

**Content enrichment workshop for TGT Mathematics at PM SHRI K V
No.1,Jallahalli(West),Bengaluru (08.07.2025 To 09.07.2025)**

1)Real Numbers

1. The decimal expansion of $\frac{22}{7}$ is
(a) Terminating
(b) Non-terminating and repeating
(c) Non-terminating and Non-repeating
(d) None of the above
2. HCF of 26 and 91 is:
(a) 15
(b) 13
(c) 19
(d) 11
- 3) Which of the following is not irrational?
(a) $(3 + \sqrt{7})$
(b) $(3 - \sqrt{7})$
(c) $(3 + \sqrt{7})(3 - \sqrt{7})$
(d) $3\sqrt{7}$
- 4)The multiplication of two irrational numbers is:
(a) irrational number
(b) rational number
(c) Maybe rational or irrational
(d) None
- 5.If p and q are integers and is represented in the form of p/q, then it is a:
(a) Whole number
(b) Rational number
(c) Natural number
(d) Even number
- 6.On a morning walk, three men step off together and their steps measure 54 cm, 60 cm and 48 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?
- 7.Express 140 as product of its prime factors.
8. Given that $\text{HCF}(306,657) = 9$, find $\text{LCM}(306,657)$.
9. Check whether 6 n can end with the digit 0 for any natural number .
- 10.Explain why $5 \times 12 \times 46 + 12$ is a composite number.
- 11.Prove that $\sqrt{3}$ is irrational.
- 12.Given that $\sqrt{5}$ is irrational. Prove that $7+3\sqrt{5}$ is irrational.
- 13.Find HCF and LCM of 12,60 and 90 using the prime factorisation method.
- 14.Three alarm clocks ring at intervals of 4, 12 and 20 minutes respectively. If they start ringing together, after how much time will they next ring together?
- 15.On a morning walk, three men step off together and their steps measure 54 cm, 60 cm and 48 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?

Ms.Sandhya Joshi

PM SHRI KV ASC & Centre

2)Polynomials

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is -3 , then the value of k is
(a) $\frac{4}{3}$ (b) $-\frac{4}{3}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$ Ans: (a) $(k - 1)x^2 + kx + 1$
One zero is -3 , so it must satisfy the equation and make it zero.
 $\therefore (k - 1)(-3)^2 + k(-3) + 1 = 0$
 $\Rightarrow 9k - 9 - 3k + 1 = 0$
 $\Rightarrow 6k - 8 = 0 \Rightarrow k = \frac{8}{6} = \frac{4}{3}$

- 6 3
2. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3 , then
 (a) $a = -7, b = -1$ (b) $a = 5, b = -1$ (c) $a = 2, b = -6$ (d) $a = 0, b = -6$

Ans: (d) $x^2 + (a + 1)x + b$
 $\because x = 2$ is a zero and $x = -3$ is another zero
 $\therefore (2)^2 + (a + 1)2 + b = 0$
 and $(-3)^2 + (a + 1)(-3) + b = 0$
 $\Rightarrow 4 + 2a + 2 + b = 0$ and $9 - 3a - 3 + b = 0$
 $\Rightarrow 2a + b = -6$... (i) and $-3a + b = -6$... (ii) Solving (i) and (ii), we get $5a = 0$
 $\Rightarrow a = 0$ and $b = -6$.

3. Zeroes of a polynomial $p(x)$ can be determined graphically. No. of zeroes of a polynomial is equal to no. of points where the graph of polynomial

- (a) intersects y-axis (b) intersects x-axis
 (c) intersects y-axis or intersects x-axis (d) none of these Ans: (b) Intersects x-axis

4. If graph of a polynomial $p(x)$ does not intersect the x-axis but intersects y-axis in one point, then no. of zeroes of the polynomial is equal to
 (a) 0 (b) 1 (c) 0 or 1 (d) none of these Ans : (a) 0

5. If $p(x) = ax^2 + bx + c$ and $a + b + c = 0$, then one zero is
 (a) $-b/a$ (b) c/a (c) b/c (d) none of these

Ans: (b) $p(1) = 0$; $a(1)^2 + b(1) + c = 0 \Rightarrow a + b + c = 0 \therefore$ one zero (a) = 1
 $\alpha\beta$ = product of zeroes = c/a
 $\Rightarrow 1 \cdot \beta = c/a \Rightarrow \beta = c/a$
 $\therefore$ zeroes are 1 and c/a

6. The number of polynomials having zeroes as -2 and 5 is
 (a) 1 (b) 2 (c) 3 (d) more than 3

Ans: (d) $\because x^2 - 3x - 10, 2x^2 - 6x - 20,$
 have zeroes -2 and 5 .

$$\frac{1}{2}x^2 - 3x - 5, \frac{3}{2}x^2 - 9x - 30 \text{ etc.,}$$

7. The quadratic polynomial, the sum of whose zeroes is -5 and their product is 6 , is
 (a) $x^2 + 5x + 6$ (b) $x^2 - 5x + 6$ (c) $x^2 - 5x - 6$ (d) $-x^2 + 5x + 6$

Ans: (a), sum of zeroes = -5 , product = 6
 Polynomial is, $x^2 - (\text{sum of zeroes})x + \text{product of zeroes}$
 $\Rightarrow x^2 - (-5)x + 6 = x^2 + 5x + 6$.

8. If zeroes of $p(x) = 2x^2 - 7x + k$ are reciprocal of each other, then value of k is
 (a) 1 (b) 2 (c) 3 (d) 4

Ans: (b) Zeroes are reciprocal of each other

$\therefore$ Product of zeroes = $1 \square$

$$k = 1 \square k = 2$$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

9. Assertion (A): $x^2 + 4x + 5$ has two real zeroes.

Reason (R): A quadratic polynomial can have at the most two zeroes.

Ans : $p(x) = 0 \Rightarrow x^2 + 4x + 5 = 0$ Discriminant, $D = b^2 - 4ac$
 $= 4^2 - 4 \times 1 \times 5$

$$= 16 - 20 = -4 < 0$$

Therefore, no real zeroes are there.

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

10. Assertion (A): If the sum of the zeroes of the quadratic polynomial $x^2 - 2kx + 8$ are is 2 then value of k is 1.

Reason (R): Sum of zeroes of a quadratic polynomial $ax^2 + bx + c$ is $-b/a$

Ans : Relation is true as we know that Sum of zeroes $= -b/a$

a

$$-(-2k)$$

$$\Rightarrow = 2 \Rightarrow k = 1$$

1

So, Assertion is true.

