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Class: 9
Subject: Mathematics
Topic: ASK1509FT01
No. of Questions: 30

1. At what point the graph of the linear equation 4x-3y = 12 cuts y-axis?
   (A) (0,-4)
   (B) (4,-0)
   (C) (2,-4)
   (D) (4,-4)

Sol. (A)

Equation 4x-3y =12

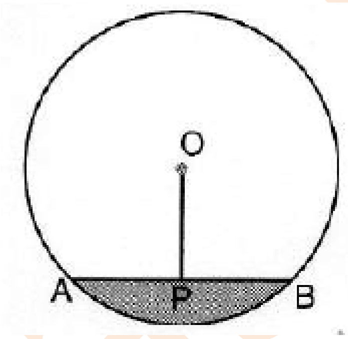
Put x = 0 in equation 4 x 0 – 3y =12

0 – 3y = 12

$y = \frac{12}{-3} = -4$

Hence, graph of linear of linear equation cut the y-axis at (0,-4).

2. In figure, O is the centre of the circle and PA= PB, find ∠OPA.



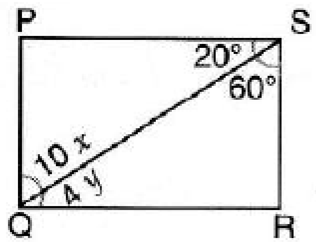
   (A) 45°
   (B) 90°
   (C) 95°
   (D) 100°

Sol. (B)

In a circle the line joining the mid-point of a chord of centre is perpendicular to the chord.

∴ ∠OPA= 90°

3. In the given figure PQRS is a parallelogram. Find the value



(A) x = 5°, y = 6°
(B) x = 4° , y 7°
(C) x = 6° , y = 5°
(D) x = 9° , y = 2°

Sol. (C)

Since PQRS is a parallelogram
PQ || SR, PS || OR and OS is a transversal
4y -20° y=5° 10x= 60° x=6°

4. What is the volume of right circular cylinder, whose base area is 606 cm^2 and height is 2 m?
(A) 121100 cm^3
(B) 121300 cm^3
(C) 121010 cm^3
(D) 121200 cm^3

Sol. (D)

Given, Area = 606cm^2
H = 2m = 200 cm.
$\therefore$ Volume $= \pi r^2 h$
$= \text{(Area) h c.cm}$
$= 606 \times 200$
$= 121200 \text{ cm}^3$

5. Find the value of 3x+1, if median of 2, 3, x, x+2, 11, 17 is 9. (The observations are arranged in ascending order of magnitude.)
   (A) 24
   (B) 23
   (C) 25.3
   (D) 25

Sol. (D)

Observation: 2, 3, x, x + 2, 11, 17

N = 6 (even)

$$\text{Median} = \frac{\left(\frac{N}{2}\right)^{th} \text{term} + \left(\frac{N+1}{2}\right)^{th} \text{term}}{2}$$

$$9 = \frac{\left(\frac{6}{2}\right)^{th} \text{term} + \left(\frac{6}{2}+1\right)^{th} \text{term}}{2}$$

18 = 3^{th} term + 4^{th} term

18 = x+ x+2

2x=16

x= 8

∴ Value of 3x+1 = 3×8 +1 = 25

6. The surface area of a sphere of radius 5cm is five times the curved surface area of a cone of radius 4cm. find the height of the cone.
   (A) 4
   (B) 5
   (C) 3
   (D) 2

Sol. (C)

Radius of sphere (r) = 5 cm

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Radius of cone (R) = 4 cm

According to question surface area of sphere

5 × curved surface area of cone

$4\pi r^2 = 5 \times \pi r l$

$l = \frac{4r^2}{5R} = \frac{4\times5\times5}{4\times5}$

$l = 5$ cm

Height of cone, $h = \sqrt{l^2 - R^2} = \sqrt{5^2 - 4^2}$

$= \sqrt{25-16} = \sqrt{9} = 3$ cm

7. The total cost of making a solid spherical ball is Rs.33,97 at the rate of Rs 7 per cubic meter. Find the radius of this ball.
(A) 10.5 m
(B) 10.4 m
(C) 10.55 m
(D) 10.3 m

