



Series **C4ABD/4**

SET~2

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **430/4/2**

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Q.P. Code on the title page of the answer-book.

नोट / NOTE :

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं ।
Please check that this question paper contains **23** printed pages.
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **38** प्रश्न हैं ।
Please check that this question paper contains **38** questions.
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।

Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।

Please write down the serial number of the question in the answer-book before attempting it.

- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।

15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

गणित (बुनियादी)

MATHEMATICS (BASIC)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) *This question paper contains **38** questions. **All** questions are **compulsory**.*
- (ii) *This question paper is divided into **five** Sections – **A, B, C, D** and **E**.*
- (iii) *In **Section A**, Questions no. **1** to **18** are Multiple Choice Questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of **1** mark each.*
- (iv) *In **Section B**, Questions no. **21** to **25** are Very Short Answer (VSA) type questions, carrying **2** marks each.*
- (v) *In **Section C**, Questions no. **26** to **31** are Short Answer (SA) type questions, carrying **3** marks each.*
- (vi) *In **Section D**, Questions no. **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.*
- (vii) *In **Section E**, Questions no. **36** to **38** are case study based questions carrying **4** marks each. Internal choice is provided in **2** marks questions in each case study.*
- (viii) *There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.*
- (ix) *Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.*
- (x) *Use of calculator is **not** allowed.*

SECTION A

This section comprises Multiple Choice Questions (MCQs) of 1 mark each. 20×1=20

1. The root(s) of the quadratic equation $x^2 - 25 = 0$ is/are :

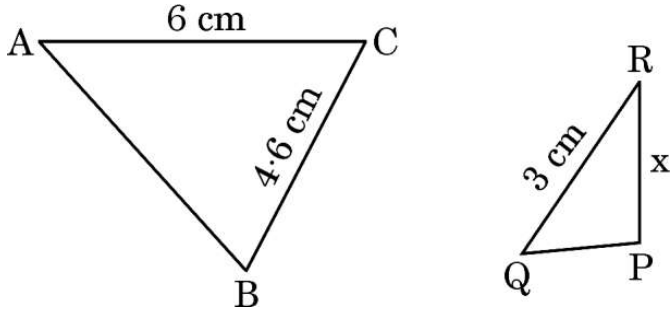
- | | |
|-----------|-----------------|
| (A) 5 | (B) – 5, 5 |
| (C) 25 | (D) – 25, 25 |

2. If $2800 = 2^x \times 5^y \times 7$, then the value of $(x + y)$ is :

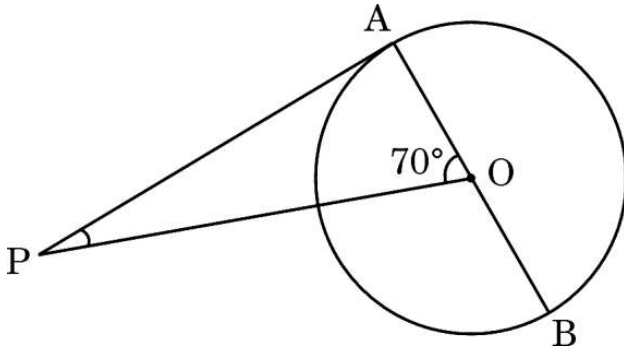
- | | |
|----------|----------|
| (A) 5 | (B) 4 |
| (C) 8 | (D) 6 |



3. दी गई आकृति में, यदि $\triangle ABC \sim \triangle QPR$ है, तो x का मान है :



