



Series WX1YZ/6



SET~2

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **30/6/2**

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 (मानक) – सैद्धान्तिक

MATHEMATICS (Standard) – Theory

निर्धारित समय : 3 घण्टे

अधिकतम अंक : 80

Time allowed : 3 hours

Maximum Marks : 80

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.
- 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 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.



30/6/2

110 B



Page 1

P.T.O.



General Instructions :

Read the following instructions carefully and follow them :

- (i) This question paper contains **38** questions. **All** questions are compulsory.
- (ii) This Question Paper is divided into **FIVE** Sections – **Section A, B, C, D** and **E**.
- (iii) In Section–**A** question number **1** to **18** are Multiple Choice Questions (MCQs) and question number **19 & 20** are Assertion-Reason based questions of **1** mark each.
- (iv) In Section–**B** question number **21** to **25** are Very Short-Answer-I (SA-I) type questions of **2** marks each.
- (v) In Section–**C** question number **26** to **31** are Short Answer-II (SA-II) type questions carrying **3** marks each.
- (vi) In Section–**D** question 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 / Passage based integrated units of assessment questions carrying **4** marks each. Internal choice is provided in **2** marks question 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 figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.
- (x) Use of calculator is **NOT** allowed.

SECTION – A

(Multiple Choice Questions)

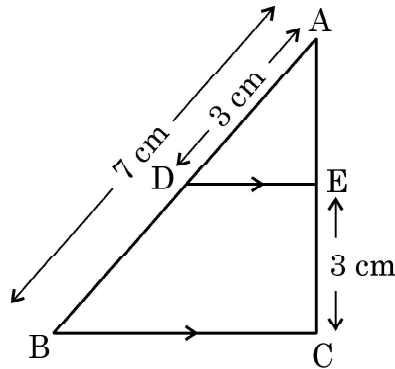
Section – A consists of 20 questions of 1 mark each.

1. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and –3, then
- | | |
|----------------------|---------------------|
| (A) $a = -7, b = -1$ | (B) $a = 5, b = -1$ |
| (C) $a = 2, b = -6$ | (D) $a = 0, b = -6$ |





2. द्विघात बहुपदों, जिनके शून्यक -5 और -3 हैं, की संख्या है :
(A) 1 (B) 2
(C) 3 (D) 3 से अधिक
3. यदि किसी एक A.P. के पहले n पदों का योग $3n^2 + n$ और उसका सार्व अन्तर 6 हो, तो पहला पद होगा :
(A) 2 (B) 3
(C) 1 (D) 4
4. $\frac{\cos^2 \theta}{\sin^2 \theta} - \frac{1}{\sin^2 \theta}$ का सरलतम रूप है :
(A) $\tan^2 \theta$ (B) $\sec^2 \theta$
(C) 1 (D) -1
5. दी गई आकृति में, $DE \parallel BC$ है। यदि $AD = 3$ cm, $AB = 7$ cm और $EC = 3$ cm है, तो AE की लंबाई होगी :

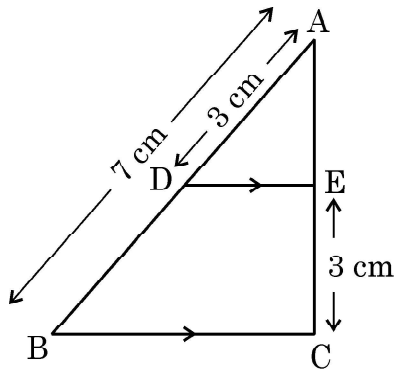


- (A) 2 cm (B) 2.25 cm
(C) 3.5 cm (D) 4 cm
6. 2-अंकीय सबसे छोटी संख्या और सबसे छोटी संयुक्त संख्या का LCM है :
(A) 12 (B) 4
(C) 20 (D) 40
7. बिंदु $(-4, 3)$ की y-अक्ष से दूरी है :
(A) -4 (B) 4
(C) 3 (D) 5





2. The number of quadratic polynomials having zeroes -5 and -3 is
(A) 1 (B) 2
(C) 3 (D) more than 3
3. If the sum of the first n terms of an A.P be $3n^2 + n$ and its common difference is 6, then its first term is
(A) 2 (B) 3
(C) 1 (D) 4
4. $\frac{\cos^2 \theta}{\sin^2 \theta} - \frac{1}{\sin^2 \theta}$, in simplified form, is :
(A) $\tan^2 \theta$ (B) $\sec^2 \theta$
(C) 1 (D) -1
5. In the given figure, $DE \parallel BC$. If $AD = 3$ cm, $AB = 7$ cm and $EC = 3$ cm, then the length of AE is



