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1. As 'Video' is related to 'Cassette', similarly 'Computer' is related to 'Floppy'.

2. As 'Blood sugar' is measured by 'Glucometer' similarly 'Blood Pressure' is measured by 'Sphygmomanometer'.

3. As 'Behaviour' is studied in 'Psycology', similarly 'Plants' are studied in 'Botany'.

4. As 'Mytocondria' carries 'energy' similarly 'DNA' carries 'structure of genes'.

5. As 'mirage' occurs due to heating up of air just above the surface of the 'Desert'. Similarly, 'EL-Nino' effect occurs due to heating up near the sea surface.
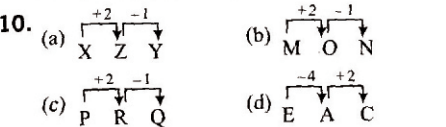
6. $525 : 25 :: 315 : 15$
   $\div 21 \qquad \div 21$

7. Except $\dfrac{7}{2}$ all others are simple fractions.

8. 'Navigation' is different from others.

9. (a) Z Y X (-1, -1) (b) F E D (-1, -1)
   (c) N M L (-1, -1) (d) G H I ($+1$, $+1$)
   ∴ Option (d) is different.
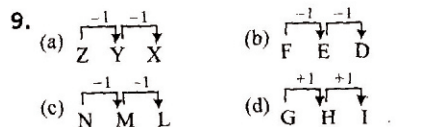
10. (a) X Z Y ($+2$, -1) (b) M O N ($+2$, -1)
    (c) P R Q ($+2$, -1) (d) E A C (-4, $+2$)
    ∴ Option (d) is different.

11. (a) $1 \to 1 \times 5 = 5$
    (b) $4 \to 4 \times 5 = 20$
    (c) $5 \to 5 \times 13 = 65$
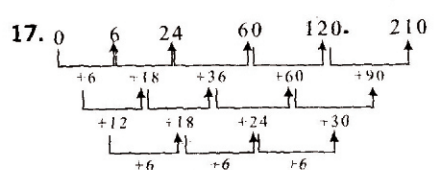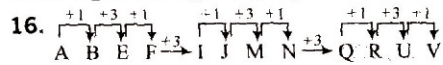   (d) $7 \to 7 \times 5 = 35$
    ∴ Option (c) is different.

12. The pair 91-12 is a set of co-prime numbers.

13. The required order is as follows:
    Mercury < Venus < Earth < Mars <
    (4)   (1)   (2)   (3)
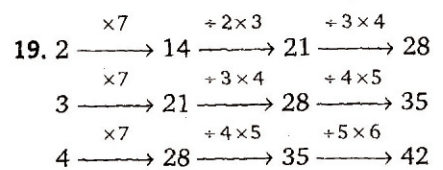   Jupiter
    (5)
    The above order is based on their distances from the Sun.

14. The required order is as follows:
    Pages < Books < Book rack <
    (1)   (4)   (2)
    Catalogue < Library
    (5)   (3)

15. a b c b/a b c b/a b c b/a b c b / ab

16. A B E F $\xrightarrow{+3}$ I J M N $\xrightarrow{+3}$ Q R U V
    ($+1$ $+3$ $+1$) (-1 $+3$ $+1$) ($+1$ $+3$ $+1$)

17. 0 6 24 60 120. 210
    $+6$ $+18$ $+36$ $+60$ $+90$
    $+12$ $+18$ $+24$ $+30$
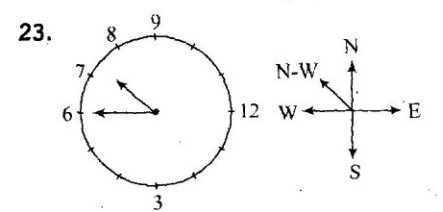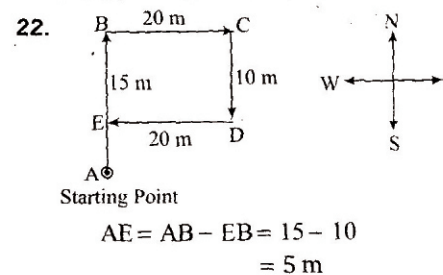 $+6$ $+6$ $+6$

18. $\sqrt{49} - \sqrt{4} + \sqrt{25} = 7 - 2 + 5 = 10$
    $\sqrt{81} - \sqrt{49} + \sqrt{16} = 9 - 7 + 4 = 6$
    $\sqrt{64} - \sqrt{9} + \sqrt{36} = 8 - 3 + 6 = 11$

19. $2 \xrightarrow{\times 7} 14 \xrightarrow{\div 2 \times 3} 21 \xrightarrow{\div 3 \times 4} 28$
    $3 \xrightarrow{\times 7} 21 \xrightarrow{\div 3 \times 4} 28 \xrightarrow{\div 4 \times 5} 35$
    $4 \xrightarrow{\times 7} 28 \xrightarrow{\div 4 \times 5} 35 \xrightarrow{\div 5 \times 6} 42$

20. $2^2 + 20 = 24$
    $3^2 + 30 = 39$
    $4^2 + 40 = 56$

21. $7 + 4 + 2 = 13 \times 3 = 39$
    $3 + 9 + 1 = 13 \times 5 = 65$
    $2 + 6 + 5 = 13 \times 7 = 91$

22.
    B — 20 m — C
    15 m (left), 10 m (right)
    E — 20 m — D
    A ● Starting Point

    $AE = AB - EB = 15 - 10$
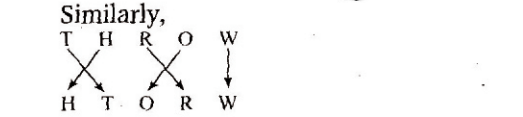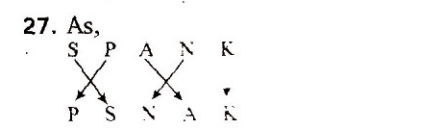 $\qquad = 5\ m$

