ROLL NUMBER				

INDIAN SCHOOL MUSCAT
FINAL EXAMINATION 2022
MATHEMATICS BASIC (241)

CLASS : X
DATE: 24th November 2022

TIME ALLOTED   : 3 HRS.
MAXIMUM MARKS: 80

GENERAL INSTRUCTIONS:

- All questions must be attempted, however there are internal options given for 2-, 3- and 5-marks questions.
- SECTION A has 20 questions of 1mark each.
- SECTION B has 5 questions of 2 marks each.
- SECTION C has 6 questions of 3 marks each.
- SECTION D has 4 questions of 5 marks each.
- SECTION E has 3 case-based questions of 4 marks each.
- Use of calculator is not permitted.
- Attach the graph paper with the answer sheet irrespective of the fact whether you use it or not.

SECTION – A

1. Which term of an AP 0, 21, 42, 63 ... is 210?
   (a) 9th
   (b) 10th
   (c) 11th
   (d) 12th

2. The secant of a circle meets a circle at
   (a) 1 point
   (b) 2 points
   (c) 3 points
   (d) no point

3. If $xy = 180$ and $HCF\ (x, y) = 3$, then find the $LCM\ (x, y)$.
   (a) 60
   (b) 180
   (c) 3
   (d) 120

4. If a card is selected from a deck of 52 cards, then the probability of being a red face card is
   (a) $\frac{3}{26}$
   (b) $\frac{3}{13}$
   (c) $\frac{2}{13}$
   (d) $\frac{1}{2}$

5. If the centre of a circle is (3, 5) and end points of a diameter are (4, 7) and (2, m), then the value of m is
   (*a*) 3
   (*b*) − 3
   (*c*) 7
   (*d*) 4

6. If $\triangle ACB \sim \triangle ADC$, AC = 6 cm and AD = 3 cm, then the length of AB is
   (a) 6 cm
   (b) 3 cm
   (c) 12 cm
   (d) 24 cm

7. If the area of a circle is numerically equal to twice its circumference, then the diameter of the circle is:
(a) 4 units　　　　(b) n units　　　　(c) 8 units　　　　(d) 2 units

8. **Assertion (A):** The equation $8x^2 + 3kx + 2 = 0$ has equal roots then the value of k is $\pm\dfrac{8}{3}$.

Reason (R): The equation $ax^2 + bx + c = 0$ has equal roots if $D = b^2 - 4ac = 0$
(a) Both assertion (A) and reason (R) are true and (R) is the correct explanation of (A).
(b) Both assertion (A) and reason (R) are true but (R) is not the correct explanation of (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. The $P(A)$ denotes the probability of an event A, then
(a) $P(A) < 0$　　　(b) $P(A) > 1$　　c) $0 \leq P(A) \leq 1$　　(d) $-1 \leq P(A) \leq 1$

10. In an AP, if $a = 5, d = 0$ and $n = 105$, then n^{th} term will be
(a) 0　　　　(b) 5　　　　(c) 110　　　　(d) 105

11. The value of: $sin\,60° + 2\,tan\,45° - cos\,30°$ is
(a) 1　　　　(b) 0　　　　(c) -1　　　　(d) 2
(b)

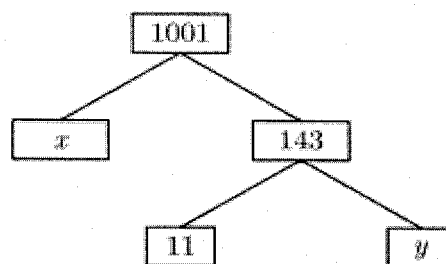12. The graph of y=p(x) is given.
Identify the number of zeros of p(x).
(a)1
(b)5
(c)6
(d)4
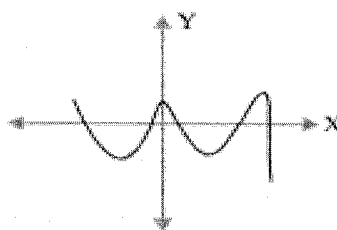
13. In a circle of diameter 42 cm, if an arc subtends an angle of 60° at the centre, where $\pi = \dfrac{22}{7}$, then the length of the corresponding arc is.
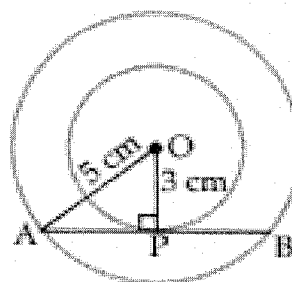(a) 22 cm　　　　(b) 44 cm　　　　(c) 11 cm　　　　(d) 33 cm