- (A) 2 cm (B) 2.25 cm
(C) 3.5 cm (D) 4 cm
6. The LCM of smallest 2-digit number and smallest composite number is
(A) 12 (B) 4
(C) 20 (D) 40
7. The distance of the point $(-4, 3)$ from y-axis is
(A) -4 (B) 4
(C) 3 (D) 5



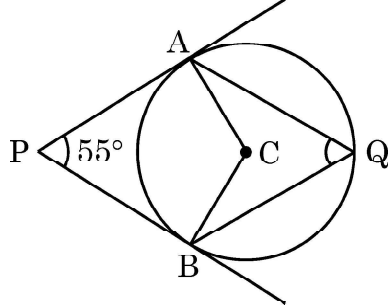
8. यदि बहुपद $x^2 + 3x + k$ का एक शून्यक 2 है, तो k का मान होगा
(A) -10 (B) 10
(C) 5 (D) -5
9. $3x - y = 3$ से निरूपित रेखा और y -अक्ष के प्रतिच्छेदन बिन्दु के निर्देशांक हैं :
(A) $(0, -3)$ (B) $(0, 3)$
(C) $(2, 0)$ (D) $(-2, 0)$
10. यदि द्विघात समीकरण $ax^2 + bx + c = 0$ के दो वास्तविक और बराबर मूल हैं, तो 'c' होगा :
(A) $\frac{-b}{2a}$ (B) $\frac{b}{2a}$
(C) $\frac{-b^2}{4a}$ (D) $\frac{b^2}{4a}$
11. 52 ताश के पत्तों की अच्छी प्रकार से फेंटी गई गड्डी से एक पत्ता यादृच्छया निकाला जाता है। इस पत्ते का फेस (face) का पत्ता होने की प्रायिकता है
(A) $\frac{1}{2}$ (B) $\frac{3}{13}$
(C) $\frac{4}{13}$ (D) $\frac{1}{13}$
12. यदि $\Delta PQR \sim \Delta ABC$, $PQ = 6$ cm, $AB = 8$ cm और ΔABC का परिमाप 36 cm हो, तो ΔPQR का परिमाप होगा
(A) 20.25 cm (B) 27 cm
(C) 48 cm (D) 64 cm
13. एक लंब-वृत्तीय शंकु का आयतन होगा, जिसके आधार का क्षेत्रफल 156 cm² तथा ऊर्ध्वाधर ऊँचाई 8 cm है,
(A) 2496 cm³ (B) 1248 cm³
(C) 1664 cm³ (D) 416 cm³
14. दो वृत्तों की परिधियों का अनुपात 4 : 5 है। इनकी त्रिज्याओं का अनुपात क्या होगा ?
(A) 16 : 25 (B) 25 : 16
(C) $2 : \sqrt{5}$ (D) 4 : 5



8. If one zero of the polynomial $x^2 + 3x + k$ is 2, then the value of k .
(A) -10 (B) 10
(C) 5 (D) -5
9. The point of intersection of the line represented by $3x - y = 3$ and y -axis is given by
(A) $(0, -3)$ (B) $(0, 3)$
(C) $(2, 0)$ (D) $(-2, 0)$
10. If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots, then 'c' is equal to
(A) $\frac{-b}{2a}$ (B) $\frac{b}{2a}$
(C) $\frac{-b^2}{4a}$ (D) $\frac{b^2}{4a}$
11. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability of getting a face card is
(A) $\frac{1}{2}$ (B) $\frac{3}{13}$
(C) $\frac{4}{13}$ (D) $\frac{1}{13}$
12. If $\Delta PQR \sim \Delta ABC$; $PQ = 6$ cm, $AB = 8$ cm and the perimeter of ΔABC is 36 cm, then the perimeter of ΔPQR is
(A) 20.25 cm (B) 27 cm
(C) 48 cm (D) 64 cm
13. The volume of a right circular cone whose area of the base is 156 cm^2 and the vertical height is 8 cm, is
(A) 2496 cm^3 (B) 1248 cm^3
(C) 1664 cm^3 (D) 416 cm^3
14. The circumferences of two circles are in the ratio 4 : 5. What is the ratio of their radii ?
(A) 16 : 25 (B) 25 : 16
(C) $2 : \sqrt{5}$ (D) 4 : 5