23.
    Clearly, if minute-hand is in West direction, then the hour-hand is in North-West direction.

24. ELIMINATE cannot be formed because there is only one 'I' in PENULTIMATE.

25. PRINTED cannot be formed because there is no 'D' in PROCRASTINATE.

26. SECRET cannot be formed because there is no 'R' in ADOLESCENT.

27. As,
    S P A N K
    (cross pattern)
    P S N A K

    Similarly,
    T H R O W
    (cross pattern)
    H T O R W

28. As,
    A N C I E N T and N A T U R E
    2 5 1 6 8 5 9   5 2 9 0 4 8
    Similarly,
    T R A I N
    9 4 2 6 5

29. As,
    B L U E → E U B L
    1 2 3 4   4 3 1 2
    Similarly,
    B U L B → B L B U
    1 2 3 4   4 3 1 2

30. $1620 \times \dfrac{40}{100} + 960 \times \dfrac{30}{100}$
    $\qquad = 5200 \times \dfrac{x}{100}$
    $648 + 288 = 52x$
    $\Rightarrow \qquad x = \dfrac{936}{52}$
    $\qquad\qquad x = 18$

31. $2 \times 3 + 6 - 12 \div 4 = 17$
    (a) $2 + 3 \times 6 - 12 \div 4$
    $\qquad\qquad = 2 + 18 - 3 = 17$
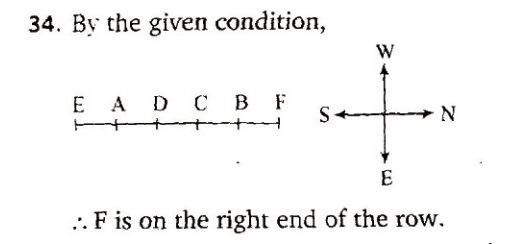   ∴ Option (a) is the correct option.

32. (a) 15 C 3 B 2 A 6 E 2
    $= 15 \div 3 + 2 > 6 \times 2$
    $\qquad = 5 + 2 > 12$
    $\qquad = 7 > 12$ (✗)
    (b) 15 B 2 G 5 F 4 G 4
    $= 15 + 2 - 5 < 4 - 4$
    $= 17 - 5 < 0$
    $= 12 < 0$ (✗)
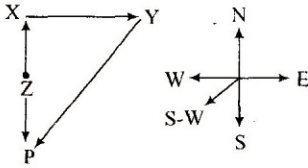   (c) 15 C 3 B 2 D 6 B 1
    $= 15 \div 3 + 2 = 6 + 1$
    $= 5 + 2 = 7$
    $= 7 = 7$ (✔)
    (d) 15 B 3 D 4 E 6 = $15 + 3 = 4 \times 6$
    $= 18 = 24$ (✗)

33. $24\ \triangle 4\ \triangle 5\ \triangle 4 \Rightarrow 24 = 4 \times 5 + 4$
    ∴ Option (b) is correct.

34. By the given condition,
    E A D C B F
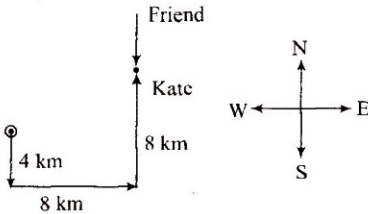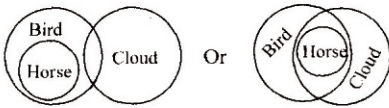   ∴ F is on the right end of the row.

35. By the given condition,

∴ P is in the South-West direction of Y.

36.
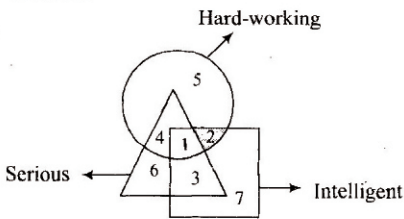

Clearly, Kate is facing North.

37.

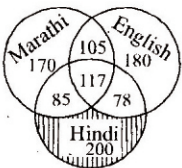Clearly, only conclusion I follows.

38. It is clear from the given information that only Ravi has five pens. Therefore only conclusion IV is correct.
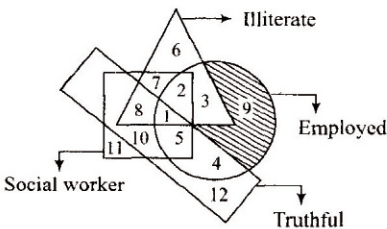
40.

The shaded portion shows the hard working people who are intelligent but not sincere. Thus the required number is 2.

41.

The numbers of people speaking only Hindi is 200 which is shown by the shaded portion.

42.

Those who are literate employed people but neither truthful nor social worker are represented by the shaded portion in the figure.

101. Let the two digit be $= 10x + y$

The number obtained by interchanging the digits $= 10y + x$

The difference between the numbers

$= 10x + y - (10y + x)$

$= 10x + y - 10y - x$

$= 9x - 9y$

$= 9(x - y)$

∴ Such type of numbers are always divisible by 9.

102. $323 = 17 \times 19$

∴ It has only two prime factors.