14. The values of x and y in the given figure are

(a) 7, 13
(b) 13, 7
(c) 9, 12
(d) 12, 9

15. In the given figure, the length of PB is.

(a) 6 cm
(b) 5 cm
(c) 8 cm
(d) 4 cm

16. The pair of linear equations $x = 0$ & $x = -4$ has
(a)Unique solution　　(b)No solution　　(c)Infinite solutions　　(d)Two solutions

17. **Assertion:** Common difference of the AP: $-5, -1, 3, 7, \ldots\ldots\ldots$ is 4.
    Reason : Common difference of the AP: $a, a + d, a + 2d, \ldots\ldots\ldots$ is given by $d = a_1 - a_2$
    (a) Both assertion (A) and reason (R) are true and (R) is the correct explanation of (A).
    (b) Both assertion (A) and reason (R) are true but (R) is not the correct explanation of (A).
    (c) Assertion (A) is true but reason (R) is false.
    (d) Assertion (A) is false but reason (R) is true.

18. When a die is thrown, the probability of getting an odd number is
    (a) $\dfrac{1}{6}$ (b) $\dfrac{1}{3}$ (c) $\dfrac{1}{2}$ (d) 0

19. The distance between the points $A(-1, 0)$ and $B(5, 0)$ is
    (a) 25 units   (b) 5 units   (c) 6 units   (d) 4 units

20. If α and β are the zeroes of the polynomial $2x^2 - 13x + 6$, then $\alpha + \beta$ is equal to
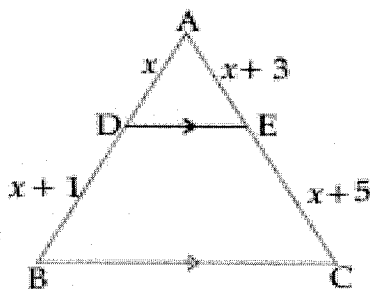 $(a)\ -3$ $(b)\ 3$ $(c)\ \dfrac{13}{2}$ $(d)\ \dfrac{-13}{2}$

SECTION – B

21. Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other.

22. Find the area of the sector of a circle of radius 14 cm whose central angle is $45°$.

23. Find the 11th term from the end of the AP: 3, 5, 7, ...201.

24. In figure, if AD = 6 cm, DB = 9 cm, AE = 8 cm and EC = 12 cm and $\angle ADE = 48°$. Find $\angle ABC$.

OR
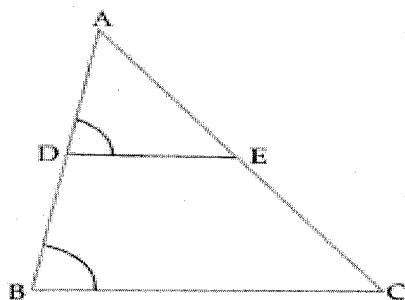
In $\triangle ABC, DE \parallel BC$, find the value of x.

25. Find the quadratic polynomial whose sum and product of the zeroes are 10 and 21 respectively.
    OR
    Show that $\dfrac{1}{2}$ and $\dfrac{-3}{2}$ are the zeroes of the polynomial $4x^2 + 4x - 3$.

26. If $tan(A + B) = 1$ and $tan(A - B) = \frac{1}{\sqrt{3}}$, $0° < A + B < 90°$, $A > B$, then find the values of A and B.

OR

If $sin\theta + cos\theta = \sqrt{2}$, prove that $tan\theta + cot\theta = 2$

27. Solve for x: $x^2 + 5x - (a^2 + a - 6) = 0$.

OR

Divide 27 into two parts such that the sum of their reciprocals is $\frac{3}{20}$.

28. Prove that the lengths of two tangents drawn from an external point to a circle are equal.

29. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.

