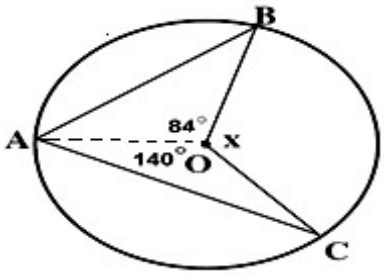
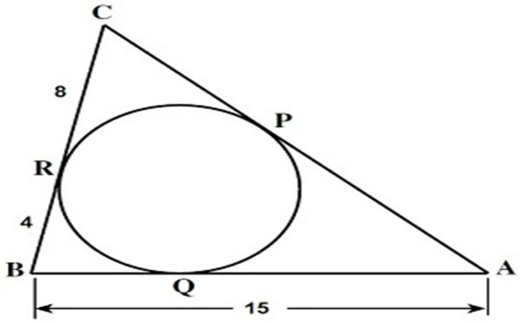
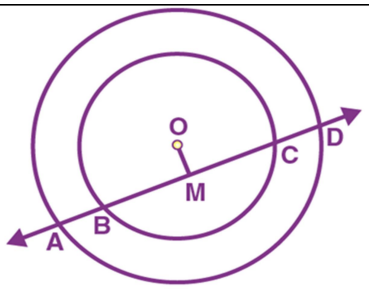
SAMPLE QUESTION PAPER
MATHEMATICS (211)

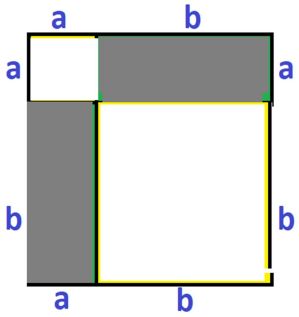
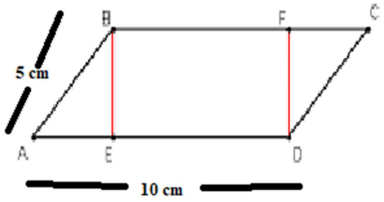
Time: 2½ hrs **Maximum Marks: 85**

Note:

i. This question paper consists of 44 questions in all.
ii. All questions are compulsory.
iii. Marks are given against each question.
iv. **Section A** consists of
   a. **Q.No. 1 to 17** – Multiple Choice type questions (MCQs) carrying 1 mark each. Select and write the most appropriate option out of the four options given in each of these questions.
   b. **Q.No. 18 to 28** – Objective type questions. **Q.No. 18 to 27** carry 02 marks each (with 2 sub-parts of 1 mark each) and **Q.No. 28** carries 05 marks (with 5 sub-parts of 1 mark each). Attempt these questions as per the instructions given for each of the questions 18 – 28.
v. **Section B** consists of
   a. **Q.No. 29 to 37** – Very Short questions carrying 02 marks each.
   b. **Q.No. 38 to 42** – Short Answer type questions carrying 03 marks each.
   c. **Q.No. 43 to 44** – Long Answer type questions carrying 05 marks each.
   (An internal choice has been provided in some of the questions in **Section B**. You have to attempt only one of the given choices in such questions.)

SECTION A		
S.NO.	Questions	Marks
	Q.No. 1 to 17 are MCQs (1 mark each):	
1.	If a +b= 12 and ab = 22 then $a^2 + b^2$= ? (a) 188 (b) 144 (c) 34 (d) 100	1
2.	Which of the following is not a solution of the equation: 3x + 6y = 12. (a) (-4, 4) (b) (0,2) (c) (8, -2) (d) (3,1)	1
3.	Simple interest on ₹ 1632 for 5 years at $6\frac{1}{4}$% per annum: (a) ₹ 649 (b) ₹ 510 (c) ₹ 580 (d) ₹ 630	1
4.	If P is 40% less than Q, then Q is what % more than P? (a) 40 % (b) 66.66% (c) 60 % (d) 33.3%	1