103. Time taken by both the punctures deflate the tyre

$= \dfrac{9 \times 6}{9 + 6}$

$= \dfrac{54}{15}$

$= 3 \dfrac{9}{15}$

$= 3 \dfrac{3}{5}$ min

104. $8\,M = 12\,C$

$\Rightarrow 2\,M = 3\,C$

By the formula $\dfrac{M_1 D_1}{W_1} = \dfrac{M_2 D_2}{W_2}$

$8\,M \times 16 = (20\,M + 6\,C) \times D$

$8\,M \times 16 = (20 + 4)\,M \times D$

$\Rightarrow D = \dfrac{8 \times 16}{24} = 5\dfrac{1}{3}$ days

105. A's and B's one day's work $= \dfrac{1}{12}$

B's and C's one day's work $= \dfrac{1}{16}$

A's 5 day's work and B's 5 days' work together, *i.e.* total 10 days' work

$= 5 \times \dfrac{1}{12} = \dfrac{5}{12}$ part

B's work in remaining 2 days and C's work in remaning 2 days, *i.e.* their 4 days work $= 2 \times \dfrac{1}{16} = \dfrac{1}{8}$ part

∴ Remaining work $= 1 - \left(\dfrac{5}{12} + \dfrac{1}{8} \right)$

$= \dfrac{11}{24}$ part

C's 11 days work $= \dfrac{11}{24}$ part
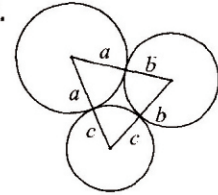
C's 1 days work $= \dfrac{1}{24}$ part

B's 1 one days work $= \dfrac{1}{16} - \dfrac{1}{24}$

$= \dfrac{3 - 2}{48} = \dfrac{1}{48}$ part

∴ B can complete that work in 48 days

106.

The length of the lines joining the three centres are $a + b$, $b + c$ and $c - a$ respectively.

By the formula,

Area of $\Delta = \sqrt{s(s - a)(s - b)(s - c)}$

where,

$s = \dfrac{a + b + b + c + c + a}{2} = a + b + c$

∴ Δ

$= \sqrt{\begin{array}{l}(a + b + c)(a + b + c - a - b)(a + b \\ + c - b - c)(a + b + c - c - a)\end{array}}$

$= \sqrt{(a + b + c) a \cdot b \cdot c}$

$= \sqrt{abc(a + b + c)}$

107. Let the spheres so formed be n, then the volume of metallic cone $= n \times$ volume of one sphere

$\dfrac{1}{3} \pi R^2 h = n \times \dfrac{4}{3} \pi r^3$

$\dfrac{1}{3} \pi (30)^2 \times 45 = n \times \dfrac{4}{3} \pi (5)^3$

$n = \dfrac{\pi}{3} (30)^2 \times 45 \times \dfrac{3}{4\pi} \times \dfrac{1}{125}$

$= \dfrac{900 \times 45}{500} = 81$

108. Let the centre of the circle be O, then In the given circle,
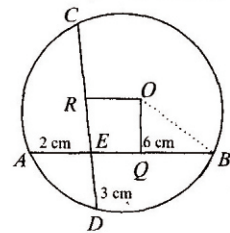
$AE \times EB = DE \times EC$

$\Rightarrow 2 \times 6 = 3 \times EC$

$\Rightarrow EC = 4$ cm

Now, $OQ \perp AB$, ∴ $AQ = QB = \dfrac{8}{2} = 4$ cm

Again, $OR \perp CD$, ∴ $CR = DR$

$= \dfrac{4 + 3}{2} = \dfrac{7}{2}$ cm

$ER = DR - ED = \dfrac{7}{2} - 3 = \dfrac{1}{2}$ cm $= OQ$

In ΔOQB, $OB = \sqrt{OQ^2 + QB^2}$

$= \sqrt{\left(\dfrac{1}{2} \right)^2 + (4)^2} = \sqrt{\dfrac{1}{4} + 16} = \dfrac{\sqrt{65}}{2}$

2

$$= 2 \times \frac{\sqrt{65}}{2}$$
$$= \sqrt{65} \text{ cm}$$

109. Let the number of kites given free by the vendor $= x$

Then, $\dfrac{x}{27 + x} \times 100 = 10\%$

$\Rightarrow \quad 100x = 270 + 10x$

$\Rightarrow \quad 90x = 270 \Rightarrow x = 3$

∴ In order to give 10% discount the Vendor gives 3 kites free on the sale of 27 kites.

110. After manufacture of the ring, the total expense $= 1600 + 2400$
$$= ₹ 4000$$

List price of the ring $= ₹ 7800$

Selling Price $= 7800 \times \dfrac{(100 - 10)}{100}$
$$= ₹ 7020$$

∴ Profit % $= \dfrac{7020 - 4000}{4000} \times 100$
$$= \dfrac{3020}{40} = 75.5\%$$

111. CP of article $= ₹ 450$

Marked price $= 450 \times \dfrac{(100 + 20)}{100}$
$$= \dfrac{450 \times 120}{100} = ₹ 540$$

Discount % $= \dfrac{540 - 496.80}{540} \times 100$
$$= \dfrac{43.20}{540} \times 100 = 8\%$$

112. By the given condition,

Area of circle $\alpha \ r^2$

$\Rightarrow$ Area of circle $= kr^2$

Area of bigger circle $= k(5)^2 = 25k$

Area of smaller circle $= k(3)^2 = 9k$

Area of the annular zone $= 25k - 9k = 16k$

∴ Area of annular zone : Area of bigger circle
$$= 16k : 25k$$
$$= 16 : 25$$

113. Let the total amount $= ₹ \ x$

$\dfrac{x}{3} \times \dfrac{7}{100} + \dfrac{x}{4} \times \dfrac{8}{100}$

$- \left(x - \dfrac{x}{3} - \dfrac{x}{4} \right) \times \dfrac{10}{100} = 561$

$\dfrac{7x}{300} + \dfrac{2x}{100} + \dfrac{12x - 4x - 3x}{12} \times \dfrac{10}{100}$
$$= 561$$

$\dfrac{7x}{300} + \dfrac{2x}{100} - \dfrac{5x}{120} = 561$

$\Rightarrow \quad \dfrac{51x}{600} = 561$

$\Rightarrow \quad x = \dfrac{561 \times 600}{51}$
$$= 11 \times 600$$
$$x = ₹ 6600$$

114. Total age of Ram and the children $= 17 \times 3 = 51$ yrs.

Total age of Ram's wife and the children $= 16 \times 3 = 48$ yrs.