15. दी गई आकृति में, केंद्र C वाले वृत्त पर बाह्य बिंदु P से PA और PB स्पर्श रेखाएँ खींची गई हैं। वृत्त पर Q एक अन्य बिंदु है। $\angle AQB$ का माप है :



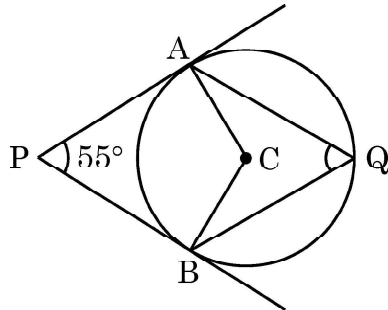
- (A) $62\frac{1}{2}^\circ$ (B) 125°
(C) 55° (D) 90°
16. एक पेटी में 90 डिस्क (discs) हैं, जिन पर 1 से 90 तक की संख्याएँ अंकित हैं। यदि इस पेटी से एक डिस्क यादृच्छया निकाली जाती है, तो इस पर 23 से छोटी अभाज्य संख्या के लिखे होने की प्रायिकता होगी :
- (A) $\frac{7}{90}$ (B) $\frac{1}{9}$
(C) $\frac{4}{45}$ (D) $\frac{9}{89}$
17. बिन्दु, जहाँ रेखा $2y = 4x + 5$ x-अक्ष को काटती है, के निर्देशांक हैं :
- (A) $\left(0, \frac{-5}{4}\right)$ (B) $\left(0, \frac{5}{2}\right)$
(C) $\left(\frac{-5}{4}, 0\right)$ (D) $\left(\frac{-5}{2}, 0\right)$
18. $(\cos^4 A - \sin^4 A)$ को सरल करने पर प्राप्त होता है :
- (A) $2 \sin^2 A - 1$ (B) $2 \sin^2 A + 1$
(C) $2 \cos^2 A + 1$ (D) $2 \cos^2 A - 1$

अभिकथन – तर्क आधारित प्रश्न : प्रश्न संख्या 19 तथा 20 प्रत्येक में एक अभिकथन (A) के पश्चात् एक तर्क (R) कथन दिया है। निम्न में से सही विकल्प चुनिए :

- (A) (A) तथा (R) दोनों सत्य हैं तथा (R), कथन (A) की व्याख्या करता है।
(B) (A) तथा (R) दोनों सत्य हैं, परन्तु (R) कथन (A) की व्याख्या नहीं करता।
(C) (A) सत्य है, परन्तु (R) सत्य नहीं है।
(D) (A) असत्य है, जबकि (R) सत्य है।



15. In the given figure, PA and PB are tangents from external point P to a circle with centre C and Q is any point on the circle. Then the measure of $\angle AQB$ is



- (A) $62\frac{1}{2}^\circ$ (B) 125°
(C) 55° (D) 90°
16. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, the probability that it bears a prime number less than 23 is
- (A) $\frac{7}{90}$ (B) $\frac{1}{9}$
(C) $\frac{4}{45}$ (D) $\frac{9}{89}$
17. The coordinates of the point where the line $2y = 4x + 5$ crosses x -axis is
- (A) $\left(0, \frac{-5}{4}\right)$ (B) $\left(0, \frac{5}{2}\right)$
(C) $\left(\frac{-5}{4}, 0\right)$ (D) $\left(\frac{-5}{2}, 0\right)$
18. $(\cos^4 A - \sin^4 A)$ on simplification, gives
- (A) $2 \sin^2 A - 1$ (B) $2 \sin^2 A + 1$
(C) $2 \cos^2 A + 1$ (D) $2 \cos^2 A - 1$

Assertion – Reason Based Questions : In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option out of the following :

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



19. **Statement A (Assertion)** : For $0 < \theta \leq 90^\circ$, $\operatorname{cosec} \theta - \cot \theta$ and $\operatorname{cosec} \theta + \cot \theta$ are reciprocal of each other.

Statement R (Reason) : $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$

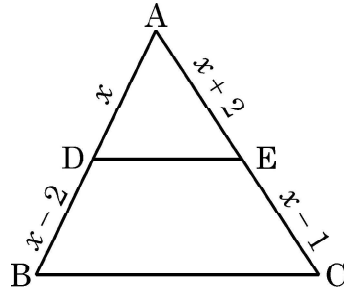
20. **Statement A (Assertion)** : If $5 + \sqrt{7}$ is a root of a quadratic equation with rational co-efficients, then its other root is $5 - \sqrt{7}$.

