Quadratic equations

Grade: 10   Ms. Atiya Farooqui

1. What is the general form of a quadratic equation?
2. When does the root of a quadratic equation exist?
3. What is the formula given by Sreedharacharya to find the roots of quadratic equation,
4. Without finding the roots of the following quadratic equations, predict on the nature of the root.

   (a) $3x^2 + 18x + 9 = 0$ (b) $2x^2 - 3x + 9 = 0$ (c) $2y^2 - 5y + 3 = 0$
5. Find the zeroes of the above given polynomials.
6. Solve the following quadratic equations using formula and also by completing the square method

(a) $2x^2 + 4x - 8 = 0$ (b) $2x^2 - 5x = -3$ (c) $x^2 - 5x + 5 = 0$

7. If the roots of the quadratic equations $-ax^2 + bx + c = 0$ are equal then show that $b^2 + 4ac=0$.

7. Find the value of 'k' for which the quadratic equation $kx^2 - 5x + k = 0$ have real roots.
8. If -4 is the root of the quadratic equation $x^2 + px - 4 = 0$ and $x^2 + px + k = 0$ has equal roots, find the value of k.
9. If one of the root of the quadratic equation $2x^2 - 3x + p = 0$ is 3, find the other root of the quadratic equation.Also find the value of p.
10. If one of the root of the quadratic equation $x^2 + px - 4 = 0$ is 4, find the product of its roots and the value of p.
11. For what value of k, does the given equation have real and equal roots?
$$(k + 1)x^2 - 2(k - 1)x + 1 = 0$$
12. Using quadratic formula ,solve the following quadratic equation for x:
$$x^2 - 2ax + (a^2 - b^2) = 0$$
13. If one of the root of the quadratic equation $2x^2 + px - 6 = 0$ is 2, Find the value of p.
14. For what value of k does $(k - 12)x^2 - 2(k - 12)x + 2 = 0$ have equal roots?
15. Solve $\dfrac{x+1}{x-1} + \dfrac{x-2}{x+2} = 3$
16. Solve for x:

(a) $36x^2 - 12ax + (a^2 - b^2) = 0$ (b) $16x^2 - 8a^2x + (a^4 - b^4) = 0$

(c) $9x^2 - 6ax + (a^2 - b^2) = 0$ (d) $x^2 - 4ax + (4a^2 - b^2) = 0$

17. Find the roots of the equations:

(a) $\dfrac{1}{x+3} + \dfrac{1}{2x-1} = \dfrac{11}{7x+9}$:x≠-3,$\dfrac{1}{2}$,$\dfrac{-9}{7}$

(b) $\dfrac{1}{x-2} + \dfrac{1}{x} = \dfrac{8}{2x+5}$:x≠-0,2,$\dfrac{-5}{2}$

(c) $\dfrac{1}{x+4} + \dfrac{1}{x-7} = \dfrac{11}{30}$:x≠-4,7

18. A motor boat whose speed in still water is 5 km/hr,takes 1 hour more to go 12 km upstream than to return downstream to the same spot. Find the speed of the stream.

19. Sum of the areas of two squares is 280 sq.m.If the difference of their perimeters is 24m, then find the sides of the two squares.

20. The age of the father is twice the square of the age his son. Eight years hence, the age of the father will be 4 years more than three times the age of his son. Find their present ages.

21. The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 30 m more than the shorter side, find the sides of the field.

22.A train travels 288 km at a uniform speed .If the speed had been 4 km/hr more ,it would have taken 1 hour less for the same journey. Find the speed of the train.

23. The sum of the areas of two squares is 640 sq. m.If the difference of their perimeters is 64 m, find the side of the two squares.

24. In a class test, the sum of Sameer's marks in Mathematics and English is 45.If he had 1 more mark in Mathematics and 1 less in English, the product of the marks would have been 500.Find the original marks obtained by Sameer in Mathematics and English separately.

25.In a class test ,the sum of Kamal's marks in Mathematics and English is 40.Had he 3 marks more in Mathematics and 4 marks less in English, the product of his marks would have been 360.Find the marks of two subjects separately.

26.A motor boat whose speed is 18 km/hr in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

27. In a class test, the sum of Sam's marks in Mathematics and English is 28.If he had 3 more mark in Mathematics and 4 marks less in English, the product of the marks would have been 180.Find the original marks obtained by Sam in Mathematics and English separately.

28. The hypotenuse of a right-angled triangle is 1 cm more than twice the shortest side .If the third side is 2 cm less than the hypotenuse, find the sides of the triangle.

29. A passenger train takes 2 hour less for a journey of 300 miff its speed is increased by 5 km/hr from its usual speed .Find its usual speed.

30. The numerator of a fraction is one less than its denominator. If three is added to each numerator and denominator, the fraction is increased by $\dfrac{3}{10}$.Find the fraction.

31. The difference of squares of two natural numbers is 45.The square of the smaller number is four times the larger number. Find the numbers.

32.A train travels a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km an hour, the journey would have taken two hours less. Find the original speed of the train.

33. A train covers a distance of 90 km at a uniform speed .Had the speed been 15 km/hr. more ,it would have taken 30 minutes less for the journey. Find the original speed of the train.

34. A two -digit number is such that the product of its digits is 18.When 63 is subtracted from the number, the digits interchange their places. Find the number.

35. A number consist of 2-digit whose product is 18. When 27 is subtracted from the number, the digit change their places. Find the number.

Grade: 10   **Arithmetic Progressions**

1 mark questions

1. Find the next three terms of the AP: $\sqrt{2}$,$\sqrt{8}$, $\sqrt{18}$ ………..
2. Find the next three terms of the AP: $\sqrt{8}$,$\sqrt{18}$, $\sqrt{32}$ ………..
3. Which term in AP: 14, 11, 8……..is -1?
4. Which term in AP: 21, 18, 15……… is zero?
5. The nth term of an AP is 6n+2.Find the common difference.
6. The nth term of an AP is 7-4n.Find the common difference.
7. The first term of AP is p and the common difference is q. Find the 10th term.
8. (a) The nth term is (3n-2), find the common difference.
   (b)Write the common difference of an AP, whose n^{th} term is 3n+5.
9. The nth term is (7n-5), find the first term.
10. The first term of AP is 'a' and common difference is 'd', find the nth term.
11. What is the sum of first n natural numbers?

