24628

නව නිර්දේශය/புதிய பாடத்திட்டம்/New Syllabus

NEW

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා விை்க දෙ තමේ
Department of Examinations, Sri Lanka

32 | E | I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2017 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2017 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2017

ගණිතය	**I**
கணிதம்	**I**
Mathematics	**I**

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Index Number: ....

Certified Correct

....
Signature of Invigilator

Important:

* This question paper consists of **8** pages.

* Write your **Index Number** correctly in the space provided on **this page** and on **page three**.

* Answer **all** questions **on this question paper itself**.

* Use the space provided under each question for working and writing the answer.

* Indicate the **relevant steps** and the **correct units** when answering the questions.

* Marks are awarded as follows:

  In Part A
  2 marks for each question
  In Part B
  10 marks for each question

* Blank papers can be obtained for scratch work.

For Marking Examiners' Use Only

Part	Question Numbers	Marks
A	1 - 25	
	1	
	2	
B	3	
	4	
	5	
Total		

....	....
First Examiner	Code Number
....	....
Second Examiner	Code Number
....	....
Arithmetic Checker	Code Number
....	....
Chief Examiner	Code Number

Part A
*Answer all questions on this question paper itself.*

1. A person deposits an amount of 1000 rupees in a bank at an annual simple interest rate of 8%. How much interest does he get for this amount at the end of the first year?

2. A vehicle travels at a uniform speed of 30 kilometres per hour. Find the time in hours that this vehicle takes to travel a distance of 120 kilometres.

3. Express in logarithm form: $3^4 = 81$

4. Simplify: $\dfrac{1}{2x} - \dfrac{1}{4x}$

5. Find the magnitude of $D\hat{B}C$ using the information given in the figure.
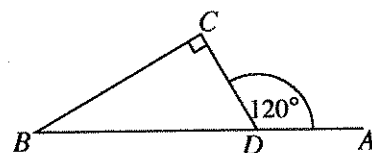
6. It has been estimated that 10 men will require 8 days to complete a certain task. How many men should be engaged to complete this task in 5 days?
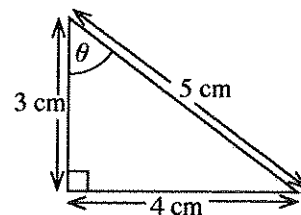
7. Find the least common multiple of the two algebraic expressions $2xy$ and $4y^2$.

[*see page three*

8. From the values given below, select the first approximation of $\sqrt{32}$.

5.2,   5.3,   5.7,   5.9

**9.** Find the value of $\cos\theta$ using the information given in the figure.

3 cm, 4 cm, 5 cm, θ

10. If A and B are two sets such that $n(A) = 5$, $n(B) = 7$ and $n(A \cup B) = 10$, find the value of $n(A \cap B)$.

11. Factorize: $x^2 - 36$

12. In a lottery which issued only 100 lottery tickets, 35 lottery tickets were bought by females and the rest were bought by males. If only one winner is selected in the lottery draw, what is the probability of the winner being a male?

13. AB is a diameter of the circle with centre O. The point C lies on the circle. If $AB = 10$ cm and $CB = 6$ cm, find the length of AC in centimetres.
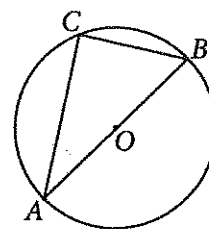
14. Solve : $(x + 2)(x - 1) = 0$

15. **Write the pair of triangles** that are congruent from the triangles given in the figure, and from the following cases ①, ② and ③, select and underline the case you used to identify this pair.
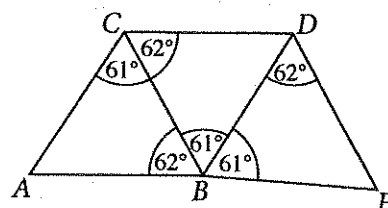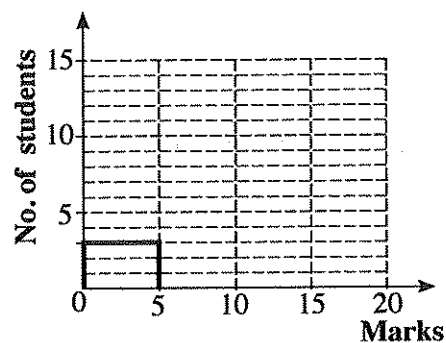
① SAS   ② AAS   ③ SSS