30. Prove that $3 + \sqrt{2}$ is an irrational number.

31. If $A(-2, 1), B(a, 0), C(4, b)$ and $D(1, 2)$ are the vertices of a parallelogram ABCD, find the values of a and b.

32. (i) Find the value of $\frac{secA - cosA}{1 + cosec A}$ if $sin A = \frac{3}{5}$
    (ii) Prove that $(cosec\theta - cot\theta)^2 = \frac{1 - cos\theta}{1 + cos\theta}$

33. 5, 12 and 13 are the sides of a right triangle. A circle, of radius r, touches the sides of the triangle. Find r.

34. Two poles of equal heights are standing opposite to each other on either side of a road, which is 80 m wide. From a point between them on the road, angles of elevation of their top are 60° and 30°. Find the height of the poles and distance of point from poles.

OR

The angles of depression of the top and bottom of an 8 m tall building from top of a multi-storey building are 30° and 45°, respectively. Find the height of multi-storey building and distance between two buildings.

35. Draw the graphs of the pair of linear equations: $x + 2y = 5$ and $2x - 3y = -4$. Also, find the points where the lines meet the X-axis.
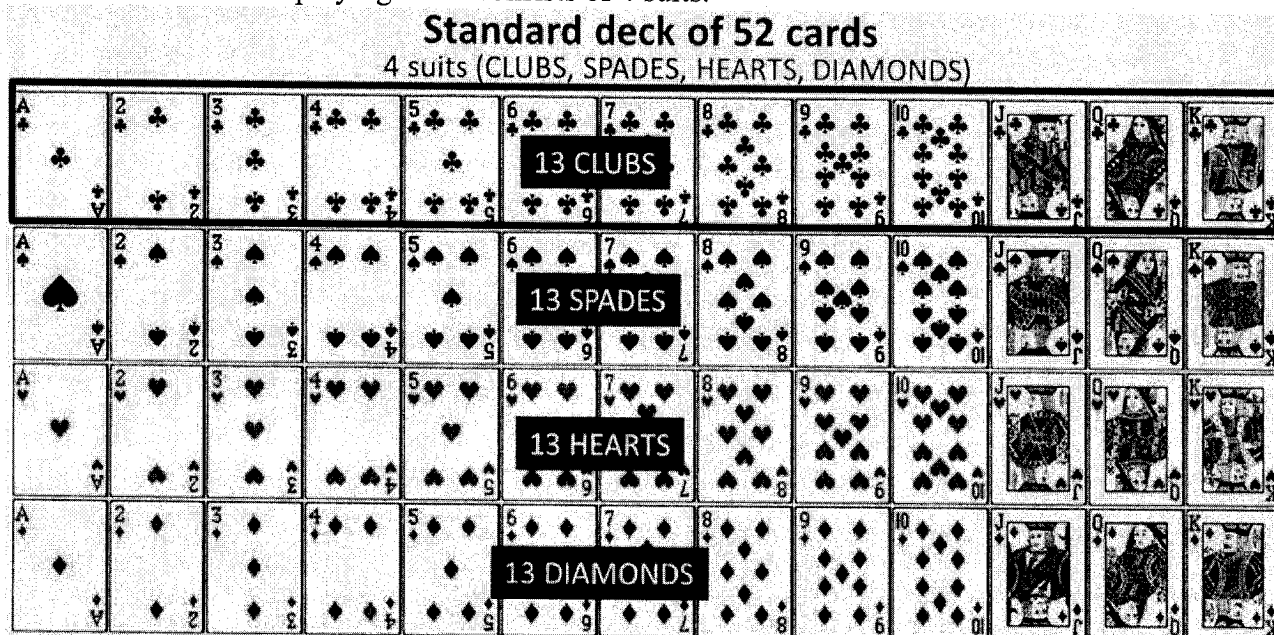
OR

Seven times a two digit number is equal to four times the number obtained by reversing the order of its digits. If the difference of the digits is 3, determine the number.

36. Mr. Jeeva bought a pack of playing cards for his children to learn to play cards so that they can even play online as well with their friends since they have no chances of moving out in the pandemic. But the children knew nothing about playing cards or different kinds of suits in it. So, Mr. Jeeva thought of explaining both his children the different suits as well as colours of cards. So, he spread out all the cards in an organized manner and explained.

