



Series DA2AB/2

SET~2

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **30/2/2**

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 परीक्षार्थी 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 candidates 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

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

30/2/2/DA2AB/21

107 B

Page 1

P.T.O.



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 number **1** to **18** are Multiple Choice Questions (MCQs) and question number **19** and **20** are Assertion-Reason based questions of **1** mark each.
- (iv) In Section–**B** questions number **21** to **25** are Very Short Answer (VSA) type questions, carrying **2** marks each.
- (v) In Section–**C** questions number **26** to **31** are Short Answer (SA) type questions, carrying **3** marks each.
- (vi) In Section–**D** questions number **32** to **35** are Long Answer (LA) type questions, carrying **5** marks each.
- (vii) In Section–**E** question number **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** question 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.



खण्ड - क

$20 \times 1 = 20$

इस खण्ड में 20 प्रश्न हैं तथा प्रत्येक प्रश्न का 1 अंक है।

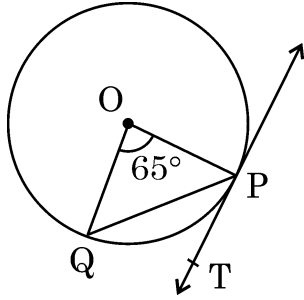
1. समांतर श्रेढ़ी (A.P.) $-29, -26, -23, \dots, 61$ का कौन सा पद 16 है ?

1

- (A) 11वाँ (B) 16वाँ
(C) 10वाँ (D) 31वाँ

2. दी गई आकृति में PT केंद्र O वाले वृत्त की एक स्पर्श-रेखा है। जीवा PQ वृत्त के केंद्र पर 65° का कोण अंतरित करती है। $\angle QPT$ की माप है :

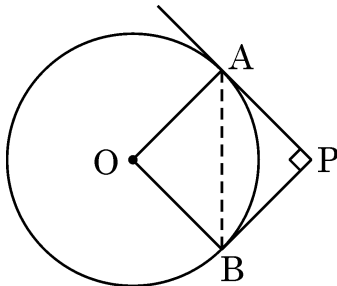
1



- (A) 65° (B) 57.5°
(C) 67.5° (D) 32.5°

3. दी गई आकृति में, केंद्र O वाले वृत्त पर बिंदु P से परस्पर लंबवत स्पर्श-रेखाएँ PA और PB खींची गई हैं। यदि $PA = 5 \text{ cm}$ है, तो AB की लंबाई है :

1



- (A) 5 cm (B) $5\sqrt{2} \text{ cm}$
(C) $2\sqrt{5} \text{ cm}$ (D) 10 cm



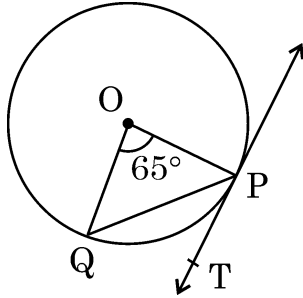
SECTION – A

$20 \times 1 = 20$

This section consists of 20 questions of 1 mark each.

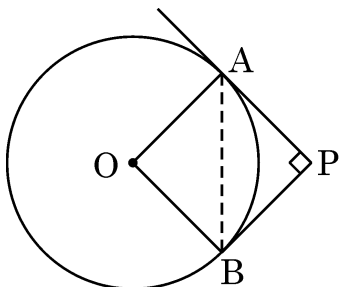
1. Which term of the A.P. $-29, -26, -23, \dots, 61$ is 16 ? 1
- (A) 11^{th} (B) 16^{th}
(C) 10^{th} (D) 31^{st}

2. In the given figure, PT is tangent to a circle with centre O. Chord PQ subtends an angle of 65° at the centre. The measure of $\angle QPT$ is : 1



- (A) 65° (B) 57.5°
(C) 67.5° (D) 32.5°

3. In the given figure, tangents PA and PB to the circle centred at O, from point P are perpendicular to each other. If $PA = 5$ cm, then length of AB is equal to 1