[see page four

16. A frequency distribution prepared using the marks obtained by the students of a class in a test is given below. Using the information in the frequency distribution, complete the given incomplete histogram.
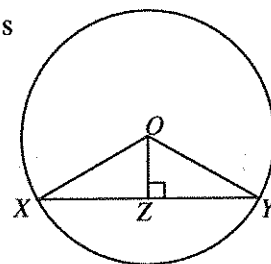
| Marks	No. of students
0 - 5	3
5 - 10	10
10 - 20	10

17. In the figure, XY is a chord of the circle with centre O. The point Z lies on XY as shown in the figure.

For each statement given below, if it is correct, mark a '√' and if it is incorrect, mark a 'X' in the box in front of it.

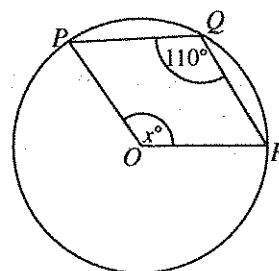| $XY = 2\,XZ$	
$X\hat{O}Y = 2\,X\hat{O}Z$	

18. In the figure, AB denotes a lighthouse and P and Q denote two small boats. A person in boat P observes the top B of the lighthouse with an angle of elevation of 30°. A person at B observes the boat Q with an angle of depression of 20°. Represent this information in the given figure. (Disregard the heights of the observers.)
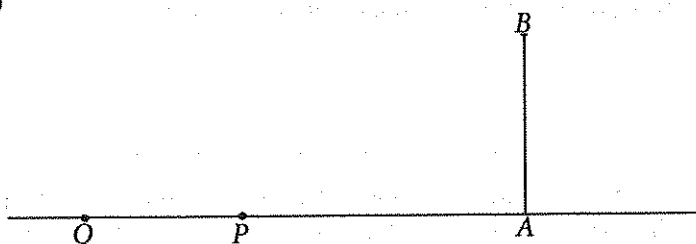
19. The matrices A and B are given by $A = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$ and $B = (-1 \quad 2)$. Find the matrix AB.

20. In the given figure, P, Q and R are three points that lie on the circle with centre O. Find the value of x using the information given in the figure.

21. A sector of a circle with centre L is given in the figure. Draw a sketch of the construction lines that are necessary to find the point on the arc MN which is at an equal distance from the line LM and the line LN.
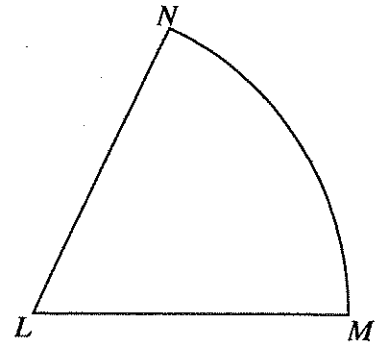
22. If the volume of a right circular cylinder of height $7\,m$ is $88\,m^3$, find the base radius of the cylinder in metres. (The volume of a right circular cylinder of base radius r and height h is given by $\pi r^2 h$. Use $\dfrac{22}{7}$ for the value of π.)

23. In the given figure, the point D lies on the straight line segment AE. If the area of the parallelogram $ABCD$ is $1\,cm^2$, find the area of $\triangle ACE$, using the given information.
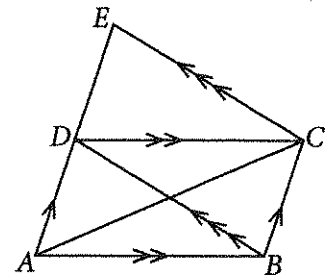
24. In the given figure, $KLMN$ is a cyclic quadrilateral. The line KN has been produced to P. Find the value of x using the given information.
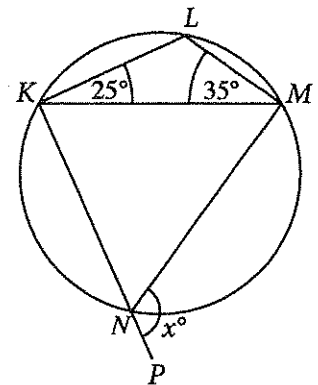
25. Find the gradient of the straight line which passes through the points A and B in the figure.
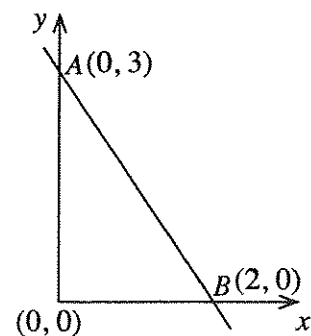
Part B
Answer all questions on this question paper itself.