A standard deck of 52 playing cards consists of 4 suits.

Standard deck of 52 cards
4 suits (CLUBS, SPADES, HEARTS, DIAMONDS)

In the picture above, the four rows are the four suits. The clubs are all in the first row, followed by the spades, then the hearts, and last the diamonds. Among the 13 kinds, we find the numbers from 2 to 10, and four are other kinds. The A stands for ace, the J for jack, the Q for queen, and the K for king. The jack, queen, and king are often referred to as face cards.

Answer the following questions.

(i) The cards were shuffled and one card is drawn from the deck, what is the probability of getting a king of red colour?

(ii) What is the probability of getting the numbered card 6 of clubs?

(iii) What is the probability that the card drawn is a prime numbered black card?

OR

(iii) What is the probability that the card drawn is an even prime number?

37. A mathematics teacher of a school has taken his children to a science centre to visit the Science and Mathematics exhibition. When the students were visiting different stalls, one student, Rani, observed that some rectangular bars are arranged in ascending order as shown below. In the meantime, her teacher reached at the stall and asked some questions to Rani and the other students to verify whether the pattern is in AP or not? Just by observing the pattern shown below Rani and her friends were asked to answer the following questions. Find the correct answers for the same.
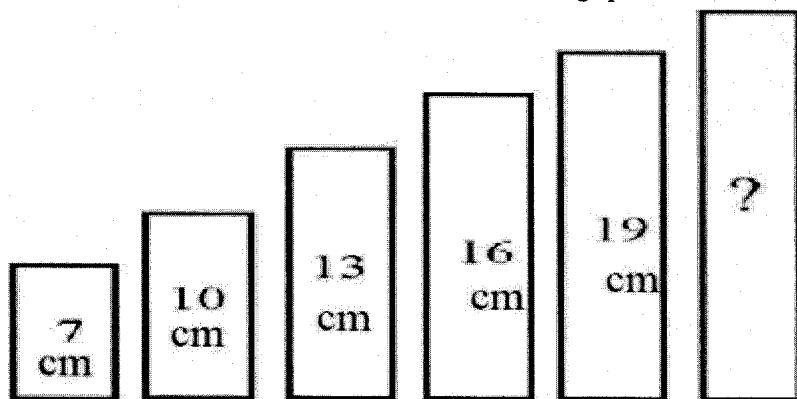

(i) What will be the height of 6th bar?
(ii) What will be the expression for the nth term of the above sequence?
(iii) If the sum of heights of first n rectangular bars is 242, then find the value of n.

OR

(iii) These rectangular bars are laid on the ground and joined end to end. Find the total length of first 10 bars in meters.

38. Two brothers Ramesh and Pulkit were at home and have to reach School. Ramesh went to Library first to return a book and then reaches School directly whereas Pulkit went to Skate Park first to meet his friend and then reaches School.
(i) Find the coordinates of library, skate park, school and home
(ii) If both walks with same speed throughout their journey then who will be the first to reach the school. Justify your answer with proper working.
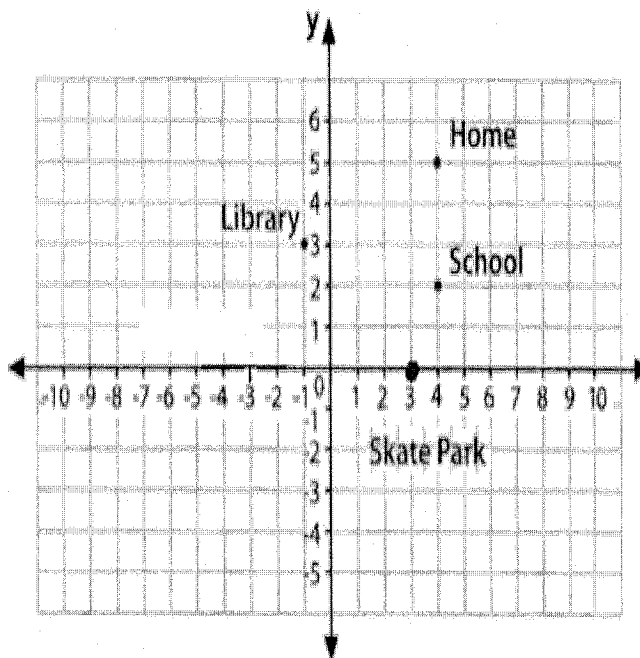
****END OF THE QUESTION PAPER****