3 mark questions

12. Determine the AP whose 3rd term is 5 and 7th term is 9.
13. If the 7th term of an AP is $\dfrac{1}{9}$ and 9th term is $\dfrac{1}{7}$, find its 36th term.
14. Which term of the AP: 21, 18, 15…….., is -81?
15. Which term of the AP: 50, 55, 60……is 255.
16. Which term of the AP: 3, 15, 27, 39……will be 132 more than its 54th term?
17. How may multiples of 4 lie between 10 and 250?
18. How many term three-digit numbers are divisible by 7?
19. An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.
20. Find the sum of first 22 terms of an AP in which d=7 and 22nd term is 149.
21. Find the sum of first 51 terms of an AP whose second and third term is 14 and 18.
22. How many terms of the AP: 24, 21, 18, must be taken so that their sum is 78?
23. How many terms of the AP: 9, 17, 25, must be taken to give a sum of 636?
24. Find the sum of the first 40 positive integers divisible by 6.
25. The sum of 5th term and 9th term of an AP is 72 and the sum of 7th term and 12th term is 97. Find the AP.
26. Find the sum of series 103+101+99+…..+49.
27. Find the sum of AP in -5+ (-8) + (-11) +……. + (-230).
28. Determine the AP whose 3rd term is 16 and 7th term exceeds the 5th term by 12.
29. Find the sum of all multiples of 7 lying between 500 and 900.
30. If 9th term of an AP is zero, prove that its 29th term is double of its 19th term.
31. The value of the middlemost term(s) of the AP: -11,-7,-3,………49.
32. For what values of p are 2p+1, 13 and 5p-3 three consecutive terms of an AP
33. For what values of p are 2p-1, 7 and 3p three consecutive terms of an AP.
34. Write the value of x for which x+2, 2x, 2x+3 are three consecutive terms of an AP.

4 marks question

35. The first term of an AP is -7 and the common difference 5, find its 18th term and general term.
36. If sum of n terms of an AP is $S_n = 2n^2 + 5$, then prove that a_n = 8-n

37. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row and 18 in the next row and so on as shown in fig below. In how many rows are the 200 logs placed and how many logs are there in the top most rows?
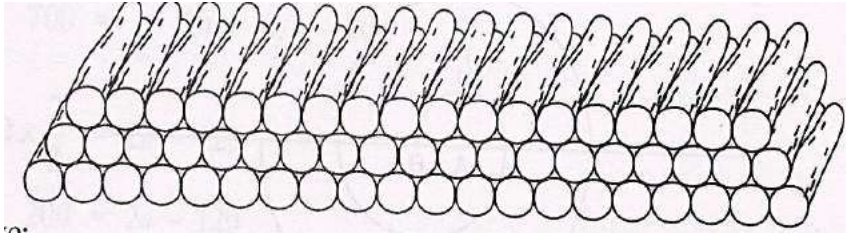
38. In the potato race, bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3m apart in the straight line. There are ten potatoes in the line (in figure).A competitor starts from the bucket ,picks up the nearest potato, runs to the bucket to drop it in ,and she continues in the same way until all the potatoes are in
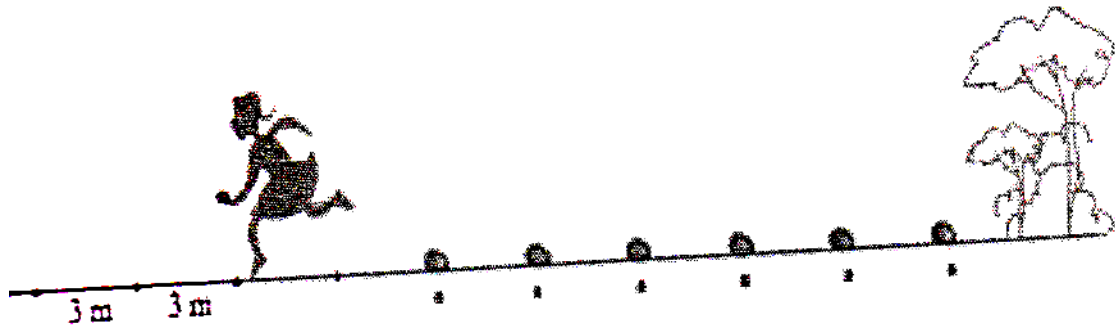
the bucket .What is the total distance (in metres) the competitor has to run?

39. In an A.P., the first term is 25, n^{th} is -17 and the sum of the first n terms is 60.Find 'n' and 'd' the common difference.

40. In an A.P., the first term is 8, n^{th} is 33 and the sum of the first n terms is 123.Find 'n' and 'd' the common difference.

41. For what value of n are the nth terms of term of two A.P.'s 63,65,67,……..and 3,10,17,…..equal .

APPLICATIONS OF TRIGONOMETRY

1. A tree breaks due to storm and the broken part bends so that top of the tree touches the ground making an angle 30^0 with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m, find the height of the tree.

2. A tree breaks due to storm and the broken part bends so that top of the tree touches the ground making an angle 45^0 with it. The distance between the foot of the tree to the point where the top touches the ground is 9 find the height of the tree.

3. A tree breaks due to storm and the broken part bends so that top of the tree touches the ground making an angle 60^0 with it. The distance between the foot of the tree to the point where the top touches the ground is 10m.Find the height of the tree.

4. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30^0 to 60^0 as he walks towards the building. Find the distance he walked towards the building.

5. A statue 1.6m tall stands on the top of pedestal. From a point on ground, the angle of elevation of the top of a statue is 60^0 and from the same point the angle of elevation of the top of pedestal is 45^0. Find the height of the pedestal.

6. As observed from the top of a 150 m tall lighthouse, the angles of depression of the two ships approaching it are 30^0 and 45^0. If one ship is directly behind the other, find the distance between the two ships.

7. The angles of depression of two ships from the top of a lighthouse and on the same side are found to be 45^0 and 30^0 respectively. If the ships are 200 m apart, find the height of the light house.

8. As observed from the top of a 75 m tall lighthouse from the sea-level, the angles of depression of the two ships approaching it are 30^0 and 45^0. If one ship is directly behind the other, find the distance between the two ships.

9. An observer 1.5 m tall is 28.5 m away from a chimney. The angle of elevation of the top of the chimney from her eyes is 450. What is the height of the chimney?

10. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower in the same straight line with it are complementary. Prove that the height of the tower is 6 m.

11. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30^0 and 45^0 respectively. If the bridge is at a height of 3 m from a bank, find the width of the river.

12. An angle of depression of the top and bottom of an 8 meter tall building from the top of a multi-storeyed building is 30° and 45° respectively. Find the height of the multi-storeyed building and the distance between the two buildings.

13. The shadow of a tower standing on a level ground is found to be 40 m long and sun's altitude is 30^0 than when it is 60^0 . Find the height of the tower.