1. A household water tank is completely filled with water. $\frac{1}{10}$ of the water in the tank is used to water the garden and $\frac{1}{4}$ is used for bathing.

   (i) Find what fraction of the water in the tank is used to water the garden and for bathing.

   Of the remaining water in the tank, $\frac{4}{13}$ is used to wash clothes.

   (ii) Find what fraction of the water in the completely filled tank is used to wash clothes.

   (iii) Find what fraction of the tank remains filled now.

   When another 500 litres of water is used for kitchen requirements, $\frac{1}{4}$ of the tank remains filled.

   (iv) Find the capacity of the tank in litres.

2. The given figure is a sketch of a garden consisting of a rectangular part *ABDE* and a part *BCD* in the shape of a sector of a circle with angle at the centre 45°. Here *BD* = 14 m.

   Use $\frac{22}{7}$ for the value of π in the following calculations.

   (i) Find the area of the part *BCD*.

   The area of the part *ABDE* is four times the area of the part *BCD*.

   (ii) Find the length of *AB*.
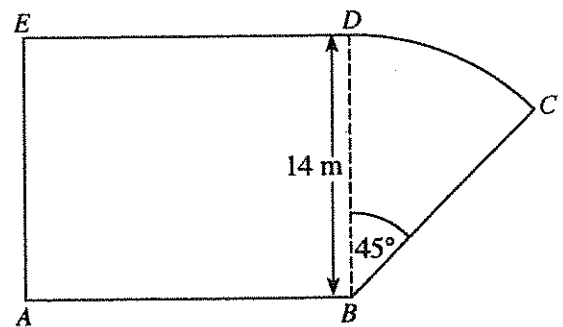
   (iii) Find the length of the arc *DC*.

   (iv) Find the perimeter of the garden.

3. Varuna owned 100 shares of company A. At the beginning of a financial year he sold 40 of these shares at 210 rupees per share.

    (i) Find the amount of money Varuna received by selling 40 shares of company A.

    Varuna bought a certain number of shares of company B at 240 rupees per share at the beginning of the same financial year, by investing the total amount he received by selling 40 shares of company A.

    (ii) Find how many shares of company B Varuna bought.

    At the end of the financial year, company A paid 15 rupees per share and company B paid 18 rupees per share as dividends.

    (iii) Find the total dividend income he received from companies A and B.

    (iv) Find the additional dividend income he received at the end of the financial year due to selling 40 shares of company A and buying shares of company B, without keeping all the shares of company A with him.
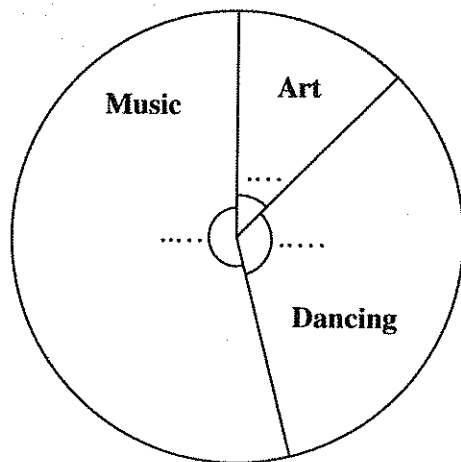
4. Each student in grade 6 of a certain school had to select exactly one of the three subjects Art, Dancing and Music as the aesthetic subject. How the students selected these subjects is given below.
   The number of students who selected Dancing is three times the number of students who selected Art and the number of students who selected Music is five times the number of students who selected Art.

    Pie chart depicting how the students selected the aesthetic subjects

    (i) Write the number of students who selected Art as a fraction of the total number of students.

    (ii) Calculate the magnitudes of the angles at the centres of the sectors corresponding to the three subjects, and write them on the relevant dotted lines in the given pie chart.