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MATHEMATICS BASIC (241)

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GENERAL INSTRUCTIONS:

- **All questions must be attempted, however there are internal options given for 2-, 3- and 5-marks questions.**
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- **SECTION B has 5 questions of 2 marks each.**
- **SECTION C has 6 questions of 3 marks each.**
- **SECTION D has 4 questions of 5 marks each.**
- **SECTION E has 3 case-based questions of 4 marks each.**
- **Use of calculator is not permitted.**
- **Attach the graph paper with the answer sheet irrespective of the fact whether you use it or not.**

SECTION – A

1. If α and β are the zeroes of the polynomial $2x^2 - 13x + 6$, then $\alpha + \beta$ is equal to

   (a) -3 (b) 3 (c) $\dfrac{13}{2}$ (d) $\dfrac{-13}{2}$

2. In a circle of radius 21 cm, if an arc subtends an angle of 60° at the centre, where $\pi = \dfrac{22}{7}$, then the length of the corresponding arc is.

   (a)22 cm   (b) 44 cm   (c) 11 cm   (d) 33 cm

3. **Assertion:** Common difference of the AP: $-5, -1, 3, 7, \ldots\ldots\ldots$ is 5.
   Reason : Common difference of the AP: $a, a + d, a + 2d, \ldots\ldots\ldots$ is given by $d = a_2 - a_1$
   (a) Both assertion (A) and reason (R) are true and (R) is the correct explanation of (A).
   (b) Both assertion (A) and reason (R) are true but (R) is not the correct explanation of (A).
   (c) Assertion (A) is true but reason (R) is false.
   (d) Assertion (A) is false but reason (R) is true.

4. The values of x and y in the given figure are

(a) 7, 13
(b) 13, 7
(c) 9, 12
(d) 12, 9

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        [1001]
        /    \
     [x]     [143]
             /    \
          [11]    [y]
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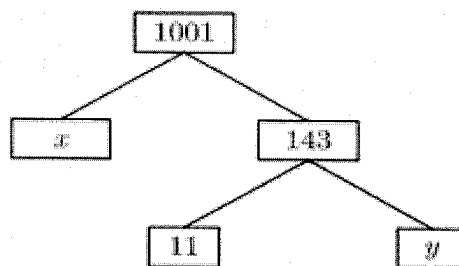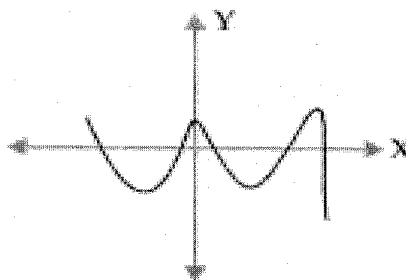
5. The $P(A)$ denotes the probability of an event A, then
(a) $P(A) < 0$ (b) $P(A) > 1$ c) $0 \leq P(A) \leq 1$ (d) $-1 \leq P(A) \leq 1$

6. The graph of y = p(x) is given.
Identify the number of zeros of p(x).
(a)1
(b)5
(c)6
(d)4
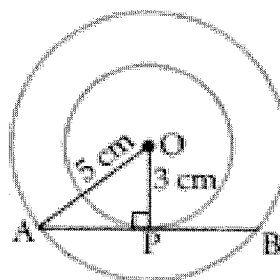

7. Which term of an AP 0, 21, 42, 63 ... is 189?
(a) 9th   (b) 10th   (c) 11th   (d) 12th

8. In the given figure, the length of PB is.

(a) 6 cm
(b) 5 cm
(c) 8 cm
(d) 4 cm

9. The secant of the circle meets the circle at
(a)1 point   (b) 2 points   (c) 3 points   (d) no point

10 If a card is selected from a deck of 52 cards, then the probability of being a black face card is
(a) $\dfrac{3}{26}$ (b) $\dfrac{3}{13}$ (c) $\dfrac{2}{13}$ (d) $\dfrac{1}{2}$

11 If the area of a circle is numerically equal to twice its circumference, then the diameter of the circle is:
(a) 4 units   (b) n units   (c) 8 units   (d) 2 units