14. On a horizontal plane there is vertical tower with a flag pole on the top of the tower. At a point 9 m away from the foot of the tower the angle of elevation of the top and the bottom of the flagpole are 60° and 30° respectively. Find the height of the tower and the flagpole mounted on it.

15. The horizontal distance between the poles is 15 m. the angle of depression off the top of the first pole as seen from the top of the second pole is 30° .if the height of the second pole is 24 meters find the height of the first pole.

16. A tower $100\sqrt{3}$ m high. Find the angle of elevation if it's top from a point 100 m away from the foot.

17. The angle of elevation of the top of a tower from a point on the ground which is 30 m away from the foot of the tower is 30°. Find the height of the tower

18. A circus artist is climbing from the ground along a rope stretched from the top of the vertical pole and tied to the ground .The height of the pole is 12 m and the angle made by the rope with the ground is 30° .Calculate the distance covered by the artist in climbing to the top of the pole.

19. A bridge across a river makes an angle of 45° with the river bank. If the length of the bridge across the river is 150 m find the width of the river.

20. A tree 12m high is broken by the wind in such a way that its top touches the ground and makes an angle of 60° with the ground. At what height from the bottom of the tree is broken by the wind.

21. A 1.2 m tall girl spots a balloon moving with the wind in the horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60°. After some time the angle of elevation reduces to 30°.Find the distance travelled by the values during the interval.

22. Two pillars of equal height on either side of the road which is 100 m wide. the angles of elevation of the top of the pillars are 60° and 30° at the point on the road between the pillars. Find the position of the point between the pillar and height of each pillar.

23. A man on the top of a vertical tower observes a car moving at uniform speed coming directly towards it, if it takes 12 minutes for the angle of depression to change from 30° to 45°, how soon after this, will the car reach the tower.

24. A straight highway leads to the foot of a tower. A man standing on the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. 6 seconds later, the angle of depression of the car is found to be 60°, Find the time taken by the car to reach the foot of the tower from this.

25. An airplane at an altitude of 200m observes the angle of depression on opposite sides of the two banks of river to be 45° and 60°. Find the breadth of the river.

26. From a window 15 meter high above the ground in a street, the angle of elevation and depression of the top and the foot of another house on the opposite side of the street are 30° and 45° respectively show that the height of the opposite house is 23.66 with it.

27. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30^0 to 60^0 as he walks towards the building. Find the distance he walked towards the building.

28. A 1.6 m tall girl stands at a distance of 3.2m from a lamp-post and cast a shadow of 4.8m on the ground. Find the height of the lamp-post.

29. A TV tower stands vertically on the bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the Tower is 60°. From another point 20 m away from this point on the line joining the points to the foot of the tower, the angle of elevation of the top of the Tower is 30°. Find the height of the tower and the width of the canal.

30. .An airplane at an altitude of 1200m find that two ships are sailing towards it in the same direction. The angle of depression of the ships as observed from the airplane are 60° and 30° respectively. Find the distance between the two ships

31. The angle of elevation of the top of a hill from foot of a tower is 60° and the angle of elevation of the top of the tower from the foot the hill is 30°. If tower is 50m high, then find the height of the hill.

32. The angle of elevation of an airplane from a point on the ground is 45°. After flight for 15seconds the elevation changes to 30°. If the airplane is flying at a height of 3000 m. find the speed of the airplane.
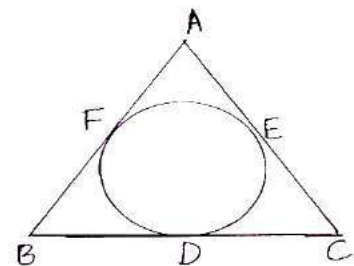
Circles

1. A circle touches the sides of a quadrilateral ABCD at P, Q, R and S respectively. Show that the angles subtended at the centre by a pair of opposite sides are supplementary. (4m)
2. Prove that the segment joining the points of contact of two parallel tangents passes through the center. (3m)
3. In two concentric circles, prove that a chord of larger circle which is tangent to the smaller circle is bisected at the point of contact.
4. Show that tangent lines at the end of a diameter of a circle are parallel. (3m)
5. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle which is tangent to the smaller circle. (4m)
6. Prove that the angle between the two tangents drawn from an external point to the circle is supplementary to the angle subtended by the line segments joining the point of contact. (4m)
7. In (fig), l and m are two parallel tangents at A and B.The tangents at C makes an intercept DE between l and m. Prove that $\angle DFE = 90^0$. (4m)
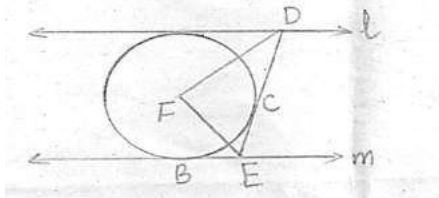
8. ABCD is a quadrilateral (fig) such that $\angle D = 90^0$.
A circle C (O, r) touches the sides AB, BC, CD and DA at P, Q, R and S respectively .if BC = 38 cm, CD=25 cm and BP = 27 cm, find r. (4m)
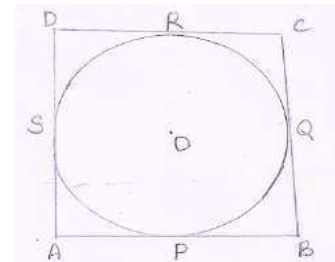
9. The radius of the in circle of a triangle(fig) is 4 cm
And the segments into which one side is divided by the Points of contact are 6 cm and 8 cm.
Determine the other two sides of the triangle. (4m)

10. A circle is inscribed in a ABC having sides 8 cm, 10 cm and 12 cm (fig) .Find the AN, BL, CM. (4m)
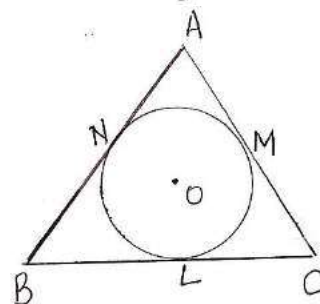
11. A circle touches all the four sides of a quadrilateral ABCD. Prove that AB + CD = BC + DA.(3m)
12. If all the sides of a parallelogram touch a circle , show that the parallelogram is a rhombus.(4m)
13. In fig, two circles touch each other at the point C.
Prove that the common tangents to the circles at C,
Bisect the common tangent at P and Q. (3m)
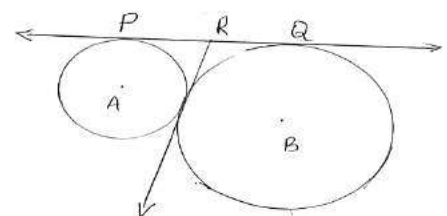
14. in (fig), inscribed in a ABC touches the
Sides BC, AC and AB at D, E and F respectively
Show that AF+BD+CE=AE+BF+CD = $\frac{1}{2}$(PERIMETER $\triangle$ABC) (4m)
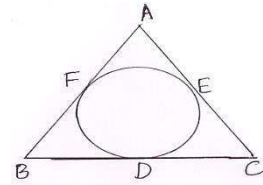
15. Two tangents TP and TQ are drawn to the circle
With center O from an external point T .Prove that $\angle PTQ = 2\angle OPQ$ (4m)
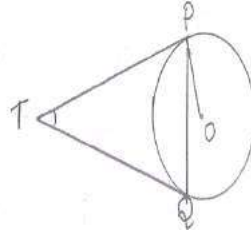
16. Two concentric circles of of radii 13 cm and 5cm .Find the length of the chord of the larger circle which touches the smaller circle. (3m)

