement alone is sufficient to answer the question. Hence answer is (c).
2. From statement I, we know the area of the oval. But, as we do not know the measures of the angles of the sectors, we cannot determine the ratio of the areas of the sectors. So, statement I alone is not sufficient to answer the question. From statement II, we can conclude that the oval must necessarily be a circle. The 6 sectors are therefore congruent and the ratio of the areas of these sectors is 1. Therefore, the question can be answered with the help of statement II alone. Hence answer is (b).
3. Neither of the two statements alone is sufficient to answer the question. As Vijay has not scored more than Ramesh, his marks could be less than or equal to Ramesh's marks. As these positions cannot be uniquely determined, the question cannot be answered even by combining both statements. Hence answer is (d).
4. We know that $x^3 + y^3 + z^3 - 3xyz = (x+y+z)(x^2 + y^2 + z^2 - xy - yz - zx)$. Therefore each statement alone is sufficient to answer the question. Hence answer is (c).
5. Using statement I and the information given in the question, we can calculate the speed of the train with the help of the result $S_a + S_b = (l_1 + l_2)/t$. It should be noted that "the trains cross each other" means that the trains are moving in opposite directions. Therefore, the question can be answered with the help of statement I alone. The data in statement II is redundant. Hence answer is (e).
6. Let R_1 and R_2 and H_1 and H_2 be the radii and heights of the two cones. For similarity of cones, we require $R_1/R_2 = H_1/H_2$. From statement I, we know that the volumes of the two cones are equal. But the ratios of the radii and the heights of the two cones could be different. So, statement I alone is not sufficient to answer the question. From statement II, we

know that the ratio of the respective curved surface areas is $\sqrt{10}$. If L_1 and L_2 are the respective lateral heights, then $R_1L_1 = \sqrt{10}(R_2L_2)$. So, statement II alone is not sufficient to answer the question. If we combine both statements, we can definitely say that $R_1/R_2 \neq H_1/H_2$. Therefore, both statements together are sufficient to answer the question. Hence answer is (a).

7. The data in statement I is redundant. From statement II, we can determine the cost price of the mixture. As the mixture is sold at a profit of 23%, we can calculate the selling price. Therefore, the question can be answered with the help of statement II alone. Hence answer is (b).
8. Neither of the two statements alone is sufficient to answer the question. From statement II, we know that the height of the conical part of the tent is the same as the height of the cylindrical part. From statement I, we know the radius. Combining the two statements, we can determine the heights of the conical and the cylindrical parts of the tent and hence the total surface area. Therefore, the question can be answered with the help of both statements together. Hence answer is (a).
9. Neither of the two statements alone is sufficient to answer the question. From statement I, we know the side of the triangle and can therefore determine the co-ordinates of the third vertex. But, this statement does not help to uniquely determine the vertex Q of the triangle. From statement II, we know that the co-ordinates of point Q are both negative. We can now determine Q uniquely. From the co-ordinates of P and Q, we can determine the equation of the line by using the two-points form of the equation of the line. Therefore, the question can be answered with the help of both statements together. Hence answer is (a).
10. Neither of the two statements alone is sufficient to answer the question. Even if we combine the two statements, we do not know the duration for which the inlets and the outlet are kept open. Therefore, even the two statements together are not sufficient to answer the question. Hence answer is (d).

EXERCISE 10(A)

1. Statement I: If $x = 2$, then $x / 2$ is not an even integer. If $x = 4, 6, 8, \dots$, then $x / 2$ can be even or odd integer. So Statement I alone is not sufficient. Statement II alone is sufficient as $x / 2$ has to be an even integer. Hence answer is (b).
2. Statement I: Since p is a prime number, $p q$ will be prime if $q = 1$ and $p q$ will not be prime if q is not equal to 1. So Statement I alone is not sufficient. Statement II alone is not sufficient as we don't know about p . Both statements together are not sufficient. E.g. If $p = 13$ and $q = 1 / 13$, then $p q = 1$, which is not prime. If $p = 13$, $q = 8 / 13$, then $p q = 8$, which is not prime. Hence answer is (e).
3. Statement I alone is sufficient as it gives $PQ = PR$. Statement II alone is not sufficient as we don't know about PR . Hence answer is (a).
4. Statement I alone is not sufficient as common ratio ' r ' could be positive such that $0 < r < 1$ or negative. Statement II gives $b = ar$, $c = ar^2$. We get $(ar)^3 > (ar)^2$. So $ar > 0$. But a and r can be both positive or both negative. So Statement II alone is not sufficient. Both statements together are not sufficient. Hence answer is (e).
5. Statement I: $(101 + 5) / (161 + 5) > (101 / 161)$. So Statement I alone is sufficient. Statement II: If we take both a and b as positive numbers, then $[(a + 5) / (b + 5)] < a / b$. If we take both a and b as negative numbers, then $[(a + 5) / (b + 5)] > a / b$. Therefore Statement II alone is not sufficient. Hence answer is (a).
6. Statement I alone is not sufficient as we don't know the values of the arms of the right angle triangle. Statement II alone is not sufficient as one can draw any number of right angle

