

Series : **5LMKN**



SET ~ 3



रोल नं.



प्रश्न-पत्र कोड
Q.P. Code **430/5/3**

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

430/5/3

1159-3

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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.

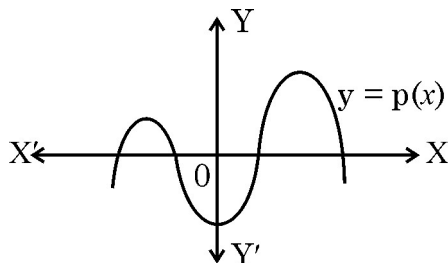


Section – A
(Multiple Choice Questions)

20 × 1 = 20

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

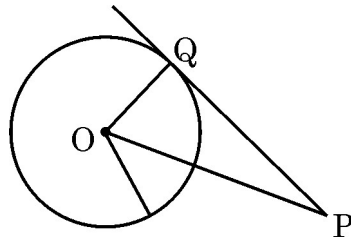
1. The graph of a polynomial $p(x)$ is shown here. The number of zeroes of the polynomial $p(x)$ is



- (A) 5 (B) 1
(C) 0 (D) 4
2. Three coins are tossed together. The probability of getting exactly two tails is
- (A) $\frac{2}{8}$ (B) $\frac{1}{2}$
(C) $\frac{3}{8}$ (D) 1
3. 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) $\frac{2}{7}$
4. 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



5. एक पेंडुलम की लम्बाई 70 cm है। घूमने पर यह पेंडुलम 88 cm लम्बाई की चाप बनाता है। चाप द्वारा केन्द्र पर अंतरित कोण की माप है :
- (A) 36° (B) 70°
(C) 72° (D) 80°
6. बिंदुओं $(-2, 5)$ तथा $(5, -2)$ के बीच की दूरी है :
- (A) $7\sqrt{2}$ (B) 14
(C) $2\sqrt{7}$ (D) 7
7. $17 \times 11 \times 13 + 11$
- (A) एक अभाज्य संख्या है। (B) 17 का गुणज है।
(C) एक भाज्य संख्या है। (D) एक विषम संख्या है।
8. PQ वृत्त पर स्थित बिंदु P पर खींची गयी एक स्पर्श-रेखा है। PQ के समांतर खींची गयी वृत्त की स्पर्श-रेखाओं की संख्या है :
- (A) 2 (B) 1
(C) अनेक (D) शून्य
9. यदि $-26, x, 2$ समांतर श्रेढ़ी में हैं तो x का मान है :
- (A) 14 (B) -13
(C) -12 (D) -14
10. द्विघात समीकरण $x^2 + 9 = 0$ के मूल
- (A) वास्तविक एवं बराबर हैं। (B) वास्तविक नहीं हैं।
(C) वास्तविक तथा एक दूसरे के ऋणात्मक हैं। (D) परिमेय संख्याएँ हैं।
11. PQ केन्द्र O वाले वृत्त पर खींची गयी ऐसी स्पर्श-रेखा है कि $OP = 2OQ$ है। $\angle OPQ$ की माप है :

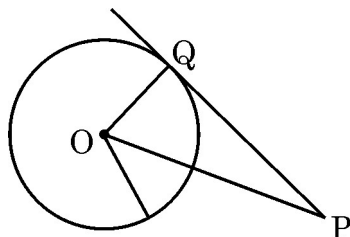


- (A) 15° (B) 60°
(C) 45° (D) 30°



5. 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°
6. The distance between the points $(-2, 5)$ and $(5, -2)$ is
(A) $7\sqrt{2}$ (B) 14
(C) $2\sqrt{7}$ (D) 7
7. $17 \times 11 \times 13 + 11$ is
(A) a prime number. (B) multiple of 17.
(C) a composite number. (D) an odd number.
8. 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
9. If $-26, x, 2$ are in A.P., then the value of x is
(A) 14 (B) -13
(C) -12 (D) -14
10. 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

11. PQ is tangent to the circle with centre O such that $OP = 2OQ$. $m\angle OPQ$ is



- (A) 15° (B) 60°
(C) 45° (D) 30°



12. 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) $\frac{1}{2}$

13. 52 पत्तों की अच्छी प्रकार से फेंटी गयी गड्डी में से एक पत्ता निकाला जाता है। हुकुम (spade) की बेगम निकलने की प्रायिकता है :

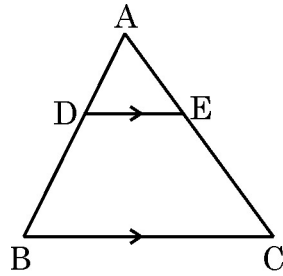
(A) $\frac{1}{26}$

(B) $\frac{1}{52}$

(C) 0

(D) $\frac{1}{4}$

14. 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

15. एक A.P. का 14वाँ पद 4 तथा 15वाँ पद शून्य है। इसका प्रथम पद है :

