

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Section-A

Q1. $398 - 7 = 391$, $436 - 11 = 425$,
 $542 - 15 = 527$

HCF of 391, 425 and 527

$\begin{array}{r l} 17 & 391 \\ \hline 23 & 23 \\ \hline & 1 \end{array}$	$\begin{array}{r l} 5 & 425 \\ \hline 5 & 85 \\ \hline 17 & 17 \\ \hline & 1 \end{array}$	$\begin{array}{r l} 17 & 527 \\ \hline 31 & 31 \\ \hline & 1 \end{array}$
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HCF = 17.

17 is the largest number which will divide
 398, 436, 542 leaving remainder
 7, 11, 15 respectively.

Q2. $\frac{\sqrt{1204.09} - \sqrt{125.44}}{\sqrt{1204.09} + \sqrt{125.44}} = \frac{34.7 - 11.2}{34.7 + 11.2}$

$$= \frac{23.5}{45.9} = \frac{235}{459}$$

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q3. Perimeter = $2(l+b)$

$$\begin{aligned}
 &= 2(-6p^3 + 7p^2q^2 + pq + 7pq - 5p^3 + 9p^2q^2) \\
 &= 2(-11p^3 + 16p^2q^2 + 8pq) \\
 &= -22p^3 + 32p^2q^2 + 16pq
 \end{aligned}$$

Q4.
$$\frac{a^{-17} \times (a^4)^8 \times (8a^3)^{3/2}}{(16a^4)^{1/4} \times (a^2)^8} = 2$$

LHS:

$$\begin{aligned}
 &= \frac{a^{-17} \times a^{32} \times (2a)^2}{2a \times a^{16}} = \frac{a^{-17} \times a^{-16} \times a^{-1} \times a^{32} \times 4a^2}{2} \\
 &= \frac{a^{-17-16-1+32+2} \times 4}{2} = \frac{a^0 \times 4}{2} = 1 \times \frac{4}{2}
 \end{aligned}$$

$$= 2$$

LHS = RHS.

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q5. in decagon, $n=10$.

$$\begin{aligned} \text{Sum of interior Angles} &= (n-2) \times 180 \\ &= (10-2) \times 180 \\ &= 8 \times 180 = 1440^\circ \end{aligned}$$

$$\text{One interior Angles} = \frac{1440}{10} = 144^\circ$$

$$\text{Sum of Ext + int} = 180$$

$$\text{Ext} = 180^\circ - 144$$

$$\text{Ext.} = 36^\circ$$

$$\text{Ext Angle} = 36^\circ$$

$$\text{Int. Angles} = 4 \text{ times of Ext. Angle.}$$

Q6. Let the original price be 100.

$$\text{New price} = 120\% \text{ of } 100 = 120.$$

$$\text{difference} = 120 - 100 = 20.$$

$$\% \text{ decrease in consumption} = \frac{20}{120} \times 100$$

$$= \frac{100}{6} = 16\frac{2}{3} \%$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

07. let $HCF = x$, $LCM = 9x$

$$HCF + LCM = 500$$

$$x + 9x = 500$$

$$10x = 500 ; x = 50$$

$$HCF = 50.$$

08. $\left(\frac{x+1}{x+2}\right)^2 = \frac{x+2}{x+4}$

$$(x+1)^2(x+4) = (x+2)^3$$

$$(x^2+1+2x)(x+4) = x^3+8+6x(x+2)$$

$$x^3+x+2x^2+4x^2+4+8x = x^3+8+6x^2+12x$$

$$x + 6x^2 + 4 + 8x = 8 + 6x^2 + 12x$$

$$9x + 4 = 8 + 12x$$

$$9x - 12x = 8 - 4$$

$$-3x = +4$$

$$x = \frac{4}{-3} = -\frac{4}{3}$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q9.

Let the original amount = Rs. x .

