# Blue-Print

**SUMMATIVE ASSESSMENT – II**

**MATHEMATICS**

Class IX

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**Note**: Number of question(s) are given within brackets and marks outside the brackets.

* - Based on OTBA.
SUMMATIVE ASSESSMENT - II
संकल्प परीक्षा - II
MATHEMATICS
गणित
CLASS - IX
कक्षा - IX

Time Allowed: 3 hours
Maximum marks: 90

General Instructions:
1. All questions are compulsory.
2. The question paper consists of 31 questions divided into five sections – A, B, C, D and E. Section A contains 4 questions of 1 mark each, Section B contains 6 questions of 2 marks each, Section C contains 8 questions of 3 marks each, Section D contains 10 questions of 4 marks each and Section E contains three OTBA questions of 3 mark, 3 mark and 4 mark.
3. All questions in Section-A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. There is no overall choice in this question paper.
5. Use of calculators is not permitted.
6. An additional 15 minutes time has been allotted to read this question paper. During this period students will read the question paper only and will not write any answer on the answer book.

Section – A
लघु – अ

Question numbers 1 to 4 carry 1 mark each.
प्रश्न संख्या 1 से 4 तक प्रत्येक प्रश्न 1 अंक का है।

1. If (3, 2) is a solution of the equation $3x - Ky = 5$, then find $K$
यदि (3, 2) समीकरण $3x - Ky = 5$ का हल है, तब $K$ का मान जाते कीजिए |

2. In the figure, if O is the centre of circle and $\angle BOD = 150^\circ$, then find $\angle BAD$.

![Diagram of a circle with points A, B, C, D and O, where $\angle BOD = 150^\circ$.]
3. If the sum of all the edges of a cube is 36 cm, then what will be the volume of that cube?
   यदि किसी घन के सभी बिंदुओं का योग 36 सेमी. है, तो उस घन का आयतन क्या होगा?

4. A die is thrown once. What is the probability of getting a number greater than 4?
   एक पासा एक बार फेंका गया | 4 से बड़े संख्या प्राप्त होने की प्रायिकता क्या है?

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**Section - B**

**Question numbers 5 to 10 carry 2 marks each.**

5. Find the points on the graph of the linear equation $3x + 5y = 15$, where it cuts the x-axis and y-axis.
   रेखाकार समीकरण $3x + 5y = 15$ का आलेख X-अक्ष और Y-अक्ष को जिन बिंदुओं पर प्रतिच्छेद करता है उसे जात कीजिए।

6. Write $5 = 2x$ as an equation in two variables. Also find one solution of this equation.
   $5 = 2x$ को दो चरां वाले एक रेखाकार समीकरण के रूप में लिखिए | इस समीकरण का एक हल भी जात कीजिए।

7. In a parallelogram ABCD, if $\angle A = (2x + 25)^\circ$ and $\angle B = (3x - 5)^\circ$, find the value of x.
   एक समांतर चतुर्भुज ABCD में यदि $\angle A = (2x + 25)^\circ$ और $\angle B = (3x - 5)^\circ$ है तो x का मान जात कीजिए।

8. The diagonals of a rhombus are 48 cm and 20 cm long. Find the perimeter of the rhombus.
   एक सम-चतुर्भुज के वक्रों की लम्बाई 48 सेमी. और 20 सेमी. है | इस सम-चतुर्भुज की परिमिता जात कीजिए।

9. In the figure, find the value of x and y.
   दी गई आकृति में x और y का मान जात करें।
10. A cube and a sphere are of the same height. Find the ratio of their volume.

सामान ऊंचाई वाले एक घन और एक गोले के आयतन का अनुपात ज्ञात कीजिए।

Section - C
खण्ड - C

Question numbers 11 to 18 carry 3 marks each.
प्रश्न संख्या 11 से 18 तक प्रत्येक प्रश्न 3 अंक का है।

11. Solve the equation $3(x + 2) = 2(2x - 1)$ and represent the solution on:
   i. the Number Line.
   ii. the Cartesian Plane.

समीकरण $3(x + 2) = 2(2x - 1)$ को हल कीजिए और हल को:
   i. संख्या रेखा
   ii. कार्तीय तल पर

निरूपित कीजिए।

12. ABCD is a parallelogram. Bisector of angle A also bisects BC at X. Prove that AD = 2AB.

ABCD एक समान्तर चतुर्भुज है | ∠A का समद्विभाजक BC को X बिंदु पर समद्विभाजित करता है | सिद्ध कीजिए कि AD = 2AB.