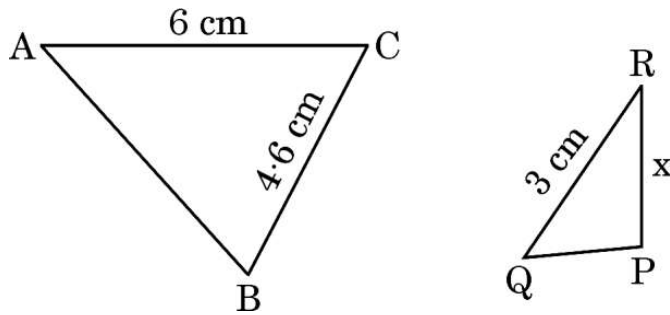
- (A) 5.3 cm (B) 4.6 cm
(C) 2.3 cm (D) 4 cm
4. दी गई आकृति में, केन्द्र O वाले एक वृत्त पर बाह्य बिन्दु P से एक स्पर्श-रेखा PA बनी है । यदि $\angle AOP = 70^\circ$ है, तो $\angle APO$ का माप है :



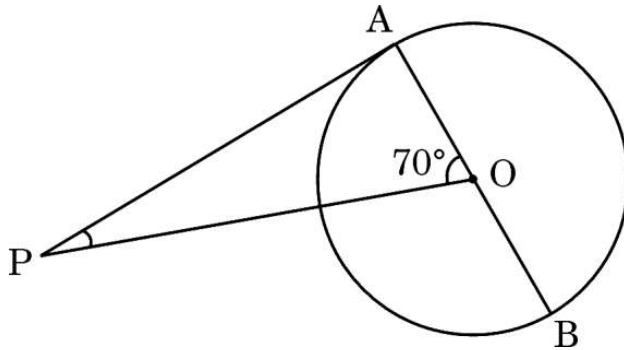
- (A) 70° (B) 90°
(C) 110° (D) 20°
5. द्विघात बहुपदों, जिनके शून्यक -1 और 3 हैं, की संख्या है :
- (A) 1 (B) 2
(C) 3 (D) 3 से अधिक
6. वृत्त की एक जीवा और दो चापों में से किसी एक के बीच का प्रत्येक क्षेत्र कहलाता है :
- (A) एक चाप (B) एक त्रिज्यखंड
(C) एक वृत्तखंड (D) एक अर्धवृत्त



3. In the given figure, if $\triangle ABC \sim \triangle QPR$, then the value of x is :



- (A) 5.3 cm (B) 4.6 cm
(C) 2.3 cm (D) 4 cm
4. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle AOP = 70^\circ$, then the measure of $\angle APO$ is :



- (A) 70° (B) 90°
(C) 110° (D) 20°
5. The number of quadratic polynomials having zeroes -1 and 3 is :
- (A) 1 (B) 2
(C) 3 (D) more than 3
6. The region between a chord and either of the two arcs of a circle is called :
- (A) an arc (B) a sector
(C) a segment (D) a semicircle



7. किसी वृत्त की स्पर्श-रेखा वह रेखा होती है जो वृत्त को स्पर्श करती है :

- (A) केवल एक ही बिन्दु पर (B) दो बिन्दुओं पर
(C) तीन बिन्दुओं पर (D) अनंत बिन्दुओं पर

8. निम्नलिखित बंटन एक फैक्टरी के 50 श्रमिकों की दैनिक आय दर्शाता है :

आय (₹ में)	400 – 424	425 – 449	450 – 474	475 – 499	500 – 524
श्रमिकों की संख्या	12	14	8	6	10

बहुलक वर्ग की निचली सीमा है :

- (A) 425 (B) 449
(C) 424.5 (D) 425.5

9. समांतर श्रेणी का सार्व अंतर, यदि $a_{23} - a_{19} = 32$ है, है :

- (A) 8 (B) - 8
(C) - 4 (D) 4

10. r त्रिज्या के एक वृत्त में, कोण θ (डिग्री में) वाले त्रिज्यखंड का क्षेत्रफल है :

- (A) $\frac{\theta}{180} \times 2\pi r$ (B) $\frac{\theta}{180} \times \pi r^2$
(C) $\frac{\theta}{360} \times 2\pi r$ (D) $\frac{\theta}{720} \times 2\pi r^2$

11. बिन्दुओं $A(4, x)$ और $B(-2, 4)$ को मिलाने वाले रेखा खंड AB का मध्य-बिन्दु यदि $C(1, -1)$ है, तो x का मान है :

