

Series : **5LMKN**



SET ~ 1



रोल नं.



प्रश्न-पत्र कोड
Q.P. Code **430/5/1**

Roll No.

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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 :

- (I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं।
Please check that this question paper contains **23** printed pages.
- (II) 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.
- (III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में **38** प्रश्न हैं।
Please check that this question paper contains **38** questions.
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
Please write down the Serial Number of the question in the answer-book at the given place before attempting it.
- (V) 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 (बुनियादी)

MATHEMATICS (BASIC)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

430/5/1

1159-1

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P.T.O.



General Instructions :

Read the following instructions very carefully and follow them strictly :

- (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**, Question numbers **1** to **18** are Multiple Choice Questions (MCQs) and Question numbers **19 & 20** are Assertion-Reason based questions of **1** mark each.
- (iv) In Section–**B**, Question numbers **21** to **25** are Very Short Answer (VSA) type questions carrying **2** marks each.
- (v) In Section–**C**, Question numbers **26** to **31** are Short Answer (SA) type questions carrying **3** marks each.
- (vi) In Section–**D**, Question numbers **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.
- (vii) In Section–**E**, Question numbers **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 $\pi = 22/7$ wherever required, if not stated.
- (x) Use of calculator is **NOT** allowed.

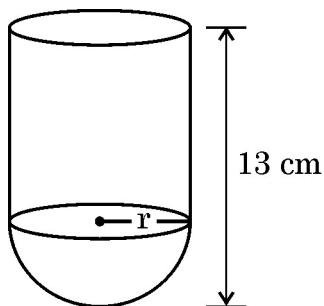


Section – A
(Multiple Choice Questions)

20 × 1 = 20

Q. Nos. 1 to 20 are Multiple Choice Questions of 1 mark each.

1. $7 \times 11 \times 13 + 5$ is
(A) a prime number. (B) an odd number.
(C) a composite number. (D) a multiple of 5.
2. The roots of the quadratic equation $x^2 + 9 = 0$ are
(A) real and equal (B) not real
(C) real and negative of each other (D) rational numbers
3. The distance between the points $(-2, 5)$ and $(5, -2)$ is
(A) $7\sqrt{2}$ (B) 14
(C) $2\sqrt{7}$ (D) 7
4. A cylinder of radius r is surmounted on a hemisphere of same radius. If total height of the object is 13 cm, then its inner surface area is



- (A) $2\pi r(r + 13)$ (B) $13\pi r$
(C) $2\pi(13 + r)^2$ (D) $26\pi r$
5. Which of the following statements is not always true ?
(A) Two circles are similar.
(B) Two isosceles right triangles are similar.
(C) Two rectangles are similar.
(D) Two equilateral triangles are similar.



6. यदि $\cot \theta$ का मान $\sqrt{5}$ है, तो $\sin \theta$ का मान है :

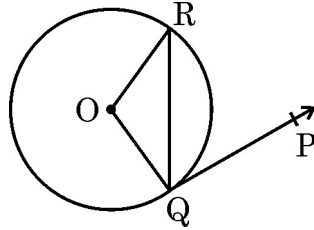
(A) $\frac{1}{\sqrt{6}}$

(B) $\sqrt{6}$

(C) $\frac{\sqrt{5}}{6}$

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

7. केन्द्र O वाले वृत्त में जीवा QR केन्द्र पर 105° का कोण अंतरित करती है। $\angle RQP$ का मान है :



(A) $\frac{75^\circ}{2}$

(B) $\frac{105^\circ}{2}$

(C) 75°

(D) 15°

8. दो पासों को एक साथ फेंका जाता है। प्राप्त संख्याओं के योग के 10 से बड़ा होने की प्रायिकता है :

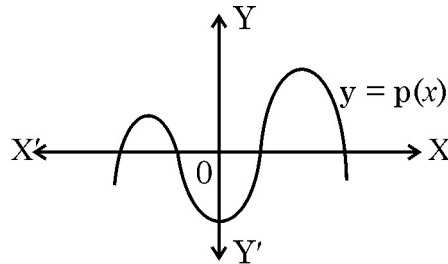
(A) $\frac{1}{9}$

(B) $\frac{1}{18}$

(C) $\frac{1}{12}$

(D) 1

9. बहुपद $p(x)$ का ग्राफ यहाँ दर्शाया गया है। बहुपद $p(x)$ के शून्यकों की संख्या है :



