CBSE EXAMINATION PAPER-2023

MATHEMATICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 88

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **44 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 3** are case based questions

iv. **Section B** – questions number **4 to 23** are multiple choice questions

v. **Section C** – questions number **24 to 30** are very short answer

vi. **Section D** – questions number **31 to 38** are short answer

vii. **Section E** – questions number **39 to 44** are long answer

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1.

India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country.

It helps them to compare and analyse the results. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018 :

Based on the above information, answer the following questions :

Rainfall (mm)	Number of Sub-divisions
200-400	2
400-600	4
600-800	7
800-1000	4
1000-1200	2
1200-1400	3
1400-1600	1
1600-1800	1

(1)

Write the modal class.

[1 Marks]

(2)

Find the median of the given data.

[2 Marks]

(3)

If sub-division having at least 1000 mm rainfall during monsoon

season, is considered good rainfall sub-division, then how many subdivisions had good rainfall ?

[1 Marks]

(4)

Find the mean rainfall in this season.

[2 Marks]

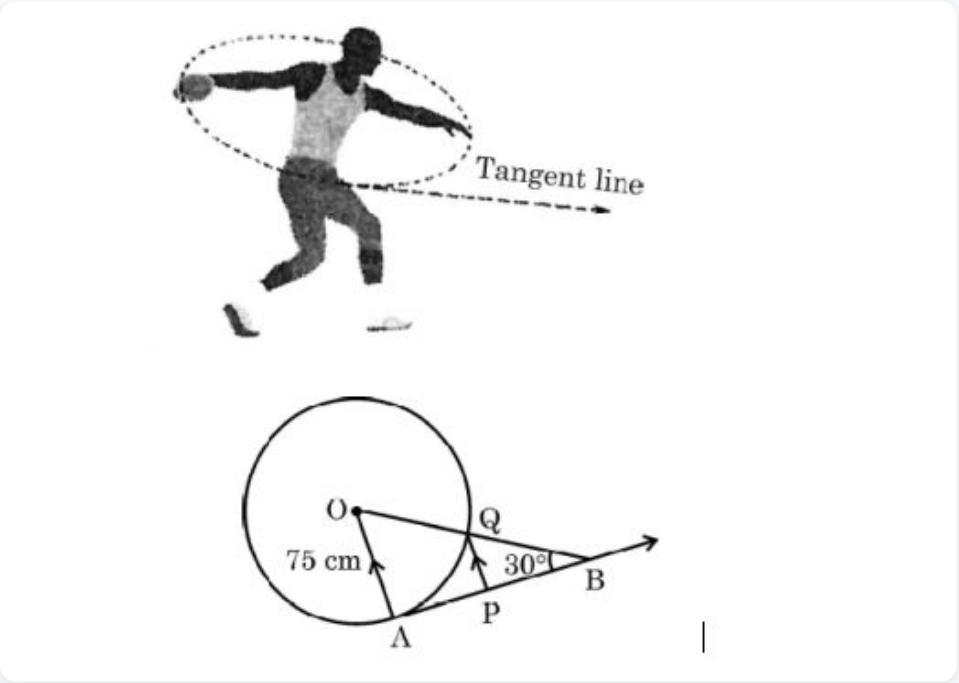
Question 2.

The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti-clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.

In the given figure, AB is one such tangent to a circle of radius 75 cm.

Point O is centre of the circle and ∠ABO = 30°. PQ is parallel to OA.

Based on above information :



(1) Find the length of AB.

[1 Marks]

(2) Find the length of OB.

[1 Marks]

(3) Find the length of AP.

[2 Marks]

(4)

find the length of PQ.