- (A) 5 (B) - 5
(C) 6 (D) - 6

12. $\left(\frac{1}{\cot^2 \theta}\right) - \left(\frac{1}{\cos^2 \theta}\right)$ बराबर है :

- (A) 1 (B) - 1
(C) 0 (D) $\sec^2 \theta$



7. A tangent to a circle is a line that touches the circle at :

- (A) one point only (B) two points
(C) three points (D) infinite number of points

8. The following distribution gives the daily income of 50 workers of a factory :

Income (in ₹)	400 – 424	425 – 449	450 – 474	475 – 499	500 – 524
Number of workers	12	14	8	6	10

The lower limit of the modal class is :

- (A) 425 (B) 449
(C) 424.5 (D) 425.5

9. The common difference of an A.P., if $a_{23} - a_{19} = 32$, is :

- (A) 8 (B) – 8
(C) – 4 (D) 4

10. Area of a sector of angle θ (in degrees) of a circle with radius r is :

- (A) $\frac{\theta}{180} \times 2\pi r$ (B) $\frac{\theta}{180} \times \pi r^2$
(C) $\frac{\theta}{360} \times 2\pi r$ (D) $\frac{\theta}{720} \times 2\pi r^2$

11. If $C(1, -1)$ is the mid-point of the line segment AB joining points $A(4, x)$ and $B(-2, 4)$, then value of x is :

- (A) 5 (B) – 5
(C) 6 (D) – 6

12. $\left(\frac{1}{\cot^2 \theta}\right) - \left(\frac{1}{\cos^2 \theta}\right)$ is equal to :

- (A) 1 (B) – 1
(C) 0 (D) $\sec^2 \theta$



13. यदि एक घटना की प्रायिकता 'p' है, तो इस घटना की पूरक घटना की प्रायिकता क्या है ?

- (A) $1 - p$ (B) $p - 1$
(C) p (D) $\frac{1}{p}$

14. x-अक्ष से बिन्दु (4, 5) की दूरी है :

- (A) 5 (B) 4
(C) 9 (D) 1

15. निम्नलिखित में से कौन-सा द्विघात समीकरण *नहीं* है ?

- (A) $(x - 2)^2 + 1 = 2x - 3$
(B) $(2x - 1)(x - 3) = (x + 5)(x - 1)$
(C) $x(x + 1) + 8 = (x + 2)(x - 2)$
(D) $2x + \frac{3}{x} = 5$

16. यदि द्विघात बहुपद $kx^2 + 4x + k$ का एक शून्यक 1 है, तो k का मान है :

- (A) 2 (B) -2
(C) 4 (D) -4

17. निम्नलिखित बारंबारता बंटन का माध्यक वर्ग है :

वर्ग	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
बारंबारता	5	8	20	15	7	5

- (A) 10 - 20 (B) 20 - 30
(C) 30 - 40 (D) 40 - 50

18. 9 m ऊँचे बिजली के खंभे की ज़मीन पर $3\sqrt{3}$ m लम्बी छाया है । उस समय पर सूर्य का उन्नतांश है :

- (A) 60° (B) 90°
(C) 45° (D) 30°



13. If the probability of an event is 'p', what is the probability of its complementary event ?

- (A) $1 - p$ (B) $p - 1$
(C) p (D) $\frac{1}{p}$

14. The distance of the point (4, 5) from x-axis is :

- (A) 5 (B) 4
(C) 9 (D) 1

15. Which of the following is **not** a quadratic equation ?

- (A) $(x - 2)^2 + 1 = 2x - 3$
(B) $(2x - 1)(x - 3) = (x + 5)(x - 1)$
(C) $x(x + 1) + 8 = (x + 2)(x - 2)$
(D) $2x + \frac{3}{x} = 5$

16. If one zero of a quadratic polynomial $kx^2 + 4x + k$ is 1, then the value of k is :

- (A) 2 (B) -2
(C) 4 (D) -4

17. The median group in the following frequency distribution is :

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	5	8	20	15	7	5

- (A) 10 - 20 (B) 20 - 30
(C) 30 - 40 (D) 40 - 50

18. A lamp post 9 m high casts a shadow $3\sqrt{3}$ m long on the ground. The Sun's elevation at this moment is :

- (A) 60° (B) 90°
(C) 45° (D) 30°



Questions number **19** and **20** are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (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.

