



Series **C4ABD/4**

SET~2

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code

30/4/2

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 (मानक)

MATHEMATICS (STANDARD)



निर्धारित समय : 3 घण्टे

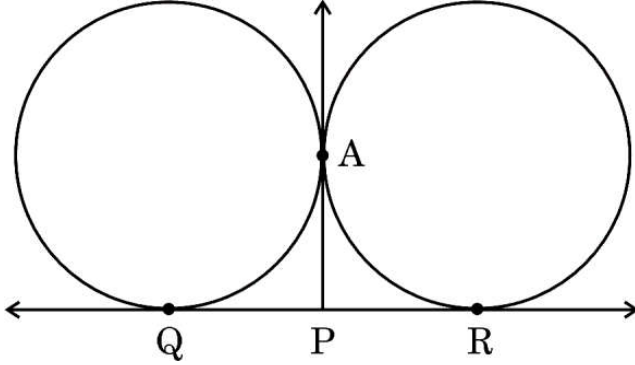
अधिकतम अंक : 80

Time allowed : 3 hours

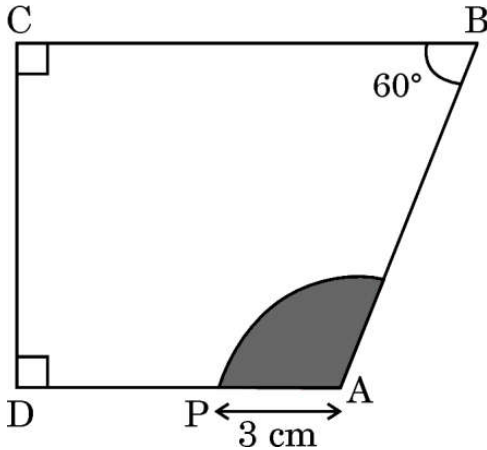
Maximum Marks : 80



3. दी गई आकृति में, बिंदु A पर बाह्य स्पर्श करने वाले दो वृत्तों की एक उभयनिष्ठ स्पर्श-रेखा QR है। बिंदु A पर खींची गई स्पर्श-रेखा QR को P पर मिलती है। यदि $AP = 4.2 \text{ cm}$ है, तो QR की लंबाई है :



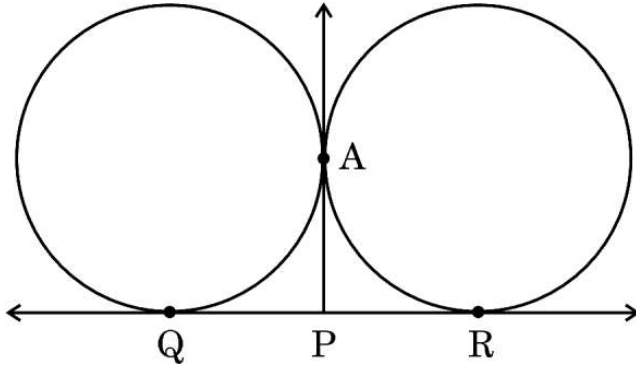
- (A) 4.2 cm (B) 2.1 cm
(C) 8.4 cm (D) 6.3 cm
4. यदि दी गई आकृति में, $\angle C = \angle D = 90^\circ$, $\angle B = 60^\circ$ तथा $AP = 3 \text{ cm}$ है, तो छायांकित भाग का क्षेत्रफल है :



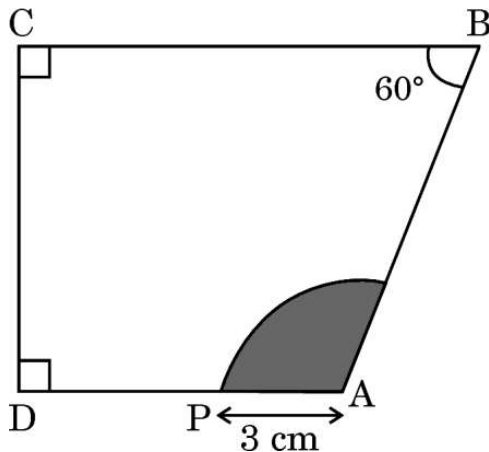
- (A) $3\pi \text{ cm}^2$ (B) $6\pi \text{ cm}^2$
(C) $7\pi \text{ cm}^2$ (D) $9\pi \text{ cm}^2$
5. यदि 6, 7, p, 8, q, 14 का माध्य 9 है, तो
- (A) $p - q = 19$ (B) $p + q = 19$
(C) $p - q = 21$ (D) $p + q = 21$
6. दिन में किसी समय, एक मीनार की छाया की लंबाई इसकी ऊँचाई के बराबर होती है। तो उस समय सूर्य का उन्नतांश है :
- (A) 30° (B) 45°
(C) 60° (D) 90°



