



Series WX1YZ/2



SET~2

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code

430/2/2

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.

गणित (बुनियादी)

MATHEMATICS (BASIC)

*

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

नोट / NOTE :

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 27 हैं।
Please check that this question paper contains 27 printed pages.
- 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 जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- 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.



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 calculators is **not** allowed.*

SECTION A

This section comprises multiple choice questions (MCQs) of 1 mark each.

1. The pair of linear equations $x + 2y - 5 = 0$ and $2x - 4y + 6 = 0$:
- (a) is inconsistent
 - (b) is consistent with many solutions
 - (c) is consistent with a unique solution
 - (d) is consistent with two solutions



2. निम्नलिखित में से कौन-सी संख्या किसी घटना की प्रायिकता *नहीं* हो सकती ?

(a) 0.5

(b) 5%

(c) $\frac{1}{0.5}$

(d) $\frac{0.5}{14}$

3. $2 \sin^2 30^\circ + 3 \tan^2 60^\circ - \cos^2 45^\circ$ का मान है :

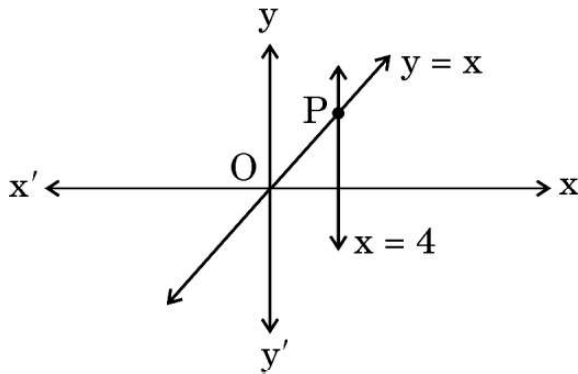
(a) $3\sqrt{3}$

(b) $\frac{19}{2}$

(c) $\frac{9}{4}$

(d) 9

4. रैखिक समीकरणों $y = x$ और $x = 4$ द्वारा निरूपित रेखाएँ P पर प्रतिच्छेदी हैं। बिंदु P के निर्देशांक हैं :



(a) (4, 0)

(b) (4, 4)

(c) (0, 4)

(d) (-4, 4)

5. यदि द्विघात समीकरण $9x^2 + bx + \frac{1}{4} = 0$ के मूल बराबर हैं, तो b का मान होगा :

(a) 0

(b) केवल -3

(c) केवल 3

(d) ± 3



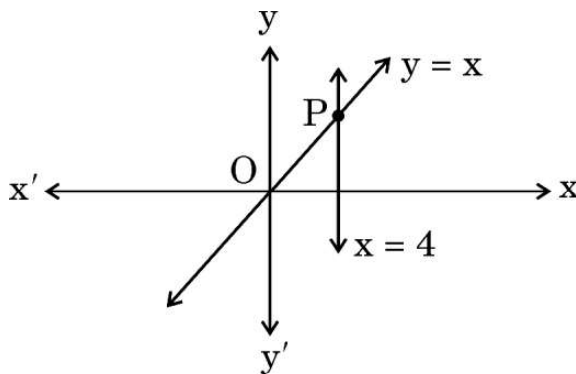
2. Which of the following numbers **cannot** be the probability of an event ?

- (a) 0.5 (b) 5%
(c) $\frac{1}{0.5}$ (d) $\frac{0.5}{14}$

3. The value of $2 \sin^2 30^\circ + 3 \tan^2 60^\circ - \cos^2 45^\circ$ is :

- (a) $3\sqrt{3}$ (b) $\frac{19}{2}$
(c) $\frac{9}{4}$ (d) 9

4. The lines represented by the linear equations $y = x$ and $x = 4$ intersect at P. The coordinates of the point P are :



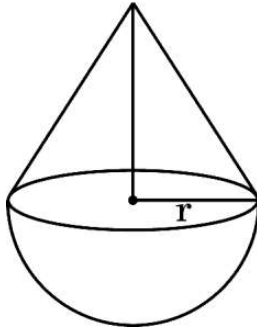
- (a) (4, 0) (b) (4, 4)
(c) (0, 4) (d) (-4, 4)