(A) -48

(B) -56

(C) 56

(D) 48



12. 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) $\frac{1}{2}$

13. A card is drawn from a well-shuffled deck of 52 playing cards. The probability of getting a queen of spade is

(A) $\frac{1}{26}$

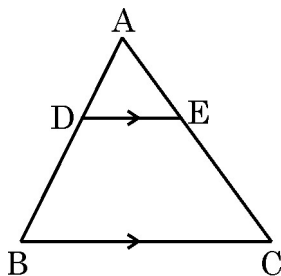
(B) $\frac{1}{52}$

(C) 0

(D) $\frac{1}{4}$

14. 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

15. If 14th term of an A.P. is 4 and its 15th term is zero, then its first term is

(A) -48

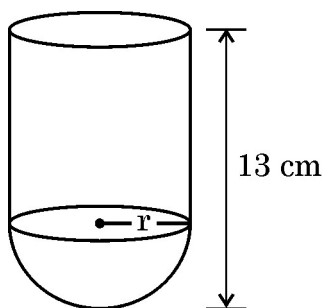
(B) -56

(C) 56

(D) 48



16. 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) $26\pi r$
17. 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
18. 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.

(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)

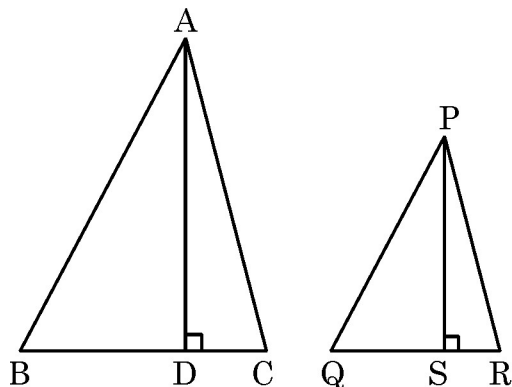
5 × 2 = 10

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

21. (a) 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'.
22. In the given figure, two triangles ABC and PQR are shown such that $\angle A = \angle P$ and $\angle C = \angle R$. If $AD \perp BC$ and $PS \perp QR$, then prove that (i) $\triangle ADB \sim \triangle PSQ$ (ii) $AD \times QS = BD \times PS$.



23. Find the H.C.F. and L.C.M. of 408 and 312.

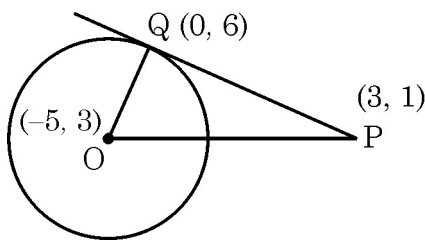


24. (a) If $\sec A = \sqrt{2}$ and $\tan B = \sqrt{3}$, then find the value of $2 \sin A \cos B$.

OR

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

25. In the given figure, PQ is a tangent to a circle with centre O(−5, 3). If coordinates of P and Q are (3, 1) and (0, 6) respectively, then using distance formula, show that $PQ \perp OQ$.



Section – C

(Short Answer Type Questions)

6 × 3 = 18

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

26. (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

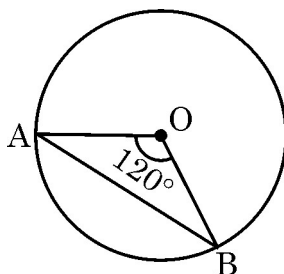
- (b) Find the zeroes of the polynomial $p(x) = 3x^2 + 7x - 20$ and verify the relationship between its zeroes and the coefficients.
27. (a) The 4th and 10th term of an A.P. are 13 and 25 respectively. Find its 24th term.

OR

- (b) From 232 to 540, find the number of multiples of 3.



28. वृत्त की जीवा AB, केन्द्र O पर 120° का कोण अंतरित करती है। यदि वृत्त की त्रिज्या 21 cm है तो चाप AB की लम्बाई ज्ञात कीजिए।



29. वह अनुपात ज्ञात कीजिए जिसमें बिंदुओं (1, 3) तथा (2, 5) को मिलाने वाला रेखाखंड, रेखा $2x + y = 6$ से विभाजित होता है।

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

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

खण्ड - घ

(दीर्घ-उत्तरीय प्रश्न)

4 × 5 = 20

प्रश्न संख्या 32 से 35 तक दीर्घ-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 5 अंकों का है।

32. निम्नलिखित आँकड़ों का माध्य 19 तथा बारम्बारताओं का योग 40 है। लुप्त बारम्बारता p तथा q के मान ज्ञात कीजिए :

वर्ग	0-5	5-10	10-15	15-20	20-25	25-30	30-35
बारम्बारता	2	5	6	p	10	q	4

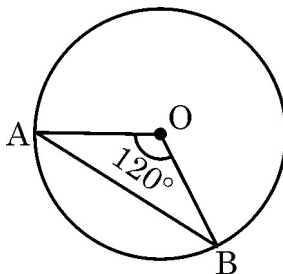
33. (a) ABCD एक आयत है जिसकी विमायें 80 cm × 60 cm हैं। PQRS एक अन्य आयत है जो आयत ABCD के अंदर भुजाओं से x cm की समान दूरी बनाते हुये खींचा गया है। यदि PQRS का क्षेत्रफल आयत ABCD के क्षेत्रफल का आधा है, तो x का मान ज्ञात कीजिए।

अथवा

- (b) एक रेलगाड़ी एकसमान चाल से 90 km की दूरी तय करती है। यदि यह चाल 15 km/h अधिक होती तो वह उसी यात्रा में 30 मिनट कम समय लेती। रेलगाड़ी की मूल चाल ज्ञात कीजिए।



28. 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.