Total age of the children $= 51 - 33 = 17$ yrs.

∴ Ram's wife's age $= 48 - 17 = 31$ yrs.

115. Salary on $1 - 1 - 1983 = ₹ 380$

salary on $1 - 10 - 1983$
$$= ₹ 380 + ₹ 40 = ₹ 420$$

salary on $1 - 10 - 1984$
$$= ₹ 420 + ₹ 40 = ₹ 460$$

salary on $1 - 10 - 1985$
$$= ₹ 460 + ₹ 40 = ₹ 500$$

∴ Pension after the person's retirement $= \dfrac{1}{2}$ (Avg. of last three yrs)

$= \dfrac{1}{2} \left[\dfrac{\begin{array}{c} 380 \times 9 + 420 \times 12 + 460 \\ \times 12 + 500 \times 12 \end{array}}{3 \times 12} \right]$

$= \dfrac{1}{2} \left[\dfrac{3420 + 5040 + 5520 + 1500}{36} \right]$

$= \dfrac{1}{2} \times \dfrac{15480}{36} = ₹ 215$

116. Let the CP of one cow $= x$

$20 \cdot \dfrac{15}{100} + 40 \cdot \dfrac{19}{100} + 16 \cdot \dfrac{25}{100}$
$$= ₹ 6570$$

$3x + \dfrac{38}{5} x + 4x = 6570$

$\dfrac{15x + 38x + 20x}{5} = 6570$

$\dfrac{73x}{5} = 6570$

$x = \dfrac{6570 \times 5}{73} = ₹ 450$

117. Percentage decrease in the second side
$$= \dfrac{30}{100 + 30} \times 100 = \dfrac{3000}{130}$$
$$= \dfrac{300}{13} = 23 \dfrac{1}{13} \%$$

118. Total distance travelled by Ram
$$= 1200 \times \dfrac{5}{2}$$
$$= 3000 \text{ km}$$

$$= \dfrac{1}{3} \times 3000 = 1000 \text{ km}$$

Distance travelled by Ram by train
$$= 3000 - 1200 - 1000 = 800 \text{ km}$$

119. Speed of policeman $= \dfrac{1000}{8 \times 60}$
$$= \dfrac{25}{12} \text{ m/s}$$

speed of thief $= \dfrac{1000}{10 \times 60} = \dfrac{5}{3}$ m/s

Time taken to catch the thief
$$= \dfrac{100}{\dfrac{25}{12} - \dfrac{5}{3}} = \dfrac{100}{\dfrac{25 - 20}{12}}$$
$$= \dfrac{100 \times 12}{5} = 240 \text{ sec.}$$

Distance travelled by the thief
$$= \dfrac{5}{3} \times 240 = 400 \text{ m}$$

120. Annual Instalment

$\left[\left(\dfrac{100}{100 + r} \right) + \left(\dfrac{100}{100 + r} \right)^2 \right]$
$$= \text{Total Debt}$$

$\Rightarrow$ Annual Instalment $\times$

$\left[\left(\dfrac{100}{100 + 10} \right) + \left(\dfrac{100}{100 + 10} \right)^2 \right] = 21000$

$\Rightarrow$ Annual Instalment $\times$

$\left[\dfrac{10}{11} + \dfrac{100}{121} \right] = 21000$

$\Rightarrow$ Annual Instalment $\times$

$\left[\dfrac{110 + 100}{121} \right] = 21000$

$\Rightarrow$ Annual Instalment $= \dfrac{21000 \times 121}{210}$

Annual Instalment $= 12100$

121. $A + \sqrt{B} = \dfrac{4 + 3\sqrt{3}}{\sqrt{7 + 4\sqrt{4}}}$

$= \dfrac{4 + 3\sqrt{3}}{\sqrt{4 + 3 + 2 \cdot 2\sqrt{3}}}$

$= \dfrac{4 + 3\sqrt{3}}{\sqrt{(2 + \sqrt{3})^2}} = \dfrac{4 + 3\sqrt{3}}{2 + \sqrt{3}}$

$= \dfrac{(4 + 3\sqrt{3})(2 - \sqrt{3})}{(2 + \sqrt{3})(2 - \sqrt{3})}$

$= \dfrac{8 - 4\sqrt{3} + 6\sqrt{3} - 9}{4 - 3}$

$= 2\sqrt{3} - 1 = \sqrt{12} - 1$

On comparing both the sides,
$$A = -1 \ ; B = 12$$
∴ $B - A = 12 - (-1)$
$$= 12 + 1 = 13$$

122. $x^2 + x + 1 = \left(x + \dfrac{1}{2}\right)^2 + q^2$

$x^2 + x + 1 = x^2 + \dfrac{1}{4} + 2 \cdot x \cdot \dfrac{1}{2} + q^2$

$1 - \dfrac{1}{4} = q^2 \quad \Rightarrow \quad q^2 = \dfrac{3}{4}$

$\Rightarrow \quad q = \sqrt{\dfrac{3}{4}} \quad \Rightarrow \quad q = \pm\dfrac{\sqrt{3}}{2}$

