6. Mathematics
Code No. 041
Summative Assessment - II
Class IX
Design of Sample Question Paper

Type of Question	Marks per question	Total No. of Questions	Total Marks
M.C.Q.	1	10	10
SA-I	2	8	16
SA-II	3	10	30
LA	4	6	24
TOTAL		34	80

Blue Print
Sample Question Paper
Mathematics, SA-II
CLASS - IX

Topic / Unit	MCQ(1)	SA- I(2)	SA-II (3)	LA(4)	Total
Algebra	2(2)	2(1)	6(2)	4(1)	14(6)
Geometry	6(6)	8(4)	9(3)	12(3)	35(16)
Mensuration	1(1)	4(2)	6(2)	4(1)	15(6)
Statistics and Probability	1(1)	2(1)	9(3)	4(1)	16(6)
TOTAL	10(10)	16(8)	30(10)	24(6)	80(34)

Sample Question Paper
Mathematics (Code-041)
Class IX (SA-II)

Time: 3 hours   **M.M.: 80**

General Instructions

1. All questions are compulsory.

2. The questions paper consists of 34 questions divided into four sections A, B, C and D.

3. Section A contains 10 questions of 1 mark each, which are multiple choice type questions, Section B contains 8 questions of 2 marks each, Section C contains 10 questions of 3 marks each, Section D contains 6 questions of 4 marks each.

4. There is no overall choice in the paper. However, internal choice is provided in one question of 2 marks, 3 questions of 3 marks and two questions of 4 marks.

5. Use of calculators is not permitted.

Section-A

Question numbers 1 to 10 carry 1 mark each. For each of the questions 1-10, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

1. Which of the following is a solution of the equation x+2y=7?

   (A)   x=3, y=5   (B)   x=3, y=-5

   (C)   x=3, y=2   (D)   x=0, y=7

2. Three angles of a quadrilateral are 60°, 110° and 86°. The fourth angle of the quadrilateral is

   (A)   104°   (B)   124°

   (C)   94°   (D)   84°

3. A triangle and a rhombus are on the same base and between the same parallels. Then the ratio of area of triangle to that of rhombus is

   (A)   1:1   (B)   1:2

   (C)   1:3   (D)   1:4

4. In Fig. 1, O is the centre of the circle and ∠OBA=60°. Then ∠ACB equals

   Fig. 1

   (A)   60°   (B)   45°

   (C)   30°   (D)   90°
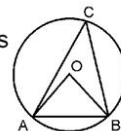
5. The diameter and height of a right circular cone are 7cm and 12cm respectively. The volume of the cone (in cm³) is

   (A)   88   (B)   112

   (C)   154   (D)   616

6. A fair coin is tossed 100 times and the Head occurs 58 times and tail 42 times. The experimental probability of getting a Head is

   (A) $\dfrac{1}{2}$ (B) $\dfrac{21}{50}$

   (C) $\dfrac{29}{50}$ (D) $\dfrac{42}{58}$

7. The condition that the equation ax+by+c=0 represents a linear equation is two variables is

   (A)   a≠0, b=0   (B)   b≠0, a=0

   (C)   a=0, b=0   (D)   a≠0, b≠0

8. In Fig.2, if the area of a parallelogram ABCD is 30cm², then the length of altitude AQ is

   Fig. 2

   (A)   5cm   (B)   4cm
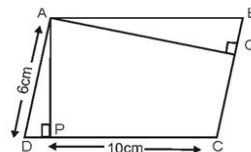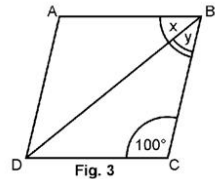
   (C)   3.5cm   (D)   6cm

9. In Fig.3 ABCD is a rhombus in which ∠BCD=100°. Then (x+y) equals

(A) 40°　　　　　(B) 60°

(C) 80°　　　　　(D) 70°

10. In Fig.4, OC is drawn perpendicular from the centre O of the circle to the chord AB. If OB=5cm and OC=3cm, then the length of the chord AB is
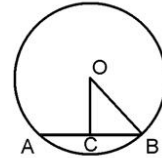
(A) 3cm　　　　　(B) 4cm

(C) 6cm　　　　　(D) 8cm

Section-B

Question numbers 11 to 18 carry 2 marks each.

