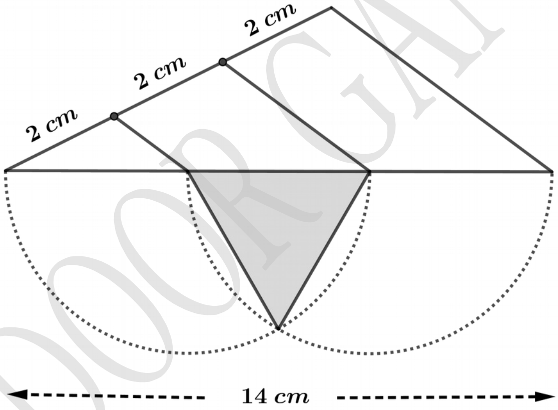
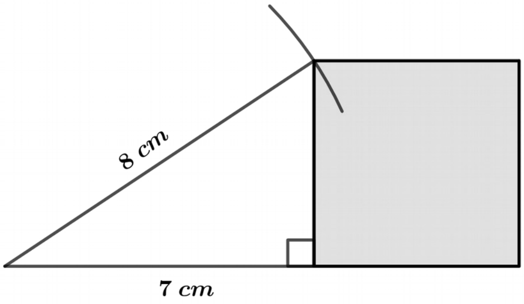
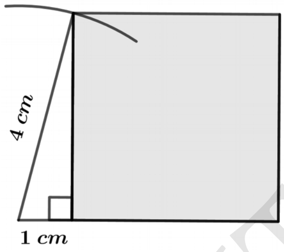
SUMMATIVE ASSESSMENT – TERM I 2025 – 26

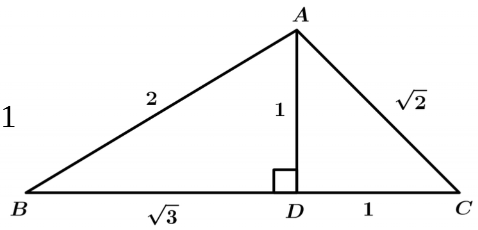
Class - IX

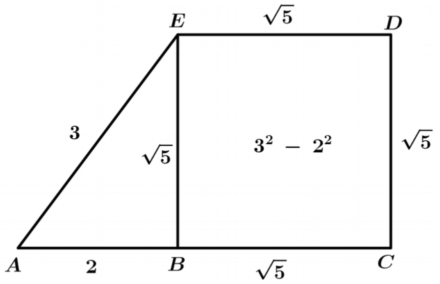
MATHEMATICS – ANSWER KEY

E-903

Qn no	Key	Score
	SECTION A	
1	A. $3x + 5y = 18$	1
2	B. $1\frac{1}{2}$	1
3	C. 4	1
4	A. $\frac{1}{4}$ $\left[\left(20+\frac{1}{2}\right)\left(10+\frac{1}{2}\right) = 20 \times 10 + \frac{1}{2}(20+10) + \frac{1}{2} \times \frac{1}{2}\right]$	1
5	B [Circumcentre of a right triangle is the midpoint of its hypotenuse]	1
6	C. (I) and (iii) are true	1
7	C. Both are true , statement 2 is the reason for statement 1	1
8	B. statement 2 is true , statement 1 is false .	1
	SECTION B	
9	For drawing a line of length 14 centimetre and divide into three equal parts . For completing the equilateral triangle . 	1 2
10	Numbers $= \frac{41+15}{2}$, $\frac{41-15}{2}$ $= \frac{56}{2}$, $\frac{26}{2}$ $=$ 28 , 13 Another way Take numbers as x and y , then $x + y = 41$ (1) $x - y = 15$ (2) Adding equations we get , $x + y + (x - y) = 41 + 15$ $x + y + x - y = 56$ $2x = 56$ = = = > $x = \frac{56}{2} = 28$ Putting $x = 28$ in equation (1) we get , $28 + y = 41$ = = = > $y = 13$	2 1