123. $a^2 - 4a - 1 = 0$

$\Rightarrow \quad a^2 - 1 = 4a$

$\Rightarrow \quad a - \dfrac{1}{a} = 4 \qquad \qquad \dots(i)$

Squaring both the sides,

$\left(a - \dfrac{1}{a}\right)^2 = 16$

$\Rightarrow \quad a^2 + \dfrac{1}{a^2} - 2 = 16$

$a^2 + \dfrac{1}{a^2} = 18 \qquad \qquad \dots(ii)$

$a^2 + \dfrac{1}{a^2} + 3a - \dfrac{3}{a} = \left(a^2 + \dfrac{1}{a^2}\right)$

$\qquad \qquad \qquad + 3\left(a - \dfrac{1}{a}\right)$

$\qquad = 18 + 3 \times 4$

$\qquad = 18 + 12 = 30$

124. $x = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - (a^2 + b^3)}$

$\Rightarrow x^3$

$= \left(\sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}\right)^3$

$= \left(\sqrt[3]{a + \sqrt{a^2 + b^3}}\right)^3 + \left(\sqrt[3]{a - \sqrt{a^2 + b^3}}\right)^3$

$+ 3 \cdot \sqrt[3]{a + \sqrt{a^2 + b^3}} \cdot \sqrt[3]{a - \sqrt{(a^2 + b^3)}} \cdot$

$\left(\sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}\right)^3$

$= a + \sqrt{a^2 + b^3} + a - \sqrt{a^2 + b^3}$

$+ 3 \cdot \sqrt[3]{(a + \sqrt{a^2 + b^3})(a - \sqrt{a^2 + b^3})} \cdot x$

$= 2a + 3x \cdot \sqrt[3]{a^2 - a^2 - b^3}$

$= 2a + 3x \cdot \sqrt[3]{-b^3}$

$= 2a + 3x \, (-b^3)^{1/3}$

$= 2a - 3bx$

$\Rightarrow x^3 + 3bx = 2a$

125. $x^2 + y^2 = 80$

$(x + y)(x - y) = 80 \qquad \qquad \dots(i)$

$\qquad \qquad x - y = 8 \qquad \qquad \dots(ii)$

from eq. (i) and (ii),

$\qquad (x + y) \cdot 8 = 80$

$\Rightarrow \qquad x + y = 10$

Avg. of x and $y = \dfrac{x + y}{2} = \dfrac{10}{2} = 5$

127. $\dfrac{1}{1 + 2^{a-b}} + \dfrac{1}{1 + 2^{b-a}}$

$= \dfrac{1 + 2^{b-a} + 1 + 2^{a-b}}{(1 + 2^{a-b})(1 + 2^{b-a})}$

$= \dfrac{2 + 2^{(b-a)} + 2^{(a-b)}}{1 + 2^{b-a} + 2^{a-b} + 2^{b-a+a-b}}$

$= \dfrac{2 + 2^{b-a} + 2^{a-b}}{1 + 2^{b-a} + 2^{a-b} + 1}$

$= \dfrac{2 + 2^{b-a} + 2^{a-b}}{2 + 2^{b-a} + 2^{a-b}} = 1$

128. $\dfrac{a}{b} = \dfrac{4}{5}$ and $\dfrac{b}{c} = \dfrac{15}{16}$

$a : b : c = \quad 4 \quad : \quad 5$

$\qquad \qquad \qquad 15 \quad : \quad 16$

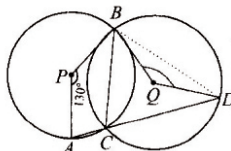$\qquad \qquad \overline{\quad 60 \quad : \quad 75 \quad : \quad 80 \quad}$

$a : b : c = 12 : 15 : 16$

$\dfrac{18c^2 - 7a^2}{45c^2 + 20a^2} = \dfrac{18\,(16)^2 - 7\,(12)^2}{45\,(16)^2 + 20\,(12)^2}$

$= \dfrac{18 \times 256 - 7 \times 144}{45 \times 256 + 20 \times 144}$

$= \dfrac{4608 - 1008}{11520 + 2880} = \dfrac{3600}{14400} = \dfrac{1}{4}$

129.

In circle P,

$\angle ACB = 180 - \dfrac{130}{2}$

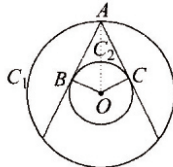$\qquad = 180 - 65 = 115°$

$\angle BCD = 180 - \angle ACB$

$\because \ \angle BCD$ and $\angle ACB$ are collinear

$\Rightarrow \angle BCD = 180 - 115 = 65°$

$\therefore \ \angle BQD = 2 \, \angle BCD$

$\qquad x° = 2 \times 65 = 130°$

130.

$\because \ B$ and C are tangential point on circle C_2,

$\therefore OB \perp AB$ and $OA = 12$ cm,

$\quad OB = 3$ cm

$AD = \sqrt{(12)^2 - (3)^2}$
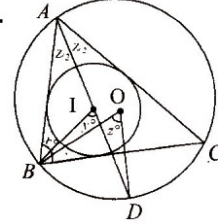
$\qquad = \sqrt{144 - 9}$

$\qquad = \sqrt{135} = 3\sqrt{15}$

Area $\triangle AOB = \dfrac{1}{2} AB \times OB$

$\qquad = \dfrac{1}{2} 3\sqrt{15} \times 3 = \dfrac{9}{2}\sqrt{15} \ \text{cm}^2$

Area of $ABOC = 2 \times$ Area $\triangle AOB$

$\qquad = 2 \times \dfrac{9}{2}\sqrt{15} = 9\sqrt{15} \ \text{cm}^2$

131.