Statement R (Reason) : Surd roots of a quadratic equation with rational co-efficients occur in conjugate pairs.

SECTION - B

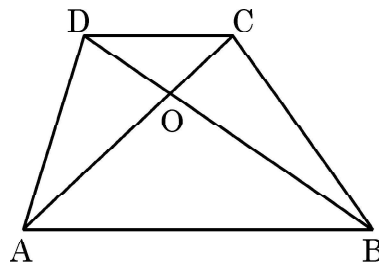
Section - B consists of Very Short Answer (VSA) type of questions of 2 marks each.

21. Find the length of the shadow on the ground of a pole of height 18 m when angle of elevation θ of the sun is such that $\tan \theta = \frac{6}{7}$.
22. (A) In the given figure, ABC is a triangle in which $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, then find the value of x .



OR

- (B) Diagonals AC and BD of trapezium ABCD with $AB \parallel DC$ intersect each other at point O. Show that $\frac{OA}{OC} = \frac{OB}{OD}$.

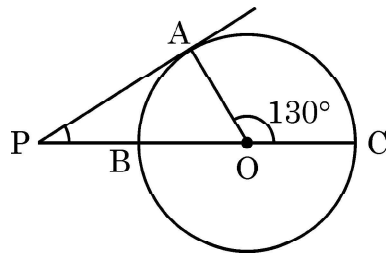




23. (A) Show that 6^n can not end with digit 0 for any natural number 'n'.

OR

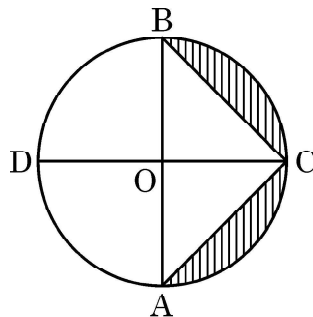
- (B) Find the LCM and HCF of 72 and 120.
24. Find the points on the x -axis, each of which is at a distance of 10 units from the point $A(11, -8)$.
25. In the given figure, PA is a tangent to the circle drawn from the external point P and PBC is the secant to the circle with BC as diameter. If $\angle AOC = 130^\circ$, then find the measure of $\angle APB$, where O is the centre of the circle.



SECTION - C

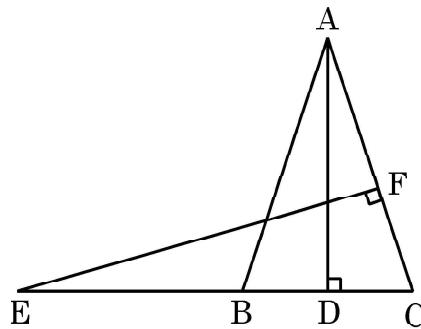
Section – C consists of Short Answer (SA) type of questions of 3 marks each.

26. In the given figure, AB and CD are diameters of a circle with centre O perpendicular to each other. If $OA = 7$ cm, find the area of shaded region.





27. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then prove that $q(p^2 - 1) = 2p$.
28. (A) The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$, find the two numbers.
- OR**
- (B) If α and β are roots of the quadratic equation $x^2 - 7x + 10 = 0$, find the quadratic equation whose roots are α^2 and β^2 .
29. Find the ratio in which the line segment joining the points $A(6, 3)$ and $B(-2, -5)$ is divided by x -axis.
30. In the given figure, E is a point on the side CB produced of an isosceles triangle ABC with $AB = AC$. If $AD \perp BC$ and $EF \perp AC$, then prove that $\triangle ABD \sim \triangle ECF$.



31. (A) Find the HCF and LCM of 26, 65 and 117, using prime factorisation.

OR

- (B) Prove that $\sqrt{2}$ is an irrational number.





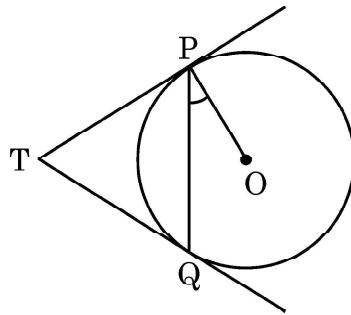
SECTION – D

Section – D consists of Long Answer (LA) type questions of 5 marks each.