11. A three-wheeler scooter charges Rs. 10 for the first kilometer and Rs. 4.50 each for every subsequent kilometer. For a distance of x km, an amount of Rs. y is paid. Write the linear equation representing the above information.

12. ABCD is parallelogram. The angle bisectors of ∠A and ∠D intersect at O. Find the measures of ∠AOD.

13. In Fig.5, ABCD is a quadrilateral in which P, Q, R and S are the mid-points of the sides AB, BC, CD and DA respectivaely. Show that PQRS is a parallelogram.
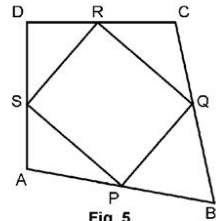
14. In Fig.6, ABCD is a cyclic quadrilateral in which AB is a diameter of the circles passing through A, B, C and D. If ∠ADC=130°, find ∠BAC.
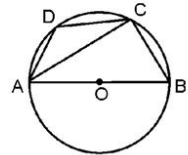
15. In Fig.7, find the measure of arc ADC if ∠OAB=30° and ∠OCB=50°
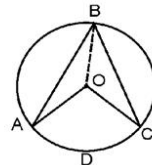
OR

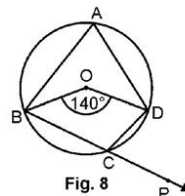In Fig.8. O is the centre of the circle. The angle by the arc BCD at the centre is 140°. BC is produced to P. Find ∠DCP.

16. The curved surface area of a cylinder is 176cm² and its base area is 38.5cm². Find the volume of the cylinder and justify your answer. $\left[\text{use } \pi = \dfrac{22}{7}\right]$

17. A hemispherical bowl is made of steel 0.25cm thick. The inner radius of the bowl is 5cm. Find the outer curved surface area of the bowl. $\left[\text{use } \pi = \dfrac{22}{7}\right]$

18. Find the mean of the first ten prime numbers.

Section-C

Question numbers 19 to 28 carry 3 marks each.

19. Draw the graph of two lines, whose equations are 3x-2y+6=0 and x+2y-6=0 on the same graph paper. Find the area of triangle formed by the two lines and x-axis.

20. If the number of hours for which a labourer works is x and y are his wages (in rupees) and y=2x-1, draw the graph of work-wages equation. From the graph, find the wages of the labourer if he works for 6 hours.

21. In Fig.9, ABCD is a square. If ∠PQR=90° and PB=QC=DR, prove that ∠QPR=45°.
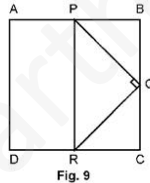

Fig. 9

22. Show that the diagonals of a rhombus are perpendicular to each other.

OR

In Fig.10, OABC is a rectangle inscribed in a quadrant of a circle of radius 25cm. Find the area of the rectangle, if OC=7cm.
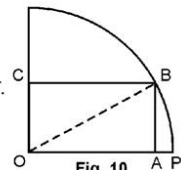

Fig. 10

23. Construct a △ABC, in which base BC=3cm, ∠B=30° and AB+AC=5.2cm.

24. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7cm. If the bowl is filled with soup to a height of 4cm, how much soup the hospital has to prepare daily to serve 250 patients. $\left[\text{use } \pi = \dfrac{22}{7}\right]$

OR

The ratio of the curved surface area to the total surface area of a right circular cylinder is 1:3. Find the volume of the cylinder if its total surface area is 1848cm². $\left[\text{use } \pi = \dfrac{22}{7}\right].$

25. A heap of wheat is in the form of a cone, whose diameter is 10.5m and height 7m. Find the volume of wheat in the heap. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required. $\left[\text{use } \pi = \dfrac{22}{7}\right]$.

26. Find the mean of the following data by shortcut method.

Marks	20	22	25	30	35	39	45	50	Total
Frequency	4	6	8	10	8	7	5	2	50

OR

Draw a bar chart of the data representing pass percentage of students during the period 1998-2003 given below :

Year	1998	1999	2000	2001	2002	2003
Pass percentage	80%	75%	90%	70%	95%	85%

27. On a page of a telephone directory, there are 200 telephone numbers. The frequency distribution of the digits at their units place is given below:

Unit digit	0	1	2	3	4	5	6	7	8	9
Frequency	22	26	22	22	20	10	14	28	16	20

Without looking at the page, a number is chosen at random from the page. What is the probability that the digit at the unit's place of the number chosen is greater than 6?

28. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes:

Outcome	3 Heads	2 Heads	1 Head	No Head
Frequency	23	72	77	28

Find the experimental probability of getting

(i) 2 Heads   (ii) at least 2 Heads

Section-D

Question numbers 29 to 34 carry 4 marks each

29. Solve for x :

$$\frac{3x+2}{7} + \frac{4(x+1)}{5} = \frac{2}{3}(2x+1)$$

OR

A and B are friends. A is elder to B by 5 years. B's sister C is half the age of B while A's father D is 8 years older than twice the age of B. If the present age of D is 48 years, find the present ages of A, B and C.

30. Prove that parallelograms on the same base and between the same parallels are equal in area.

OR

In Fig.11, ABCD is a parallelogram.
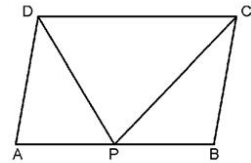If AB=2AD and P is the mid-point of AB,
then find ∠CPD.

Fig. 11

31.   In Fig.12, ABCD is a trapezium in which AB||DC.
       BD is a diagonal and E is the mid-point of AD.
       A line is drawn through E, parallel to AB, intersecting
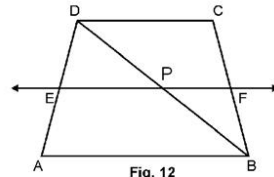   BC at F. Show that F is the mid-point of BC.

Fig. 12

32.   In Fig.13. O is the centre of the circle.
       The distance between P and Q is 4cm.
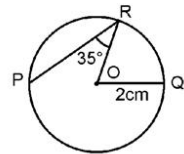   Find the ∠ROQ.

Fig. 13.

33.   In Fig.14, a right circular cone of diameter r cm
       and height 12cm rests on the base of a right
       circular cylinder of radius r cm. Their bases are
       in the same plane and the cylinder is filled with
       water upto a height of 12cm. If the cone is then
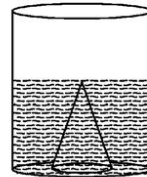   removed, find the height to which water level will fall.

Fig. 14.

34.   Draw a histogram for the following data

Marks	10-15	15-20	20-25	25-30	30-40	40-60	60-80
Number of candidates	7	9	8	5	12	12	8

Marking Scheme
Mathematics, SA-II
Class IX

Section-A

1.	(C)	2.	(A)	3.	(B)	4.	(C)	5.	(C)
6.	(C)	7.	(D)	8.	(A)	9.	(C)	10.	(D)

$1 \times 10 = 10$

Section-B

11.
$$x \text{ km} = \left[1 + (x-1)\right] \text{km}$$
$$\therefore \ y = 10 + (x-1)\left(\frac{9}{2}\right) \Rightarrow 2y = 20 + 9x - 9$$

1

$$\Rightarrow 9x - 2y + 11 = 0$$

1

12. $\angle A + \angle D = 180°$ [ABCD is a parallelogram]   1

$$\therefore \ \frac{1}{2}\angle A + \frac{1}{2}\angle D = 90°$$

$$\angle AOD = 180° - \left(\frac{1}{2}\angle A + \frac{1}{2}\angle D\right) = 90°$$

1

13. Join AC. R and S are mid-points of DC and DA respectively   ½

$$\therefore \ RS \| AC \text{ and } RS = \frac{1}{2}AC \ \dots\dots\dots(i)$$ ½

Similarly $PQ \| AC$ and $PQ = \frac{1}{2}AC \ \dots\dots (ii)$ ½

From (i) and (iii) PQRS is a $\|^{gm}$ ½

14. ABCD is a cyclic quadrilateral
$$\therefore \ \angle ABC = 180° - \angle ADC = 180° - 130° = 50°$$ 1

$\angle ACB = 90°$ (Angle in a semi-circle)   ½

$$\Rightarrow \angle BAC = 180° - (90° + 50°) = 40°$$ ½

15. Measure of arc ADC=∠AOC   ½

Again, OA=OB $\Rightarrow$ ∠ABO = 30°   ½

Similarly, ∠CBO=50° $\Rightarrow$ ∠ABC = 80°

$\Rightarrow$ ∠AOC=160° $\Rightarrow$ Measure of are AC=160°   1

<p style="text-align:center">OR</p>

∠BAD = $\frac{1}{2}$∠BOD=70°   1

Also ABCD is a cyclic quad $\Rightarrow$ ∠DCP=∠BAD=70°   1

16. $\frac{77}{2} = \pi r^2$, where r is the base radius of cylinder

$\Rightarrow r^2 = \frac{77}{2} \times \frac{77}{2} = \frac{49}{4} \Rightarrow r = \frac{7}{2}$ cm   1