From the fig $\angle BZD = z°$

$\Rightarrow \qquad \angle BAD = \dfrac{z°}{2}$

{$\because$ the angle in the segment is half the angle formed at the centre}

I is the in centre of $\triangle ABC$

$\therefore BI$ is the angle bisector of $\angle ABC$
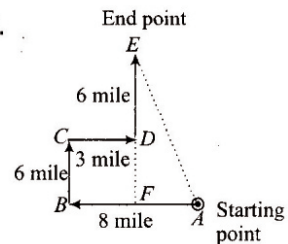
$\Rightarrow \angle ABI = \angle IBC = \dfrac{x°}{2}$

In $\triangle ABI$, $\angle BAI + \angle IBA = \angle BID$

$\qquad \qquad \qquad \qquad$ {Ext. angle}

$\Rightarrow \dfrac{z}{2} + \dfrac{x}{2} = y$

$\Rightarrow \dfrac{z + x}{2} = y \Rightarrow \dfrac{z + x}{y} = 2$

132.

In $\triangle EFA$

$EF = ED + CD = 6 + 6 = 12$ mile

$AF = BA - CD = 8 - 3 = 5$ mile

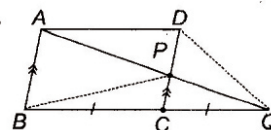Distance between the starting point and end point.

$EA = \sqrt{(EF)^2 + (AF)^2}$

$\qquad = \sqrt{(12)^2 + (5)^2} = \sqrt{144 + 25}$

$\qquad = \sqrt{169} = 13$ mile

133.

$\because ABCD$ is a $\|$ gm,

$\therefore AB \| CD$ or $AB \| CP \qquad \qquad \dots i)$

It is given that, $BC = CQ$

or, C is the mid point of BQ. $\qquad \dots ii)$

From (i) and (ii), P is the mid-point of CD.

4

∴ we know that a median of a triangle divides it into two equal triangles.

∴ In Δ BPQ,

Area Δ BPC = Area Δ PCQ   ...(iii)

and in Δ DCQ,

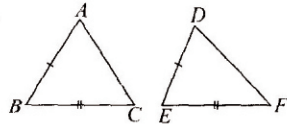Area Δ PCQ = Area Δ DPQ   ...(iv)

Thus, from (iii) and (iv),
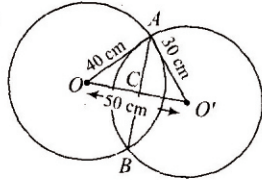
Area Δ BPC = Area Δ DPQ.

134.

$AB = DE$ and $BC = EF$ then

$$\Delta ABC \cong \Delta DEF,$$

when $\angle ABC = \angle DEF$

By (SAS) rule

135.

Let AB be the common tangent, then ΔAOO′ is a right angled traingle.

∵ $(OO')^2 = AO^2 + AO'^2$

$(50)^2 = (40)^2 + (30)^2$

$2500 = 1600 + 900$

$2500 = 2500$

Again, $OO' \perp AB$ and divides AB in two equal parts.

∴ In Δ AOO′,

Area Δ AOO′

$= \dfrac{1}{2} AO \times AO' = \dfrac{1}{2} OO' \times AC$
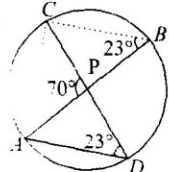
$\dfrac{1}{2} \times 40 \times 30 = \dfrac{1}{2} \times 50 \times AC$

$\Rightarrow \qquad AC = \dfrac{40 \times 30}{50}$

$AC = 24$ cm

$AB = 2AC = 2 \times 24$

$= 48$ cm

136.

$\angle ADP = 23°$

$\angle ADC = \angle ABC = 23°$

Both are the angles in the same segment hence are equal.

$\angle BPC = 180° - 70° = 110°$

∴ In ΔBPC

$\angle BCP = 180° - \angle PCB - \angle PBC$

$= 180° - 110° - 23°$

$= 180° - 133°$

$\angle BCP = 47° = \angle BCD$

137. Sum of all ∠ of any pentagon = 540°

∴ The smallest angle $= 540 \times \dfrac{2}{18}$

$= 30 \times 2 = 60°$

138. $\sec\theta + \tan\theta = \sqrt{3}$

$\dfrac{1}{\cos\theta} + \dfrac{\sin\theta}{\cos\theta} = \sqrt{3}$

$\Rightarrow \quad 1 + \sin\theta = \sqrt{3}\,\cos\theta$

$\Rightarrow \quad (1 + \sin\theta)^2 = (\sqrt{3}\,\cos\theta)^2$

$\Rightarrow \quad 1 + \sin^2\theta + 2\sin\theta = 3\cos^2\theta$

$\Rightarrow \quad 1 + \sin^2\theta + 2\sin\theta - 3\cos^2\theta = 0$

$\Rightarrow \quad 1 + \sin^2\theta - \cos^2\theta - 2\cos^2\theta$
$\qquad\qquad\qquad\qquad = -2\sin\theta$