13. Angles of a quadrilateral are in ratio 2:4:5:7. Find all the angles.

एक चतुर्भुज के कोण 2:4:5:7 के अनुपात में हैं | इस चतुर्भुज के सभी कोण ज्ञात कीजिए।

14. Prove that the median of a triangle divides it into two triangles of equal area.

दर्शाइए कि बिंदुओं की एक माध्यिका उसे दो बिंदुओं में विभाजित करती है।

15. In the given figure, O is centre of the circle. Prove that $\angle OBC + \angle BAC = 90^\circ$

दी गई आकृति में, O वृत्त का केंद्र है | साबित कीजिए कि $\angle OBC + \angle BAC = 90^\circ$

16. Construct an angle of $22\frac{1}{2}^\circ$ using scale and compass only.

स्केल एवं कम्पस का प्रयोग करते हुए $22\frac{1}{2}^\circ$ के कोण की रचना कीजिए।

17. A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube?

12 सेमी. भुजा वाले एक ठोस घन को 8 बराबर आयतन वाले घनों में काटा गया | नए घन की भुजा कितनी होगी?

18. Solve the equation $3(x + 2) = 2(2x - 1)$ and represent the solution on:
   i. the Number Line.
   ii. the Cartesian Plane.

समीकरण $3(x + 2) = 2(2x - 1)$ को हल कीजिए और हल को:
   i. संख्या रेखा
   ii. कार्तीय तल पर

निरूपित कीजिए।
18. Eleven bags of wheat flour, each marked 5 kg, actually contained the following weights of flour (in kg):
   4.97, 5.05, 5.08, 5.03, 5.00, 5.06, 5.08, 4.98, 5.04, 5.07, 5.00.
Find the probability that any of these bags chosen at random contains more than 5 kg of flour.

Section – D

19. Draw the graph of linear equation $x = 4$ and $y = 5$. Find the area formed by the two graphs and the axes.

20. Let cost of a pen and a pencil be ‘x’ and ‘y’ respectively. A girl pays Rs 16 for 2 Pens and 3 Pencils. Write the given data in the form of a linear equation in two variables. Also represent it graphically.

21. In the figure, ABCD is a parallelogram and P, Q are the points on the diagonal BD such that $BQ = DP$. Show that APCQ is a parallelogram.

22. ABCD is a trapezium with $AB \parallel DC$. A line parallel to AC intersects AB at X and BC at Y. Prove that $\text{ar}(ADX) = \text{ar}(ACY)$.

23. Prove that the quadrilateral formed (if possible) by the internal angle bisectors of any quadrilateral is cyclic.
24. Construct a $\Delta XYZ$ in which $\angle Y = 60^\circ, \angle Z = 45^\circ$ and $XY + YZ + ZX = 11$ cm. Also write the steps of construction.

25. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of Rs 12.50 per m$^2$.

26. How many litres of milk can a hemispherical bowl of diameter 10.5 cm hold?

27. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm. Find its total surface area.

28. In a society, 6 children out of 28 did not participate in the campaign 'Save Energy'. Find the probability that a child selected at random.

   i. participated in the Campaign.

   ii. did not participate in the Campaign.

Which values of children are depicted here?
29. In how many years, the number of FTAs (Foreign Tourist Arrivals) was less than the mean FTAs during 2000-2011?

वर्ष 2000-2011 के दौरान कितने साल विदेशी पर्यटकों के आगमन की संख्या इसी दौरान उनके आगमन की संख्या के माध्यम से कम रही?

30. Find the number of male and female FTAs in India during the year 2012?

वर्ष 2012 में पुरुष एवं महिला विदेशी पर्यटकों के आगमन की संख्या जान करें?

31. Represent the given information in table-2 graphically.

सारणी-2 में दी गई सूचनाओं को आलेखीय रूप में निरूपित कीजिए?

OR

29. Represent the data given in table-2 as a histogram.

सारणी-2 में दिए गए आंकों को निरूपित करने वाला एक आयत चित्र खींचिए?

30. Which social networking site is more beneficial in learning mathematics and how?

कौन सा सोशल नेटवर्किंग साइट गणित गणित में ज्ञान लाभदायक है और कैसे?