5.	 What is the measure of the angle x, when angle measure of arcs AB and AC are 84^0 and 140^0 respectively? (a) 134^0 (b) 135^0 (c) 136^0 (d) 137^0	1
6.	 What is the length of AC? (a) 19 (b) 18 (c) 17 (d) 16	1
7.	The degree measure of the angle subtended by the diameter of a semi-circle at its centre is: (a) 90 (b) 45 (c) 180 (d) 60	1
8.	 If a line intersects two concentric circles with centre O at A, B, C and D, as shown below, Then (a) AB = CD (b) AB > CD (c) AB < CD (d) None of the above	1

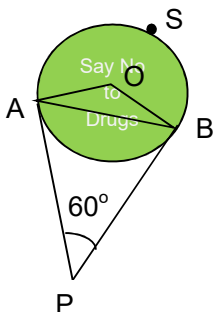
9.	Area of shaded portion in the following figure is:  (a) $a^2 + b^2$ (b) 2ab (c) (a + b) (d) a +ab^2	1
10.	 In the following figure Area of parallelogram ABCD is 40 cm^2 . What is the area of Rectangle BEDF? (a) 20 cm^2 (b) 24 cm^2 (c) 28 cm^2 (d) 32cm^2	1
11.	Area of a circle whose circumference is equal to the perimeter of a square of side 11 cm is: (a) 231 cm^2 (b) 140 cm^2 (c) 77 cm^2 (d) 154 cm^2	1
12.	If sin A + $\sin^2$A be equal to 1, then what is the value of $\cos^2$A + $\cos^4$A? (a) 1 (b) ½ (c) 2 (d) 3	1
13.	Value of $(\sin A + \cos A)^2 - 2 \sin A \cos A$ is equal to (a) 0 (b) 1 (c) 2 (d) $\sin^2 A - \cos^2 A$	1
14.	In Δ ABC, right-angled at B, AB = 24 cm, BC = 7 cm. The value of tan C is: (a) 12/7 (b) 24/7 (c) 20/7 (d) 7/24	1
15.	A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that it is of red colour	1

	(a) 0.1 (b) 0.3 (c) 0.5 (d) 1.0	
16.	If P(E) + P($\bar{E}$) = y , value of $y^3 - 4$ is (a) 4 (b) 3 (c) – 3 (d) 0	1
17.	Two different coins are tossed at the same time. How many outcomes are possible? (a) 2 (b) 4 (c) 6 (d) 8	1
	Q.No. 18 to 27 are Objective Questions (2 marks each):	
18.	**Fill in the blanks:**	1 x 2
(i)	Two factors (x+3) and _____ are obtained on factorising $x^2 + 8x + 15$.	
(ii)	The value of the polynomial $2x + 3x^2 - 4$ at $x = 0$ is _____	
19.	**Match column –I statement with the right option of column - II**	1 x 2

Column –I	**Column - II**
(i) roots of $4x^2 + 4\sqrt{3}x + 3 = 0$ are	P. real and distinct
(ii) roots of $2x^2 + 5x + 5 = 0$ are	Q. not real R. real and equal

20.	**Write TRUE for correct statement and FALSE for incorrect statements:**	1 x 2
(i)	Graphically, the pair of equations $6x - 3y + 10 = 0$ and $2x - 9y + 10 = 0$ represents two lines which are intersecting at exactly one point.	
(ii)	One of the factors of $(25x^2 - 1) + (1 + 5x)^2$ is (5x+1).	
21.	**Write the factorised form of following algebraic expression.** (i) $x^2 + 2xy + y^2$ = …….. (ii) $x^2 - 2xy + y^2$ = ……..	1 x 2
22.	**Read the passage and answer the questions that follow it. (i to ii)**	1 x 2
	Seema has in her kitchen 16 spoons, 4 serving spoons, 19 quarter plates, 22 full plates, 11 forks, 2 lighters and 36 boxes. Some of these boxes contain spices, 7 of the boxes contain pulses and 6 boxes contain rice. Two boxes have ghee and three boxes have oil in them. In this way full variety of things are there in Seema's Kitchen.	
(i)	What percentage of boxes of rice are there in the kitchen? (a) 7 (b) 50/3 (c) 100/3 (d) 100/7	
(ii)	What percentage of boxes of spices are there in the kitchen? (a) 7 (b) 14 (c) 50 (d) 100/3	
23.	**Fill in the blanks:**	1 x 2