$\Rightarrow \quad \sin^2\theta + \sin^2\theta - 2\cos^2\theta = -2\sin\theta$

$\Rightarrow \quad 2\sin^2\theta - 2\cos^2\theta = -2\sin\theta$

$\Rightarrow \quad -2\,(\cos^2\theta - \sin^2\theta) = -2\sin\theta$

$\Rightarrow \quad \cos 2\theta = \sin\theta$

$\Rightarrow \quad \cos 2\theta = \cos(90° - \theta)$

$\Rightarrow \quad 2\theta = 90° - \theta$

$\theta = \dfrac{90}{3} = 30°$

$\Rightarrow \quad \tan 3\theta = \tan 3 \times 30°$

$\tan 90° = \infty$

$= $ Infinity

139. $\sin(60° - \theta) = \cos(\psi - 30°)$

$\sin(60° - \theta) = \sin[90° - (\psi - 30°)]$

$\Rightarrow 60° - \theta = 90° - \psi + 30°$

$\Rightarrow 60° - \theta = 120° - \psi$

$\Rightarrow \quad \psi - \theta = 120° - 60°$

$\psi - \theta = 60°$

Taking tan of both the sides

$\tan(\psi - \theta) = \tan 60°$

$\tan(\psi - \theta) = \sqrt{3}$

140. $(1 + \cot\theta - \mathrm{cosec}\,\theta)(1 + \tan\theta + \sec\theta)$

$= 1 + \tan\theta + \sec\theta + \cot\theta + \cot\theta\tan\theta$
$+ \cot\theta\sec\theta - \mathrm{cosec}\,\theta - \mathrm{cosec}\,\theta\tan\theta$
$\qquad\qquad\qquad\qquad - \mathrm{cosec}\theta\sec\theta$

$= 1 + \dfrac{\sin\theta}{\cos\theta} + \sec\theta + \dfrac{\cos\theta}{\sin\theta} + 1$

$+ \dfrac{\cos\theta}{\sin\theta}\cdot\dfrac{1}{\cos\theta} - \mathrm{cosec}\theta - \dfrac{1}{\sin\theta}\cdot\dfrac{\sin\theta}{\cos\theta}$

$\qquad\qquad\qquad\qquad - \mathrm{cosec}\cdot\sec\theta$

$= 2 + \dfrac{\sin^2\theta + \cos^2\theta}{\sin\theta\cdot\cos\theta} + \sec\theta + \mathrm{cosec}\,\theta$

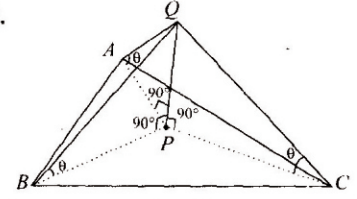$- \mathrm{cosec}\,\theta - \sec\theta - \mathrm{cosec}\,\theta\sec\theta$

$= 2 + \dfrac{1}{\sin\theta\cdot\cos\theta} - \dfrac{1}{\sin\theta\cdot\cos\theta} = 2$

141. $\tan\theta + \cot\theta = 2$

$\tan^n\theta + \cot^n\theta = 2$

$(0° < \theta < 90°, n$ is an integer$)$

142.

Let the length of the pole in park ABC
$\qquad\qquad = PQ$

$\Delta PBQ \cong \Delta PCQ \cong \Delta PAQ$

$\Rightarrow PA = PB = PC$

∴ The pole is standing at the circumcentre of the park.

143. $\dfrac{\sin\theta}{x} = \dfrac{\cos\theta}{y}$

$\Rightarrow \dfrac{\sin\theta}{\cos\theta} = \dfrac{x}{y}$

$\Rightarrow \tan\theta = \dfrac{x}{y}$
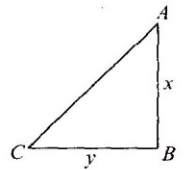
In right ∠ triangle ΔABC,

$AC = \sqrt{x^2 + y^2}$

$\sin\theta - \cos\theta = \dfrac{x}{\sqrt{x^2 + y^2}} - \dfrac{y}{\sqrt{x^2 + y^2}}$

$\sin\theta - \cos\theta = \dfrac{x - y}{\sqrt{x^2 + y^2}}$

146. Total expense on cricket and Hockey
$\qquad\qquad = ₹\,80,000$

$\Rightarrow 81 + 63 \equiv ₹\,80,000$

∴   Total expense on games

$= 80000 \times \dfrac{360}{81 + 63}$

$= 80000 \times \dfrac{360}{144} = ₹\,2,00,000$

147. Required percentage

$= \dfrac{63 - 36}{36} \times 100$

$= \dfrac{27}{36} \times 100 = 75\%$

For (149-150):

Year	Ratio	Income	Expense
*	0.25 = 1 : 4	1	4
2000	0.50 = 2 : 4	2	4
2002	0.75 = 3 : 4	3	4
2001	1.00 = 4 : 4	4	4
*	1.25 = 5 : 4	5	4
2005	1.50 = 6 : 4	6	4
2004	1.75 = 7 : 4	7	4
2003	2.00 = 8 : 4	8	4

149. Percentage decrease in income from 2001 to 2002.

$= \dfrac{4 - 3}{4} \times 100 = 25\%$

150. Clearly, in the years, 2002, 2004 and 2005 there is a decrease in income. If the income is increased in these years, the expense will also increase. Hence, there are 3 such years.

151 (b) यहा In whcih there has been (singular) का प्रयोग होगा।

152 (c) यहाँ discovered का प्रयोग होगा। ध्यान दे :

Discover = to find somebody/ something that was hidden or that you did not expect to find.

Invent = to produce or design something that has not existed before.

