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10th Std Maths

One Marks Solution to
Book back and QR Codes given in the book
For All Chapters

Dear Students,

1. Don't think that it is just one mark only. So don't muck up the answer.
2. One mark questions are all logically based ones.
3. If you understand the logics behind the question, it will increase your thinking capacity.
4. By which you can easily solve the big questions also.
5. Sometimes this one marks may come as other 2 or even in 5 mark also.
6. Keep it in mind that a small rudder only changes the direction of the huge ship.

அன்பார்ந்த மாணவர்களே,

நுணங்கிய கேள்விய ரல்லார் வணங்கிய
வாயின ராதல் அரிது.
சிறு துரும்பும் பல்குத்த உதவும்.
கடுகு சிறுத்தாலும் காரம் குறையாது.
ஒருபானை சோற்றுக்கு ஒரு சோறே பதம்.

1. எனவே ஒருமதிப்பெண் வினாதானே என்று புரியாமல் மனனம் செய்து விடாதீர்கள்.
2. ஒரு மதிப்பெண் வினாக்கள் நுட்பம் நிறைந்தவை.
3. அதனுள் இருக்கும் நுட்பத்தை அறிந்தால் நமது சிந்தனைத்திறன் அதிகரிக்கும்.
4. அச்சிந்தனைத் திறன் மிகப்பெரிய வினாக்களையும் எளிதாக்கி விடும்.
5. சிலசமயங்களில் ஒருமதிப்பெண் வினாக்கள் பெரிய வினாக்களாக கேட்கப்படுவதும் உண்டு.
6. நமது திறமையை அதிகரிப்பதும், திறமை வெளிப்படுவதும் ஒரு மதிப்பெண் வினாக்களில் தான் .
7. பள்ளிப் படிப்பிற்குப் பின் தொழில்நுட்பம் (JEE), மருத்துவம் (NEET) போன்றவற்றை நிர்ணயிப்பது ஒரு மதிப்பெண் வினாக்களே.
8. நமது வேலைவாய்ப்பை நிர்ணயிப்பதும் ஒரு மதிப்பெண் வினாக்களே.

10th Maths Book back 1 Mark Solutions

Exercise 1.6

1. If $n(A \times B) = 6$ and A = {1, 3} then n B ( ) is : (1) 1 (2) 2 (3) 3 (4) 6

$n(A) = 2, \quad n(A) \times n(B) = n(A \times B)$; $\therefore 2 \times n(B) = 6$, $n(B) = \frac{6}{2} = 3$ (This is to be done in mind).

2. A = {a,b, p}, B = {2, 3}, C = {p,q,r,s} then $n[(A \cup C) \times B]$ is : (1) 8 (2) 20 (3) 12 (4) 16

$(A \cup C) = \{a, b, p, q, r, s\}$, $n(A \cup C) = 6$, $n(B) = 2$ (This is to be done in mind)

$n[(A \cup C) \times B] = n(A \cup C) \times n(B) = 6 \times 2 = 12$

3. If A = {1,2}, B = {1,2, 3, 4},C = {5,6} and D = {5, 6, 7, 8} then state which of the following statement is true. : (1) $(A \times C) \subset (B \times D)$ (2) $(B \times D) \subset (A \times C)$ (3) $(A \times B) \subset (A \times D)$ (4) $(D \times A) \subset (B \times A)$.

(Here we have to use our mind.) $A \subset B, \quad C \subset D \quad \therefore (A \times C) \subset (B \times D)$. (Note : This question also given as 7th question in the unit exercise. Solution is given in the unit exercise)

4. If there are 1024 relations from a set A = {1, 2, 3, 4, 5} to a set B, then the number of elements in B is : (1) 3 (2) 2 (3) 4 (4) 8. Here : $n(A) = p = 5, \quad n(B) = q$

Number relation from A to B i.e. $n[A(R)B] = 2^{pq} = 2^{5 \times q} = 1024$

Factorizing 1024 into the prime factor of 2, then $1024 = 2^{10}$, $\therefore 2^{5 \times q} = 2^{10}$

If base is equal , then it's power is also equal. $\therefore 5 \times q = 10$ so $q = \frac{10}{5} = 2$, $n(B) = 2$

5. The range of the relation R $= \{(x, x^2) \mid x \text{ is a prime number less than } 13\}$ is

(1) {2,3,5,7} (2) {2,3,5,7,11} (3) {4,9,25,49,121} (4) {1,4,9,25,49,121}

$x = \{2, 3, 5, 7, 11\} < 13 \quad x^2 = \{4, 9, 25, 49, 121\}$ (Note : 1 is neither a prime nor a composite).

6. If the ordered pairs (a +2, 4) and (5,2a +b)are equal then (a,b) is :

(1) (2, –2) (2) (5,1) (3) (2,3) (4) (3, –2) $(a, b) = (3, -2)$

$(a + 2, 4) = (5, 2a + b) \quad a + 2 = 5, \therefore a = 3, \quad 2a + b = 4, \quad 2 \times 3 + b = 4 \quad \therefore b = 4 - 6 = -2$

7. Let n(A) = m and n(B) = n then the total number of non-empty relations that can be defined from A to B is : (1) m^n (2) n^m (3) $2^{mn} - 1$ (4) 2^{mn}

As in 4th question , $n[A(R)B] = 2^{mn}$ which includes an one null relation.

$\therefore$ Non-empty relations $= 2^{mn} - 1$.

8. If {(a, 8),(6,b)} represents an identity function, then the value of a and b are respectively :

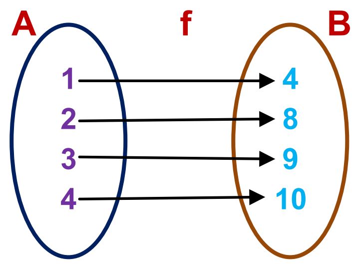
(1) (8,6) (2) (8,8) (3) (6,8) (4) (6,6) :

In an identity function images and it's preimages are the same. $\therefore a = 8, \quad b = 6$

9. Let A = {1,2, 3, 4} andB = {4, 8,9,10}. A function $f : A \to B$ given by f = {(1, 4),(2, 8),(3,9),(4,10)} is a : (1) Many-one function (2) Identity function 3) One-to-one function (4) Into function

From the Arrow diagram drawn in the rough column we can easily find out the solution. (or in mind) From the fig. it is One-to-one.

It's not only one-to-one but also bijective, since $n(A) = n(B)$



10. If $f(x) = 2x^2$ and $(x) = \frac{1}{3x}$, then $f \circ g$ is

(1) $\frac{3}{2x^2}$ (2) $\frac{2}{3x^2}$ (3) $\frac{2}{9x^2}$ (4) $\frac{1}{6x^2}$

$$f \circ g = f(g(x)) = 2\left[\frac{1}{3x}\right]^2 = 2 \times \frac{1}{9x^2} = \frac{2}{9x^2}$$

11. If $f : A \to B$ is a bijective function and if n(B) = 7 , then n(A) is equal to

(1) 7 (2) 49 (3) 1 (4) 14 For Bijective function : $n(A) = n(B)$ $\therefore$ $n(A) = 7$.

12. Let f and g be two functions given by $f = \{(0,1),(2,0),(3,-4),(4,2),(5,7)\}$

$g = \{(0,2),(1,0),(2,4),(-4,2),(7,0)\}$ then the range of $f\ o\ g$ is

(1) {0, 2, 3, 4, 5} (2) {–4, 1 ,0, 2, 7} (3) {1, 2, 3, 4, 5} (4) {0, 1, 2}

(Here put the images of g as preimages in f and find it's corresponding images.) So it's $\{0,1,2\}$

13. Let $f(x) = \sqrt{1+x^2}$ then

(1) $f(xy) = f(x).f(y)$ (2) $f(xy) \geq f(x).f(y)$ (3) $f(xy) \leq f(x).f(y)$ (4) None of these

$f(x) = \sqrt{1+x^2}$,

Putting $x = y$, $f(y) = \sqrt{1+y^2}$,

Putting $x = xy$, $f(xy) = \sqrt{1+(xy)^2} = \sqrt{1+x^2y^2}$ ---------- 1

$f(x).f(y) = \left(\sqrt{1+x^2}\right).\left(\sqrt{1+y^2}\right) = \sqrt{(1+x^2)(1+y^2)} = \sqrt{1+x^2+y^2+x^2y^2}$ ---------- 2

Comparing 1 and 2 $f(xy) \leq f(x).f(y)$

14. If $g = \{(1,1),(2,3),(3,5),(4,7)\}$ is a function given by $g(x) = \alpha x + \beta$, then the values of α *and* β are : (1) (–1,2) (2)(2, –1) (3) (–1, –2) (4) (1,2)

$g = \{(1,1),(2,3),(3,5),(4,7)\}$

$g(x) = \alpha x + \beta$

$g(1) = \alpha \times 1 + \beta = \alpha + \beta = 1$ ---------- 1

$g(2) = \alpha \times 2 + \beta = 2\alpha + \beta = 3$ ---------- 2

1 $-$ 2 $\to$ $-\alpha = -2$ *or* $\alpha = 2$ $\therefore$ *And from* 1 $\beta = -1$

15. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is

(1) linear (2) cubic (3) reciprocal (4) quadratic

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

$(x+1)^3 - (x-1)^3 = (x+1-x+1)\left[(x+1)^2 + (x+1(x-1) + (x-1)^2\right]$

$= 2\left[x^2+2x+1+x^2-1^2+x^2-2x+1\right]$

$= 2\left[3x^2+1\right]$

$= 6x^2+2$ (it's degree is 2) $\therefore$ It's a quadratic function.

10th Maths QR Code 1 Mark Solutions

Chapter-1 :

1. If $f:\mathbb{R}\to\mathbb{R}$ is defined by $(x) = x^2+2$, then the preimage 27 are :

$(1)\ 0,\ 5$ $\quad$ $(2)\ 5,\ -5$ $\quad$ $(3)\ 5,\ 0$ $\quad$ $(4)\ \sqrt{5},\ -\sqrt{5}$

$f(x) = x^2+2 = 27\ ;\quad \therefore x^2 = 27-2 = 25\ ;\quad x = \sqrt{25} = 5\ \ or -5$

2. $\left(x-\frac{1}{x}\right) = x^2+\frac{1}{x^2}$, then $f(x) =$ $\quad$ $(1)\ x^2+2$ $\quad$ $(2)\ x^2+\frac{1}{x^2}$ $\quad$ $(3)\ x^2-2$ $\quad$ $(4)\ x^2-\frac{1}{x^2}$

Let $X = \left(x-\frac{1}{x}\right);\quad X^2 = \left(x-\frac{1}{x}\right)^2 = x^2+\frac{1}{x^2}-2\times x\times\frac{1}{x} = x^2+\frac{1}{x^2}-2,\quad X^2+2 = x^2+\frac{1}{x^2}$

3. A = {a, b, c}, B = {2, 3}, C = { a, b, c, d} then $n[(A\cap C)\times B]$ is : (1) 6 $\quad$ (2) 8 $\quad$ (3) 4 $\quad$ (4) 12

$(A\cap C) = \{a,b,c\}$, $\therefore n(A\cap C) = 3,\quad n(B) = 2$ (This is to be done in mind)

$n[(A\cap C)\times B] = n(A\cap C)\times n(B) = 3\times 2 = 6$

4. If the ordered pairs (a, -1) and (5, b) belongs to $\{(x,y)|y = 2x+3\}$, then a and b are :

$(1) -13,\ 2$ $\quad$ $(2)\ 2, 13$ $\quad$ $(3)\ 2, -13$ $\quad$ $(4) -2, 13$

$f(x) = 2x+3\ ;\quad f(a) = 2a+3 = -1\quad 2a = -4\quad \therefore a = -2$

$f(x) = 2x+3\ ;\quad f(5) = 2\times 5+3 = b\quad \therefore b = 13$

5. If function $f:\mathbb{N}\to\mathbb{N}$, $f(x) = 2x$, then the function is :

(1) *Not one – one and not onto* $\quad$ (2) *one – one and onto*

(3) *Not one – one but not onto* $\quad$ (4) *one – one but not onto*

$\mathbb{N} = \{1,2,3,4,5,6,\ 7,8,9,\dots\}$

$f(x) = 2x$

$f(1) = 2\times 1 = 2$

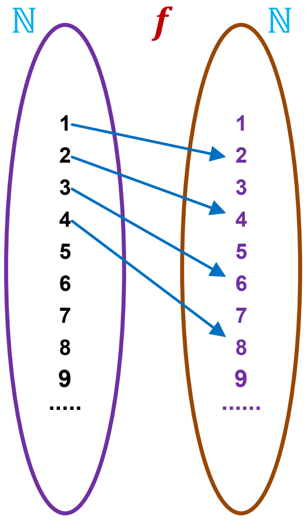
$f(2) = 2\times 2 = 4$

$f(3) = 2\times 3 = 6$

$\mathbb{N} = \{1,2,3,4,5,6,7,8,9,\dots\}$

$f(x) = 2x = \{2,4,6,8,10,\dots.\}$

∴The function is *one – one but not onto*



6. If $f(x) = x+1$ then $f(f(f(y+2)))$ is :

$(1)\ y+5$ $\quad$ $(2)\ y+7$ $\quad$ $(3)\ y+7$ $\quad$ $(4)\ y+9$

$f(x) = x+1$

$f(y+2) = (y+2)+1 = y+3$

$f(f(y+2)) = (y+3)+1 = y+4$

$f(f(f(y+2))) = (y+4)+1 = y+5$

7. If $(x) = mx+n$, where m and n are integers, $f(-2) = 7$, and $f(3) = 2$ then m and n are equal to : $(1) -1, -5$ $\quad$ $(2)\ 1,\ -9$ $\quad$ $(3) -1,\ 5$ $\quad$ $(4) 1, 9$

$f(x) = mx+n$

$f(-2) = m(-2)+n = -2m+n = 7$ ----- ①

$f(3) = m(3)+n = \quad 3m+n = 2$ ----- ②

① − ② → $-5m = 5\quad \therefore m = -1$

Putting $m = -1$ in ① $\quad n = 5$

8. The function t which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by Fahrenheit degree is 95, then the value of C $\ t(c) = \frac{9C}{5}+32$ is :

$(1)\ 37$ $\quad$ $(2)\ 39$ $\quad$ $(3)\ 35$ $\quad$ $(4)\ 36$

$t(c) = \frac{9C}{5}+32 = 95\ ;\quad \frac{9C}{5} = 95-32 = 63\ ;\ \therefore C = 63\times\frac{5}{9} = 35$

9. If $(x) = ax-2$, $g(x) = 2x-1$ and $fog = gof$, the value of a is : $(1)\ 3$ $\quad$ $(2) -3$ $\quad$ $(3)\ \frac{1}{3}$ $\quad$ $(4)\ 13$

$fog = f(g(x)) = a(2x-1) - 2 = 2ax - a - 2$ ----- ①

$gof = g(f(x)) = 2(ax-2) - 1 = 2ax - 4 - 1 = 2ax - 5$ ----- ②

Given : $fog = gof$

$\therefore$ *Equating* ① *and* ② $\rightarrow$ $2ax - a - 2 = 2ax - 5 \quad -a = -5 + 2 = -3$ (Or) $a = 3$

10. If $f(x) = \frac{1}{x}$, and $g(x) = \frac{1}{x^3}$ then $fogof(y)$, is : (1) $\frac{1}{y^8}$ (2) $\frac{1}{y^6}$ (3) $\frac{1}{y^4}$ (4) $\frac{1}{y^3}$

$f(x) = \frac{1}{x}$; $f(y) = \frac{1}{y}$; $gof(y) = \frac{1}{\frac{1}{y^3}} = y^3$; $fogof(y) = \frac{1}{y^3}$

11. If $(x) = 2 - 3x$, then $fof(1-x) =?$: (1) $5x+9$ (2) $9x-5$ (3) $5-9x$ (4) $5x-9$

$f(x) = 2 - 3x$; $f(1-x) = 2 - 3(1-x) = 2 - 3 + 3x = -1 + 3x$

$fof(1-x) = 2 - 3(-1+3x) = 2 + 3 - 9x = 5 - 9x$

12. If $f(x) + f(1-x) = 2$ then $f\left(\frac{1}{2}\right)$ is : (1) 5 (2) -1 (3) -9 (4) 1

$f\left(\frac{1}{2}\right) = \frac{1}{2} + 1 - \frac{1}{2} = 1$

13. If f is constant function of value $\frac{1}{10}$, the value of $f(1) + f(2) + \cdots + f(100)$ is :

(1) $\frac{1}{100}$ (2) 100 (3) $\frac{1}{10}$ (4) 10

$f(1) + f(2) + \cdots + f(100) = \frac{1}{10} + \frac{1}{10} + \cdots + \frac{1}{10}$ *ie* $(100 \text{ times } \frac{1}{10}) = 100 \times \frac{1}{10} = 10$

14. If $(x) = \frac{x+1}{x-2}$, $g(x) = \frac{1+2x}{x-1}$ then $fog(x)$ is :

(1) *Constant function* (2) *Quadratic function* (3) *Cubic function* (4) *Identity function*

$f(x) = \frac{x+1}{x-2}$, $g(x) = \frac{1+2x}{x-1}$

$$fog(x) = f(g(x)) = \frac{\frac{1+2x}{x-1}+1}{\frac{1+2x}{x-1}-2} = \frac{\frac{1+2x+x-1}{x-1}}{\frac{1+2x-2x+2}{x-1}} = \frac{3x}{3} = x$$

$fog(x) = x$ $\therefore$ *It is an identity function*

15. If f is an identity function, then the value of $f(1) - 2f(2) + f(3)$ is :

(1) -1 (2) -3 (3) 1 (4) 0

For example let us take an identity function $f(x) = x$ $\therefore f(1) = 1$, $f(2) = 2$, $f(3) = 3$

$f(1) - 2f(2) + f(3) = 1 - 2 \times 2 + 3 = 0$

10th Maths Book back 1 Mark Solutions

Exercise 2.10

1. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where r must satisfy.
   (1) $1 < r < b$ (2) $0 < r < b$ (3) $0 \le r < b$ (4) $0 < r \le b$
   Remainder is always 0 (zero) to one less than the divisor

2. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are : (1) 0, 1, 8 (2) 1, 4, 8 (3) 0, 1, 3 (4) 1, 3, 5
   The positive intregers are : 1, 2, 3, 4, 5, 6, ...
   It's cubes are : 1, 8, 27, 64, 125, 216, ...
   If it is divided by 9, the remainders are : 1, 8, 0, 1, 8, 0, ...