(i)	Angle in the same segment of a circle are _____.	
(ii)	If the sum of a pair of opposite angles of a quadrilateral is 180º, the quadrilateral is _____.	
24.	**Write TRUE for correct statement and FALSE for incorrect statements:**	1 x 2
(i)	To draw a pair of tangents to a circle which are inclined to each other at an angle of 30°, it is required to draw tangents at the end points of those two radii of the circle, the angle between which is 140°.	
(ii)	Using ruler and compass it is possible to construct an angle of 25°.	
25.	**Fill in the blanks:**	1 x 2
(i)	Ratio of area of a circle of radius 'r' to its circumference is _____	
(ii)	Ratio of area of a square of side 'a' to its perimeter is _____	
26.	**Read the passage and answer the questions that follow it. (i to ii)**	1 x 2
	Two towers of equal heights are standing opposite each other on either side of the road which is 100 m wide. From a point between them on the road the angles of elevation of the top of towers are 30^o and 60^o, respectively.	
(i)	Distance of the point from the tower whose top has the angle of elevation of 30^o is: (a) 20 m (b) 25 m (c) 50 m (d) 75 m	
(ii)	Distance of the point from the tower whose top has the angle of elevation of 60^o is: (a) 20 m (b) 25 m (c) 50 m (d) 75 m	
27.	**Read the passage and answer the questions that follow it. (i to ii)**	1 x 2
	Probability is that branch of mathematics which deals with the measure of uncertainty in various phenomenon that gives several results/outcomes instead of a particular one. Sample space is the collection of all possible outcomes of a random experiment whereas event is some specific or a set of specific outcomes. Probability of an event is denoted by P(E). Let us consider a random experiment is in which two dice are thrown simultaneously and the sum of the numbers appearing on them is noted.	
(i)	The number of all possible outcomes in the sample space corresponding to this experiment are _____	
(ii)	The number of outcomes related to the event (E) that sum of the numbers appearing on the two dice is 7 are_____	
28.	**Read the passage and answer the questions that follow it. (i to v)** As a part of a campaign a huge balloon with message of awareness on "Say no to Drugs" was displayed from the terrace of a tall building. It was held by strings of length 12 m each and inclined at an angle of 60^o at the point where it was tied as shown in figure. A sparrow bird sits at a point S on the balloon.	1 x 5

		
(i)	ΔABP is (a) Equilateral triangle (b) Isosceles triangle (c) Scalene triangle (d) can be Isosceles or scalene triangle	
(ii)	What is the length of AB? (a) 9 m (b) 12 m (c) 8 m (d) 18 m	
(iii)	Find measure of reflex $\angle AOB$ (a) 60^o (b) 120^o (c) 80^o (d) 240^o	
(iv)	What is the measure of $\angle ASB$ (a) 60^o (b) 120^o (c) 80^o (d) 240^o	
(v)	Find the radius of balloon (a) $3\sqrt{3}$ m (b) $4\sqrt{3}$ m (c) $6\sqrt{3}$ m (d) $8\sqrt{3}$ m	

SECTION B		
Q.No.	**Questions**	**Marks**
29.	Construct a tangent to a circle at any point on it when radius of the circle is 3 cm.	2
30.	The surface area of a cube is 294 cm^2. Find its volume. **OR** From a circular disc of diameter 8 cm, a square of side 1.5 cm is removed. Find the area of the remaining portion of the disc. (Use $\pi = 3.14$)	2
31.	Find the value of k so that the quadratic equation $2x^2 + kx + 3 = 0$ has equal roots.	2
32.	Find the sum of all natural numbers upto 125 which are divisible by 5. **OR** How many terms of the AP 25,28,31,34, ……. are needed to give the sum	2