Sol. (A)

Let the radius of this ball – rm

Volume of spherical ball $= \frac{4}{3}\pi r^3$

The total cost of making a solid spherical ball $= 7 \times \frac{4}{3}\pi r^3$

$33957 = 7 \times \frac{4}{3} \times \frac{22}{7} \times r^3$

$r^3 = \frac{33957\times3}{4\times22} = \frac{343\times9\times3}{8}$

$r^3 = \left(\frac{7\times3}{2}\right)^3$

$r = \frac{21}{2} = 10.5$ m

8. For the data 3, 21 25, 17 (x+3), 19 (x-4) if mean is 18, find the value of x and hence, find the mole of the data.
(A) 16
(B) 16.5
(C) 17.2
(D) 17

Sol. (D)

Data: 3, 21, 25, 17, (x+3), 19, (x-4)

$$\text{Mean} = \frac{\text{sum of observations}}{\text{Total number of observation}}$$

$$18 = \frac{3+21+25+17+x+3+19+x-4}{7}$$

126 = 88 – 4 + 2x

2x = 126 -84 =42

$$x = \frac{42}{2} = 21$$

Data: 3, 21, 25, 17, (21+3), 19, (21-4) = 3,21 ,25 17, 24, 19, 17

Mode = 17

9. Three coins are tossed simultaneously 1000 times and the following observations are made. Three leads = 216 times, two heads= 384 times, 1 head =270 times, no head = 130 times. If coins are tossed once again, find the probability of non-occurrence of exactly 2 heads.
(A) 0.615
(B) 0.616
(C) 0.617
(D) 0.618

Sol. (B)

Probability (nonoccurrence of exactly 2 heads)

$$= \frac{216+270+130}{1000} = \frac{616}{100} = 0.616$$

10. The weight of 60 persons in a group are given below:

Weight (in kg)	60	61	62	63	64	65
No. of persons	5	18	4	16	5	12

Find the probability that a person selected at random has Weight less than 65kg
(A) 4/3
(B) 5/4
(C) 4/5
(D) 6/5

Sol. (C)

P (weight less than 65 kg) $= \frac{5+18+4+16+5}{60} = \frac{48}{60} = \frac{4}{5}$

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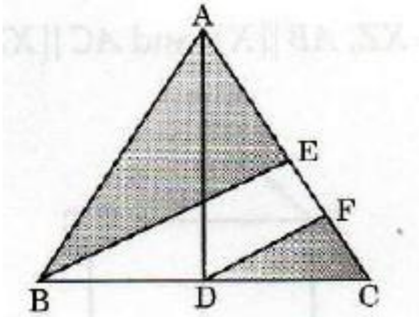
11. The monthly hostel charges for a student comprises of Rs 1000 p.m as fixed boarding charges and remaining charges at the rate of Rs50 per day (for the no. of days for which the food has been availed by a student) what are the monthly charges to be paid by a student who availed meals for 21 days in given month?
    (A) 2040
    (B) 2030
    (C) 2050
    (D) 2045

Sol. (C)

Fixed charges = Rs 1000
Let the no. of days for which the food has been availed = y
Let total charges = x
Then according to question X = 1000+ 50 ×y
Again put y = 21 (days) x= 1000 + 50 x 21
= 1000 + 1050
x= Rs 2,050 charges for 21 days

12. In figure, AD and BE are medians BE || DF. Which of the following is correct?



(A) CF = ½ Ac
(B) CF = 1/8 AC
(C) CF = ¼ AC
(D) CF = 1/6 AC

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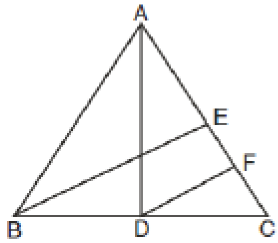
Sol. (c)



In ΔBEC, BE || DF and D is the mid-point of BC.