29. Determine the ratio in which the line $2x + y = 6$ divides the line segment joining the points (1, 3) and (2, 5).
30. Prove that $\sqrt{2}$ is an irrational number.
31. Prove that : $\sqrt{\frac{1 - \cos A}{1 + \cos A}} = \frac{\tan A}{\sec A + 1}$.

Section – D

(Long Answer Type Questions)

$4 \times 5 = 20$

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

32. Find the missing frequencies p and q in the following frequency distribution, when sum of frequencies is 40 and mean is 19 :

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	2	5	6	p	10	q	4

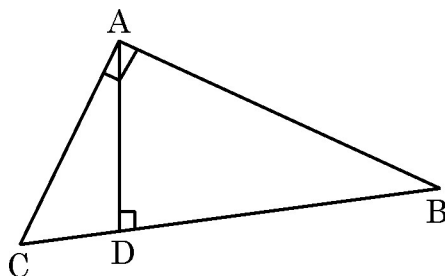
33. (a) ABCD is a rectangle of dimensions 80 cm $\times$ 60 cm. Another rectangle PQRS is drawn inside ABCD leaving space of equal width x cm along the edges of ABCD. If area PQRS is half of the area ABCD, then find the value of x .

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.



34. 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.
35. (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.

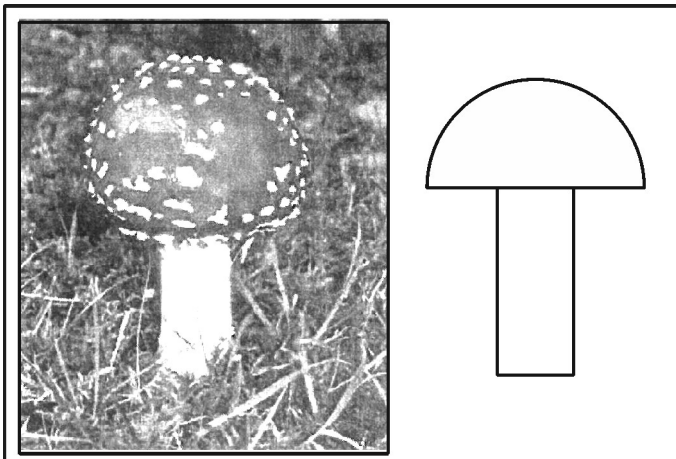
Section – E

(Case-study based Questions)

$3 \times 4 = 12$

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

36.





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).

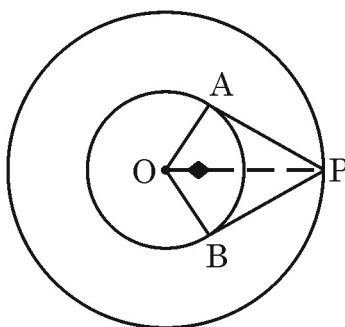
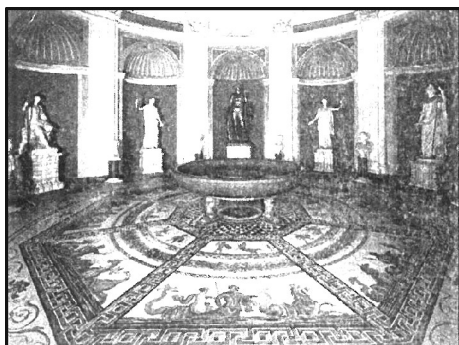
The hemispherical cap’s radius = 3 cm and cylindrical stem is 2 cm high with diameter 1.4 cm. Considering mushroom a solid object, answer the following questions :

- (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.

37.



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 :

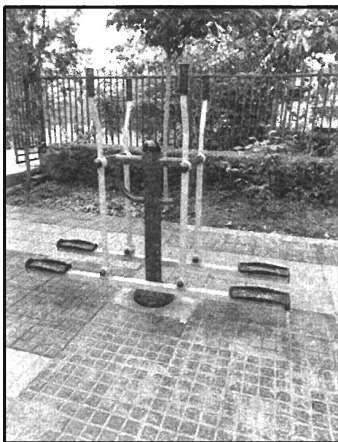
- (i) Find $m\angle AOP$. 1
- (ii) Prove that $\triangle OAP \cong \triangle OBP$. 1
- (iii) (a) Find the length of fencing required to protect the statue.
(Take $\sqrt{3} = 1.73$) 2

OR

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



38.



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.