(A) 5

(B) 1

(C) 0

(D) 4



6. If value of $\cot \theta$ is $\sqrt{5}$, then $\sin \theta$ equals

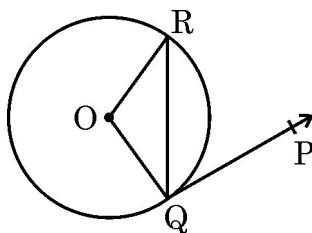
(A) $\frac{1}{\sqrt{6}}$

(B) $\sqrt{6}$

(C) $\frac{\sqrt{5}}{6}$

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

7. A chord QR subtends an angle of 105° at the centre O of the circle. The measure of $\angle RQP$ is



(A) $\frac{75^\circ}{2}$

(B) $\frac{105^\circ}{2}$

(C) 75°

(D) 15°

8. The probability of getting sum greater than 10, when two dice are rolled together, is

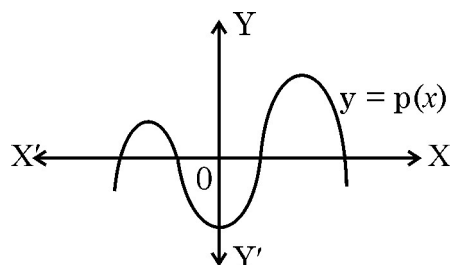
(A) $\frac{1}{9}$

(B) $\frac{1}{18}$

(C) $\frac{1}{12}$

(D) 1

9. The graph of a polynomial $p(x)$ is shown here. The number of zeroes of the polynomial $p(x)$ is



(A) 5

(B) 1

(C) 0

(D) 4



10. समांतर श्रेढी (A.P.) $\frac{-1}{3}, \frac{4}{3}, 3, \dots$ का n वाँ पद है :

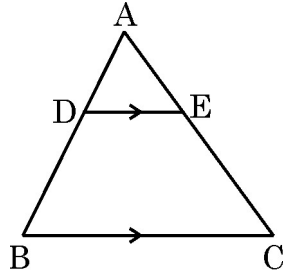
(A) $\frac{5n-9}{3}$

(B) $\frac{5n-6}{3}$

(C) $\frac{3n-4}{3}$

(D) $\frac{3n+2}{3}$

11. दी गई आकृति में, त्रिभुज ABC में $DE \parallel BC$ है। यदि $AD : AB = 1 : 3$ तथा $AE = 2.5$ cm है, तो AC बराबर है :



(A) 7.5 cm

(B) 5 cm

(C) 10 cm

(D) 2.5 cm

12. यदि बहुपद $p(x) = 3x^2 - kx + 6$ के शून्यकों का योग 2 है, तो k का मान है :

(A) 2

(B) -6

(C) -2

(D) 6

13. एक थैले में कुछ लाल तथा कुछ सफेद गेंदें हैं। थैले में से यादृच्छया एक गेंद निकाली गयी। यदि एक लाल गेंद निकालने की प्रायिकता $\frac{2}{7}$ है, तो एक सफेद गेंद निकालने की प्रायिकता है :

(A) $\frac{1}{14}$

(B) $\frac{5}{7}$

(C) $\frac{1}{7}$

(D) $\frac{2}{7}$



10. n^{th} term of the A.P. : $\frac{-1}{3}, \frac{4}{3}, 3, \dots$ is

(A) $\frac{5n-9}{3}$

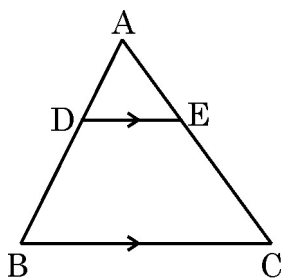
(B) $\frac{5n-6}{3}$

(C) $\frac{3n-4}{3}$

(D) $\frac{3n+2}{3}$

11. In the given figure, $DE \parallel BC$.

If $AD : AB = 1 : 3$ and $AE = 2.5$ cm, then AC equals



(A) 7.5 cm

(B) 5 cm

(C) 10 cm

(D) 2.5 cm

12. The value of k for which sum of the zeroes of the polynomial $p(x) = 3x^2 - kx + 6$ is 2, is

(A) 2

(B) -6

(C) -2

(D) 6

13. A bag contains some red and some white balls. A ball is drawn at random from the bag. If the probability of getting a red ball is $\frac{2}{7}$, then the probability of getting a white ball is