12 If $\triangle ACB \sim \triangle ADC$, AC = 6 cm and AD = 3 cm, then the length of AB is
(a) 6 cm   (b) 3 cm   (c) 12 cm   (d) 24 cm

13 The distance between the points $A(-2, 0)$ and $B(4, 0)$ is
(a) 25 units   (b) 5 Units   (c) 6 Units   (d) 4 Units

14 When a die is thrown, the probability of getting an odd number is
(a) $\dfrac{1}{6}$ (b) $\dfrac{1}{3}$ (c) $\dfrac{1}{2}$ (d) 0

15 **Assertion :** The equation $8x^2 + 3kx + 2 = 0$ has equal roots then the value of k is $\pm \frac{8}{3}$.

Reason : The equation $ax^2 + bx + c = 0$ has equal roots if $D = b^2 - 4ac \neq 0$

(a) Both assertion (A) and reason (R) are true and (R) is the correct explanation of (A).

(b) Both assertion (A) and reason (R) are true but (R) is not the correct explanation of (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

16 The value of: $sin\ 60° + 2\ tan\ 45° - cos\ 30°$ is

    (a) 1   (b) 0   (c) −1   (d) 2

17 If $xy = 150$ and $HCF\ (x, y) = 3$, then find the $LCM\ (x, y)$.

    (a) 50   (b) 150   (c) 3   (d) 100

18 The pair of linear equations $y = 0$ & $y = -1$ has

    (a)Unique solution   (b)No solution   (c)Infinite solutions   (d)Two solutions

19 If the centre of a circle is (3, 5) and end points of a diameter are (4, 7) and (2, p), then the value of p is

    (a) 3   (b) -3   (c) 7   (d) 4

20 In an AP, if $a = 5, d = 0\ and\ n = 105$, then n^{th} term will be

    (a) 0   (b) 5   (c) 110   (d) 105
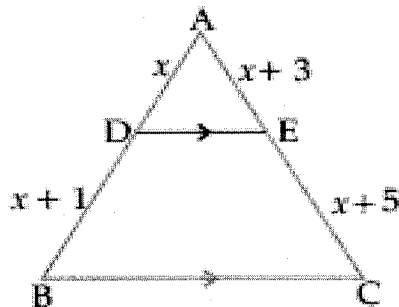
SECTION – B

21 In figure, if AD = 4 cm, DB = 6 cm, AE = 8 cm and EC = 12 cm and $\angle ADE = 48°$. Find $\angle ABC$.

OR
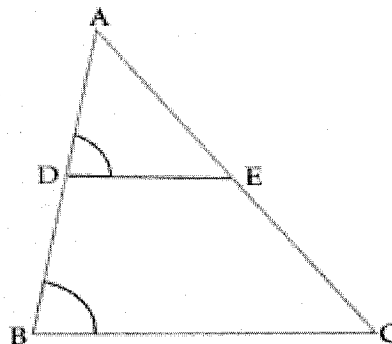
In $\triangle ABC, DE \parallel BC$, find the value of x.

22 Find the quadratic polynomial whose sum and product of the zeroes are 11 and 24 respectively.

OR

Show that $\frac{1}{2}$ and $\frac{-3}{2}$ are the zeroes of the polynomial $4x^2 + 4x - 3$.

23 Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other.

24 Find the area of the sector of a circle of radius 14 cm whose central angle is 45°.

25 Find the 11th term from the end of the AP: 3, 5, 7, ...201.

SECTION – C

26 Prove that the lengths of two tangents drawn from an external point to a circle are equal.

27 Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.

28 If $tan(A + B) = 1$ and $tan(A - B) = \frac{1}{\sqrt{3}}$, 0° < A + B < 90°, A > B, then find the values of A and B.

OR

If $sin\theta + cos\theta = \sqrt{2}$, prove that $tan\theta + cot\theta = 2$

29 If $A(-2, 1), B(a, 0), C(4, b)$ and $D(1, 2)$ are the vertices of a parallelogram ABCD, find the values of a and b.

30 Prove that $2 + \sqrt{3}$ is an irrational number.

31 Solve for x: $x^2 + 5x - (a^2 + a - 6) = 0$.

OR

Divide 27 into two parts such that the sum of their reciprocals is $\frac{3}{20}$.