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

SECTION – B

Questions 11 to 14 carry 2 marks each.

1. Find the zeroes of $\sqrt{3}x^2 + 10x + 7\sqrt{3}$

12. Find a quadratic polynomial whose zeroes are -9 and $-\frac{1}{9}$.

13. If the sum of the zeroes of the quadratic polynomial $ky^2 + 2y - 3k$ is equal to twice their product, find the value of k .

14. If the product of the zeroes of the polynomial $ax^2 - 6x - 6$ is 4, then find the value of a . Also find the sum of zeroes of the polynomial.

Questions 15 to 17 carry 3 marks each.

15. Find the zeroes of $p(x) = 4x^2 + 24x + 36$ quadratic polynomials and verify the relationship between the zeroes and their coefficients.

16. If α and β are zeroes of the quadratic polynomial $4x^2 + 4x + 1$, then form a quadratic polynomial whose zeroes are 2α and 2β .

17. If α, β are zeros of quadratic polynomial $2x^2 + 5x + k$, find the value of k such that $(\alpha + \beta)^2 - \alpha\beta = 24$

1. Case Study-1 : Lusitania Bridge

Quadratic polynomial can be used to model the shape of many architectural structures in the world. The Lusitania Bridge is a bridge in Merida, Spain. The bridge was built over the Guadiana River in 1991 by a Spanish consortium to take the road traffic from the Romano bridge. The architect was Santiago Calatrava. The bridge takes its name from the fact that Emerita Augusta (present day Merida) was the former capital of Lusitania, an ancient Roman province.



Based on the above information, answer the following questions.

(i) If the Arch is represented by $10x^2 - x - 3$, then find its zeroes. (2)

(ii) Find the quadratic polynomial whose sum of zeroes is 0 and product of zeroes is 1. (2)

OR

(ii) Find the sum and product of zeroes of the polynomial $\sqrt{3}x^2 - 14x + 8\sqrt{3}$ (2)

2. The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it

is a parabola. Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time ‘t’ in seconds is given by the polynomial $h(t)$ such that $h(t) = -16t^2 + 8t + k$.



- i. What is the value of k ? (2)
- ii. At what time will she touch the water in the pool? (2)

OR

(ii) Rita’s height (in feet) above the water level is given by another polynomial $p(t)$ with zeroes - 1 and 2. Then find $p(t)$

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3)linear equations

Section A: 1 Mark Each – MCQs (Q1 to Q5)
Choose the correct option.

- Q1. The graph of the equation $2x + 3y = 6$ is:
- a) A point
 - b) A pair of intersecting lines
 - c) A straight line
 - d) A circle
- Q2. The pair of equations $x + y = 5$ and $2x + 2y = 10$ are:
- a) Consistent and independent
 - b) Inconsistent
 - c) Consistent and dependent
 - d) None of these
- Q3. Which of the following is not a linear equation in two variables?
- a) $2x + 3y = 5$
 - b) $x^2 + y = 1$
 - c) $x - y = 3$
 - d) $4x + y = 8$
- Q4. If the pair of equations has no solution, then the lines are:
- a) Intersecting
 - b) Coincident
 - c) Parallel
 - d) Perpendicular
- Q5. The value of y in the solution of $2x + y = 7$ and $x - y = 1$ is:
- a) 3
 - b) 5
 - c) 1
 - d) 2

2. Find the discriminant of the quadratic equation $4x^2 - 5 = 0$ and hence comment on the

nature of roots of the equation.

3. A natural number when increased by 12 becomes 160 times of reciprocal of natural number. Find the number.
4. If one root of the quadratic equation $x^2 + 12x - k = 0$ is thrice the other root, then find the value of k.

3 MARKS (SHORT ANSWER)

- 1 .If α and β are roots of the quadratic equation $x^2 - 7x + 10 = 0$ find the quadratic equation whose roots are α^2 and β^2 .
- 2.Find the value of m for which the roots of the equation.
 $mx(6x + 10) + 25 = 0$, are equal.
3. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers.

Mrs. Ruchi
KV Donimalai

5) ARITHMETIC PROGRESSION

SECTION - A (Multiple Choice Questions) [1 MARK EACH]

- 1 In an Arithmetic Progression, if $a = 28$, $d = -4$, $n = 7$, then an is:
(a) 4 (b) 5 (c) 3 (d) 7
- 2 30th term of the A.P: 10, 7, 4, ..., is
(a) 97 (b) 77 (c) -77 (d) -87
- 3 The 4th term from the end of the AP: $-11, -8, -5, \dots, 49$ is
(a)37 (b) 40 (c)43 (d) 34
- 4 If the 2nd term of an AP is 13 and the 5th term is 25, what is its 7th term?
(a)30 (b) 33 (c)37 (d)38
- 5 The sum of first five multiples of 3 is
(a)45 (b) 55 (c)65 (d) 75

SECTION – B [2 MARKS EACH]

- 6 Find the sum of first 40 positive integers divisible by 6.
- 7 Find the 31st term of an AP. whose 11th term is 38 and the 16th term is 73.
- 8 Which term of the AP 3, 15, 27, 39,... Will be 132 more than its 54th term?
- 9 Find the sum of first 15 multiples of 8?
- 10 An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.?

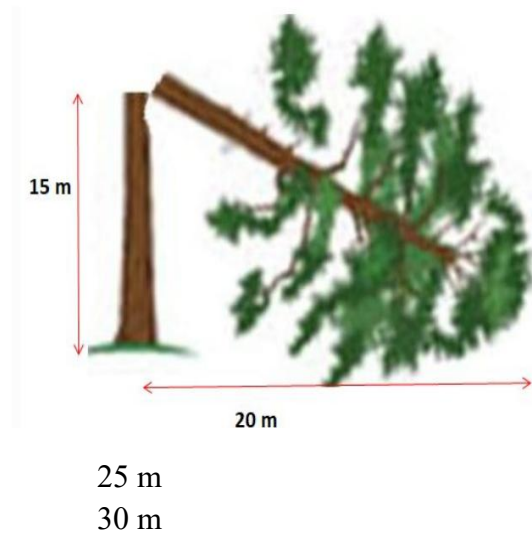
SECTION – C [3 MARKS EACH]

- 11 If 5 times the 5th term of an AP is equal to 10 times the 10th term, show that its 15th term is zero.
- 12 Find $a_{30} - a_{20}$ for an AP -9,-14,-19,-24.....
- 13 Which term of the AP : 21, 42,63,84, ...is 210?
- 14 How many terms of the AP : 24,21, 18,...must be taken so that their sum is 78?
- 15 Find the sum of the odd numbers between 0 and 50.