(A) $\frac{1}{14}$

(B) $\frac{5}{7}$

(C) $\frac{1}{7}$

(D) $\frac{2}{7}$



14. If $-26, x, 2$ are in A.P., then the value of x is
(A) 14 (B) -13
(C) -12 (D) -14
15. PQ is tangent to a circle at a point P on the circle. The number of tangents which can be drawn to the circle parallel to PQ, is
(A) 2 (B) 1
(C) many (D) zero
16. A card is drawn from a well-shuffled deck of 52 playing cards. The probability of getting a queen of spade is
(A) $\frac{1}{26}$ (B) $\frac{1}{52}$
(C) 0 (D) $\frac{1}{4}$
17. The length of a pendulum is 70 cm and it describes an arc of length 88 cm when swings. The angle subtended by the arc at the centre is
(A) 36° (B) 70°
(C) 72° (D) 80°
18. The total surface area of a solid cone of radius 7 cm and slant height 25 cm, is
(A) 724 cm^2 (B) 704 cm^2
(C) 550 cm^2 (D) 616 cm^2

(Assertion – Reason based questions)

Directions : In Q. No. 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- (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) :** For an acute angle θ , $\cos \theta$ is always less than 1.
Reason (R) : In a right-angled triangle, hypotenuse is the longest side
and $\cos \theta = \frac{\text{Base}}{\text{Hypotenuse}}$.
20. **Assertion (A) :** Median of a data is the value of $\frac{N}{2}$, where N represents
sum of all frequencies.
Reason (R) : Median divides the whole distribution in two equal parts.

Section – B

(Very Short Answer Type Questions)

5 × 2 = 10

Q. Nos. 21 to 25 are Very Short Answer type questions of 2 marks each.

21. (a) If $\sec A = \sqrt{2}$ and $\tan B = \sqrt{3}$, then find the value of $2 \sin A \cos B$.

OR

- (b) Evaluate : $\frac{4 \cos^3 60^\circ + \operatorname{cosec} 30^\circ}{\tan^2 30^\circ}$

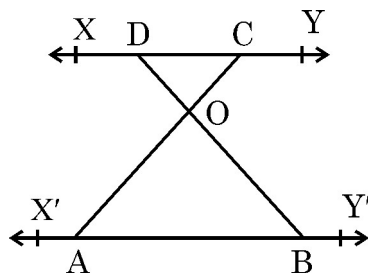
22. Find the H.C.F. and L.C.M. of 1530 and 2040.
23. If A(a, 0), B(1, 1) and C(0, b) form a triangle, right angled at B when joined, then establish a relation between a and b.
24. (a) Find the probability that a number selected at random from the numbers 30, 31, 32, 33,, 60 is (i) a prime number (ii) a multiple of 6.

OR

- (b) Slips of letters of the word 'BACKGROUND' are put in a bowl and thoroughly mixed. One slip is picked up at random. Find the probability that picked up slip's letter is (i) a vowel (ii) present in the word 'BALL'.



25. दी गयी आकृति में $AB \parallel DC$ है। यदि $OB = 3OD$ तथा $CD = 1.8 \text{ cm}$ है, तो AB की लम्बाई ज्ञात कीजिए।



खण्ड – ग

(लघु-उत्तरीय प्रश्न)

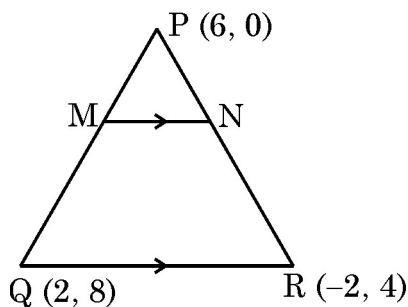
$6 \times 3 = 18$

प्रश्न संख्या 26 से 31 तक लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न के 3 अंक हैं।

26. सिद्ध कीजिए कि $\sqrt{2}$ एक अपरिमेय संख्या है।

27. $P(6, 0)$, $Q(2, 8)$ तथा $R(-2, 4)$ त्रिभुज PQR के शीर्ष बिंदु हैं। दिया गया है $MN \parallel QR$ है तथा

$$\frac{PM}{MQ} = \frac{1}{3} \text{ है। विभाजन सूत्र तथा दूरी सूत्र का प्रयोग करते हुये दशाइये कि } \frac{MN}{QR} = \frac{1}{4} \text{।}$$



28. (a) एक A.P. में $a = 2$, $d = 8$ तथा $S_n = 90$ दिया है। n का मान ज्ञात कीजिए।

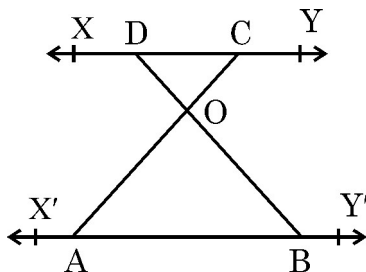
अथवा

- (b) 4-अंकों वाली कितनी संख्याएँ 7 से विभाज्य हैं ?