SECTION – D

32 The angles of depression of the top and bottom of an 8 m tall building from top of a multi-storey building are 30° and 45°, respectively. Find the height of multi-storey building and distance between two buildings.

OR

Two poles of equal heights are standing opposite to each other on either side of a road, which is 80 m wide. From a point between them on the road, angles of elevation of their top are 60° and 30°. Find the height of the poles and distance of point from poles.

33 Draw the graphs of the pair of linear equations: $x + 2y = 5$ and $2x - 3y = -4$.

Also, find the points where the lines meet the X-axis.

OR

Seven times a two-digit number is equal to four times the number obtained by reversing the order of its digits. If the difference of the digits is 3, determine the number.

34 3cm , 4cm and 5cm are the lengths of the sides of a right triangle. A circle, of radius r, touches the sides of the triangle. Find r.

35 (i)Express the trigonometric ratio of sec A and tan A in terms of sin A.

(ii)Prove that $(Cosec\theta - cot\theta)^2 = \dfrac{1-cos\theta}{1+cos\theta}$

SECTION – E

36 Two brothers Ramesh and Pulkit were at home and have to reach School. Ramesh went to Library first to return a book and then reaches School directly whereas Pulkit went to Skate Park first to meet his friend and then reaches School.
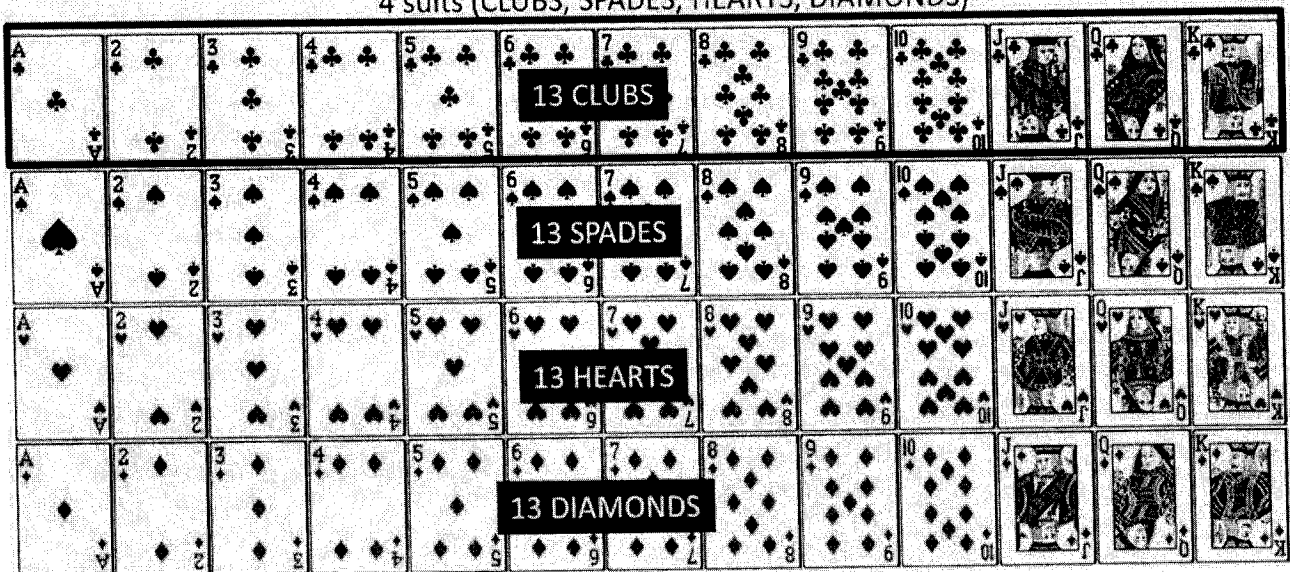(i) Find the coordinates of library, skate park, school and home
(ii) If both walks with same speed throughout their journey then who will be the first to reach the school. Justify your answer with proper working.
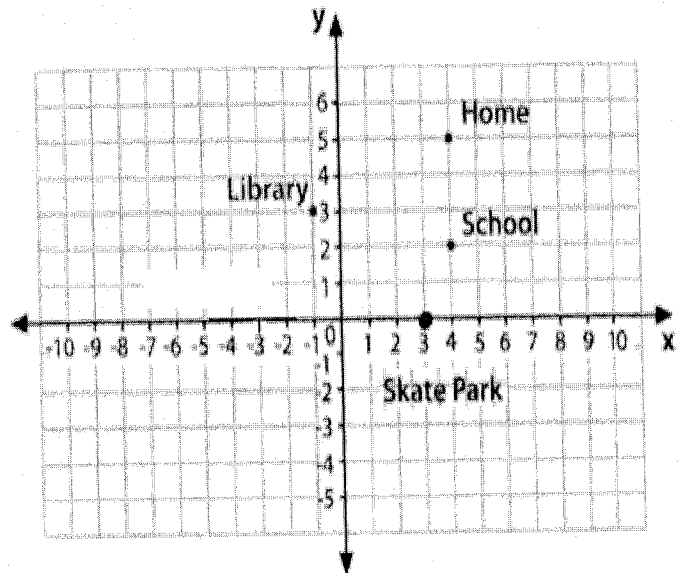
37 Mr. Jerry bought a pack of playing cards for his children to learn to play cards so that they can even play on line as well with their friends since they have no chances of moving out in the pandemic. But the children knew nothing about playing cards or different kinds of suits in it. So, Mr. Jerry thought of explaining both his children the different suits as well as colours of cards. So, he spread out all the cards in an organized manner and explained.
A standard deck of 52 playing cards consists of 4 suits.