    (iii) If the number of students who selected Art is 30, find the total number of students in grade 6 of this school.

[see page eight

After two weeks, 15 of the students who had selected Music, changed their subject to Art.

(iv) Find the angle at the centre of the sector corresponding to the subject Art, in a new pie chart consisting of all three subjects, that is drawn based on the changed data.

5. A box contains 5 bulbs which are identical in shape and size. Of these, 2 are burnt out bulbs and the rest are good bulbs.

A bulb is drawn randomly from the box and examined, and **without replacing** this bulb, another bulb is drawn randomly from the box and examined.

(i) Using the symbol '✗', represent the sample space of the experiment of drawing bulbs, in the given grid. The burnt out bulbs are denoted by B_1 and B_2 and the good bulbs are denoted by G_1, G_2 and G_3.
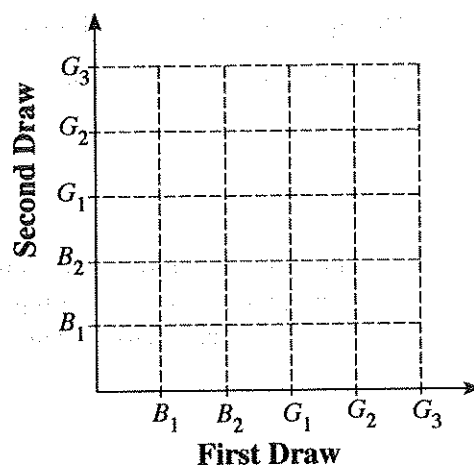
(ii) In the grid, encircle the event of drawing at least one burnt out bulb, and find its probability.

(iii) An incomplete tree diagram relevant to the above experiment is given below. Complete the tree diagram by indicating the corresponding probabilities.

A burnt out bulb is denoted by B and a good bulb is denoted by G.

First Draw   **Second Draw**

$\dfrac{3}{5}$ G — G, B

B — G, B
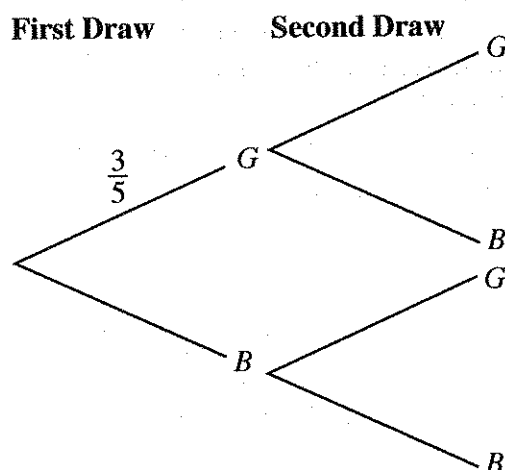
(iv) Using the tree diagram, find the probability that exactly one of the two bulbs that are drawn in this experiment is burnt out.

✳ ✳ ✳

නව නිර්දේශය/புதிய பாடத்திட்டம்/New Syllabus

32 E II

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2017 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2017 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2017

ගණිතය	II
கணிதம்	II
Mathematics II	

පැය තුනයි
மூன்று மணித்தியாலம்
Three Hours

Important:

* Answer **ten** questions selecting **five** questions from **Part A** and **five** questions from **Part B**.
* Write the **relevant steps** and the **correct units** in answering the questions.
* Each question carries **10** marks.
* The volume of a right circular cone of base radius r and height h is $\frac{1}{3}\pi r^2 h$.
* The volume of a sphere of radius r is $\frac{4}{3}\pi r^3$.

Part A
Answer five questions only.

1. An incomplete table of values prepared to draw the graph of the function $y = x^2 + 4x - 2$ is given below.

x	−5	−4	−3	−2	−1	0	1
y	3	−2	−5		−5	−2	3

   (i) Find the value of y when x = −2.
   (ii) Using the scale of 10 small divisions representing one unit along the x-axis and along the y-axis, draw the graph of the above function on a graph paper.

   Answer the following questions **using the graph**.
   (iii) Find the interval of values of x for which y is negative and decreasing.
   (iv) Express the given function in the form $y = (x + a)^2 - b$; where a and b are two numbers.
   (v) Find the positive root of the equation $x^2 + 4x - 2 = 0$ to the first decimal place and thereby find an approximate value for $\sqrt{6}$.