Mr.Praveen Chaudhary
PMSHRI KV Hassan

6)Triangles

Case Study 1



Sakshi is having a garden near Delhi.
In the garden, there are different types of trees and flower plants. one day due to heavy rain and storm one of the trees got broken as shown in the figure. The height of the unbroken part is 15 m and the broken part of the tree has fallen at 20 m away from the base of the tree. Using the Pythagoras theorem answer the following questions

1. What is the length of the broken part?
15 m
20 m

- What was the height of the full tree?
40 m
50 m
35 m
30 m
- In the formed right-angle triangle which part of the tree is Altitude?
the broken part
Standing part
Leaves part
Touching part on ground
- What is the perimeter of the formed triangle?
50m
60m
45m
100m

1. If a line divides any two sides of the triangle in the same ratio, then the line is parallel to the third side. The statement depicts which theorem-
- a) Pythagorus b) Thales Theorem
- c) Converse of Thales theorem d) Converse of Pythagorus theorem.

- a) 12 ft b) 10 ft
c) 15 ft d) 7 ft

3. In the given figure ΔABC is shown. DE is parallel to BC . If $AD = 5\text{cm}$, $DB = 2.5\text{cm}$ and $BC = 12\text{cm}$, then DE is equal to

- (a) 10cm (b) 6cm (c) 8cm (d) 7.5cm

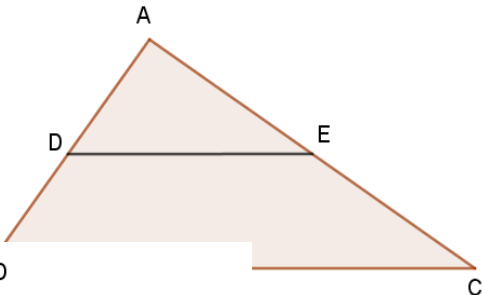
sides AB and AC
= 8.5 cm, AY =
relation is c

AA similarity criterion
SSS similarity criterion

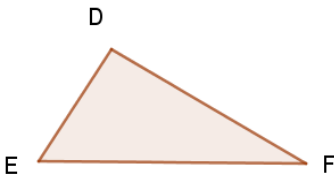
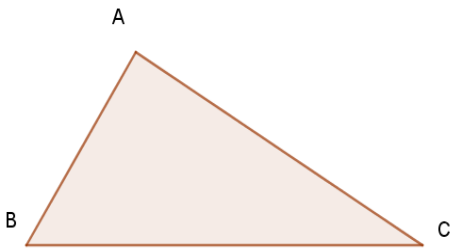
7. If vertical pole of length 12 m casts a shadow 5 m long on the ground and at the same time a tower casts a shadow 25 m long. Find the height of the tower.
- 40 m
60 m
42 m
36 m

8. Which is correct one as per BPT for given figure

$\frac{AB}{AD} = \frac{AC}{AE}$ $\frac{AD}{BD} = \frac{AE}{CE}$
 $\frac{AB}{BD} = \frac{AC}{CE}$ All of them



9. In these two triangles if $\frac{AB}{DE} = \frac{AC}{DF}$

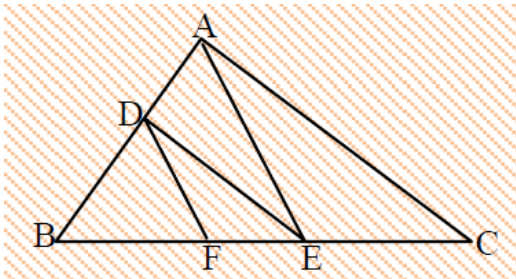


$\angle BAC = \angle EDF$

The pair of included angle is
 $\angle ABC = \angle DEF$
 $\angle ACB = \angle DFE$
None of them

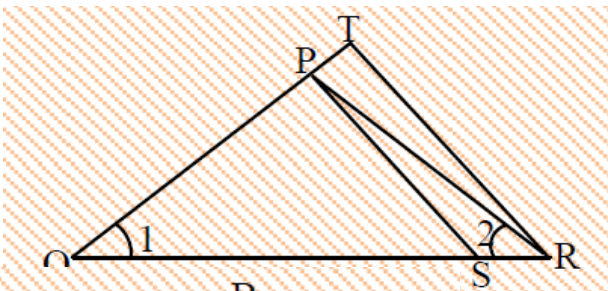
SAQ

1. State and draw required figure for Converse of Basic Proportionality theorem.
2. if $\frac{BD}{AD} = \frac{BF}{FE}$
Name the triangles are similar
Name the sides are parallel



diagram

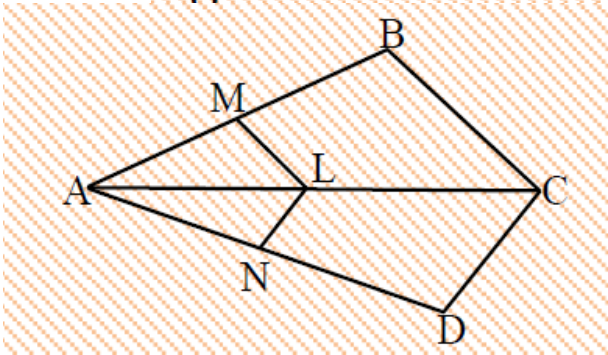
3. State the Thales theorem with labeled
4. Study the figure to answer
If $\angle 1 = \angle 2$
Name the sides are equal
If $\triangle PQS \sim \triangle TQR$
Find the ratio of sides



and $LN \parallel CD$,

5. In the figure, If $LM \parallel CB$

Name the triangles
Similar
Apply the BPT



property

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7)Coordinate Geometry

1 MARKS QUESTIONS

- Que.1 What is the distance formula and section formula?
Que.2 Find distance of the point (2, 3) from the origin?
Que.3 Find distance between the points (-5, 7) and (-1, 4) ?
Que.4 Determine if the points (1, 5), (2, 3) and (-2, 11) are collinear ?
Que.5 Find radius of a circle if its centre is at (5, 0) and the point (6, 8) lies on its boundary?