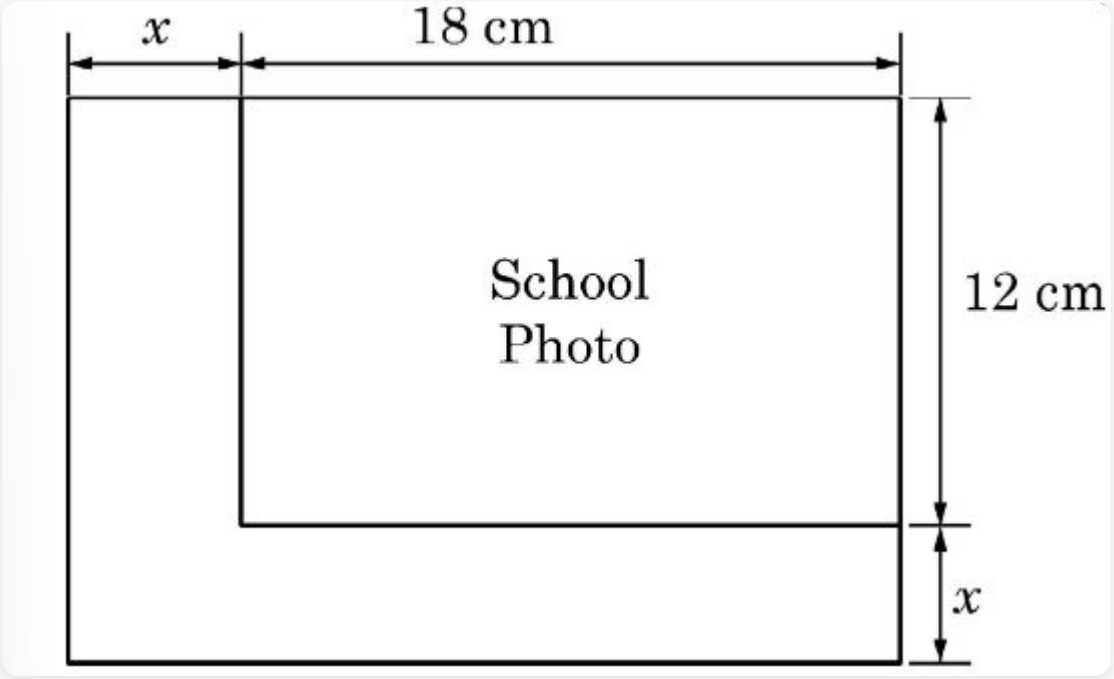
[2 Marks]

Question 3. While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide. Based on the above information, answer the following questions :

(1) Write the corresponding quadratic equation in standard form.

[1 Marks]

(2) What should be the new dimensions of the enlarged photo?



[1 Marks]

(3) Write an algebraic equation depicting the above information.

[2 Marks]

(4) Can any rational value of x make the new area equal to 220 cm²?

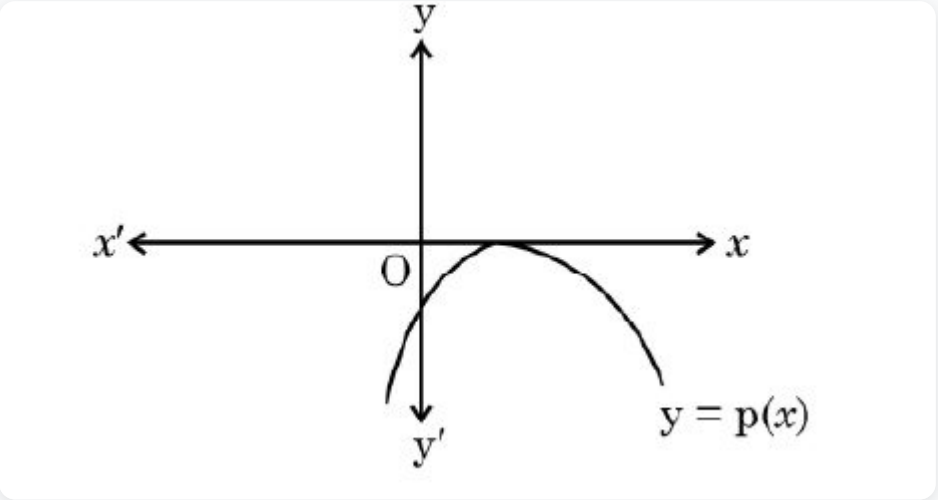
[2 Marks]

Section B

Question 4.