∴ F is the mid-point of CE

∴ $CF = \frac{1}{2} CF$

As, BE is the medium, E is the mid- point of AC

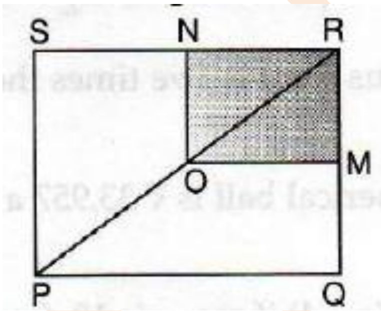
$CF = \frac{1}{2} AC$

From (i) and (ii), we get

$CF = \frac{1}{2}\left(\frac{1}{2} AC\right)$

$CF = \frac{1}{4} AC$

13. PQRS is a square. N and M are the mid-points of sides SR and QR respectively. O is a point on diagonal PR such that OP=OR. Also find the ratio of ar (ΔORM) and ar (PQRS)



(A) 1/7
(B) 1/9
(C) 1/6
(D) 1/8

Sol. (D)

Since OP = OR, O is the mid- Point of PR.

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In SRP, O and N are the mid-points of PR and SR respectively.
By mid-point theorem,

$$\text{ON} = \frac{1}{2}\text{ SP And ON} \mid\mid \text{SP}$$

Similarly,
Using (i) and (ii) we get,
ONRM is a||^{gm}

Now, $\text{ON} = \frac{1}{2}\text{SP}$

$= \frac{1}{2}\text{ SR } (\because \text{SP} = \text{SR})$

$= \text{NR}$

In ||^{gm} ONRM, pair of adjacent sides ON and NR are equal and ∠S=∠N=90°(Corresponding angles)

∵ ONRM is a square
Since OR is a diagonal of square.

$\text{ar}(\Delta\text{ORM}) = \text{ar }(\Delta\text{ONRM})$

$\text{ar}(\text{ONRM}) = \text{NR} \times \text{RM}$

$= \frac{1}{2}\text{SR} \times \frac{1}{2}\text{RQ} = \frac{1}{4}(\text{SR})^2$

$= \frac{1}{4}\text{ ar (PQRS)}$

Using (iii) and (iv) we get,

$$\frac{\text{ar}(\Delta\text{ORM})}{\text{ar}(\text{PQRS})} = \frac{\frac{1}{2}\text{ar (ONRM}}{4\text{ ar(ONRM)}}$$

$$= \frac{1}{8}$$

14. Rain water which falls on a flat rectangular surface of length 6 m and breadth 4 m is transferred into a cylindrical vessel of internal radius 120cm. what will be the height of water in the cylindrical vessel if the rain fall is 1 cm? give your answer to the nearest whole number.(use π= 3.14)
(A) 190.9 cm
(B) 190.8 cm
(C) 190. 7 cm
(D) 189.9 cm

Sol. (A)

Volume of water which is transferred into a cylindrical vessel = lbh

$= 6\text{m} \times 4\text{m} \times 1\text{cm}$
$= 600 \times 400 \times 1$
$= 240000\ \text{cm}^3$

Let the height of water in cylindrical vessel $= \text{h cm}$

Then volume of water $=$ volume of cylindrical vessel

$$= 24000 = \pi^2 h = \frac{22}{7} \times 20 \times 20 \times h$$

$$h = \frac{240000 \times 7}{22 \times 20 \times 20} = 190.9\text{cm}$$

15. A small indoor green house is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high. What is the area of the glass? How much tape of width 10 cm is required for all the 12 edges?
    (A) 320
    (B) 230
    (C) 310
    (D) 340

Sol. (A)