After losing 20%,

Remaining amount = 80% of x

$$= \frac{80}{100} x = \frac{4x}{5}$$

Amount Remaining after spending 25%

$$= 75\% \text{ of } \frac{4x}{5} = \frac{75}{100} \times \frac{4x}{5}$$

$$= \frac{3x}{5}$$

A.T.Q; $\frac{3x}{5} = 480,$

$$x = \frac{480 \times 5}{3} = 800.$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q10. (a) $x^2 - y^2 - 9z^2 + 6yz$
 $= x^2 - [y^2 + 9z^2 - 6yz]$
 $= x^2 - [y^2 + (3z)^2 - 2(y)(3z)]$
 $= x^2 - (y - 3z)^2$
 $= x^2 - (y - 3z)^2$
 $= (x + y - 3z)(x - y + 3z).$

Q10. (b) $3 - 12(a-b)^2$
 $= 3[1 - 4(a-b)^2]$
 $= 3[1 - (2(a-b))^2]$
 $= 3[1 - 2a + 2b][1 + 2a - 2b]$

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q11. Total distance = 690km,
 let speed of one car = x km/hr.
 Speed of 2nd car = $(x-10)$ km/hr.
 Relative speed = $x+x-10=(2x-10)$ km/hr
 Total distance to be travelled in 6hrs.
 $= 690-30 = 660$ km.

$$\text{A.T.Q.}, \frac{660}{2x-10} = 6$$

$$660 = 6(2x-10)$$

$$110 = 2x-10$$

$$2x = 120$$

$$x = 60 \text{ km/hr.}$$

$$\text{Speed of 2nd car} = 60-10 = 50 \text{ km/hr.}$$

Q12. Volume = $2.2 \times 10 \times 10 \times 10 = 2200 \text{ cm}^3$.
 $\pi r^2 h = 2200$; $\frac{22}{7} \times \frac{1}{4} \times \frac{1}{4} \times h = 2200$

$$h = \frac{2200 \times 4 \times 4 \times 7}{22}$$

$$h = 11200 \text{ cm.}$$

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q.13. Let the first number = x
 2nd number = $x+1$
 3rd number = $x+2$.
 $x + x+1 + x+2 = 156$
 $3x + 3 = 156$
 $x+1 = \frac{156}{3}, \quad x+1 = 52$
 $x = 51$

Q14. $\sqrt[3]{968} + \sqrt[3]{1375}$

$ \begin{array}{r} 2 \overline{) 968} \\ \underline{2 484} \\ 2 242 \\ \underline{2 121} \\ 11 121 \\ \underline{11 11} \\ 1 \end{array} $	$ \begin{array}{r} 5 \overline{) 1375} \\ \underline{5 275} \\ 5 275 \\ \underline{5 55} \\ 11 55 \\ \underline{11 11} \\ 1 \end{array} $
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$\sqrt[3]{2 \times 2 \times 2 \times 11 \times 11} + \sqrt[3]{5 \times 5 \times 5 \times 11}$
 $2 \sqrt[3]{121} + 5 \sqrt[3]{11}$

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3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q15. Let the number be x

$$\frac{3x}{5} - \frac{2x}{7} = 44$$

$$\frac{21x - 10x}{35} = 44$$

$$11x = 44 \times 35$$

$$x = \frac{44 \times 35}{11}, \quad x = 4 \times 35$$

$$x = 140.$$

Q16. (a). $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2$

$$(11)^2 = x^2 + \frac{1}{x^2} + 2$$

$$121 = x^2 + \frac{1}{x^2} + 2$$

$$x^2 + \frac{1}{x^2} = 121 - 2 = 119.$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q16. (b) $\left(x^2 + \frac{1}{x^2}\right)^2 = x^4 + \frac{1}{x^4} + 2$

$$(119)^2 = x^4 + \frac{1}{x^4} + 2$$

$$14161 = x^4 + \frac{1}{x^4} + 2$$

$$x^4 + \frac{1}{x^4} = 14161 - 2$$

$$x^4 + \frac{1}{x^4} = 14161 - 2 = 14159.$$

RIMC EXAM

3rd Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q17. Let the ticket of Rs. $2.50 = x$
ticket of Rs. $5 = 300 - x$

$$x \times (2.5) + (300 - x) \times 5 = 1250$$

$$2.5x + 1500 - 5x = 1250$$

$$-2.5x = 1250 - 1500$$

$$\neq 2.5x = -250$$

$$2.5x = 250$$

$$x = \frac{250}{2.5} = 100.$$

Ticket of Rs. $2.50 = 100$,

Ticket of Rs. $5 = 300 - 100 = 200$.