11	(i) $15 = \left(\frac{15+1}{2}\right)^2 - \left(\frac{15-1}{2}\right)^2 = \left(\frac{16}{2}\right)^2 - \left(\frac{14}{2}\right)^2 = 8^2 - 7^2$ (ii)  Another way (i) $15 = 4^2 - 1^2$ (ii) 	1 2
12(A)	The price of 2 umbrellas $= 1850 - 1150 = 700$ Rs. Price of an umbrella $= \frac{700}{2} = 350$ Rs. The price of 2 bags $= 1150 - 350 = 800$ Rs Price of a bag $= \frac{800}{2} = 400$ Rs. Another way Take the price of a bag as x rupees and the price of an umbrella as y rupees , then $2x + y = 1150$ (1) $2x + 3y = 1850$ (2) Subtracting equation (1) from equation (2) , we get $2y = 1850 - 1150 = 700$ $y = \frac{700}{2} = 350$ Putting $y = 350$ in equation (1) , we get $2x + 300 = 1150$ $2x = 1150 - 300 = 800$ $x = \frac{800}{2} = 400$ Price of an umbrella = 350 Rs. , Price of a bag = 400 Rs.	1 1 1
12(B)	5 times the number = 20 [Difference of the numbers = 5 times the number] $\therefore$ Smaller number $= \frac{20}{5} = 4$ Numbers $= 4$, $6 \times 4 = 24$ Another way Take the smaller number as x , then the larger number $= 6x$ $6x - x = 20$	1 2

	$5x = 20$ $x = \frac{20}{5} = 4$ ∴ Smaller number $= 4$, Larger number $= 6 \times 4 = 24$ Another way Take the smaller number as x and the larger number as y , then $y = 6x$ (1) $y - x = 20$ (2) Putting $y = 6x$ in equation (2) , we get $6x - x = 20$ $5x = 20 \quad ===> \quad x = \frac{20}{5} = 4$ ∴ Smaller number $= 4$, Larger number $= 6 \times 4 = 24$	
13	(i) $10x + 6$ (ii) Take the numbers as $10x + 6$ and $10y + 6$, then $(10x + 6)(10y + 6) = 10x \times 10y + 6(10x + 10y) + 6 \times 6$ $= 100xy + 60x + 60y + 36$ $= 100xy + 60x + 60y + 30 + 6$ Ones place digit of the number got by adding 6 to the multiples of 10 is 6 . . [$100xy + 60x + 60y + 30 + 6 = 10(10xy + 6x + 6y + 3) + 6$]	1 1 1
14(A)	(i) $(x + 2)(y + 2) = xy + 2(x + y) + 2 \times 2$ (ii) Take the even numbers as x and y , then $x + y = 26$, $xy = 144$ $(x + 2)(y + 2) = xy + 2(x + y) + 2 \times 2$ $= 144 + 2 \times 26 + 4 = 200$	1 1 1
14(B)	Length of the first rectangle $= x$ metres , Breadth $= y$ metres $===>$ $xy = 96$ (i) $(x + 1)(y + 1) = 117$ $xy + x + y + 1 \times 1 = 117$ $96 + x + y + 1 = 117$ $x + y = 117 - 97 = 20$ (ii) Perimeter of the first rectangle $= 2x + 2y = 2 \times 20 = 40$ metres	1 1 1
	SECTION C	
15(A)	(i) $AC = \sqrt{1^2 + 1^2} = \sqrt{2}$ metres (ii) $BD = \sqrt{2^2 - 1^2} = \sqrt{3}$ metres (iii) Perimeter of the triangle ABC $= 2 + \sqrt{2} + \sqrt{3} + 1$ $= 3 + \sqrt{2} + \sqrt{3}$ $= 3 + 1.41 + 1.73$ $= 6.14$ metres $=$ 614 centimetres 	1 1 1 1