3. If the HCF of 65 and 117 is expressible in the form of 65m -117 , then the value of m is
   (1) 4 (2) 2 (3) 1 (4) 3
   Prime factorization of 65 : $65 = 5 \times 13$; Prime factorization of 117 : $117 = 3 \times 3 \times 13$
   ∴ HCF of 65, 117 = 13. So $65m - 117 = 13;$ $65m = 117 + 13$; $\therefore m = \frac{130}{65} = 2$

4. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   (1) 1 (2) 2 (3) 3 (4) 4
   (Note : Seeing this number 1729, students should come to conclude that it will not divisible by 2, 3, 5, 11 which are prime numbers. So student should try for 7, 13, 17, 19, etc.)
   ∴ By long division $1729 = 7 \times 13 \times 17$
   It's exponential form $1729 = 7^1 \times 13^1 \times 17^1$; ∴Sum of the exponents = 1+1+1 = 3

5. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
   (1) 2025 (2) 5220 (3) 5025 (4) 2520
   Student should remember that This question is already asked in Exercise 2.2 (9) (Solved)

6. $7^{4k} \equiv$ ____ $(mod\ 100)$: (1) 1 (2) 2 (3) 3 (4) 4
   $7^4 = 7^2 \times 7^2 = (50-1)(50-1) = (50-1)^2 = 50^2 - 2 \times 50 \times 1 + 1^2 = 2500 - 100 + 1 = 2401$
   If 2401 is divivided by 100, the remainder is 1, $\therefore 7^4 \equiv 1\ (mod\ 100)$
   $(7^4)^k \equiv 1^k\ (mod\ 100)$
   $7^{4k} \equiv 1\ (mod\ 100)$ $[\because 1^k = 1]$

7. Given $F1 = 1$, $F2 = 3$ and $F_{n=} F_{n-1} + F_{n-2}$, then F_5 is : (1)3 (2)5 (3)8 (4)11
   $F_n = F_{n-1} + F_{n-2}$
   $F_3 = F_{3-1} + F_{3-2} = F_2 + F_1 = 3 + 1 = 4$
   $F_4 = F_{4-1} + F_{4-2} = F_3 + F_2 = 4 + 3 = 7$
   $F_5 = F_{5-1} + F_{5-2} = F_4 + F_3 = 7 + 4 = 11$

8. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P. : (1) 4551 (2) 10091 (3) 7881 (4) 13531
   (Note : For any A.P, it's t_n is inclusive of first term. If we deduct the first term from the t_n , then remainder will be divisible of it's common difference)
   Here the 1st term = 1, Common difference = 4. So If we deduct 1 from the answers given, then the 3rd $(7881 - 1 = 7880)$ one only is divisible by 4. So it is the answer.

9. If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is : (1) 0 (2) 6 (3) 7 (4) 13

6 times of 6^{th} term of an A.P $= 6(a + 5d) = 6a + 30d$ ----- ①

7 times of 7^{th} term of an A.P $= 7(a + 6d) = 7a + 42d$ ----- ②

Given : ① and ② are equal $\rightarrow 7a + 42d = 6a + 30d$

$Bringing\ to\ oneside \rightarrow 7a + 42d - 6a + 30d = 0$

$$a + 12d = 0$$

$$t_{13} = 0 \qquad [\because t_{13} = a + 12d]$$

10. An A.P. consists of 31 terms. If its 16th term is m, then the sum of all the terms of this A.P. is :

(1) 16 m (2) 62 m (3) 31 m (4) $\frac{31}{2}m$

Here 16^{th} term is the midst term (centre) of the given AP of 31 terms and it is m

The 15^{th} term and 17^{th} terms are : $m - d,\ m + d$; It's sum = $2m$

So from either side of the 16^{th} term, we have 15 doublets of $2m$.

It's sum $= 15 \times 2m = 30m$. $\therefore$ The total sum = 15 doublets + 16^{th} term $= 30m + m = 31m$

11. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P. must be taken for their sum to be equal to 120? (1) 6 (2) (3) 8 (4) 9

$S_n = \frac{n}{2}[2a + (n-1)d]$ $\because$ $a = 1,\ d = 4$ $\therefore S_n = \frac{n}{2}[2 \times 1 + (n-1)4] = 120$

$$\frac{n}{2}[4n - 2] = \frac{n}{2} \times 2[2n - 1] = n[2n - 1] = 2n^2 - n = 120$$

$$2n^2 - n - 120 = 0$$

$$(n - 8)(n + 15) = 0$$

$n = 8\ (or)\ -15$. $\because n$ never takes negative value, $\therefore$ Number of terms = 8

12. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \cdots + 2^0$ which of the following is true?

(1) B is 2^{64} more than A (2) A and B are equal

(3) B is larger than A by 1 (4) A is larger than B by 1

$$B = 2^{64} + 2^{63} + 2^{62} + \cdots + 2^0$$

(or) $B = 2^0 + 2^1 + 2^2 + \cdots + 2^{64}$

$B = 1 + 2 + 4 + \cdots + 2^{64}$ It's a GP series. In this series $a = 1,\ r = 2,\ n = 65$

$$S_n\ of\ GP\ series\ B = \frac{a(r^n - 1)}{r - 1} = \frac{1(2^{65} - 1)}{2 - 1} = 2^{65} - 1\ ;\ A = 2^{65}$$

$[\because r > 1,\ we\ can\ use\ this\ formula]$

$\therefore$ A is larger than B by 1.

13. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$ is : (1) $\frac{1}{24}$ (2) $\frac{1}{27}$ (3) $\frac{2}{3}$ (4) $\frac{1}{81}$

The $r = \frac{t_2}{t_1} = \frac{1}{8} \times \frac{16}{3} = \frac{2}{3}$; $\frac{t_3}{t_2} = \frac{1}{12} \times \frac{8}{1} = \frac{2}{3}$; $\therefore$ It's GP. So $t_5 = t_4 \times r = \frac{1}{18} \times \frac{2}{3} = \frac{1}{27}$

14. If the sequence $t_1,\ t_2, t_3, \ldots$ are in A.P. then the sequence $t_6,\ t_{12}, t_{18}, \ldots$ is :

(1) a Geometric Progression (2) an Arithmetic Progression

(3) neither an Arithmetic Progression nor a Geometric Progression (4) a constant sequence

$t_1,\ t_2, t_3, \ldots$ are in A.P. with a common difference of $(2-1)d = (3-2)d = d$

$t_6,\ t_{12}, t_{18}, \ldots$ are also in A.P. $\because$ It's common difference is $(12 - 6)d = (18 - 12)d = 6d.$

15. The value of $(1^3 + 2^3 + 3^3 + \cdots + 15^3) - (1 + 2 + 3 + \cdots + 15)$ is :

(1) 14400 (2) 14200 (3) 14280 (4) 14520

$$(1^3 + 2^3 + 3^3 + \cdots + 15^3) - (1 + 2 + 3 + \cdots + 15) = \left[\frac{n(n+1)}{2}\right]^2 - \left[\frac{n(n+1)}{2}\right]$$

$$= \left[\frac{15(15+1)}{2}\right]^2 - \left[\frac{15(15+1)}{2}\right]$$

$$= 120^2 - 120 = 14400 - 120 = 14280$$

10th Maths QR Code 1 Mark Solutions

Chapter- 2 :

1. What is the HCF of the least prime and the least composite number?

   (1) 1 (2) 2 (3) 3 (4) 4

   Least prime = 2 ; Least composite number = 4 ; 2 is the HCF of 2, 4 $\because$ 2 is the factor of 2 and 4.

2. If a and b are the two positive integers when $a > b$ and b is a factor of a then HCF (a, b) is :

   (1) b (2) a (3) ab (4) $\frac{a}{b}$ b is the HCF of a, b ; $\because$ b *is the factor of both* a *and* b.

3. If m and n are co-prime numbers then m^2 *and* n^2 are :

   (1) *Co − prime* (2) *Not co − prime* (3) *Even* (4) *Odd*

   The numbers which have 1 as a HCF are called co-prime.

   For example let us take two co-primes 3, 5 having 1 as a HCF. Then it's 3^2, 5^2 i.e. 9, 25 also have 1 as a HCF. $\therefore$ The squares of the co-primes are also *co − prime*.

4. If 3 is the least prime factor of number a and 7 is least prime factor of b, then the least prime factor of $a+b$ is : (1) $a+b$ (2) 2 (3) 5 (4) 10

   The product of any prime numbers (excluding 2) is always an odd number. $\therefore$The addition of two such products is an even number. $\therefore$ It's least prime factor is 2

5. The difference between the remainders when 60002 and 601 are divided by 6 is :

   (1) 2 (2) 1 (3) 0 (4) 3

   If 60002 and 601 are divided by 6 , the remainders are 2, 1. $\therefore$Their difference is $= 2 - 1 = 1$

6. $44 \equiv 8 \ (mod\ 12)$, $113 \equiv 5 \ (mod\ 12)$, thus $44 \times 113 \equiv$ ____ $(mod\ 12)$:

   (1) 4 (2) 3 (3) 2 (4) 1

   $44 \equiv 8 \ (mod\ 12)$; $113 \equiv 5 \ (mod\ 12)$; $\therefore 44 \times 113 \equiv 8 \times 5 \ (mod\ 12)$

   $44 \times 113 \equiv 40 \ (mod\ 12)$

   $44 \times 113 \equiv 4 \ (mod\ 12)$ $[\because 40 \equiv 4 \ (mod\ 12)]$

7. Given $a_1 = -1$, $a = \frac{a_{n-1}}{n+2}$, then a_4 is : (1) $-\frac{1}{20}$ (2) $-\frac{1}{4}$ (3) $-\frac{1}{840}$ (4) $-\frac{1}{120}$

   $a_1 = -1$; $a_n = \frac{a_{n-1}}{n+2}$; $a_2 = \frac{a_{2-1}}{2+2} = \frac{a_1}{4} = \frac{-1}{4}$

   $$a_3 = \frac{a_{3-1}}{3+2} = \frac{a_2}{5} = \frac{\frac{-1}{4}}{5} = \frac{-1}{20}$$

   $$a_4 = \frac{a_{4-1}}{4+2} = \frac{a_3}{6} = \frac{\frac{-1}{20}}{6} = \frac{-1}{120}$$

8. The first term of an A.P. whose 8th and 12th terms are 39 and 59 respectively is :

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

   $t_{12} - t_8 = (12 - 8)d = 59 - 39$; $4d = 20$; $d = 5$; $t_8 = a + 7d = a + 7 \times 5 = 39$; $\therefore a = 4$

9. In the arithmetic series $S_n = k + 2k + 3k + \cdots + 100$, k is positive integer and k is a factor 100 then S_n is : (1)$1000\frac{10}{k}$ (2)$5000\frac{50}{k}$ (3) $\frac{1000}{k} + 10$ (4) $\frac{5000}{k} + 50$

   In this series $a = k$; $d = k$; $l = 100$ $\therefore n = \frac{l-a}{d} + 1 = \frac{100-k}{k} + 1 = \frac{100-k+k}{k} = \frac{100}{k}$

   $S_n\ of\ AP = \frac{n}{2}[a + l] = \frac{100}{2k}[k + 100] = \frac{50}{k}[k + 100] = 50 + \frac{5000}{k}$

10. How many terms are there in the G.P: 5, 20, 80, 320, ...,20480 : (1) 5 (2) 6 (3) 7 (4) 9

    In this G.P $a = 5$, $r = 4$; $t_n = ar^{n-1}$; $5 \times 4^{n-1} = 20480$;

    $4^{n-1} = \frac{20480}{5} = 4096$ $[4096 = 4^6]$

    $4^{n-1} = 4^6$; $\therefore n - 1 = 6$; $n = 7$.

11. If p^{th}, q^{th} *and* r^{th} terms of an A.P. are a, b, c respectively, then

$a(q-r)+b(r-p)+c(p-q)$ is : (1) 0 (2) $a+b+c$ (3) $p+q+r$ (4) pqr

It is similar to the Exemplar problem 2.28 (Page 60) by changing the alphabets only. Ans : 0

12. Sum of infinite terms of a G.P is 12 and the first term is 8. What is the fourth term of the G.P?

(1) $\frac{8}{27}$ (2) $\frac{4}{27}$ (3) $\frac{8}{20}$ (4) $\frac{1}{3}$

Sum of infinity terms $S_n = \frac{a}{1-r} = \frac{8}{1-r} = 12$; $\therefore 8 = 12 - 12r$; $\therefore r = \frac{12-8}{12} = \frac{4}{12} = \frac{1}{3}$

In G.P $t_n = ar^{n-1}$; $t_4 = ar^{4-1} = ar^3 = 8 \times \left[\frac{1}{3}\right]^3 = \frac{8}{27}$

13. A square is drawn by joining the mid points of the sides of a given square in the same way and this process continues indefinitely. If the side of the first square is 4 cm, then the sum of the areas of all the squares is : (1) $8\ cm^2$ (2) $16\ cm^2$ (3) $32\ cm^2$ (4) $64\ cm^2$

Area of the 1st square $= 4^2 = 16\ cm^2$; 2nd square $= \frac{16}{2} = 8\ cm^2$; 3rd square $= \frac{8}{2} = 4\ cm^2$

The area of the squares make a GP series with $a = 16$ and $r = \frac{1}{2} < 1$

Sum of the infinity series $S_n = \frac{a}{1-r} = \frac{16}{1-\frac{1}{2}} = \frac{16}{\frac{1}{2}} = 16 \times 2 = 32\ cm^2$

14. A boy saves ₹1 on the first day ₹ 2 on the second day, ₹ 4 on the third day and so on. How much did the boy will save up to 20 days? : (1) $2^{19}+1$ (2) $2^{19}-1$ (3) $2^{20}-1$ (4) $2^{21}-1$

$S_n = 1+2+4+\cdots$ *for 20 days*. It is a GP series with $a = 1$, $r = 2$, $n = 20$

$S_n = \frac{a(r^n-1)}{r-1}$; $S_{20} = \frac{1(2^{20}-1)}{2-1} = 2^{20}-1$

15. The sum of first n terms of the series $a, 3a, 5a, \ldots$ is : (1) na (2) $(2n-1)a$ (3) n^2a (4) n^2a^2

Given series : $a, 3a, 5a, \ldots$ Here 1st term = a, Common difference = 2a, ∴ It's an A.P

S_n *of AP* $= \frac{n}{2}[2a+(n-1)d]$; $\therefore S_n = \frac{n}{2}[2a+(n-1)2a] = \frac{n}{2}[2a+2na-2a]$

$= \frac{n}{2}[2na] = n^2a$

16. If p, q, r, x, y, z are in A.P, then $5p+3,\ 5q+3,\ 5r+3,\ 5x+3,\ 5y+3,\ 5z+3$ form

(1) a G.P (2) an A.P (3) a constant sequence (4) neither an A.P nor a G.P

(Note : If an AP is added, subtracted, multiplied and divided by any constant, then the resultant also an AP. But in GP, only Multiplication and Division are possible to get the resultant as GP.)

For example an AP : $2, 4, 6, 8, 10, 12$, If it is multiplied each by 5 and added with 3,

Then the resuntant : $13, 23, 33, 43, 53, 63$. It's also an AP with $d = 10$

17. In an A. P if the p^{th} term is q and the q^{th} term is p , then its n^{th} term is

(1) $p+q-n$ (2) $p+q+n$ (3) $p-q+n$ (4) $p-q-n$

Let a, d be the 1st term and common difference of an AP. Then

$t_p = a+(p-1)d = q$ ----- ① $t_q = a+(q-1)d = p$ ----- ②

① − ② → $(p-1)d-(q-1)d = q-p$

or $(p-q)d = q-p$ $\therefore d = \frac{q-p}{p-q} = \frac{-1(p-q)}{p-q} = -1$

Placing $d = -1$ *in* ① → $a+(p-1)(-1) = q$; $a-p+1 = q$; $a = p+q-1$

$t_n = a+(n-1)d = (p+q-1)+(n-1)(-1) = p+q-n$

18. Sum of first n terms of the series $\sqrt{2}+\sqrt{8}+\sqrt{18}+\cdots$ is : (1) $\frac{n(n+1)}{2}$ (2) $\sqrt{n}$ (3) $\frac{n(n+1)}{\sqrt{2}}$ (4) 1

Given series $= \sqrt{2}+\sqrt{8}+\sqrt{18}+\ \ldots$; By rewriting $= \sqrt{2}+\sqrt{4\times 2}+\sqrt{9\times 2}+\ \ldots$

$= \sqrt{2}+2\sqrt{2}+3\sqrt{2}+\ \ldots$

$= \sqrt{2}(1+2+3+\cdots)$

$= \sqrt{2}\times\left(\frac{n(n+1)}{2}\right) = \sqrt{2}\times\frac{n(n+1)}{\sqrt{2}\times\sqrt{2}} = \frac{n(n+1)}{\sqrt{2}}$

Exercise 3.19

1. A system of three linear equations in three variables is inconsistent if their planes :
(1) intersect only at a point (2) intersect in a line (3) coincides with each other
(4) do not intersect

2. The solution of the system $x + y - 3z$ (No x) $= -6$, $-7y + 7z = 7$, $3z = 9$ is :
$(1) x = 1,\ y = 2,\ z = 3$ $(2) x = -1,\ y = 2,\ z = 3$ $(3) x = -1,\ y = -2, z = 3$ $(4) x = 1, y = 2, z = 3$
From 3rd eqn. $z = \frac{9}{3} = 3$
Placing $z = 3$ in the 2nd eqn. $-7y + 7 \times 3 = 7$; $-7y = 7 - 21$; $y = \frac{-14}{-7} = 2$
Placing $y = 2 , z = 3$ in the 1st eqn. $x + 2 - 3 \times 3 = -6$; $x = -6 + 9 - 2$; $x = 1$

3. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is :
(1) 3 (2) 5 (3) 6 (4) 8
$\because (x - 6)$ is the HCF of both, place $x = 6$ in the 2nd eqn. Then $6^2 - k \times 6 - 6 = 0$ $\therefore k = \frac{-30}{-6} = 5$

4. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is : $(1)\ \frac{9y}{7}$ $(2)\ \frac{9y^2}{(21y-21)}$ $(3)\ \frac{21y^2-42y-21}{3y^3}$ $(4)\ \frac{7(y^2-2y-2)}{y^2}$
$\frac{3y-3}{y} \div \frac{7y-7}{3y^2} = \frac{3y-3}{y} \times \frac{3y^2}{7y-7} \rightarrow \frac{3(y-1)}{y} \times \frac{3y^2}{7(y-1)} = \frac{9y}{7}$

5. $y^2 + \frac{1}{y^2}$ is not equal to : $(1)\ \frac{y^4+1}{y^2}$ $(2)\ \left[y + \frac{1}{y}\right]^2$ $(3)\ \left[y - \frac{1}{y}\right]^2 + 2$ $(4)\ \left[y + \frac{1}{y}\right]^2 - 2$

1. Adding by taking LCM : $y^2 + \frac{1}{y^2} = \frac{y^4+1}{y^2}$ (So it is equal)

2.(from answer) : $\left[y + \frac{1}{y}\right]^2 = y^2 + \frac{1}{y^2} + 2 \times y \times \frac{1}{y} = y^2 + \frac{1}{y^2} + 2 \neq y^2 + \frac{1}{y^2}$ (So it is not equal)

3.(from answer) : $\left[y - \frac{1}{y}\right]^2 + 2 = y^2 + \frac{1}{y^2} - 2 + 2 = y^2 + \frac{1}{y^2}$ (So it is equal)

4.(from answer) : $\left[y + \frac{1}{y}\right]^2 - 2 = y^2 + \frac{1}{y^2} + 2 - 2 = y^2 + \frac{1}{y^2}$ (So it is equal)

(Hint : If we know the $a^2 + b^2 = (a + b)^2 - 2ab$ (Or) $a^2 + b^2 = (a - b)^2 + 2ab$, it is very easy.)

6. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ gives : $(1)\ \frac{x^2-7x+40}{(x-5)(x+5)}$ $(2)\ \frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$ $(3)\ \frac{x^2-7x+40}{(x^{25}-25)(x+1)}$ $(4)\ \frac{x^2+10}{(x^{25}-25)(x+1)}$

$$\frac{x}{x^2-25} - \frac{8}{x^2+6x+5} = \frac{x}{(x+5)(x-5)} - \frac{8}{(x+5)(x+1)} = \frac{x(x+1)-8(x-5)}{(x+5)(x-5)(x+1)} = \frac{x^2+x-8x+40}{(x+5)(x-5)(x+1)} = \frac{x^2-7x+40}{(x^2-25)(x+1)}$$

7. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to : $(1)\ \frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ $(2)\ \frac{16}{5}\left|\frac{y^2}{x^2z^4}\right|$ $(3)\ \frac{16}{5}\left|\frac{y}{xz^2}\right|$ $(4)\ \frac{16}{5}\left|\frac{xz^2}{y}\right|$

$$\sqrt{\frac{256x^8y^4z^{10}}{25x^6y^6z^6}} = \sqrt{\frac{16^2 \times x^8 \times y^4 \times z^{10}}{5^2 \times x^6 \times y^6 \times z^6}} = \sqrt{\frac{16^2 \times x^2 \times z^4}{5^2 \times y^2}} = \frac{16}{5}\left|\frac{xz^2}{y}\right|$$

8. Which of the following should be added to make $x^4 + 64$ a perfect square
$(1) 4x^2$ $(2) 16x^2$ $(3) 8x^2$ $(4)\ -8x^2$
$x^4 + 64 = (x^2)^2 + 8^2 = (x^2 + 8)^2 - 2 \times x^2 \times 8$ $[\because a^2 + b^2 = (a + b)^2 - 2ab]$
$= (x^2 + 8)^2 - 16x^2$
$\therefore$ If we add $16x^2$ to it ,then it will become a perfect square.

