No. of printed pages : 9

Class- VIII

ANNUAL EXAMINATION (2023-24)

Subject- Mathematics

Solution set and Marking key

Set A1/A2

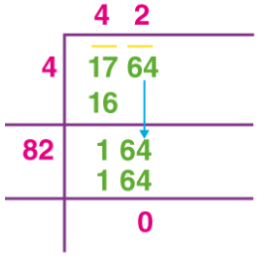
Duration: $2\frac{1}{2}$ hours **Maximum Marks: 60**

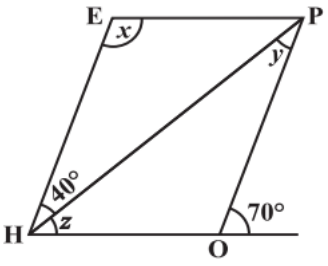
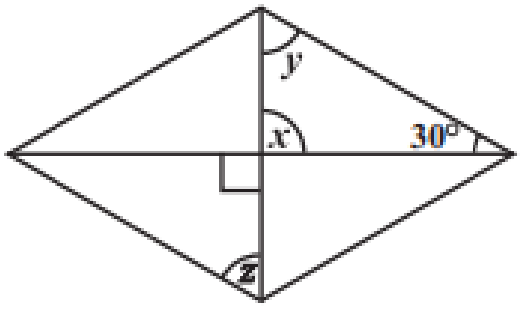
GENERAL INSTRUCTIONS: Read the following instructions carefully and follow them:

(i) This question paper contains 16 questions. All questions are compulsory.
(ii) Question paper is divided into FIVE sections – Section A, B, C, D and E.
(iii) In section A – question number 1 have multiple choice questions (MCQs) of 1 mark each.
(iv) In section B – question number 2 to 7 are Objective type questions of 2 marks each.
(v) In section C – question number 8 to 10 are Short Answer (SA) type questions carrying 3 marks each.
(vi) In section D – question number 11 to 13 are Long Answer (LA) type questions carrying 5 marks each.
(vii) In section E – question number 14 to 16 are source based/case study questions carrying 4 marks each. Internal choice is provided in 2 marks question in each source based/case study question.
(viii) There is no overall choice. However, an internal choice has been provided in 1 question in Section B, 2 question in Section C and 2 questions in Section D.
(ix) Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

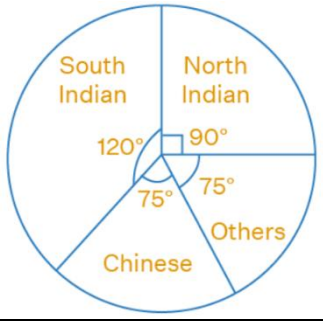
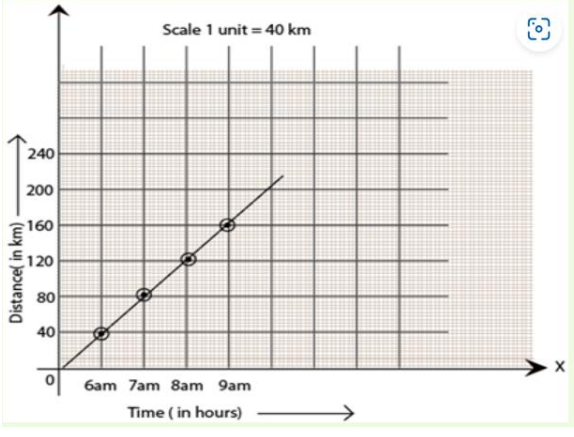
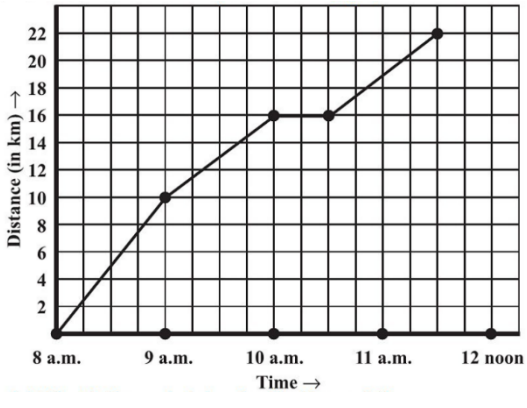
Set 1	Set 2	SECTION A	Marks
		QUESTION 1 (1-12)	
i)	xii)	When a die is thrown, the probability of getting a prime number is (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) 2 (d) $\frac{2}{3}$ Ans : (a) $\frac{1}{2}$	1
ii)	i)	If the exterior angle of a regular polygon is 24° then the total number of sides in that polygon is (a) 9 (b) 15 (c) 12 (d) 18 Ans : (b) 15	1
iii)	ii)	The total number of non perfect square numbers between 90^2 and 91^2 is (a) 181 (b) 182 (c) 179 (d) 180 Ans: (d) 180	1
iv)	iii)	The digit in the unit place of the cube of number 353 is: (a) 9 (b) 7 (c) 6 (d) 3 Ans : (b) 7	1