5. If the quadratic equation $9x^2 + bx + \frac{1}{4} = 0$ has equal roots, then the value of b is :

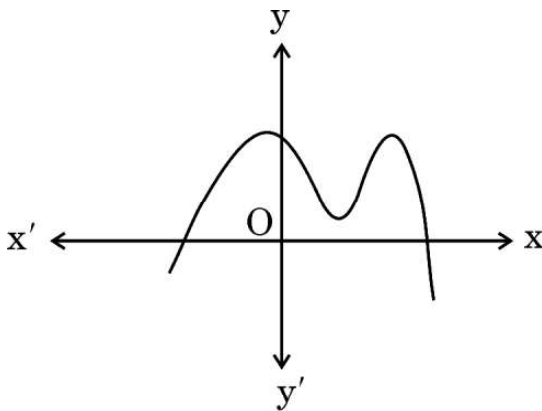
- (a) 0 (b) -3 only
(c) 3 only (d) ± 3



6. A solid is of the form of a cone of radius 'r' surmounted on a hemisphere of the same radius. If the height of the cone is the same as the diameter of its base, then the volume of the solid is :



- (a) πr^3 (b) $\frac{4}{3} \pi r^3$
(c) $3\pi r^3$ (d) $\frac{2}{3} \pi r^3$
7. Graph of a polynomial $p(x)$ is given in the figure. The number of zeroes of $p(x)$ is :



- (a) 2 (b) 3
(c) 4 (d) 5
8. Median and Mode of a distribution are 25 and 21 respectively. Mean of the data using empirical relationship is :

- (a) 27 (b) 29
(c) 18 (d) $\frac{29}{3}$



9. यदि $\tan A = \frac{2}{5}$ है, तो $\frac{1 - \cos^2 A}{1 - \sin^2 A}$ का मान है :

(a) $\frac{25}{4}$

(b) $\frac{4}{25}$

(c) $\frac{4}{5}$

(d) $\frac{5}{4}$

10. बिन्दुओं A(2, -3) और B(5, 6) को जोड़ने वाला रेखाखण्ड, x-अक्ष से किस अनुपात में विभाजित होता है ?

(a) 2 : 3

(b) 2 : 1

(c) 3 : 4

(d) 1 : 2

11. A.P. : 16, 12, 8, 4, के प्रथम 21 पदों का योगफल है :

(a) -480

(b) -504

(c) 1176

(d) -484

12. त्रिज्या R वाले वृत्त के उस त्रिज्यखण्ड का क्षेत्रफल जिसका कोण α (डिग्री में) है, है :

(a) $\frac{\alpha}{180} \times 2\pi R$

(b) $\frac{\alpha}{360} \times 2\pi R$

(c) $\frac{\alpha}{180} \times \pi R^2$

(d) $\frac{\alpha}{360} \times \pi R^2$

13. यदि 72 और 234 का HCF 18 है, तो LCM (72, 234) होगा :

(a) 936

(b) 836

(c) 324

(d) 234

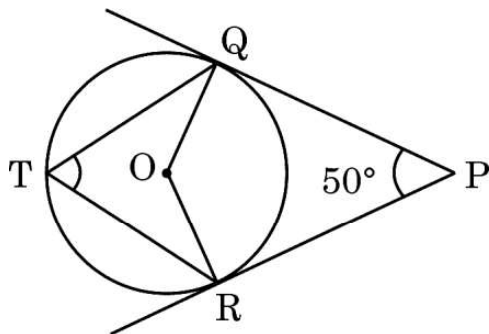




9. If $\tan A = \frac{2}{5}$, then the value of $\frac{1 - \cos^2 A}{1 - \sin^2 A}$ is :
- (a) $\frac{25}{4}$ (b) $\frac{4}{25}$
- (c) $\frac{4}{5}$ (d) $\frac{5}{4}$
10. In what ratio does x-axis divide the line segment joining the points A(2, -3) and B(5, 6) ?
- (a) 2 : 3 (b) 2 : 1
- (c) 3 : 4 (d) 1 : 2
11. The sum of the first 21 terms of an A.P. : 16, 12, 8, 4, is :
- (a) -480 (b) -504
- (c) 1176 (d) -484
12. The area of a sector of angle α (in degrees) of a circle with radius R is :
- (a) $\frac{\alpha}{180} \times 2\pi R$ (b) $\frac{\alpha}{360} \times 2\pi R$
- (c) $\frac{\alpha}{180} \times \pi R^2$ (d) $\frac{\alpha}{360} \times \pi R^2$
13. If the HCF of 72 and 234 is 18, then the LCM (72, 234) is :
- (a) 936 (b) 836
- (c) 324 (d) 234



14. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 . The diameter of its circular base is :
- (a) 2 cm (b) 1 cm
(c) 4 cm (d) 7 cm
15. A card is drawn at random from a well-shuffled deck of 52 playing cards. The probability that it is a red king, is :
- (a) $\frac{1}{13}$ (b) $\frac{1}{52}$
(c) $\frac{1}{26}$ (d) $\frac{2}{13}$
16. $8 (\cos^2 A + \sin^2 A)$ is equal to :
- (a) 1 (b) 0
(c) 9 (d) 8
17. The string of a kite in air is 50 m long and it makes an angle of 60° with the horizontal. Assuming the string to be straight, the height of the kite from the ground is :
- (a) $50\sqrt{3}$ m (b) $\frac{100}{\sqrt{3}}$ m
(c) $\frac{50}{\sqrt{3}}$ m (d) $25\sqrt{3}$ m
18. From a point P, two tangents PQ and PR are drawn to a circle with centre at O. T is a point on the major arc QR of the circle. If $\angle QPR = 50^\circ$, then $\angle QTR$ equals :



- (a) 50° (b) 130°
(c) 65° (d) 90°



Questions number **19** and **20** are Assertion and Reason based questions carrying 1 mark each. 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) : The probability of getting a prime number, when a die is thrown once, is $\frac{2}{3}$.

Reason (R): On the faces of a die, prime numbers are 2, 3, 5.

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

Reason (R) : Zeroes of the polynomial $x^2 + ax$ ($a \neq 0$) are 0 and a .

SECTION B

This section comprises very short answer (VSA) type questions of 2 marks each.

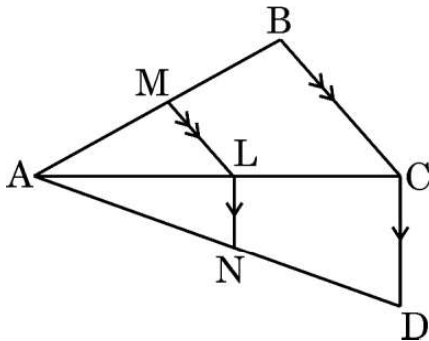
21. (a) Find the value(s) of 'x' so that $PQ = QR$, where the coordinates of P, Q and R are (6, -1), (1, 3) and (x, 8) respectively.

OR

(b) The vertices of a triangle are (-2, 0), (2, 3) and (1, -3). Is the triangle equilateral, isosceles or scalene ?



22. α, β are the zeroes of the quadratic polynomial $p(x) = x^2 - 8x + k$, such that $\alpha^2 + \beta^2 = 40$. Find the value of k .
23. From a well-shuffled deck of 52 playing cards, all diamond cards are removed. Now, a card is drawn from the remaining pack at random. Find the probability that the selected card is a king.
24. In the given figure, $LM \parallel CB$ and $LN \parallel CD$. Prove that $\frac{AM}{AN} = \frac{AB}{AD}$.



25. (a) Find the HCF of the numbers 540 and 630, using prime factorization method.

OR

- (b) Show that $(15)^n$ cannot end with the digit 0 for any natural number 'n'.



खण्ड ग

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

26. (क) सिद्ध कीजिए :

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

अथवा

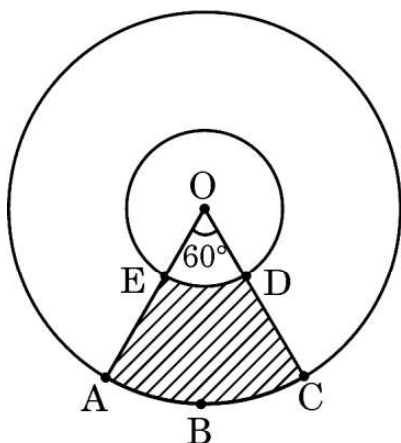
(ख) सिद्ध कीजिए :

$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$

27. बहुपद $p(x) = 3x^2 + 5x - 28$ के शून्यक ज्ञात कीजिए और इसके गुणांकों तथा शून्यकों के बीच के संबंध की सत्यता की जाँच कीजिए।

28. सिद्ध कीजिए कि बिन्दु $A(-1, 0)$, $B(3, 1)$, $C(2, 2)$ और $D(-2, 1)$ एक समांतर चतुर्भुज ABCD के शीर्ष हैं। क्या यह चतुर्भुज एक आयत भी है ?