19. Assertion (A) : The probability of getting number 8 on rolling a die is zero (0).

Reason (R) : The probability of an impossible event is zero (0).

20. Assertion (A) : The pair of linear equations $5x + 2y + 6 = 0$ and $7x + 6y + 18 = 0$ have infinitely many solutions.

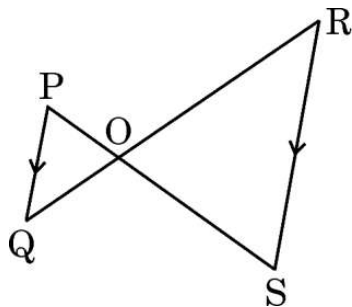
Reason (R) : The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinitely many solutions, if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

SECTION B

This section comprises Very Short Answer (VSA) type questions of 2 marks each.

5×2=10

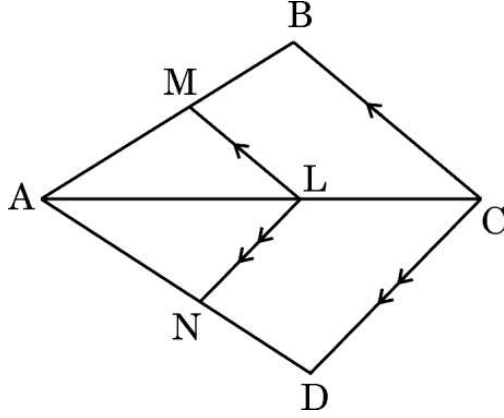
21. (a) In the given figure, $PQ \parallel RS$. Prove that $OP \times OR = OQ \times OS$.



OR



- (b) दी गई आकृति में, $LM \parallel CB$ और $LN \parallel CD$ है। सिद्ध कीजिए कि $\frac{AM}{AN} = \frac{AB}{AD}$.



22. मान ज्ञात कीजिए :

$$\sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ - \cot 45^\circ$$

23. अभाज्य गुणनखंडन विधि द्वारा, 45, 54, 270 का HCF ज्ञात कीजिए।

24. किसी वृत्त के व्यास AB के सिरो पर दो स्पर्श-रेखाएँ XY और PQ खींची गई हैं। सिद्ध कीजिए कि $XY \parallel PQ$ है।

25. (a) यदि बहुपद $8x^2 + 14x + 3$ के शून्यक α, β हैं, तो $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ का मान ज्ञात कीजिए।

अथवा

- (b) एक द्विघात बहुपद ज्ञात कीजिए जिसके शून्यक -9 और 6 हैं।

खण्ड ग

इस खण्ड में लघु-उत्तरीय (SA) प्रकार के प्रश्न हैं, जिनमें प्रत्येक के 3 अंक हैं।

6×3=18

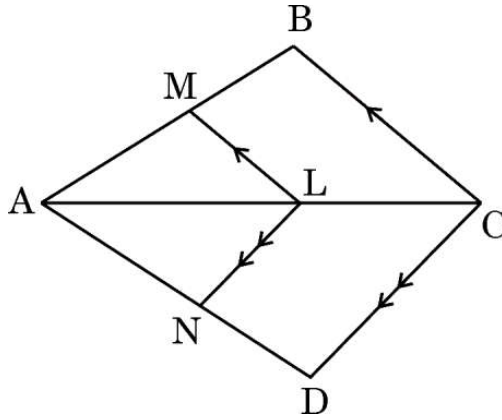
26. सिद्ध कीजिए कि :

$$(\operatorname{cosec} A - \cot A)^2 = \frac{1 - \cos A}{1 + \cos A}$$

27. जाँच कीजिए कि क्या किसी प्राकृत संख्या n के लिए, संख्या 4^n अंक 0 पर समाप्त हो सकती है। अपने उत्तर के लिए कारण दीजिए।



- (b) In the given figure, $LM \parallel CB$ and $LN \parallel CD$. Prove that $\frac{AM}{AN} = \frac{AB}{AD}$.