31. Prepare a pie-chart to represent the data given in table-1.

सारणी-1 में दिए गए आंकों से थुर्ट-थुर्ट बनाएं?
1. K = 2
2. 105°
3. 27 cm³
4. \( \frac{1}{3} \)
5. Putting \( y = 0 \) in the equation, we have \( x = 5 \)
   i.e. the graph cuts X-axis at (5,0)
   Putting \( x = 0 \), we get \( y = 3 \)
   i.e. graph cuts Y-axis at (0,3)
6. \( 2 \cdot x + 0 \cdot y + (-5) = 0 \)
   For any solution.
7. In \( \parallel gm \ ABCD \), \( \angle A + \angle B = 180° \)
   or, \( 2x + 25 + 3x - 5 = 180° \)
   \( \Rightarrow x = 32° \)
8. In rhombus \( ABCD \),
   Let diagonal \( AC = 48 \text{ cm} \) and \( BD = 20 \text{ cm} \).
   Since diagonals of a rhombus bisects each other at 90°
   \( \therefore OA = 24 \text{ cm}, OB = 10 \text{ cm} \) and \( \angle AOB = 90° \)
   In right \( \Delta AOB \), \( AB = \sqrt{OA^2 + OB^2} = \sqrt{576 + 100} = 26 \text{ cm} \)
   \( \therefore \) Perimeter = \( 26 \times 4 = 104 \text{ cm} \)
9. \( \angle AOB = 2\angle ACB \)
   \( \Rightarrow y = 130° \)
   In \( \Delta AOB \), \( OA = OB \)
   \( \therefore \angle OBA = \angle OAB = x° \) (Let)
   By angle sum property of triangle
   \( 2x + y = 180° \)
   \( \Rightarrow x = 25° \)
10. Let height of cube and sphere be \( x \) unit
    \( \therefore \) Volume of cube = \( x^3 \) unit
    Radius of sphere = \( \frac{x}{2} \) unit
    Volume of sphere = \( \frac{4}{3} \pi \left( \frac{x}{2} \right)^3 = \frac{4\pi}{3} \times \frac{x^3}{8} = \frac{\pi x^3}{6} \)
    \( \therefore \) Ratio = \( \frac{x^3}{\pi x^3} = \frac{6}{\pi} = 6: \pi \)
11. \( 3(x + 2) = 2(2x - 1) \)
    \( or, 3x + 6 = 4x - 2 \)
    \( \Rightarrow x = 8 \)
For representing on number line
For representing in Cartesian Plane

12. Let ABCD be a \( gm \) in which bisector of \( \angle A \) meets BC at X such that BX = CX.
   Draw \( XY \parallel BA \), meeting AD at Y.
   Since X is mid-point of BC and \( XY \parallel BA \parallel CD \)
   Y is also mid-point of AD, i.e. \( AY=AYD \)
   Let \( \angle XAB = x^\circ = \angle XAY \) .... (i)
   \( \Rightarrow \angle AXY = x^\circ \) (alt angle) .... (ii)
   From (i) & (ii)
   \( \angle YAX = \angle YXA = x^\circ \Rightarrow AY = XY \)
   \( \text{or}, AY = AB \) (\( XY = AB, ABXY \parallel gm \))
   \( \text{or}, 2AY = 2AB \)
   \( \text{or}, AD = 2AB \)

13. Let the angles of the quadrilateral be \( 2x^\circ, 4x^\circ, 5x^\circ \) and \( 7x^\circ \)
   \( \Rightarrow 2x^\circ + 4x^\circ + 5x^\circ + 7x^\circ = 360^\circ \)
   \( \Rightarrow x = 20^\circ \)
   \( \therefore \text{Angles are } 40^\circ, 80^\circ, 100^\circ \) and \( 140^\circ \)

14. In \( \triangle ABC \), \( AD \) is median, \( \therefore BD = DC \)
   Draw, \( AM \perp BC \),
   \( ar \triangle ABD = \frac{1}{2} \times BD \times AM \) .... (i)
   \( ar \triangle ADC = \frac{1}{2} \times DC \times AM = \frac{1}{2} \times BD \times AM \) .... (ii)
   From (i) & (ii),
   \( ar \triangle ABD = ar \triangle ADC \)

