Punjab Education, Curriculum, Training & Assessment Authority

SMART / REDUCED SYLLABUS OF MATHEMATICS GRADE-9

To facilitate students, the content of *Mathematics–9* has been **rationalized and reduced** from the compulsory textbook. This rationalization aims to help students focus on the **key Student Learning Outcomes (SLOs)** that are essential for conceptual understanding and examination preparation, rather than covering the entire textbook. It clearly specifies the **exercises, examples, and questions excluded** from the *Mathematics Grade 9* syllabus for the annual examination-**2027**. **Teachers and students are advised to follow this Smart / Reduced Syllabus** for effective teaching, learning, and exam preparation. The **unit-wise Smart / Reduced Syllabus** is provided below.

Name of the Unit	Skipped / Excluded Content of Mathematics-9
1-Real Numbers	• 1.1 Introduction to Real Numbers; Page # 1 to 3. • 1.3 Applications of Real Numbers in Daily Life; Page # 14 to 15. • 1.3.1 Temperature Conversion, Example # 10; Page # 15 to 16. • 1.3.2 Profit and Loss, Examples # 11 to 14; Page # 16 to 18. • Exercise # 1.3 (Complete); Page # 18 to 19. • **Review Exercise 1: Q # 3, 8 to 10; Page # 20 (Revised)**
2-Logarithms	• 2.4 Laws of Logarithm, Examples # 12 to 15; Page # 30 to 34. • Exercise # 2.4 (Complete); Page # 34 to 35. • **Review Exercise 2: Q # 1 (iv, ix, x), Q # 6 (ii, iii), Q # 7 to 10; Page # 35 to 36 (Revised)**
3-Sets and Functions	• Introduction; Page # 37. • 3.1 Mathematics as the Study of Patterns, Structures and Relationships; Page # 37-39 (before the basic definition of Set). • Example # 5; Page # 51. • Exercise # 3.2, Q # 9, Q # 11 to 13; Page # 54 to 55. • 3.3 Binary Relations, Examples # 7 & 8; Page # 55-56. • 3.3.1 Relation as Table, Ordered Pair and Graphs; Page # 56-57. • 3.3.2 Functions and its Domain and Range, Example # 9; Page # 57-59. • 3.3.3 Notation of Function; Page # 59. • 3.3.4 Linear and Quadratic Functions, Examples # 10 & 11; Page # 59-60 • Exercise # 3.3, (Complete); Page # 61. • Review Exercise 3: Q # 1 (vii to x), Q # 10 to 16; Page # 62 to 64.
4-Factorization and Algebraic Manipulation	• 4.4 Square Root of an Algebraic Expression, Examples # 26 & 27; Page # 77 to 78. • 4.4.1 Real World Problems of Factorization, Examples # 28 to 30; Page # 78 & 79. • Exercise # 4.4 (Complete); Page # 79 to 80. • Review Exercise 4: Q # 1 (vi), Q # 4 & 5; Page # 81.

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5-Linear equations and Inequalities	• 5.3 Feasible Solution, Example # 6; Page # 91-92. • 5.3.2 Maximum and Minimum Values of a Function in the Feasible Solution, Example # 7; Page # 93-94. • Exercise # 5.2 (Complete); Page # 94 to 95. • **Review Exercise 5: Q # 1 (vii, ix & x), Q # 3 to 5; Page # 95 to 96. (Revised)**
6-Trigonometry	• Example 12; Page # 109. • Exercise # 6.3, Q # 10 to 12; Page # 111. • Exercise # 6.4, Q # 2 (vii & viii), Q # 3 (iii); Page # 113. • Exercise # 6.5, Q # 5, 6 & 9; Page # 117 to 118. • 6.6 The Angle of Elevation and the Angle of Depression, Examples # 19 & 20; Page # 118 to 119. • Exercise # 6.6 (Complete); Page # 120. • **Review Exercise 6: Q # 1(iii), Q # 3 (iii to vi), Q # 5 & 6; Page # 121-122. (Revised)**
7-Coordinate Geometry	• Exercise # 7.1, Q # 6, 9 & 10; Page # 128. • Exercise # 7.2, Q # 2 (iii, iv), Q # 12 & 13; Page # 140 to 141. • 7.3 Applications of Coordinate Geometry in Real Life Situations, Examples # 14, 15, 16, 17, 18, 19, 20; Page # 141 to 144. • Exercise # 7.3 (Complete); Page # 144 to 145. • Review Exercise 7: Q # 4 to 10; Page # 146.
8-Logic	Complete chapter is excluded.
9-Similar Figures	• Exercise # 9.1, Q # 8 & 9; Page # 166. • Exercise # 9.2, Q # 5 & 8; Page # 172. • 9.4 Geometrical Properties of Polygon and their applications; Page # 177. • 9.4.1 Geometrical Properties of Regular Polygon; Page # 177-178. • 9.4.2 Geometrical Properties of Triangle; Page # 178. • 9.4.3 Geometrical Properties of Parallelogram, Example # 13; Page # 178. • 9.4.4 Applications of Polygon, Examples # 14 to 18; Page # 179 to 181. • Exercise # 9.4 (Complete); Page # 182. • **Review Exercise 9: Q # 1 (iv, vi to x), Q # 2, 4, 7 to 9; Page # 183 to 184 (Revised)**
10-Graphs of Functions	• 10.2 Exponential Growth / Decay of a Practical Phenomenon through its Graph, Example # 12; Page # 193-194. • 10.2.1 Gradients of Curves by Drawing Tangents, Example # 13; Page # 194. • 10.2.2 Applications of Graph in Real Life, Examples # 14 & 15; Page # 195 to 196. • Exercise # 10.2 (Complete); Page # 197. • Review Exercise 10: Q # 3, 5 to 7; Page # 199.