22. Evaluate :

$$\sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ - \cot 45^\circ$$

23. Find the HCF of 45, 54, 270 using prime factorization method.
24. XY and PQ are two tangents drawn at the end points of the diameter AB of a circle. Prove that $XY \parallel PQ$.
25. (a) If α, β are zeroes of the polynomial $8x^2 + 14x + 3$, then find the value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$.

OR

- (b) Find a quadratic polynomial whose zeroes are -9 and 6 .

SECTION C

This section comprises Short Answer (SA) type questions of 3 marks each. 6×3=18

26. Prove that :

$$(\operatorname{cosec} A - \cot A)^2 = \frac{1 - \cos A}{1 + \cos A}$$

27. Check whether the number 4^n can end with digit 0 for any natural number n . Give reasons for your answer.



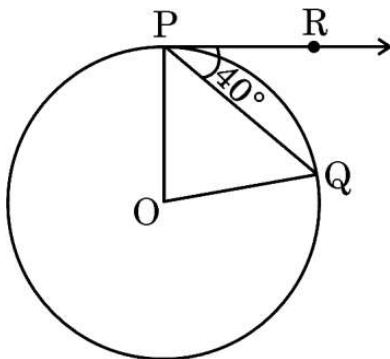
28. One card is drawn at random from a well-shuffled deck of 52 playing cards. Find the probability that the card drawn is :
- (i) a red king.
 - (ii) not a black card.
 - (iii) an ace of hearts.
29. A chord of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding (i) minor sector (ii) major sector. (Use $\pi = 3.14$)
30. (a) Using quadratic formula, find the real roots of the equation $2x^2 + 2x + 9 = 0$, if they exist.

OR

- (b) Find the values of 'k' for which the quadratic equation $kx^2 - 2kx + 6 = 0$ has real and equal roots. Also, find the roots.
31. (a) Prove that opposite sides of a quadrilateral circumscribing a circle subtends supplementary angles at the centre of the circle.

OR

- (b) If O is the centre of a circle, PQ is a chord and the tangent PR at P makes an angle of 40° with PQ, then find the measure of $\angle POQ$.





SECTION D

This section comprises Long Answer (LA) type questions of 5 marks each. 4×5=20

32. From a point P on the ground, the angle of elevation of the top of a 15 m tall building is 30° . A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45° . Find the length of the flagstaff and the distance of the building from the point P. (Use $\sqrt{3} = 1.732$)

33. The second term of an A.P. is 29 and the fourth term is 51. If the last term of the A.P. is 425, find how many terms are there and what is their sum.

34. (a) Two cubes each of volume 125 cm^3 are joined end to end. Find the volume and the surface area of the resulting cuboid.

OR

(b) A solid is in the shape of a cone surmounted on a hemisphere with both their diameters being equal to 7 cm and the height of the cone is equal to its radius. Find the volume of the solid.

35. (a) If BD and QM are medians of triangles ABC and PQR, respectively, where $\triangle ABC \sim \triangle PQR$, prove that $\frac{AB}{PQ} = \frac{BD}{QM}$.