15(B)	(I) Area of the square BCDE $= 3^2 - 2^2 = 5$ sq.cm Length of a side of the square BCDE $= \sqrt{5}$ cm (ii) Perimeter of the square BCDE $= 4\sqrt{5}$ cm (iii) Difference of the perimeters $= 4\sqrt{5} - (3 + 2 + \sqrt{5})$ $= 3\sqrt{5} - 5$ cm  	1 1 1 1
16	$\begin{array}{\|c\|c\|}\hline 1 & 2 \\ \hline 8 & 9 \\ \hline\end{array}$ (i) $AC = (2 \times 8) - (1 \times 9) = 16 - 9 = 7$ (ii) $\begin{array}{\|c\|c\|}\hline x & x+1 \\ \hline x+7 & x+8 \\ \hline\end{array}$ $x(x + 8) = x^2 + 8x$ $(x + 1)(x + 7) = x^2 + x(7 + 1) + 1 \times 7 = x^2 + 8x + 7$ Difference of the diagonal products $= 7$	1 1 1 1
17	Take the numbers as x and y , then $x + 13 = 2y$ (1) $y + 7 = 2x$ (2) From equation (1) , $x = 2y - 13$ Putting $x = 2y - 13$ in equation (2) , we get $y + 7 = 2(2y - 13)$ $y + 7 = 4y - 26$ $3y = 33 ===> y = \frac{33}{3} = 11$ $\therefore x = 2 \times 11 - 13 = 9$ Numbers $= 11 , 9$ Another way Take the numbers as x and y , then $x + 13 = 2y$ (1) $y + 7 = 2x$ (2) Adding the equations , we get $x + y + 20 = 2y + 2x ===> x + y = 20$ $===> x = 20 - y$ Putting $x = 20 - y$ in equation (1) , we get $20 - y + 13 = 2y ===> 3y = 33 ===> y = \frac{33}{3} = 11$ $\therefore x = 20 - 11 = 9$ Numbers $= 11 , 9$	1 1 1 1

Another way

Take the numbers as x and y , then

$$x + 13 = 2y \quad ===> \quad 2y - x = 13 \qquad (1)$$

$$y + 7 = 2x \quad ===> \quad 2x - y = 7 \qquad (2)$$

Adding the equations , we get

$$2y - x + 2x - y = 13 + 7$$

$$x + y = 20 \quad ===> \quad x = 20 - y$$

Putting $x = 20 - y$ in the equation $x + 13 = 2y$, we get

$$20 - y + 13 = 2y \quad ===> \quad 3y = 33 \quad ===> \quad y = \frac{33}{3} = 11$$

$x = 20 - 11 = 9$ $\quad \therefore$ Numbers $= 11 , 9$

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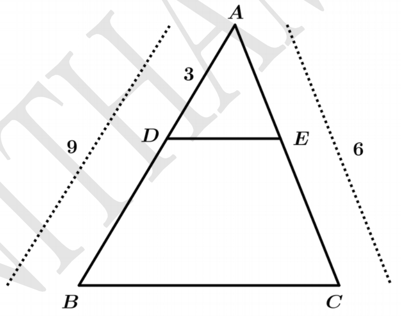
18 (i) $AD : AB = 3 : 9 = 1 : 3$ 1

[In any triangle, a line parallel to one of the sides cuts the other two sides in the same ratio]