	1070?	
33.	A refrigerator is sold for Rs 22000 cash or Rs. 10000 cash down payment and Rs 12600 after six months. Find the rate of simple interest charged under the instalment plan.	2
34.	A second hand car is sold for Rs 50000 cash down payment along with two equal monthly instalment of Rs 102010 each. If the dealer charges interest at the rate of 12% p.a. compounded monthly under the instalment plan, find the cash price of the car.	2
35.	If point C (–2,–1) divides the line segment joining points A(1,5) and B in the ratio 3: 4, then find the coordinates of B. **OR** Find the centroid of the triangle whose vertices are (5,–1), (–3, –2) and (–1,8).	2
36.	A circus artist climbs a 16 m long rope whose one end is tied to the ground and the other end to the top of a vertical pole. If the angle of elevation made by the rope with the ground level is 30°, then find the height of the pole. **OR** A balloon is connected to a meterological ground station by a cable of length 100 m inclined at 60^o to the horizontal. Find the height of the balloon from the ground assuming that there is no slack in the cable.	2
37.	By what number the median will increase if 25 is removed from the data 20, 24, 25, 28, 30, 31, 33, 38?	2
38.	If the 7^{th} term of an AP is 27 and the 11^{th} term is 43, then find its 20th term.	3
39.	Sum of two natural numbers is 12 and sum of their squares is 74. Find the greater number. **OR** The product of digits of a two digit number is 12. When 9 is added to the number, the digits interchange their places. Determine the number.	3
40.	In a ΔABC with vertices A (6,4), B (5, –2) and C (7, –2), find the length of median through A.	3
41.	A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 90cm and the diameter of the hemispherical ends is 28cm, then find the surface area of the solid. (Use $\pi = \frac{22}{7}$) **OR** A cone, a cylinder and a hemisphere are of the same base and same height. Find the ratio of their volumes.	3
42.	Find the value of $\frac{4\,cos^2 30^o + sin^2 45^o - 3tan^2 60^o}{2cos^2 60^o sin^2 60^o + cot 45^o}$	3
43.	If the mean of the following distribution is 30, their find the value of **p** **OR** (a) If $\bar{x}$ represents the mean of n observations x_1, x_2,…… x_n, then show that $\sum_{i=0}^{n}(x_i - \bar{x}) = 0$. (b) If each observation of a data is increased by 'a', then show that its mean also increases by 'a'.	5
44.	Construct a ΔABC in which BC= 6cm, AB= 6cm and median AD = 4cm. **OR** Construct a triangle whose perimeter is 9.5 cm and base angles are 60^o and 45^o	5

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	4	8	10	**p**	13

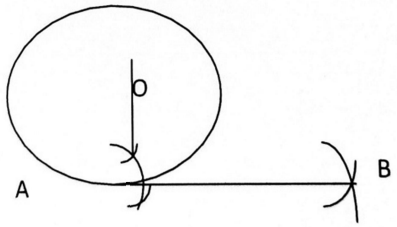
SAMPLE QUESTION PAPER
Mathematics (211)
Making Scheme

SECTION A

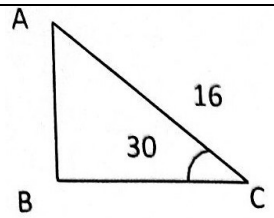
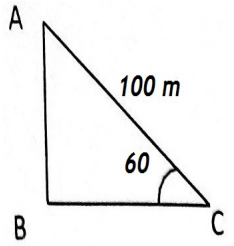
Question Number	Correct option	Explanation	Marks
		Q.No. 1 to 17 are MCQs	
1.	(d)	a+ b = 12 $(a + b)^2 = 144$ $a^2 + b^2 + 2ab = 144$ $a^2 + b^2 + 2X\ 22 = 144$ $a^2 + b^2 = 100$ Option (d)	1
2.	(d)	Verify by putting the values of x and y in the equation.	1
3.	(b)	S.I = (1632 X 25 X 5 X100)/ (100 X 4) = ₹510 Option (b)	1
4.	(b)	Let P = 100y. Then Q = 60 y $\frac{Q-P}{P}$ = 40y / 60 y = 2/3 Q – P = (2/3)P = 66.66 P% Therefore Q is 66.66 % more than P Option (b)	1
5	(c)	Angle measure of minor arc BC = 360 – (84 + 140) = 136 Option (c)	1
6	(a)	$\widehat{CP} = \widehat{CR} = 8$ AP = AQ = AB – BQ = 15 - BR = 15 – 4 = 11 AC = AP + CP = 11 + 8 = 19	1
7.	(a)		1
8	(a)	OM ⊥AB. Therefore AM = DM and BM = CM Or AB = CD Option (a)	1
9	(b)		1
10	(c)		1
11	(d)	Perimeter of square of side 11 cm = 44 cm Therefore circumference of circle = 44 cm r = 7 cm Or $\frac{(2\ x\ 22\ x\ 7\ x\ 7\ )}{7}$ = 154 cm^2 Option (d)	1
12	(a)	$\sin A + \sin^2 A = 1$ $\sin A = 1 – \sin^2 A = \cos^2 A$ $\sin^2 A = \cos^4 A$ $1- \cos^2 A= \cos^4 A$ $1 = \cos^2 A + \cos^4 A$ Option (a)	1
13	(b)	$(\sin A + \cos A)^2 – 2 \sin A \cos A$ $= \sin^2 A + \cos^2 A+ 2 \sin A \cos A – 2 \sin A \cos A$	1