The graph of y = p(x) is given, for a polynomial p(x). The number of zeroes of p(x) from the graph is:

[1 Marks]



(A) 1

(B) 2

(C) 3

(D) 0

Question 5.

The value of k for which the pair of equations kx = y + 2 and 6x = 2y + 3 has infinitely many solutions is:

[1 Marks]

(A) is k = 3

(B) is k = -3

(C) is k = 4

(D) does not exist

Question 6.

If p -1,p+1 and 2p+3 are in AP, then the value of p is:

[1 Marks]

(A) -2

(B) 0

(C) 4

(D) 2

Question 7.

In what ratio does the x-axis divide the line segment joining the points A(3 , 6) and B(-12, -3)?

[1 Marks]

(A) 2:1

(B) 1:4

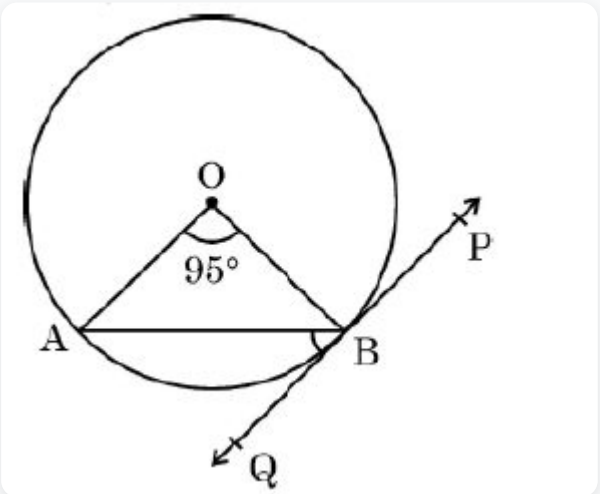
(C) 1:2

(D) 4:1

Question 8.

In the given figure, PQ is tangent to the circle centred at O. If ∠AOB = 95°, then the measure of ∠APQ will be:

[1 Marks]



(A) 42.5°

(B) 95°

(C) 85°

(D) 47.5°

Question 9.

If 2 tan A = 3, then the value of 4 sin A + 3 cos A / 4 sin A - 3 cos A is

[1 Marks]

(A) does not exist

(B) 7/ √13

(C) 3

(D) 1/ √13

Question 10.

If α and β are the zeroes of polynomial $p(x) = x^2 + x - 1$ / α + 1 / β equals to

[1 Marks]

(A) -1/2

(B) 1

(C) -1

(D) 2

Question 11.

The least positive value of k for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots is:

[1 Marks]

(A) ±2√2

(B) 2

(C) ±2

(D) √2

Question 12.

[3/4 $\tan^2 30° - \sec^2 45° + \sin^2 60°$] is equal to

[1 Marks]

(A) -3/2

(B) 1/6

(C) 5/6

(D) -1

Question 13.

Curved surface area of a cylinder of height 5 cm is 94.2 cm^2. Radius of the cylinder is (Take $\pi = 3.14$):

[1 Marks]

(A) 2 cm

(B) 6 cm

(C) 3 cm

(D) 2.9 cm

Question 14.

The distribution below gives the marks obtained by 80 students on a test :

The modal class of the distribution with marks obtained by 80 students is:

[1 Marks]

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60
Number of Students	3	12	27	57	75	80

(A) 10-20

(B) 20-30

(C) 30-40

(D) 50-60

Question 15.

The curved surface area of a cone having height 24 cm and radius 7 cm is:

[1 Marks]

(A) 500 cm^2

(B) 528 cm^2

(C) 550 cm^2

(D) 1056 cm^2

Question 16.