Here! = cm, b = 25 cm, h = 25cm

Area of glass = Total surface area

$= 2(lh + bh + hl)$
$= 2[30 \times 25 + 25 \times 30]$
2×2125
$= 4250\ \text{cm}^2$

Top needed for all the 12 edges = The sum of all the edges

$= 4(l + b + h) = 4(30 + 25 + 25)$
$= 4 \times 80$
$= 320\ \text{cm}$

16. If $\sqrt{x}$ is an irrational number then x is:
    (A) Rational
    (B) Irrational
    (C) 0
    (D) Positive real

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Sol. (D)

If $\sqrt{x}$ is an irrational number, then x can be any positive real numer.

17. Two lines PR and QS intersect each other at O. if $\angle POQ$: $\angle QOR = 2:3$. Find $\angle POS$.
    (A) 144°
    (B) 72°
    (C) 108°
    (D) 216°

Sol. (C)

Let $\angle POQ = 2x$

Then $\angle QOR = 3x$

Since PR, Qs intersect at O, so these angles must form a linear pair.

So, $2x+3x = 180°$

i.e $x = 36°$

$\angle QOR\text{-}=3x = 108°$

$\angle POS = \angle QOR$ (vertically opposite angles)

So, $\angle POS = 108°$

18. What should be added to $x^2 + 2x + 0.5$ to make it a perfect square?
    (A) 0.5
    (B) 0.6
    (C) 0.4
    (D) 0.1

Sol. (A)

Only when 0.5 is added to the given equation it will become a perfect square

19. A measure of the number of square units needed to cover the outside of a figure is called…
    (A) Volume
    (B) Area
    (C) Surface
    (D) Curved surface area

Sol. (B)

20. Find the remainder when $x^{11} + 1$ is divided by $x + 1$.
(A) 1
(B) -1
(C) -2
(D) 0

Sol. (D)

$x + 1 = 0 \Rightarrow x = -1$
Let $p(x) = x^{11} + 1$
$\Rightarrow p(-1) = (-1)^{11} + 1 = 0$
The remainder when $x^{11} + 1$ is divided by (x+1) is 0.

21. If x+y+z=9 then find the value of $(3 - x)^3 + (3 - y)^3 + (3 - z)^3 - 3(3 - x)(3 - y((3 - z)$.
(A) -2
(B) -1
(C) 0
(D) 1

Sol. (C)
Given $x + y + z = 9$
Let $a = 3 - x$
$b = 3 - y$
$c = 3 - z$
$a + b + c = 9 - (x + y + z) = 9 - 9 = 0$
$\frac{3}{2}(x - 1)^2 = \frac{3}{2}(x - 1)(x - 1)$
$\therefore$ we have
$a^3 + b^3 + c^3 = 3abc$
$\Rightarrow (3 - x)^3 + (3 - y)^3 + (3 - z)^3 = 3(3 - x)(3 - y)(3 - z)$
$\Rightarrow (3 - x)^3 + (3 - y)^3 + (3 - z)^3 - 3(3 - x)(3 - y)(3 - z) = 0$

22. In figure 8, AB|| CD and CD || EF, Also, EA $\perp$ AB. If $\angle BEF = 55°$. Find the values of x, y and z.

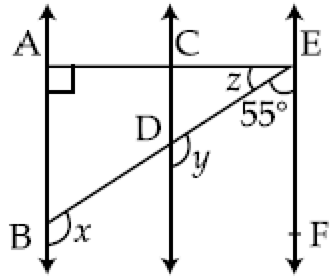


Figure 8

(A) 120°
(B) 130°
(C) 125°
(D) 115°

Sol. (C)

$\angle CEF = 90°$

$\Rightarrow \quad \angle Z + 55° = 90° - 55° = 35°$

Also $\angle y + 55° = 180°$

[Sum of co-interior angles on same side of parallel line is 180°]

$\Rightarrow \quad \angle y = 180° - 55°$

$= 125°$

Again, $\angle x = \angle y$ [Corresponding angles]