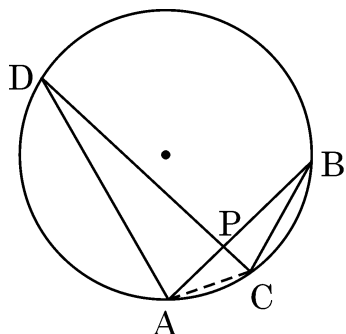


- (A) 5 cm (B) $5\sqrt{2}$ cm
(C) $2\sqrt{5}$ cm (D) 10 cm



4. AB and CD are two chords of a circle intersecting at P. Choose the correct statement from the following :

1



- (A) $\triangle ADP \sim \triangle CBA$ (B) $\triangle ADP \sim \triangle BPC$
(C) $\triangle ADP \sim \triangle BCP$ (D) $\triangle ADP \sim \triangle CBP$

5. If value of each observation in a data is increased by 2, then median of the new data

1

- (A) increases by 2 (B) increases by $2n$
(C) remains same (D) decreases by 2

6. If α and β are zeroes of the polynomial $2x^2 - 9x + 5$, then value of $\alpha^2 + \beta^2$ is

1

- (A) $\frac{1}{4}$ (B) $\frac{61}{4}$
(C) 1 (D) $\frac{71}{4}$

7. After an examination, a teacher wants to know the marks obtained by Maximum number of the students in her class. She requires to calculate _____ of marks.

1

- (A) median (B) mode
(C) mean (D) range

8. The value of k for which the system of equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ has infinitely many solutions, is

1

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



9. बिंदु P, बिंदुओं A(4, -5) तथा B(1, 2) को मिलाने वाले रेखाखण्ड को 5:2 के अनुपात में बाँटता है। बिंदु P के निर्देशांक हैं :

1

- (A) $\left(\frac{5}{2}, \frac{-3}{2}\right)$ (B) $\left(\frac{11}{7}, 0\right)$
(C) $\left(\frac{13}{7}, 0\right)$ (D) $\left(0, \frac{13}{7}\right)$

10. एक बक्से में कार्ड हैं जिन पर 6 से 55 तक की संख्याएँ अंकित हैं। बक्से में से यादृच्छया एक कार्ड निकालने पर इस पर अंकित संख्या के एक पूर्ण वर्ग संख्या होने की प्रायिकता है :

1

- (A) $\frac{7}{55}$ (B) $\frac{7}{55}$
(C) $\frac{1}{10}$ (D) $\frac{5}{49}$

11. यदि $\sin \theta = \cos \theta$, ($0^\circ < \theta < 90^\circ$) है, तो $(\sec \theta \cdot \sin \theta)$ का मान है :

1

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

12. दो पासे एक साथ उछाले गए। दोनों पासों पर आई संख्याओं का योग 10 से अधिक आने की प्रायिकता है :

1

- (A) $\frac{1}{9}$ (B) $\frac{1}{6}$
(C) $\frac{7}{12}$ (D) $\frac{1}{12}$

13. k का वह मान जिसके लिए $x = 2$ समीकरण $5x^2 - 4x + (2 + k) = 0$ का एक हल है, है :

1

- (A) 10 (B) -10
(C) 14 (D) -14



9. Point P divides the line segment joining the points A(4, -5) and B(1, 2) in the ratio 5:2. Co-ordinates of point P are

1

- (A) $\left(\frac{5}{2}, \frac{-3}{2}\right)$ (B) $\left(\frac{11}{7}, 0\right)$
(C) $\left(\frac{13}{7}, 0\right)$ (D) $\left(0, \frac{13}{7}\right)$

10. A box contains cards numbered 6 to 55. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square, is

1

- (A) $\frac{7}{50}$ (B) $\frac{7}{55}$
(C) $\frac{1}{10}$ (D) $\frac{5}{49}$

11. If $\sin \theta = \cos \theta$, ($0^\circ < \theta < 90^\circ$), then value of $(\sec \theta \cdot \sin \theta)$ is :

1

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

12. Two dice are rolled together. The probability of getting the sum of the two numbers to be more than 10, is

1

- (A) $\frac{1}{9}$ (B) $\frac{1}{6}$
(C) $\frac{7}{12}$ (D) $\frac{1}{12}$

13. Value of k for which $x = 2$ is a solution of the equation $5x^2 - 4x + (2 + k) = 0$, is

1

- (A) 10 (B) -10
(C) 14 (D) -14



14. दो समरूप त्रिभुजों ABC तथा PQR के परिमाप क्रमशः 56 cm तथा 48 cm हैं। PQ/AB बराबर है :