9. The solution of $(2x - 1)^2 = 9$ is equal to : (1) -1 (2) 2 (3) –1, 2 (4) None of these
$\sqrt{(2x - 1)^2} = \sqrt{9}$; $2x - 1 = \pm 3$; $\therefore x = \frac{3+1}{2} = 2$ or $x = \frac{-3+1}{2} = -1$

10. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are

(1) 100,120 (2) 10,12 (3) -120 ,100 (4) 12,10

Hint : For perfect square, the last term b should be a perfect square number. Here a represent the first and b represent second in the answer. So the second in 3rd answer (-120, 100) only a perfect square. So this is the answer.

11. If the roots of the equation $q^2x^2 + p^2x + r^2 = 0$ are the squares of the roots of the equation $qx^2 + px + r = 0$, then q, p, r are in __ : (1) A.P (2) G.P (3) Both A.P and G.P (4) none of these

12. Graph of a linear polynomial is a : (1) straight line (2) circle (3) parabola (4) hyperbola

13. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is : (1) 0 (2) 1 (3) 0 or 1 (4) 2

$x^2 + 4x + 4 = 0$; Hint : $b^2 - 4ac = 0$; ∴ It touches the X axis at one point. (Equal real roots)

If $b^2 - 4ac > 0$; ∴ It intersects the X axis at two point. (Unequal real roots)

If $b^2 - 4ac < 0$; ∴ It never touches or intersects the X axis. (No real roots)

14. For the given matrix $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$ the order of the matrix A^T is

$(1) 2 \times 3$ $(2) 3 \times 2$ $(3)\ 3 \times 4$ $(4)\ 4 \times 3$ (Hint : Order of $A = 3 \times 4$; ∴ Order of $A^T = 4 \times 3$)

15. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have

(1) 3 (2) 4 (3) 2 (4) 5 (Hint : $A_{2\times3} \times B_{3\times4} = AB_{2\times4}$)

16. If number of columns and rows are not equal in a matrix then it is said to be a :

(1) diagonal matrix (2) rectangular matrix (3) square matrix (4) identity matrix

17. Transpose of a column matrix is

(1) unit matrix (2) diagonal matrix (3) column matrix (4) row matrix

18. Find the matrix X if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$

(1) $\begin{bmatrix} -2 & -2 \\ 2 & -1 \end{bmatrix}$ (2) $\begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$ (4) $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$ Hint : $X = \begin{bmatrix} \frac{5-1}{2} & \frac{7-3}{2} \\ \frac{9-5}{2} & \frac{5-7}{2} \end{bmatrix} = \begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$

19. Which of the following can be calculated from the given matrices

$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ $(i)\ A^2$ $(ii)\ B^2$ $(iii)\ AB$ $(iv)\ BA$

(1) (i) and (ii) only (2) (ii) and (iii) only (3) (ii) and (iv) only (4) all of these

Hint : Order of $A = 3 \times 2$, $B = 3 \times 3$; ∴ A^2, AB *are not possible* ; *but* B^2 , BA *are possible.*

20. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 \\ 2 & -1 \\ 0 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 1 \\ -2 & 5 \end{bmatrix}$. Which of the following statements are correct?

$(i)\ AB + C = \begin{bmatrix} 5 & 5 \\ 5 & 5 \end{bmatrix}$ $(ii)\ BC = \begin{bmatrix} 0 & 1 \\ 2 & -3 \\ -4 & 10 \end{bmatrix}$ $(iii) BA + C = \begin{bmatrix} 2 & 5 \\ 3 & 0 \end{bmatrix}$ $(iv) (AB)C = \begin{bmatrix} -8 & 20 \\ -8 & 13 \end{bmatrix}$

$(1) (i)$ *and* (ii) *only* $(2) (ii)$ *and* (iii) *only* $(3) (iii)$ *and* (iv) *only* (4) *all of these*

Hint : Don't do any calculations. Just find the order of matrices. From this orders find whether the resultant's orders are possible or not. Here the orders of $A = 3 \times 2$, $B = 3 \times 2$, $C = 2 \times 2$ As per the orders, the calculations are possible and the Resultants orders also same in all except (iii) . ∵In (iii) the order of $BA = 3 \times 3$. It can't added with $= 2 \times 2$. Hence the answers having (iii) i.e. (2), (3) and (4) are not possible. ∴ The answer is (1)

10th Maths QR Code 1 Mark Solutions

Chapter- 3 :

1. Which of the following are linear equation in three variables

(i) $2x = z$ (ii) $2\sin x + y\cos y + z\tan z = 2$ (iii) $x + 2y^2 + z = 3$ (iv) $x - y - z = 7$

(1) (i) and (iii) only (2) (i) and (iv) only (3) (iv) only (4) All

2. Graphically an infinite number of solutions represents

(1) three planes with no point in common (2) three planes intersecting at a single point

(3) three planes intersecting in a line or coinciding with one another (4) None

3. Which of the following is correct

(i) Every polynomial has finite number of multiples

(ii) LCM of two polynomials of degree 2 may be a constant

(iii) HCF of 2 polynomials may be a constant

(iv) Degree of HCF of two polynomials is always less then degree of LCM.

(1) (i) and (ii) (2) (iii) and (iv) (3) (iii) only (4) (iv) only

4. The HCF of two polynomials $p(x)$ and $q(x)$ is $2x(x+2)$ and LCM is $24x(x+2)^2(x-2)$.

If $p(x) = 8x^3 + 32x^2 + 32x$, then $q(x)$:

(1) $4x^3 - 16x$ (2) $6x^3 - 24x$ (3) $12x^3 + 24x$ (4) $12x^3 - 24x$

$p(x) \times q(x) = HCF \times LCM$ $\therefore q(x) = \frac{HCF \times LCM}{p(x)} = \frac{2x(x+2)\times 24x(x+2)^2(x-2)}{8x^3+32x^2+32x} = \frac{2x(x+2)\times 24x(x+2)^2(x-2)}{8x(x^2+4x+4)}$

$= \frac{2x(x+2)\times 24x(x+2)^2(x-2)}{8x(x^2+4x+4)} = \frac{2x(x+2)\times \cancel{24x}^{3}\cancel{(x+2)^2}(x-2)}{\cancel{8x}\cancel{(x+2)^2}}$

$= 6x(x+2)(x-2) = 6x(x^2 - 2^2) = 6x^3 - 24x$

5. Consider the following statements:

(i) The HCF of $x + y$ and $x^8 - y^8$ is $x + y$ (ii) The HCF of $x + y$ and $x^8 + y^8$ is $x + y$

(iii) The HCF of $x - y$ and $x^8 + y^8$ is $x - y$ (iv) The HCF of $x - y$ and $x^8 - y^8$ is $x - y$

(1) (i) and (ii) (2) (ii) and (iii) (3) (i) and (iv) (4) (ii) and (iv)

$\because$ We can't factorize $x^8 + y^8$, $\therefore$ (ii) and (iii) are not possible.

$x^8 - y^8 = (x^4)^2 - (y^4)^2 = (x^4 + y^4)(x^4 - y^4) = (x^4 + y^4)\left[(x^2)^2 - (y^2)^2\right]$

$= (x^4 + y^4)[(x^2 + y^2)(x^2 - y^2)]$

$= (x^4 + y^4)(x^2 + y^2)(x + y)(x - y)$

6. For what set of values $\frac{x^2+5x+6}{x^2+8x+15}$ is undefined

(1) $-3, -5$ (2) -5 (3) $-2, -3, -5$ (4) $-2, -3$

$\frac{x^2+5x+6}{x^2+8x+15} = \frac{(x+2)(x+3)}{(x+3)(x+5)} = \frac{x+2}{x+5}$ $\therefore$According to the denominator, $x = -5$ is undefined.

7. $\frac{x^2+7x+12}{x^2+8x+15} \times \frac{x^2+5x}{x^2+6x+8} =$ ______ : (1) $x + 2$ (2) $\frac{x}{x+2}$ (3) $\frac{35x^2+60x}{48x^2+120}$ (4) $\frac{1}{x+2}$

$\frac{x^2+7x+12}{x^2+8x+15} \times \frac{x^2+5x}{x^2+6x+8} = \frac{(x+4)(x+3)}{(x+5)(x+3)} \times \frac{x(x+5))}{(x+4)(x+2)} = \frac{x}{x+2}$ (Well known of factorization is very essential)

8. If $\frac{p}{q} = a$ then $\frac{p^2+q^2}{p^2-q^2}$ is : (1) $\frac{a^2+1}{a^2-1}$ (2) $\frac{1+a^2}{1-a^2}$ (3) $\frac{1-a^2}{1+a^2}$ (4) $\frac{a^2-1}{a^2+1}$

$\frac{p}{q} = a$; $\frac{p}{q} = \frac{a}{1}$; Squaring both sides $\frac{p^2}{q^2} = \frac{a^2}{1^2}$; $\frac{p^2}{q^2} + 1 = \frac{a^2}{1^2} + 1$; $\frac{p^2+q^2}{q^2} = \frac{a^2+1^2}{1^2}$ ----- 1

$\frac{p^2}{q^2} - 1 = \frac{a^2}{1^2} - 1$; $\frac{p^2-q^2}{q^2} = \frac{a^2-1^2}{1^2}$ ----- 2 $\therefore$ 1 $\div$ 2 $\rightarrow \frac{p^2+q^2}{p^2-q^2} = \frac{a^2+1}{a^2-1}$

9. The square root of $4m^2-24m+36$ is : (1) $4(m-3)$ (2) $2(m-3)$ (3) $(2m-3)^2$ (4) $(m-3)$

$\sqrt{4m^2-24m+36}=\sqrt{4(m^2-3m+9)}=\sqrt{4(m-3)^2}=2(m-3)$

10. The real roots of the quadratic equation x^2-x-1 are

(1) $1,1$ (2) $-1,1$ (3) $\frac{1+\sqrt{5}}{2}, \frac{1-\sqrt{5}}{2}$ (4) $None$

x^2-x-1 : Here $a=1,\ b=-1,\ c=-1$

Sq.root $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-(-1)\pm\sqrt{(-1)^2-4\times1(-1)}}{2\times1}=\frac{1\pm\sqrt{5}}{2}$ (or) $\frac{1+\sqrt{5}}{2}$, $\frac{1-\sqrt{5}}{2}$

11. The product of the sum and product of roots of equation

$(a^2-b^2)x^2-(a+b)^2x+(a^3-b^3)=0$ is : (1) $\frac{a^2+ab+b^2}{a-b}$ (2) $\frac{a-b}{a+b}$ (3) $\frac{a-b}{a+b}$ (4) $\frac{a-b}{a^2+ab+b^2}$

Here $a=(a^2-b^2),\ b=-(a+b)^2,\ c=(a^2-b^2)$

$\alpha+\beta=\frac{-b}{a}=\frac{(a+b)^2}{(a^2-b^2)}=\frac{(a+b)(a+b)}{(a+b)(a-b)}=\frac{(a+b)}{(a-b)}$; $\alpha\times\beta=\frac{c}{a}=\frac{(a^3-b^3)}{(a^2-b^2)}=\frac{(a-b)(a^2+ab+b^2)}{(a+b)(a-b)}=\frac{(a^2+ab+b^2)}{(a+b)}$

$(\alpha+\beta)(\alpha\times\beta)=\frac{(a+b)}{(a-b)}\times\frac{(a^2+ab+b^2)}{(a+b)}=\frac{(a^2+ab+b^2)}{(a-b)}$

12. A quadratic polynomial whose one zero is 5 and sum of the zeroes is 0 is given by

(1) x^2-25 (2) x^2-5 (3) x^2-5x (4) x^2-5x+5

$\because x^2-25=(x+5)(x-5)$ $\therefore$ It has the roots of $5,-5$; Sum of roots $=5+(-5)=0$

13. Axis of symmetry in the term of vertical line separates parabola into :

(1) 3 equal halves (2) 5 equal halves (3) 2 equal halves (4) 4 equal halves

14. The parabola $y=-3x^2$ is : (Hint :Here y is always negative for all values of x)

(1) Open upward (2) Open downward (3) Open rightward (4) Open leftward

15. Choose the correct answer

(i) Every scalar matrix is an identity matrix (ii) Every identity matrix is a scalar matrix

(iii) Every diagonal matrix is an identity matrix (iv) Every null matrix is a scalar matrix

(1) (i) and (iii) only (2) (iii) only (3) (iv) only (4) (ii) and (iv) only

16. If $2A+3B=\begin{bmatrix}2&-1&4\\3&2&5\end{bmatrix}$ and $A+2B=\begin{bmatrix}5&0&3\\1&6&2\end{bmatrix}$ then $B=$ [Hint : $B=2(A+2B)-(2A+3B)$]

(1) $\begin{bmatrix}8&-1&-2\\-1&10&-1\end{bmatrix}$ (2) $\begin{bmatrix}8&-1&2\\-1&10&-1\end{bmatrix}$ (3) $\begin{bmatrix}8&1&2\\1&10&1\end{bmatrix}$ (4) $\begin{bmatrix}8&1&2\\-1&10&-1\end{bmatrix}$

17. If $\begin{bmatrix}4&3&2\end{bmatrix}\begin{bmatrix}1\\-2\\x\end{bmatrix}=[6]$, then x is : (1) 4 (2) 3 (3) 2 (4) 1

$[4\times1+3\times(-2)+2x]=6$; $4-6+2x=6$; $2x=6+6-4=8$ $x=4$

18. If $A=\begin{bmatrix}y&0\\3&4\end{bmatrix}$ and $I=\begin{bmatrix}1&0\\0&1\end{bmatrix}$ then $A^2=16I$ for : (1) $y=4$ (2) $y=5$ (3) $y=-4$ (4) $y=16$

$a_{1\times1}$ of $A^2=y^2$; $a_{1\times1}$ of $16I=16$; $y^2=16$; $y=\sqrt{16}=4$

19. If P and Q are matrices, then which of the following is true?

(1) $PQ\neq QP$ (2) $(P^T)^T\neq P$ (3) $P+Q\neq Q+P$ (4) All are true

20. If $A=\begin{bmatrix}1&2\\3&4\\5&6\end{bmatrix}_{3\times2}$ $B=\begin{bmatrix}1&2&3\\4&5&6\end{bmatrix}_{2\times3}$ then which of the following products can be made from these matrices (i) A^2 (ii) B^2 (iii) AB (iv) BA

(1) (i) only (2) (ii) and (iii) only (3) (iii) and (iv) only (4) All the above

According to the orders (i) and (ii) can't be performed. But (iii) and (iv) can be performed.

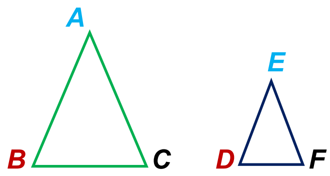
10th Maths Book back 1 Mark Solutions

Exercise 4.5

1. If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when

(1) $\angle B = \angle E$ (2) $\angle A = \angle D$ (3) $\angle B = \angle D$ (4) $\angle A = \angle F$

Hint : Compare the corresponding ratios and it's sides and then find



2. In ΔLMN, $\angle L = 60°$, $\angle M = 50°$. If $\Delta LMN \sim \Delta PQR$ then the value of $\angle R$ is

(1)$40°$ (2)$70°$ (3)$30°$ (4) $110°$ (Hint : Compare the corresponding letters of the triangles)

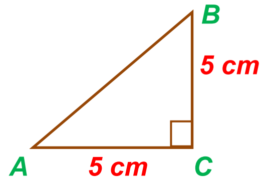
$In\ \Delta LMN,\ \angle N = 180° - (60° + 50°) = 70°$ $\because \Delta LMN \sim \Delta PQR,\ \angle N = \angle R = 70°$

3. If ΔABC is an isosceles triangle with $C = 90°$ and $AC = 5\ cm$, then AB is

(1) $2.5\ cm$ (2) $5\ cm$ (3) $10\ cm$ (4) $5\sqrt{2}\ cm$

$\because C = 90°$ and isosceles, the ΔABC is Right triangle. $AC = BC = 5\ cm$

$\therefore AB$ is the hypotenuse. $AB = \sqrt{5^2 + 5^2} = \sqrt{25 + 25} = \sqrt{2 \times 25} = 5\sqrt{2}$

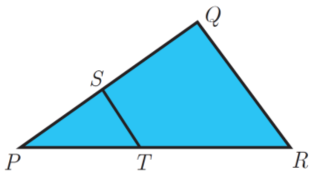


4. In a given figure $ST \parallel QR$, $PS = 2\ cm$ and $SQ = 3\ cm$. Then the ratio of the area of ΔPQR to the area of ΔPST is (1) $25 : 4$ (2) $25 : 7$ (3) $25 : 11$ (4) $25 : 13$

From the fig. $PQ = 2 + 3 = 5\ cm$, $PS = 2\ cm$

$Area's\ ratios = Squares\ of\ it's\ sides\ ratio$

$Area's\ ratios\ \Delta PQR : \Delta PST = 5^2 : 2^2 = 25 : 4$



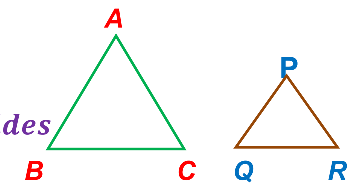
5. The perimeters of two similar triangles ΔABC and ΔPQR are $36\ cm$ and $24\ cm$ respectively. If $PQ = 10\ cm$, then the length of AB is :

(1) $6\frac{2}{3}\ cm$ (2) $\frac{10\sqrt{6}}{3}\ cm$ (3) $66\frac{2}{3}\ cm$ (4) $15\ cm$

In similar triangles $Ratios\ perimeter = Ratios\ of\ it's\ corresponding\ sides$

$\Delta ABC\ Perimeter : \Delta ABC\ Perimeter = AB : PQ$

$36 : 24 = AB : 10$ $AB = \frac{36 \times 10}{24} = 15\ cm$



6. If in ΔABC , $DE \parallel BC$, $AB = 3.6\ cm$, $AC = 2.4\ cm$ and $AD = 2.1\ cm$ then the length of AE is

(1) $1.4\ cm$ (2) $1.8\ cm$ (3) $1.2\ cm$ (4) $1.05\ cm$

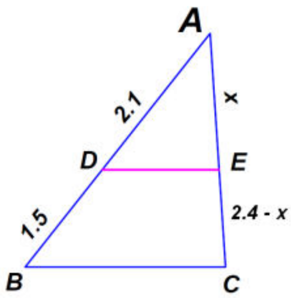
$\Delta ABC,\ AB = 3.6\ cm;\ AD = 2.1\ cm;\ DB = 3.6 - 2.1 = 1.5cm;$

$AC = 2.4\ cm;\ Let\ AE = x\ cm;\ EC = 2.4 - x$

According to the Thales's Theorem ; $\frac{AD}{DB} = \frac{AE}{EC}$; $\frac{2.1}{1.5} = \frac{x}{2.4 - x}$;

$1.5x = 2.1 \times 2.4 - 2.1x$

$1.5x + 2.1x = 2.1 \times 2.4$; $x = \frac{2.1 \times 2.4}{3.6} = 1.4\ cm$



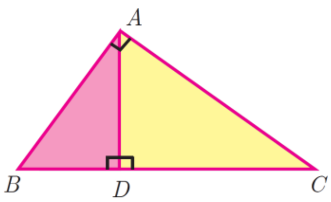
7. In a ΔABC , AD is the bisector of ΔBAC . $If\ AB = 8\ cm,\ BD = 6\ cm\ and\ DC = 3\ cm$. The length of the side AC is (1) 6 cm (2) 4 cm (3) 3 cm (4) 8 cm

Hints : According to Bisector Theorem $\frac{BD}{DC} = \frac{AB}{AC}$; $\frac{6}{3} = \frac{8}{AC}$; $AC = \frac{8 \times 3}{6} = 4\ cm$

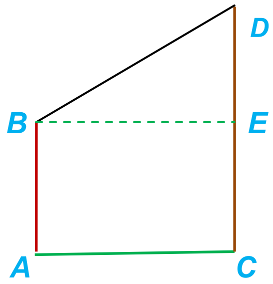
8. In the adjacent figure $\angle BAC = 90°$ and $AD \perp BC$ then

(1)$BD.CD = BC^2$ (2)$AB.AC = BC^2$ (3)$BD.CD = AD^2$ (4)$AB.AC = AD^2$

Due AA similarity, $\Delta BDA \sim \Delta ADC$. $\frac{BD}{AD} = \frac{AD}{CD}$; $\therefore BD.CD = AD^2$



9. Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?