17. A circle touching the side BC at P and touching AB and AC produced at Q and R respectively. Prove that AQ = $\frac{1}{2}$(perimeter of $\triangle$ ABC) (3m)
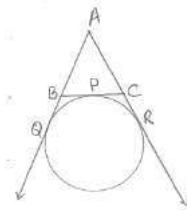
18. in the length of the tangent drawn to a circle with radius 5 cm, from a point 13 cm away from the center of the circle. (3m)
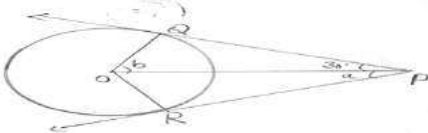
19. In the fig, a circle touches the sides BC of $\triangle$ ABC at D and AB and AC produced at Q and R respectively. If AQ = 9 cm then find perimeter of $\triangle$ ABC. **(4m)**
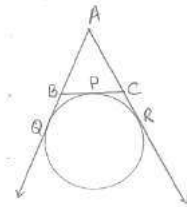
20. In the given fig, PA and PA are tangents drawn from point P to the circle with center O such that $\angle OBA= 60^0$ then find $\angle APB$. (4m)
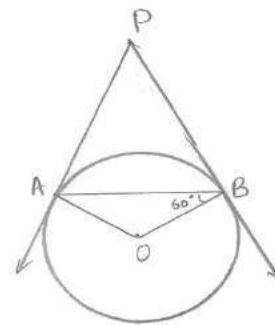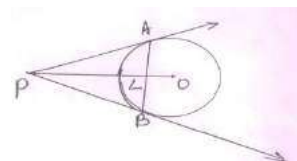
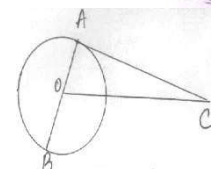21. In the fig, PQ and PR are tangent, find 'a' and 'b' (4m)

22. In the given fig AB is a chord of a circle, such that

AB = 16 cm and radius of the circle is 10 cm.
Tangents at A and B intersect each other at P.
Find the length PA. (3m)

23. In the fig, AOB is the diameter of the circle with
Centre O, AC is the tangent to the circle at A.
If $\angle BOC= 130^0$, find $\angle ACO$. (3m)

Constructions

1. Draw line segment 7.6 cm and divide it in the ratio 5: 8. Measure the two parts.

2. Construct circumcircle for a triangle of sides 4cm 5cm and 6cm

3. Construct a circumcircle of a triangle of side 5 cm 6 cm and 7 cm

4. Construct a circumcircle of a triangle of side BC = 7 cm, $\angle B = 45^0$ and $\angle A = 105^0$.

5. Draw right angle triangle in which sides are of length 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ the corresponding sides of the given triangle.

6. Draw a triangle ABC with side BC = 6 cm, AB= 5 cm and $\angle ABC = 60^0$. Then construct a triangle whose sides are $\frac{3}{4}$ to the corresponding sides of triangle ABC.

7.   Construct a triangle of sides 4cm .5cm and 6cm and then a triangle similar to it whose sides are two- third of the corresponding sides of the first triangle.

8.   Construct a triangle of side 5 cm, 6 cm and 7 cm and then another triangle whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

9. Draw a circle of radius 6 cm. From a point 10 cm away from its center, construct a pair of tangents to the circle and measure the length.

10. Construct a tangent to a circle of radius 4 cm from a point on a concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

11. Draw circle of radius 3 cm. Take two points P and on one of its extended diameter is at a distance of 7 cm from the center. Draw tangent to the circle from these two points P and Q.

12. Draw a pair of tangents to a circle of radius 5cm which are inclined at each other at an angle of 60°.

13. Let ABC right angle triangle in which AB=6 cm, BC= 8 cm and $\angle B = 90^0$. BD is perpendicular from B on AC. The circle through B, C, and D is drawn. Construct the tangents from A to the circle.

14. Draw a circle with the help of a round bangle. Take a point outside the circle. Construct a pair of tangents from this point to the circle.

15. Draw a line segment of length 5 cm and divide it in the ratio 3 :2

1 MARK QUESTIONS

1. What is the perimeter of a circle with radius r?
2. What is area of a circle with radius r?
3. What is area of a sector the angle subtended at the centre is θ and r is the radius of the circle?
4. What is the length of an arc l of a circle with radius r an angle subtended at the centre θ?
5. If the perimeter and area of the circle are numerically equal, then the radius of the circle is

    (a) 2 units   (b) Π (c) 4 units   (d) 7 units

6. What is the area of a quadrant of a circle with radius R units?
7. Area of a sector of angle p of a circle with radius R is

    (a) $\frac{P}{180} \times 2\Pi R$ (b) $\frac{P}{180} \times \Pi R^2$

    (c) $\frac{P}{360} \times 2\Pi R$ (d) $\frac{P}{360} \times \Pi R^2$

8. The length of a minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes

9. Find the circumference of a circle with radius 8.4 cm.

10. Find the area of a circle whose circumference is 22cm.

3 MARK QUESTIONS

11. The two circles of radii 19 cm and 9 cm respectively. Find the radius of the circle which has circumference equal to c the sum of the circumference of the two circles.

12 The radii of two circles are 8cm and 6cm respectively. Find the radius of the circle having areas equal to the sum of the areas of two circles.

13. (i) The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour?

(ii) A wheel has diameter 84 cm. Find how many complete revolutions must it make to cover 792 metres.

(iii) A bicycle wheel makes 5000 revolutions in moving 11 km. find the diameter of the wheel.

14. Find the area of a sector and length of an arc of the following circles

    (a) with radius 21 cm and angle subtended by the arc is 60°
    (b) With radius 6 cm and angle of the sector is 60°.