The distance between points $(0, 2\sqrt{5})$ and $(-2\sqrt{5}, 0)$ is:

[1 Marks]

(A) $4\sqrt{10}$ units

(B) 0

(C) $2\sqrt{10}$ units

(D) $2\sqrt{20}$ units

Question 17.

Which of the following is a quadratic polynomial having zeroes - 2 / 3 and 2/3 ?

[1 Marks]

(A) $4x^2-9$

(B) $x^2+9/4$

(C) $4/9\ (9x^2+4)$

(D) $5(9x^2-4)$

Question 18.

If the value of each observation of a statistical data is increased by 3, then the mean of the data:

[1 Marks]

(A) remains unchanged

(B) increases by 3

(C) increases by 3n

(D) increases by 6

Question 19.

Probability of happening of an event is denoted by p and probability of non-happening of the event is denoted by q. Relation between p and q is:

[1 Marks]

(A) p =1, q = 1

(B) p +q + 1=0

(C) p + q = 1

(D) p = q - 1

Question 20.

A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 16,000 tickets are sold, how many tickets has she bought?

[1 Marks]

(A) 750

(B) 480

(C) 240

(D) 40

Question 21.

In a group of 20 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim is:

[1 Marks]

(A) 1/3

(B) 1/4

(C) 3/4

(D) 1

Question 22.

Assertion (A) : Point P(0, 2) is the point of intersection of y-axis with the line 3x + 2y = 4. Reason (R) : The distance of point P(0, 2) from x-axis is 2 units.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Assertion (A) is false but Reason (R) is true.

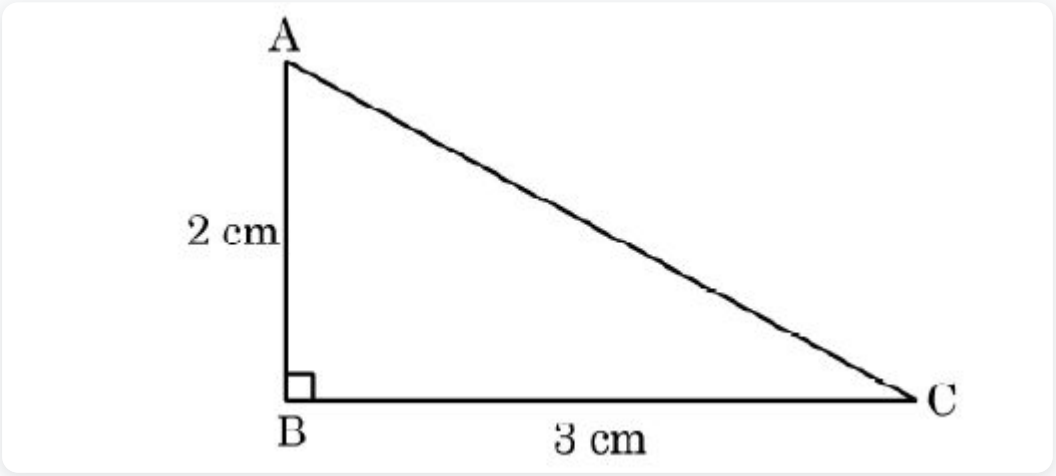
(C) Assertion (A) is true but Reason (R) is false.

(D) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Question 23.

Assertion (A) : The perimeter of AABC is a rational number. Reason (R) : The sum of the squares of two rational numbers is always rational.

[1 Marks]



(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Assertion (A) is true but Reason (R) is false.

(C) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(D) Assertion (A) is false but Reason (R) is true.

Section C

Question 24.

Solve the pair of equations x=3 and y= -4 graphically.

[2 Marks]

Question 25.