$(1) 13\ m$ $(2) 14\ m$ $(3)\ 15\ m$ $(4)\ 12.8\ m$ $AB\ and\ CD$ are the poles.

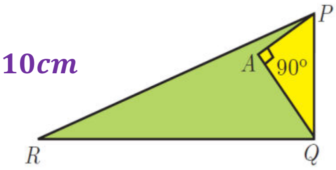
$AB = 6\ m,\ CD = 11\ m,\ ED = 11 - 6 = 5m,\ AC = BE = 12\ m$

$\Delta\ BED\ is\ right\ triangle,\ BD\ is\ the\ hypotenuse$

$BD = \sqrt{12^2 + 5^2} = \sqrt{144 + 25} = \sqrt{169} = 13\ m$

10. In the given figure, $PR = 26\ cm,\ QR = 24\ cm,\ PAQ = 90°, PA = 6\ cm\ and\ QA = 8\ cm.$

Find $\angle PQR$ (1) 80° (2) 85° (3) 75° (4) 90°



In the $Right\ \Delta\ PAQ,\ PQ = \sqrt{PA^2 + QA^2} = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10cm$

In the $\Delta\ PQR,\ PR^2 = 26^2 = 676;\ PQ^2 = 10^2 = 100;\ QR^2 = 24^2 = 576;$

$\because PR^2 = PQ^2 + QR^2,\ \angle PQR = 90°$

11. A tangent is perpendicular to the radius at the

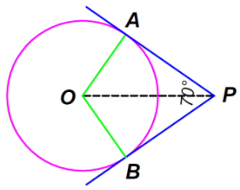
$(1)\ centre$ $(2)\ point\ of\ contact$ $(3)\ infinity$ $(4)\ chord$

12. How many tangents can be drawn to the circle from an exterior point?

$(1)\ one$ $(2)\ two$ $(3)\ infinite$ $(4)\ zero$

13. The two tangents from an external points P to a circle with centre at O are PA and PB.

If $APB = 70°$ then the value of $\angle AOB$ is

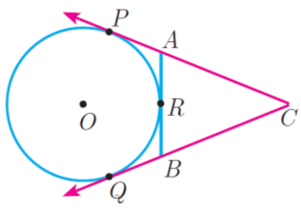


$(1) 100°$ $(2)\ 110°$ $(3)\ 120°$ $(4)\ 130°$

In the quadrilateral $AOBP;\ \angle\ A = 90°;\ \angle B = 90°;\ \angle P = 70°$

$\therefore \angle\ AOB = 360° - (90° + 90° + 70°) = 360° - 250° = 130°$

14. In figure CP and CQ are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If $CP = 11\ cm$ and $BC = 7\ cm$, then the length of BR is

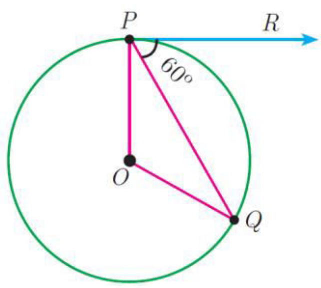


$(1) 6\ cm$ $(2) 5\ cm$ $(3) 8\ cm$ $(4)\ 4\ cm$

From the fig. $CP = CQ = 11\ cm;\ BC = 7\ cm\ \therefore QB = 11 - 7 = 4\ cm$

$\because QB\ and\ BR\ are\ the\ two\ tangets\ from\ the\ point\ B,\ BR = QB = 4\ cm$

15. In figure if PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is : $(1) 120°$ $(2) 100°$ $(3) 110°$ $(4)\ 90°$



$\because PR\ is\ the\ tangent,\ \angle OPR = 90°;\ \angle OPQ = 90° - 60° = 30°$

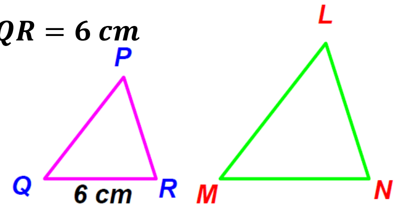
$\because OP\ and\ OQ\ are\ the\ radius,\ \angle OPQ = \angle OQP = 30°;$

$\angle POQ = 180° - 2 \times 30° = 120°$

10th Maths QR Code 1 Mark Solutions

Chapter- 4 :

1. If triangle PQR is similar to triangle LMN such that $4PQ = LM$ and $QR = 6\ cm$ then MN is equal to : (1) 12 cm (2) 24 cm (3) 10 cm (4) 36 cm

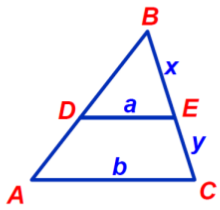


$\Delta\, PQR \sim \Delta\, LMN$; $4PQ = LM$;

$\frac{PQ}{LM} = \frac{1}{4} = \frac{QR}{MN}$; $\frac{6}{MN} = \frac{1}{4}$; $\therefore MN = 6 \times 4 = 24\ cm$

2. In the given figure $DE \parallel AC$ which of the following is true.

(1) $x = \frac{ay}{b+a}$ (2) $x = \frac{a+b}{ay}$ (3) $x = \frac{ay}{b-a}$ (4) $\frac{x}{y} = \frac{a}{b}$

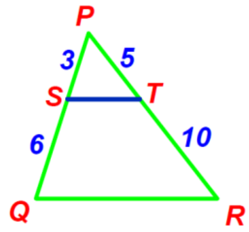


In the fig. $\Delta\, BAC \sim \Delta\, BDE$; $\therefore \frac{DE}{AC} = \frac{BE}{BC}$; $\frac{a}{b} = \frac{x}{x+y}$; $bx = ax + ay$

$(b-a)x = ay$; $x = \frac{ay}{b-a}$

3. S and T are points on sides PQ and PR respectively of $\Delta\, PQR$. If $PS = 3\ cm$, $SQ = 6\ cm$, $PT = 5\ cm$, and $TR = 10\ cm$ and then QR

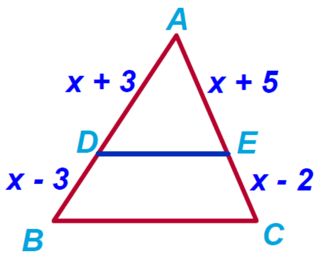
(1) $4\ ST$ (2) $5\ ST$ (3) $3\ ST$ (4) $3\ QR$



$\frac{PS}{SQ} = \frac{3}{6} = \frac{1}{2}$; $\frac{PT}{TR} = \frac{5}{10} = \frac{1}{2}$; $\because \frac{PS}{SQ} = \frac{PT}{TR}$; $ST \parallel QR$; $So\ \Delta\, PQR \sim \Delta\, PST$

$\because \Delta\, PQR \sim \Delta\, PST$; $\frac{QR}{ST} = \frac{PQ}{PS} = \frac{9}{3} = 3$; $\therefore QR = 3\ ST$

4. In the given figure $DE \parallel BC$; $BD = x - 3$, $BA = 2x$, $CE = x - 2$, and $AC = 2x + 3$. Find the value of x . (1) 3 (2) 6 (3) 9 (4) 12



$BD = x - 3$, $BA = 2x$, $\therefore AD = 2x - (x-3) = x + 3$

$CE = x - 2$, $AC = 2x + 3$, $\therefore AE = 2x + 3 - (x-2) = x + 5$

$\because DE \parallel BC$, $according\ to\ BBT$, $\frac{AD}{DB} = \frac{AE}{EC}$; $\frac{x+3}{x-3} = \frac{x+5}{x-2}$

$\therefore (x+3)(x-2) = (x-3)(x+5)$; $x^2 - 2x + 3x - 6 = x^2 - 3x + 5x - 15$

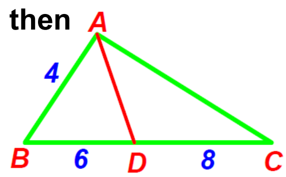
(Or) $x - 6 = 2x - 15$; $\therefore x = 9$

5. The ratio of the areas of two similar triangles is equa l to

(1) The ratio of their corresponding sides (2) The cube of the ratio of their corresponding sides

(3) The ratio of their corresponding altitudes (4) The square of the ratio of their corresponding sides

6. If ABC is a triangle and AD bisects $\angle A$, $AB = 4\ cm$, $BD = 6\ cm$, $DC = 8\ cm$ then the value of AC is (1) $\frac{16}{3}\ cm$ (2) $\frac{32}{3}\ cm$ (3) $\frac{3}{16}\ cm$ (4) $\frac{1}{2}\ cm$



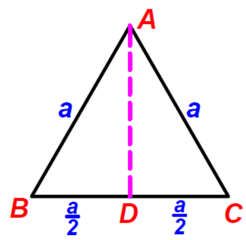
According to Bisectcor Theorem, $\frac{BD}{DC} = \frac{AB}{AC}$; $\therefore AC = \frac{AB \times DC}{BD}$

$= \frac{4 \times 8}{6} = \frac{16}{3}\ cm$

7. In a triangle, the internal bisector of an angle bisects the opposite side . Find the nature of the triangle. (1) right angle (2) equilateral (3) scalene (4) isosceles

8. The height of an equilateral triangle of side a is

(1) $\frac{a}{2}\ cm$ (2) $\sqrt{3}a$ (3) $\frac{\sqrt{3}}{2}a$ (4) $\frac{\sqrt{3}}{4}a$



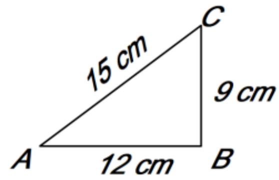
From the fig. $\Delta\, ABD\ is\ a\ right\ triangle$, $AB = a$, $BD = \frac{a}{2}$;

$\therefore AD = \sqrt{AB^2 - BD^2} = \sqrt{a^2 - \frac{a^2}{4}} = \sqrt{a^2\left(1 - \frac{1}{4}\right)} = \sqrt{a^2\left(\frac{4-1}{4}\right)} = \sqrt{a^2 \frac{3}{4}} = \frac{\sqrt{3}}{2}a$

9. The perimeter of a right triangle is $36\ cm$. Its hypotenuse is $15\ cm$, then the area of the triangle is (1) $108\ cm^2$ (2) $54\ cm^2$ (3) $27\ cm^2$ (4) $216\ cm^2$

In the rt. Triangle, the sum of the two perpendicular sides = $36 - 15 = 21\ cm$

Let one side = $x\ cm$ $\therefore$ The other side = $(21 - x)\ cm$



Also being rt. Triangle, $x^2 + (21 - x)^2 = 15^2$

Expanding and simplifying, $x^2 - 21x + 108 = 0$;

$$(x - 12)(x - 9) = 0\ ;\ x = 9\ or\ 12\ cm$$

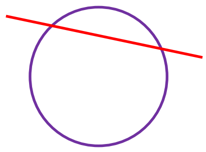
The perpendicular sides = 9cm and 12 cm The area of the triangle $= \frac{1}{2} \times 12 \times 9 = 54\ cm^2$

Short method for this particular problem : Here the hypotenuse is the multiple of 5.

We know the minimum rt. Triangle with hypotenuse as 5 is $3: 4: 5$.

Multiplying it by 3 then it becomes $9\ cm : 12\ cm : 15\ cm$ From this we can find the area.

10. A line which intersects a circle at two distinct points is called

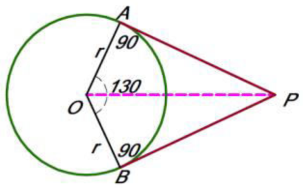


(1) $Point\ of\ contact$ (2) $secant$ (3) $diameter$ (4) $tangent$

Note : A line touches the circle is called Tangent.

But a line intersects the circle is called secant.

11. If the angle between two radii of a circle is ° , the angle between the tangents at the end of the radii is (1) $50°$ (2) $90°$ (3) $40°$ (4) $70°$



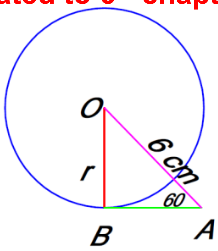
$Angle\ between\ two\ radii + Angle\ between\ the\ tangents = 180°$

$Angle\ between\ the\ tangents = 180° - Angle\ between\ two\ radii$;

$$= 180° - 130° = 50°$$

12. In figure $\angle OAB = 60°$ and $OA = 6\ cm$ then radius of the circle is : (It is related to 6th chapter)

(1) $\frac{3}{2}\sqrt{3}\ cm$ (2) $2cm$ (3) $3\sqrt{3}\ cm$ (4) $2\sqrt{3}\ cm$



Always tangents are perpendicular to the radius at touching points

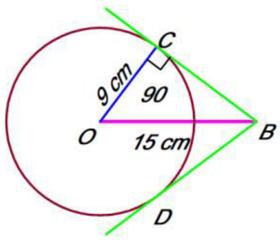
$\therefore \Delta\ OAB\ is\ rt.triangle\ and\ \angle B = 90°$; $\angle A = 90°$.

$Sin\ \theta = \frac{Opposite\ side}{Hypotenuse}$; $Sin\ 60° = \frac{OB}{AB}$;

$$\frac{\sqrt{3}}{2} = \frac{r}{6}\ ;\ r = \frac{6 \times \sqrt{3}}{2} = 3\sqrt{3}\ cm$$

13. In the given figure if $OC = 9\ cm$ and $OB = 15\ cm$ then $OB + BD$ is equal to

(1) $23\ cm$ (2) $24\ cm$ (3) $27\ cm$ (4) $30\ cm$



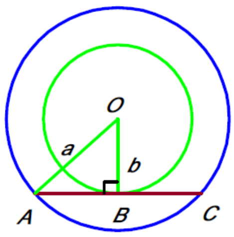
In the rt. triangle OBC ; $BC = \sqrt{15^2 - 9^2} = \sqrt{225 - 91} = \sqrt{144} = 12\ cm$

Also BD and BC are the two tangents. $\therefore BD = BC = 12\ cm$

$\therefore OB + BD = 15 + 12 = 27\ cm$

14. Two concentric circles of radii a and b where $a > b$ are given. The length of the chord of the larger circle which touches the smaller circle is

(1) $\sqrt{a^2 - b^2}$ (2) $2\sqrt{a^2 - b^2}$ (3) $\sqrt{a^2 + b^2}$ (4) $2\sqrt{a^2 + b^2}$

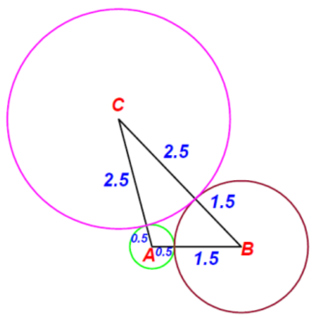


In the rt. triangle OAB ; $AB = \sqrt{a^2 - b^2}$

$\therefore AC = 2 \times AB = 2\sqrt{a^2 - b^2}$

15. Three circles are drawn with the vertices of a triangle as centres such that each circle touches the other two if the sides of the triangle are $2cm$, $3\ cm\ and\ 4\ cm$. find the diameter of the smallest circle.

(1) $1\ cm$ (2) $3\ cm$ (3) $5\ cm$ (4) $4\ cm$



The radii of the circles are marked in the fig..

In which the smallest radius is 0.5 cm. $\therefore$It's diameter = 1cm.

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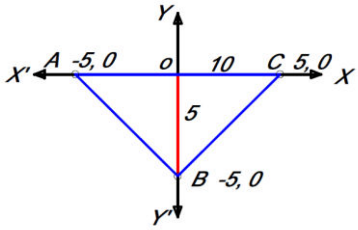
Exercise 5.5



1. The area of triangle formed by the points (−5,0) , (0,−5) and (5,0) is

(1) $0\ sq.units$ (2) $25\ sq.units$ (3) $5\ sq.units$ (4) $none\ of\ these$

If you imazine the points in a graph, then the it forms a triangle of base $10\ units$ and height $5\ units$. $It's\ area\ = \frac{1}{2} \times 10 \times 5 = 25\ sq.units$

2. 2. A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the Y axis. The path travelled by the man is

(1) $x = 10$ (2) $y = 10$ (3) $x = 0$ (4) $y = 0$

Human being $Walks\ along\ the\ X - axis$ and $Grows\ along\ the\ Y - axis.$

3. The straight line given by the equation x = 11 is (1) $parallel\ to\ X\ axis$ (2) $parallel\ to\ Y\ axis$ (3)$passing\ through\ the\ origin$ (4) $passing\ through\ the\ point\ (0, 11)$

The line $x = a$ is parallel to the $Y - Axis$ and the line $y = b$ is parallel to the $X - Axis$, where a and b are constants.