$\frac{2\pi r h}{\pi r^2} = \frac{176 \times 2}{77} \Rightarrow h = \frac{16}{7}r = \left(\frac{16}{7} \times \frac{7}{2}\right)$ cm = 8cm   ½

$\therefore$ volume = $\left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 8\right)$ cm² = 308cm³   ½

17. Outer radius = $5\frac{1}{4}$cm = $\frac{21}{4}$cm   ½

Curved surface area = $2\pi r^2$ = $\left(2 \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4}\right)$ cm² = $\frac{693}{4}$ cm²
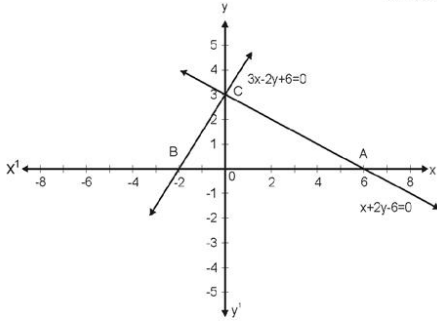
= 173.25cm²   1+½

18. The first 10 prime nos are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29   1

Their mean = $\frac{2+3+5+7+11+13+17+19+23+29}{10} = \frac{129}{10}$

= 12.9   1

19.

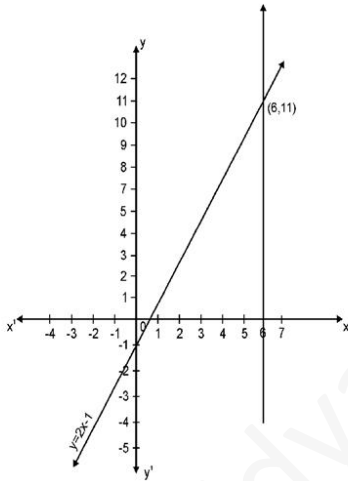Correct lines 2

Area of $\triangle ABC = \dfrac{1}{2}$ (AB) (OC)

$= \dfrac{1}{2}$ (8) (3) sq.units

$= 12$ sq. units   1

20.

Correct graph 2

$\chi = 6$

$y = 11$

$\therefore$ After working for 6 hours   1

wage = Rs 11

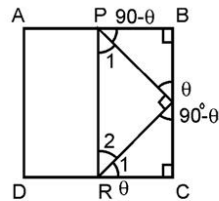21. From the figure, $\triangle PBQ \cong \triangle QCR$ 1

$\Rightarrow$ PQ=RQ (cpct)
$\Rightarrow \angle 1 = \angle 2 = 45°$ 1+½

$\Rightarrow \angle QPR = \angle 1 = 45°$ ½
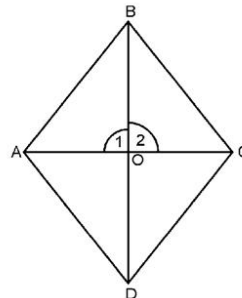

22. ABCD is a rhombus

$\therefore$ Diagonals bisect each other

$\Rightarrow$ AO = OC

In $\triangle$'s AOB and COB

OB = OB, AO = OC, AB = BC

$\therefore \triangle AOB \cong \triangle COB \Rightarrow \angle 1 = \angle 2$ 1+½