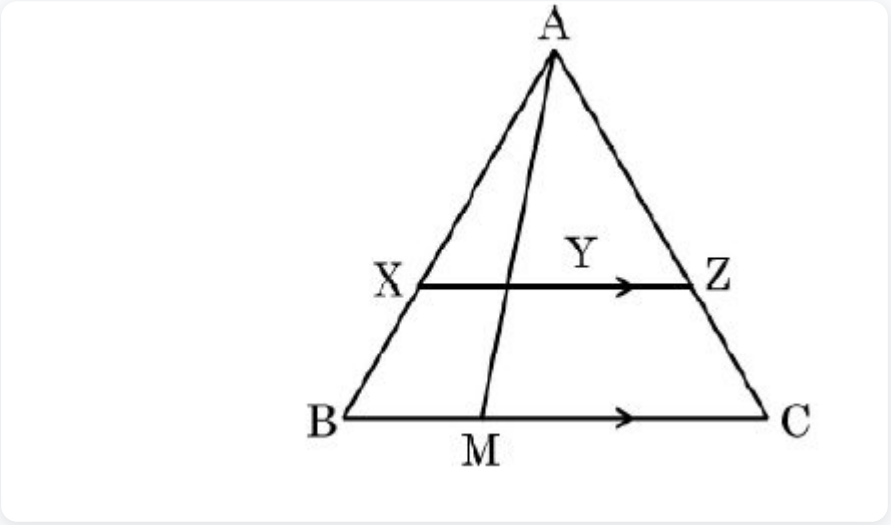
Using graphical method, find whether the following system of linear equations is consistent or not: x=0 and y =-7

[2 Marks]

Question 26.

In the given figure, XZ is parallel to BC. If AZ = 3 cm, ZC = 2 cm, BM = 3 cm and MC = 5 cm, find the length of XY.

[2 Marks]



Question 27.

If sin θ + cos θ= √3,then find the value of sin θ . cos θ.

[2 Marks]

Question 28. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.

[2 Marks]

Question 29.

A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random. Find the probability that drawn ball is

(i) red

(ii) yellow.

[2 Marks]

Question 30.

If sin α= 1 / √2 and cot β = √3, then find the value of cosec α + cosec β .

[2 Marks]

Section D

Question 31. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

[3 Marks]

Question 32. Prove that √5 is an irrational number.

[3 Marks]

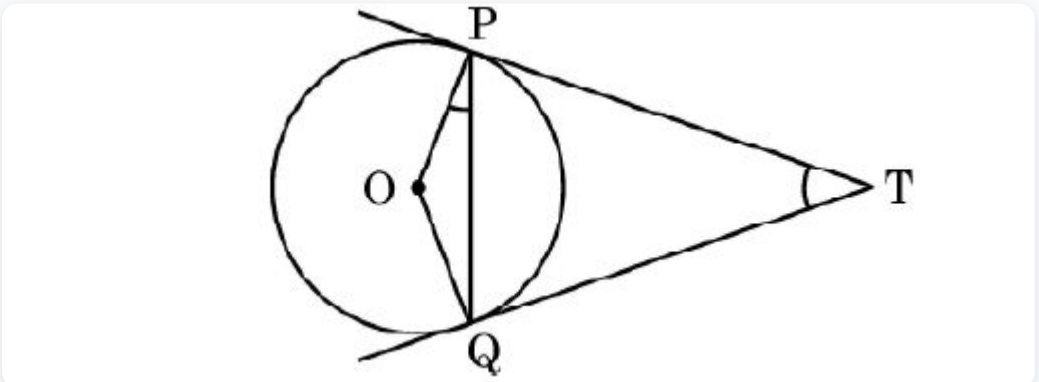
Question 33.

If (-5, 3) and (5, 3) are two vertices of an equilateral triangle, then find coordinates of the third vertex, given that origin lies inside the triangle. (Take √3 = 1.7)

[3 Marks]

Question 34. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ.