4. If (5,7), (3,p) and (6,6) are collinear, then the value of p is

(1) 3 (2) 6 (3) 9 (4) 12

The given points $A(5,7), B(3,p)\ and\ C(6,6)$ are collinear (in the same line) only when

The slope of AB = The slope of AC $\left[Solpe\ between\ two\ points = \frac{y_2-y_1}{x_2-x_1}\right]$

$$\frac{p-7}{3-5} = \frac{6-7}{6-5}\ ; \quad \frac{p-7}{-2} = \frac{-1}{1}\ ; \quad p - 7 = 2\ ; \quad p = 7 + 2 = 9$$

5. The point of intersection of $3x - y = 4$ and $x + y = 8$ is : (1) $(5, 3)$ (2) $(2, 4)$ (3) $(3, 5)$ (4)$(4, 4)$

By adding the two eqns., then $4x = 12,\ \therefore x = 3$, and placing this in the 2nd eqn. we get $y = 5$

6. The slope of the line joining $(12, 3), (4, a)\ is\ \frac{1}{8}$. The value of 'a' is: (1) 1 (2) 4 (3) -5 (4) 2

$$Solpe\ between\ two\ points = \frac{y_2-y_1}{x_2-x_1}\ ; \quad \frac{a-3}{4-12} = \frac{1}{8}\ ; \quad a - 3 = -\frac{8}{8}\ ; \quad a - 3 = -1\ ; \quad a = 3 - 1 = 2$$

7. The slope of the line which is perpendicular to line joining the points (0,0) and (–8,8) is

(1)-1 (2) 1 (3)$\frac{1}{3}$ (4) -8

$$Solpe\ between\ the\ points\ given\ m = \frac{8-0}{-8-0} = -1; \therefore It's\ perpendicular\ slope = \frac{-1}{m} = \frac{-1}{-1} = 1$$

8. If slope of the line $PQ\ is\ \frac{1}{\sqrt{3}}$ then the slope of the perpendicular bisector of PQ is :

(1)$\sqrt{3}$ (2) $-\sqrt{3}$ (3) $\frac{1}{\sqrt{3}}$ (4)0 $It's\ perpendicular\ slope = \frac{-1}{m} = \frac{-1}{\frac{1}{\sqrt{3}}} = -\sqrt{3}$

9. If A is a point on the Y axis whose ordinate is 8 and B is a point on the X axis whose abscissa is 5 then the equation of the line AB is : (1)$8x + 5y = 40$ (2)$8x - 5y = 40$ (3)$x = 8$ (4)$y = 5$

The X-axis ordinate means the intercept a = 5, and the Y-axis ordinate means the intercept b = 5

$Solpe\ of\ a\ line\ with\ two\ intercepts\ a\ and\ b\ : \frac{x}{a} + \frac{y}{b} = 1\ ; \frac{x}{5} + \frac{y}{8} = 1$

Multiplying it by 40 (LCM of 5 and 8 is 40) on both sides,then $40 \times \frac{x}{5} + 40 \times \frac{y}{8} = 40$; (or) $8x + 5y = 40$

10. The equation of a line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$ is :

(1) $7x - 3y + 4 = 0$ (2) $3x - 7y + 4 = 0$ (3) $3x + 7y = 0$ (4) $7x - 3y = 0$

The given eqn. $-3y + 4 = 0$; [If $ax + by + c = 0$, then it's perpendicular eqn. is : $bx - ay + k = 0$]

Here $= 7,\ b = -3$. $\therefore$ It's perpendicular eqn. is $-3x - 7y + c = 0$

Since it passas through the origin i.e. $= 0, y = 0$, then $-3 \times 0 - 7 \times 0 + c = 0 \quad \therefore c = 0$

The required perpendicular eqn. $-3x - 7y + 0 = 0$ (Or) $3x + 7y = 0$

11. Consider four straight lines (i) $l_1 : 3y = 4x + 5$ (ii) $l_2 : 4y = 3x - 1$ (iii) $l_3 : 4y + 3x = 7$ (iv) $l_4 : 4x + 3y = 2$ Which of the following statement is true ? : $(1)\ l_1$ *and* l_2 *are perpendicular* $(2)\ l_1$ *and* l_4 *are parallel* $(3)\ l_2$ *and* l_4 *are perpendicular* $(4)\ l_2$ *and* l_3 *are parallel*

Here we have change given eqn. in the form y=mx+c in a quick manner. From this we can easily find out.

(i) $l_1 : 3y = 4x + 5$; $y = \frac{4}{3}x + \frac{5}{3}$; $m_1 = \frac{4}{3}$ (ii) $l_2 : 4y = 3x - 1$; $y = \frac{3}{4}x - \frac{1}{4}$; $m_2 = \frac{3}{4}$

(iii) $l_3 : 4y + 3x = 7$; $y = -\frac{3}{4}x + \frac{7}{4}$; $m_3 = -\frac{3}{4}$ (iv) $l_4 : 4x + 3y = 2$; $y = -\frac{4}{3}x + \frac{2}{3}$; $m_4 = -\frac{4}{3}$

Here $m_2 \times m_4 = \frac{3}{4} \times \frac{-4}{3} = -1$; $\therefore l_2$ *and* l_4 *are perpendicular*

12. A straight line has equation $8y = 4x + 21$. Which of the following is true

(1) The slope is 0.5 and the y intercept is 2.6 (2) The slope is 5 and the y intercept is 1.6

(3) The slope is 0.5 and the y intercept is 1.6 (4) The slope is 5 and the y intercept is 2.6

Converting the given eqn. in the form of $y = mx + c$

$8y = 4x + 21$; $y = \frac{4x}{8} + \frac{21}{8}$; $y = \frac{1}{2}x + 2.625$; $\therefore Slope = \frac{1}{2}$; $Y\ intercept = 2.6$

13. When proving that a quadrilateral is a trapezium, it is necessary to show

(1) *Two sides are parallel.* (2) *Two parallel and two non − parallel sides.*

(3) *Opposite sides are parallel.* (4) *All sides are of equal length.*

14. When proving that a quadrilateral is a parallelogram by using slopes you must find

(1) *The slopes of two sides* (2) *The slopes of two pair of opposite sides*

(3) *The lengths of all sides* (4) *Both the lengths and slopes of two sides*

15. (2, 1) is the point of intersection of two lines.

(1) $x - y - 3 = 0;\ 3x - y - 7 = 0$ (2) $x + y = 3;\ 3x + y = 7$

(3) $3x + y = 3;\ x + y = 7$ (4) $x + 3y - 3 = 0;\ x - y - 7 = 0$

Don't solve the equations. Just verify the pair of eqns. By placing (2,1)

Taking the 1st pair : $2 - 1 - 3 = -2 \neq 0$; $3 \times 2 - 1 = 6 \neq 7$ Not satisfies

Taking the 2nd pair : $2 + 1 = 3 = 3$; $3 \times 2 + 1 = 7 = 7$ Satisfies. ∴The answer is (2)

Chapter- 5 :

1. Find the ratio in which the line segment joining the points (-3,10) and (6,-8) is internally divided by (-1,6) : $(1)\ 7:2$ $(2)\ 3:4$ $(3)\ 2:7$ $(4)\ 5:3$

From the given ratio of m and n in the answer, let us find x value only and match with $(x, y) = (-1, 6)$.

$(x_1,\ y_1) = (-3, 10);\ (x_2,\ y_2) = (6, -8);\ \ (x,\ y) = (-1,\ 6)$

$(1)\ m : n = 7 : 2\ \ \frac{mx_2+nx_1}{m+n} = \frac{7\times6+2\times(-3)}{7+2} = \frac{36}{9} = 4 \neq -1$

$(2)\ m : n = 3 : 4\ \ \frac{mx_1+nx_2}{m+n} = \frac{3\times6+4\times(-3)}{3+4} = \frac{6}{7} \neq -1$

$(3)\ m : n = 2 : 7\ \ \frac{mx_1+nx_2}{m+n} = \frac{2\times6+7\times(-3)}{2+7} = \frac{-9}{9} = -1 = -1$ (It matches) ∴The answer is (3)

2. If the points $(0,0), (a, 0)$ *and* $(0, b)$ are collinear, then

$(1)\ a = b$ $(2)\ a + b$ $(3)\ ab = 0$ $(4)\ a \neq b$

The given points $A(0,0), B(a, 0)$ *and* $C(0, b)$ are collinear (in the same line) only when

The slope of AB = The slope of AC $\left[\textit{Solpe between two points} = \frac{y_2-y_1}{x_2-x_1}\right]$

$\frac{0-0}{a-0} = \frac{b-0}{0-a}$; $0 = \frac{b}{-a}$; (or) $\frac{b}{a} = 0$; $a^2 \times \frac{b}{a} = a^2 \times 0$; $ab = 0$

3. If the mid-point of the line segment joining $A\left(\frac{x}{2},\ \frac{y+1}{2}\right)$ and $B\ (x + 1,\ y - 3)$ is $C\ (5, -2)$ then find the values of x , y : $(1)\ (6, -1)$ $(2)\ (-6, 1)$ $(3)\ (-2, 1)$ $(4)(3, 5)$

It is easy by checking the x value alone from the answers and match with $C(5, -2)$

From the answer $(1)\ (6, -1)$ the x value is 6.

The midpoint A *and* B is $\left(\frac{x_1+x_2}{2}\right)$; $\left(\frac{\frac{x}{2}+x+1}{2}\right)$; $\left(\frac{\frac{6}{2}+6+1}{2}\right) = \frac{3+7}{2} = 5 = C(5, -2)$ ∴ $(1)(6, -1)$ *is the answer*

4. The area of triangle formed by the points $(a, b + c), (b, c + a)$ and $(c, a + b)$ is

$(1)\ a + b + c$ $(2)\ abc$ $(3)\ (a + b + c)^2$ $(4)\ 0$

Area of a triangle $= \frac{1}{2}\begin{Bmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{Bmatrix}$

$$= \frac{1}{2}\begin{Bmatrix} a & b & c & a \\ b+c & c+a & a+b & b+c \end{Bmatrix}$$

$$= \frac{1}{2}[\{a(c + a) + b(a + b) + c(b + c)\} - \{(b + c)b + (c + a)c + (a + b)a\}]$$

$$= \frac{1}{2}[\{ac + a^2 + ba + b^2 + cb + c^2\} - \{(b^2 + bc + c^2 + ac + a^2 + ba\}]$$

$$= \frac{1}{2}[ac + a^2 + ba + b^2 + cb + c^2 - b^2 - bc - c^2 - ac - a^2 - ba]$$

$$= \frac{1}{2}[ac + a^2 + ba + b^2 + cb + c^2 - b^2 - bc - c^2 - ac - a^2 - ba]$$

$$= \frac{1}{2}[0] = 0$$

5. The four vertices of a quadrilateral are $(1, 2), (-5, 6), (7, -4)$ and $(k, -2)$ taken in order. If the area of quadrilateral is zero then find the value of k.

$(1)\ 4$ $(2) - 2$ $(3)\ 6$ $(4)\ 3$

Since the area given 0, then the given points are collinear.

∴The slope of 1st pair of points = The slope of 2nd pair of points $\left[\textit{Solpe between two points} = \frac{y_2-y_1}{x_2-x_1}\right]$

$\frac{6-2}{-5-1} = \frac{-2+4}{k-7}$; $\frac{4}{-6} = \frac{2}{k-7}$; $4k - 28 = -12$; $k = \frac{16}{4} = 4$

6. Find the equation of the line passing through the point which is parallel to the y axis $(5, 3)$ is

$(1)\ y = 5$ $(2)\ y = 3$ $(3)\ x = 5$ $(4)\ x = 3$

The line $x = a$ is parallel to the $Y - Axis$ and the line $y = b$ is parallel to the $X - Axis$, where a and b are constants. ∴ *The answer is* $x = 5$

7. Find the slope of the line $2y = x + 8$: $(1)\frac{1}{2}$ $(2)\ 1$ $(3)\ 8$ $(4)2$

Convert the given eqn. in the form of $y = mx + c$

Given eqn. $2y = x + 8$; $y = \frac{x}{2} + \frac{8}{2}$; $y = \frac{1}{2}x + 4$; $\therefore Slope\ m = \frac{1}{2}$

8. Find the value of p , given that the line $\frac{y}{2} = x - p$ passes through the point $(-4, 4)$ is

$(1) - 4$ $\quad$ $(2) - 6$ $\quad$ $(3)\ 0$ $\quad$ $(4)\ 8$

Placing the point $(-4, 4)$ in the eqn. $\frac{y}{2} = x - p$; $\frac{4}{2} = -4 - p$; $2 = -4 - p$; $\therefore p = -4 - 2 = -6$

9. Find the slope and the y -intercept of the line $3y - \sqrt{3}x + 1 = 0$ is

$(1)\ \frac{1}{\sqrt{3}}, \frac{-1}{3}$ $\quad$ $(2) - \frac{1}{\sqrt{3}}, \frac{-1}{3}$ $\quad$ $(3)\ \sqrt{3},\ 1$ $\quad$ $(4)\ -\sqrt{3},\ 3$

Conversion of the given eqn. in the form of $y = mx + c$ gives the slope and y-intercept.

Given eqn. $3y - \sqrt{3}x + 1 = 0$; $y = \frac{\sqrt{3}x}{3} - \frac{1}{3}$; $y = \frac{\sqrt{3}}{\sqrt{3}\times\sqrt{3}}x - \frac{1}{3}$; $y = \frac{1}{\sqrt{3}}x - \frac{1}{3}$

$\therefore Slope\ m = \frac{1}{\sqrt{3}}$; $y - intercept\ c = \frac{-1}{3}$

10. Find the value of ' a ' if the lines $7y = ax + 4$ and $2y = 3 - x$ are parallel.

$(1)\ \frac{7}{2}$ $\quad$ $(2) - \frac{2}{7}$ $\quad$ $(3)\ \frac{2}{7}$ $\quad$ $(4) - \frac{7}{2}$

Line 1 : $7y = ax + 4$; $y = \frac{a}{7}x + \frac{4}{7}$ $\quad \therefore Slope\ m_1 = \frac{a}{7}$

Line 2 : $2y = 3 - x$; $y = \frac{-1}{2}x + \frac{3}{2}$ $\quad \therefore Slope\ m_2 = \frac{-1}{2}$

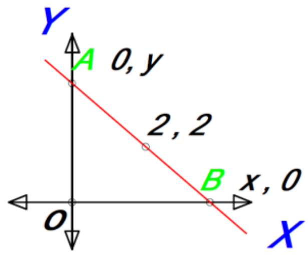
Since line1 line 2 are parallel, $m_1 = m_2$; $\frac{a}{7} = \frac{-1}{2}$; $\therefore a = \frac{-7}{2}$

11. A line passing through the point (2,2) and the axes enclose an area $\propto$. The intercepts on the axes made by the line are given by the roots of

$(1) x^2 - 2 \propto x + \propto = 0$ $\quad$ $(2)\ x^2 + 2 \propto x + \propto = 0$ $\quad$ $(3)\ x^2 - \propto x + 2 \propto = 0$ $\quad$ $(4)\ none\ of\ these$

Let $\Delta\, AOB$ is enclosed area by line AB whose $area = \propto$

Let $X - axis$ intercept $a = x$, and $Y - axis$ intercept $b = y$



Eqn. of AB : $\frac{X}{a} + \frac{Y}{b} = 1$;

$\frac{X}{x} + \frac{Y}{y} = 1$; $yX + xY = xy$ It passes through (2,2)

$y \times 2 + x \times 2 = xy$

$2y + 2x = xy$

$2y - xy = -2x$ (or) $(2 - x)y = -2x$; $\therefore y = \frac{-2x}{(2-x)} = \frac{2x}{(x-2)}$

$\therefore$ The area of $\Delta\, AOB = \frac{1}{2} \times x \times y = \frac{1}{2} \times x \times \frac{2x}{(x-2)} = \frac{x^2}{x-2} = \propto$; $x^2 = \propto x - 2 \propto$ (Or) $x^2 - \propto x + 2 \propto = 0$

12. Find the equation of the line passing through the point (0, 4) and is parallel to $3x + 5y + 15 = 0$ the line is

$(1)\ 3x + 5y + 15 = 0$ $\quad$ $(2)\ 3x + 5y - 20 = 0$ $\quad$ $(3)\ 2x + 7y - 20 = 0$ $\quad$ $(4)\ 4x + 3y - 15 = 0$

Given eqn. $3x + 5y + 15 = 0.$

So it's parallel eqn. $x + 5y + k = 0$;

It passes through (0, 4) $\therefore 3 \times 0 + 5 \times 4 + k = 0$; $k = -20$; The eqn. is : $3x + 5y - 20 = 0$

13. In a right angled triangle , right angled at B , if the side BC is parallel to $X\ axis$, then the slope of AB is : $(1)\ \sqrt{3}$ $\quad$ $(2)\ \frac{1}{\sqrt{3}}$ $\quad$ $(3)\ 1$ $\quad$ $(4)\ not\ defined$

The given triangle ABC is right angled at B, and BC is parallel to $X - axis$.

$\therefore AB$ is perpendicular to $X - axis$. So AB is parallel to $Y - axis$ and it's slope is undefined.

14. The $y\ - intercept$ of the line $3x - 4y + 8 = 0$ is : $(1) - \frac{8}{3}$ $\quad$ $(2)\ \frac{8}{3}$ $\quad$ $(3)\ 2$ $\quad$ $(4)\ \frac{1}{2}$

$3x - 4y + 8 = 0$; $\therefore -4y = -3x - 8$ (Or) $4y = 3x + 8$; $y = \frac{3x}{8} + \frac{8}{4}$; $Y\text{-}intercept = \frac{8}{4} = 2$

15. The lines $y = 5x - 3$, $y = 2x + 9$ intersect at A . The coordinates of A are

$(1)\ (2,\ 7)$ $\quad$ $(2)\ (2,\ 3)$ $\quad$ $(3)\ (4,\ 17)$ $\quad$ $(4)\ (-4,\ 23)$

Directly subtracting the 2nd eqn from 1st : $0 = 3x - 12$; $\therefore x = \frac{12}{3} = 4$; $y = 5 \times 4 - 3 = 17$

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Exercise 6.5

1. The value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$ is equal to : (1) $\tan^2\theta$ (2) 1 (3) $\cot^2\theta$ (4) 0

$\sin^2\theta + \frac{1}{1+\tan^2\theta} \to \sin^2\theta + \frac{1}{\sec^2\theta} \to \sin^2\theta + \frac{1}{\frac{1}{\cos^2\theta}} \to \sin^2\theta + \cos^2\theta = 1$

2. $\tan\theta\,cosec^2\theta - \tan\theta$ is equal to : (1) $\sec\theta$ (2) $\cot^2\theta$ (3) $\sin\theta$ (4) $\cot\theta$

$\tan\theta\,cosec^2\theta - \tan\theta \to \tan\theta(cosec^2\theta - 1) \to \tan\theta\cot^2\theta \to \tan\theta\frac{1}{\tan^2\theta} \to \frac{1}{\tan\theta} = \cot\theta$

3. If $(\sin\alpha + cosec\,\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$, then the value of k is equal to : (1) 9 (2) 7 (3) 5 (4) 3

Given : $= (\sin\alpha + cosec\,\alpha)^2 + (\cos\alpha + \sec\alpha)^2$

Expanding $= \sin^2\alpha + cosec^2\alpha + 2\sin\alpha\,cosec\,\alpha + \cos^2\alpha + \sec^2\alpha + 2\cos\alpha\sec\alpha$

$= \sin^2\alpha + \cos^2\alpha + (1+\cot^2\alpha) + 2\sin\alpha\frac{1}{\sin\alpha} + 1 + \tan^2\alpha + 2\cos\alpha\frac{1}{\cos\alpha}$

$= 1 + 1 + \cot^2\alpha + 2 + 1 + \tan^2\alpha + 2$

$= 7 + \tan^2\alpha + \cot^2\alpha$

Equating : $7 + \tan^2\alpha + \cot^2\alpha = k + \tan^2\alpha + \cot^2\alpha$; $\therefore k = 7$

4. If $\sin\theta + \cos\theta = a$ and $\theta + cosec\theta = b$, then the value of b(a2 -1) is equal to

(1) $2a$ (2) $3a$ (3) 0 (4) $2ab$

$a = \sin\theta + \cos\theta$;

$a^2 = \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta$

$a^2 - 1 = 1 + 2\sin\theta\cos\theta - 1$

$a^2 - 1 = 2\sin\theta\cos\theta$

$b = \sec\theta + cosec\theta$

$b = \frac{1}{\cos\theta} + \frac{1}{\sin\theta}$

$b = \frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta}$

$b = \frac{a}{\sin\theta\cos\theta}$

$\therefore b(a^2-1) = \frac{a}{\sin\theta\cos\theta} \times 2\sin\theta\cos\theta = 2a$

5. If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to : (1) 25 (2) $\frac{1}{25}$ (3) 5 (4) 1

$5x = \sec\theta$; $\therefore x = \frac{\sec\theta}{5}$: $\frac{5}{x} = \tan\theta$; $\frac{1}{x} = \frac{\tan\theta}{5}$

$x^2 - \frac{1}{x^2} = \frac{\sec^2\theta}{25} - \frac{\tan^2\theta}{25} = \frac{1}{25}(\sec^2\theta - \tan^2\theta) = \frac{1}{25} \times 1 = \frac{1}{25}$

6. If $\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to : (1) $\frac{-3}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{-2}{3}$

$If\ \sin\theta = \cos\theta,\ then\ \theta = 45°$; $\therefore \sin\theta = \cos\theta = \frac{1}{\sqrt{2}}$; $Also\ \tan^2\theta = 1$