OR

(b) CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of $\triangle ABC$ and $\triangle FEG$ respectively. If $\triangle ABC \sim \triangle FEG$, show that :

(i) $\frac{CD}{GH} = \frac{AC}{FG}$

(ii) $\triangle DCB \sim \triangle HGE$



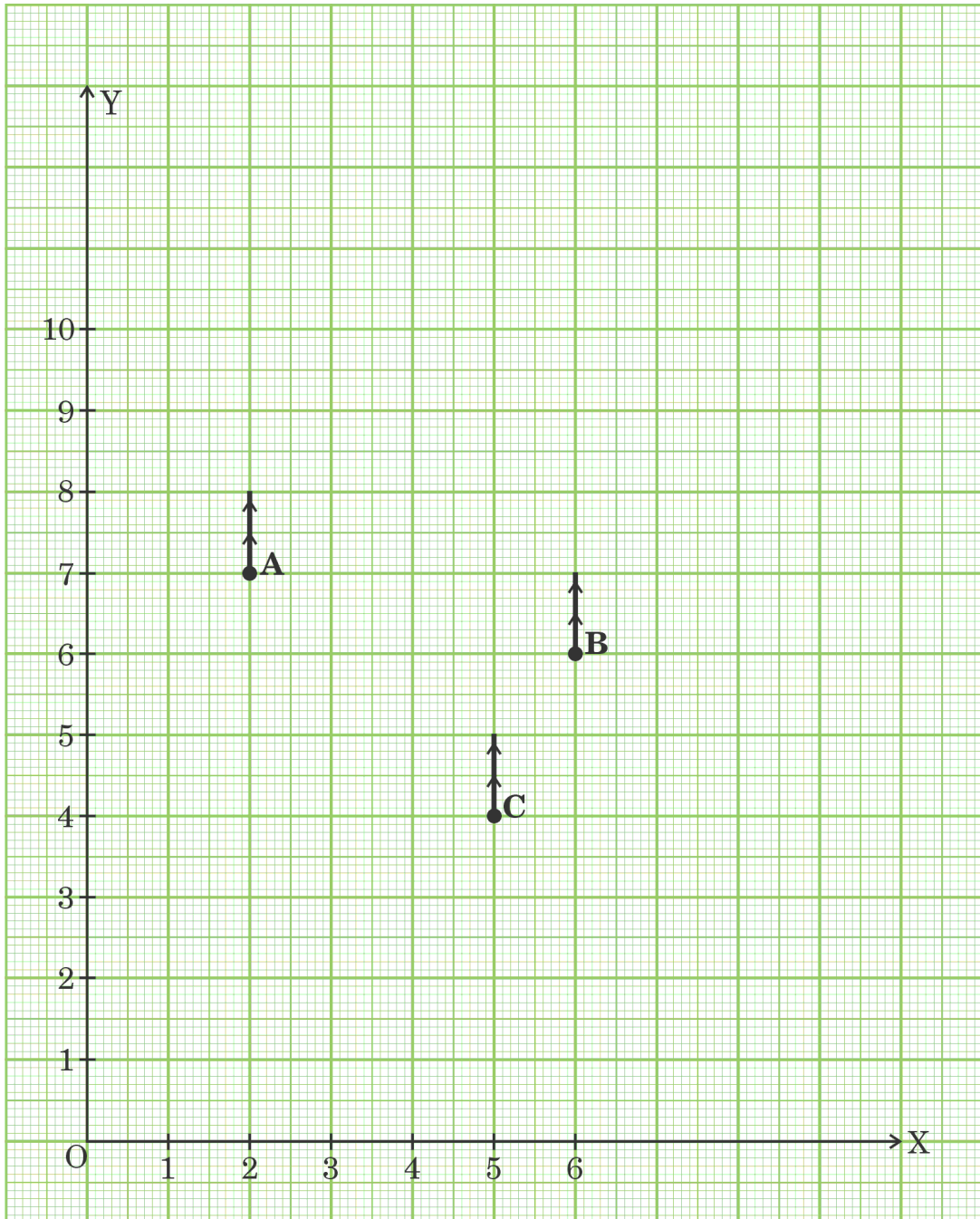
SECTION E

This section comprises 3 case study based questions of 4 marks each.

3×4=12

Case Study – 1

36. Resident Welfare Association (RWA) of Gulmohar Society in Delhi, have installed three electric poles A, B and C in the society's common park. Despite these three poles, some parts of the park are still in the dark. So, RWA decides to have one more electric pole D in the park. The park can be modelled as a coordinate system given below.