2. The mass of each of 100 sweetmeats of a particular type was measured in grammes. A frequency distribution constructed using this information is given below.

Mass (grammes)	17 - 18	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23
Number of sweetmeats	4	34	26	20	10	6

   (i) Find the modal class of this distribution.
   (ii) Using a suitable assumed mean or otherwise, find the mean mass of a sweetmeat.

   A packet of sweetmeats of this type contains 120 sweetmeats.
   (iii) Estimate the mass of sweetmeats in one such packet.
   (iv) The production cost of 100 grammes of this type of sweetmeat is 50 rupees. Estimate the cost of producing the sweetmeats in a packet, in rupees.
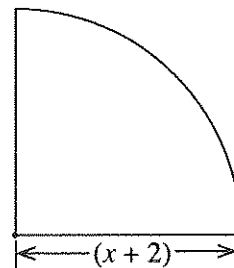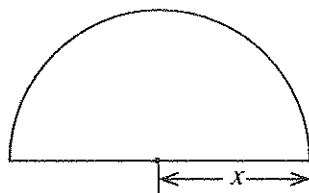
[see page two

3. The price of an almirah is 30 000 rupees when it is purchased outright. It can also be purchased by making a downpayment of 6 000 rupees and paying the remaining amount with interest in 24 equal monthly installments of 1 100 rupees each. If the interest for this method of payment is calculated according to the reducing balance method, calculate the annual rate of interest that is charged.

4. On a horizontal ground, a mango tree, a jak tree and a coconut tree are located at the positions A, B and T respectively. B is located to the north of A and T is located to the east of A. Moreover, $AT = 100$ m and the bearing of T from B is 162°.

   (i) Draw a sketch of the positions A, B and T and indicate the given measurements.

   (ii) Find the magnitude of $A\hat{T}B$.

   (iii) Using the trigonometric tables, find the distance AB in metres.

   A well is located at position C to the north of A, between A and B, such that $TC = 175$ m.

   (iv) Using the trigonometric tables, find the magnitude of $A\hat{C}T$.

5. (a) The prices of the entrance tickets to an art exhibition are given below.

   | For an adult – 225 rupees |
   | For a child – 150 rupees |

   A group consisting of adults and children have decided to attend this exhibition together. The number of children in this group is five more than twice the number of adults. The total cost of the entrance tickets for this group is 6 525 rupees.

   (i) Construct a pair of simultaneous equations by taking the number of adults in this group as x and the number of children as y.

   (ii) Solve the pair of simultaneous equations and find separately, the number of adults and the number of children in the group.

   (b) Solve the inequality $225p + 3750 \le 5500$ and find the maximum integral value that p can take.

6. The two plane figures shown below are respectively, half a circle of radius x units and a quarter of a circle of radius $(x + 2)$ units.

   If the areas of the two plane figures are equal, construct a quadratic equation in terms of x and by solving it, find the value of x correct to the first decimal place.
   Use 1.41 for the value of $\sqrt{2}$.

   (The area of a circle of radius r is πr^2.)

Part B
Answer five questions only.

7. (a) A vertical wall is constructed on a horizontal ground by using identical bricks, as follows.

   - The first row of the wall consists of 106 bricks.
   - The number of bricks in each row above the first row is three less than the number of bricks in the row immediately below it.
   - The last row consists of only one brick.

   (i) Find how many rows of bricks this wall consists of.

   (ii) Find how many bricks in total were used to construct this wall.

   (b) The first term of a geometric progression is 2. The common ratio of this progression is positive, and the sum of the second and third terms is 24.

   (i) Find the common ratio of this progression.

   (ii) Show that the seventh term of this progression is 1458.

8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. Show the construction lines clearly.

   (i) Construct the triangle ABC such that $AB = 8.0$ cm, $AC = 7.5$ cm and $B\hat{A}C = 60°$.

   (ii) Construct the angle bisector of $A\hat{C}B$.

   (iii) Mark the point D on the side BC such that $CD = 5$ cm and construct the circle that touches the side BC at the point D, and has its centre O on the angle bisector of $A\hat{C}B$.

   (iv) From B, construct another tangent to the above constructed circle and name the point at which it touches the circle as E.