2 MARKS QUESTIONS

- Que.6 Check whether (5,-2),(6,4) and (7,-2) are the vertices of an isosceles triangle ?
- Que.7 Find the point on the x-axis which is equidistant from the points (2,-5) and (-2,9) ?
- Que.8 If the distance between the points (4,p) and (1,0) is 5 unit then find the value of p ?
- Que.9 If A and B are the points (-6,7) and (-1,-5) respectively, then find the distance 2AB ?
- Que.10 Find the co ordinates of a point P which divides the line segment joining the points A (2,-5) and B(5,2) in the ratio 2:3 ?

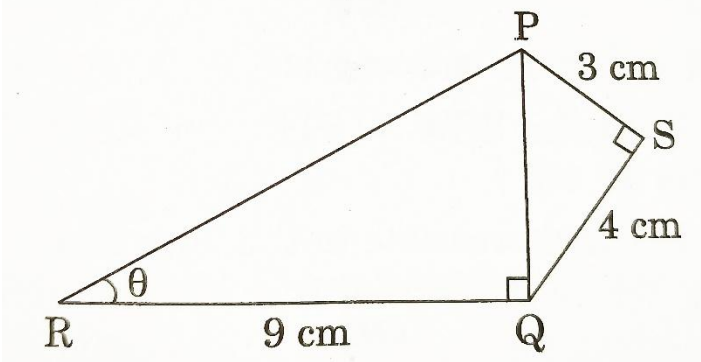
3 MARKS QUESTIONS

- Que.11 If P (1,2),Q(4,6), R(5,7) and S(a,b) are the vertices of a parallelogram PQRS then find a and b ?
- Que. 12 What is the type of this triangle formed by the vertices (4,0) ,(-1,-1) and (3,5) ?
- Que.13 Find the ratio in which the line segment joining the points (2,-3) and (5,6) is divided by x-axis ?
- Que.14 Find the value of k if P(4,2) is the mid point of the line segment joining the points A(5k,3) and B(-k,-7) ?
- Que.15 Show that the points A(2,-2), B(14,10), C(11,13) and D(-1,1) are the vertices of a rectangle ?

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8)Trigonometry

- The value of θ for which $\cos(10^\circ + \theta) = \sin 30^\circ$, is
 - 50°
 - 40°
 - 80°
 - 20°
 -
- The value of θ for which $\sin (44^\circ + \theta) = \cos 30^\circ$, is
 - 46°
 - 60°
 - 16°
 - 90°
- If $\tan A = 1$, then $2 \sin A \cos A =$ _____.
- In figure, $PS = 3 \text{ cm}$, $QS = 4 \text{ cm}$, $\angle PRQ = \theta$, $\angle PSQ = 90^\circ$, $PQ \perp RQ$ and $RQ = 9 \text{ cm}$. Evaluate $\tan \theta$.



- If $\tan \alpha = 5/12$, find the value of $\sec \alpha$.
- If $4 \tan \theta = 3$, evaluate $\frac{4\sin\theta - \cos\theta + 1}{4\sin\theta + \cos\theta - 1}$.
- If $\tan (A+B) = 1$ and $\tan (A-B) = 1/\sqrt{3}$, $0^\circ < A+B < 90^\circ$, $A > B$, then find the value of A and B.
- Prove that : $\frac{\sin\theta - \cos\theta + 1}{\cos\theta + \sin\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$
- Prove that $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$

10.Prove the following:

$$\frac{1}{1 + \sin^2\theta} + \frac{1}{1 + \cos^2\theta} + \frac{1}{1 + \sec^2\theta} + \frac{1}{1 + \operatorname{cosec}^2\theta} = 2$$

9)Appln of Trigonometry

Q1. A ladder 10 m long is leaning against a wall. It makes an angle of 60° with the ground. Find the height at which the ladder touches the wall.

Hint: Use the formula:
 $\sin(\theta) = \text{opposite/hypotenuse}$
Here, opposite = height, hypotenuse = 10 m

Q2. A boy is flying a kite. The string of the kite is 100 m long and it makes an angle of 30° with the horizontal. Find the height of the kite from the ground. (Assume the string is tight and straight.)

Hint:
 $\sin(30^\circ) = \text{height}/100$
 $\sin(30^\circ) = \frac{1}{2}$

Q3. From the top of a building 20 m high, the angle of depression of a car on the road is 45°. Find the distance of the car from the base of the building.

Hint:
Use $\tan(\theta) = \text{opposite/adjacent}$
Here, opposite = 20 m, $\theta = 45^\circ$

Q4. A man is standing 50 m away from the foot of a tower. The angle of elevation of the top of the tower from his eye is 30°. Find the height of the tower.

Hint:
Use $\tan(30^\circ) = \text{height}/50$
 $\tan(30^\circ) = 1/\sqrt{3}$

Q5. The angle of elevation of the top of a pole from a point on the ground is 60°. If the pole is 15 m high, find the distance of the point from the base of the pole.

Hint:
Use $\tan(60^\circ) = 15/\text{distance}$
 $\tan(60^\circ) = \sqrt{3}$

Q6. A tree breaks due to a storm and the broken part bends so that the top touches the ground making an angle of 30° with it. The total height of the tree before breaking was 10 m. Find at what height from the ground did the tree break.

Hint:
Let the broken part be x m.
Use $\sin(30^\circ) = \text{height from ground} / x$
Also use: x + height from ground = 10

Q7. From a point 40 m away from the foot of a tower, the angle of elevation of the top of the tower is 45°. Find the height of the tower.

Hint:
Use $\tan(45^\circ) = \text{height}/40$
 $\tan(45^\circ) = 1$

Q8. The shadow of a pole is 5 m long when the angle of elevation of the sun is 60°. Find the height of the pole.

Hint:
Use $\tan(60^\circ) = \text{height}/5$
 $\tan(60^\circ) = \sqrt{3}$

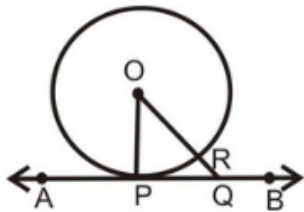
10)Circles

Section A: Multiple Choice Questions (1 mark each)

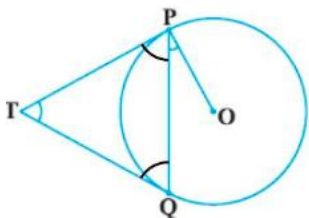
- 1. How many tangents can be drawn from a point outside a circle?
(a) One (b) Two (c) Infinite (d) None
- 2. The length of the tangent from a point 10 cm away from the center of a circle of radius 6 cm is:
(a) 6 cm (b) 8 cm (c) 9 cm (d) 10 cm
- 3. The angle between a tangent to a circle and the radius drawn to the point of contact is:
(a) 30° (b) 60° (c) 90° (d) 180°
- 4. A line that intersects a circle at two points is called:
(a) Tangent (b) Radius (c) Chord (d) Secant
- 5. If two tangents are drawn to a circle from an external point, then:
(a) They are of different lengths
(b) They are equal in length
(c) They do not intersect
(d) None of the above

Section B: Short Answer Questions (2 marks each)

- 1. Draw a tangent to a circle. What is the maximum number of tangents that can be drawn from a point outside the circle?
- 2. In the given figure, a tangent at point P and a radius drawn to the point of contact is shown. Prove that they are perpendicular.