triangles with $AC = 4$, but of different areas. Both statements together give $AB = \sqrt{(8^2 - 4^2)} = \sqrt{48}$. So $A(\Delta ABC) = \frac{1}{2} \times \sqrt{48} \times 4$. Hence answer is (c).

7. We have $S = kt^2$, where S = distance from the starting point, t = time, k = constant. Statement I: $122.6 = k(5)^2$. So $k = 122.6 / 25$. Therefore $S_{10} - S_9 = (122.6 / 25)(10^2 - 9^2)$. Therefore, Statement I alone is sufficient to answer the question. Statement II: $490.4 = k(10)^2$. So $k = 490.4 / 100$. Therefore $S_{10} - S_9 = 490.4 - (490.4 \times 9^2 / 100)$. Therefore Statement II alone is sufficient. Hence answer is (d).
8. Statement I alone is not sufficient as we don't know the radius of the wheel. Statement II gives radius of the wheel = $1.3 / 2$. Therefore the number of revolutions = $1000 / [2\pi(1.3 / 2)]$. Therefore Statement II alone is sufficient. Hence answer is (b).
9. Statement I: We have $1 / 4 + 20d = -9^3 / 4$. On solving we get $d = -73 / 8$. So the first arithmetic mean = $1 / 4 - 73 / 8 = -71 / 8$. Therefore Statement I alone is sufficient. Statement II: We have $1 / 4 + 4d = -9^3 / 4$. On solving we get $d = -365 / 8$. So the first arithmetic mean = $1 / 4 - 365 / 8 = -363 / 8$. Therefore Statement II alone is sufficient. Hence answer is (d).
10. Statement I alone is not sufficient as we don't know about a . For the same reason, Statement II alone is not sufficient. Statement I and (2) gives $ab < 0$. Since we don't know about a , both statements together are not sufficient. Hence answer is (e).
11. Statement I alone is not sufficient as we don't know the rate of work by Jean alone. For the same reason Statement II alone is not sufficient. Suppose Julie alone takes d days to complete the work, then Jean alone takes $d - 5$ days. Therefore we have $10\{(1 / d) + [1 / (d - 5)]\} = 1$. On solving we get $d = (25 + \sqrt{425}) / 2$. Hence answer is (c).
12. Statement I alone is not sufficient as we don't know about c . Since integers b and c differ by 1, one number has to be even. So the product bc is even. Therefore Statement II alone is sufficient. Hence answer is (b).
13. Statement I alone is not sufficient as we get $a = 3$ or $a = -2$. So there is no unique solution. Statement II alone is not sufficient as we get $a = 3$ or $a = -5 / 2$. So there is no unique solution. Both statements together give $a = 3$. Hence answer is (c).
14. Statement I alone is sufficient as if $a > b$, then $3 / a < 3 / b$. Statement II alone is not sufficient as we don't know about b . Hence answer is (a).
15. Statement I alone is not sufficient as we don't know the exact position of P . Statement I alone is not sufficient as we don't know anything about $\square ABCD$. From Statement I and (2), we have $CD = PD = BD$. $m\angle PDC = 60^\circ$. Therefore $m\angle PDB = 30^\circ$. In ΔPBD , $x = (180 - 30) / 2 = 75^\circ$. Therefore both statements together are sufficient. Hence answer is (c).
16. Statement I alone is not sufficient as we can't determine the smallest angle from the information, $m\angle B + m\angle C = 170^\circ$. Statement II alone is not sufficient as we can't determine the smallest angle from the information, $\angle B > \angle C$. Both statements together are not sufficient to answer the question. Hence answer is (e).
17. Let a, b, c are the sides of ΔABC . From Statement I, we have $a + b + c = 132$. Similarly Statement II gives $a^2 + b^2 + c^2 = 6050$. Since there are 3 unknowns we require at least 3 consistent equations. By Pythagoras theorem, we have $c^2 + a^2 = b^2$. On solving we get $a = 44, b = 55$ and $c = 33$. Hence answer is (c).
18. Statement I: If both b and c are < 0 , then $abc < 0$. If $b < 0$, then $abc > 0$. Therefore Statement I alone is not sufficient. Statement II: If $b = 5, c = 4$, then $abc < 0$. If $b = 5, c = -4$, then $abc > 0$. Therefore Statement II alone is not sufficient. Both statements together give

between b and c , one number has to be positive and the other number has to be negative. Therefore we get $a b c > 0$. Hence answer is (c).