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11-Loci and Construction	• 11.5.2 Intersection of Loci, Examples # 10 to 12; Page # 209 to 211. • 11.6 Real Life Application of Loci; Page # 211. • Exercise # 11.2 (Complete); Page # 212 to 213. • **Review Exercise 11: Q # 1 (x), Q # 2 to 8 Page # 214 (Revised)**
12-Information Handling	• Exercise # 12.1: Q # 8; Page # 224. • 12.2.4 Weighted Mean, Examples # 19 & 20; Page # 234 to 235. • **Exercise # 12.2: Q # 11(ii), Q # 13 to 20; Page # 238 to 239 (Revised)** • Review Exercise 12: Q # 7 & 12; Page # 241 to 242.
13-Probability	• 13.6 Expected Frequency, Example # 11; Page # 255. • 13.7 Real Life Application on Expected Frequency, Examples # 12 & 13; Page # 255 to 256. • Exercise # 13.2, Q # 5 to 8; Page # 257. • **Review Exercise 13: Q # 1 (v), Q # 2 (ii), Q # 3 to 7; Page # 258 to 259 (Revised)**

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INSTRUCTIONS FOR PREPARATION OF EXAM PAPER OF SMART / REDUCED SYLLABUS OF MATHEMATICS GRADE-9
Annual Exam-2027

The paper of Mathematics for Grade-9 will consist of 75 marks.

Objective Type = 15 + Subjective Type = 60 marks.

Timing of the paper will be 2:30 hours.

Objective Type = 20 minutes + Subjective Type = 2:10 hours.

The paper will be made as per following details:

Objective Type (MCQs)	**Q-1:** There will be 15 Multiple Choice Questions (MCQs) from the entire content of the textbook. The distribution is as follows: • One MCQ each from chapters 1, 2, 5, 7, 9, 10, 11, 12, and 13 and two MCQs each from chapters 3, 4 & 6.	1 × 15 = 15
Subjective: (Part-I)	This section contains three short questions. The details are as follows: **Q-2:** Students are required to attempt any 6 out of 9 short questions. The details are as follows: • Two short questions will be selected from each of chapters 1, 2, 3 and 4, and one from chapter 5.	2 × 6 = 12
	Q-3: Students are required to attempt any 6 out of 9 short questions. The details are as follows: • Three short questions will be selected from each of chapters 6, 7 and 9.	2 × 6 = 12
	Q-4: Students are required to attempt any 6 out of 9 short questions. The details are as follows: • Two short questions will be selected from each of chapters 10, 11, and 13, and three from chapter 12.	2 × 6 = 12