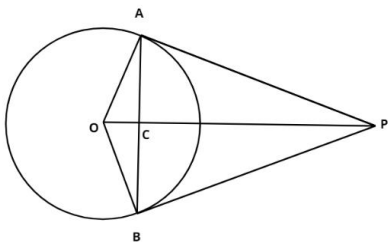
- 3. 8. From a point 13 cm away from the center of a circle, the length of the tangent is 5 cm. Find the radius of the circle.
- 4. Two tangents TP and TQ are drawn to a circle from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.



- 5. Find the number of tangents that can be drawn to a circle from:
a) a point on the circle
b) a point outside the circle

Section C: Long Answer Questions (3 marks each)

- 1. Prove that the lengths of the tangents drawn from an external point to a circle are equal.
- 2. From an external point, two tangents to a circle are drawn. Prove that the triangle formed by the tangents and the line joining the center to the external point is isosceles.
- 3. A circle of radius 5 cm is given, and a point lies 13 cm from the center. Find the length of the tangent from the point to the circle.
- 4. Two tangents PA and PB are drawn from a point P to a circle with center O. Show that OP is the angle bisector of $\angle APB$.



11)Areas related to circles

(Question No- 1 to 8 are 1 mark questions)

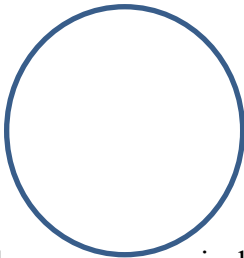
1. If θ is the angle in degrees of a sector of a circle of radius r , then area of the sector is:-----
2. A sector is cut from a circle of radius 21cm and angle of the sector is 150° , the area of the sector is:
3. If the area of the circle is 154cm^2 , its perimeter is _____.
4. The radius of the circle whose area is equal to sum of areas of the two circles of radii 24cm and 7cm is _____.

Very short answer type questions

5. What is the area of quadrant of a circle whose radius is 14cm?

Hints for start up

- *Draw a quadrant
- *Mark radius=14 cm



6. What is the radius of a circle if its perimeter and area are numerically equal?

Hints for start up

- * Perimeter of circle = circumference
- * Write the formula for circumference $c = \text{-----}$
- * Write the formula for area of a circle $A =$
- * Write Area = circumference
- Find the value of radius

7. What is the length of an arc of a circle of radius 7cm, if the angle subtended by it at the center is 60°

Hints for start up

- * Draw a circle
- * Draw two radii, Mark radius $r=7\text{cm}$
- * Mark the central angle = 60°
- * Write the formula of arc length =

8. What is the area of a circle if its circumference is 616cm?

Hints for start up

- * Draw a circle
- * Write t formula for circumference $c = \text{-----} = 616 \text{ cm}$
- * Write the formula for Area of circle =

(Question No- 9 to 16 are 2 marks questions)

Short answer type question-I

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

Hints for start up

- * Draw a circle, mark numbers from 1 to 12 as in the case of clock
- * Mark two radii in the form of minute hand one pointing towards 12 and the other pointing to 1(representing 5 minutes)
- * Write the formula of area of a sector.....

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

11. What is the ratio of area of two circles whose circumference are in ratio 3: 4.

Hints for start up

- * Draw two circles with radii r_1, r_2 /write required formulae(circumference)/
- * Write formula for area
- * Find the ratio of Area

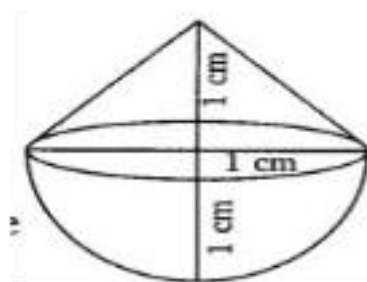
12. A chord of a circle of radius 10cm subtends a right angle at the center. Find the area of the corresponding minor segment.

Hints for start up

* Draw a circle/*mark radius 10 cm/* draw one more radius making 90° * Draw minor segment and shade it/Write the formula for segment * Formula of right triangle 13. What is the angle subtended at the center of a circle of radius 5cm by an arc of length $4\pi cm$? <u>Hints for start up</u> • Write formula for arc length • Rearrange the formula to find angle θ 14. Find the radius of the circle which can be inscribed in a square of side 6cm. 15. Find the side of the square that can be inscribed in a circle of radius 8cm. Write your own hints and find solution... 16. If the perimeter of a semicircular protractor is 36 cm, then find its diameter. Write your own hints and find solution... (Question No- 17 to 21 are 3 mark questions) Short answer type question-II 17. An umbrella has 8 ribs which are equally spaced. Assuming umbrella to be flat circle of radius 45cm, find the area between two consecutive ribs of the umbrella. 18. A chord of a circle of radius 15cmsubtends an angle 60° at the center. Find the area of the corresponding minor segment of the circle. (use $\pi = 3.14$, $\sqrt{3} = 1.73$) 19. A horse is tied at one corner of a square grass field by means of 5m long rope. Find the area of the part of the field in which the horse can graze. 20. Find the difference of areas of sector of angle 90° and its corresponding major Sector of the circle of radius 21cm. 21. Find the area of a circular ring whose outer and inner radii are 20cm and 15cm respectively.	Mr. Haridas K. P PM SHRI KV Mysuru
12) Surface areas and Volumes	

Q:1. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of π .

Solution:



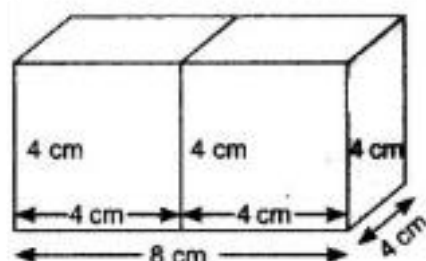
Radius of the hemisphere and cone, $r =$ _____

Height of the cone , $h =$ _____

Total volume of solid = _____ +
 =
 =
 = _____

Q:2 Two cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

Solution:



Volume of the cube = _____cm³

Let edge of one cube = _____

Volume of the cube =(_____)³, a³= _____ , a= _____ cm

Length of the cuboid formed is _____

Breadth of the cuboid formed is _____

Height of the cuboid formed is _____

Surface of the cuboid so formed = _____

= _____

Q:3.Two cones have their heights in the ratio 1 : 3 and radii in the ratio 3 : 1.
What is the ratio of their volumes?