15. Find the area of the quadrant of a circle whose circumference is 22cm.

16. Find the area of a sector of a circle whose radius is 14 cm and angle of the sector is 45^0.

4 mark questions

17. In a circle of radius 21 cm and an arc subtends an angle of 60° at the centre. Find

(i) Length of the arc

(ii) Area of the sector formed by the arc

(iii) Area of the segment formed by the corresponding chord.

18. A chord of a circle of radius 10cm subtends a right angle at the centre. Find area of the corresponding

    (i) Minor segment   (ii) major sector   ($\Pi = 3.14$)

19. (i) AB and CD are respectively arcs of two concentric circles of radii 21 cm and 7cm with centre O. If ∠AOB=30° find the area of the shaded region in the given figure below.
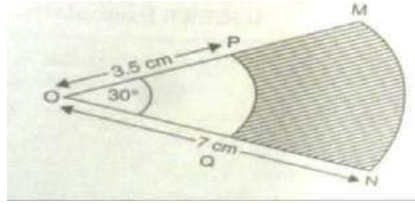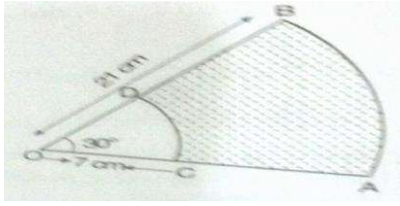
(ii) In the figure given above, MN and PQ are the arcs of two concentric circles of radii 7 cm and 3.5 cm respectively and ∟MON=30⁰. Find the area of the shaded region.

20(i) PQRS is a diameter of a circle of radius 6 cm. The length of PQ, QR and RS are equal. Semi circles are drawn on PQ and QS as diameter (as shown in figure given below).Find the perimeter and the area of the shaded region
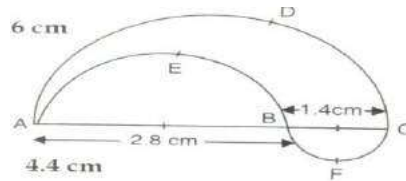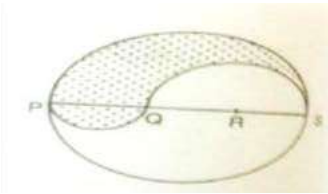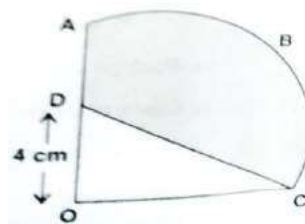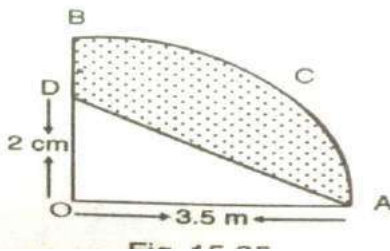

(ii) In the figure given above, find the perimeter of the shaded region where ADC, AEB and BFC are semicircles of diameter AC, AB and BC respectively.

21 (i) Paper is in the form of a rectangle ABCD in which AB = 20 cm and BC =14 cm. A semi-circular portion with BC as diameter is cut off, find the area of the remaining part.

(ii) Sheet of paper in the form of a rectangle ABCD in which AB = 40 cm and BC = 28 cm. A semi-circular portion with BC as diameter is cut off. Find the area of the remaining part.

22 (i) In the adjoining figure, AOBCA represents a quadrant of a circle of radius 3.5 cm with centre O. Calculate the area of the shaded portion .

(ii) In the figure given above, OABC is a quadrant of a circle of radius 7 cm. If OD = 4 cm, find the area of the shaded region.

23. ABCP is a quadrant of a circle of radius 14 cm.
With AC as diameter, a semicircle is drawn.
Find the area of the shaded region.
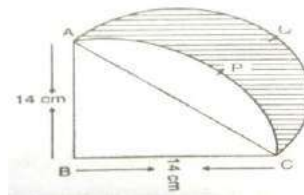
24 (i) the area of an equilateral triangles is 49√3 sq. cm.
Taking each angular point at centre, a circle is described with
Radius equal to half the length of the side of a triangle as shown
In figure above. Find the area of the triangle not included in
The circle.
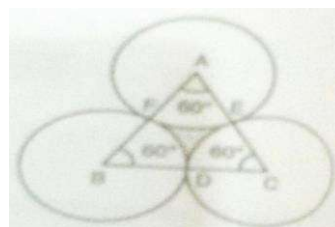
(ii) The area of an equilateral triangle is 1732.05 sq.cm. About each angular point as centre, a circle is described with radius equal to half the length of the side of a triangle. Find the area of the triangle not included in the circles.($\sqrt{3}$ = 1.732) ($\Pi = 3.14$)

25. ABCD is a field in the shape of a trapezium.
AB || DC and $\angle ABC = 90^0$ in which AB||DC From this field,
 quadrant BEFC is removed, DC = BC = 4.2 cm.
Calculate the area of the remaining field.

26. In the figure ABCD is a square of side 14 cm.
With centres A, B, C and D four circles are drawn such
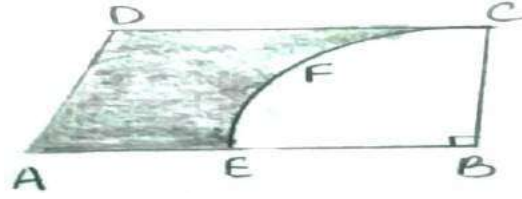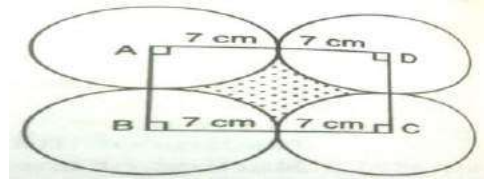that each circle touches externally two of the remaining
three circles. Find the area of the shaded region.