$\Rightarrow \angle x = 125°$

23. If a and b are rational numbers, find the value of a and b.

$$\frac{\sqrt{3}+1}{\sqrt{3}+1} = a + b\sqrt{3}$$

(A) a = -1, b = 2
(B) a = 2 , b = -1
(C) a = -2, b = -1
(D) a = 2 , b = 1

Sol. (B)

$a + b\sqrt{3} = \frac{\sqrt{3}-1}{\sqrt{3}+1} = \left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) \times \left(\frac{\sqrt{3}-1}{\sqrt{3}-1}\right)$

$= \frac{(\sqrt{3}-1)^2}{(\sqrt{3}-1)(\sqrt{3}+1)} = \frac{3+1-2\sqrt{3}}{(\sqrt{2})^2} = \frac{4-2\sqrt{3}}{2}$

$= 2 - \sqrt{3}$

Comparing both sides, we get

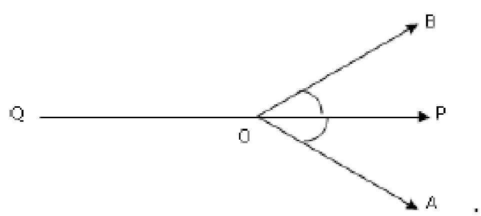
$a = 2, b = -1$

24. A jigsaw puzzle is made of triangular pieces. Each piece is an isosceles triangle with base 8 cm and perimeter 18 cm. find the number of pieces that can be fitted on 16×9 cm rectangular board
(A) 11
(B) 13
(C) 12.5
(D) 12

Sol. (D)

Let the base of the isosceles triangle be b = 8 and the equal side be a.
Perimeter = 18 cm therefore 18 = 8 +2a
Hence a = 5 cm
Now, $s = \frac{a+b+c}{2} = \frac{8+5+5}{2} = 9$
$s - a = 9 - 5 = 4,\ s - b = 9 - 8 = 1$ and $S - c = S - a = 4$
Area of the triangle $= \sqrt{s(s-a)(s-b)(S-c)} = \sqrt{9.4.1.} = \sqrt{144} = 12$
Area of the rectangular board = length × breadth = 16.9 = 144 sq cm
So the number of triangular pieces is $= \frac{144}{12} = 12$
Hence 12 pieces are required for the puzzle.

25. In the given figure PQ is a straight line. OP bisects $\angle AOB$. Find the relation between $\angle BOQ$ and $\angle AOQ$.



(A) $\angle BOQ = \angle AOQ$

(B) $\angle OBQ = \angle OAQ$
(C) $\angle POA = \angle PBO$
(D) $\angle BQO = \angle AQO$

Sol. (A)

PQ is a straight line
$\angle POB + \angle BOQ = 180o$ (Linear pair)
$\angle POA + \angle AOQ = 180o$ (Linear pair)
$\therefore \angle POB + \angle BOQ = \angle POA + \angle AOQ$... (i)
But, OP bisects $\angle AOB$
$\therefore \angle POA = \angle POB$
Substituting in (i), we have
$\angle BOQ = \angle AOQ$

26. Factorize: $a^{12} \times^4 - a^4 \times^{12}$
(A) $a^4x^4(a^4 + x^4)a^2 + x^2(a + x)(a - x)$
(B) $a^4x^4(a^4 - x^4)a^2 + x^2(a + x)(a - x)$
(C) $a^4x^4(a^4 + x^4)a^2 + x^2(a + x)(a + x)$
(D) $a^4x^4(a^4 + x^4)a^2 - x^2(a + x)(a - x)$

Sol. (A)