$2\tan^2\theta + \sin^2\theta - 1 = 2 + \frac{1}{2} - 1 = \frac{3}{2}$

7. If $x = a\tan\theta$ and $y = b\sec\theta$ then : (1) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ (2) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (3) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (4) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

$\sec\theta = \frac{y}{b}$; $\tan\theta = \frac{x}{a}$; $\therefore \sec^2\theta - \tan^2\theta = 1 = \frac{y^2}{b^2} - \frac{x^2}{a^2}$

8. $(1+\tan\theta+\sec\theta)(1+\cot\theta - cosec\,\theta)$ is equal to : (1) 0 (2) 1 (3) 2 (4) – 1

$$(1+\tan\theta+\sec\theta)(1+\cot\theta - cosec\,\theta) = \left(1+\frac{\sin\theta}{\cos\theta}+\frac{1}{\cos\theta}\right)\left(1+\frac{\cos\theta}{\sin\theta}-\frac{1}{\sin\theta}\right)$$

$$= \left(\frac{\cos\theta+\sin\theta+1}{\cos\theta}\right)\left(\frac{\sin\theta+\cos\theta-1}{\sin\theta}\right)$$

$$= \frac{(\sin\theta+\cos\theta)^2-1^2}{\sin\theta\cos\theta}$$

$$= \frac{\sin^2\theta+\cos^2\theta+2\sin\theta\cos\theta-1}{\sin\theta\cos\theta} = \frac{1+2\sin\theta\cos\theta-1}{\sin\theta\cos\theta} = 2$$

9. $a\cot\theta + b\,cosec\,\theta = p$ and $b\cot\theta + a\,cosec\,\theta = q$ then $p^2 - q^2$ is equal to :

(1) $a^2 - b^2$ (2) $b^2 - a^2$ (3) $a^2 + b^2$ (4) $b - a$

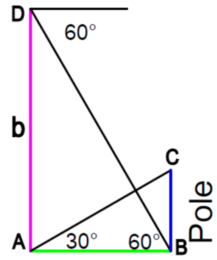
$$p^2 - q^2 = (a\cot\theta + b\,cosec\,\theta)^2 - (b\cot\theta + a\,cosec\,\theta)^2$$
$$= a^2\cot^2\theta + b^2 cosec^2\theta + 2ab\cancel{\cot\theta\, cosec\,\theta} - b^2\cot^2\theta - a^2 cosec^2\theta - 2ab\cancel{\cot\theta\, cosec\,\theta}$$
$$= a^2\cot^2\theta + b^2 cosec^2\,\theta - b^2\cot^2\theta - a^2 cosec\,\theta$$
$$= a^2(cosec^2\theta - 1) + b^2(1+\cot^2\theta) - b^2\cot^2\theta - a^2 cosec\,\theta$$
$$= a^2\cancel{cosec^2\theta} - a^2 + b^2 + \cancel{b^2\cot^2\theta} - \cancel{b^2\cot^2\theta} - \cancel{a^2 cosec\,\theta} = b^2 - a^2$$

10. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure : (1) $45°$ (2) $30°$ (3) $90°$ (4) $60°$

Height : Shadow $= \sqrt{3} : 1$; $\frac{\text{Height}}{\text{Shadow}} = \frac{\sqrt{3}}{1} = \sqrt{3} = \tan 60°$;

∴ Angle of elevation of the sun $= 60°$

11. The electric pole subtends an angle of 30° at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the tower is 60° . The height of the tower (in metres) is equal to : (1) $\sqrt{3}\,b$ (2) $\frac{b}{3}$ (3) $\frac{b}{2}$ (4) $\frac{b}{\sqrt{3}}$



From the fig. In ΔABD, $\tan 60° = \frac{b}{AB}$; $\sqrt{3} = \frac{b}{AB}$; $AB = \frac{b}{\sqrt{3}}$

In ΔABC, $\tan 30° = \frac{BC}{AB}$; $\frac{1}{\sqrt{3}} = \frac{BC}{AB}$; $BC = \frac{AB}{\sqrt{3}} = \frac{b}{\sqrt{3}\times\sqrt{3}} = \frac{b}{3}$

∴ The height of the tower (Electric pole) $BC = \frac{b}{3}\,m$

12. A tower is 60 m height. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30°, then x is equal to : (1) $41.92\,m$ (2) $43.92\,m$ (3) $43\,m$ (4) $45.6\,m$

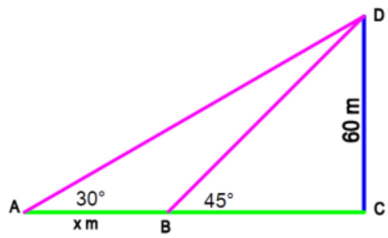
From the fig. In ΔBCD, $\tan 45° = \frac{CD}{BC}$; $1 = \frac{60}{BC}$; $BC = 60\,m$

In ΔACD, $\tan 30° = \frac{CD}{AC}$; $\frac{1}{\sqrt{3}} = \frac{60}{AB+BC}$; $\frac{1}{\sqrt{3}} = \frac{60}{x+60}$;

$x + 60 = 60\sqrt{3}$; $x = 60\sqrt{3} - 60$; $x = 60(\sqrt{3}-1)$;

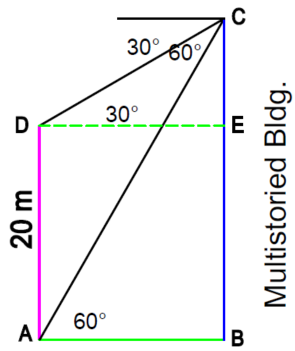
$x = 60(1.732 - 1)$

$x = 60 \times 0.732 = 43.92\,m$



13. The angle of depression of the top and bottom of 20 m tall building from the top of a multistoried building are 30° and 60° respectively. The height of the multistoried building and the distance between two buildings (in metres) is

(1) $20,\ 10\sqrt{3}$ (2) $30,\ 5\sqrt{3}$ (3) $20,\ 10$ (4) $30,\ 10\sqrt{3}$



From the fig. In ΔDEC, $\tan 30° = \frac{EC}{DE}$; $\frac{1}{\sqrt{3}} = \frac{EC}{DE}$; $DE = EC\sqrt{3}$

In ΔABC, $\tan 60° = \frac{BC}{AB}$; $\sqrt{3} = \frac{BC}{AB}$;

$AB = \frac{BC}{\sqrt{3}} = \frac{BE+EC}{\sqrt{3}} = \frac{20+EC}{\sqrt{3}} = \frac{20}{\sqrt{3}} + \frac{EC}{\sqrt{3}}$

Here, $DE = AB$

$EC\sqrt{3} = \frac{20}{\sqrt{3}} + \frac{EC}{\sqrt{3}}$

$EC\sqrt{3} - \frac{EC}{\sqrt{3}} = \frac{20}{\sqrt{3}}$; $EC\left(\frac{3-1}{\sqrt{3}}\right) = \frac{20}{\sqrt{3}}$; $EC = \frac{20}{2} = 10\,m$

Width of the road $AB = DE = EC\sqrt{3} = 10\sqrt{3}\,m$

Height of the multistoried building $BC = BE + EC = 20 + 10 = 30\,m$

14. Two persons are standing 'x' metres apart from each other and the height of the first person is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shorter person (in metres) is : (1) $\sqrt{2}\,x$ (2) $\frac{x}{2\sqrt{2}}$ (3) $\frac{x}{2}$ (4) $2x$

Let AB be the short person and CD be the tall person

$CD = 2AB$; $AC = x\,m$; $AE = EC = \frac{x}{2}$

$\angle AEB$ and $\angle CED$ are compimentary

$Let \angle AEB = \theta\ ; \quad \therefore \angle CED = 90° - \theta$

$From\ \Delta AEB\ ;\ tan\ \theta = \frac{AB}{AE} = \frac{AB}{\frac{x}{2}} = \frac{2AB}{x}$ ------ ①

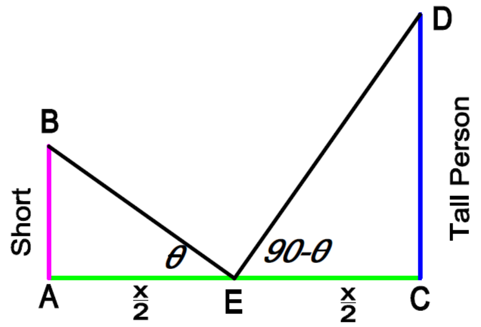
$From\ \Delta ECD\ ;\ tan(90-\theta) = \frac{CD}{EC} = \frac{2AB}{\frac{x}{2}} = \frac{4AB}{x}$

$cot\ \theta = \frac{4AB}{x}$ ------ ②

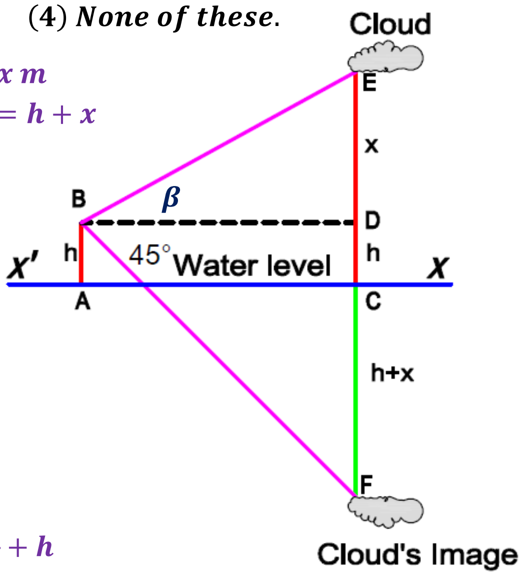
① × ② $\rightarrow tan\ \theta \times\ cot\ \theta = \frac{2AB}{x} \times \frac{4AB}{x}$

$tan\ \theta \times \frac{1}{tan\ \theta} = \frac{2AB}{x} \times \frac{4AB}{x}$

$1 = \frac{8AB^2}{x^2}\ ;\quad 8AB^2 = x^2\ ;\ \ AB = \sqrt{\frac{x^2}{8}}\ ;\ \ AB = \sqrt{\frac{x^2}{4\times 2}} = \frac{x}{2\sqrt{2}}$



15. The angle of elevation of a cloud from a point h metres above a lake is b . The angle of depression of its reflection in the lake is 45° . The height of location of the cloud from the lake is : (1) $\frac{h(1+tan\beta)}{1-tan\beta}$ (2) $\frac{h(1-tan\beta)}{1+tan\beta}$ (3) $h\ tan(45° - \beta)$ (4) $None\ of\ these.$



Let $X - X'$ be the water level ; $AB = CD = h\ m$ Let $DE = x\ m$

Height of the cloud from the water level : $CE = CD + DE = h + x$

Dedth of it's image from the water level : $CF = h + x$

$From\ \Delta BDF\ ;\ tan\ 45° = \frac{DF}{BD} = \frac{DC+CF}{BD}$

$1 = \frac{h+h+x}{BD}\ ;\quad \therefore BD = 2h + x$

$From\ \Delta BDE\ ;\ tan\ \beta = \frac{DE}{BD} = \frac{x}{2h+x}$

$x = 2h\ tan\beta + x\ tan\beta$

$x - x\ tan\beta = 2h\ tan\beta$

$x(1 - tan\beta) = 2h\ tan\beta$

$x = \frac{2h\ tan\beta}{(1-tan\beta)}$

Height of the cloud from the water level : $x + h = \frac{2h\ tan\beta}{(1-tan\beta)} + h$

$x + h = h\left(\frac{2tan\beta}{1-tan\beta} + 1\right)$

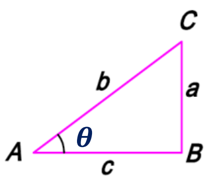
$x + h = h\left(\frac{2tan\beta+1-tan\beta}{1-tan\beta}\right) = \frac{h(1+tan\beta)}{1-tan\beta}$

10th Maths QR Code 1 Mark Solutions

Chapter- 6 :

1. From the figure, the value of $cosec\ \theta + cot\ \theta$ is :

(1) $\frac{a+b}{c}$ (2) $\frac{c}{a+b}$ (3) $\frac{b+c}{a}$ (4) $\frac{b}{a+c}$



$cosec\ \theta + cot\ \theta = \frac{b}{a} + \frac{c}{a} = \frac{b+c}{a}$

2. $(sec\ A + tan\ A)(1 - sin\ A)$ is equal to : (1) $sec\ A$ (2) $sin\ A$ (3) $cosecA$ (4) $cos\ A$

$(sec\ A + tan\ A)(1 - sin\ A) = \left(\frac{1}{cos\ A} + \frac{sin\ A}{cos\ A}\right)(1 - sin\ A)$

$= \left(\frac{1+sin\ A}{cos\ A}\right)(1 - sin\ A) = \frac{1-sin^2 A}{cos\ A} = \frac{cos^2 A}{cos\ A} = cos\ A.$

3. If $x = rsin\ \theta\ cos\varphi\ ;\ y = rsin\theta sin\varphi$ and $z = rcos\theta$. Then $x^2 + y^2 + z^2$: (1) r (2) r^2 (3) $\frac{r^2}{2}$ (4) $2r^2$

$x^2 + y^2 + z^2 = r^2 sin^2\theta\ cos^2\varphi + r^2 sin^2\theta sin^2\varphi + r^2 cos^2\theta$

$= r^2[sin^2\theta\ cos^2\varphi + sin^2\theta sin^2\varphi + cos^2\theta]$

$= r^2[sin^2\theta\ (cos^2\varphi + sin^2\varphi) + cos^2\theta]$ $\quad [cos^2\varphi + sin^2\varphi = 1]$

$= r^2[sin^2\theta\ + cos^2\theta]$

$= r^2$ $\quad [sin^2\theta\ + cos^2\theta = 1]$

4. If $cos\ \theta + cos^2\theta = 1$ then $sin^2\theta + sin^4\theta$ is equal to : (1) 1 (2) 0 (3) -1 (4) *None of this*

$cos\ \theta + cos^2\theta = 1$; $\therefore cos\ \theta = 1 - cos^2\theta$

$$sin^2\theta + sin^4\theta = sin^2\theta(1 + sin^2\theta)$$
$$= (1 - cos^2\theta)[1 + (1 - cos^2\theta)]$$
$$= cos\ \theta[1 + cos\ \theta] = cos\ \theta + cos^2\theta = 1$$

5. If $tan\ \theta + cot\ \theta = 3$ then $tan^2\theta + cot^2\theta$ is equal to : (1) 4 (2) 7 (3) 6 (4) 9

Given : $tan\ \theta + cot\ \theta = 3$

Squaring both sides : $(tan\ \theta + cot\ \theta)^2 = 3^2$

$$tan^2\ \theta + cot^2\ \theta + 2tan\ \theta cot\ \theta = 9$$

$$tan^2\ \theta + cot^2\ \theta + 2\cancel{tan\ \theta}\frac{1}{\cancel{tan\ \theta}} = 9\ ; \quad \therefore tan^2\theta + cot^2\theta = 9 - 2 = 7$$

6. If $mcos\ \theta + nsin\ \theta = a$ and $msin\ \theta - ncos\ \theta = b$ then $a^2 + b^2$ is equal to :

(1) $m^2 - n^2$ (2) $m^2 + n^2$ (3) m^2n^2 (4) $n^2 - m^2$

$a = mcos\ \theta + nsin\ \theta$; $b = msin\ \theta - ncos\ \theta$

$a^2 = m^2cos^2\theta + n^2sin^2\theta + 2mnsin\ \theta cos\ \theta$; $b^2 = m^2sin^2\theta + n^2cos^2\theta - 2mnsin\ \theta cos\ \theta$

$$a^2 + b^2 = m^2cos^2\theta + n^2sin^2\theta + m^2sin\ \theta + n^2cos^2\ \theta$$
$$a^2 + b^2 = m^2(cos^2\theta + sin^2\theta) + n^2(sin^2\theta + cos^2\theta)$$
$$a^2 + b^2 = m^2 + n^2$$

7. $\frac{tan\ \theta}{sec\ \theta - 1} + \frac{tan\ \theta}{sec\ \theta + 1}$ is equal to : (1) $2tan\ \theta$ (2) $2sec\ \theta$ (3) $2cosec\theta$ (4) $2tan\theta\ sec\theta$

$$\frac{tan\ \theta}{sec\ \theta-1} + \frac{tan\ \theta}{sec\ \theta+1} = \frac{tan\ \theta(sec\ \theta+1) + tan\theta(sec\ \theta-1)}{(sec\ \theta-1)(sec\ \theta+1)}$$
$$= \frac{tan\ \theta sec\ \theta + tan\ \theta + tan\ \theta sec\ \theta - tan\ \theta}{sec^2\theta - 1}$$
$$= \frac{2tan\ \theta sec\ \theta}{tan^2\theta} = \frac{2sec\ \theta}{tan\ \theta} = 2 \times \frac{1}{cos\ \theta} \times \frac{cos\ \theta}{sin\ \theta} = \frac{2}{sin\theta} = 2cosec\ \theta$$

8. The value of $\frac{3}{cot^2\theta} - \frac{3}{cos^2\theta}$ is equal to : (1) $\frac{1}{3}$ (2) 3 (3) 0 (4) -3

$$\frac{3}{cot^2\theta} - \frac{3}{cos^2\theta} = 3\left[\frac{1}{cot^2\theta} - \frac{1}{cos^2\theta}\right] = 3\left[\frac{sin^2\theta}{cos^2\theta} - \frac{1}{cos^2\theta}\right] = \frac{3}{cos^2\theta}(sin^2\theta - 1) = \frac{3}{cos^2\theta} \times cos^2\theta = 3$$

9. If $sin(\alpha + \beta) = 1$ then $cos(\alpha - \beta)$ can be reduced to :

(1) $sin\ \alpha$ (2) $cos\ \beta$ (3) $sin\ 2\beta$ (4) $cos\ 2\beta$

If $sin(\alpha + \beta) = 1$; then $\alpha + \beta = 90°$; $\alpha = 90° - \beta$ $[\because sin\ 90° = 1]$

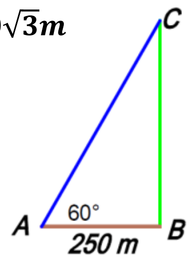
$$cos(\alpha - \beta) = cos(90° - \beta - \beta)$$
$$= cos(90° - 2\beta) \quad [\because cos(90° - \theta) = sin\theta]$$
$$= sin\ 2\beta$$

10. If $x = asec\ \theta$ and $= btan\ \theta$, then $b^2x^2 - a^2y^2$ is equal to :

(1) ab (2) $a^2 - b^2$ (3) $a^2 + b^2$ (4) a^2b^2

$$b^2x^2 - a^2y^2 = (bx + ay)(bx - ay)$$
$$= (basec\ \theta + abtan\ \theta)(basec\ \theta - abtan\ \theta)$$
$$= ab(sec\ \theta + tan\ \theta)ab(sec\ \theta - tan\ \theta)$$
$$= a^2b^2(sec^2\theta - tan^2\theta) = a^2b^2 \quad [\because (sec^2\theta - tan^2\theta) = 1]$$

11. The angle of elevation of the top of tree from a point at a distance of 250 m from its base is 60 ° . The heights of the tree is : (1) $250\ m$ (2) $250\sqrt{3}\ m$ (3) $\frac{250}{3}m$ (4) $200\sqrt{3}m$

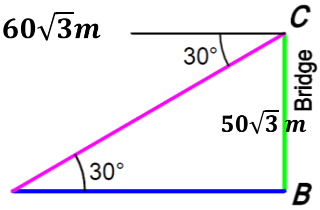


BC is height of the tree, Angle of elevation $= 60°$

From ΔABC, $tan\ 60° = \frac{BC}{AB} = \frac{BC}{250}$

$$\sqrt{3} = \frac{BC}{250}\ ;\ BC = 250\sqrt{3}\ m$$

12. The angle of depression of a boat from a $50\sqrt{3}\ m$ high bridge is ° . The horizontal distance of the boat from the bridge is : $(1)\ 150\ m$ $\quad(2)\ 150\sqrt{3}m$ $\quad(3)\ 60\ m$ $\quad(4)\ 60\sqrt{3}m$