v)	iv)	The sum of $-7pq$ and $2pq$ is $(a) -9pq$ $(b) 9pq$ $(c) 5pq$ $(d) -5pq$ Ans: $(d) -5pq$ (SET B1) , The sum of $-7pq$ and $-2pq$ is $(a) -9pq$ $(b) 9pq$ $(c) 5pq$ $(d) -5pq$ Ans: $(a) -9pq$ (SET B2)	1
vi)	v)	The sale price of a printer is ₹13000. The rate of sales tax is 10% . The amount Vinod will have to pay if he buys it is (a) Rs 14300 (b) Rs 11700 (c) Rs15300 (d) Rs 12700 Ans: (a) Rs 14300	1
vii)	vi)	If 'x' and 'y' vary inversely then the unknown value a is: <table><tr><td>x</td><td>90</td><td>a</td></tr><tr><td>y</td><td>10</td><td>20</td></tr></table> (a) 45 (b) 60 (c) 35 (d) 18 Ans: (a) 45	1
viii)	vii)	Factorised form of $y^2 + y - 20$ is: $(a)\ (y-5)(y+4)$ $(b)\ (y+5)(y+4)$ $(c)\ (y-5)(y-4)$ $(d)\ (y+5)(y-4)$ Ans : $(d)\ (y+5)(y-4)$	1
ix)	viii)	The value of $(3^{-1}+4^{-1}+5^{-1})^0$ is (a) 12 (b) 12^{-1} (c) 0 (d) 1 Ans: (d) 1	1
x)	ix)	The reciprocal of Zero is (a) 0 (b) 1 (c) not defined (d) -1 Ans : (c) not defined	1
xi)	x)	A linear equation in one variable has (a) Only one solution (b) Two solutions (c) More than two solutions (d) No solution Ans : (a) Only one solution	1
xii)	xi)	Which of the following is the square of an odd number? (a) 256 (b) 361 (c) 144 (d) 400 Ans : (b) 361	1
		SECTION B	
2	7	Find the value of m for which $5^m \div 5^{-3} = 5^5$. Ans: $5^m \div 5^{-3} = 5^5$ $\Rightarrow 5^{m-(-3)} = 5^5$ $\Rightarrow 5^{m+3} = 5^5$	 ½ ½