   (v) Construct the isosceles triangle ABP such that the point P lies on BE produced and $B\hat{A}P = A\hat{B}E$.

9. A, B and C are 3 points on the circle given in the figure. CB is a diameter of the given circle. The line CB produced and the tangent drawn to the circle at A meet at Q. Moreover, point E lies on the other tangent drawn to the circle from Q, such that $CAQE$ is a cyclic quadrilateral. If $A\hat{C}B = x°$, then show that $B\hat{C}E = 3x°$.
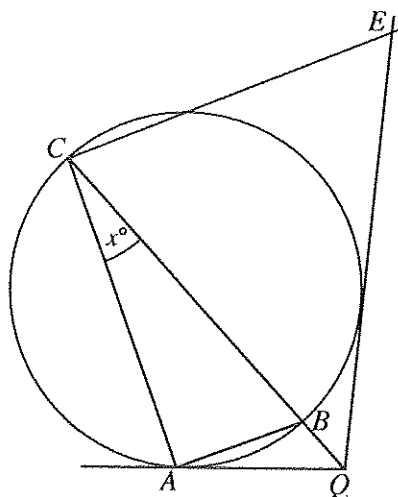
10. In the triangle *ABC* given in the figure, *AC* = *BC*. Moreover, *X* and *Y* are the midpoints of *AC* and *BC* respectively. The lines *AY* and *BX* intersect at *T*.
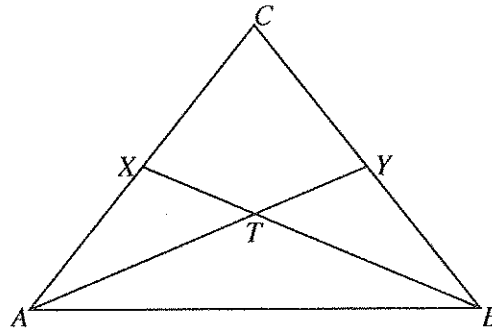
Copy the figure in your answer script.

(i) Show that $\Delta ABX \equiv \Delta ABY$.

(ii) Show that $B\hat{T}Y = 2T\hat{A}B$.

(iii) Join *XY*. Show that, area of $\Delta ABY = 2 \times$ area of ΔAXY .

11. A solid iron sphere of radius 2 cm is melted and a solid right circular cone with the same volume as the sphere is made, such that the ratio of the base radius of the cone to its perpendicular height is 3 : 4. Show that the base radius of the cone that is made is $2 \times \sqrt[3]{3}$ cm and find its value correct to the second decimal place using the logarithms table.

12. Three mathematics problems numbered as ①, ② and ③ were given to a class of 50 students. Some information on how they had solved these problems is given below.

- The number of students who did not get the correct solution to any of the three problems is 6.
- The number of students who got the correct solution to problem ① only is 20.
- The number of students who got the correct solution to problem ③ is 8.
- No student got the correct solution to both problems ② and ③.

(i) Copy the incomplete Venn diagram given below in your answer script and represent the above information in it.

Students who got the correct solution to ②

Students who got the correct solution to ③

Students who got the correct solution to ①
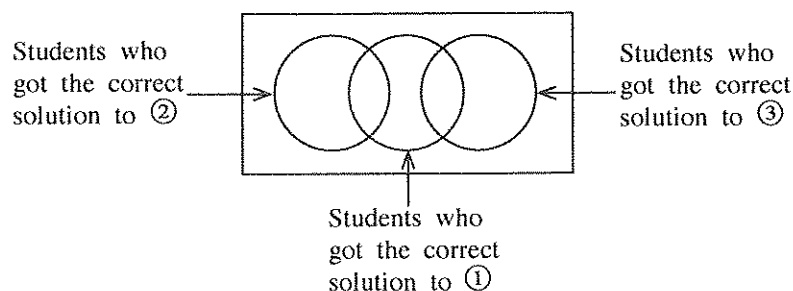
(ii) In the Venn diagram, shade the regions which represent the students who got the correct solution to more than one problem.

(iii) Find the number of students who got the correct solution to problem ②.

(iv) The number of students who got the correct solution to problem ① is twice the number of students who got the correct solution to problem ②. Find the number of students who got the correct solution to two problems.

* * *