BC is the height of the bridge $= 50\sqrt{3}\ m$; The boat point is at A

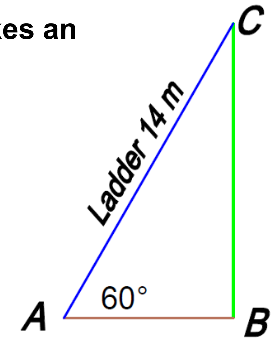
$Angle\ of\ depression\ from\ C = Angle\ of\ Elvation\ from\ A = 30°$

$From\ \Delta ABC,\ \ tan\ 30° = \frac{BC}{AB} = \frac{50\sqrt{3}}{AB}$

$\frac{1}{\sqrt{3}} = \frac{50\sqrt{3}}{AB}$; $\quad AB = 50\sqrt{3} \times \sqrt{3} = 50 \times 3 = 150\ m$

13. A Ladder of length 14 m just reaches the top of a wall. If the ladder makes an angle of 60 ° with the horizontal, then the height of the wall is :

$(1) 14\sqrt{3}\ m$ $\quad(2)\ 28\sqrt{3}\ m$ $\quad(3)\ 7\sqrt{3}\ m$ $\quad(4)\ 35\sqrt{3}\ m$



BC is the height of the wall

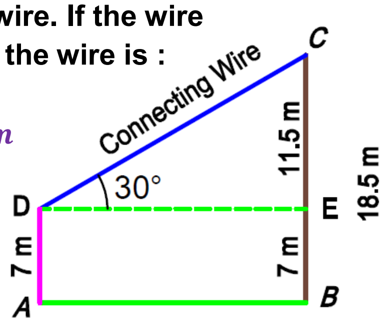
$Angle\ of\ Elvation\ from\ A = 60°$

$From\ \Delta ABC,\ \ sin\ 60° = \frac{BC}{AC} = \frac{BC}{14}$

$\frac{\sqrt{3}}{2} = \frac{BC}{14}$; $\quad BC = \frac{14\times\sqrt{3}}{2} = 7\sqrt{3}\ m$

14. The top of two poles of height 18.5 m and 7 m are connected by a wire. If the wire makes an angle of measure 30 ° with horizontal, then the length of the wire is :

$(1)\ 23\ m$ $\quad(2)\ 18\ m$ $\quad(3)\ 28\ m$ $\quad(4)\ 25.5\ m$



Height of the pole : $AD = 7\ m$ and Height of the pole : $BC = 18.5\ m$

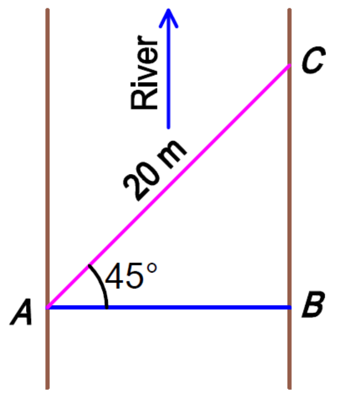
Difference in height : $EC = 18.5 - 7.0 = 11.5\ m$

$From\ \Delta DEC,\ \ sin\ 30° = \frac{EC}{DC} = \frac{11.5}{DC}$

$\frac{1}{2} = \frac{11.5}{DC}$; $\quad DC = 2 \times 11.5 = 23\ m$

15. The banks of a river are parallel. A swimmer starts from a point on one of the banks and swims in a straight line inclined to the bank at 45 ° and reaches the opposite bank at a point 20 m , from the point opposite to the starting point. The breadth of the river is equal to :

$(1)\ 12.12\ m$ $\quad(2)\ 14.14\ m$ $\quad(3) 16.16\ m$ $\quad(4)\ 18.18\ m$ $\qquad(\sqrt{2} = 1.414)$



AB is the width of river.

AC is the swimmer's path at an inclination $45°$

$From\ \Delta ABC,\ \ cos\ 45° = \frac{AB}{AC} = \frac{AB}{20}$

$\frac{1}{\sqrt{2}} = \frac{AB}{20}$

$AB = \frac{20}{\sqrt{2}}$

$= \frac{10\times\sqrt{2}\times\sqrt{2}}{\sqrt{2}}$

$= 10\sqrt{2}$

$= 10 \times 1.414$

$= 14.14\ m$

எளிதாய் விளங்கும் கல்வியை
இளமையில் விரும்பிக் கற்றிடு
வானமாய் விரிந்த கல்வியை
பாணமாய் விரைந்து கற்றிடு
தானமாய் பெற்ற கல்வியைத்
தரணியில் பலருக் களித்திடு.

Exercise 7.5

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is

(1) $60\pi\ cm^2$ (2) $68\pi\ cm^2$ (3) $120\pi\ cm^2$ (4) $136\pi\ cm^2$

$Diameter : d = 16\ cm$; $\therefore Radius : r = \frac{d}{2} = \frac{16}{2} = 8\ cm$; $Height : h = 15\ cm$

Slanting length : $l = \sqrt{r^2 + h^2} = \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17\ cm$

CSA of a right circular cone$= \pi rl = \pi \times 8 \times 17 = 136\pi\ cm^2$

2. If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is :

(1) $4\pi r^2\ sq.units$ (2) $6\pi r^2\ sq.units$ (3) $3\pi r^2\ sq.units$ (4) $8\pi r^2\ sq.units$

If two solid hemispheres as said are joined together, it will make a solid sphere whose $CSA = 4\pi r^2\ sq.units$

3. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(1) $12\ cm$ (2) $10\ cm$ (3) $13\ cm$ (4) $5\ cm$

Height of the cone : $h = \sqrt{l^2 - r^2} = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12\ cm$

4. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is :

(1) $1 : 2$ (2) $1 : 4$ (3) $1 : 6$ (4) $1 : 8$

Let the original radius be r unit and it's height be h unit

Then the new cone radius is $\frac{r}{2}$ unit and it's height is h unit

Ratio of Vol. of New cone to the old is : $\pi\left(\frac{r}{2}\right)^2 h : \pi r^2 h$

$$\pi\frac{r^2}{4}h : \pi r^2 h$$

$$\cancel{\pi r^2} h\left(\frac{1}{4}\right) : \cancel{\pi r^2} h(1)$$

$$\frac{1}{4} : 1$$

Multipying both sides by 4 → $1 : 4$

5. The total surface area of a cylinder whose radius is 1/3 of its height is

(1) $\frac{9\pi h^2}{8}\ sq.units$ (2) $24\pi h^2\ sq.units$ (3) $\frac{8\pi h^2}{9}\ sq.units$ (4) $\frac{56\pi h^2}{9}\ sq.units$

Let the height of the cylinder be h unit ; $\therefore$ It's radius r $= \frac{h}{3}$ $unit$

TSA of the cylinder $= 2\pi r(h + r)$; $\frac{2\pi h}{3}\left[h + \frac{h}{3}\right]$; $\frac{2\pi h}{3}\left[\frac{3h+h}{3}\right]$; $\frac{2\pi h}{3}\left[\frac{4h}{3}\right] = \frac{8\pi h^2}{9}\ sq.units$

6. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is

(1) $5600\pi\ cm^3$ (2) $1120\pi\ cm^3$ ($\cancel{11200\pi}\ cm^3$) (3) $56\pi\ cm^3$ (4) $3600\pi\ cm^3$

Here $(R + r) = 14\ cm$; Thickness : $(R - r) = 4\ cm$; Height : $h = 20\ cm$

Vol. of hollow cylinder $= \pi h(R + r)(R - r) = \pi \times 20 \times 14 \times 4 = 1120\pi\ cm^3$

7. If the radius of the base of a cone is tripled and the height is doubled then the volume is :

(1) made 6 times (2) made 18 times (3) made 12 times (4) unchanged

Vol. of a cone $= \frac{1}{3}\pi r^2 h$; New radius $= 3r$; New height $= 2h$

Vol. of cone thus formed $= \frac{1}{3}\pi(3r)^2(2h) = \frac{1}{3}\pi 9r^2(2h) = 18 \times \frac{1}{3}\pi r^2 h$; ∴18 times the original

8. The total surface area of a hemi-sphere is how much times the square of its radius.

(1) π (2) 4π (3) 3π (4) 2π

TSA of a hemi-sphere $= 3\pi r^2 = 3\pi \times square\ of\ it's radius.$ ∴ 3π times the square of its radius

9. A solid sphere of radius $x\ cm$ is melted and cast into a shape of a solid cone of same radius. The height of the cone is : $(1)\ 3x\ cm$ $(2)\ x\ cm$ $(3)\ 4x\ cm$ $(4)\ 2x\ cm$

Vol. of the cone thus formed = Vol. of the sphere

$$\frac{1}{3}\pi x^2 h = \frac{4}{3}\pi x^3$$

$$\frac{1}{3}\cancel{\pi x^2} h = \frac{1}{3}\cancel{\pi x^2} 4x \ ; \quad \therefore h = 4x\ cm$$

10. A frustum of a right circular cone is of height $16\ cm$ with radii of its ends as $8\ cm$ and $20\ cm$. Then, the volume of the frustum is :$(1) 3328\pi cm^3$ $(2) 3228\pi cm^3$ $(3) 3240\pi cm^3$ $(4) 3340\pi cm^3$

Vol. of the frustum cone $= \frac{1}{3}\pi\left(R^2 + Rr + r^2\right)h$

$$= \frac{1}{3}\pi\left(20^2 + 20 \times 8 + 8^2\right)16$$

$$= \frac{1}{3}\pi(400 + 160 + 64)16 = \frac{1}{\cancel{3}}\pi \times \overset{208}{\cancel{624}} \times 16 = 3328\pi\ cm^3$$

11. A shuttle cock used for playing badminton has the shape of the combination of

(1) *a cylinder and a sphere* (2) *a hemisphere and a cone*

(3) *a sphere and a cone* (4) *frustum of a cone and a hemisphere*

12. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is : $(1)\ 2{:}1$ $(2)\ 1{:}2$ $(3)\ 4{:}1$ $(4)\ 1{:}4$

$l.of\ sphere\ whose\ radius\ r_1 = 8 \times Vol.of\ sphere\ whose\ radius\ r_2$

$$\frac{4}{3}\pi {r_1}^3 = 8 \times \frac{4}{3}\pi {r_2}^3$$

$${r_1}^3 = 8 \times {r_2}^3$$

Taking cube root on both sides $\rightarrow$ $r_1 = 2r_2$

$\therefore\ r_1 : r_2 = 2\cancel{r_2} : \cancel{r_2}$

$= 2 : 1$

13. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is : $(1)\ \frac{4}{3}\pi$ $(2)\ \frac{10}{3}\pi$ $(3)\ 5\pi$ $(4)\ \frac{20}{3}\pi$

The greatest dia. of sphere = Dia. of cylindrical log = 2 cm

$\therefore$ The radius of greatest sphere = 1cm . It's volume $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \times 1^3 = \frac{4}{3}\pi$

14. The height and radius of the cone of which the frustum is a part are h_1 units and $r_1$units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1$ = 1 : 2 then $r_2 : r_1$ is : $(1)\ 1 : 3$ $(2)\ 1 : 2$ $(3)\ 2 : 1$ $(4)\ 3 : 1$

$h_2 : h_1 = 1 : 2$

In a frustum cone, their heights and it's radii are directly proportional. $\therefore r_2 : r_1 = 1 : 2$

15. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is : $(1)\ 1{:}2{:}3$ $(2)\ 2{:}1{:}3$ $(3)\ 1{:}3{:}2$ $(4)\ 3{:}1{:}2$

Let the diameter $d = 2$ units and height $h = 2$ units $\therefore$ It's radius $r = 1$ unit

Volume of cylinder $= \pi r^2 h = \pi \times 1^2 \times 2 = 2\pi\ cu.units$

Volume of cone $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 1^2 \times 2 = \frac{2\pi}{3}\ cu.units$

Volume of sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3} \times \pi \times 1^3 = \frac{4\pi}{3}\ cu.units$

Their volume's ratios is $= 2\pi : \frac{2\pi}{3} : \frac{4\pi}{3}$

Multipyling all by $\frac{3}{2\pi}$ $\rightarrow$ $= \frac{3}{2\pi} \times 2\pi : \frac{3}{2\pi} \times \frac{2\pi}{3} : \frac{3}{2\pi} \times \frac{4\pi}{3}$

$= 3 : 1 : 2$

Chapter- 7 :

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
(1) $60\pi\ cm^2$ (2) $68\pi\ cm^2$ (3) $120\pi\ cm^2$ (4) $136\pi\ cm^2$ $[It's\ a\ repeated\ one]$
$Diameter : d = 16\ cm$; $\therefore Radius : r = \frac{d}{2} = \frac{16}{2} = 8\ cm$; $Height : h = 15\ cm$
Slanting length : $l = \sqrt{r^2 + h^2} = \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17\ cm$
CSA of a right circular cone$= \pi rl = \pi \times 8 \times 17 = 136\pi\ cm^2$

2. If S_1 denotes the total surface area of a sphere of radius r and S_2 denotes the total surface area of a cylinder of base radius r and height 2r ,then :
(1) $S_1 = S_2$ (2) $S_1 > S_2$ (3) $S_1 < S_2$ (4) $S_1 = 2S_2$
TSA of a sphere whose radius r : $S_1 = 4\pi r^2$ ------- ①
TSA of a cylinder whose radius r and height 2r : $S_2 = 2\pi r(h + r) = 2\pi r(2r + r) = 6\pi r^2$ ----- ②
Comparing ① and ②, $S_1 < S_2$

3. The ratio of the volumes of two spheres is 8:27. If r and R are the radii of spheres respectively, Then $(R - r) : r$ is : (1) $1 : 2$ (2) $1 : 3$ (3) $2 : 3$ (4) $4 : 9$
Volume's ratio $= 8 : 27$
$\therefore$ It's radii's ratio $r : R = \sqrt[3]{8} : \sqrt[3]{27} = 2 : 3$
$\therefore (R - r) : r = (3 - 2) : 2 = 1 : 2$

4. The radius of a wire is decreased to one-third of the original. If volume remains the same, then the length will be increased _____ of the original.:
(1) $3\ times$ (2) $6\ times$ (3) $9\ times$ (4) $27\ times$
If the radius is decreases by one-third, then it's area is reduced by 9 times. $[Square\ of\ it's\ radius]$
$\therefore$ The length should be increased by 9 times to have the volume.

5. The height of a cone is 60 cm . A small cone is cut off at the top by a plane parallel to the base and its volume is $\left[\frac{1}{64}\right]^{th}$ the volume of the original cone. Then the height of the smaller cone is
(1) $45\ cm$ (2) $30\ cm$ (3) $15\ cm$ (4) $20\ cm$
Volume is reduced by $= \frac{1}{64}$; $\therefore It's\ height\ is\ reduced\ by = \sqrt[3]{\frac{1}{64}} = \frac{1}{4}\ times = \frac{1}{4} \times 60 = 15\ cm$

6. A solid frustum is of height 8 cm . If the radii of its lower and upper ends are 3 cm and 9 cm respectively, then its slant height is : (1) $15\ cm$ (2) $12\ cm$ (3) $10\ cm$ (4) $17\ cm$
Difference in radii $= 9 - 3 = 6\ cm$. $\therefore$ It's slant height$= \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10\ cm$

7. A solid is hemispherical at the bottom and conical above. If the curved surface areas of the two parts are equal, then the ratio of its radius and the height of its conical part is :
(1) $1 : 3$ (2) $1 : \sqrt{3}$ (3) $1 : 1$ (4) $\sqrt{3} : 1$
Here the radius is common for cone and hemisphere
$CSA\ of\ the\ cone = CSA\ of\ the\ hemisphere$
$\pi rl = 2\pi r^2$; $\therefore l = 2r$; $\sqrt{h^2 + r^2} = 2r$;
$h^2 + r^2 = 4r^2$; $h^2 = 3r^2$; $h = \sqrt{3}r$; $\frac{r}{h} = \frac{1}{\sqrt{3}}$; $r : h = 1 : \sqrt{3}$

8. The material of a cone is converted into the shape of a cylinder of equal radius. If the height of the cylinder is 5 cm , then height of the cone is : (1) $10\ cm$ (2) $15\ cm$ (3) $18\ cm$ (4) $24\ cm$
$Volume\ of\ the\ cone = Volume\ of\ the\ cylinder$; Also Radii are equal for both.
$\frac{1}{3}\cancel{\pi r^2}h = \cancel{\pi r^2} \times 5$; $\therefore h = 3 \times 5 = 15\ cm$

9. The curved surface area of a cylinder is $264\ cm^2$ and its volume is $924\ cm^2$. The ratio of diameter to its height is : (1) $3:7$ (2) $7:3$ (3) $6:7$ (4) $7:6$
$CSA\ of\ the\ Cylinder = 2\pi rh = 264\ cm^2$ ------- ①

$Volume\ of\ the\ Cylinder\ = \pi r^2 h = 924\ cm^2$ ------- ②

② ÷ ① → $\frac{\pi r^2 h}{2\pi r h} = \frac{924}{264}$; $r = \frac{924\times 2}{264} = 7\ cm$; Diameter $= 2r = 14\ cm$

From ① $2 \times \frac{22}{\cancel{7}} \times \cancel{7} \times h = 264$; $h = \frac{264}{2\times 22} = 6\ cm$; $d : h = 14 : 6 = 7 : 3$

10. When Karuna divided surface area of a sphere by the sphere's volume, he got the answer as $\frac{1}{3}$. What is the radius of the sphere? : (1) $24\ cm$ (2) $9\ cm$ ($6\ \cancel{cm}$) (3) $54\ cm$ (4) $4.5\ cm$

$\frac{Surface\ area\ of\ the\ sphere}{Volume\ of\ the\ sphere} = \frac{4\pi r^2}{\frac{4\pi r^3}{3}} = \frac{1}{3}$; $\frac{3}{r} = \frac{1}{3}$; $\therefore r = 9\ cm$

11. A spherical steel ball is melted to make 8 new identical balls. Then the radius each new ball is how much times the radius of the original ball? : (1) $\frac{1}{3}$ (2) $\frac{1}{4}$ (3) $\frac{1}{2}$ (4) $\frac{1}{8}$

If a spherical steel ball is melted to make 8 new identical balls,

Then it's radius is reduced by $\sqrt[3]{\frac{1}{8}} = \frac{1}{2}\ times.$

12. A semicircular thin sheet of a metal of diameter 28 cm is bent and an open conical cup is made. What is the capacity of the cup? :

(1) $\left[\frac{1000}{3}\right]\sqrt{3}\ cm^3$ (2) $300\sqrt{3}\ cm^3$ (3) $\left[\frac{700}{3}\right]\sqrt{3}\ cm^3$ (4) $\left[\frac{1078}{3}\right]\sqrt{3}\ cm^3$

$Perimeter\ of\ cone\ formed = Perimeter\ of\ the\ curved\ length\ of\ the\ semicircular\ sheet$

$2\pi r = 2\pi \times \frac{14}{2}$; $r = 7\ cm$

$Also\ slanting\ height\ (l)\ of\ the\ cone = Radius\ of\ semicircular\ sheet$; $l = 14\ cm$

Height of the conical cup $h = \sqrt{l^2 - r^2} = \sqrt{14^2 - 7^2} = \sqrt{(2\times 7)^2 - (2\times 7)^2} = \sqrt{7^2(4-1)} = 7\sqrt{3}$

Volume of the conical cup $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{\cancel{7}} \times 7^2 \times \cancel{7}\sqrt{3} = \left[\frac{1078}{3}\right]\sqrt{3}\ cm^3$

13. A cone of height 9 cm with diameter of its base 18 cm is carved out from a wooden solid sphere of radius 9 c m . The percentage of wood wasted is : (1) 45% (2) 56% (3) 67% (4) 75%

Volume of the sphere $= \frac{4\pi r^3}{3} = \frac{4\times\pi\times 9^3}{3} = 972\pi\ cm^3$

Volume of the cone $= \frac{\pi r^2 h}{3} = \frac{\pi\times 9^2\times 9}{3} = 243\pi\ cm^3$; Wastage $= 972\pi - 243\pi = 729\pi\ cm^3$

Percentage of wastage $= \frac{Wastage}{\text{Volume of the sphere}} \times 100$

$= \frac{729\pi}{972\pi} \times 100 = 75\%$

14. A cylinder having radius 1 m and height 5 m is completely filled with milk. In how many conical flasks can this milk be filled if the flask radius and height is 50 cm each?