3. In the given figure, QR is a common tangent to the two given circles touching externally at A. The tangent at A meets QR at P. If $AP = 4.2$ cm, then the length of QR is :



- (A) 4.2 cm (B) 2.1 cm
(C) 8.4 cm (D) 6.3 cm
4. If in the given figure, $\angle C = \angle D = 90^\circ$, $\angle B = 60^\circ$ and $AP = 3$ cm, then the area of the shaded region is :



- (A) $3\pi \text{ cm}^2$ (B) $6\pi \text{ cm}^2$
(C) $7\pi \text{ cm}^2$ (D) $9\pi \text{ cm}^2$
5. If the mean of 6, 7, p, 8, q, 14 is 9, then
(A) $p - q = 19$ (B) $p + q = 19$
(C) $p - q = 21$ (D) $p + q = 21$
6. At some time of the day, the length of the shadow of a tower is equal to its height. Then, the Sun's altitude at that time is :
(A) 30° (B) 45°
(C) 60° (D) 90°



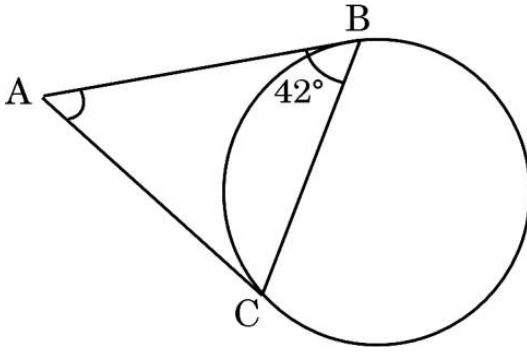
7. यदि वृत्त की एक चाप वृत्त केंद्र पर 90° का कोण अंतरित करती है, तो इस चाप की लंबाई तथा वृत्त की परिधि में अनुपात है :

- (A) $2 : 3$ (B) $1 : 4$
(C) $4 : 1$ (D) $1 : 3$

8. यदि $ax + by = a^2 - b^2$ तथा $bx + ay = 0$ है, तो $x + y$ का मान है :

- (A) $a^2 - b^2$ (B) $a + b$
(C) $a - b$ (D) $a^2 + b^2$

9. दी गई आकृति में, AB तथा AC एक वृत्त पर खींची गई स्पर्श-रेखाएँ हैं। यदि $\angle ABC = 42^\circ$ है, तो $\angle BAC$ की माप है :



- (A) 96° (B) 42°
(C) 106° (D) 86°

10. यदि द्विघात समीकरण $3x^2 - 2x + c = 0$ का विविक्तकर 16 है, तो c का मान है :

- (A) 1 (B) 0
(C) -1 (D) $\sqrt{2}$

11. एक समांतर चतुर्भुज ABCD के तीन शीर्ष $A(-2, 3)$, $B(6, 7)$ तथा $C(8, 3)$ हैं, तो इसका चौथा शीर्ष D है :

- (A) $(0, 1)$ (B) $(0, -1)$
(C) $(-1, 0)$ (D) $(1, 0)$

12. दो पासों को एक साथ उछाला गया। दोनों पासों पर विषम संख्याएँ प्राप्त होने की प्रायिकता है :