27. Find the area of the shaded region, where a circular arc of
Radius 6 cm has been done with vertex O of an equilateral
Triangle OAB of side 12cm at centre.
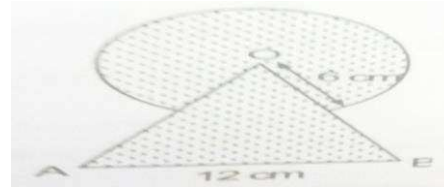
28. In the figure given below, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA= 7 cm, find the area of the shaded region
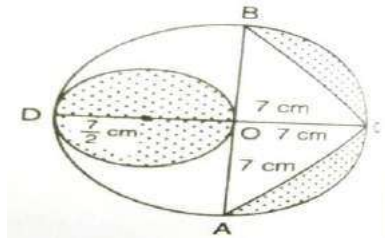
29. Find the area of shaded region as shown in figure, if PQ =24 cm,
 PR= 7 cm and O is the centre of the circle.
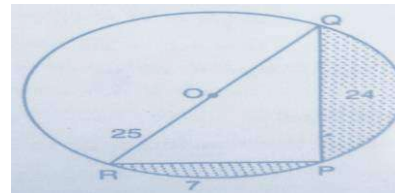
30. In the figure given below ABC is a right angled at A.
Find the area of the shaded region,
 If AB= 6 cm, BC =10 cm and I is a centre of incircle of triangle ABC.
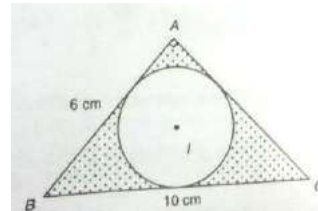
31. In a figure, arc are Drawn by taking A, B and C of an equilateral triangle of side 10 cm to intersect the sides BC, AC and AB b at their respective midpoints D E and F. Find the area of the shaded regi
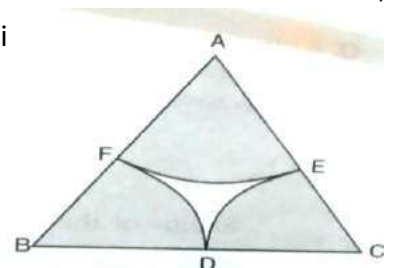
1. A toy is the shape of a cone of radius 'r' units mounted on a hemisphere of same radius .The total height of the toy is 'h' units. Find the height of the cone

2. Two cubes each of volume a^3 cubic unit are joined end to end. Find the surface area of the resulting cuboid.

3. A cone and a cylinder are of same radius 'r' unit and same height 'H'. What is the ratio volume of cylinder to that of a cone?

4. If two identical solid cubes of side 'a' units are joined end to end, then the total surface area of the resulting cuboid is $12a^2$. Is it true?

5. If the length breadth and height of a solid cube are in the ratio 4:3:2 and the total surface area is 832 sq.cm. Find its volume.

6. A vessel is in the form of hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 'r' units and the total height is 'h' units .Find the inner surface of the vessel.

7. Two cubes each of volume 'a^{3}' cubic unit are joined end to end. Find the surface area of the resulting cuboid.

8. A cubical block of side 'a' units is surmounted by a hemisphere. What is the greatest diameter of the hemisphere can have? Find the surface area of the solid.

9. A hemispherical depression is cut from one face of a cubical wooden block such that the radius r of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

    4 mark questions

10. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends (as shown in fig below). The length of the entire capsule is 14 mm and the diameter of the capsule is 5mm.Find its surface area.

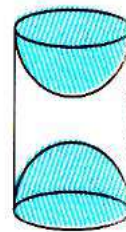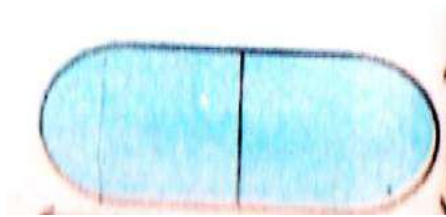11. A wooden article was made by scooping out a hemisphere from each of, its end of a cylinder (as shown in fig above). If the height of the cylinder is 10 CM, and its base radius is 3.5cm, find the surface area of the article.

12. Rashid got a playing top (lattu) as his birthday present, which surprisingly had to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere (as shown in fig). The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour.

13. Solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi=3.14$).

14. A gulab jamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamun, each shaped like a cylinder with two hemispherical ends with length 5cm and diameter 2.8 cm.
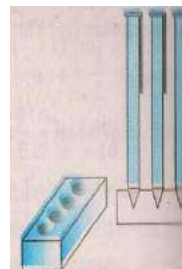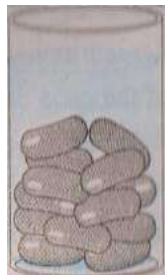
15. A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5cm.The radius of each of the depression is 0.5cm and the depth is 1.4cm.Find the volume of the entire stand.

16. Salma's house has an overhead tank in the same of a cylinder. This is filled by pumping water from an underground cuboidal sump whose dimensions 1.57m by 1.44m by 95 cm. The overhead tank has a radius 60 cm and height is

95cm. Find the height of water left in the sump after the overhead tank has been completely filled with water from the sump which had been full. Compare the capacity of the tank with that of the sump.(π=3.14).

17. Metallic spheres of radii 6cm, 8 cm and 10 cm respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.

18. A well of diameter 3m dug 14m deep. The earth taken out it after digging it is evenly all around it in the shape of a circular ring of width 4m to for an embankment. Find the height of the embankment.

19. A 20 m deep well with diameter 7m is dug and the earth from the game is evenly spread out to form a platform 22 m by 14 find the height of the platform.

20. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream if the ice cream is to be filled in two poles of height 12 cm and diameter 6 cm having a hemispherical shape on the top .Find the number of such cones which can be filled with ice cream.

21. If the length breadth and height of a solid cube are in the ratio 4:3:2 and the total surface area is 832 sq.cm.Find its volume.

22. The largest possible sphere is carved out of a wooden solid cube of side 7 cm find the volume of the wood left.

23.   Prema empties a cylindrical bucket full of sand of base radius 18 cm and height 32cm on the floor to form a conical heap of sand is the height of this conical heap is 24 cm then find its not height correct upto 1 decimal place

24. A cylinder a cone and a hemisphere have the same value for radius and height find the ratio of their volumes

25. If two identical solid cubes of side a joined end to end find the total surface area of the resulting cuboid

26. An object is formed by a solid cone of base radius R and height H is placed over a solid cylinder having the same base radius R and height H as that of a cone then the curved surface area of the shape of the object.

27. A cylinder and a cone are of same base radius and same height finds the ratio of the volumes of the cylinder to that of a cone.

28. A figure shows a decorative box which is made of two solids a cube and a hemisphere the base of the block is cube with edge 5 cm and the hemisphere is fixed on the top has a diameter 4.2 cm find the total surface area of the block .
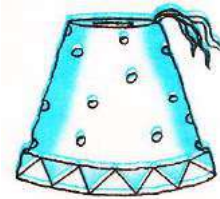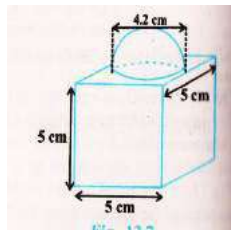
29.A FEZ, the Turkish cap is in the shape of a frustum of a cone (as shown in fig above) .If the radius on the open side is 10 cm, the radius at the upper base is 4 cm and its slant height is 15 cm, find the area of material used for making it.