(1) 50 (2) 500 (3) 120 (4) 160

Number of flask filled $= \frac{Vol.of\ the\ cylinder}{Vol.of one\ conical\ flask} = \frac{\pi r^2 h}{\frac{\pi r^2 h}{3}} = \frac{3\pi r^2 h}{\pi r^2 h} = \frac{3\times\pi\times 100\times 100\times 500}{\pi\times 50\times 50\times 50} = 120$

15. A floating boat having a length 3 m and breadth 2 m is floating on a lake. The boat sinks by 1 cm when a man gets into it. The mass of the man is (density of water is 1000 kg/m 3)

(1) $50\ kg$ (2) $60\ kg$ (3) $70\ kg$ (4) $80\ kg$

$Mass\ of\ the\ man\ = Mass\ of\ the\ water\ displaced\ by\ the\ boat\ (i.e. sunk\ by\ the\ boat)$

$= 3 \times 2 \times 0.01 \times 1000$

$= 60\ kg$

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Exercise 8.5

1. Which of the following is not a measure of dispersion?

(1) *Range* (2) *Standard deviation* (3) *Arithmetic mean* (4) *Variance*

2. The range of the data 8, 8, 8, 8, 8. . . 8 is : (1) 0 (2) 1 (3) 8 (4) 3

$Range = Largest - Smallest$; $Range = 8 - 8 = 0$

3. The sum of all deviations of the data from its mean is

(1) *Always positive* (2) *always negative* (3) *zero* (4) *non − zero integer*

4. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all deviations is : (1) 40000 (2) 900 ($\cancel{160900}$) (3) 160000 (4) 30000

$\sum {d_i}^2$ *is the sum of the squares all deviations,* n *is number of observations* $= 100$; $\sigma = 3$

Standard deviation $\sigma = \sqrt{\frac{\sum {d_i}^2}{n}}$; (or) $\sqrt{\frac{\sum {d_i}^2}{n}} = \sigma$; $\sqrt{\frac{\sum {d_i}^2}{100}} = 3$; $\frac{\sum {d_i}^2}{100} = 3^2$; $\sum {d_i}^2 = 100 \times 9 = 900$

5. Variance of first 20 natural numbers is : (1) 32.25 (2) 44.25 (3) 33.25 (4) 30

Variance of n natural numbers : $\sigma^2 = \frac{n^2-1}{12} = \frac{20^2-1}{12} = \frac{400-1}{12} = \frac{399}{12} = 33.25$

6. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is

(1) 3 (2) 15 (3) 5 (4) 225

If each value is multiplied by 5, then the new SD : $= 5 \times \sigma = 5 \times 3 = 15$

Variance of n natural numbers : $\sigma^2 = 15^2 = 225$

7. If the standard deviation of x, y, z is p then the standard deviation of 3x + 5 , 3y + 5 , 3z + 5 is :

(1) $3p + 5$ (2) $3p$ (3) $p + 5$ (4) $9p + 15$

SD will not change for addition and subtraction.

But it will change for multiplication and division accordingly. ∴The new SD $= 3p$

8. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is

(1) 3.5 (2) 3 (3) 4.5 (4) 2.5

$C.V. = \frac{\sigma \times 100}{\bar{x}}$; (Or) $\frac{\sigma \times 100}{4} = 87.5$; $\sigma = \frac{4 \times 87.5}{100} = \frac{350}{100} = 3.50$

9. Which of the following is incorrect?

(1) $P(A) > 1$ (2) $0 \le P(A) \le 1$ (3) $P(\emptyset) = 0$ (4) $P(A) + P(\bar{A}) = 1$

10. The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is : (1) $\frac{q}{p+q+r}$ (2) $\frac{p}{p+q+r}$ (3) $\frac{p+q}{p+q+r}$ (4) $\frac{p+r}{p+q+r}$

$n(S) = p + q + r$; $n(A) = p$; $\therefore P(A) = \frac{n(A)}{n(S)} = \frac{p}{p+q+r}$

11. A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is : (1) $\frac{3}{10}$ (2) $\frac{7}{10}$ (3) $\frac{3}{9}$ (4) $\frac{7}{9}$

$S\ (All\ possible\ uint\ places) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$; $n(S) = 10$

$A\ (Unit\ places\ selected\ is\ less\ than\ 7) = \{0, 1, 2, 3, 4, 5, 6\}$; $n(A) = 7$; $P(A) = \frac{n(A)}{n(S)} = \frac{7}{10}$

12. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$ then the value of x is : (1) 2 (2) 1 (3) 3 (4) 1.5

$P(A) = \frac{x}{3}$; $P(\bar{A}) = \frac{2}{3}$; $P(A) + P(\bar{A}) = 1$

$\frac{x}{3} + \frac{2}{3} = 1$; $\frac{x}{3} = 1 - \frac{2}{3} = \frac{1}{3}$; $x = 1$

13. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is $\frac{1}{9}$, then the number of tickets bought by Kamalam is

(1) 5 (2) 10 (3) 15 (4) 20

$n(S) = 135$, $P(A) = \frac{1}{9}$; $P(A) = \frac{n(A)}{n(S)}$; $n(A) = P(A) \times n(S)$; $n(A) = \frac{1}{9} \times 135 = 15$

14. If a letter is chosen at random from the English alphabets$\{a, b, \dots, z\}$, then the probability that the letter chosen precedes x : (1) $\frac{12}{13}$ (2) $\frac{1}{13}$ (3) $\frac{23}{26}$ (4) $\frac{3}{26}$

$S\ (English\ alphabets) = \{a, b, \dots, z\}$; $n(S) = 26$

$A\ (The\ letter\ chosen\ precedes\ x) = \{a, b, \dots, w\}$; $n(A) = 23$; $P(A) = \frac{n(A)}{n(S)} = \frac{23}{26}$

15. A purse contains 10 notes of Rs.2000, 15 notes of Rs. 500, and 25 notes of Rs.200. One note is drawn at random. What is the probability that the note is either a ₹500 note or ₹200 note?

(1) $\frac{1}{5}$ (2) $\frac{3}{10}$ (3) $\frac{2}{3}$ (4) $\frac{4}{5}$

$S = Total\ number\ of\ notes\ of\ currency$; $n(S) = 10 + 15 + 25 = 50$

$A = Total\ number\ of\ notes\ of\ currency\ of\ 200\ and\ 500$; $n(A) = 15 + 25 = 40$

$P(A) = \frac{n(A)}{n(S)} = \frac{40}{50} = \frac{4}{5}$

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Chapter- 8 :

1. The range of first 10 prime numbers is : (1) 9 (2) 20 (3) 27 (4) 5

The first 10 prime numbers $= \{2, 3, 5, 7, 11, 13, 17, 19, 23, 29\}$; $Range = L - S = 29 - 2 = 27$

2. If the smallest value and co-efficient of range of a data are 25 and 0.5 respectively. Then the largest value is : (1) 25 (2) 75 (3) 100 (4) 12.5

$co-efficient\ of\ range = \frac{L-S}{L+S}$; $\frac{L-25}{L+25} = 0.5$; $L - 25 = 0.5L + 12.5$; $0.5L = 37.5$; $L = \frac{37.5}{0.5} = 75$

3. If the observations 1, 2, 3, … 50 have the variance V_1 and the observations 51, 52, 53, . . .100 have the variance V_2 then $\frac{V_1}{V_2}$ is : (1) 2 (2) 1 (3) (4) 0

$The\ 1^{st}\ observation = \{1, 2, 3, \dots 50\}$; $Let\ the\ SD\ of\ this = \sigma$; $\therefore It's\ variance\ (V_1) = \sigma^2$

$The\ 2^{nd}\ observation = \{51, 52, 53, \dots 100\}$.

$It\ can\ be\ rewritten\ as = \{1 + 50,\ 2 + 50,\ 3 + 50, \dots 50 + 50\}$

Now it is a constant addition 50 in each term of 1st observation.

$\therefore$ $The\ SD\ of\ the\ 2nd\ observation\ also = \sigma$; $\therefore It's\ variance\ also\ (V_2) = \sigma^2$; $\frac{V_1}{V_2} = \frac{\sigma^2}{\sigma^2} = 1$

4. If the standard deviation of a variable x is 4 and if $= \frac{3x+5}{4}$, then the standard deviation of y is :

(1) 4 (2) 3.5 (3) 3 (4) 2.5

$x = 4$; $y = \frac{3x+5}{4} = \frac{3x}{4} + \frac{5}{4}$; $y = \frac{3x}{4} = \frac{3\times4}{4} = 3$ $[SD\ will\ not\ change\ for\ addition\ and\ subtraction]$

5. If the data is multiplied by 4, then the corresponding variance is get multiplied by :

(1) 4 (2) 16 (3) 2 (4) $None$

Before multiplying by 4, let the SD $= \sigma$; And it's variance $= \sigma^2$

If the data is multiplied by 4, then the new SD $= 4\sigma$; $\therefore$ It's new variance $= (4\sigma)^2 = 16 \times \sigma^2$

6. If the co-efficient of variation and standard deviation of a data are 35% and 7.7 respectively then the mean is : (1) 20 (2) 30 (3) 25 (4) 22

$C.V. = \frac{\sigma\times100}{\bar{x}}$; (Or) $\frac{7.7\times100}{\bar{x}} = 35$; $\bar{x} = \frac{7.7\times100}{35} = \frac{770}{35} = 22$

7. The batsman A is more consistent than batsman B if

(1) $C.V\ of\ A > C.V\ of\ B$ (2) $C.V\ of\ A < C.V\ of\ B$

(3) $C.V\ of\ A = C.V\ of\ B$ (4) $C.V\ of\ A \geq C.V\ of\ B$

8. If an event occurs surely, then its probability is : (1) 1 (2) 0 (3) $\frac{1}{2}$ (4) $\frac{3}{4}$

9. A letter is selected at random from the word 'PROBABILITY'. The probability that it is not a vowel is : (1) $\frac{4}{11}$ (2) $\frac{7}{11}$ (3) $\frac{3}{11}$ (4) $\frac{6}{11}$

$S\ (All\ letters) = \{P, R, O, B, A, B, I, L, I, T, Y\}$; $n(S) = 11$

$A\ (Letters\ excluding\ vowels) = \{P, R, B, B, L, T, Y\}$; $n(A) = 7$; $P(A) = \frac{n(A)}{n(S)} = \frac{7}{11}$

10. In a competition containing two events A and B , the probability of winning the events A and B are $\frac{1}{3}$ and $\frac{1}{4}$ respectively and the probability of winning both the events is $\frac{1}{4}$. The probability of winning only one event is : (1) $\frac{1}{12}$ (2) $\frac{5}{12}$ (3) $\frac{1}{12}$ (4) $\frac{7}{12}$

$P(A) = \frac{1}{3}$; $P(B) = \frac{1}{4}$; $P(A \cap B) = \frac{1}{12}$;

$P(only\ A) = P(A) - P(A \cap B) = \frac{1}{3} - \frac{1}{12} = \frac{4-1}{12} = \frac{3}{12}$

$P(only\ B) = P(B) - P(A \cap B) = \frac{1}{4} - \frac{1}{12} = \frac{3-1}{12} = \frac{2}{12}$

$P(only\ A) + P(only\ B) = \frac{3}{12} + \frac{2}{12} = \frac{5}{12}$

11. A number x is chosen at random from $-4, -3, -2, -1, 0, 1, 2, 3, 4$. The probability that $|x| \leq 3$ is : (1) $\frac{3}{9}$ (2) $\frac{4}{9}$ (3) $\frac{1}{9}$ (4) $\frac{7}{9}$

$S = \{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$; $n(S) = 9$

$A\ (|x| \leq 3) = \{-3, -2, -1, 0, 1, 2, 3\}$; $n(A) = 7$; $P(A) = \frac{n(A)}{n(S)} = \frac{7}{9}$

12. If the probability of non-happening of an event is , then the probability of happening of the event is : (1) $1 - q$ (2) q (3) $\frac{q}{2}$ (4) $2q$

$P(\bar{A}) = q$; $P(A) + P(\bar{A}) = 1$; $\therefore P(A) = 1 - P(\bar{A}) = 1 - q$

13. In one thousand lottery tickets, there are 50 prizes to be given. The probability of Mani winning a prize who bought one ticket is : (1) $\frac{1}{50}$ (2) $\frac{1}{100}$ (3) $\frac{1}{1000}$ (4) $\frac{1}{20}$

$Total\ lottery\ tickets :\ n(S) = 1000$;

$Prizes\ given\ : n(A) = 50$; $P(A) = \frac{n(A)}{n(S)} = \frac{50}{1000} = \frac{1}{20}$

14. When three coins are tossed, the probability of getting the same face on all the three coins is (1) $\frac{1}{8}$ (2) $\frac{1}{4}$ (3) $\frac{3}{8}$ (4) $\frac{1}{3}$

$Sample\ space\ of\ tossing\ 3\ coins :\ \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$; $n(S) = 8$

$A\ (Getting\ the\ same\ face) = \{HHH,\ TTT\}$; $n(A) = 2$; $P(A) = \frac{n(A)}{n(S)} = \frac{2}{8} = \frac{1}{4}$

15. A box contains some milk chocolates and some coco chocolates and there are 60 chocolates in the box. If the probability of taking a milk chocolate is $\frac{2}{3}$ then the number of coco chocolates is : (1) 40 (2) 50 (3) 20 (4) 30

$Let\ \ P(A)\ is\ the\ probability\ of\ taking\ a\ milk\ chocolate = \frac{2}{3}$

$n(S) = 60$; $P(A) = \frac{n(A)}{n(S)}$; $n(A) = P(A) \times n(S) = \frac{2}{3} \times 60 = 40$; $n(B) = 60 - 40 = 20$

$Number\ of\ coco\ chocolates = 20$

Each and Every 10^{th} Student Must familiar with the following Basic and Essential Concepts which have been already studied in the previous classes.

1. Clear understanding of the various numbers such as Natural ($\mathbb{N}$), Whole ($\mathbb{W}$), Integer ($\mathbb{Z}$), Rational ($\mathbb{Q}$), Irrational ($\mathbb{Q}'$), Real numbers($\mathbb{R}$) and the differences between them.

2. Also Odd number, Even number, Prime numbers and Composite numbers upto 100, Prime factors, Perfect square numbers (1,4,9,16,25, .. etc), Perfect cube numbers. (1, 8,27,64,125,..etc)

3. Shortcuts and BODMAS in $+, -, \times, \div$ for Quickness. i.e. 190 x 30 = 5700 etc

4. Knowing all the fractions (Proper, Improper, Mixed, Like, Unlike), shortcut to find LCM for it's operations. (For example LCM of 5 and 25 is 25 because 25 is divisible by 5. LCM of 11 and 12 is (11x12) = 132 because of consecutive numbers & also for consecutive odd numbers but this not applicable consecutive odd numbers and etc like this.)

5. Proportions, Ratios and Conversion of Ratios → Fraction → Percentage → Decimal etc.

6. Decimal numbers calculations and placing correct decimal point during multiplication.

7. Sharpness of placing (+, –) signs during fundamental operations. i.e. $(-2)^2 = 4$; $(-2)^3 = -8$ etc.

8. Divisibility checks for easy cut shorting the fractions. (For 2, 3, 4, 5, 6, 8, 9, 10, 11, etc)

9. Squares of numbers up to 20. Shortcut methods to find the squaring.

1^2	2^2	3^2	4^2	5^2	6^2	7^2	8^2	9^2	10^2	11^2	12^2	13^2	14^2	15^2	16^2	17^2	18^2	19^2	20^2
1	4	9	16	25	36	49	64	81	100	121	144	169	196	225	256	289	324	361	400

35 x 35 =(3x4)(5x5) = 1225; 65 x 65 =(6x7)(5x5) = 4225; 105 x 105 =(10x11)(5x5) = 11025

$13^2 = 169$; $\therefore 130^2 = 16900$; $1300^2 = 1690000$; $600^2 = 360000$; $2500^2 = 6250000$

$20^2 = 400$; $\therefore 21^2 = 400 + (20+21) = 441$; $19^2 = 400 - (20+19) = 361$; $29^2 = 900 - (30+29) = 841$

$99^2 = 10000 - (100+99) = 9801$; $201^2 = 40000 + (200+201) = 40401$; Practice likewise.

10. Actual method of Square rooting the numbers of perfect squares and other numbers and decimals. As per (8) we can easily find out certain square roots. If the unit places are 1, 4, 5, 6, 9 and with ending 00, 0000 etc then it may be a perfect square (not sure). But If the unit places are 2, 3, 7, 8 and ending with 0, 000, 00000, then it will never be a perfect square. (Note : A shortcut to find out square root is attached. It is much useful for the 8^{th} chapter.)

11. Knowing of $\sqrt{2} = 1.414$; $\sqrt{3} = 1.732$; $\sqrt{5} = 2.236$; $\sqrt{6} = 2.45$; $\sqrt{10} = 3.16$ etc will be better.

12. Similarly remember the cubes of numbers up to 10 and cube roots of it.

13. Surds rules like $\sqrt{6} = \sqrt{3 \times 2} = \sqrt{3} \times \sqrt{2}$; $8\sqrt{5} + 3\sqrt{5} = 11\sqrt{5}$; $5\sqrt{7} - 4\sqrt{7} = \sqrt{7}$ etc

14. Exponents rules such as : $a^m \, x \, a^n = a^{m+n}$; $\frac{a^m}{a^n} = a^{m-n}$; $(ab)^m = a^m \times b^m$; $a^0 = 1$

$a^m = \frac{1}{a^{-m}}$; $a^{-m} = \frac{1}{a^m}$; $a^{m^n} = a^{mn}$; $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ etc

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15. The Algebraic Identities $(1).\ (x+y)^2 = x^2 + 2xy + y^2$; $(2).\ (x-y)^2 = x^2 - 2xy + y^2$

$(3).\ x^2 - y^2 = (x+y)(x-y)$; $(4).\ (x+y)^3 = x^3 + 3xy(x+y) + y^3\ (or) = x^3 + 3x^2y + 3xy^2 + y^3$

$(5).\ (x+y)^3 = x^3 - 3xy(x-y) + y^3\ (or) = x^3 - 3x^2y + 3xy^2 - y^3$

$(6).\ x^3 + y^3 = (x+y)(x^2 - xy + y^2)$; $(7).\ x^3 - y^3 = (x-y)(x^2 + xy + y^2)$ are very important and practice it with left to right and right to left since both will be involved in the sums.

16. Well practice in the Factorization of quadratic equations is also very important because it is invariably used almost in all the chapters.

Email : kannank1956@gmail.com. Errors if any, Pl. notify to the mail.

17. Daily before going to sleep, remember all the formulae involved in all the chapters for 10 mts.

18. For best result obey the 1^{st} Teachers & 2^{nd} Parents, because they will bless in mind and not by word. If anything left here and anything you forget in the above, clear it with the near & dear.