Solution:

Given, Ratio of heights of two cones =

Ratio of radii =

Let h and 3h be the height of two cones.

Also, 3r and r be the corresponding radii of cones.

(Volume of cone = $\frac{1}{3}\pi r^2h$)

So, r₁ = _____ , h₁ = _____, r₂ = _____, h₂ = _____.

Ratio of volumes =

= _____

Hence, the ratio of volumes = 3 : 1

Q:4 A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter; the diameter of the spherical part is 8.5 cm. By measuring the amount of water it holds, a child finds its volume to be 345 cm³. Check whether she is correct, taking the above as the inside measurements, and $\pi = 3.14$.

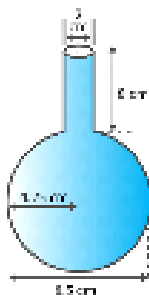
Solution:

Given,

For the cylinder part,

Height (h) = _____

Radius (R) = _____



For the spherical part,

Radius (r) = _____

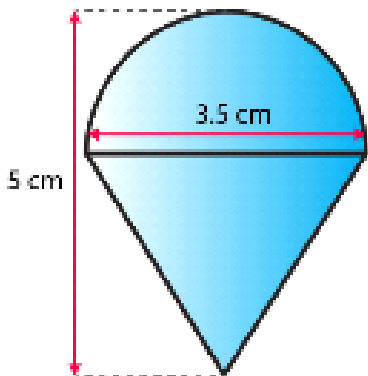
Now, the volume of this vessel = Volume of _____ + Volume of a _____

= _____

= _____

= _____

Q:5 Rasheed got a playing top (lattu) as his birthday present, which surprisingly had no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere. 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. (Take $\pi = 22/7$)



Solution:

TSA of the toy = CSA of _____ + CSA of _____

Curved surface area of the hemisphere = $\frac{1}{2} (4\pi r^2) =$ _____

=

= _____

= 19.25 cm²

Height of the cone = Height of the top – Radius of the _____ part

= (_____) cm = _____ cm

Slant height of the cone $l^2 = r^2 + h^2$
 $= (\quad)^2 + (\quad)^2$
 $= \quad \text{cm}$

Therefore, CSA of cone = $\pi r l = \underline{\hspace{2cm}}$
 $= \underline{\hspace{2cm}}$
 $= \underline{\hspace{2cm}}$

Hence, the surface area of the top = _____

Q:6 A joker's cap is in the form of cone of base radius 7 cm and height 24 cm. The area of sheet to make 10 such caps is

(a) 5500 cm² (b) 6500 cm² (c) 8500 cm² (d) 3500 cm²

Solution:

CSA of cone = $\pi r l$

CSA of 10 cones = $\pi r l \times \underline{\hspace{2cm}}$

$= 10 \times \pi \times 7 \times \underline{\hspace{2cm}}$

$$L = \sqrt{r^2 + h^2} = \sqrt{7^2 + 24^2} = \sqrt{49 + 576} =$$

Area of the sheet to make 10 such caps = _____

Q:7 Volume and surface area of a solid hemisphere are numerically equal.

What is the diameter of hemisphere?

Solution:

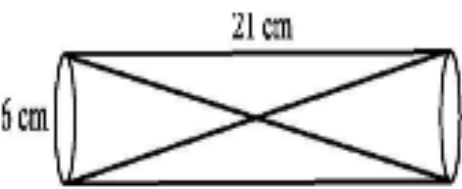
Given: volume of hemisphere = $\frac{2}{3}\pi r^3$ _____

Surface area of hemisphere = $(2\pi r^2) = \underline{\hspace{2cm}}$

$$\frac{2}{3}\pi r^3 = 2\pi r^2$$

Therefore R = _____ and diameter = $2XR = \underline{\hspace{2cm}}$

Q:8 Two solid cones are placed in a cylindrical tube as shown in the below figure. The ratio of their capacities is 2:1. Find the heights of each cone



Solution:

(Volume of cone = $\frac{1}{3}\pi r^2 h$)

Ratio of Volumes of two cones = $\frac{1}{3}\pi r^2 h_1 : \frac{1}{3}\pi r^2 h_2 = h_1 : h_2$

Radii of both the cones =

If height of one cone h_1 is h

Then $h_2 = 21 - h$

Ratio of their volumes = $h_1 : h_2 = 2:1$

$$h_1 : h_2 = h : 21 - h = 2:1$$

$$2x h = 21 - h$$

$$3xh = \text{-----}$$

$$h = \text{-----}$$

$$h_1 = \text{----}$$

$$h_2 = \text{-----}$$

Mrs.P.Lalitha
KV NAL

13)Statistics

- The relation between Mean, Median and Mode is
 - 2 Mean = 3 Mode- Median
 - 2 Mean = Mode+ 3 Median
 - 2 Mean = 3 Median – Mode
 - Mean = 3 Mode- 2 Median

- The Mid value of the Class interval is used to calculate
 - Mean
 - Median
 - Mode
 - Both Median and Mode

3. The sum of all the probability of the elementary event is
- a) 0

b) 1

c) -1

d) 10

TO FIND MEAN: DIRECT METHOD:

CLASS INTERVAL	frequency	x _i	f _i x _i
10-20	3	15	45
20-30	6	25	150
30-40	8	35	280
40-50	3	45	135
50-60	6	55	330
60-70	4	65	260
TOTAL	30		1200

M
Σ

30

CLASS INTERVAL	frequency	x _i	f _i x _i
100-120	12		
120-130	8		
130-140	13		
140-150	4		
150-160	6		
160-170	7		
TOTAL			

M
Σ

CLASS INTERVAL	frequency	x _i	f _i x _i
0-20	15		
20-40	12		
40-60	10		
60-80	22		
80-100	11		
100-120	10		
120-140	5		
TOTAL			

M
Σ

ASSUMED MEAN METHOD:

CLASS INTERVAL	frequency	x _i	d _i = x _i - a	f _i d _i
100-120	12	110	-20	-240
120-130	8	120	-10	-80
130-140	13	130 = a	0	0
140-150	4	140	10	40