1

- (A) $\frac{7}{8}$ (B) $\frac{6}{7}$
(C) $\frac{7}{6}$ (D) $\frac{8}{7}$

15. प्रथम 200 प्राकृत संख्याओं का योगफल है :

1

- (A) 2010 (B) 2000
(C) 20100 (D) 21000

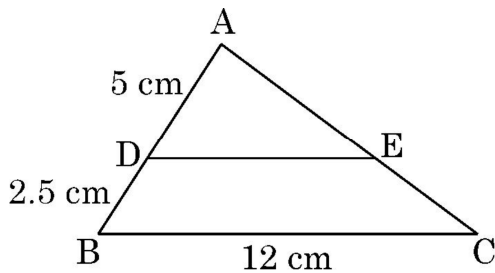
16. यदि $HCF(2520, 6600) = 40$ और $LCM(2520, 6600) = 252 \times k$ है, तो k का मान है :

1

- (A) 1650 (B) 1600
(C) 165 (D) 1625

17. दी गई आकृति में $\triangle ABC$ दिखाया गया है और $DE \parallel BC$ है, यदि $AD = 5$ cm, $DB = 2.5$ cm तथा $BC = 12$ cm है, तो DE बराबर है :

1



- (A) 10 cm (B) 6 cm
(C) 8 cm (D) 7.5 cm

18. XOYZ एक आयत है जिसके शीर्ष $X(-3, 0)$, $O(0, 0)$, $Y(0, 4)$ तथा $Z(x, y)$ हैं। इसके प्रत्येक विकर्ण की लंबाई है :

1

- (A) 5 इकाई (B) $\sqrt{5}$ इकाई
(C) $x^2 + y^2$ इकाई (D) 4 इकाई



14. The perimeters of two similar triangles ABC and PQR are 56 cm and 48 cm respectively. PQ/AB is equal to

1

- (A) $\frac{7}{8}$ (B) $\frac{6}{7}$
(C) $\frac{7}{6}$ (D) $\frac{8}{7}$

15. The sum of first 200 natural numbers is

1

- (A) 2010 (B) 2000
(C) 20100 (D) 21000

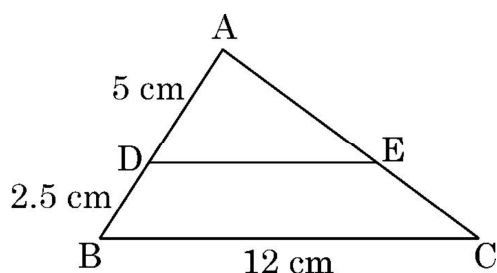
16. If the HCF (2520, 6600) = 40 and LCM (2520, 6600) = $252 \times k$, then the value of k is

1

- (A) 1650 (B) 1600
(C) 165 (D) 1625

17. In the given figure $\triangle ABC$ is shown. DE is parallel to BC. If AD = 5 cm, DB = 2.5 cm and BC = 12 cm, then DE is equal to

1



- (A) 10 cm (B) 6 cm
(C) 8 cm (D) 7.5 cm

18. XOYZ is a rectangle with vertices X(-3, 0), O(0, 0), Y(0, 4) and Z(x, y). The length of its each diagonal is

1

- (A) 5 units (B) $\sqrt{5}$ units
(C) $x^2 + y^2$ units (D) 4 units



Directions : In Question 19 and 20, **Assertion (A)** and **Reason (R)** are given. Select the correct option from the following :

- (A) Both Assertion (A) and Reason (R) are true. Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true. Reason (R) does not give correct explanation of (A).
- (C) Assertion (A) is true but Reason (R) is not true.
- (D) Assertion (A) is not true but Reason (R) is true.

19. **Assertion (A) :** Two cubes each of edge length 10 cm are joined together.

The total surface area of newly formed cuboid is 1200 cm^2 .

Reason (R) : Area of each surface of a cube of side 10 cm is 100 cm^2 .

1

20. **Assertion (A) :** If $\sin A = \frac{1}{3}$ ($0^\circ < A < 90^\circ$), then the value of $\cos A$ is $\frac{2\sqrt{2}}{3}$

Reason (R) : For every angle θ , $\sin^2 \theta + \cos^2 \theta = 1$.