29. सिद्ध कीजिए : $\sqrt{\frac{1 - \sin A}{1 + \sin A}} = \frac{1}{\sec A + \tan A}$



25. In the given figure, $AB \parallel DC$. If $OB = 3OD$ and $CD = 1.8$ cm, then find the length AB .



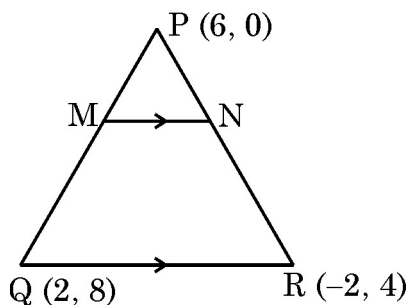
Section – C

(Short Answer Type Questions)

$6 \times 3 = 18$

Q. Nos. 26 to 31 are Short Answer type questions of 3 marks each.

26. Prove that $\sqrt{2}$ is an irrational number.
27. Points $P(6, 0)$, $Q(2, 8)$ and $R(-2, 4)$ are vertices of ΔPQR . It is given that $MN \parallel QR$ such that $\frac{PM}{MQ} = \frac{1}{3}$. Using distance formula and ratio formula, show that $\frac{MN}{QR} = \frac{1}{4}$.



28. (a) In an A.P., it is given that $a = 2$, $d = 8$ and $S_n = 90$. Find the value of n .

OR

- (b) How many 4-digit numbers are divisible by 7 ?

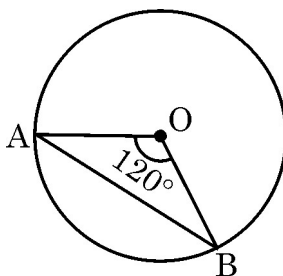
29. Prove that $\sqrt{\frac{1 - \sin A}{1 + \sin A}} = \frac{1}{\sec A + \tan A}$.



30. (a) If α, β are zeroes of the polynomial $p(x) = 5x^2 - 7x - 3$, then form a quadratic polynomial whose zeroes are $\frac{2}{\alpha}$ and $\frac{2}{\beta}$.

OR

- (b) Find the zeroes of the polynomial $p(x) = 3x^2 + 7x - 20$ and verify the relationship between its zeroes and the coefficients.
31. Chord AB of a circle subtends an angle of 120° at the centre O of the circle. Find the length of arc AB, if radius of the circle is 21 cm.



Section – D

(Long Answer Type Questions)

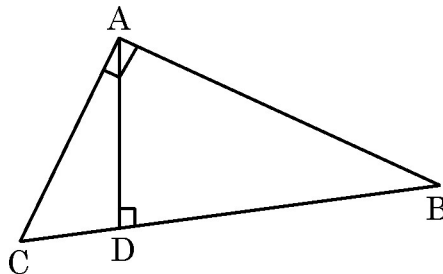
4 × 5 = 20

Q. Nos. 32 to 35 are Long Answer type questions of 5 marks each.

32. (a) In the given figure, $\triangle ABC$ is right angled triangle with $\angle A = 90^\circ$. AD is perpendicular to BC.

Prove that :

- (i) $\triangle DBA \sim \triangle DAC$
- (ii) $DA^2 = DB \times DC$
- (iii) Find the area of $\triangle ABC$ when $DB = 9$ cm and $DC = 16$ cm.



OR

- (b) 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. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distance of the point from the poles.
34. (a) ABCD is a rectangle of dimensions $80\text{ cm} \times 60\text{ cm}$. Another rectangle PQRS is drawn inside ABCD leaving space of equal width $x\text{ cm}$ along the edges of ABCD. If area PQRS is half of the area ABCD, then find the value of x .