1

$$\angle 1 + \angle 2 = 180° \implies \angle 1 = \angle 2 = 90°$$ ½

<div align="center">OR</div>

OC = AB = 7cm

OB = 25cm and $\angle OAB = 90°$

$\implies OA^2 = OB^2 - AB^2 = 625 - 49$

$= 576$

$\implies OA = 24cm$ 1

$\therefore$ Area of rectangle = $(24 \times 7)cm^2 = 168cm^2$ 1

23. Correct construction 3

24. Volume of soup in the cylindrical bowl = $\pi r^2 h$

$$= \left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4 \right) cm^3$$

$= 154cm^3$ 2

$\therefore$ Volume of soup in 250 bowls = $(250 \times 154)cm^3$

$= 38500cm^3$ 1

<div align="center">OR</div>

Total surface area = $1848cm^2$

$\implies$ Curved surface area = $\frac{1}{3} \times 1848 = 616cm^2 = 2\pi rh$ 1

$2\pi r (r+h) = 1848$

$\implies 2\pi r^2 = 1232 \implies r^2 = \frac{\overset{28}{\cancel{1232}} \times 7}{\cancel{44}} = 28 \times 7 \implies r = 14cm$ ½

$2\pi rh = 616 \implies 2 \times \frac{22}{7} \times \overset{2}{\cancel{14}} xh = 616 \implies h = \frac{616}{88} = 7cm$ ½

Volume of cylinder = $\left(\frac{22}{7} \times 14 \times 14 \times \cancel{7} \right) cm^3 = 4312cm^3$ 1

25. Volume of wheat in the heap (conical) = $\frac{1}{\cancel{3}} \times \frac{\overset{11}{\cancel{22}}}{7} \times \frac{21}{\cancel{4}} \times \frac{21}{4} \times 7$
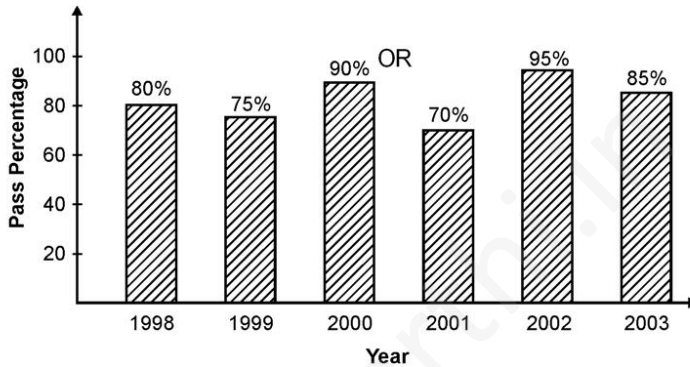
$= \frac{1617}{8}m^3 = 202.125m$ 1

slant height $\ell = \sqrt{\left(\frac{21}{4} \right)^2 + (7)^2} = \sqrt{\frac{1225}{16}} \implies \frac{35}{4}$ 1

$\therefore$ Curved surface area = $\dfrac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \dfrac{\overset{3}{\cancel{21}}}{\underset{2}{\cancel{4}}} \times \dfrac{35}{4} = \dfrac{1155}{8} = 144\dfrac{3}{8}$ m²   1

26.

x_i	20	22	25	30	35	39	45	50	Total	
f_i	4	6	8	10	8	7	5	2	50	
$d_i = 30 - x_i$	-10	-8	-5	0	5	9	15	20		½
$f_i d_i$	-40	-48	-40	0	40	63	75	40	$\Sigma f_i d_i = 90$	1

$$\therefore \overline{x} = 30 + \dfrac{90}{50} = 31.8 \qquad 1+½$$

OR

½ mark for each correct bar

½ x 6

27. $>6 \Rightarrow 7, 8, 9$ ½

Frequency of $(7+8+9) = 28+16+20 = 64$ 1

$\therefore$ Required probability = $\dfrac{64}{200} = \dfrac{8}{25}$ 1½

28.   (i) P (2 Head) = $\dfrac{72}{200} = \dfrac{9}{25}$ 1

(ii) P (At least 2 Heads) = P(2 Heads) + P(3 Heads)

$= \dfrac{72+23}{200} = \dfrac{95}{200} = \dfrac{19}{40}$ 2

Section-D

29. $\dfrac{3x+2}{7} + \dfrac{4}{5}(x+1) = \dfrac{2}{3}(2x+1)$

$\Rightarrow \dfrac{15(3x+2)+84(x+1)}{105} = 70(2x+1) \Rightarrow 45x+30+84x+84 = 140x+70$ 1½ +1