- (A) $\frac{6}{36}$ (B) $\frac{3}{36}$
(C) $\frac{12}{36}$ (D) $\frac{9}{36}$



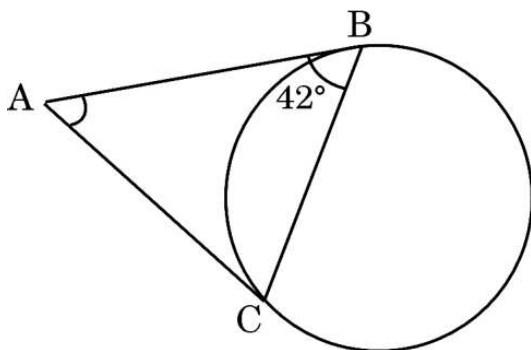
7. If an arc subtends an angle of 90° at the centre of a circle, then the ratio of its length to the circumference of the circle is :

(A) $2 : 3$ (B) $1 : 4$
(C) $4 : 1$ (D) $1 : 3$

8. If $ax + by = a^2 - b^2$ and $bx + ay = 0$, then the value of $x + y$ is :

(A) $a^2 - b^2$ (B) $a + b$
(C) $a - b$ (D) $a^2 + b^2$

9. In the given figure, AB and AC are tangents to the circle. If $\angle ABC = 42^\circ$, then the measure of $\angle BAC$ is :



(A) 96° (B) 42°
(C) 106° (D) 86°

10. If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is :

(A) 1 (B) 0
(C) -1 (D) $\sqrt{2}$

11. The fourth vertex D of a parallelogram ABCD whose three vertices are $A(-2, 3)$, $B(6, 7)$ and $C(8, 3)$ is :

(A) $(0, 1)$ (B) $(0, -1)$
(C) $(-1, 0)$ (D) $(1, 0)$

12. Two dice are tossed simultaneously. The probability of getting odd numbers on both the dice is :

(A) $\frac{6}{36}$ (B) $\frac{3}{36}$
(C) $\frac{12}{36}$ (D) $\frac{9}{36}$



13. दी गई दो रेखाएँ परस्पर समांतर हैं। इनमें से एक रेखा का समीकरण $5x - 3y = 2$ है। तो दूसरी रेखा का समीकरण हो सकता है :

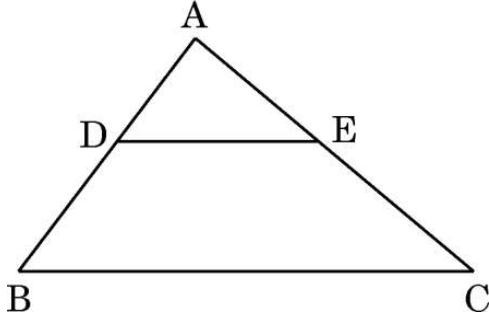
(A) $-15x - 9y = 5$

(B) $15x + 9y = 5$

(C) $9x - 15y = 6$

(D) $-15x + 9y = 5$

14. एक $\triangle ABC$ में, $DE \parallel BC$ है (जैसा कि आकृति में दर्शाया गया है)। यदि $AD = 4$ cm, $AB = 9$ cm तथा $AC = 13.5$ cm है, तो EC की लंबाई है :



(A) 6 cm

(B) 7.5 cm

(C) 9 cm

(D) 5.7 cm

15. शब्द “MOBILE” के अक्षरों में से यादृच्छया एक अक्षर चुना गया। चुने हुए अक्षर के एक स्वर (vowel) होने की प्रायिकता है :

(A) $\frac{3}{7}$

(B) $\frac{1}{6}$

(C) $\frac{1}{2}$

(D) $\frac{1}{3}$

16. यदि $3825 = 3^x \times 5^y \times 17^z$ है, तो $x + y - 2z$ का मान है :

(A) 0

(B) 1

(C) 2

(D) 3

17. एक द्विघात बहुपद, जिसका एक शून्यक $2 + \sqrt{5}$ है तथा जिसके शून्यकों का योगफल 4 है, है :

(A) $x^2 + 4x - 1$

(B) $x^2 - 4x - 1$

(C) $x^2 - 4x + 1$

(D) $x^2 + 4x + 1$

18. एक A.P. के प्रथम तीन पद क्रमशः $3p - 1$, $3p + 5$, $5p + 1$ हैं, तो p का मान है :