29. दी गई आकृति में, छायांकित भाग का क्षेत्रफल ज्ञात कीजिए, जहाँ केंद्र O वाले दो संकेन्द्रीय वृत्तों की त्रिज्याएँ क्रमशः 2 cm और 5 cm हैं।





SECTION C

This section comprises short answer (SA) type questions of 3 marks each.

26. (a) Prove that :

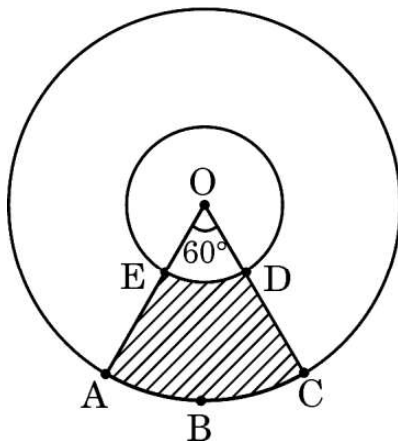
$$\frac{1 - \cos \theta}{1 + \cos \theta} = (\operatorname{cosec} \theta - \cot \theta)^2$$

OR

- (b) Prove that :

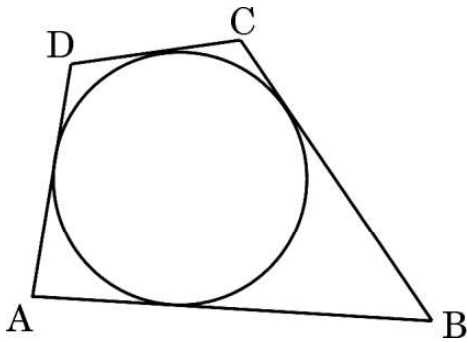
$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$

27. Find the zeroes of the polynomial $p(x) = 3x^2 + 5x - 28$ and verify the relationship between its coefficients and zeroes.
28. Prove that the points $A(-1, 0)$, $B(3, 1)$, $C(2, 2)$ and $D(-2, 1)$ are the vertices of a parallelogram ABCD. Is it also a rectangle ?
29. In the given figure, two concentric circles with centre O are shown. Radii of the circles are 2 cm and 5 cm respectively. Find the area of the shaded region.





30. Prove that $2 - 3\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.
31. (a) A quadrilateral ABCD is drawn to circumscribe a circle, as shown in the figure. Prove that $AB + CD = AD + BC$.



OR

- (b) Prove that the parallelogram circumscribing a circle is a rhombus.

SECTION D

This section comprises long answer (LA) type questions of 5 marks each.

32. 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.



33. (a) If the sum of the first 7 terms of an A.P. is -21 and that of the first 17 terms is -221 , then find the sum of its first 'n' terms.

OR

- (b) A man repays a loan of ₹ 3,250 by paying ₹ 20 in the first month and then increases the payment by ₹ 15 every month. How long will it take to clear the loan ?

34. Find the mean and the median of the following data :

Class	85 – 90	90 – 95	95 – 100	100 – 105	105 – 110	110 – 115
Frequency	10	12	15	14	12	7

35. (a) From the top of a building 60 m high, the angles of depression of the top and bottom of a tower are observed to be 30° and 60° respectively. Find the height of the tower. Also, find the distance between the building and the tower. (Use $\sqrt{3} = 1.732$)

OR

- (b) The angle of elevation of the top of a building from a point A on the ground is 30° . On moving a distance of 30 m towards its base to the point B, the angle of elevation changes to 45° . Find the height of the building and the distance of its base from point A. (Use $\sqrt{3} = 1.732$)



खण्ड ड

इस खण्ड में 3 प्रकरण अध्ययन आधारित प्रश्न हैं जिनमें प्रत्येक के 4 अंक हैं ।

प्रकरण अध्ययन – 1

36. चित्र में एक लकड़ी का खिलौना दिखाया गया है । $14\text{ cm} \times 17\text{ cm} \times 4\text{ cm}$ विमाओं का एक घनाभाकार लकड़ी का गुटका है । इसके ऊपरी तल पर मधुमक्खियों के फिट होने के लिए सात बेलनाकार खोखले हैं । प्रत्येक बेलनाकार खोखले की ऊँचाई 3 cm और त्रिज्या 2 cm है ।