1. What are the measures of central tendencies?   (1m)
2. Explain the formula to compute mean by step deviation method.   (3m)
3. Explain the formula to compute mode for grouped data.   (3m)
4. Explain the formula to explain median for grouped data.   (3m)
5. What is the empirical relation between mean, median and mode?   (1m)
6. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household:

Family size	1-3	3-5	5-7	7-9	9-11
No. of families	7	8	2	2	1

Identify the modal class for the above distribution.   (1m)

7. Find the mean and mode of the following data   (4m)

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	5	10	18	30	20	12	5

9. Find the mean and median of the following data   (4m)

Class	0-10	10-20	20-30	30-40	40-50	total
Frequency	8	16	36	34	6	100

10. Find the value of x and y if the median of the following data is 52.5 and the total frequency is 100.   (4m)

Class interval	Frequency
0-10	2
10-20	5
20-30	x
30-40	12
40-50	17
50-60	20
60-70	y
70-80	9
80-90	7
90-100	4

11. The following table gives the daily income of 50 workers of a factory. Draw both types (less than type and greater than type) OGIVE and determine the median of the data. (4m)

Daily income (in rs)	Number of workers
100-120	12
120-140	14
140-160	8
160-180	6
180-200	10

12. The mean of the following distribution is 62.8 Find the missing x. (3m)

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	8	x	12	7	8

13. Find the mode from the following distribution

Class interval	Frequency
0-10	7
10-20	14
20-30	13
30-40	12
40-50	20
50-60	11
60-70	15
70-80	8

14. Calculate the median (4m)

Marks	No. of students
0-10	5
10-30	15
30-60	30
60-80	8
80-100	2

15. Find out the mode from the following distribution (4m)

x	10-15	15-20	20-25	25-30	30-35	35-40	total
f	30	45	75	35	25	15	225

16. The arithmetic mean of the following frequency distribution is 53. Find the value of p. (4m)

Class	0-20	20-40	40-60	60-80	80-100
frequency	15	18	21	p	17

17. The arithmetic mean of the following frequency distribution is 53. Find the value of p.

Class	0-20	20-40	40-60	60-80	80-100
frequency	17	28	p	24	19

18. The arithmetic mean of the following frequency distribution is 53. Find the value of p.

Class	0-20	20-40	40-60	60-80	80-100
frequency	8	15	30	P	5

19. Find the median from the following data

Marks	No. of students
0-10	5
10-20	8
20-30	20
30-40	15
40-50	7
50-60	5

20. The arithmetic mean of the following frequency distribution is 50. Find the value of p.

Class	0-20	20-40	40-60	60-80	80-100
frequency	17	p	32	24	19

21 The arithmetic mean of the following frequency distribution is 25. Find the value of p.

Class	0-10	10-20	20-30	30-40	40-50
frequency	5	18	15	p	6

22. The arithmetic mean of the following frequency distribution is 54.5. Find the value of p.

Class	0-20	20-40	40-60	60-80	80-100
frequency	8	15	30	P	5

23. Find the mode of the following distribution.

x	100-110	110-120	120-130	130-140	140-150	150-160	160-170
f	4	6	20	32	33	8	2

24. The abscissa of the point of intersection of the 'less than type' and of the 'more than type' cumulative frequency curve of grouped data gives its (1m)

(a) mode (b) mean (c) median (d) none

25. Write the median class of the following distribution (4m)

CLASS	FREQUENCY
0-10	4
10-20	4
20-30	8
30-40	10
40-50	12
50-60	8
60-70	4

26. What measure of central tendency is obtained graphically as the x-coordinate of the point of intersection of the two ogives for grouped data? (1m)

27. The following distribution gives the daily income of 50 workers of a factory. (4m)

Daily income (in Rs.)	100-120	120-140	140-160	160-180	180-200
No. of workers	12	14	8	6	10

Convert the distribution above to a less than type cumulative frequency distribution, greater than type cumulative frequency distribution, and draw its ogive.

28. During the medical check-up of 35 students of a class, their weights were recorded as follows (4m)

Weight (in kg)	No. of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Draw a less than type for the given data .Hence obtain the median weight from the graph and verify the result by using the formula.

29. Find the mean, median and mode for the following distribution (3m)

21,32,28,14,11,4,36,44,54,23,21,16,25,11,4,21,32,28,14,11.

30. The annual profits earned by 30 shops of a shopping complex in a locality give rise to the following distribution (4m)

Profit (in lakhs in Rs)	No. of shops
More than or equal to 5	30
More than or equal to 10	28
More than or equal to 15	16
More than or equal to 20	14
More than or equal to 25	10
More than or equal to 30	7
More than or equal to 35	3

Draw both ogives for the above data and hence obtain the median.

Probability

1 Mark Questions

1. What is the probability of an uncertain event?
2. What is the empirical formula of 'probability of an event E'?
3. If P (E) =0.05.what is probability of 'not E'? Match?
4. Why is tossing of coin considered to be a fair means of deciding which team should get the ball at the beginning of a football match?
5. What is the number of possible outcomes when three coins are tossed simultaneously?
6. What is the number of possible outcomes when two dice are tossed simultaneously?
7. A die is thrown once find the probability of getting a prime number?
8. A die is thrown once find the probability of getting an even number?
9. A letter is chosen at random from English alphabet. find the probability that the letter chosen is a consonant
10. A letter is chosen randomly from English alphabet; find the probability that the letter chosen precedes G.
11. Cards each marked with of the numbers 6, 7, 8 ... 15 and placed in a box and mixed thoroughly point one card is drawn at random from the box. What is the probability of getting a card with number less than 10
12. A card is drawn from a well shuffled deck of 52 cards. What is the probability of getting a black king?
13. What is the probability that two different friends have different birthdays, if their birthday falls in a non-leap year?
14. From a well shuffled pack of cards a card is drawn at random. Find the probability of getting a black queen.
15. A box contains 3 blue, 2 white and 4 red marbles. If the marble is drawn at random from the box, what is the probability that it will not be a white marble?
16. A bag contains 4 red and 6 black balls. A ball is taken out of a bag at random. Find the probability of getting a black ball.
17. A die is thrown once. Find the probability of getting a number less than 3.
18. The probability of an event is greater than or equal to _____ and less than or equal to _____.
19. A die is thrown once. Find the probability of getting a number greater than 5.
20. Find the probability of obtaining 7 on a single toss of one die.
21. What is the sum of all possible elementary events of an experiment?