Q18. Possible outcome = 1, 2, 3, 4, 5, 6.

(a) Even prime number = 2

$$\text{Probability} = \frac{\text{Total favorable outcome}}{\text{Total outcome}} = \frac{1}{6} = \frac{1}{6}.$$

(b) Non-prime - non-composite = 1

$$\text{Probability} = \frac{1}{6}$$

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q 19. diameter = $1\frac{1}{4} = \frac{5}{4}$; radius = $\frac{5}{8}$ cm.

Length of aluminium strip = $8\frac{3}{4} = \frac{35}{4}$ cm.

width of strip = $1\frac{1}{4} = \frac{5}{4}$ cm.

Number of possible circles = $\frac{35/4}{5/4} = \frac{35}{5} = 7$ circles

wastage of Aluminium strip
 = (Area of strip) - Area of 7 circles
 = $\left(\frac{35}{4} \times \frac{5}{4}\right) - \left(7 \times \frac{22}{7} \times \frac{5}{8} \times \frac{5}{8}\right)$

= $\frac{175}{16} - \frac{275}{32} = \frac{350 - 275}{32}$

= $\frac{75}{32}$ cm².

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q20. In $\triangle OPQ$, $\angle OPQ = 48^\circ$

By property of Rectangle.
diagonal Bisect Angle of Rectangle

Hence; $\angle 1 = \angle 2$,
 $\angle 3 = 48^\circ$.

$\angle RSQ = 48^\circ$.

RIMC EXAM

3th Dec'22
SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Section-B

Q21. C.P of 9 toffees = Rs 10

$$\text{C.P of 1 toffee} = \frac{10}{9}$$

$$\text{C.P of 11 toffees} = \text{Rs. 10}$$

$$\text{C.P of 1 toffee} = \frac{10}{11}$$

$$\text{C.P of 2 toffees} = \frac{10}{9} + \frac{10}{11} = \frac{110+90}{99}$$

$$= \frac{200}{99}$$

$$\text{S.P of 10 toffees} = \text{Rs 10.}$$

$$\text{S.P of 1 toffee} = \text{Rs. 1}$$

$$\text{S.P of 2 toffee} = \text{Rs. 2.}$$

$$\text{Loss} = \text{C.P} - \text{S.P} = \frac{200}{99} - 2 = \frac{200-198}{99}$$

$$= \frac{2}{99}$$

$$\text{Loss \%} = \frac{\text{L}}{\text{C.P}} \times 100 = \frac{2/99}{200/99} \times 100 = \frac{2}{200} \times 100 = 1\%$$

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q22.

$$\text{diameter} = 7\text{mm}, R = \frac{7}{2}\text{mm}$$

$$\text{diameter} = 1\text{mm} \Rightarrow r = \frac{1}{2}\text{mm}$$

$$h = 10\text{cm} = 100\text{mm}$$

$$\text{Volume of graphite part of pencil} = \pi r^2 h$$

$$= \frac{22}{7} \times \frac{1}{2} \times \frac{1}{2} \times 100$$

$$= 78.57\text{mm}^3$$

$$\text{Volume of wood in pencil} = \pi R^2 h - \pi r^2 h$$

$$= \pi h (R^2 - r^2)$$

$$= \frac{22}{7} \times 100 \times \left(\frac{7^2}{2} - \frac{1^2}{2} \right)$$

$$= \frac{22}{7} \times 100 \times \left(\frac{7}{2} + \frac{1}{2} \right) \left(\frac{7}{2} - \frac{1}{2} \right)$$

$$= \frac{22}{7} \times 100 \times 4 \times 3 = 3771.42\text{mm}^3$$

$$\text{weight of graphite} = 78.57 \times 2.1 = 164.99\text{gm}$$

$$\text{weight of wood} = 3771.42 \times 0.7 = 2639.99\text{gm}$$

$$\text{weight of whole pencil} = 164.99 + 2639.99$$

$$= 2804.98\text{gm}$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q23.