$a^{12}x^4 - a^4x^{12}$
$= a^4x^4(a^8 - x^8)$
$= a^4x^4(a^8 - x^8)$
$= a^4x^4[(a)^2 - (x^4)^2]$
$= a^4x^4(a^4 + x^4)a^4 - x^4)$
$= a^4x^4(a^4 + x^4)[(a^2)^2 - (x^2)^2]$
$= a^4x^4[a^4 + x^4][a^2 + x^2]\ [a^2 - x^2]$
$= a^4x^4(a^4 + x^4)a^2 + x^2(a + x)(a - x)$

27. In figure 9, ABC is a triangle with $\angle BAC = 90°$ and $AL \perp BC$ which of the following is correct?

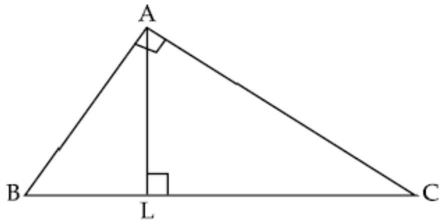


Figure 9

(A) ∠ACB = ∠CBA
(B) ∠ACB = 3∠LCBA
(C) ∠CAL =∠ABL
(D) ∠CAL = ∠ABC

Sol. (D)

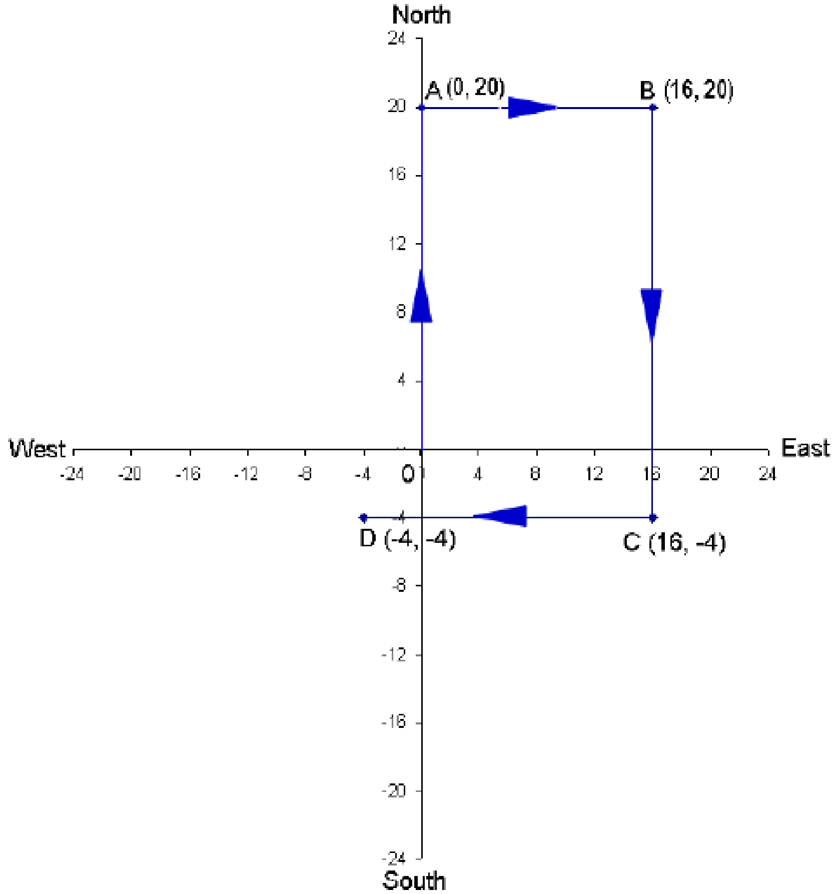
In ΔABC and ΔLAC
∠BAC = ∠ ALC [90° each]
∠BCA = ∠ACL [Common angle]
∴ ABC = ∠LAC [Third angle of the triangles ABC & LAC]
∴ ∠ CAL = ∠ ABC

28. A car starts the center of city and in each consecutive hour it covers a distance of 20 km (along north), 16 km (along east), 24 kmm (along south) and 20 km (along west) respectively. Assuming the centre of city to be the origin, north-south direction is along y axis and west-east direction is along x axis, find how far is the car from x and y axis respectively at its final position.
(A) x = 4, y = -4
(B) x = - 4 , y = - 4
(C) x = - 4 , y = - 3
(D) x = 4 = y = -2

