Class: 10
Subject: Mathematics
Topic: OASK1510SA101
No. of Questions: 20

Solution: 1.

HCF × LCM = 54 × 336

HCF = $\frac{54 \times 336}{302} = 6$

Solution: 2.

$\frac{\Delta A_1}{\Delta A_2} = \left(\frac{4}{9}\right)^2 = \frac{16}{81}$

Solution: 3.

$5\,[\tan^2 A - \sec^2 A] = -5$

Solution: 4.

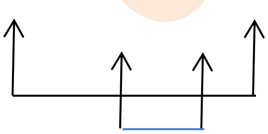
Median = Mode + $\frac{2}{3}\,[mean \ - mode]$

Find out answer by yourself

Solution: 5.

If this all parallel or same

$\frac{2p-1}{p} = \frac{p-1}{3} = \frac{2p+1}{1}$



Use these 2 pairs to find out he values of p

Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Solution: 6.

tan and cot are complimentary

$2A + A - 18 = 90°$

$3A = 108°$

$A = 36°$

Solution: 7.

$7 \times 11 \times 13 + 13$

$= 13\,[77 + 1] = 13 \times 78$

This number is even hence divisible by 13 and 20. So the number is composite

Solution: 8.

All the triangle all Similar

$\Delta PRQ \sim \Delta ZXY$

$\angle X = \angle R$

$\therefore \quad LX = 180° - 60° - 70°$

$LX = 180° - 130°$

$LX = 50°$

Solution: 9.

Product of roots is $\propto \times \frac{1}{\propto} = 1$

$\therefore \frac{k-4}{4} = 1$

$k = 8$

Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Solution: 10.

Number of worker	Daily Income
12	< 120
26	< 140
34	< 160
40	< 180
50	<200

Solution: 11.

Let the two digits be x & y

$(10x + y) + (10y + x) = 66 \quad \Rightarrow x + y = 6$

$x - y = 2$

Considering x > y

$x + y = 6$

$x - y = 2 \qquad \therefore \ (42)\ is\ the\ number$

$x = 4$

$y = 2$

Solution: 12.

$\alpha\ and\ ß\ are\ roots$

$\alpha + ß\ = sum\ of\ the\ roots = 2$

$\alpha\, ß = \ -8$

$\therefore \qquad 3\alpha + 3ß\ = 3\ (\alpha + ß) \quad = 6$

$9 \times ß = 9 \times -8 = \ -72$

$\therefore \qquad Quadratic\ equation = x^2 - 6x - 72.$

Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Solution: 13.

$$\frac{cotA-cosA}{cotA+cosA} = \frac{cosecA-1}{cosec\,A+1}$$

$$\text{L.H.S.} = \frac{cosA\left[\frac{1}{sinA}-1\right]}{cosA\left[\frac{1}{sina}+1\right]}$$

$$= \frac{cosecA-1}{coseceA+1} = R.H.S.$$

Solution: 14.

$$sinA\,cosA - \frac{sinA\cos[90°-A]\,cosA}{\sec[90°-A]} - \frac{cosA\sin(90°-A)sinA}{cosec\,[90°-A]}$$

$$= sinA\,cosA - \frac{sinA\,sinA\,cosA}{cosecA} - \frac{cosA\,cosA\,sinA}{secA}$$

$$= sinA\,cosA\ - \sin^3 A\,cosA\ - \cos^3 A\,sinA$$

$$= SinA\,cosA - sinA\,cosA\,[\sin^2 A\cos^2 A]$$

$$= \ sinA\,cosA - sinA\,cosA$$

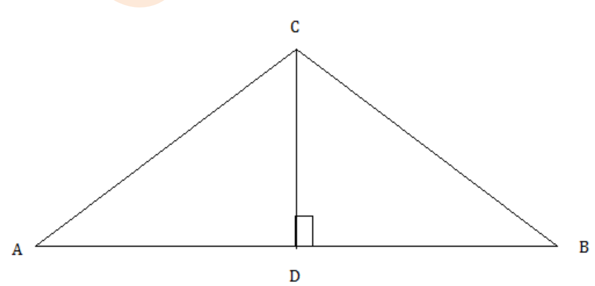
$$= 0$$

Solution: 15.

$$\frac{sin\theta-2\sin^3\theta}{2\cos^3\theta-cos\theta} = \frac{\sin_2[1-2\,sin2\theta]}{cos\theta\,[2\cos^2\theta-1]}$$

$$= \frac{sin\theta\,.\cos 2\theta}{cos\theta\,.cos2\theta} = tan\theta = R.H.S.$$

Solution: 16.