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Subjective: (Part-II)	This section will contain three long questions bifurcated in two-parts **a & b** (carrying 4 marks each) and students have to attempt two questions. The detail is as follows: **Q-5:** **(a)** One long question will be selected from chapter 1. **(b)** One long question will be selected from chapter 2. **Q-6:** **(a)** One long question will be selected from chapter 3. **(b)** One long question will be selected from chapter 4. **Q-7:** **(a)** One long question will be selected from chapter 5. **(b)** One long question will be selected from chapter 6.	2 × 8 = 16
Subjective: (Part-III)	This section will contain two long questions bifurcated in two-parts **a & b** (carrying 4 marks each) and students have to attempt one question. The detail is as follows: **Q-8:** **(a)** One long question will be selected either from chapter 7 or chapter 10. **(b)** One long question will be selected from chapter 9. **Q-9:** **(a)** One long question will be selected from chapter 12. **(b)** One long question will be selected either from chapter 11 or chapter 13.	1× 8 = 8

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SMART/REDUCED SYLLABUS

MODEL PAPER OF MATHEMATICS FOR GRADE-9

Objective Type

Time allowed: 20 Minutes. **Maximum Marks: 15**

نوٹ: ہر سوال کے چار ممکنہ جوابات A، B، C اور D دیے گئے ہیں۔ جو انتخاب آپ کے خیال میں درست ہے، اس سوال کے سامنے والے دائرے کو مار کر یا پین کی سیاہی سے بھریں۔ دو یا دو سے زیادہ دائروں کو کاٹنے یا بھرنے کی صورت میں جواب غلط تصوّر ہو گا۔

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle with marker or ink pen in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

Q.1

(i) The product of $(3 + \sqrt{5})(3 - \sqrt{5})$ is:

(a) prime number مفرد عدد (b) odd number طاق عدد

(c) irrational number غیر ناطق عدد (d) rational number ناطق عدد

(ii) The base of common logarithm is:

(a) 2 (b) 10

(c) 5 (d) e

(iii) If $A = \{\ \}$, then $P(A)$ is:

(a) $\{\ \}$ (b) $\{1\}$

(c) $\{\{\ \}\}$ (d) ϕ

(iv) If $n(A \cup B) = 50, n(A) = 30$ and $n(B) = 35$, the $n(A \cap B) =$:

(a) 23 (b) 15

(c) 9 (d) 40

(v) The LCM of $16x^2$, $4x$ and $30xy$ is:

(a) $480x^3y$ (b) $400xy$

(c) $240x^2y$ (d) $120x^4y$

سوال 1:

(i) $(3 + \sqrt{5})(3 - \sqrt{5})$ کا حاصل ضرب ہے۔

(ii) عام لوگارتھم کی اساس ہوتی ہے۔

(iii) اگر $A = \{\ \}$ ہو تو $P(A)$ برابر ہے۔

(iv) اگر $n(A \cup B) = 50$، $n(A) = 30$ اور $n(B) = 35$ تو $n(A \cap B)$ برابر ہے:

(v) $16x^2$, $4x$ اور $30\ xy$ کا ذوالضعاف اقل ہے۔

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(vi) The factorization of $12x+36$ is:

(a) $12(x+3)$ (b) $12\ (3x)$

(c) $13\ (3x+1)$ (d) $x(12+36x)$

(vii) Solution of $5x - 10 = 10$ is:

(a) 0 (b) 50

(c) 4 (d) -4

(viii) $\sin 60° =$ _____.

(a) 1 (b) $\frac{1}{2}$

(c) $\sqrt{(3)^2}$ (d) $\frac{\sqrt{3}}{2}$

(ix) $\sec^2\theta - \tan^2\theta =$ _____.

(a) $\sin^2\theta$ (b) 1

(c) $\cos^2\theta$ (d) $\cot^2\theta$

(x) Distance between two points $P(1, 2)$ and $Q(4, 6)$ is:

(a) 5 (b) 6

(c) $\sqrt{13}$ (d) 4

(xi) If the volume of two similar solids is 125 cm^2 and 27 cm^2, the ratio of their corresponding heights is:

(a) 3:5 (b) 5:3

(c) 25:9 (d) 9:25

(xii) Slope of the line $y = 5x + 3$ is:

(a) 3 (b) -3

(c) 5 (d) -5

(vi) $12x+36$ کی تجزی ہے:

(vii) $5x-10 = 10$ کا حل ہے۔

(viii) $\sin 60° =$ _____.

(ix) $\sec^2\theta - \tan^2\theta =$ _____.

(x) نقاط $P(1, 2)$ اور $Q(4, 6)$ کے درمیان فاصلہ ہوتا ہے۔

(xii) خط $y = 5x + 3$ کی ڈھلوان ہے۔

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(xiii) An equilateral triangle _____.