19. Statement I alone is not sufficient. Statement II alone is not sufficient. Since we don't know about QR , both statements together are not sufficient to answer the question. Hence answer is (e).
20. Statement I alone is not sufficient as N can be any integer multiple of 42. Statement II gives $N^2 = 144K$, where K is any integer. Therefore we have $N = 12\sqrt{K}$. Since N is an integer, \sqrt{K} is also an integer. Therefore $N / 12$ is an integer. So N is divisible by 12. Therefore Statement II alone is sufficient. Hence answer is (b).

EXERCISE 10(B)

1. Neither of the two statements alone can answer the question. By combining the two statements, we can calculate the lengths of the trains with the help of the formulae $S_a + S_b = (l_1 + l_2)/t_1$ and $S_a = l_1/t_2$. Therefore, the question can be answered with the help of both statements together. Hence answer is (c).
2. Neither of the two statements alone is sufficient to answer the question. To find the volume of the figure, we need to know the area of the base and the height of the figure. From statement I, we can calculate the height of the solid. By combining the two statements, we can find the height of the base and hence its area. The volume of the figure can now be calculated. Therefore, both statements together are required to answer the question. Hence answer is (c).
3. Let the initial tax on the commodity be $8X$ and the sales be $9Y$. From statement I, we know that the tax and the sales are now respectively $5X$ and $8Y$. So, the change in revenue can be calculated. So, statement I alone is sufficient to answer the question. Now, let the initial tax and the sales be $8P$ and $81Q$ respectively. These values are changed to $9P$ and $50Q$ respectively. The change in revenue can now be calculated. So, statement II alone is sufficient to answer the question. Therefore, each statement alone is sufficient to answer the question. Hence answer is (b).
4. Neither of the two statements alone is sufficient to answer the question. From statement I, we know that the product $XY = 100$. So, X and Y could be both negative or both positive. As it is not possible to uniquely determine X and Y , the question cannot be answered even with the help of both statements together. Hence answer is (a).
5. Statement I and statement II give the same relation between M and N . We do not know the value of X . Depending on the value of X , we could get $X^M > X^N$, $X^M < X^N$ or $X^M = X^N$. Hence answer is (a).
6. We know that line AB is perpendicular to the line $7X + 8Y = 56$ with slope $(-7/8)$. We know that if two lines are perpendicular, the product of their slopes is -1 . So, the slope of line AB is $8/7$. Therefore, the question can be answered with the help of statement I alone. Hence answer is (e).
7. Statement I gives us the ratio of times over a constant distance. This statement alone is not sufficient to answer the question. From statement II, we know the ratio of distances covered in constant time. This ratio is the same as the ratio of speeds. Therefore, the question can be answered with the help of statement II alone. Hence answer is (d).
8. The question cannot be answered with the help of statement I alone. All the parameters in statement II are exactly $3/2$ times of those in the question. Using this information, we can find the number of days required. Therefore, statement II alone is sufficient to answer the question. Hence answer is (d).

9. From statement I, we can find the selling price of the transistor. This value is 1.1 times the cost price. Using this information, we can calculate the cost price of the transistor. So, statement I alone is sufficient to answer the question.
From statement II, we can determine the selling price of the transistor. As the shopkeeper has announced a no profit - no loss scheme, the selling price of the transistor is the same as its cost price. So, statement II alone is sufficient to answer the question. Therefore, each statement alone is sufficient to answer the question. Hence answer is (b).
10. From the question, we know that, $A + B + C = 252$ kgs and $A + B + C + D = 320$ kgs. So, $D = 68$ kgs. From statement I, we know that $E = 71$ kgs. So, $B + C + D + E = 316$ kgs, giving $B + C + D = 245$. We can now determine A's weight as 75 kgs. Therefore, statement I alone is sufficient to answer the question.
From statement II, $(A - 7) + B + C = B + C + D$, giving us $A = D + 7$. From the question, we know that D weighs 68 kgs. Hence, we can calculate A's weight. So, statement II alone is sufficient to answer the question. Therefore, each statement alone is sufficient to answer the question. Hence answer is (b).

PROGGA