Mean = a + $\frac{\sum f_i d_i}{\sum f_i}$

= 40 + 50/40

= 40 + 1.25

= 41.25

150-160	6	150	20	120
160-170	7	160	30	210
TOTAL	40			50

CLASS INTERVAL	frequency	x _i	d _i	f _i d _i
10-20	3			
20-30	6			
30-40	8			
40-50	3			
50-60	6			
60-70	4			

Mean = a + $\frac{\sum f_i d_i}{\sum f_i}$

CLASS INTERVAL	frequency	x _i	d _i	f _i d _i
0-20	15			
20-40	12			
40-60	10			
60-80	22			
80-100	11			
100-120	10			
120-140	5			

Mean = a + $\frac{\sum f_i d_i}{\sum f_i}$

STEP DEVIATION METHOD:

CLASS INTERVAL	frequency	x _i	U _i	f _i u _i
10-20	3	15	-2	-6
20-30	6	25	-1	-6
30-40	8	35 = a	0	0
40-50	3	45	1	3
50-60	6	55	2	12
60-70	4	65	3	12
TOTAL	30			15

Mean = a + [$\frac{\sum f_i u_i}{\sum f_i}$] × h

= 35 + 15/30 × 10

=35 + 5 = 40

CLASS INTERVAL	frequency	x _i	u _i	f _i u _i
100-120	12			
120-130	8			
130-140	13			
140-150	4			

Mean = a + [$\frac{\sum f_i u_i}{\sum f_i}$] × h

150-160	6				
160-170	7				
170-180	10				
					Mean = a + [$\sum f_{iui} / \sum f_i$]× h
CLASS INTERVAL	frequency	x _i	ui	f _{iui}	
0-20	15				
20-40	12				
40-60	10				
60-80	22				
80-100	11				
100-120	10				
120-140	5				

TO FIND MODE:

MODE = 1 + [(f_l – f₀)/ (2f₁ – f₀ – f₂)]

Where l = lower class limit of modal class

F₁ = frequency of modal class

F₀ = frequency of the previous class

F₂ = frequency of the next class

Modal class : class interval with highest frequency

<table> <tr> <th>Class interval</th><th>Frequency</th></tr> <tr> <td>0-10</td><td>8 = f₀</td></tr> <tr> <td>10-20 – modal class</td><td>10 = f₁</td></tr> <tr> <td>20-30</td><td>5 = f₂</td></tr> <tr> <td>30-40</td><td>12</td></tr> <tr> <td>40-50</td><td>6</td></tr> <tr> <td>50-60</td><td>9</td></tr> <tr> <td>60-70</td><td>7</td></tr> </table>	Class interval	Frequency	0-10	8 = f ₀	10-20 – modal class	10 = f ₁	20-30	5 = f ₂	30-40	12	40-50	6	50-60	9	60-70	7	Mode = 1 + [(f_l – f₀)/ (2f₁ – f₀ – f₂)] = 10 + [10 – 8 / 2×10 – 8 – 5] = 10 + 2/7 = 10+ 0.28 = 10.28		
Class interval	Frequency																		
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100-150	16																		
150-200 – modal class	22																		
200-250	5																		
250-300	7																		
300-350	10																		
350-400	13																		

TO FIND MEDIAN:

MEDIAN = 1 +[(n/2 – c.f)/f × h]

Where l = lower class limit of median class

n = total frequency

c.f = cumulative freq of the prev class
f = freq of the median class
h = class size

Class interval	Frequency	Cumulative freq
0-10	3	3
10-20	5	8
20-30	2	10- c.f
30-40 – median class	8 = f	18
40-50	5	23
50-60	3	26
60-70	4	30

MEDIAN = 1 +[(n/2 – c.f)/f × h]

n/2 = 30/2 =15
h = 10

median = 30 + [(15 – 10)/8 × 10]

= 30 + 50/8

= 30 + 6.25 = 36.25

Class interval	Frequency	Cumulative freq
0-50	12	
50-100	4	
100-150	16	
150-200	20	
200-250	15	
250-300	12	
300-350	10	
350-400	13	

MEDIAN = 1 +[(n/2 – c.f)/f × h]

1. Find the mean of the following data:

Class interval	100-150	150-200	200-250	250-300	300-350	350-400	400-450
Freq	24	40	33	28	30	22	16

Class interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Freq	7	12	9	5	6	7	4

Class interval	40-55	55-70	70-85	85-100	100-120	120-140
freq	20	13	27	20	24	26

2. Find the mode of the following:

Class interval	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
freq	12	16	10	9	13	8	18	4

Class interval	300-400	400-500	500-600	600-700	700-800	800-900	900-1000	1000-1100
freq	22	25	16	30	25	27	19	20

3. Find the median of the following:

Class interval	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
freq	12	16	10	12	13	8	18	11

Class interval	100-150	150-200	200-250	250-300	300-350	350-400	400-450
Freq	24	40	33	28	30	22	16

4. The arithmetic mean of the following distribution is 40. Find the missing frequency p.

C.I.	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	3	6	8	3	6	p

5. Find the missing frequencies. If n=100 and median is 32.

C.I.	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	10	F1	25	30	F2	10

6. Find the values of x and y , if total frequency is 100. The median of data is 525.

C.I.	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	x	12	17	20	y	9	7	4

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PM SHRI KV Tumkuru

14)Probability

Section 1: Multiple Choice Questions (MCQs) - 20 Questions

A die is thrown once. The probability of getting a prime number is: (a) 1/6
(b) 1/3 (c) 1/2 (d) 2/3

A coin is tossed twice. The probability of getting at least one head is: (a) 1/4
(b) 1/2 (c) 3/4 (d) 1

The probability of an impossible event is: (a) 0
(b) 1 (c) 0.5 (d) undefined

If P(E)=0.75, then P(not E) is: (a) 0.25
(b) 0.75 (c) 0.5 (d) 0

A card is drawn from a well-shuffled deck of 52 cards. The probability of getting a red king is:
(a) 1/26 (b) 1/13 (c) 1/52 (d) 1/2

A bag contains 3 red balls and 5 black balls. The probability of drawing a red ball is:
(a) 3/5 (b) 3/8 (c) 5/8 (d) 1/3

Two coins are tossed simultaneously. The probability of getting two tails is: (a) 1/4
(b) 1/2 (c) 3/4 (d) 1

From the numbers 1 to 10, if a number is chosen at random, the probability of choosing a number divisible by 3 is:
(a) 1/10 (b) 3/10 (c) 1/3 (d) 7/10