(a) can be isosceles

(b) can be right angled

(c) can be obtuse angled

(d) has each angle equal to 50°

(xiii) ایک متساوی الاضلاع مثلث ہے۔

متساوی الساقین ہو سکتی ہے

قائمۃ الزاویہ ہو سکتی ہے

منفرجہ زاویہ ہو سکتی ہے

اس کا ہر زاویہ 50° کا ہوتا ہے

(xiv) Which data takes only some specific values?

(a) continuous data مسلسل مواد

(b) discrete data غیر مسلسل مواد

(c) grouped data گروہی مواد

(d) ungrouped data غیر گروہی مواد

(xiv) کون سا مواد صرف مخصوص اقدار لیتا ہے؟

(xv) While rolling a pair of dice, what will be the probability of double 2?

(a) $\frac{1}{6}$

(b) $\frac{1}{3}$

(c) $\frac{5}{6}$

(d) $\frac{1}{36}$

(xv) اگر ڈائس کا جوڑا پھینکا جائے تو دو مرتبہ 2 آنے کا احتمال کیا ہو گا؟

Subjective Type (Part-I)

Time allowed: 2:10 hrs. **Max. Marks:60**

Q. 2: Write short answers to any six (06) questions: 2 × 6 = 12

سوال نمبر2: کوئی سے چھ (6) سوالات کے مختصر جوابات لکھیے:

(i) Find two rational numbers between 2 and 3.

(i) 2 اور 3 کے درمیان دو ناطق اعداد معلوم کیجیے۔

(ii) Simplify $\left(\frac{3}{4}\right)^{-2} \div \left(\frac{4}{9}\right)^{3} \times \frac{16}{27}$.

(ii) $\left(\frac{3}{4}\right)^{-2} \div \left(\frac{4}{9}\right)^{3} \times \frac{16}{27}$ مختصر کیجیے۔

(iii) Find the value of x in $\log_{10} x = -3$

(iii) اگر $\log_{10} x = -3$ تو x کی قیمت معلوم کیجیے۔

(iv) Find characteristic of 0.000049.

(iv) 0.000049 کا خاصہ معلوم کریں۔

(v) Write down the power set of $\{+, -, \times, \div\}$.

(v) $\{+, -, \times, \div\}$ کا پاور سیٹ لکھیں۔

(vi) Define difference of two sets.

(vi) دو سیٹوں کا فرق بیان کریں۔

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(vii) $x^2 + x - 12$ کی تجزی کیجیے۔

(vii) Factorize $x^2 + x - 12$.

(viii) $125a^3 - 1$ کی تجزی کیجیے۔

(viii) Factorize $125a^3 - 1$.

(ix) $12x + 30 = -6$ حل کیجیے اور عددی خط پر ظاہر کیجیے۔

(ix) Solve $12x + 30 = -6$ and represent the solution on a real line.

Q. 3: Write short answers to any six (06) questions: $2 \times 6 = 12$

سوال 3: کوئی سے چھ (6) سوالات کے مختصر جوابات لکھیے:

(i) $315°$ کو ریڈین میں تبدیل کیجیے۔

(i) Convert 315° to radians.

(ii) قوس کی لمبائی معلوم کیجیے جبکہ $r = 6\text{cm}$ اور مرکزی زاویہ $\frac{\pi}{3}$ ریڈین ہے۔

(ii) Find the arc length if $r = 6$ cm and central angle $\theta = \frac{\pi}{3}$ radians.

(iii) $2 \cos \frac{\pi}{6} \sin \frac{\pi}{6}$ کی قیمت معلوم کیجیے۔

(iii) Evaluate $2 \cos \frac{\pi}{6} \sin \frac{\pi}{6}$.

(iv) $L(0, 3)$ اور $M(-2, -4)$ کے درمیان فاصلہ معلوم کیجیے۔

(iv) Find the distance between the points $L(0, 3)$ and $M(-2, -4)$.

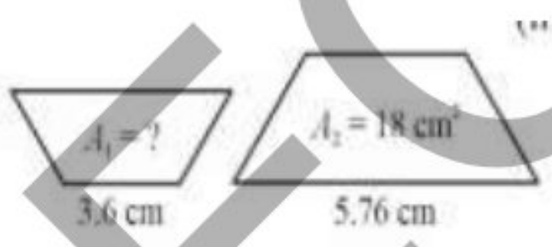
(v) $(3, -2)$ اور $(2, 7)$ نقاط سے بننے والے خط کی ڈھلوان معلوم کیجیے۔

(v) Find the slope of the line joining the points $(3, -2)$ and $(2, 7)$.