$11x = 44 \Rightarrow x=4$ $\qquad$ 1½

<div align="center">OR</div>

Let the age of the sister be x years $\qquad$ ½

$\therefore$ Age of B = 2x years

$\qquad$ A = (2x+5) years

$\qquad$ D = 2(2x)+8 = 4x+8 = 48 years (given) $\qquad$ 1½

$\qquad \Rightarrow$ x=10 $\qquad$ ½

$\therefore$ Age of A, B and C are 25 years, 20 years and 10 years respectively $\qquad$ 1½

30. Correctly stated

Given, To Prove, Const and figure $\qquad$ ½x4=2

Correct Proof $\qquad$ 2

<div align="center">OR</div>

$AP=\dfrac{1}{2}AB=AD \Rightarrow AP=AD$ $\qquad$ ½

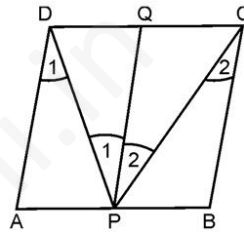Let $\angle 1 = \angle ADP=x \Rightarrow \angle A=180°-2x$ $\qquad$ 1

$\angle B=2x \Rightarrow \angle CPB=90°-x = \angle PCB=\angle 2$ $\qquad$ 1

Draw PQ‖AD‖BC

$\Rightarrow \angle DPC=\angle 1+\angle 2=90°$ $\qquad$ 1+1½

31. In $\triangle DAB$, EF‖AB and E is the mid-point of AD $\qquad$ 1

$\Rightarrow$ P is the mid-point of BD $\qquad$ 1

Now, in $\triangle BCD$, PF‖DC and P is the $\qquad$ 1

mid-point of BD $\Rightarrow$ F is the mid-point of BC $\qquad$ 1

32. PQ=4cm=2OQ $\Rightarrow$ PQ is a diameter $\qquad$ 1

Join RQ $\Rightarrow \angle PRQ = 90° \Rightarrow \angle ORQ=55°$ $\qquad$ 1

As OR=OQ $\Rightarrow \angle ORQ=\angle OQR=55°$ $\qquad$ 1

$\Rightarrow \angle ROQ=180°-2x55° = 70°$ $\qquad$ 1

33. Radius of base of cone $=\dfrac{r}{2}$, radius of base of cylinder = r $\qquad$ 1

Height of conical portion = 12cm

$\Rightarrow$ Height of water in cylinder before cone take nout   = 12cm

$\therefore$ Volume of water left in the cylinder when cone is taken out

$= \pi r^2(12)-\dfrac{1}{3}\pi\left(\dfrac{r}{2}\right)^2 \times 12 = \pi r^2 \cdot 11$ $\qquad$ 2
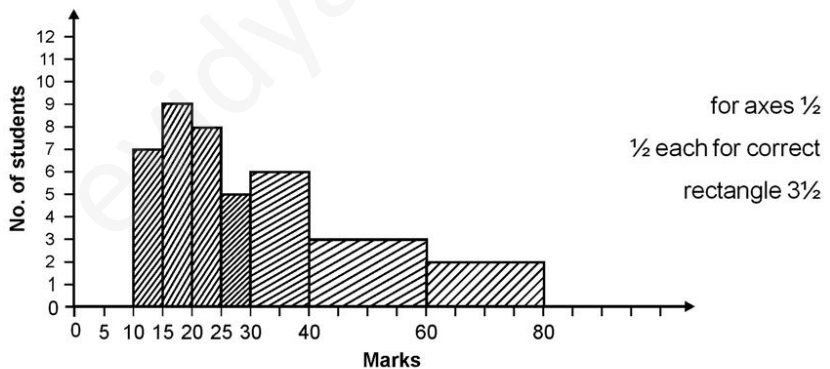
34.   Here the classes are of unequal widths, so let us form the table with adjusted frequencies

Mark	Frequency	Adjusted Frequency
10-15	7	$\frac{5}{5} \times 7 = 7$
15-20	9	$\frac{5}{5} \times 9 = 9$
20-25	8	$\frac{5}{5} \times 8 = 8$
25-30	5	$\frac{5}{5} \times 5 = 5$
30-40	12	$\frac{5}{10} \times 12 = 6$
40-60	12	$\frac{5}{20} \times 12 = 3$
60-80	8	$\frac{5}{20} \times 8 = 2$

for axes ½

½ each for correct

rectangle 3½