Difference between CI and SI for
2 year = $\frac{PR^2}{10000}$

$R = 10\%$ p.a.

$$500 = \frac{PR^2}{10000}$$

$$500 \times 10000 = P \times 10 \times 10$$

$$\frac{500 \times 10000}{100} = P$$

$$50000 = P$$

Principal = Rs. 50000.

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q24.

$$M_1 \times D_1 = M_2 \times D_2$$

$$M_1 = 120 \text{ men}, D_1 = 200 - 5 = 195 \text{ days.}$$

Now, 30 men died,

$$M_2 = \text{men left} = 120 - 30 = 90 \text{ men.}$$

$$M_1 \times D_1 = M_2 \times D_2$$

$$120 \times 195 = 90 \times D_2$$

$$\frac{120 \times 195}{90} = D_2$$

$$D_2 = 260 \text{ Days.}$$

Remainig food will last for 60 more
Days.

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q25. (a). $8p = 59^2 - 51^2$
 $8p = (59-51)(59+51)$
 $a^2 - b^2 = (a-b)(a+b)$

$$8p = \frac{8 \times 110}{8}$$

$$p = 110.$$

(b) $abp = (3a+b)^2 - (3a-b)^2$
 $abp = (3a+b-3a+b)(3a+b+3a-b)$

$$abp = (2b)(6a)$$

$$p = \frac{12ab}{ab}, \quad p = 12.$$

(c) $143p = 76^2 - 67^2$

$$143p = (76+67)(76-67)$$

$$p = \frac{143 \times 9}{143}, \quad p = 9$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

(d)

$$441 - p^2 = 21^2 - 17^2$$

$$441 - p^2 = (21 + 17)(21 - 17)$$

$$441 - p^2 = 38 \times 4$$

$$-p^2 = 152 - 441$$

$$-p^2 = -289$$

$$p^2 = 289$$

$$p = \sqrt{289}$$

$$p = 17.$$

RIMC EXAM

3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q26.

Given investment = Rs. 20,000.