(vi) $(7, -9)$ میں سے گزرنے والا افقی خط کی مساوات معلوم کریں۔

(vi) Find the equation of the horizontal line through $(7, -9)$.

(vii) درج ذیل شکل میں نامعلوم مقدار معلوم کریں۔



(vii) Find the unknown in the given figure.

(viii) دو کُرّوں کے رداسوں میں نسبت 3:4 کی ہے ان کے حجموں میں نسبت معلوم کیجیے۔

(viii) The radii of two spheres are in the ratio of 3:4. What is the ratio of their volumes?

(ix) چاولوں کی ایک بوری جس کی اونچائی 60 cm ہے اس کا وزن 50 kg ہے۔ اگر اُسی طرح کی بوری کی اونچائی 90 cm ہو تو اس میں چاولوں کا وزن معلوم کریں۔

(ix) The mass of sack of rice is 50 kg and height 60 cm. Find the mass of the similar sack of rice with height of 90 cm.

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Q. 4: Write short answers to any six (6) questions: 2 × 6 = 12

سوال4: کوئی سے چھ (6) سوالات کے مختصر جوابات لکھیے:

(i) Sketch the graph of $y = 2x - 1$.

(i) $y = 2x - 1$ کا گراف بنائیے۔

(ii) Plot the graph of the function $y = 5^{-x}$.

(iii) Construct a triangle BCD in which measures of two sides are 5.5 cm and 4.2 cm and measure of their included angle is 60°.

(iii) ایک مثلث BCD بنائیے جس میں دو اضلاع کی لمبائیاں 5.5 سم اور 4.2 سم ہوں اور درمیانی زاویہ 60° کا ہو۔

(iv) Define orthocentre.

(iv) عمودی مرکز کی تعریف کیجیے۔

(v) Define Arithmetic Mean (AM).

(v) حسابی اوسط کی تعریف کیجیے۔

(vi) The marks in mathematics of Jamal in eight monthly tests were 75, 76, 80, 80, 82, 82, 82, 85. Find the mode of the marks.

(vi) جمال کے ریاضی کے آٹھ ماہانہ ٹیسٹوں میں حاصل کردہ نمبر 85 ,82 ,82 ,82 80 ,80 ,76 ,75 تھے، حاصل کردہ نمبروں کا عادہ معلوم کیجیے۔

(vii) Following are the heights in (inches) of 12 students. Find the median height.

55, 53, 54, 58, 60, 61, 62, 56, 57, 52, 51, 63.

(vii) بارہ طلبہ کے قد 63 ,51 ,52 ,57 ,56 ,62 ,61 ,60 ,58 ,54 ,53اور 55 ہیں۔ مواد کا وسطانیہ معلوم کیجیے۔

(viii) Abdul Raheem rolls a fair dice, what is the probability of getting the number divisible by 3?

(viii) عبدالرحیم ایک ڈائس پھینکتا ہے۔ 3 پر تقسیم ہونے والے اعداد کا احتمال کیا ہوتا ہے؟

(ix) Define sample space.

(ix) سیمپل سپیس کی تعریف کیجیے۔

Subjective Type (Part-II)

Note: Attempt any two questions. 2 × 8 = 16

نوٹ: کوئی سے دو سوالات کے جوابات لکھیے۔

Q. 5: (a) Simplify the following $\dfrac{(25)^{\frac{3}{2}} \times (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} \times (8)^{\frac{4}{3}}}$.

سوال5: (الف) مختصر کیجیے۔ $\dfrac{(25)^{\frac{3}{2}} \times (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} \times (8)^{\frac{4}{3}}}$

(b) Find the value of x.

$$\log x = -2.0184$$

(ب) x کی قیمت معلوم کیجیے۔

Q. 6: (a) There are 98 secondary school students in a sports club, 58 students join the swimming club, and 50 join the tug-of-war club. How many students participated in both games?