(ii) $AE : AC = 1 : 3$ 1

(iii) $AE = \frac{1}{3} \times 6 = 2$ centimetres

$EC = 6 - 2 = 4$ centimetres 1

[OR $EC = \frac{2}{3} \times 6 = 4$ centimetres] 1

19(A) Take the numbers as x and y , then

$$2x + 3y = 52 \qquad (1)$$ 1

$$6x + 5y = 108 \qquad (2)$$

(1) x 3 : $6x + 9y = 156$ (3) 1

Subtracting equation (2) form equation (3) , we get

$$4y = 156 - 108 = 48$$

$$4y = 156 - 108 = 48$$

$$y = \frac{48}{4} = 12$$

Putting $y = 12$ in equation (1) , we get 1

$$2x + (3 \times 12) = 52$$

$$2x = 52 - 36 = 16 \quad ===> \quad x = \frac{16}{2} = 8$$

Numbers $= 8 , 12$ 1

Another way

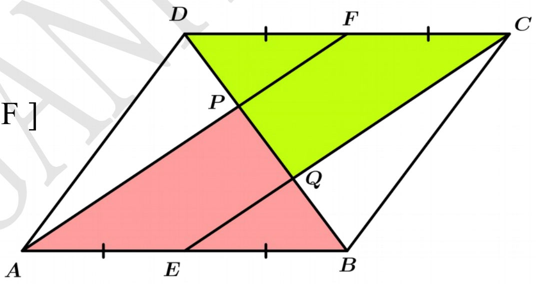
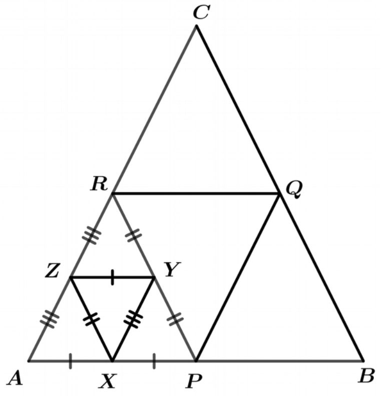
Take the numbers as x and y , then

$$2x + 3y = 52 \qquad (1)$$

$$6x + 5y = 108 \qquad (2)$$

(1) x 5 : $10x + 15y = 260$ (3)

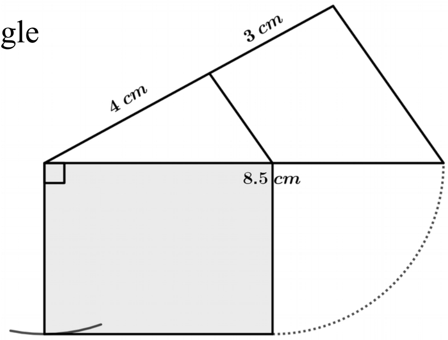
(2) x 3 : $18x + 15y = 324$ (4)

	Subtracting equation (3) from equation (4) , we get	
	$8x = 324 - 260 = 64 \quad ===> \quad x = \frac{64}{8} = 8$	
	Putting $x = 8$ in the equation (1) , we get	
	$(2 \times 8) + 3y = 52 \quad ===> \quad 3y = 52 - 16 = 36$	
	$y = \frac{36}{23} = 12 \qquad \therefore$ Numbers = 8 , 12	
19(B)	Fraction $= \frac{x}{y}$	
	$\frac{x+1}{y} = \frac{1}{5} \quad ===> \quad y = 5(x+1) \quad ===> \quad y = 5x + 5 \qquad (1)$	1
	$\frac{x}{y+1} = \frac{1}{6} \quad ===> \quad y + 1 = 6x \qquad (2)$	1
	Putting $y = 5x + 5$ in equation (2) , we get	
	$5x + 5 + 1 = 6x \quad ===> \quad x = 6$	1
	$\therefore \quad y = (5 \times 6) + 5 = 35 \quad == > \quad$ Fraction $= \frac{6}{35}$	1
20	ABCD is a rhombus [AB =BC =CD=DA] 	
	(i) AECF is a parallelogram.	1
	[AB and DC are parallel, AE = BE = CF = DF]	
	So AF and EC are parallel. .	
	[Parallelogram is a quadrilateral with one pair	
	of equal and parallel sides]	1
	(ii) The lines AF and EC cut the diagonal BD at P and Q.	
	PQ = BQ [In triangle ABP , AE = BE , AP and EQ are parallel , In any	1
	triangle, the line parallel to a side, through the midpoint of another side,	
	meets the third side also at its midpoint.]	1
	DP = PQ [In triangle CDQ , DF = CF , PF and QC are parallel]	
	∴ DP = PQ = BQ	
20(B)	(i) Area of the triangle AXZ = 3 sq.cm 	1
	[AX= PX = YZ , AZ = RZ = XY , PY = RY = XZ]	
	In any triangle, the length of the line joining the midpoints	
	of two sides is half the length of the third side ,	
	AXZ , XYZ , PXY are RYZ equal triangles]	
	(ii) Area of the triangle APR $= 4 \times 3 = 12$ sq.cm	1
	∴ Area of the parllelogram APQR $= 2 \times 12 = 24$ sq.cm	1
	[APR and PQR are equal triangles]	
	(iii) Area of the triangle ABC $= 4 \times 12 = 48$ sq.cm	
	[APR , PQR , BPQ and CQR are equal triangles]	1