(A) 2

(B) -3

(C) 4

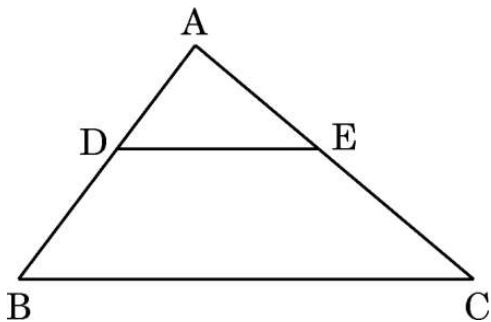
(D) 5



13. Two lines are given to be parallel. The equation of one of these lines is $5x - 3y = 2$. The equation of the second line can be :

(A) $-15x - 9y = 5$ (B) $15x + 9y = 5$
(C) $9x - 15y = 6$ (D) $-15x + 9y = 5$

14. In $\triangle ABC$, $DE \parallel BC$ (as shown in the figure). If $AD = 4$ cm, $AB = 9$ cm and $AC = 13.5$ cm, then the length of EC is :



(A) 6 cm (B) 7.5 cm
(C) 9 cm (D) 5.7 cm

15. From the letters of the word “MOBILE”, a letter is selected at random. The probability that the selected letter is a vowel, is :

(A) $\frac{3}{7}$ (B) $\frac{1}{6}$
(C) $\frac{1}{2}$ (D) $\frac{1}{3}$

16. If $3825 = 3^x \times 5^y \times 17^z$, then the value of $x + y - 2z$ is :

(A) 0 (B) 1
(C) 2 (D) 3

17. A quadratic polynomial, one of whose zeroes is $2 + \sqrt{5}$ and the sum of whose zeroes is 4, is :

(A) $x^2 + 4x - 1$ (B) $x^2 - 4x - 1$
(C) $x^2 - 4x + 1$ (D) $x^2 + 4x + 1$

18. If the first three terms of an A.P. are $3p - 1$, $3p + 5$, $5p + 1$ respectively; then the value of p is :

(A) 2 (B) -3
(C) 4 (D) 5



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 the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the 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) : If the circumference of a circle is 176 cm, then its radius is 28 cm.

Reason (R): Circumference = $2\pi \times$ radius of a circle.

20. Assertion (A) : Mid-point of a line segment divides the line segment in the ratio 1 : 1.

Reason (R) : The ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, 4)$ and $(-2, 3)$ is 1 : 2.

SECTION B

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

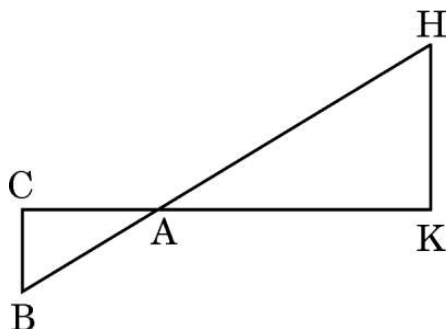
5×2=10

21. (a) Evaluate : $\frac{5 \cos^2 60^\circ + 4 \sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \sin^2 60^\circ}$

OR

(b) If $\sin (A - B) = \frac{1}{2}$, $\cos (A + B) = \frac{1}{2}$; $0 < A + B \leq 90^\circ$, $A > B$; find $\angle A$ and $\angle B$.

22. In the given figure, $\Delta AHK \sim \Delta ABC$. If $AK = 8$ cm, $BC = 3.2$ cm and $HK = 6.4$ cm, then find the length of AC .

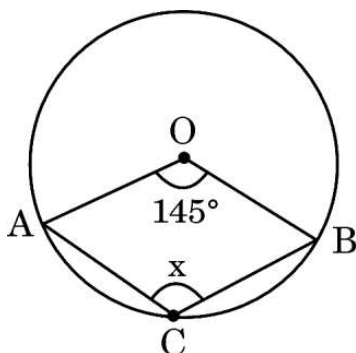




- 23.** In a school, there are two sections of class X. There are 40 students in the first section and 48 students in the second section. Determine the minimum number of books required for their class library so that they can be distributed equally among students of both sections.
- 24.** (a) The minute hand of a clock is 14 cm long. Find the area on the face of the clock described by the minute hand in 5 minutes.

OR

- (b) Find the length of the arc of a circle which subtends an angle of 60° at the centre of the circle of radius 42 cm.
- 25.** In the given figure, O is the centre of the circle. If $\angle AOB = 145^\circ$, then find the value of x.