32. 250 apples of a box were weighed and the distribution of masses of the apples is given in the following table :

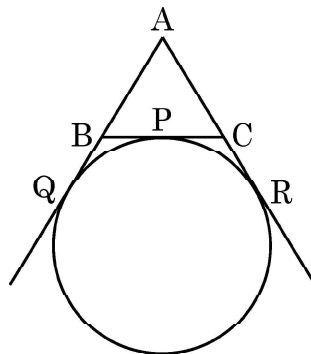
Mass (in grams)	80 – 100	100 – 120	120 – 140	140 – 160	160 – 180
Number of apples	20	60	70	x	60

- (i) Find the value of x and the mean mass of the apples. 3
- (ii) Find the modal mass of the apples 2
33. (A) Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2 \angle OPQ$.



OR

- (B) A circle touches the side BC of a $\triangle ABC$ at a point P and touches AB and AC when produced at Q and R respectively. Show that $AQ = \frac{1}{2}$ (Perimeter of $\triangle ABC$).





34. A solid is in the shape of a right-circular cone surmounted on a hemisphere, the radius of each of them being 3.5 cm and the total height of the solid is 9.5 cm. Find the volume of the solid.
35. (A) Find the sum of integers between 100 and 200 which are (i) divisible by 9 (ii) not divisible by 9.

OR

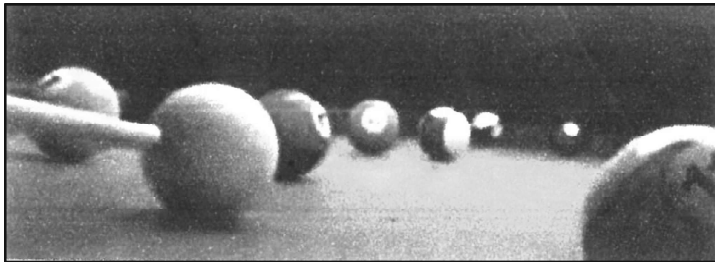
- (B) Solve the equation :

$$-4 + (-1) + 2 + 5 + \dots + x = 437.$$

SECTION – E

3 Case Study Based Questions. Each question is of 4 marks.

36. “Eight Ball” is a game played on a pool table with 15 balls numbered 1 to 15 and a “cue ball” that is solid and white. Of the 15 numbered balls, eight are solid (non-white) coloured and numbered 1 to 8 and seven are striped balls numbered 9 to 15.



The 15 numbered pool balls (no cue ball) are placed in a large bowl and mixed, then one ball is drawn out at random.

Based on the above information, answer the following questions :

- (i) What is the probability that the drawn ball bears number 8 ?
- (ii) What is the probability that the drawn ball bears an even number ?

OR

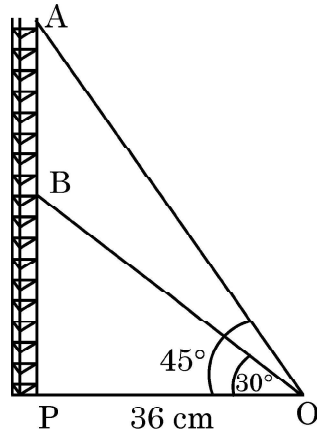
What is the probability that the drawn ball bears a number, which is a multiple of 3 ?

- (iii) What is the probability that the drawn ball is a solid coloured and bears an even number ?



37. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O.

Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is 30° and the angle of elevation of the top of Section A is 45° .



Based on the above information, answer the following questions :

- (i) Find the length of the wire from the point O to the top of Section B. 1

- (ii) Find the distance AB. 2

OR

Find the area of $\triangle OPB$.

- (iii) Find the height of the Section A from the base of the tower. 1



38. A coaching institute of Mathematics conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, there are 20 poor and 5 rich children, whereas in batch II, there are 5 poor and 25 rich children. The total monthly collection of fees from batch I is ₹ 9000 and from batch II is ₹ 26,000. Assume that each poor child pays ₹ x per month and each rich child pays ₹ y per month.



Based on the above information, answer the following questions :

- (i) Represent the information given above in terms of x and y . 1
- (ii) Find the monthly fee paid by a poor child. 2

OR

Find the difference in the monthly fee paid by a poor child and a rich child.

- (iii) If there are 10 poor and 20 rich children in batch II, what is the total monthly collection of fees from batch II ? 1