$\Delta\, ACD \sim \Delta ABC$ [RHS similarity]

$\frac{AC}{AB} = \frac{CD}{AC}$ ...(i)

$\Delta\, CDB \sim \Delta ACB$

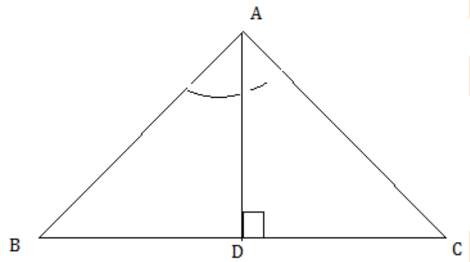
$\frac{BC}{AB} = \frac{DB}{BC}$ ...(ii)

Equating value of AB

$\frac{AC^2}{AD} = \frac{BC^2}{BD} \quad \Rightarrow \frac{AC^2}{BC^2} = \frac{AD}{BD}$

Solution: 17.

$AB^2 + CD^2 = BD^2 + AC^2$



In ΔABD

$AB^2 = AD^2 + BD^2$

$AB^2 - BD^2 = AD^2$ ....(i)

In ΔABC

$AC^2 = AD^2 + CB^2$

$AC^2 - CB^2 = AB^2$ ....(ii)

From (i) and (ii)

$AB^2 - BD^2 = AC^2 - CB^2$

$AB^2 + CD^2 = AC^2 + BD^2$

Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Solution: 18.

Subtraction and addition of rational numbers.

Gives rational numbers

If $6 - \sqrt{5} = Rational$

But $\sqrt{5}$ $is\ irrational$ $[can\ be\ proved\ by\ contridiction]$

$\therefore\ 6 - \sqrt{5} = irrational$

Solution: 19.

Here, maximum frequency is 18. So the modal class is 4000 – 5000.

So $l = 4000,\ f_1 = 18, f_0 = 4, f_2 = 9$

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h = 4000 + \left(\frac{18-4}{2\times18-4-9}\right) \times 1000$$

$$= 4000 + \frac{14}{23} \times 1000 = 4000 + 608.7 = 4608.7$$

If n (the number of observations) is odd and if n is even, then the median

$\frac{1}{2}\left[\frac{n}{2}th + \left(\frac{n}{2}+1\right)th\right]$ Observations.

Solution: 20.

Class – Interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Class Age	10	30	50	70	90
Frequency	17	28	32	P	19

$$50 = \frac{170 + 28\times30 + 50\times32 + P\times70 + 19\times90}{96+P}$$

$50P = 96 \times 50 = 170 + 840 + 1600 + 70P + 1710$

$20P = -4320 + 4800$

$20\ P = 480$

$P = 24$

Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Solution: 21.

$$\frac{1-cosA+\sin A}{cosA+cosA-1} = \frac{sinA-[cosA-1]}{sinA+[cosA-1]} \times \frac{sinA-[cosA-1]}{sinA-[cosA-1]}$$

$$= \frac{\sin^2 A+\cos^2 A+1-2cosA-2\,sinA\,cosA+2\,sinA}{\sin^2 A-\cos^2 A-1+2\,cosA}$$

$$= \frac{2-2cosA-2\,sinA\,cosA+2\,sinA}{2\,cosA-2\cos^2 A}$$

$$= \frac{[1-cosA][1-cosA]}{cosA\,[1-cosA]} = \frac{1+sinA}{cosA} = R.H.S.$$

Solution: 22.

$$\left.\begin{matrix} x & = & 2\sqrt{3} \\ x & = & 2-\sqrt{3} \end{matrix}\right\} all\ two\ roots$$

$$to\ \left[(x-2)+\sqrt{3}\right]\ \left[(x-2)-\sqrt{3}\right] all\ two\ \ factors$$

$$x^2+4-4x-3 = x^2-4x+1\ \ is\ a\ factor$$

$$x^2-2x-35$$

$$x^2-4x+1 \;\Big)\; x^4-6x^3-26x^2+138x-35$$

$$x-4x^3+x^2$$

- + -

$$-2x^3-27x^2+138\,x-35$$

$$-2x^3+8x^2-2x$$

+ - +

$$-35x^2+140x-35$$

$$-35x^2+140x-35$$

+ - +

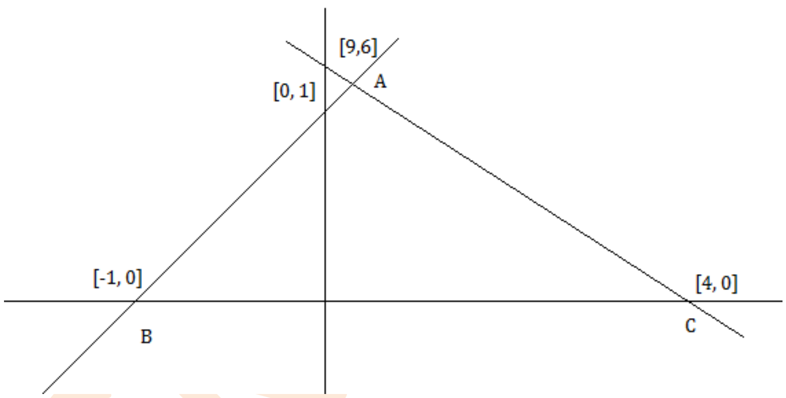
0

Other 3 cos are $\frac{2\pm\sqrt{144}}{2}$ $=\frac{2-12}{2},\frac{2+12}{2}$

$= -5\,,7$

Solution: 23.