उपर्युक्त के आधार पर, निम्नलिखित प्रश्नों के उत्तर दीजिए :

- (i) एक बेलनाकार खोखला बनाने के लिए खोदी गई लकड़ी का आयतन ज्ञात कीजिए । 1
- (ii) घनाभाकार गुटके को हरे रंग में रंगने के लिए पार्श्व पृष्ठीय क्षेत्रफल ज्ञात कीजिए । 1
- (iii) (क) सात बेलनाकार खोखले खोदने के पश्चात्, घनाभाकार गुटके में बची हुई लकड़ी का आयतन ज्ञात कीजिए । 2

अथवा

- (iii) (ख) घनाभाकार गुटके के ऊपरी सतह पर पीला रंग करवाने के लिए इसका पृष्ठीय क्षेत्रफल ज्ञात कीजिए । 2



SECTION E

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

Case Study – 1

- 36.** A wooden toy is shown in the picture. This is a cuboidal wooden block of dimensions $14\text{ cm} \times 17\text{ cm} \times 4\text{ cm}$. On its top there are seven cylindrical hollows for bees to fit in. Each cylindrical hollow is of height 3 cm and radius 2 cm.



Based on the above, answer the following questions :

- (i) Find the volume of wood carved out to make one cylindrical hollow. 1
- (ii) Find the lateral surface area of the cuboid to paint it with green colour. 1
- (iii) (a) Find the volume of wood in the remaining cuboid after carving out seven cylindrical hollows. 2

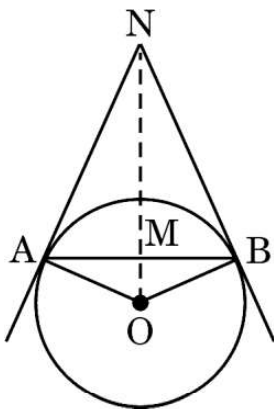
OR

- (iii) (b) Find the surface area of the top surface of the cuboid to be painted yellow. 2



Case Study – 2

37. Circles play an important part in our life. When a circular object is hung on the wall with a cord at nail N, the cords NA and NB work like tangents. Observe the figure, given that $\angle ANO = 30^\circ$ and $OA = 5$ cm.



Based on the above, answer the following questions :

- | | | |
|-------|---|---|
| (i) | Find the distance AN. | 1 |
| (ii) | Find the measure of $\angle AOB$. | 1 |
| (iii) | (a) Find the total length of cords NA, NB and the chord AB. | 2 |

OR

- | | | |
|-------|-----|---|
| (iii) | (b) | If $\angle ANO$ is 45° , then name the type of quadrilateral OANB. |
|-------|-----|---|

Justify your answer.

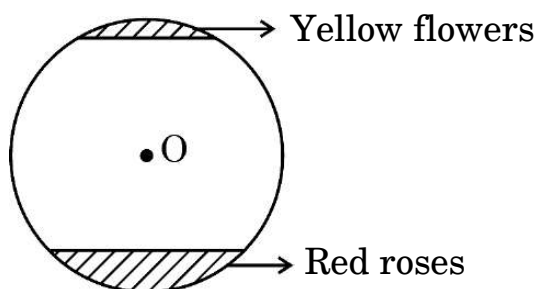
2





Case Study – 3

38. Flower beds look beautiful growing in gardens. One such circular park of radius 'r' m, has two segments with flowers. One segment which subtends an angle of 90° at the centre is full of red roses, while the other segment with central angle 60° is full of yellow coloured flowers. [See figure]



It is given that the combined area of the two segments (of flowers) is $256\frac{2}{3}$ sq m.

Based on the above, answer the following questions :

- | | | |
|-------|--|---|
| (i) | Write an equation representing the total area of the two segments in terms of 'r'. | 1 |
| (ii) | Find the value of 'r'. | 1 |
| (iii) | (a) Find the area of the segment with red roses. | 2 |

OR

- | | | |
|-------|---|---|
| (iii) | (b) Find the area of the segment with yellow flowers. | 2 |
|-------|---|---|