SECTION D

21 For drawing a line of length 8.5 centimetres and divide it in the ratio 4 : 3 — 3

For completing the rectangle — 2



22 (i) Length of the hypotenuse of the smallest right triangle $= \sqrt{2}$ cm — 1

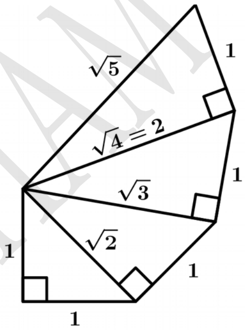
(ii) Perimeter of the fourth triangle $= 2 + 1 + \sqrt{5}$

$= 3 + \sqrt{5}$ cm — 1

(iii) Perimeter of the fifth triangle $= \sqrt{5} + 1 + \sqrt{6}$ cm — 1

Perimeter of the sixth triangle $= \sqrt{6} + 1 + \sqrt{7}$ cm — 1

Difference of the perimeters $= \sqrt{7} - \sqrt{5}$ cm — 1



23

	Age of son	Age of father
Before 2 years	$x - 2$	$y - 2$
Present	x	y
After 2 years	$x + 2$	$y + 2$

— 1

$y - 2 = 6(x - 2)$ ===> $y - 2 = 6x - 12$ ===> $y = 6x - 10$ (1) — 1

$y + 2 = 4(x + 2)$ ===> $y + 2 = 4x + 8$ ===> $y = 4x + 6$ (2) — 1

From equation (1) and equation (2) , we get

$6x - 10 = 4x + 6$

$2x = 16$ = = = > $x = \frac{16}{2} = 8$ — 1

$\therefore\ y = (6 \times 8) - 10 = 48 - 10 = 38$ — 1

Present age of son = 8 , Present age of father = 38

Another way

	Age of son	Age of father
Before 2 years	x	y
Present	$x + 2$	$y + 2$
After 2 years	$x + 4$	$y + 4$

$y = 6x \qquad (1)$

$y + 4 = 4(x + 4) \quad ===> \quad y + 4 = 4x + 16 \quad ===> \quad y = 4x + 12 \qquad (2)$

From equation (1) and equation (2) , we get

$6x = 4x + 12$

$2x = 12$

$x = \frac{12}{2} = 6$

$\therefore \quad y = 6x = 6 \times 6 = 36$

Present age of son $= 6 + 2 = 8$

Present age of father $= 36 + 2 = 38$

Another way

	Age of son	Age of father
Before 2 years	x	$6x$
Present	$x + 2$	$6x + 2$
After 2 years	$x + 4$	$6x + 4$

$6x + 4 = 4(x + 4)$

$6x + 4 = 4x + 16 \quad === > \quad 6x = 4x + 12$

$2x = 12 \quad === > \quad x = \frac{12}{2} = 6$

$\therefore \quad y = 6 \times 6 = 36$

Present age of son $= 6 + 2 = 8$

Present age of father $= 36 + 2 = 38$

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24 Take the length of the rectangle as x metres and the breadth as y metres, then

$(x + 1)(y + 1) = 336$

$xy + x + y + 1 \times 1 = 336 \quad ===> \quad xy + x + y = 335 \qquad (1)$ 1

$(x - 1)(y - 1) = 226$

$xy - (x + y) + 1 \times 1 = 226 \quad ===> \quad xy - (x + y) = 225 \qquad (2)$

Adding the equations , we get 1

$xy + x + y + xy - (x + y) = 335 + 225$

$2xy = 560 \quad ===> \quad xy = \frac{560}{2} = 280$ 1

(i) Area of the original rectangle $= xy = \frac{560}{2} = 280$ square meters.