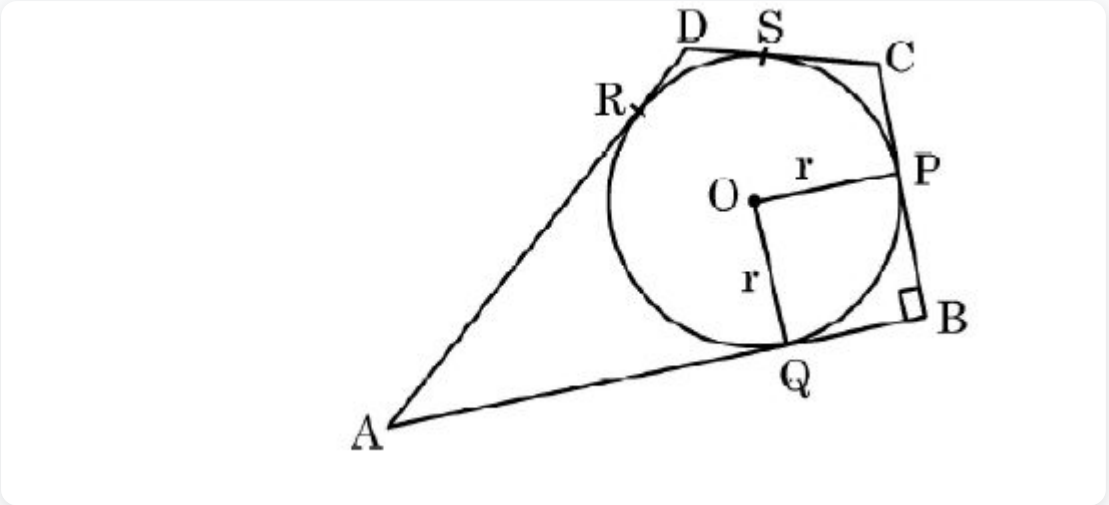
[3 Marks]



Question 35.

In the given figure, a circle is inscribed in quadrilateral ABCD in which ∠B = 90°. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle.

[3 Marks]



Question 36.

Prove that: tan θ + sec θ - 1 / tan θ- sec θ +1 = 1 + sin θ / cos θ

[3 Marks]

Question 37.

A room is in the form of a cylinder surmounted by a hemispherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find the total height of the room if it contains (1408 / 21) m^3 of air. (Take π = 22/7).

[3 Marks]

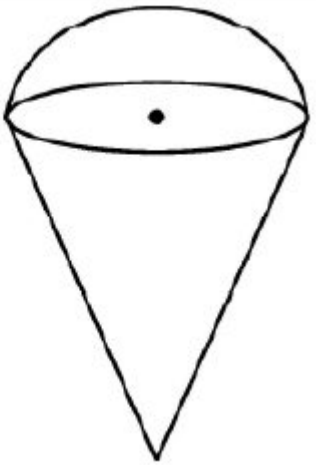
Question 38.

An empty cone of radius 3 cm and height 12 cm .Ice cream is filled is in it so that lower part of the cone which is $1/6^{th}$ of the volume of

the cone is unfilled but hemisphere is formed on the top. Find

volume of the ice-cream. (Take n = 3.14)

[3 Marks]



Section E

Question 39.

If a line drawn parallel to one side of the triangle intersects the other two sides at distinct points. Prove that the two sides are divided in the same ratio.

[5 Marks]

Question 40.

The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60°. The angle of elevation of the top of second tower from the foot of the first tower is 30°. Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers.

[5 Marks]

Question 41.

A spherical balloon of radius r subtends an angle of 60° at the eye of

an observer. If the angle of elevation of its centre is 45° from the

same point, then prove that height of the centre of the balloon is √2

times its radius.

[5 Marks]

Question 42. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also, find the area of the major segment of the circle.

[5 Marks]

Question 43.

The ratio of the 11^{th} term to the 17^{th} term of an A.P is 3:4. Find the ratio of the 5^{th} term to the 21^{st} term of the same A.P. Also, find the ratio of the sum of the first 5 terms to that of the first 21 terms.

[5 Marks]

Question 44.

250 logs are stacked in in the following manner :

22 logs are in the bottom row, 21 in the next, 20 in the row next to it

and so on (as shown by an example). In how many rows, are the 250

logs placed and how many logs are there in the top row ?

[5 Marks]