A die is thrown once. The probability of getting a number greater than 4 is: (a) 1/6
(b) 1/3 (c) 1/2 (d) 2/3

A card is drawn from a well-shuffled deck of 52 cards. The probability of getting a face card is:
(a) 3/13 (b) 4/13 (c) 1/13 (d) 1/4

The sum of probabilities of all possible outcomes of an experiment is:
(a) 0 (b) 1 (c) greater than 1 (d) less than 1

A letter is chosen at random from the word "MATHEMATICS". The probability of choosing the letter 'M' is:
(a) 1/11 (b) 2/11 (c) 3/11 (d) 1/2

1.	A die is thrown twice. The probability of getting a sum of 8 is:	(a) 5/36
	(b) 1/12 (c) 1/6 (d) 7/36	
2.	A leap year is chosen at random. The probability that it has 53 Sundays is:	
	(a) 1/7 (b) 2/7 (c) 1/366 (d) 2/366	
3.	If P(E)=0.05, then P(not E)=?	
	(a) 0.95 (b) 0.05 (c) 0 (d) 1	
4.	A number is chosen from the first 20 natural numbers. The probability of choosing a multiple of 5 is:	
	(a) 1/20 (b) 1/5 (c) 1/4 (d) 1/2	
5.	A bag contains 5 red and 7 blue balls. The probability of drawing a blue ball is:	
	(a) 5/12 (b) 7/12 (c) 5/7 (d) 1/12	
6.	Two dice are rolled. The probability of getting an even number on both dice is:	
	(a) 1/4 (b) 1/2 (c) 3/4 (d) 1/36	
7.	If the probability of winning a game is 0.6, the probability of losing it is:	(a) 0.6 (b) 0.3
	(c) 0.4 (d) 1	
8.	A ticket is drawn from a bag containing tickets numbered from 1 to 100. The probability that the number on the ticket is a perfect square is:	
	(a) 1/10 (b) 9/100 (c) 10/100 (d) 1/5	

SHORT ANSWERS QUESTIONS (2 MARKS)

A die is thrown once. Find the probability of getting:	
	(i) A prime number less than 4.
	(ii) (ii) An odd number greater than 3.
A coin is tossed twice. What is the probability of getting at least one head?	
A card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:	
	(i) A black king.
	(ii) (ii) A spade.
Two distinct dice are rolled. What is the probability of getting a sum of 6?	
A bag contains 6 red balls, 5 black balls and 4 white balls. Find the probability of drawing a black ball.	
What is the probability that a randomly selected year is a leap year? (Assume no specific starting year).	
The probability of event A is 2/7 and the probability of event B is 3/7. If A and B are mutually exclusive events, find the probability of A or B.	
A number is chosen at random from the first 50 natural numbers. Find the probability that the number is divisible by both 2 and 5.	
What is the probability of picking a vowel from the English alphabet?	

SHORT ANSWERS QUESTIONS (3 MARKS)

A die is thrown twice. Find the probability of getting a sum which is a prime number.	
A bag contains 3 red, 5 black and 7 white balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is:	
	(i) red or white.
	(ii) (ii) not black.
Two dice are rolled simultaneously. Find the probability of getting:	
	(i) A double (same number on both dice).
	(ii) (ii) A sum of 5. (iii) A sum greater than 10.
A card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:	
(i) A red face card. (ii) A black ace. (iii) A diamond.	
The probability of selecting a blue ball at random from a jar containing blue and green balls is 2/5. If the jar contains 10 green balls, find the number of blue balls in the jar.	
A game consists of tossing a coin three times and noting the outcome. If at least two heads appear, Ravi wins. Calculate the probability that Ravi wins.	
A bag contains 12 blue balls, and some red balls. If the probability of drawing a red ball is twice the probability of drawing a blue ball, find the total number of balls in the bag.	

In a single throw of a pair of dice, find the probability of getting an aggregate of at least 7. A letter is chosen at random from the word "PROBABILITY". What is the probability that the chosen letter is: (i) A vowel? (ii) The letter 'B'? (iii) A consonant?

. The probability of drawing a spade from a well-shuffled deck of cards is $\frac{1}{4}$. What is the probability of drawing a card that is not a spade?

Case Study Based Questions

Case Study 1: Cricket Match

In a cricket match between India and Australia, the coach is analyzing the performance of the Indian batsmen. He recorded the number of runs scored by the top 5 batsmen in a particular match.

Batsman	Runs Scored
Rohit	75
Virat	120
Suryakumar	45
Ishan	15
Hardik	60

What is the probability that a randomly chosen batsman scored more than 50 runs?
What is the probability that a randomly chosen batsman scored exactly 15 runs?
What is the probability that a randomly chosen batsman scored less than 70 runs?

Case Study 2: School Elections

In a school, elections were held for the Head Boy and Head Girl positions. There were 4 candidates for Head Boy and 3 candidates for Head Girl.

1. What is the total number of possible outcomes for the election results?

What is the probability that Rohan (one of the candidates for Head Boy) and Priya (one of the candidates for Head Girl) are elected?

Case Study 3: Traditional Indian Games

A group of students is playing a traditional Indian game involving a spinner. The spinner is divided into 8 equal segments, numbered 1 to 8.

1. What is the probability that the spinner lands on an even number?

What is the probability that the spinner lands on a prime number?
If the spinner lands on a number greater than 5, what is the probability that it is an odd number?

Case Study 4

Tushara took a pack of 52 cards. She kept aside all the black face cards and shuffled the remaining cards well.



Based on the above information answer the following questions.

- | | |
|-------|--|
| (i) | Write the number of total possible outcomes. |
| | ii) She draws a card from the well-shuffled pack of remaining cards. What is the probability that the card is a face card? |
| (ii) | Write the probability of drawing a black card. |
| | OR |
| (iii) | What is the probability of getting neither a black card nor an ace card? |
| | |

Case Study 5

A, B, C, D and E are five friends. They prepared some numbered cards with labelled from 11 to 60 and then they put all the number cards in the empty box. In this game, every friend was asked to pick the card randomly and after each draw, card was replaced back in the box.



- (a) Find the probability that the number on the drawn card is an odd number (1)
- (b) Find the probability that the number on the drawn card is a perfect square number (1)
- (c) Find the probability that the number on the drawn card is divisible by 5 (1)
- (d) Find the probability that the number on the drawn card is a prime number less than 20 (1)

Mr Naveen Pandey
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