15. \( \angle BOC = 2\angle BAC \)
   \( \text{or}, (180^\circ - 2x) = 2\angle BAC \)
   \( \text{or}, (90^\circ - x) = \angle BAC \)
   \( \text{or}, 90^\circ = x + \angle BAC \)
   \( \text{or}, 90^\circ = \angle OBC + \angle BAC \)

16. For neat and correct construction of given measure.

17. Volume of the solid cube = \( 12 \times 12 \times 12 = 1728 \text{ cm}^3 \)
   Let the side of the new cube = \( x \text{ cm} \)
   Volume of 8 such cubes = \( 8x^3 \text{ cm}^3 \)
   \( A/q, 8x^3 = 1728 \)
   \( \Rightarrow x = 6 \text{ cm} \)

18. \( n(s) = 11 \)
    \( n(e) = 7 \)
    \( P(\text{bags containing more than } 5 \text{ kg of flour}) = \frac{7}{11} \)

19. For correct table and graph of equation \( x = 4 \)
   For correct table and graph of equation \( y = 5 \)
   For correct area.

20. \( 2x + 3y = 16 \)
    For correct table and graph.

21. Construction: Join diagonal AC
    Let AC and BD intersect each other at O.
    Since diagonals of a \( gm \) bisect each other.
    \( \Rightarrow OA = OC \) and \( OB = OD \)
    \( \text{It is given that } BQ = DP \)
    \( \text{or}, OB - BQ = OD - DP \)
⇒ OQ = OP

In quadrilateral APCQ, diagonals AC & PQ bisect each other.

∴ APCQ is a || gm

22. In trapezium ABCD, AB || DC, XY is drawn parallel to AC

Construction: Joint CX

ar ΔADX = ar ΔACX (both Δs lie on same base and between same parallel lines) 
.......... (i)

ar ΔACX = ar ΔACY (both Δs lie on base AC and between || lines AC and XY) 
.......... (ii)

From (i) and (ii),

ar ΔADX = ar ΔACY

23. Let ABCD be a quadrilateral. Internal bisectors of ∠A, ∠B, ∠C and ∠D form Quadrilateral EFGH.

In ∆ADG, ∠AGD = 180° - (1/2 ∠A + 1/2 ∠D) 
..........(i)

But, ∠AGD = ∠EGF (VOA)

∴ ∠EGF = 180° - (1/2 ∠A + 1/2 ∠D)  
 ..........(ii)

Similarly, ∠EHF = 180° - (1/2 ∠B + 1/2 ∠C)  
 ..........(iii)

Adding (ii) and (iii),

∠EGF + ∠EHF = 360° - 1/2(∠A + ∠B + ∠C + ∠D)
= 360° - 1/2 × 360°
= 180°

∴ Quadrilateral EFGH is cyclic.

24. For correct construction as per given scale

Steps of construction.

25. CSA of Pillar = 2× 22/7 × 25/100 × 3.5 = 5.5 m²

Cost of painting = Rs 5.50 × 12.50 = Rs 68.75

26. Volume of bowl = 2/3 π(5.25)³ cm³
= 303.1875 cm³
= 0.3031875 litre.

27. Inner radius (r) = 2 cm
Outer radius (R)= 2.2 cm
Height (h) = 77 cm
∴ R + r = 4.2,  R - r = 0.2
Total SA = Inner CSA + Outer CSA + Area of Circular rings on both ends.
= 2πrh + 2πRh + 2(πR² - πr²)
= 2π(rh + Rh + (R² - r²))
= 2 × 22/7 (2 × 77 + 2.2 × 77 + 4.2 × 0.2)
\[= 2 \times \frac{22}{7} (154 + 169.4 + 0.84)\]
\[= \frac{44}{7} \times 324.24\]
\[= 2038.08 \, cm^2\]

28. (i) No. of children participated in campaign = \(28 - 6 = 22\)

\[P(E) = \frac{22}{28} = \frac{11}{14}\]

(ii) \[P(E) = \frac{6}{28} = \frac{3}{14}\]

Value: The children are socially active, futuristic and disciplined.

29. For calculating mean of FTAs.
   For showing number of years.

30. For finding number of males
    For finding number of females

31. For correct representation of graph

OR

(अथवा)

29. For correct class interval.
   For correct histogram.

30. For naming correct social networking site.
    For answering how the site is beneficial.

31. For calculating correct angles for different languages.
    For drawing pie-chart.