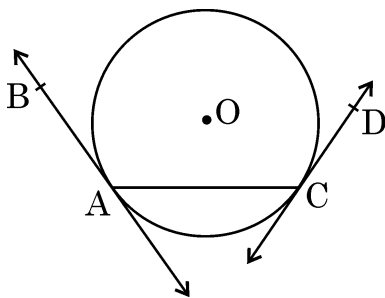
1

SECTION – B

In this section, there are 5 questions of 2 marks each.

21. In the given figure, AB and CD are tangents to a circle centred at O. Is $\angle BAC = \angle DCA$? Justify your answer.

2





22. (a) बिंदुओं $(3, -5)$ तथा $(-1, 6)$ को मिलाने वाला रेखाखण्ड रेखा $y = x$ द्वारा किस अनुपात में विभाजित होता है ?

2

अथवा

- (b) $A(3, 0)$, $B(6, 4)$ तथा $C(-1, 3)$ एक $\triangle ABC$ के शीर्ष हैं। माधिका BE की लंबाई ज्ञात कीजिए।

2

23. व्याख्या कीजिए कि $7 \times 11 \times 13 + 13$ और $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ भाज्य संख्याएँ क्यों हैं।

2

24. यदि एक $\triangle ABC$ के शीर्ष $A(-2, 4)$, $B(4, 3)$ तथा $C(1, -6)$ हैं, तो माधिका BD की लंबाई ज्ञात कीजिए।

2

25. (a) $2 \sin^2 30^\circ \sec 60^\circ + \tan^2 60^\circ$ का मान ज्ञात कीजिए।

2

अथवा

- (b) यदि $2 \sin (A + B) = \sqrt{3}$ तथा $\cos (A - B) = 1$ है, तो कोण A तथा B की माप ज्ञात कीजिए, $0 \leq A, B, (A + B) \leq 90^\circ$.

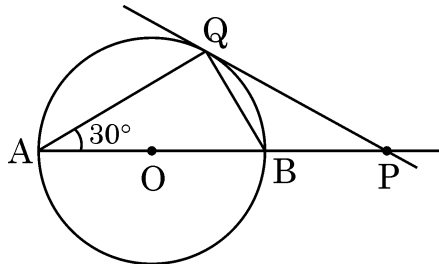
2

खण्ड – ग

इस खण्ड में 6 प्रश्न हैं तथा प्रत्येक के 3 अंक हैं।

26. (a) दी गई आकृति में, केंद्र O वाले वृत्त की एक स्पर्श-रेखा PQ है तथा $\angle BAQ = 30^\circ$ है, तो दर्शाइए कि $BP = BQ$ ।

3



अथवा



22. (a) In what ratio is the line segment joining the points $(3, -5)$ and $(-1, 6)$ divided by the line $y = x$?

2

OR

- (b) $A(3, 0)$, $B(6, 4)$ and $C(-1, 3)$ are vertices of a triangle ABC . Find length of its median BE .

2

23. Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers.

2

24. The vertices of a ΔABC are $A(-2, 4)$, $B(4, 3)$ and $C(1, -6)$. Find length of the median BD .

2

25. (a) Evaluate : $2 \sin^2 30^\circ \sec 60^\circ + \tan^2 60^\circ$.

2

OR

- (b) If $2 \sin (A + B) = \sqrt{3}$ and $\cos (A - B) = 1$, then find the measures of angles A and B . $0 \leq A, B, (A + B) \leq 90^\circ$.

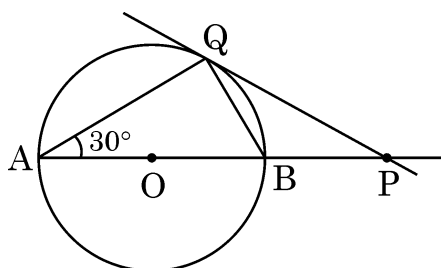
2

SECTION – C

This section consists of 6 questions of 3 marks each.

26. (a) In the given figure, PQ is tangent to a circle centred at O and $\angle BAQ = 30^\circ$; show that $BP = BQ$.

3

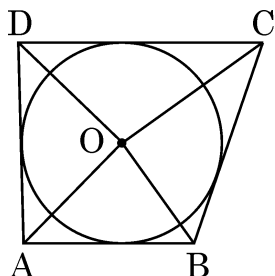


OR



- (b) In the given figure, AB, BC, CD and DA are tangents to the circle with centre O forming a quadrilateral ABCD. 3

Show that $\angle AOB + \angle COD = 180^\circ$



27. In a test, the marks obtained by 100 students (out of 50) are given below : 3

Marks obtained :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Number of students :	12	23	34	25	6

Find the mean marks of the students.