Standard deck of 52 cards
4 suits (CLUBS, SPADES, HEARTS, DIAMONDS)

In the picture above, the four rows are the four suits. The clubs are all in the first row, followed by the spades, then the hearts, and last the diamonds. Among the 13 kinds, we find the numbers from 2 to 10, and four are other kinds. The A stands for ace, the J for jack, the Q for queen, and the K for king. The jack, queen, and king are often referred to as face cards.

Answer the following questions.

(i) The cards were shuffled and one card is drawn from the deck, what is the probability of getting a queen ?

(ii) What is the probability of getting the 9 of clubs?

(iii) What is the probability that the card drawn is a odd numbered black card?

OR

(iii) What is the probability that the card drawn has a number which is a multiple of 5?

38 A mathematics teacher of a school has taken his children to a science centre to visit the Science and Mathematics exhibition. When the students were visiting different stalls, one student, Rani, observed that some rectangular bars are arranged in ascending order as shown below. In the meantime, her teacher reached at the stall and asked some questions to Rani and the other students to verify whether the pattern is in AP or not? Just by observing the pattern shown below Rani and her friends were asked to answer the following questions. Find the correct answers for the same.
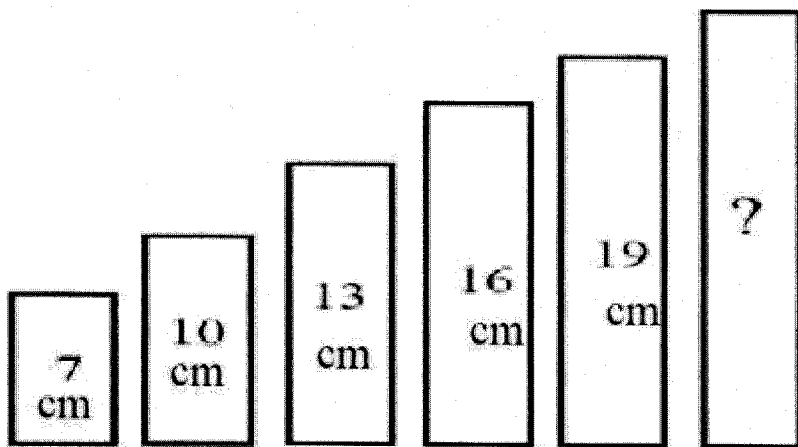
(i) What will be the height of 7th bar?

(ii) What will be the expression for the nth term of the above sequence?

(iii) If the sum of heights of first n rectangular bars is 282, then find the value of n.

OR

(iii) These rectangular bars are laid on the ground and joined end to end. Find the total length of first 11 bars in meters.

****END OF THE QUESTION PAPER****