SECTION C

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

- 26.** (a) Three coins are tossed simultaneously. What is the probability of getting
- (i) at least one head ?
 - (ii) exactly two tails ?
 - (iii) at most one tail ?

OR



- (b) A box contains 90 discs which are numbered 1 to 90. If one disc is drawn at random from the box, find the probability that it bears a :
- (i) 2-digit number less than 40.
 - (ii) number divisible by 5 and greater than 50.
 - (iii) a perfect square number.

27. Prove that the parallelogram circumscribing a circle is a rhombus.

28. Prove that $\frac{2 - \sqrt{3}}{5}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

29. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then prove that $q(p^2 - 1) = 2p$.

30. (a) Find the zeroes of the polynomial $4x^2 + 4x - 3$ and verify the relationship between zeroes and coefficients of the polynomial.

OR

(b) If α and β are the zeroes of the polynomial $x^2 + x - 2$, then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

31. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was ₹ 15,000 after 4 years of service and ₹ 18,000 after 10 years of service, what was his starting salary and what was the annual increment ?



SECTION D

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

32. (a) Find the value of 'k' for which the quadratic equation $(k + 1)x^2 - 2(3k + 1)x + (8k + 1) = 0$ has real and equal roots.

OR

- (b) A 2-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.

33. The following table shows the ages of the patients admitted in a hospital during a year :

Age (in years)	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
Number of patients	6	11	21	23	14	5

Find the mode and mean of the data given above.

34. (a) E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$.

OR

- (b) Sides AB, BC and the median AD of $\triangle ABC$ are respectively proportional to sides PQ, QR and the median PM of another $\triangle PQR$. Prove that $\triangle ABC \sim \triangle PQR$.

35. The angles of depression of the top and the bottom of a 50 m high building from the top of a tower are 45° and 60° , respectively. Find the height of the tower. (Use $\sqrt{3} = 1.73$)



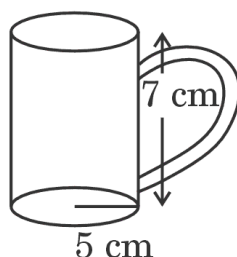
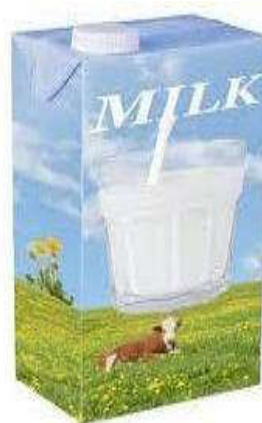
SECTION E

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

$3 \times 4 = 12$

Case Study – 1

- 36.** Tamper-proof tetra-packed milk guarantees both freshness and security. This milk ensures uncompromised quality, preserving the nutritional values within and making it a reliable choice for health-conscious individuals.



500 mL milk is packed in a cuboidal container of dimensions $15 \text{ cm} \times 8 \text{ cm} \times 5 \text{ cm}$. These milk packets are then packed in cuboidal cartons of dimensions $30 \text{ cm} \times 32 \text{ cm} \times 15 \text{ cm}$.

Based on the above given information, answer the following questions :

- (i) Find the volume of the cuboidal carton. 1
- (ii) (a) Find the total surface area of a milk packet. 2