28. Three consecutive integers are such that sum of the square of second and product of other two is 161. Find the three integers. 3

29. (a) If the sum of first m terms of an A.P. is same as sum of its first n terms ($m \neq n$), then show that the sum of its first $(m + n)$ terms is zero. 3

OR

- (b) In an A.P., the sum of three consecutive terms is 24 and the sum of their squares is 194. Find the numbers. 3

30. Prove that $\sqrt{5}$ is an irrational number. 3

31. Prove that $\sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$. 3



SECTION – D

This section consists of 4 questions of 5 marks each.

32. The angle of elevation of an aircraft from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . The aircraft is flying at a constant height of $3500\sqrt{3}$ m at a uniform speed. Find the speed of the aircraft. 5

33. If the length of a rectangle is reduced by 5 cm and its breadth is increased by 2 cm, then the area of the rectangle is reduced by 80 cm^2 . However, if we increase the length by 10 cm and decrease the breadth by 5 cm, its area is increased by 50 cm^2 . Find the length and breadth of the rectangle. 5

34. (a) Using graphical method, solve the following system of equations : 5

$$3x + y + 4 = 0 \text{ and } 3x - y + 2 = 0$$

OR

- (b) Tara scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each wrong answer, then Tara would have scored 50 marks. Assuming that Tara attempted all questions, find the total number of questions in the test. 5

35. (a) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio. 5

OR

- (b) Sides AB and AC and median AD to $\triangle ABC$ are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\triangle ABC \sim \triangle PQR$. 5



SECTION – E

This section consists of 3 case based questions of 4 marks each.

36. The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd.

A circus tent is cylindrical upto a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m.



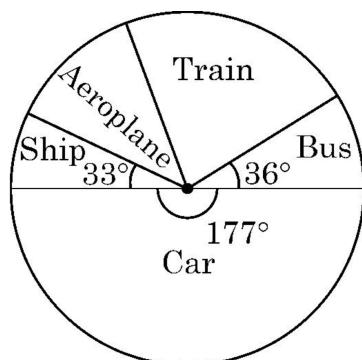
Based on the above, answer the following questions :

- | | |
|--|---|
| (i) Find slant height of the conical part. | 1 |
| (ii) Determine the floor area of the tent. | 1 |
| (iii) (a) Find area of the cloth used for making tent. | 2 |

OR

- | | |
|--|---|
| (iii) (b) Find total volume of air inside an empty tent. | 2 |
|--|---|

37. In a survey on holidays, 120 people were asked to state which type of transport they used on their last holiday. The following pie chart shows the results of the survey.



Observe the pie chart and answer the following questions :

- (i) If one person is selected at random, find the probability that he/she travelled by bus or ship.

1



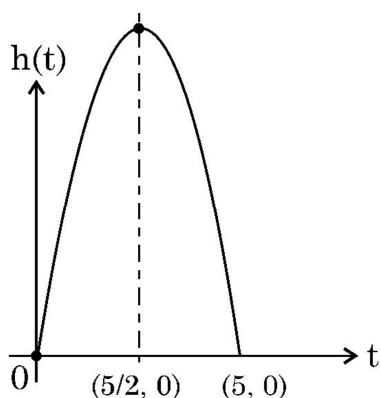
(ii) Which is most favourite mode of transport and how many people used it ? 1

(iii) (a) A person is selected at random. If the probability that he did not use train is $\frac{4}{5}$, find the number of people who used train. 2

OR

(iii) (b) The probability that randomly selected person used aeroplane is $\frac{7}{60}$. Find the revenue collected by air company at the rate of ₹ 5,000 per person. 2

38. A ball is thrown in the air so that t seconds after it is thrown, its height h metre above its starting point is given by the polynomial $h = 25t - 5t^2$.



Observe the graph of the polynomial and answer the following questions :

(i) Write zeroes of the given polynomial. 1

(ii) Find the maximum height achieved by ball. 1

(iii) (a) After throwing upward, how much time did the ball take to reach to the height of 30 m ? 2

OR

(iii) (b) Find the two different values of t when the height of the ball was 20 m. 2