Students should use graphs



$x - y = -1$

$3x + 2y = 12$

$2x - 2y = -2$

$5x = 10$

$x = 2$

Vertices are

$A = [2, 3]$

$B = [-1, 0]$

$C = [4, 0]$

Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Area of $\Delta = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 5 \times 3 = \frac{15}{2}$ Eq. units

Solution: 24.

Class-Interval	0 – 10	10 – 20	20 - 30	30 – 40	40 – 50	50 – 60	Total
Class Age Average	5	15	25	35	42	55	
Frequency	5	X	20	15	Y	5	60

$60 = x + y + 45$

$x + y = 15$ ……(i)

$28.5 = \frac{25+15x+500+525+45\,y+275}{60}$

$1710 = 15x + 45\,y + 1325$

$15\,x + 45\,y = 385$

$3x + 9y = 77$ (ii)

Equation (i) and (ii)

$3x + 9y = 77$

$3x + 3y = 45$

\- \- \-

$6y = 32$

$y = \frac{16}{3}$ $X = \frac{29}{3}$

Solution: 25.

Any number can be written as 3m +1 , 3 m +2 , 3 m from Euclid Division Lemma

$(3m+1)^3 = 27m^3 + 1 + 3 \times 9m^2 + 3.3m$

$= 27m^3 + 27m^2 + 9m + 1$

$= 9\,[k_1] + 1$

$(3m+2)^3 = 27m^3 + 8 + 3.9m^2.2 + 3.4.3m$

$= 9k_2 + 8$

$(3m)^3 = 27m^3 = 9k_3$

Hence all the cubes can be written as

$9m, 9m+1, 9m+8$

Solution: 26.

Distance between AB = 90 km

Speed of A = V_A

Speed of B = V_B

Relative speed of approach = $\frac{90}{V_A+V_B} = \frac{9}{7}$ $---(i)$

Relative speed of separation = $\frac{90}{V_A-V_B} = 9$ -------(ii)

$V_A + V_B = 70$

$V_A - V_B = 10$

$2V_A = 80$

$V_A = 40\ km/hr$

$V_B = 30\ km/hr$

Solution: 27.

Pythagoras theorem:

Statement a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Construct a right triangle angled at B.

Construction : Construct a perpendicular BD on side AC.

Given : angle B = 90

To prove : $AB^2 + BC^2 = AC^2$

Proof : In triangle ABD and tri ABC,

Angle A = Angle A

Angle ADB = Angle BDC = 90°

Therefore, implies AD/AB = AB/AC (sides are in proportion)

Which implies AD * AC = AB^2 ……(1)

Tri BDC is similar to tri ABC

BC / DC = AB / BC (sides are in proporiton)

Which implies AC * DC = BC^2 ….(2)

Add (1) and (2)

$AD\,.AC = AB^2$

$AD.AC + AC\,.DC = AB^2 + BC^2$

$= AC\,(AD + DC) = AB^2 + BC^2$

$= AC^2 = AB^2 + BC^2$

Solution: 28.

$sec\theta = x + 1/4x$

$\mathrm{Tan}^2\,\theta = \sec^2 - 1$

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

$= x^2 + \frac{1}{16x^2} + 2x.\frac{1}{4x} - 1$

$= x^2 + \frac{1}{16x^2} + \frac{1}{2} - 1$

$= x^2 + \frac{1}{16x^2} - 2x.\frac{1}{4x}$

$= \left(x - \frac{1}{4x}\right)^2$

$tan\theta = +\left(x - \frac{1}{4x}\right)\ or\ \left(x - \frac{1}{4x}\right)$

$sec\theta + \tan_2 = x + \frac{1}{4x} + \left(x - \frac{1}{4x}\right)\ or\ x + \frac{1}{4x} - \left(x - \frac{1}{4x}\right)$

$sec\theta + tan\theta = 2x\ \ or\,\frac{1}{2x}$

Solution: 29.

Production	50 - 55	55 -60	60 – 65	65 – 70	70 – 75	75 – 80
No. of farms	100	98	90	78	54	16

More than	>50	>55	>60	>65	>70	75

'O give' consult book and use formulae for median

Solution: 30.

$$\frac{csec^2\theta - \cot^2\theta}{2} \quad + \frac{2\cos^2 60\ \cot^2 62 \tan^2 28}{\frac{1}{2}\times\frac{1}{2}}$$

$$= \frac{1}{2} + \frac{2\times\frac{1}{4}}{1/4}$$

$$= \frac{1}{2} + 2 \qquad = \frac{5}{2}$$

Solution: 31.

$\Delta ABD \sim \Delta PQD$

$\frac{z}{x} = \frac{\Delta Q}{\Delta B} \qquad ----(i)$

$\Delta BCD \sim \Delta BPD$

$\frac{BQ}{BD} = \frac{z}{y}$ ----------- (ii)

Adding (i) and (ii)

$1 = \frac{z}{x} + \frac{z}{y}$

$\frac{1}{z} = \frac{1}{x} + \frac{1}{y}$