Sol. (B)
Let O be the position of car when it starts
Let A, B, C and D is the positions of car after each consecutive hour.
Let us take the scale to be 1 unit = 4 km.
To trace the path of the car we first need to tabulate the distance moved in each direction . the (x,y) coordinate after each consecutive hour can be computed as follow:

Point	At origin	A	B	C	D
X (in km)	0	0	16	16	16-20=-4
Y (in km)	0	20	20	20-24=-4	-4

Now plotting the various points on the Cartesian plane gives.



Coordinates of the point D which is the final position of the car (-4,-4)
So, Distance of car from x axis = 4 km (in negative x direction)
And distance of car from y axis = 4 km (in negative y direction)

29. Find the values of a and b so that the polynomial $x^3 - ax^2 - 13x + b$ has $x - 1$ divisible by $x^2 + 3x + 2$

(A) - 15
(B) 15
(C) -14
(D) 14

Sol. (B)

Let f(x) $= x^3 - ax^2 - 13x + b$

f(1)=$1^3 - a.1^2 - 13.1 + b = b - a - 12$

Since x – 1 is a factor of f(x)

So b –a -12 = 0 ……(i)

F(-3)

Since x + 3 is a factor of f(x)

So b - 9a + 12 = 0 ---- (ii)

Subtracting (ii) from (i), we get

8a – 24 = 0 ⇒ a = 24 / 8 = 3

(i) gives

b = a + 12 = 3 + 12 = 15

30. If $x = \frac{\sqrt3+\sqrt2}{\sqrt3-\sqrt2}$ and $y = \frac{\sqrt3-\sqrt2}{\sqrt3+\sqrt2}$, find the value of $x^2 + y^2$

(A) 99

(B) 97

(C) 98

(D) 100

Sol. (C)

Given

$x = \frac{\sqrt3+\sqrt2}{\sqrt3-\sqrt2}$

$x^2 = \left(\frac{\sqrt3+\sqrt2}{\sqrt3-\sqrt2}\right)^2$

$= \frac{(\sqrt3+\sqrt2^2)}{(\sqrt3-\sqrt2)} = \frac{(\sqrt3)^2+(\sqrt2)^2+2.\sqrt3.\sqrt2}{(\sqrt3)^2+(\sqrt2)^2-2.\sqrt3.\sqrt2}$

$= \frac{3+2+2\sqrt6}{3+2-2\sqrt6} = \frac{5+2\sqrt6}{5-2\sqrt6}$

Rationalizing the denominator,

$x^2 = \left(\frac{5+2\sqrt6}{5-2\sqrt6}\right)\left(\frac{5+2\sqrt7}{5+2\sqrt6}\right) = \frac{(5+2\sqrt6)^2}{(5-2\sqrt6)} = \frac{5^2+(2\sqrt6)^2+.5.2\sqrt6}{5^2-(2\sqrt6)^2}$

$= \frac{3+2-2\sqrt6}{3+2+2\sqrt6} = \frac{5-2\sqrt6}{5+2\sqrt6}$

Rationalizing the denominator,

$y^2 = \left(\frac{5-2\sqrt6}{5+2\sqrt6}\right)\left(\frac{5-2\sqrt6}{(5-2\sqrt6)}\right) = \frac{(5-2\sqrt6)^2}{(5+2\sqrt6)(5-2\sqrt{6})}$

$= \frac{5^2+(2\sqrt6)^2-2.5.2\sqrt6}{5^2-(2\sqrt6)^2}$

$= \frac{25+25-20\sqrt6}{25-24} = 49 - 20\sqrt6$

$\therefore x^2 + y^2 = (49 + 20\sqrt6) + (49 - 20\sqrt6) = 98$