OR

- (b) A train covers a distance of 90 km at a uniform speed. Had the speed been 15 km/h more, it would have taken 30 minutes less for the same journey. Find the original speed of the train.
35. Find mean and mode of the following data :

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	4	10	13	12	10	6

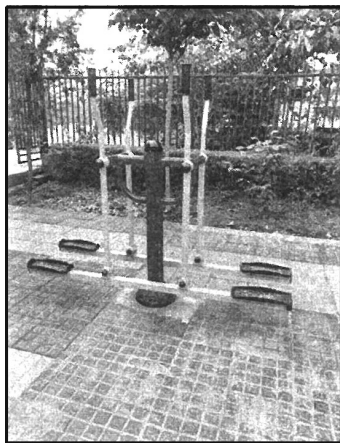
Section – E

(Case-study based Questions)

$3 \times 4 = 12$

Q. Nos. 36 to 38 are Case-study based Questions of 4 marks each.

36.





Seema daily goes to a park to exercise on machines available there. When Seema spent 15 minutes on exercise bicycle and 30 minutes on double cross walker, she received a message of burning 435 calories on her fitness watch. When she spent 30 minutes on exercise bicycle and 40 minutes on double cross walker, she received a message of burning 690 calories.

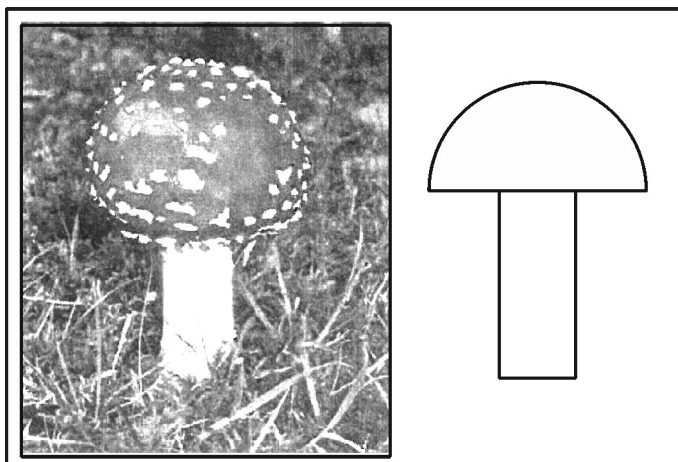
To find the number of calories burned per minute on each machine, answer the following :

- (i) Represent the above situation in terms of a pair of linear equations in two variables.
- (ii) Show that the equations have unique solution.
- (iii) (a) Solve both equations to find the values of the variables using elimination method.

OR

- (b) Solve both equations to find the values of the variables using substitution method.

37.



There are many varieties of mushrooms available in the world. One such mushroom 'Amanita muscaria' has a upper part which is like red cap (hemispherical) and lower part is like white stem (cylindrical).

The hemispherical cap's radius = 3 cm and cylindrical stem is 2 cm high with diameter 1.4 cm. Considering mushroom a solid object, answer the following questions :

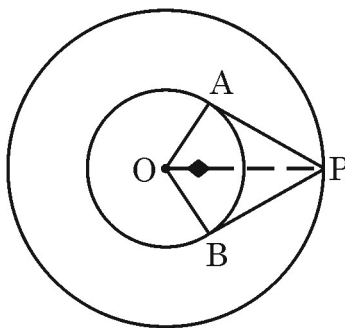
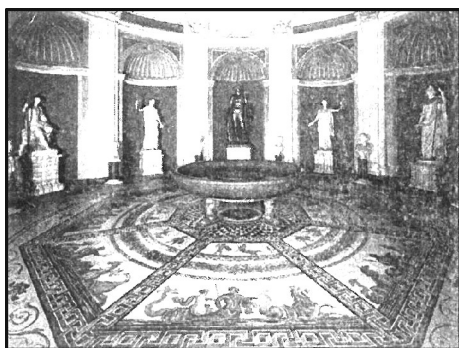
- (i) What is the total height of a mushroom ?
- (ii) Find the volume of the stem.
- (iii) (a) Determine the volume of 7 such mushrooms.

OR

- (b) Find the total surface area of 7 such mushrooms.



38.



In a circular museum hall of radius 14 m, some statues are displayed. Statues are kept inside the inner concentric circle of radius 7 m. One such statue lying in sector OAB, is fenced along line segments OA, AP, PB and BO where P is a point on outer circle.

Based on above information, answer the following questions :

- (i) Find $m\angle AOP$. 1
- (ii) Prove that $\triangle OAP \cong \triangle OBP$. 1
- (iii) (a) Find the length of fencing required to protect the statue.
(Take $\sqrt{3} = 1.73$) 2

OR

- (b) Find area of quadrilateral OAPB. (Take $\sqrt{3} = 1.73$)