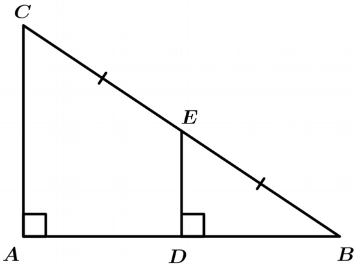
(ii) Putting $xy = 280$ in equation (1) , we get

$280 + x + y = 335$ 1

$x + y = 335 - 280 = 55$

Perimeter of the original rectangle $= 2x + 2y = 2 \times 55 = 110$ meters. 1

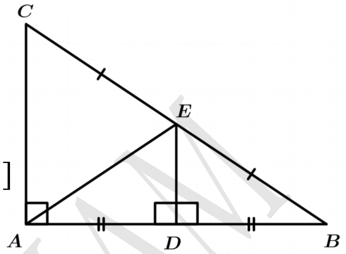
25(A) AC and DE are parallel [$\angle A = \angle D = 90^0$]



(i) AD = BD [In any triangle, the line parallel to a side, through the midpoint of another side, meets the third side also at its midpoint] 1

∴ ED is half of CA [In any triangle, the length of the line joining the midpoints of two sides is half the length of the third side]

(ii) CE = BE [E is the midpoint of BC] 1



(iii) Join AE .

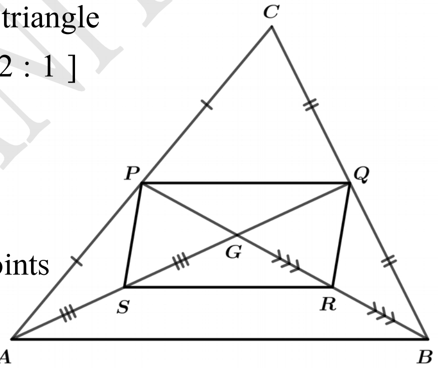
AE = BE [AD = BD , $\angle ADE = \angle BDE$,
ED is the common side , ADE and BDE are equal triangles] 1

[OR , In right triangle ADE , $AE = \sqrt{ED^2 + AD^2}$
In right triangle BDE , $BE = \sqrt{ED^2 + BD^2}$, AD = BD] 1

∴ AE = BE = CE

That is , the circumcentre of a right triangle is the midpoint of its hypotenuse. 1

25(B) (i) AG : GQ = 2 : 1 [G is the centroid , centroid of a triangle divides each median in the ratio 2 : 1] 1



(ii) $PQ = \frac{AB}{2} = \frac{24}{2} = 12$ centimetres 1

[In triangle ABC , AP = CP , BQ = CQ ,
In any triangle, the length of the line joining the midpoints of two sides is half the length of the third side]

$SR = \frac{AB}{2} = \frac{24}{2} = 12$ centimetres [In triangle ABG , AS = GS , BR = GR] 1

(ii) PQ and AB are parallel . [In triangle ABC , AP = CP , BQ = CQ ,
In any triangle, the line joining the midpoints of two sides is parallel to the third side] 1

SR and AB are parallel [In triangle ABG , AS = GS , BR = GR] 1

So PQ and SR are parallel .

∴ PQRS is a parallelogram. [PQ = SR ,PQ and SR are parallel]

26(A) Take the larger number as x and the smaller number as y ,

$(x+1)(y-1) = 112$

$x(y-1) + 1(y-1) = 112 \quad ===> \quad xy - x + y - 1 = 112$

$xy - x + y = 113 \qquad (1)$ 1

$(x-1)(y+1) = 120$

$y(x-1) + 1(x-1) = 120 \quad ===> \quad xy - y + x - 1 = 120$

$xy - y + x = 121 \qquad (2)$ 1

	Adding these equations , we get	
	$xy - x + y + xy - y + x = 113 + 121$	1
	$2xy = 234$	
	(i) $xy = \frac{234}{2} = 117$	1
	Putting $xy = 117$ in equation (1) , we get	
	$117 - x + y = 113$	1
	(ii) $x - y = 117 - 113 = 4$	
26(B)	Take the larger number as x and the smaller number as y ,	
	(i) $xy = (x + 1)(y - 1) + 4$	
	$xy = x(y - 1) + 1(y - 1) + 4$	1
	$xy = xy - x + y - 1 + 4$	
	$xy = xy - x + y + 3$	1
	$x - y = 3$	
	(ii) $(x - 1)(y + 1) = y(x - 1) + 1(x - 1)$	1
	$= xy - y + x - 1$	
	$= xy + 3 - 1$	1
	$= xy + 2$	
	The product is increased by 2 .	1