On the basis of the above information, answer the following questions :

- (i) What is the position of the pole C ? 1
 - (ii) What is the distance of the pole B from the corner O of the park ? 1
 - (iii) (a) Find the position of the fourth pole D so that the four points A, B, C and D form a parallelogram ABCD. 2
- OR**
- (b) Find the distance between poles A and C. 2

Case Study – 2

37. Deepankar bought 3 notebooks and 2 pens for ₹ 80 and his friend Suryansh bought 4 notebooks and 3 pens for ₹ 110 from the school bookshop.



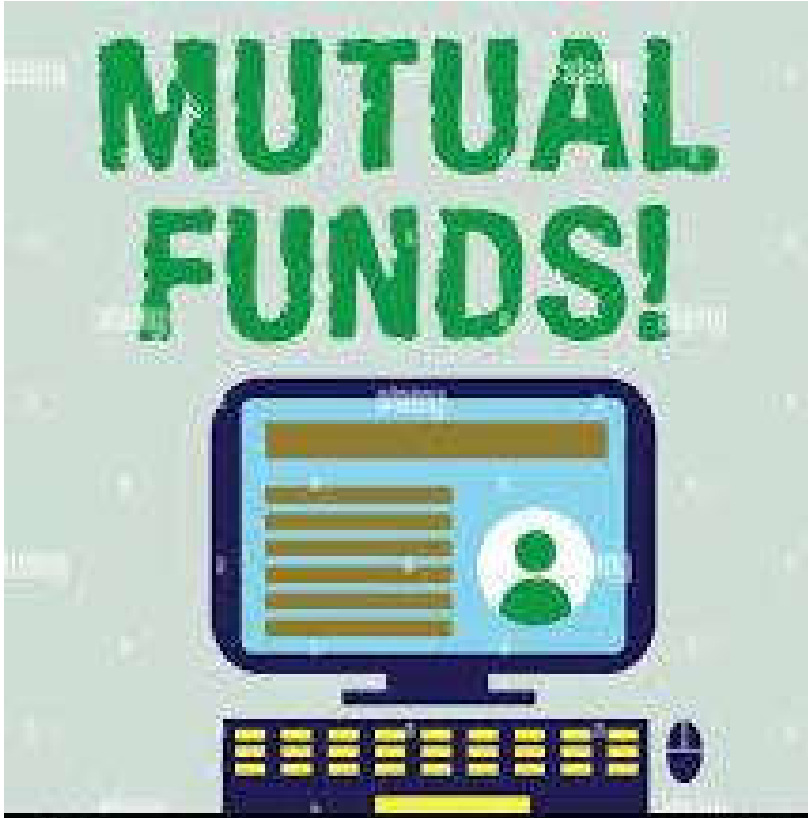
Based on the above information, answer the following questions.

- (i) If the price of one notebook be ₹ x and the price of one pen be ₹ y , write the given situation algebraically. 1
 - (ii) (a) What is the price of one notebook ? 2
- OR**
- (b) What is the price of one pen ? 2
 - (iii) What is the total amount to be paid by Suryansh, if he purchases 6 notebooks and 3 pens ? 1



Case Study – 3

38. **Mutual Fund :** A mutual fund is a type of investment vehicle that pools money from multiple investors to invest in securities like stocks, bonds or other securities. Mutual funds are operated by professional money managers, who allocate the fund's assets and attempt to produce capital gains or income for the fund's investors.



Net Asset Value (NAV) represents a fund's per share market value. It is the price at which the investors buy fund shares from a fund company and sell them to a fund company.

The following table shows the Net Asset Value (NAV) per unit of mutual fund of ICICI mutual funds :

NAV (in ₹)	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Number of mutual funds	13	16	22	18	11

Based on the above information, answer the following questions :

- (i) What is the upper limit of modal class of the data ? 1
- (ii) What is the median class of the data ? 1
- (iii) (a) What is the mode NAV of mutual funds ? 2

OR

- (b) What is the median NAV of mutual funds ? 2