153 (b) यहाँ fifty acres (plural) का प्रयोग होगा।

इस वाक्य को देखे :

Each house has acres of space around it (=a lotof space)

154 (b) यहाँ by many finer का प्रयोग होगा। to be का प्रयोग उचित नहीं।

155 (b) यहाँ inferior to का प्रयोग होगा।

इस वाक्य को देखे :

Modern music is often considered inferior

to that of the past

156 (b) 157 (d) 158 (c) 159 (d) 160 (d)

161 (b) शब्द Inadvertent (Adjective) का अर्थ है : असावधान, अनभिप्रेत heedless, unintentional; by accident)

162 (a) शब्द Fortitude (Noun) का अर्थ है: साहस, धीरता, धैर्य

Courage shown by somebody who is suffering great pain : bravery : courage

163 (b) शब्द Duplicity (Noun) का अर्थ है : छल–कपट, धोखेबाजी, द्वैधता dishonest behaviour that is intended to make somebody believe something which is not true; deceit

164 (d) शब्द Fidelity(Noun) का अर्थ है:ईमानदार, निष्ठा, स्वामिभक्ति (the quality of being loyal to somebody/ something: faithfulness)

165 (b) शब्द Vanguard (Noun) का अर्थ है : अग्रसर, अग्रणी सेनामुख

(the leaders of movement : the part of an army etc. that is the front when moving forward to attack or the enemy; flag bearer.

वाक्य में प्रयोग देखे :

The company is proud to be in the vanguard of scientific progress.

166 (b) शब्द Taciturn (Adjective) का अर्थ है : अल्पभाषी, चुप्पा

(tending not to say very much; in a way that seems unfriendly)

इसका antonym talkative (वाचाल) होगा।

167 (d) शब्द Artisan(Noun) का अर्थ है: शिल्पकार, दस्तकार, शिल्पी, कारीगर

(a person who does skilled work, making things with

their hands; craftsman)

इसका antonym unskilled labour होगा।

168 (d) शब्द Amicable (Adjective) का अर्थ है : सौहार्दपूर्ण, मैत्रीपूर्ण, स्नेहशील (done or achieved in a polite or friendly way

without arguing, friendly) शब्द Hostile (Adjective) का अर्थ है : शत्रुतापूर्ण, प्रतिकूल वैरपूर्ण,

(very unfriendly or aggressive and ready to

argue or fight : opposed to)

वाक्य में प्रयोग देखे :

An amicable settlement was reached

She was openly hostile towards her parents

169 (a) शब्द Mitigate (Verb) का अर्थ है : कम करना, घटाना, मन्द करना (to make something less harmful, serious etc alleviate)

शब्द Aggravate(Verb) का अर्थ है : बदतर बना देना, गंभीर बनाना Worsen: to make an unpleasant situation worse)

वाक्य में प्रयोग देखे :

Soil erosion was mitigated by the planting of trees.

Polluation can aggravate asthama

170 (c) शब्द Aversion (Verb) का अर्थ है : घृणा, विद्वेष, विरूचि (a great feeling of disliked; hatred)

इसका antonym liking होगा।

171 (a) Idiom out of spirits का अर्थ है : sad, gloomy, depressing; without much hope of hapiness

172 (a) Idiom smell a rat का अर्थ है: to suspect that something is wrong about a situation

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173 (c)

174 (b) Idiom to keep somebody on their toes का अर्थ है :

To make sure that somebody is ready to deal with anything that might happen by doing things that they are not expecting : alert.

वाक्य में प्रयोग देखें :

Surprise visits help to keep the staff on their toes

175 (d) Phrase look into का अर्थ है :   To examine something

वाक्य में प्रयोग देखें :

A working party has been set up to look into the problem.

176 (d) 177 (c) 178 (d) 179 (c) 180 (b) 181 (d) 182 (b)

183 (a) 184 (c) 185 (a) 186 (b) 187 (b) 188 (d) 189 (a)

190 (a) 191 (b) 192 (a) 193 (a) 194 (b)

195 (c) 196 (c) 197 (a)

198 (b) Hodge-podge= HOtch –potch= number of things mixed together without any particular order or reason.

199. (d), 200. (c).

1	B	26	C	51	C	76	C	101	B	126	B	151	B	176	D
2	B	27	D	52	D	77	C	102	C	127	C	152	C	177	C
3	B	28	C	53	B	78	A	103	C	128	C	153	B	178	D
4	A	29	D	54	D	79	C	104	A	129	B	154	B	179	C
5	A	30	D	55	D	80	D	105	A	130	C	155	B	180	B
6	B	31	A	56	B	81	C	106	D	131	C	156	B	181	D
7	B	32	C	57	C	82	B	107	A	132	A	157	D	182	B
8	C	33	B	58	C	83	C	108	A	133	A	158	C	183	A
9	D	34	B	59	A	84	D	109	A	134	D	159	D	184	C
10	D	35	D	60	B	85	C	110	C	135	D	160	D	185	A
11	C	36	A	61	D	86	A	111	A	136	B	161	B	186	B
12	D	37	A	62	C	87	A	112	C	137	C	162	A	187	B
13	C	38	D	63	C	88	C	113	C	138	C	163	B	188	D
14	C	39	A	64	C	89	C	114	D	139	C	164	D	189	A
15	A	40	B	65	B	90	B	115	D	140	B	165	B	190	A
16	B	41	D	66	C	91	D	116	A	141	A	166	B	191	B
17	C	42	C	67	B	92	C	117	A	142	B	167	D	192	A
18	A	43	B	68	C	93	C	118	B	143	C	168	D	193	A
19	B	44	D	69	A	94	C	119	B	144	B	169	A	194	B
20	D	45	A	70	A	95	A	120	B	145	B	170	C	195	C
21	A	46	A	71	D	96	B	121	C	146	B	171	A	196	C
22	A	47	A	72	D	97	C	122	B	147	D	172	A	197	A
23	C	48	C	73	D	98	A	123	B	148	C	173	C	198	B
24	C	49	B	74	B	99	B	124	C	149	D	174	B	199	D
25	C	50	A	75	A	100	C	125	D	150	B	175	d	200	C