Price of Bicycle = Rs 800

Price of Bicycle is increased by 25%

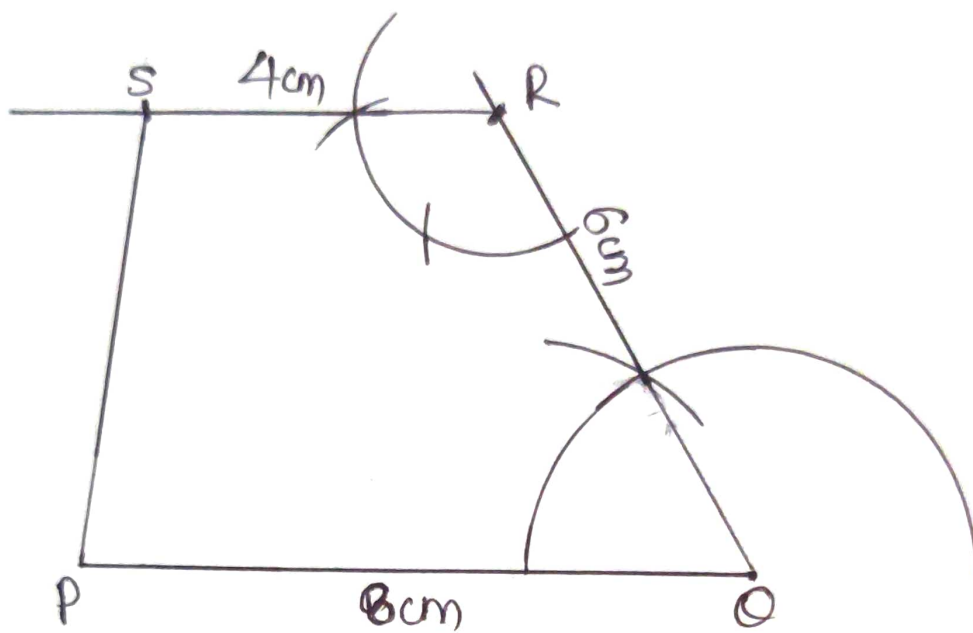
New price of Bicycle = 125% of 800

$$= \frac{125}{100} \times 800$$

$$= ₹1000.$$

Number of Bicycles that can be
purchased = $\frac{20000}{1000} = 20.$

Q27.



RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q28. In parallelogram PQRS.

Given, T is mid point of PQ

$$PT = TQ \quad \text{————— (i)}$$

ST Bisect $\angle S$, Hence, $\angle 1 = \angle 2$. — (ii)

(a) $\angle 2 = \angle 3$ (Alternate Angles)

In $\triangle SPT$, $\angle 3 = \angle 1$ — from (ii)

Hence $PT = PS$ (Angle opposite to Equal Sides are Equal in Isosceles $\triangle$)

$$PS = QR \quad \text{(parallelogram)}$$

$$QR = QT \quad (PT = PS = QR)$$

Hence proved.

(b) In $\triangle TQR$, $TQ = QR$

$\Rightarrow \angle 4 = \angle 5$ (Angle opposite to Equal Sides are Equal)

$$\angle 6 = \angle 5 \quad \text{(Alternate)}$$

$$\Rightarrow \angle 6 = \angle 4$$

$\Rightarrow$ RT bisect $\angle R$.

RIMC EXAM

 3th Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

(C) $\angle 1 = \angle 3$, In $\triangle PST$
 $\angle SPT + \angle 1 + \angle 3 = 180^\circ$
 $\angle SPT + 2\angle 3 = 180^\circ$; $\angle SPT = 180 - 2\angle 3$ — (1)
 $\angle 4 = \angle 5$, In $\triangle TQR$
 $\angle RQT + \angle 4 + \angle 5 = 180^\circ$
 $\angle RQT + 2\angle 4 = 180^\circ$; $\angle RQT = 180 - 2\angle 4$ — (2)
 $\angle SPT + \angle RQT = 180^\circ$ (Adjacent Angles in parallelogram is supplementary)
 From (1) And (2)
 $180 - 2\angle 3 + 180 - 2\angle 4 = 180^\circ$
 $2(\angle 3 + \angle 4) = 180^\circ$
 $\angle 3 + \angle 4 = 90^\circ$ — (iii)
 Now, $\angle 3 + \angle 7 + \angle 4 = 180^\circ$ (linear pair)
 $90 + \angle 7 = 180^\circ$ (from (iii))
 $\angle 7 = 180 - 90$
 $\angle 7 = 90^\circ$
 proved.

RIMC EXAM

 3rd Dec'22

SUBJECT- Maths

ANSWER KEYS & SOLUTIONS

Q29. HCF of 96, 240, 336

$$96 = 2^5 \times 3, \quad 240 = 2^4 \times 3 \times 5$$

$$336 = 2^4 \times 3 \times 7$$

$$\text{HCF} = 2^4 \times 3 = 48$$

So, there must be 48 books in each stack.

$$\text{Number of stacks of English Books} = \frac{96}{48} = 2$$

$$\text{Number of stacks of Hindi Books} = \frac{240}{48} = 5$$

$$\text{Number of stacks of Maths Books} = \frac{336}{48} = 7.$$

Q3a (1,1) (1,2) (1,3) (1,4) (1,5) (1,6)

(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)

(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)

(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)

(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)

(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)

Sum of 5 = (1,4) (4,1) (2,3) (3,2)

Total favorable outcome = 4.

Total outcome = 36

$$\text{Probability} = \frac{\text{Favorable outcome}}{\text{Total outcome}} = \frac{4}{36}$$

$$= \frac{1}{9}.$$