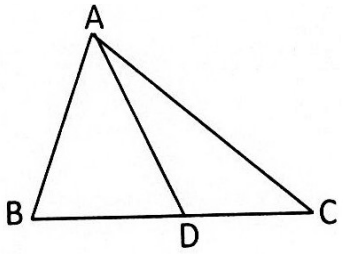
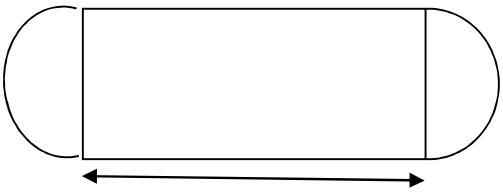
		= 1	
14	(b)		1
15	(c)		1
16	(c)	Since P(E) + P($\bar{E}$) = 1 $\therefore$ y = 1 $\Longrightarrow$. $y^3 - 4 = 1^3 - 4 = -3$	1
17	(b)	4 possible outcomes (H,H), (H,T), (T,H), (T,T)	
	Q.No. 18 to 27 are Objective type Questions of 2 marks		
18	(i) (x+5) (ii) – 4		1 x 2
19	(i) – R, (ii) – Q		1 x 2
20	(i) F (ii) T		1 x 2
21	(i) $x^2 + 2xy + y^2 = \underline{(x+y)^2}$ (ii) $x^2 - 2xy + y^2 = \underline{(x-y)^2}$		1 x 2
22	(i) (b) 50/3 (ii) (c) 50		1 x 2
23.	(i) equal (ii) cyclic		1 x 2
24.	(i) F (ii) F		1 x 2
25.	(i) r:2 (ii) a:4		1 x 2
26.	(i) (d) 75 m (ii) (b) 25 m		1 x 2
27.	(i) 36 (ii) 6		1 x 2
28.	(i) (a) equilateral triangle (ii) (b) 12 m (iii) (d) 240^o (iv) (a) 60^o (v) (b) $4\sqrt{3}$ m		1 x 5

SECTION B

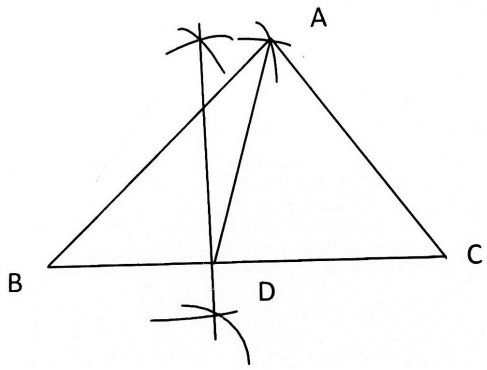
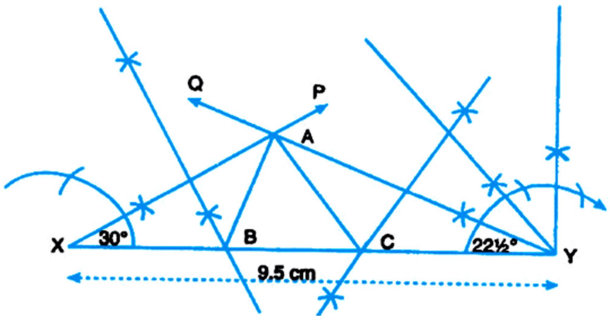
Q. No.	Explanation/Answers/Value points	Marks Distribution	Total Marks
29	Steps of construction 1. Draw a circle with radius 3cm 2. Draw $\angle\angle OAB = 90°$ AB is the required tangent  	1 1	2