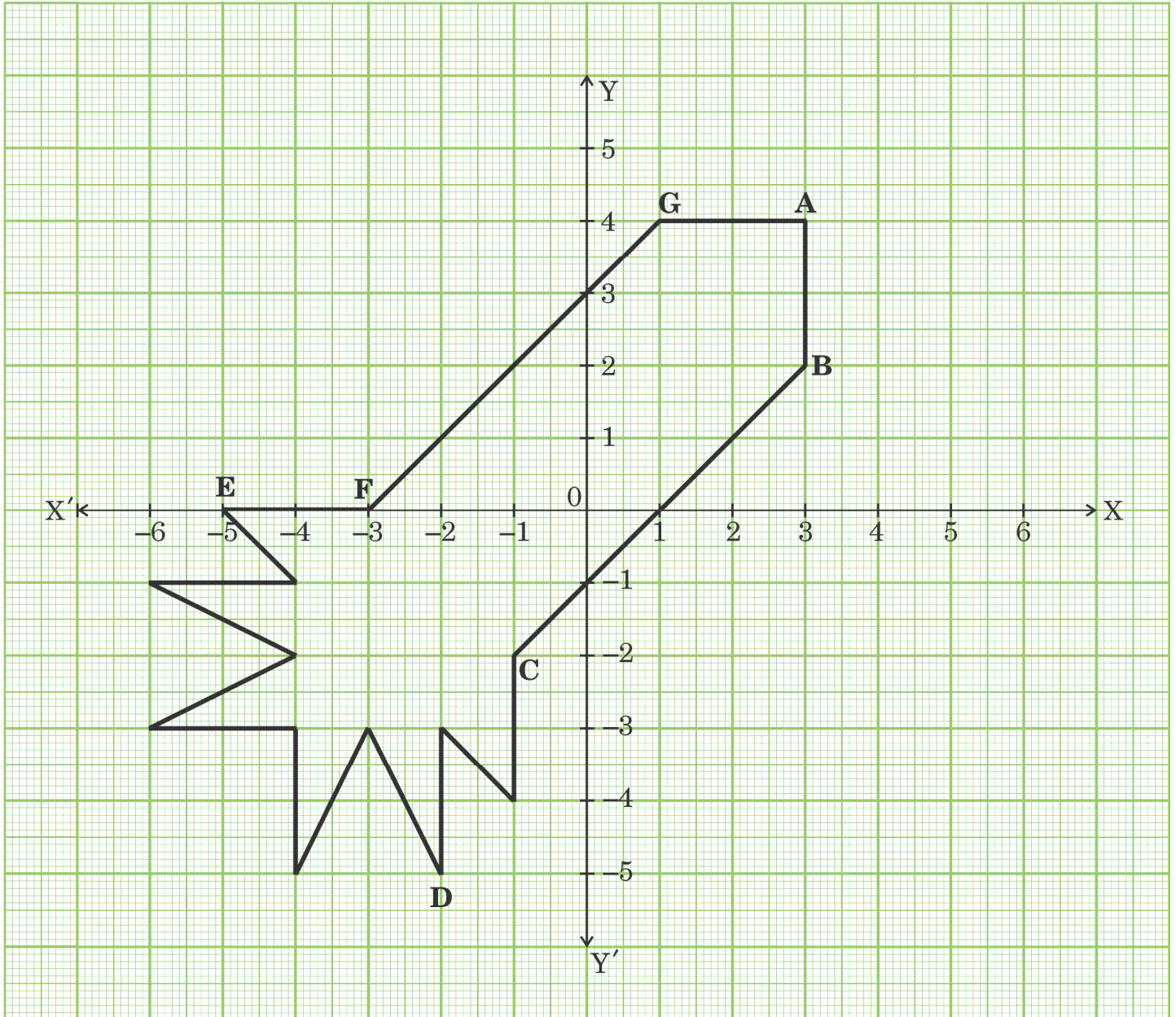
OR

- (b) How many milk packets can be filled in a carton ? 2
- (iii) How much milk can the cup (as shown in the figure) hold ? 1



Case Study – 2

37. Ryan, from a very young age, was fascinated by the twinkling of stars and the vastness of space. He always dreamt of becoming an astronaut one day. So he started to sketch his own rocket designs on the graph sheet. One such design is given below :



Based on the above, answer the following questions :

- (i) Find the mid-point of the segment joining F and G. 1
- (ii) (a) What is the distance between the points A and C ? 2

OR



- (b) Find the coordinates of the point which divides the line segment joining the points A and B in the ratio 1 : 3 internally. 2
- (iii) What are the coordinates of the point D ? 1

Case Study – 3

38. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize.

While playing a treasure hunt game, some clues (numbers) are hidden in various spots collectively forming an A.P. If the number on the n^{th} spot is $20 + 4n$, then answer the following questions to help the players in spotting the clues :



- (i) Which number is on first spot ? 1
- (ii) (a) Which spot is numbered as 112 ? 2
- OR**
- (b) What is the sum of all the numbers on the first 10 spots ? 2
- (iii) Which number is on the $(n - 2)^{\text{th}}$ spot ? 1