		Comparing exponents both sides, we get $\Rightarrow m+3=5$ $\Rightarrow m=5-3$ $\Rightarrow m=2$	 ½ ½
3	2	Is 2376 a perfect cube? If not, by which smallest natural number should 2376 be divided so that the quotient is a perfect cube? Ans : $2376 = 2\times2\times2\times3\times3\times3\times11$ The prime 11 does not appear in groups of three. So, 2376 is not a perfect cube And by 11 it must be divided.	 1 1
4	3	Using appropriate properties find: $\left(\frac{-2}{3}\times\frac{3}{5}\right)+\left(\frac{3}{5}\times\frac{1}{6}\right)$ Ans : $= -\frac{2}{3}\times\frac{3}{5}+\frac{3}{5}\times\frac{1}{6}$ $= \left(-\frac{2}{3}\times\frac{3}{5}\right)+\left(\frac{3}{5}\times\frac{1}{6}\right) = \frac{3}{5}\left[-\frac{2}{3}+\frac{1}{6}\right]$ $[by$ distributive$]$ $= \frac{3}{5}\left[\frac{-2}{3}+\frac{1}{6}\right] = \frac{3}{5}\left[\frac{-4+1}{6}\right] = \frac{3}{5}\times\frac{-3}{6} = -\frac{3}{10}$	 1 ½ , ½
5	4	Find : $\sqrt{17.64}$ Ans : $\sqrt{17.64} = 4.2$  	1 1
6	5	Solve for x : $8x+4=3(x-1)+13$ Ans: $8x+4=3(x-1)+13$ $\Rightarrow 8x+4=3x+10 \Rightarrow 8x-3x \Rightarrow 5x=6 \Rightarrow x=6/5$ OR Solve for n: $\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$ Ans : $\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21 \Rightarrow \frac{6n-9n+10n}{12}=21 \Rightarrow \frac{7n}{12}=21 \Rightarrow n=\frac{21\times12}{7} \Rightarrow n=36$	 1,1 1,1
7	6	a) Write 0.00000000000942 in the standard form . (SET B1) b) Write 3.61492×10^6 in the usual form. Ans : a) $0.00000000000942 = 9.42\times10^{-12}$ b) $3.61492\times10^6 = = 3.61492\times1000000 = 3614920$ A) Write 0.00000000000567 in the standard form . (SET B2) B) Write 3.456×10^6 in the usual form. Ans: a) $0.00000000000567 = 5.67\times10^{-12}$ b) $3.456\times10^6 = = 3.456\times1000000 = 3456000$	1 each

		SECTION C	
8	10	The adjacent figure HOPE is a parallelogram. (SET B1) Find the angle measures $x, y \text{ and } z$. (Give reasons)  Ans : $y = 40^\circ$ (alternate interior angle) $\angle P = 70^\circ$ (alternate interior angle) $\angle P = \angle H = 70^\circ$ (opposite angles of a parallelogram) $z = \angle H - 40^\circ = 70^\circ - 40^\circ = 30^\circ$ $\angle H + x = 180^\circ$ $\Rightarrow 70^\circ + x = 180^\circ$ $\Rightarrow x = 180^\circ - 70^\circ = 110^\circ$ Hence $x = 110^\circ, y = 40^\circ \text{ and } z = 30^\circ$ Find the values of the unknowns x, y, z. (SETB2)  Ans: x = 90° (vertical opposite angles) x + y + 30° = 180° (angle sum property of a triangle) ⇒ 90° + y + 30° = 180° ⇒ y = 180° – 120° = 60° also, y = z = 60° (alternate angles)	1 Each 1 each
9	9	Simplify : $(x^2 - 5)(x + 5) + 25$ Ans : $(x^2 - 5)(x + 5) + 25$ $= x^2(x + 5) - 5(x + 5) + 25$ $= x^3 + 5x^2 - 5x - 25 + 25$ $= x^3 + 5x^2 - 5x$ OR Add: $2x(z - x - y) \text{ and } 2y(z - y - x)$ Ans : $2x(z - x - y) + 2y(z - y - x)$ $= 2xz - 2x^2 - 2xy + 2yz - 2y^2 - 2xy$ $= 2xz - 2xy - 2xy + 2yz - 2x^2 - 2y^2$ $= -2x^2 - 2y^2 - 4xy + 2yz + 2zx$	1 1 1 1 1 1
10	8	The area of a trapezium shaped field is $480\ m^2$, the distance between two parallel sides is $15\ m$ and one of the parallel side is $20\ m$. Find the other parallel side. Ans :	