30	$6a^2 = 294 \Rightarrow a = 7$ Volume $= 7^3 = 343\ cm^3$ OR Remaining area $= \pi r^2 - a^2$ $= 3.14 \times 4 \times 4 - (1.5)^2 = 47.74\ cm^2$	1 1 OR 1 1	2
31	$2x^2 + kx + 3 = 0$ Discriminate $= k^2 - 4 \times 2 \times 3 = k^2 - 24$ Roots are equal $\Rightarrow\ k^2 - 24 = 0$ $k = \pm\sqrt{24} = \pm 2\sqrt{6}$	 ½ ½ 1	2
32	5, 10, 15, --------- 125 a=5, d=5 $t_n = 125 = 5+(n-1)5 \Rightarrow$ n=25 $S_{25} = \frac{25}{2}(5 + 125) = 1625$ OR a = 25, d = 3, $S_n = 1070$ $S_n = \frac{n}{2}(2a + (n-1)(3))$ $1070 = \frac{n}{2}(2(25) + (n-1)(3))$ $3n^2 + 47n - 2140 = 0$ n = 20	½ ½ 1 OR ½ ½ 1	2
33	Cash price = Rs. 22000 Cash down payment = Rs. 10000 Balance payment = Rs. 12000 $Interest = 600 = \frac{12000 \times 6 \times r}{100 \times 12}$ $r = 10$	 1 1	2
34	$102010 = P_1\left(1 + \frac{12}{1200}\right)^2\ P_1 = Rs.100000$ $102010 = P_2\left(1 + \frac{12}{100}\right) P_2 = Rs.101000$ Cash price of the car = 50000 +100000+101000 = Rs. 251000	 ½ ½ ½ ½	2

35	$\frac{4\times 1+3x}{7} = -2\ x = -6$ $\frac{20+3y}{7} = -1\ y = -9$ Point B is (-6, -9) OR centroid of the triangle whose vertices are (5,-1), (- 3,-2) and (-1,8). $x = \frac{x_1+x_2+x_3}{3} = \frac{5+(-3)+(-1)}{3} = \frac{1}{3}$ $y = \frac{y_1+y_2+y_3}{3} = \frac{-1+(-2)+(8)}{3} = \frac{5}{3}$ $\left(\frac{1}{3}, \frac{5}{3}\right)$	1 ½ ½ Or 1 1	2
36	 $\frac{AB}{16} = sin\ 30^\circ = \frac{1}{2}$ ⇒ AB = 8m OR  $\frac{AB}{100} = sin\ 60^\circ = \frac{\sqrt{3}}{2}$ ⇒ AB = $50\sqrt{3}$m	1 1 OR 1 1	2
37	20, 24, 25, 28, 30, 31, 33,38 Median = $\frac{28+30}{2} = 29$ When 25 is removed median = 30 Median increases by 1	1 ½ ½	2
38.	t_7 = a+6d = 27 t_{11} = a + 10d=43 ⇒ a=3, d= 4 t_{20} = a+ 19d = 3+19x4=79	1 1 1	3

39.	$x, 12-x$ $x^2+(12-x)^2 = 74$ x^2- 12x+35=0 $\Rightarrow$ x=7, 5 greater number is 7	½ 1 1 ½	3
40.	$D=\left(\frac{5+7}{2},\frac{-2-2}{2}\right)=(6,-2)$ $AD=\sqrt{(6-6)^2+(4+2)^2}=6\ cm$  	1 1 1	3
41.	 h = (90-2x14) = 62 cm Surface area = $2\pi rh+4\pi r^2$ = $2\pi r(h+2r)$ = $2\times\frac{22}{7}\times 14\,(62+28)$ = 7920 cm^2 OR Let height of cone = h Height of cone = height of cylinder = height of hemisphere Height of cone = height of cylinder = diameter of hemisphere h = h = 2r Ratio of volumes = $V_1 : V_2 : V_3$ $=\frac{1}{3}\pi r^2h : \pi r^2h : \frac{4}{3}\pi r^3$ $=\frac{1}{3}r^2(2r) : r^2(2r) : \frac{4}{3}r^3$ = 2:3:4	1 1 1 Or ½ 1½ 1	3
42.	$\frac{4\cos^2 30^o+\sin^2 45^o-3\tan^2 60^o}{2\cos^2 60^o\sin^2 60^o+\cot 45^o}$ $=\frac{4\left(\frac{\sqrt{3}}{2}\right)^2+\left(\frac{1}{\sqrt{2}}\right)^2-3(\sqrt{3})^2}{2\left(\frac{1}{2}\right)^2\left(\frac{\sqrt{3}}{2}\right)^2+1}$	1	3