3 mark questions

22. A lot consists of 144 ball pens of which 20 are defective and the others are good.Noori will buy a pen if it is good, but will not buy if it is defective. The shopkeepers a pen at random and gives it to her. What is the probability that:
     (i) she will buy it   (ii) she will not buy it?

23. Cards bearing number 3 to 20 are placed in a bag and mixed thoroughly. A card is taken from the bag at random what is the probability that the number on the card taken out is an even number.
24. Two friends are born in the year 2000 what is the probability that they have the same birthday.
25. A bag contains cards marked with numbers 5 to 20. A card is drawn from a bag at random. Find the probability of getting the number which is a perfect square.
26. Two dice are thrown simultaneously. Find the probability of getting different numbers on the dice.
27. Two dice are thrown simultaneously. Find the probability of getting the same number on both the dice.
28. Cards with numbers 2 to 101 are placed in a box. A card is selected at random. Find the probability that the card has a cube number.
29. In a game of chance they is spinning of an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7,8 and they are equally likely outcomes. What is the probability that it will point at   (a) the number 7   (b) an odd number   (c) a number less than 9.
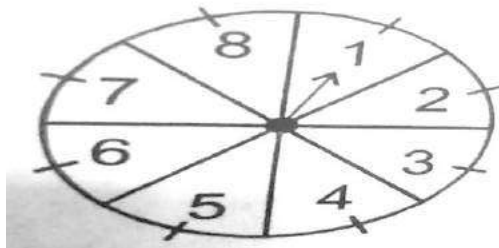
30. Two dice are thrown at the same time. Find the probability that the sum of the two numbers appearing on the top of the dice is more than 9.
31. A game contains tossing of one rupee coin 3 times and noting the outcome each time. Honey wins if all the tosses give the same result i.e.., three heads or three tails, and losers otherwise; calculate the probability that hanif will lose the game.
32. Find the probability that a number selected at random from numbers 3, 4, 5 ... 25 is prime.
33. The king, queen and jack of diamonds are removed from a pack of 52 cards and then the pack is well shuffled. A card is drawn from the remaining cards find the probability of getting a card of (a) diamonds (b) a Jack.
34. A bag contains 5 red, 4 blue and 3 Green balls. A ball is taken out of a bag at random. Find the probability that the selected ball is (a) red colour (b) Not of green colour card.
35. A card is drawn at random from a well shuffled deck of cards. Find the probability of drawing (a) a face card (b) a card which is neither a face card nor a red card.
36. A bag contains tickets, numbered 11, 12, 13... 29, 30. A ticket is taken out from the bag at random. Find the probability that the number on that ticket is:
    (a) a multiple of 7   (b) A number greater than 15 and a multiple of 5.

4 Mark Questions

37. A bag contains 4 red, 5 black and yellow balls. A ball is taken out at random. Find that the ball taken out of it (a) is yellow colour (b) not in red.

38. They are 40 students in class X: f 25 is girls and 15 are boys. The class teacher has to select one student as a class representative. She writes the name of the student on a separate card. The cards being identical and she puts these cards in a bag and stirs thoroughly. What is the probability that the name written on the card is the name of (a) a boy (b) a girl?

39. A bag contains 5 red balls and some blue balls. Is the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.

40. A box contains 12 balls out of which x are black. If one ball is drawn at random from a box, what is the probability that it will be a black ball? If 6 more red balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x.

41. Which of the following experiments are equally likely outcomes? Explain.
    (i) A driver attempts to start a car. The car start or does not start.
    (ii) Player attempts to shoot a basketball. She or he misses the shot.
    (iii)A trial is made to answer a true- false question. The answer is right or wrong.
    (iv) A baby is born. It is a boy or a girl.

42. Which of the following arguments are correct and which are not? Give reasons to your answer :
    (a) If two coins are tossed simultaneously they are three possible outcomes- Two heads, two tails or one of each. Therefore, for each of these outcomes, the probability is 1 / 3.
    (b) if a die is thrown, there are two possible outcomes- an odd number or even number. Therefore, the probability of getting an odd number is 1 / 2.

43. Complete the following table given below table

Event Sum on 2 dice	2	3	4	5	6	7	8	9	10	11	12
Probability	$\dfrac{1}{36}$						$\dfrac{5}{36}$				$\dfrac{1}{36}$

(a) A student argues that the 11 possible outcomes 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. Therefore, each of them has a probability of 1 / 11. Do you agree with this argument? Justify your answer.

44. Suppose you drop a die at random on a rectangular region 6 cm by 4cm as shown in figure what is the probability that it will land inside a circle of diameter 1 m?
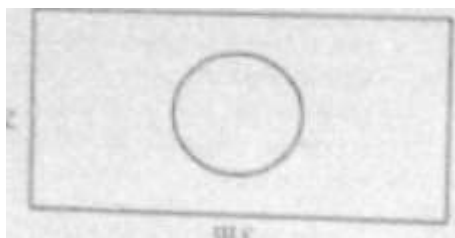
45. A child has a die whose 6 faces show the letters given below:
The die is thrown once. What is the probability of getting (a) A   (b) D?
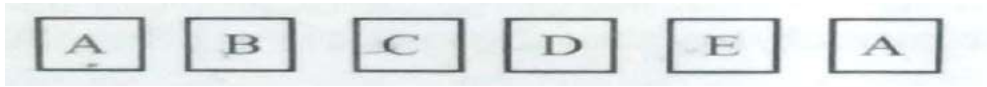
46. A box contains 90 disc which are numbered from 1 to 90 .If one does is drawn at random from the box, find the probability that it bears
(a) A two digit number   (b) perfect square   (c) a number divisible by 5.

47. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting:
 (a) King of red colour.   (b) A face card   (c) a red face card
 (d) A spade   (e) an ace   .   (f) A queen of diamonds.
 (g) An ace of red colour   (h) Jack of hearts

48. Five cards - the ten, jack comma queen king and ace of diamonds, are well shuffled with their faces downwards. One card is then pick up at random. What is the probability that the card is queen? If the queen drawn is put inside, what is the probability that the second card picked up is: (a) an ace   (b) a queen.

49. A die is thrown once. Find the probability of getting:
(a) A prime number   (b) on number line between 2 and 6
(c) An odd number   (d) even number.

50. A Kitty bank contains hundred 50 paisa coins, fifty 1 rupee coins, twenty 2 rupees coins and ten 5 rupees coins. if it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin will be a (a) 50 paisa coin and (b) will not be 5 rupees coin.

51. Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from the tank containing 5 male fishes and 8 female fishes. What is the probability that the fish taken out is a male fish?