		Area of a trapezium $= \frac{1}{2} h\,(a+b)$ So $480 = \frac{1}{2} \times 15 \times (20+b)$ or $\frac{480 \times 2}{15} = 20+b$ or $64 = 20+b$ or $b = 44$ m OR A godown is in the form of a cuboid of measures $60\,m \times 40\,m \times 30\,m$. How many cuboidal boxes can be stored in it if the volume of one box is $0.8\,m^3$? Ans : Volume of one box = $0.8\,m^3$ Volume of godown = $60 \times 40 \times 30$ Number of boxes that can be stored = $\frac{Volume\ of\ the\ godown}{Volume\ of\ one\ box} = \frac{60 \times 40 \times 30}{0.8} = 90{,}000$ Hence the number of cuboidal boxes that can be stored in the godown is 90,000.	½ 1,1 ½ 1,1,1
		SECTION D	
11	13	a) Factorise and divide: $(5p^2 - 25p + 20) \div (p-1)$ b) Factorise : $49x^2 - 36y^2$ Ans :a) $(5p^2 - 25p + 20) \div (p-1)$ $= \frac{5p^2-25p+20}{(p-1)} = \frac{5p^2-20p-5p+20}{(p-1)} = \frac{5p(p-4)-5(p-4)}{(p-1)} = \frac{5(p-1)(p-4)}{(p-1)} = 5(p-4)$ b)$49x^2 - 36y^2 = (7x)^2 - (6y)^2 = (7x-6y)(7x+6y)$ OR a) Factorise :$x^4 - (x-z)^4$ b) Divide : $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2$ Ans : a) $x^4 - (x-z)^4$ $= (x^2)^2 - [(x-z)^2]^2$ $= [x^2 - (x-z)^2]\,[x^2 + (x-z)^2]$ $= [x - (x-z)]\,[x + (x-z)]\,[x^2 + (x-z)^2]$ $= z(2x-z)\,[x^2 + x^2 - 2xz + z^2]$ $= z(2x-z)\,(2x^2 - 2xz + z^2)$ b) $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2$ $= \frac{8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3)}{4x^2y^2z^2}$ $= \frac{8x^3y^2z^2}{4x^2y^2z^2} + \frac{8x^2y^3z^2}{4x^2y^2z^2} + \frac{8x^2y^2z^3}{4x^2y^2z^2}$ $= 2x + 2y + 2z = 2(x+y+z)$	1,1,1 1,1 1 1 1 ½ 1 ½
12	12	Choice of food for a group of people is given below . Draw a pie chart for the given data. Favourite food | Number of people North Indian | 30 South Indian | 40 Chinese | 25 Others | 25 Total | 120	2

		Ans :The working of finding central angle will be done  	3
13	11	Draw the graph for the following table of values, with suitable scales on the axes **Time (in hours)** | 6 a.m. | 7 a.m. | 8 a.m. | 9 a.m. **Distances (in km)** | 40 | 80 | 120 | 160 Read from the graph and answer the following question : (i) What was the time when the car had covered a distance of 100 km since it's start? Ans : (i) It was 7.30 am, when it covered 100 km distance.  OR A courier-person cycles from a town to a neighbouring suburban area to deliver a parcel to a merchant. His distance from the town at different times is shown by the following graph. Answer the following by reading from the graph (a) What is the scale taken for the time axis? (b) How much time did the person take for the travel? (c) How far is the place of the merchant from the town? (d) Did the person stop on his way? Explain. (e) During which period did he ride fastest?  Ans : (a) On x axis , 1 hr = 4 cm (b)The person travels from 8 a.m. to 11:30 a.m,therefore the person travels 3 ½ hours. (c) Since courier person is starting from 0 km and ending at 22 km, so the place of merchant is 22 km far from the town.	4,1 1 each