	$= \frac{3+\frac{1}{2}-9}{\frac{3}{8}+1}$ $= \frac{\frac{-11}{2}}{\frac{11}{8}} = -4$	1 1	
43.	<table><tr><th>Class Interval</th><th>f_i</th><th>x_i</th><th>$u_i = \frac{x_i - a}{h}$</th><th>$f_i u_i$</th></tr><tr><td>-10</td><td>4</td><td>5</td><td>-2</td><td>-8</td></tr><tr><td>10-20</td><td>8</td><td>15</td><td>-1</td><td>-8</td></tr><tr><td>20-30</td><td>10</td><td>25</td><td>0</td><td>0</td></tr><tr><td>30-40</td><td>p</td><td>35</td><td>1</td><td>p</td></tr><tr><td>40-50</td><td>13</td><td>45</td><td>2</td><td>26</td></tr><tr><td></td><td>35+p</td><td></td><td></td><td>p+10</td></tr></table> $mean = 25 + \frac{p+1}{35+p} \times 10 = 30$ $\frac{p+10}{35+p} \times 10 = 5p = 15$ Or (a) As $\bar{x}$ is the mean of n observations x_1, x_2,…… x_n $\bar{x} = \frac{x_1 + x_2 + x_3 + \cdots \ldots \ldots x_n}{n}$ $x_1 + x_2 + x_3 + \cdots \ldots \ldots x_n = n\bar{x}$ $\sum_{i=0}^{n} x_i = n\bar{x}$ Now to show: $\sum_{i=0}^{n}(x_i - \bar{x}) = 0$ L.H.S. = $\sum_{i=0}^{n}(x_i - \bar{x}) = \sum_{i=0}^{n} x_i - \sum_{i=0}^{n} \bar{x}$ $= n\bar{x} - \bar{x} \times n = 0$ = R.H.S. (b) As $\bar{x}$ is the mean of n observations x_1, x_2,…… x_n $\bar{x} = \frac{x_1 + x_2 + x_3 + \cdots \ldots \ldots x_n}{n}$ let $\bar{X}$ is the mean of n observations (x_1+a), (x_2+a), …… (x_n+a) $\bar{X} = \frac{(x_1 + a) + (x_2 + a) + \cdots \ldots \ldots + (x_n + a)}{n}$ $\bar{X} = \frac{x_1+x_2+x_3+\cdots\ldots x_n}{n} + \frac{a+a+\cdots\ldots+a}{n}$ $= \bar{x} + a$	1 1 1 1 Or 1 Or 3 2	5.

44.		3	5
	Steps of Construction 1. Draw a line segment BC= 6cm 2. Bisect BC at D 3. Draw Δ ABD such that AB=6cm AD=4cm 4. Draw AC ΔABC is the required triangle	½ ½ ½ ½	
	OR	OR	
	To construct a triangle whose perimeter is 9.5 cm and base angles are 60^o and 45^o we go through the following steps: Step 1: Draw XY = 9.5 cm Step 2: At X, construct ∠YXP = 30^o [which is 1/2 × 60^o] Step 3: At Y, construct ∠XYQ = $22½^o$ [which is 1/2 × 45^o] Let XP and YQ intersect A. Step 4: Draw right bisector of XA intersecting XY at B. Step 5: Draw right bisector of YA intersecting XY at C. Step 6: Join AB and AC.	2	
	 ΔABC is the required triangle.	3	