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سوال6 :

(الف) ایک اسپورٹس کلب میں 98 سیکنڈری اسکول کے طلبہ ہیں 58 طلبہ (سوئمنگ) تیراکی کلب میں شامل ہوئے اور 50 نے رسہ کشی کلب میں شمولیت اختیار کی (دونوں کھیلوں میں کتنے طلبہ نے حصہ لیا)۔

(b) Factorize $x^4 - 30x^2y^2 + 9y^4$

(ب) تجزی کریں۔ $x^4 - 30x^2y^2 + 9y^4$

Q. 7: (a) Indicate the solution region of the following linear inequalities by shading:

$$2x - 3y \leq 6; \quad 2x + 3y \leq 12;$$

(b) Prove that $(\tan\theta + \cot\theta)^2 = \text{Sec}^2\,\theta\ \text{cosec}^2\,\theta$.

Subjective Type (Part-III)

نوٹ: کوئی سے ایک سوال کا جواب لکھیے۔

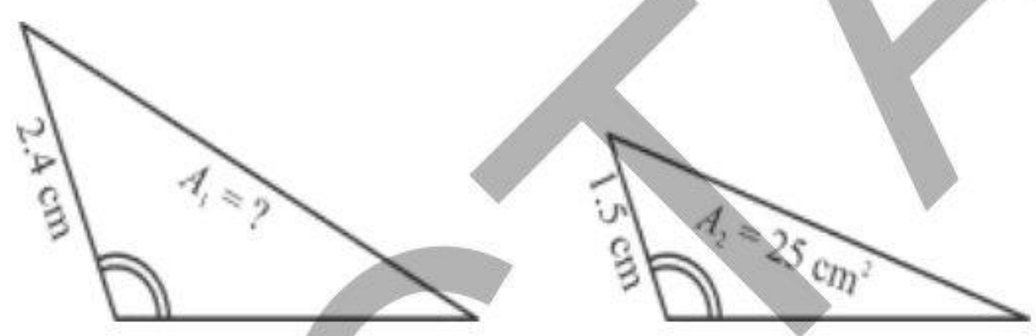
Note: Attempt any one question. 1× 8 = 8

سوال8 :

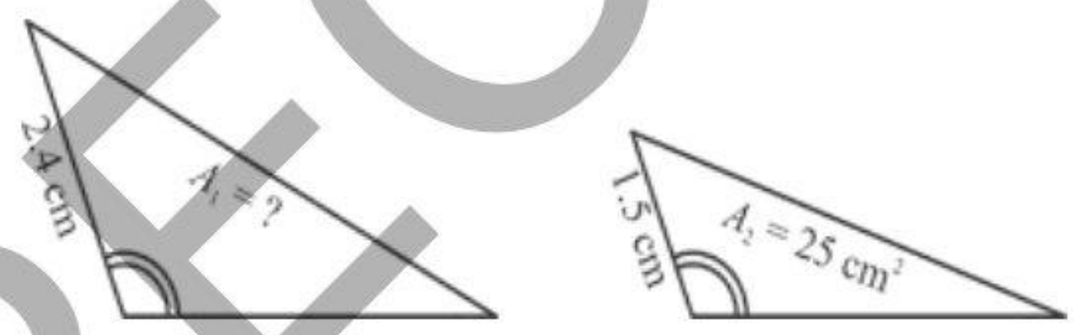
Q. 8: (a) Show that the points $A(0, 2)$, $B(\sqrt{3}, 1)$ and $C(0, -2)$ are vertices of a right triangle.

(الف) ثابت کیجیے کہ نقاط $A(0, 2)$, $B(\sqrt{3}, 1)$ اور $C(0, -2)$ قائمۃ الزاویہ مثلث کے راس ہیں۔

(b) Find the unknown value in the following:



(ب) نامعلوم مقداریں معلوم کیجیے۔



سوال 9 :(الف) مواد کے ایک سیٹ میں درج ذیل قیمتیں ہیں 148, 145, 160,157, 156, 160 ثابت کیجیے کہ

حسابی اوسط > وسطانیہ > عادہ

Q. 9: (a) A set of data contains the values as 148, 145, 160, 157, 156, 160.

Show that Mode > Median > Mean.

(b) The frequency of defective products in 750 samples are shown in the following table. Find the relative frequency for the given table.

No. of defectives per sample	0	1	2	3	4	5	6	7	8
No. of sample	120	140	94	85	105	50	40	66	50

(ب) 750 نمونوں میں سے ناقص مصنوعات کا جدول مندرجہ ذیل دیا گیا ہے۔ دیے گئے جدول کے لیے نسبتی تعدد معلوم کریں۔

ناقص مصنوعات کی تعداد فی نمونہ	0	1	2	3	4	5	6	7	8
نمونوں کی تعداد	120	140	94	85	105	50	40	66	50

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