		(d) If we see the graph, there is a time interval from 10:00 am to 10:30 am when the distance covered is same i.e. 16 km, so yes the person did stop on his way. (e) we have same time interval which is 1 hr, so speed is directly proportional to distance covered. Distance covered in time interval 8 am to 9 am is more person ride fastest during 8 am to 9 am period.	
		SECTION E	
14	14	**CASE STUDY 1** Rajesh sold his car for Rs 3,00,000. When he receives this money , he buys an electric scooter which costs him ₹ 1,80,000 and the rest of the money he deposits in the bank for a period of 2 years at rate of interest as 5% compounded annually . The value of the electric scooter depreciates at the rate of 20% per annum, then answer the following questions a) How much money did he deposit in the bank. b) What is the amount due from the bank after two years. OR What is the value of the electric scooter after the period of two years. c) If money deposited in the bank by Rajesh is for a period of 1 year ,what will be the interest earned by him. Ans : a)money he deposits in the bank = 3,00,000-1,80,000 = 1,20,000 b) $A = P\left(1+\frac{R}{100}\right)^N = 1{,}20{,}000\left(1+\frac{5}{100}\right)^2 = 1{,}20{,}000 \times \frac{21}{20} \times \frac{21}{20} = 1{,}32{,}300$ OR The value of the electric scooter after the period of two years = $A = P\left(1-\frac{R}{100}\right)^N$ $= 1{,}80{,}000\left(1-\frac{20}{100}\right)^2 = 1{,}80{,}000 \times \frac{4}{5} \times \frac{4}{5} = 11{,}52{,}000$ c)Since the time period is one year C.I = $S.I = \frac{P \times T \times R}{100} = \frac{120000 \times 1 \times 5}{100} = Rs\ 6000$	1 ½ ,1, ½ ½ 1, ½ ½, ½
15	15	**CASE STUDY 2** Two students Sheela and Tanya travel to their school in the morning. Sheela goes to her school on her cycle at an average speed of 12 km/hr and reaches in 20 minutes and Tanya goes to her school on a scooty at an average speed of 40 km/hr , she covers a distance of 16 km to reach her school.Answer the following : a)What is the distance between Sheela's house and her school. b)If Sheela wants to reach her school in 15 minutes ,what should be the speed of her cycle. OR In how much time will Tanya reach her school. c)Observe the given table and find the constant of variation x | 10 | 5 | 15	

			y	60	120	40	

Ans: speed is 12 km /hr means 12 km in 60 minutes

Distance on cycle	12 km	x
Time	60 min	20 min

Since there is direct variation 1

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

Therefore ,$\frac{12}{60} = \frac{x}{20} \Rightarrow x = 4\ km$

b)

Speed of cycle	12km /hr	x
Time	20 min	15 min

Since there is indirect variation 1,1

$x_1 \times y_1 = x_2 \times y_2 \Rightarrow 12 \times 20 = x \times 15 \Rightarrow x = 16\ km/hr$

OR

Distance on scooty	40 km	16
Time	60 min	y

1,1

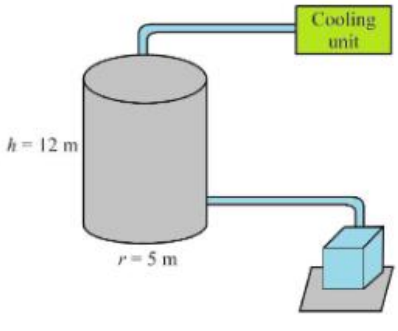
Since there is direct variation

$\frac{x_1}{y_1} = \frac{x_2}{y_2}$. Therefore ,$\frac{40}{60} = \frac{16}{y} \Rightarrow y = 24\ min$

c) ½ ,½

x	10	5	15
y	60	120	40

Since its inverse variation ,constant of variation is 600 .

16	16	One day teacher planned to take all the Class VIII students to the milk factory (Chilling plant) and asked the students to observe it carefully. Refer to this plant, its machinery is shown below. It is related to some solid shapes, which we study in our curriculum. Answer the given question below (take $\pi = 3.14$)  a) The cube shown in the picture is of side 6 cm . If it is painted on all its surface except the bottom , Find the area to be painted . b) Refer to cylindrical container , find the quantity of milk in litres that can be stored in the milk container?	

		OR The closed cylindrical container is from a sheet of metal , How much sheet of metal is required ? c) Find the capacity of this cubical container of side 6 cm . Ans : a) Let the side of cube = 6 cm Since, Surface area of the cube excluding bottom $= 5l^2 = 180cm^2$. b) quantity of milk= Volume of cylindrical tank $= \pi r^2 h$ $= 3.14 \times 5 \times 5 \times 12 = 942m^3 = 9{,}42{,}000\ litres$ OR Total surface area of cylindrical tank $= 2\pi r\,(h + r)$ $= 2 \times 3.14 \times 5(12 + 5) = 2 \times 3.14 \times 5 \times 17 = = 533.8\,m^2$ Hence, $533.8\,m^2$ metal sheet is required. c) capacity of this cube = $l^3 = 216\ cm^3$	1 ½ 1, ½ ½ 1, ½ 1